



## Training on the Use of Vetiver Grass against Soil Erosion

# TRAINING REPORT

Mr Robinson Vanoh 24<sup>th</sup> February – 04<sup>th</sup> March, 2020



Ministry of Waterways and Environment



The Vetiver Network International

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## 1.0 INTRODUCTION

Soil erosion is one of the main environmental degradation challenges affecting the environment in Fiji and is one of the major concerns to the Government of Fiji. These challenges over the years have resulted in significant damages to property, loss of life and have affected business houses. The monsoon rainfall pattern, unsustainable agricultural farming practices in the watersheds and along waterways, and lack of soil conservation practices over the years has contributed to massive loss of valuable soils. Land and water over the years have been heavily polluted with agricultural chemicals in the sugarcane farms. Riverbank erosion is becoming more prevalent as, it is becoming a threat to communities and livelihoods to people depending on the land along these streams.

Frequency of flooding in Fiji has increased over the years due to the reduced conveyance capacity of the rivers from siltation which is causing extensive damage to farms, crops and properties. As evident on all waterways across the Fiji Islands, river courses shifted resulting in riverbanks erosion causing havoc. With absence of any soil conservation measures, the likelihood of more arable land to be lost through soil erosion is eminent.

With this been a major concern to the Ministry of Waterways and Environment, it has embarked on and is implementing a countrywide program, an integrated approach by using Green Technologies for riverbank stabilization, and coastal and environmental protection. One such technology is the application of Vetiver System Technology which is a proven technology and in use in over 100 countries worldwide. It is a bottom up approach where villages and settlements will be directly involved in planting of the vetiver grass for erosion control and bank stabilization on all its erosion prong waterways.

The goal for this project is to ensure that at least all the major riverbanks that are prone to erosion and landslip are re-vegetated and stabilized using the Vetiver Grass. The main objective of this Vetiver Training Workshop is to, train the people and let them familiarize the technical aspects of Vetiver Systems, and be able to go back to their respective villages and communities and impart on the knowledge gained from the training to implement (do-it-yourself) the technology in their own environment.

Scope of Work key responsibilities and the main purpose of this Vetiver Training Workshop include the Low Value Grant Agreement for this mission was to provide support as requested by the Ministry of Waterways and Environment, specifically:

- To develop an English language Vetiver System Technology Training Manual and guidelines, for use by both communities and the Ministry's field extension workers, for propagation, establishment, and management of Vetiver Grass hedgerows for land and stream bank stabilization and sediment control.

- To develop and deliver a Vetiver System Technology training/workshop (including training materials in English language) to the participants of the training workshop to be programmed, organized, and carried out by the Ministry of Waterways and Environment.
- To visit sites selected by the Ministry of Waterways and Environment for potential pilot/demonstration application of Vetiver System Technology (VST) for land and river bank stabilization and sediment control, in order to identify vulnerable areas and provide advice and guidance on the design and installation of the VST pilots/demonstrations.
- To provide a final report on the implementation and outputs of the training and technical assistance to the Ministry of Waterways and Environment and its target community groups for the application of VST for land and river bank stabilization and sediment control.

The specific works in the LVG agreement represents a natural continuation of works that TVNI's Associate Director (Robinson Vanoh) for the South Pacific Islands has been carrying out since 2017.

Our performance target and expected outputs and deliverables for our training are:

INDICATOR(S)	DATA SOURCE	BASELINE	MILESTONES	FINAL TARGET
Develop English-language Vetiver training/Maintenance Manual for both the community and field extension workers and a vetiver guideline on how to propagate and manage vetiver grass.	<i>Manuals/ Guidelines</i>	0	<i>Manuals and Guidelines prepared and delivered to participants.</i>	<i>Vetiver Training Manual/Vetiver Propagation &amp; Management Manual and Vetiver Installation Guide for Users completed.</i>
Design and conduct vetiver training/workshop materials for the participants	<i>Training Report</i>	0	<i>Training and presentation completed.</i>	<i>Delivering of Training/ PowerPoint presentation on site to the participants.</i>
Do site visits and identification of vulnerable river banks and other sites as requested by the ministry and planting of vetiver grass as a pilot demonstration site.	<i>Pilot Demonstration Site</i>	0	<i>Site prepared and vetiver grass actively planted by communities in target areas.</i>	<i>Site visits done for farm drain stabilization and riverbank stabilization. Planting of vetiver grass for the identified pilot demonstration sites.</i>

Compile final report on the implementation and outputs of the training and technical assistance	<i>Final Mission Reports</i>	0	<i>Final mission /training report submitted.</i>	<i>Completed final mission report for the Vetiver System Technology and its applications.</i>
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## 2.0 TRAINING

The training on the use of Vetiver System Technology workshop was conducted from the 25<sup>th</sup> – 27<sup>th</sup> February at the Vunimoli Village community hall which was commissioned by Dr Mahendra Reddy, and on the 3<sup>rd</sup> of March in Suva at the Ministry of Waterways conference room. The training held in Labasa included selected representatives from the eight villages in the Labasa catchment. Technical and Field officers from Ministry of Waterways and Environment, Ridge to Reef and the Ministry of Agriculture also attended the training.

The training workshop also included a half day field work on the third day after the presentations were completed. Field work included actual planting material preparation through to the planting of vetiver slips at the demonstration site as selected by the participants in Labasa. Participants participated by actually planting the Vetiver slips in line with what they learned during our training session.

Training in Suva on the 3<sup>rd</sup> of March was for government officers and interested stakeholders from various government agencies and groups. Topics covered were the same as all covered in Labasa training, except the field demonstration. The second day was a field day, which included site inspection done to the Sigatoka river banks and the new nursery site at Nadi.

Given below are a brief summary of the training, activities and consultations that took place during the Fiji Mission.

### 2.1 LABASA TRAINING

The first Vetiver training workshop was conducted in Labasa at the Vunimoli Village Community Hall from the 25<sup>th</sup> – 27<sup>th</sup> of February 2020 for selected community leaders and youth representatives (refer annex 1) from the eight villages of the Labasa catchment area, which also included representatives from the Ministry of Agriculture, R2R Northern and Ministry of Waterways & Environment.

The training session included power point presentations, information sessions, experience sharing, and site visit with a field demonstration day. Field day included harvesting of vetiver grass, preparing of vetiver slips for planting, site preparation, field layout and actual planting of the vetiver slips. Training manuals were also issued before the training.

After the training evaluation on the second day, each participant was presented with a USB stick which contained all presentations and information presented during the workshop and other supporting references and videos.

Following were list of topics that were taught respectively during the two days of training followed by the field demonstration where participants were involved in planting of the Vetiver grass.

### **2.1.1 TRAINING ATTENDANCE**

A total of twenty two participants attended the three day workshop in Labasa. Refer annex 1 for listing of participants for the training workshop in Vunimoli village. Participants included both male and female representing each of the eight villages in the Labasa catchment.



*Figure SEQ Figure \\* ARABIC 1: group photo of the participants with Hon Dr Mahendra Reddy.*

## **2.2 TRAINING TOPICS**

The following topics were covered during our sessions. The presentations were in form of power points for case studies from countries around the world:

### **2.2.1 Introduction to the Vetiver System Technology (VST)**

- i. How the Vetiver System Technology Works.
- ii. Vetiver Grass and its Special Characteristics - covers its morphology, physiology, ecology and its genetics. Other characteristics included the weed potential of vetiver and its adaptability range and tolerance levels.
- iii. Global applications and benefits of Vetiver System Technology in infrastructure Stabilization, Catchment Management, Agro-forestry, Flood Erosion Control on the flood plain and Rehabilitation of Contaminated Lands.





Figure SEQ Figure \\* ARABIC 2: Dr. Paul Truong during one of his presentation on the VST.

## 2.2.2 VST Applications for Water Management

Session two (2) was done by Robinson Vanoh, which covered:

- i. A brief introduction about the South Pacific Vetiver Network, an associate member of The Vetiver Network International and the work it has been doing and has carried out in some countries in the region.
- ii. Introduction to the Vetiver System (VS) for Water Management, Land Preparation, Installation and Maintenance. The topics covered the importance of how we can build a good relationship with water by managing it using the VST.



Figure SEQ Figure \\* ARABIC 3: Robinson Vanoh presenting to the participants

### **2.2.3 Planting Materials Propagation and Management**

Session three (3) was presented by Robinson Vanoh with following topics:

- i. The four methods of Vetiver propagation and how it is done for multiplication.
- ii. How to prepare planting material for the success of the project.
- iii. Advantages and disadvantages of the propagation methods used.
- iv. Socio-economic benefits of VST

### **2.2.4 Stream banks Stabilization**

Session four (4) was presented by Dr. Paul Truong with following topics:

- i. A brief introduction on Vetiver System for stream bank stabilization.
- ii. The causes of land slope instability on stream banks.
- iii. Principles of controlling stream bank Erosion and Instability.
- iv. Case Studies from other Countries around the world.

### **2.2.5 Erosion and Sediment control on sloping lands**

Session four (5) was presented by Dr. Paul Truong with following topics:

- i. The common types of slope instability.
- ii. The effects of vegetation on slope stability.
- iii. Principles of soil and water conservation in sloping cropping land
- iv. Contour layout design on sloping lands.
- v. Vetiver root tensile and shear strength.
- vi. Pictorial presentation and discussions on case studies from other countries around the world

### **2.2.6 FIELD DEMONSTRATION**

After the two days in-house training, participants were taken to the site where the initial planting was done by the team from the Ministry of Waterways, a few months back. These were basically for the participants to do troubleshooting to identify the problems for the failure. The sites included a stream bank at the back of the village and at the Labasa river bank.

The sites visited were ideal sites for vetiver planting as they are prong to, highly erodible and is currently eroding on both banks.





Figure SEQ Figure \\* ARABIC 4: Bank slope where the first planting was done in 2019 (yellow dotted lines) and the community doing the planting (inset)- Pictures from UNDP FB Page



Figure SEQ Figure \\* ARABIC 5: Inspection of the planting on the stream bank crest behind the village.

The site at the stream bank crest at the edge of the village, when visited had a few remnants of young vetiver plantings seeing growing in a patch. Other plants were shaded out by creepers and shrubs as no maintenance was done.

It was emphasized to participants about the importance of maintenance during the initial stages of the planting. Creepers and woodies that will shade out vetiver must be kept under control by weeding



them or cutting back shade trees. In addition, it is important to protect both new and old plantings from grazing animals, particularly horses which prefer vetiver to local grasses.



*Figure SEQ Figure \\* ARABIC 6 &7: Dr Paul Truong (left) and a participant (right) in front of a lone young vetiver plant on the crest of the bank slope of Labasa River.*

Nearly all the vetiver plantings planted on the Labasa river bank were washed away due to a recent flash flood. During the trouble shooting discussions, participants from Vunimoli village said the vetiver was planted without the slope being battered; toe of bank slope was not stabilized, plant spacing used was about 30-40cm apart, although two hedgerows were planted on the crest. Failure in using the incorrect planting specifications resulted in river under cutting and eroding the slope, hence washing away the vetiver plants.



*Figure SEQ Figure \\* ARABIC 8-11: Participants inspecting the site along the Labasa river bank.*



Main problems as identified by participants included: planting specifications not done correctly; the slope not battered to form a gentle slope for planting; toe of bank slope not stabilized and the plant spacing were 30-40cm apart. Their identification and the feedback indicate the level of understanding acquired during our training session.

The importance of using correct specifications and designs were emphasized to the participants on site during our discussions and information sharing.

“In addition, it is important to protect both new and old plantings from grazing animals, particularly horses which prefer vetiver to local grasses”. Permanent protection from grazing is often impractical; it is therefore advisable to keep the horses away as practical as possible to protect the vetiver plants.



*Figure 12-14: Participants at the site of the previous vetiver planting*



## 2.3 PARTICIPANTS COMMENTS AND FEEDBACK (EVALUATION)

Participants were given evaluation forms to evaluate the training workshop on what they thought about the training program. These evaluations will be used as a tool to evaluate our training workshop content and be used to improve on any future training to be conducted. A score rating of 1-5 was used, 1 being the least agreed to 5 being the highest.

### 2.3.1 TRAINING EVALUATION BY PARTICIPANTS

The following data were collected from the participants of the training workshop.

No. of Participants Evaluated	22					
Participants Evaluated (%)	100%					
<b>Questions</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total</b>
1. Did the workshop provide you with the competencies (knowledge/skills) you expected?	3			2	17	<b>22</b>
2. Were the facilitators/trainers effective - in terms of preparedness, knowledge, interaction with the group and ability to convey knowledge?	2		1	1	18	<b>22</b>
3. Were the training materials appropriate (e.g. user friendly, quality, quantity, relevance) and well-organized?	2	1	2	2	15	<b>22</b>
4. The content of the training materials was organized and easy to follow	2	1	1	5	13	<b>22</b>
5. The training offered was appropriate to the local conditions and the problems faced	3		3	8	8	<b>22</b>
6. Was there adequate time allotted for various training objectives? Was there adequate time provided for questions and discussion?	2		1	5	14	<b>22</b>
7. The pace of the training was appropriate to the content and attendees	3			9	10	<b>22</b>
8. The training venue was appropriate and well prepared	2		4	4	13	<b>22</b>
9. Overall how would you rate this training on the Vetiver System Technology?	3			2	17	<b>22</b>
<b>Total Score</b>	<b>21</b>	<b>2</b>	<b>12</b>	<b>38</b>	<b>125</b>	<b>198</b>

*Table 1: Data from evaluation for the training by participants*

### **2.3.2 SUMMARY OF THE EVALUATION**

The general perception of the participants in terms of competencies provided by the workshop, the majority (86%) strongly agreed that the workshop provided them knowledge and skills required to implement Vetiver System Technology. This indicates that the participants are now more knowledgeable to apply the acquired skills and knowledge in their own villages.

Assessing the effectiveness of the trainers/facilitators in delivering the training, in terms of preparedness, knowledge, interaction with the group and ability to convey knowledge, 86% strongly agreed that we met their expectations, with 14% having to agree the least.

The training materials used were appropriate according to 77% of the participants and 23% least agreeing, with 82% strongly agreeing and 18% agreeing the least on the content of training being organized for ease of understanding. The relatively high least-agreeing percentage was probably due to some highly technical data in the presentations, which were not easily comprehended by the villagers.

Seventy two percent (72%) strongly agreed and 28% least agreeing on its applicability of Vetiver System to suit local conditions. As a facilitator/trainer I would strongly recommend more practical sessions on site than the theory especially for the participants at the village/community level. We have a well written Vetiver System manual which can be referred to for reference or if further information be required.

Although having 87% agreeing that the time allocated was adequate, and 86% agreeing that the pace of the training was appropriate with enough time for questions and answers, it was noted that not enough time was allocated for the field demonstration which is of paramount importance. This is a hand on practical experience where participants will be involved from initial plant and site preparation through to layout marking and planting of the vetiver. Future trainings to have more time allotted for practical lessons will be appropriate at village/community level.

The overall rating on the training workshop by participants was 86%, who strongly agreed that it is a good workshop, whilst 14% agreeing the least. All in all, and on an average rating, 82% strongly agreed that it met their expectations, which is an indication that the training workshop provided them with the knowledge and skills necessary for Vetiver System Technology.

As trainers/facilitators, we highly recommend such trainings to be up scaled and carried out in all Divisions with follow up meetings to ensure the concept is understood well and implemented. General discussions and Information sharing by participants during the duration of the training workshop was outstanding.

## **2.4 OBSERVATIONS AND LESSONS LEARNED FROM THE TRAINING**

- The importance of Vetiver grass to our environment and its economical values.
- More on other uses of the Vetiver grass.

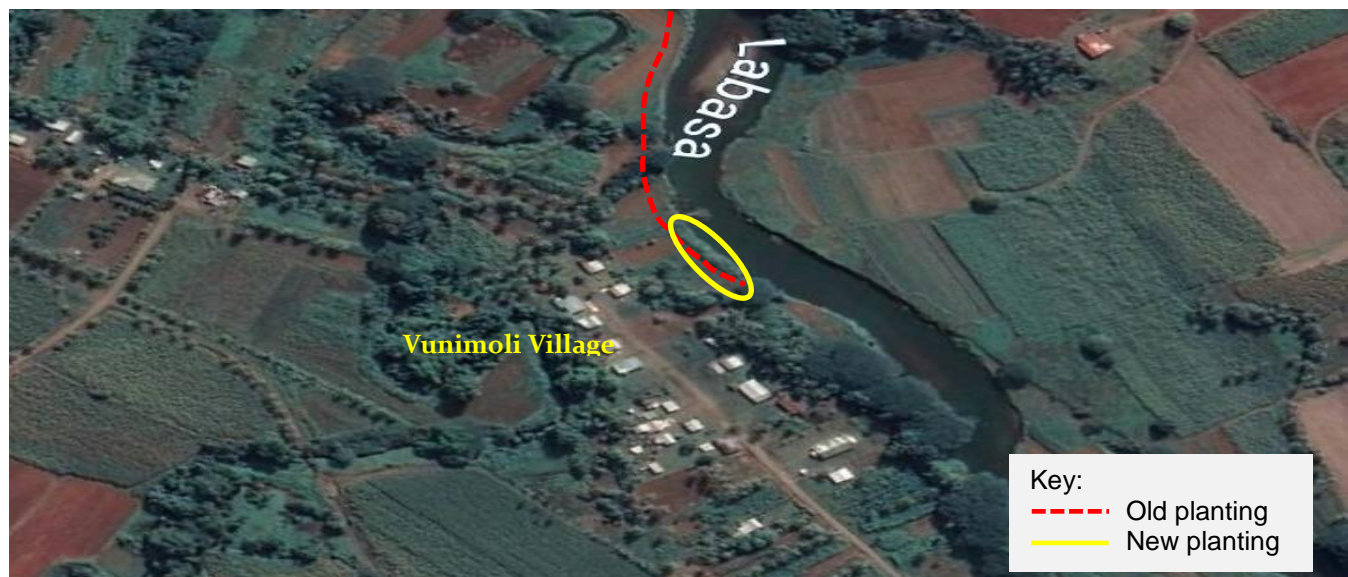
- Participants were more attentive and keen to learn new technology
- Interactive participation by some participants was encouraging, more are encouraged.
- Audio visual presentations will also be very informative.

#### 2.4.1 RECOMMENDATIONS FOR FURTHER IMPROVEMENT/FOLLOW-UP ACTIONS

- Further training is requested by participants to train more villagers and communities.
- Each division to have a well-managed nursery set up and demonstration sites each. These sites can be used as best practice demonstration sites.
- Training of Trainers (field technical officers) will be ideal; these officers can be trained as trainers of Vetiver System.
- More stakeholders who can work in collaboration with the Ministry to be invited for future training.
- Planting of vetiver on the demonstration site at Vunimoli was not completed. It is recommended that planting on current site be completed and further clearing done upstream and continue with planting before my next trip in 3-4 months' time to evaluate successful growth of the plantings.
- Critical sites need an on-site expert supervision.

### 3.0 DEMONSTRATION SITE

The Labasa riverbank slope was identified during our training workshop to be used as our demonstration site for the planting. This site also had Vetiver grass planted in one of their community programs, however was washed away during a recent flash flood. It was agreed that, vetiver will be replanted again according to specifications as recommended and taught during our training workshop.



*Image 1: Google image of the demonstration site*



Following are pictures of the field day at the selected demonstration site. The site was cleared of all weeds and bushes including creepers. No battering was done as the site already had a gentle slope angle of about 30°.



*Figure 15-19: Site preparation of demonstration site by participants.*



Whilst the site preparations were being done by the male participants, the women and girls did the preparation of the vetiver slips which were harvested on the same day of planting. Following pictures shows the preparation of vetiver slips by the participants.



*Figure 20 – 23: Preparation of the vetiver slips by participants for planting.*

The planting of the Vetiver grass was done by all the participants as a hand on experience on the same day after the site preparation and the preparation of the vetiver slips.

Generally it was pleasing to see the planting being done correctly according to what was taught at the training. This level of understanding on the planting specifications demonstrates that the concept taught is well understood.









Figure 24 – 30: The planting of vetiver slips by the participants.

## 4.0 SUVA TRAINING

The Suva Training Workshop was conducted at the Ministry of Waterways and Environment Conference room on the 4<sup>th</sup> of March from 9am to 4pm. The workshop was anticipated to have a large turnout with participants from Government Agencies and various Stakeholders to whom invitations were sent out by the Ministry; however the turnout was not as anticipated. The training topics covered were the same, as of for the Labasa Training (refer 2.2).

### 4.1 TRAINING ATTENDANCE

Participants present, were representatives from the Ministry of Waterways and Environment, two each from Ministry of Forestry and Ministry of Agriculture. A total of ten (10) participants attended the one day training workshop (refer Annex 2).



Figure 31: Group photo of the participants in Suva

## 4.2 PARTICIPANTS COMMENTS AND FEEDBACK (EVALUATION)

Evaluations of the training workshop for the Suva Training workshop are as follows. A total of 10 participants evaluated the training workshop. There were some comments and suggestions from participants which will be taken into consideration for improvement and inclusion in the future trainings.

### 4.2.1 TRAINING EVALUATION BY PARTICIPANTS

The following data was compiled from the participants' evaluation.

No. of Participants Evaluated	10					
Participants Evaluated (%)	100%					
<b>Questions</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total</b>
1. Did the workshop provide you with the competencies (knowledge/skills) you expected?	2				8	10
2. Were the facilitators/trainers effective - in terms of preparedness, knowledge, interaction with the group and ability to convey knowledge?	2				8	10
3. Were the training materials appropriate (e.g. user friendly, quality, quantity, relevance) and well-organized?	2				8	10
4. The content of the training materials was organized and easy to follow		2			8	10
5. The training offered was appropriate to the local conditions and the problems faced	1			1	8	10
6. Was there adequate time allotted for various training objectives? Was there adequate time provided for questions and discussion?	1			1	8	10
7. The pace of the training was appropriate to the content and attendees	1			1	8	10
8. The training venue was appropriate and well prepared	1			4	5	10
9. Overall how would you rate this training on the Vetiver System Technology?	1			1	8	10
<b>Total Score</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>69</b>	<b>90</b>

*Table 2: Data from evaluation for the training by participants in Suva*

## 4.2.2 SUMMARY OF THE EVALUATION

The competencies provided by the workshop, 80% strongly agreed that it met their needs, which indicates that the training provided them with the knowledge and skills which is necessary for implementing Vetiver System in their respective organisations.

Eighty percent (80%) of the participants also strongly agreed that the trainers/facilitators effectively delivered the training, in terms of preparedness, knowledge, interaction with the group and the ability to convey our expertise, while 20% having had agreed for the least preparedness.

In terms of appropriateness of the training materials used, 80% also strongly agreed, despite having an in-house workshop. In terms of the content of the training materials used, and the organization had been appropriate for ease of understanding and 80% strongly agreeing, thou 20% agreeing for the least. The Training Manual on the Vetiver System had been distributed and is compiled with very detailed and comprehensiveness which is needed for the participant's further commitment to understanding the whole Vetiver System in general.

Vetiver System Technology is an appropriate technology which when fully understood will be by all means practically applicable to suit local Fiji conditions. Ninety percent (90%) of the participants strongly agreed that the VST is applicable to Fiji conditions, whereas the other 10% think otherwise. Practical sessions after the in-house training will complement the theory lessons; therefore as a trainer/facilitator, I recommend more practical sessions on site to be included in future training workshops.

Considering the content of the Training Manual, time allocated for this training workshop was not sufficient, despite having 90% agreeing that it was sufficient. Recommend future trainings to have sufficient time allocated so that this very important technology is bound to have thoroughly taught.

In addition, ninety percent (90%) of the participants agreed that the pace of the training was appropriate with enough time for questions and answers. Participant's interaction was very good during our information sharing sessions. Participants were given the opportunity to share and ask questions of interest, which has been noted as participants were eager to learn more on Vetiver System Technology.

The overall rating on the training workshop by participants for the Suva workshop is 43:7 that is 86% strongly agreeing that the workshop met their expectations, whilst 14% agreeing for the least. All in all, from the trainers' perspective, it was encouraging to see the interest shown by the participants. Further follow-up trainings after practical applications will surely equipped them to be fully versed with the Vetiver System Technology.

## 4.2.3 OBSERVATIONS AND LESSONS LEARNED FROM THE TRAINING

General observations from either side or lessons learned during the training session are:

- The importance and wide range of usage of vetiver grass and its impacts on the communities.



- Practical demonstration on sites would be ideal for after the theory session.
- Various propagation methods of the Vetiver grass were well understood.
- Pictorial presentation of global applications of VST in other countries around the world was stimulating.

#### 4.2.4 RECOMMENDATIONS FOR FURTHER IMPROVEMENT/FOLLOW-UP ACTIONS

Following are recommendations that can be introduced or improved:

- More time to be allocated for any upcoming Training Workshops.
- Best Practice demonstration sites to be established in all the Divisions and used during field days.
- A **“Training of Trainers”** program/process is highly recommended for future training specifically to move more into quality control and technical backstopping.
- **“Certificate of Attendance”** to be issued in future training workshops.
- Provision of hands on training for spacing and planting methods.

## 5.0 SITE VISITS

Site visit and inspection were carried out on the 4<sup>th</sup> and 5<sup>th</sup> of March for the Sigatoka River, and the new nursery site at Nadi respectively. These inspection was conducted to provide advice on the procurement, planting and successful growth of vetiver grass to control soil erosion and stabilise riverbanks, and for the establishment of a new stock holding nursery for the Ministry.

### 5.1.1 SIGATOKA RIVER

The East and the West banks of the riverbank were visited to ascertain the best method to use in the Ministry’s proposed bank stabilization project. The identified sites are prone to erosion and have been heavily eroded over time due to the flash floods.



*Figure 32: View of West Bank, one of the sites to be protected using Vetiver.*

At the time of the site visit, the areas had some form of vegetation cover, rainforest trees and bamboo; thus these provides the banks with minimal protection against erosion as they have shallow tapping root system. Evidence of the banks slumping, earth flow and tension cracks on the bank crests were noted, which poses immediate threat to communities. These are indications that the Sigatoka River is widening at an increasing rate due to the ongoing soil erosion problems.

It is advisable to clear the sites, re-slope some areas, and branches of some trees to be cut back to prevent the trees from shading out new vetiver plantings. The project initiative by the Ministry to protect the river banks along the mighty Sigatoka River is very important as the valley is known to be the “salad bowl” of Fiji.

Following are random pictures of the sites as identified by the Ministry team, on both the East and West banks, which is to be stabilized using the vetiver grass.







*Figure 32-38: Random pictures of the identified sites proposed for stabilization.*

### **5.1.2 NADI NURSERY SITE**

The Ministry, with the current project plan is using vetiver grass as a mitigating technology for stabilization of the riverbanks, hence will be establishing vetiver stock holding nurseries in all the Divisions in Fiji. Hence, the Nadi nursery is their first, this nursery will be the stock holding nursery which will be used to propagate and distribute quality planting slips to farmers and communities who will be involved in their programs. Success of the mitigating projects will depend on the quality of the planting material that will be raised in the new nursery.



*Figure 39-41: The new nursery site under preparation at Nadi*



The site when visited has been cleared of all bushes; further clearing is to be completed to expand the nursery site. It is identified to be an ideal site for the nursery establishment as a small stream (water source) runs through the nursery. Spraying of weedicide is recommended to eradicate regrowth of unwanted weeds and bushes and the land is to be ploughed to form furrow before propagating the vetiver. For nursery establishment, refer the Propagation and Management Manual.

### 5.1.3 OTHERS

In addition to the riverbank and slope stabilization topics, two other applications were also pointed out to the villagers:

- Handicraft production



*Figure 42 & 43: Handicrafts made from vetiver leaves and roots*

- Pollution Control



*Figure 44: A toilet block at Vunimoli village*



Discharge from the septic tank of this toilet block will seep and drain into the local stream, which is only a few meters away and eventually to the river system. If vetiver is planted at the outlet area, it will absorb all the discharge and prevent pollution.

## **6.0 SUMMARY AND RECOMMENDATIONS**

The training was organized by the Ministry of Waterways and Environment, as a pathway to increase knowledge for the users. The training workshop was the first of its kind in the South Pacific region initiated by any Government, and it is a step forward which will stimulate the interest of users in the use of Vetiver System Technology with the Governments support.

Dr Mahendra Reddy, during his opening speech in Labasa, commissioned the training workshop and stated that soft engineering solution is vital in addressing climate issues. He further reiterated that building resilience to climate change and the use of nature-based solutions is to arrest the problems caused by nature a sustainable solution. He also stated that “Hard engineering solutions are not suitable solutions to deal with problems caused by nature”. He is therefore, championing the use of Vetiver Green Technology in protecting all its waterways to safeguard communities and infrastructure.

Vetiver has many excellent and unique characteristics; hence, the application of VST is not simply a Vetiver planting process. Theoretical basis for the application, geological geography and climatic conditions, technical survey and design specifications, technical quality standards, and application methods are all to be taken into consideration.

It also involves many interdisciplinary disciplines such as geology, hydraulics, engineering mechanics, botany, soil science, microbiology and meteorology, etc. In order to gain widespread recognition and adoption, every application of the technology should be guaranteed success to the greatest extent possible, but there are many factors that determine its success.

The key is the quality of seedlings, standardized design and construction, nutrition supply and etc. Therefore, it is necessary for the users to have more cross-disciplinary knowledge, as well as national or industry design specifications with technical standard systems.

The functional characteristics of the Vetiver System Technology are not the only factors that usually determine whether it is accepted and used or not. The Government of Fiji is playing a key role in deciding the use of nature-based solution in addressing its erosion issues.

Following are some key recommendations worth considering for the success of the project:

- Administrative policies, such as Land Use Policy with incorporation of VST are very important and fundamentally necessary to promote the technology in Fiji.
- A national movement involving responsible Government Ministries, Agencies, Community Based Organization's and Stakeholders will be the way forward in protecting the Waterways.
- There is a need for ongoing external, technical review at regular intervals to check river bank applications for quality and technical problems.
- Prepare a well prepared plan of execution for the river bank stabilization project.
- The program needs a good Manager who can provide the leadership and commitment to get things done – training – community involvement – propagation and nurseries, and on site planting.
- A further training on "Training of Trainers" is recommended, specifically to move more into quality control and technical backstopping. These trainers can then go out and train their respective communities.
- Establishing of stock holding nurseries in all divisions is of paramount importance where quality planting materials will be propagated. Establishing nurseries and capacity for riverbank stabilization will make a natural bridge to initiating promotion and capacity building for on-farm soil conservation.





### TRAINING ATTENDANCE REGISTER

Training Name: Vetiver Training

Date: 26/2/20

Time: \_\_\_\_\_

Location: Vunimoli

Trainer(s) \_\_\_\_\_

No.	Name	G	Village/ Department	Position	Phone/Email Address	Signature
1	Waisele Tavatui bogi	M	Vunimoli		9815388 / 7284086	[Signature]
2	Masanao Jiacon	M	Vunimoli	T.N.K		[Signature]
3	Sula Manawo	M	Navakuru	Farmer		[Signature]
4	Pansa Voe	M	Suwani		9814697 / 7170747	[Signature]
5	Kajileli Gakasa Daku	F	Suwani		2179379 / 2739788	[Signature]
6	Saraina Lomasau	F	Suwani		9281481	[Signature]
7	Dea Inagi	M	NASEKULA-VIII		2957510	[Signature]
8	Makelesi Matareaga	F	Suwani		8704194	[Signature]
9	KAJILELI NIVOI	M	NASEKULA		9571777	[Signature]
10	Manish Patel Shama	M	Sidona		8422242	[Signature]
11	Vijay Sat	M	Naitam		9442303	[Signature]
12	Epi. Sakaio	M	Navakuru		7551128	[Signature]
13	Ben Vohi Wainigau	M	Naitam	T.N.K	8123707	[Signature]
14	Tevita Robisari	M	NALONAI VI.		8393287	[Signature]
15	Ashley Tuiatama	M	NALONAI		2720792	[Signature]
16	Mere Gogunava	F	Vunimoli	C/worker	2107764	[Signature]
17	Johanni Vakavakavaka	F	NALONAI		9706808	[Signature]

No.	Name	G	Department	Position	Email Address	Signature
18	Mariana Vasarasi	F	Navakuru		7147932	[Signature]
19	Mr. Sigintaraga	F	Vunimoli		2159182	[Signature]
20	Ure Kajana	M	Agriculture	Field man	2159182	[Signature]

By signing this Attendance Register you are confirming at the training session detailed above.



**TRAINING ATTENDANCE REGISTER**

Training Name: Vetiver Training

Date: 27/2/20

Time: \_\_\_\_\_

Location: Unimeli

Trainer(s) \_\_\_\_\_

No.	Name	G	<sup>Village</sup> Department	Position	Phone/Email Address	Signature
1	Vyend Dutt	M	Wairakea / Akua		9442303	[Signature]
2	Manish Shantal Shama	M	Siberia		8422343	[Signature]
3	Mariana Vocamei	F	Korowiri		7147932	[Signature]
4	Jotivini Kikawakawaka	F	Korowiri		9706308	[Signature]
5	TEVITA KAMIRI	M	Korowiri		8030079	[Signature]
6	Waisele Taramuaki	M	Vunimoli		9315388	[Signature]
7	LOIE RAYWAT	M	Wairakea		2159182	[Signature]
8	Masimaka Jirani	M	Vunimoli			[Signature]
9	Kauwiri Tahi	M	MASEKULA		9022320	[Signature]
10	Soula marawi	M	Navakuru			[Signature]
11	Raijeli Daku	F	Suwani		2179379 / 2739788	[Signature]
12	Savaira Lewasan	F	Suwani		lewasais@gmail.com	[Signature]
13	Porisa Vobe	M	Suwani		9814698 / 9720977	[Signature]
14	Kauwiri Karamu	M	Navakuru		2123447	[Signature]
15	Epi Suhanu		Navakuru		7851128	[Signature]
16	Cesa Tuva	M	MASEKULA		2957510	[Signature]
17	Makelesi Matsorega	F	Suwani		8704194	[Signature]

No.	Name	G	Department	Position	Email Address	Signature
18.	KAMINIELI NIVOT	M	MASEKULA		9551977	[Signature]
19.	Rominao Tama	M	Korowiri		2991354	[Signature]
20.	Mari Sigatraga	F	Vunimoli		sigatraga@gmail.com 2379092	[Signature]
21.	Ratu D. U. Taramuaki	M	✓			[Signature]
22.	MERE SARAWAN	F	✓		2107164	[Signature]

By signing this Attendance Register you are confirming at the training session detailed above.

## Annex 2: Training Attendance Registers (Suva)

### TRAINING ATTENDANCE REGISTER

Training Name: VETIVER WORKSHOP

Date: 03/03/20

Time: 9 am

Location: LVL 4 CONFERENCE ROOM

Trainer(s)

No.	Name	G	Department	Position	Email Address	Signature
1	ROBINSON VANOH	M	TVNI	ASSOC DIR	rvanoh@gmail.com	<i>[Signature]</i>
2	PAUL TRUONG	M	TVNI	Director	p.truong@vetiver.org	<i>[Signature]</i>
3	Blair Steve Blake	M	MWWE	Labour	blakesteve@ic.com	<i>[Signature]</i>
4	Loise Vuoi	M	MWWE	LABOUR		<i>[Signature]</i>
5	Kavira Vignati	M	MWA	ATO	kavira@yachse.com	<i>[Signature]</i>
6	Lemeki B. Bismakita	M	MWWE	Labour	l.bismakita@gmail.com	<i>[Signature]</i>
7	ANITA PARIAD	M	MWWE	LABOUR	anita.pariad1@gmail.com	<i>[Signature]</i>
8	NASIR HUSSAIN	M	MWWE	LABOUR		<i>[Signature]</i>
9	LUSIANA RODGERS	F	FORESTRY	LABOUR	lusianarodgers03@gmail.com	<i>[Signature]</i>
10	Jane Taranui	M	Ministry of Forestry	Forest Guard	jantaranui@gmail.com	<i>[Signature]</i>
11	JOSEFA SAMUWALAI	F	MWWE	T.O	josofa.samuwalai@vetiver.org	<i>[Signature]</i>
12	Anthony Taraganui	M	MWWE	Intern	anthonytaraganui@gmail.com	<i>[Signature]</i>
13						
14						
15						
16						
17						

By signing this Attendance Register you are confirming at the training session detailed above.