

# VANUATU PACC

**Pacific Adaptation to Climate Change Project** 

A National Advisory Board (NAB) Initiative Implemented in Partnership with Meteorology and Public Works

Building Resilienœ to Climate Change in Our Coastal Communities "Advocator of the Ridge to Reef Approach"

Participatory 3 Dimension Modelling & GIS An Approach for Conducting Community Vulnerability & Assessment and Adaption Planning.



## EPI ISLAND SHEFA PROVINCE VANUATU

12th to 22nd MARCH 2013



#### ACKNOWLEDGEMENT

We acknowledge all the organizations and individuals for their different roles in making this workshop and the development of the Epi Island Participatory 3 Dimensional Model (P3DM) a reality and a very successful exercise.

Key to the success rests in the hands of close to 150 villagers coming from following 15 villages on Epi Island where most of the adaptation intervention will be demonstrated as a pilot namely Laman Island, Laman Bay, Vaemali, Niku, Moirui, Nivenue, Nikaura, Nuvi, Lemaru, Pinki, Wenia, Walavea, Alak, Malvasi, and Rovo Bay that represent the Varsu area council and the Varmali area council. And also participants representing all the other remaining villages in Epi from Yarsu area council and Vermaul area council.

The following organisations and networks contributed to the success of the initiative: Climate Change Project Management Unit of the Department of Meteorology, Public Works Department, Ministry of Infrastructure and Public utilities, Department of Agriculture and Forestry, Department of Fisheries, Department of Environment, Department of Lands Survey, Vanuatu Broadcasting and Television Corporation, SHEFA Provincial Government, Epi Island Council of Chiefs, Varsu area council, Varmali area council, Varmaul area council, Yarsu area council, Secretariat of the Pacific Regional Environment Program (SPREP)and most importantly, Epi High School Teachers and Students.

Pictures courtesy of Allan Simeon and Rodson Aru

#### NOTE: Workshop and interviews is captured on video by Allan Simeon

**Table of Content** 

**Table of Figures** 

#### **1 PROJECT BACKGROUND**

Over the past ten years a solid body of knowledge and extensive experience have been gained in South East Asia in practicing Participatory GIS (PGIS) in the contexts of collaborative natural resource management and customary rights on resource tenure. In these contexts Participatory 3D modelling (P3DM) has been widely used in conjunction with Global Positioning Systems (GPS) and Geographic Information System (GIS) applications.

In Vanuatu, native communities as in Epi Island are the custodians of about 80% of land area and of all the coastal and marine environments up to 12 miles offshore. The Government entrusts handson management of terrestrial and coastal resources to local communities. The latter therefore need to be sufficiently skilled and technically equipped to be in an informed position when deciding on how to manage the territory especially now in the face of climate change impacts

The regulatory, legal and cultural frameworks are supportive for native communities to take the lead in sustainable management of their resources. Nonetheless actual implementation depends on a number of contributing factors the occurrence of which is varied. Typically local knowledge is scattered and invisible or partially shared among other villages and especially the decision makers. Historic data on the occurrence of resources is transferred orally or in a manner, which is not conducive to systematic monitoring or detailed planning.

Data available at Government level is often of poor quality, outdated incomplete or in a format that could not be interpreted by the community leaders. While some efforts have been made by Non Government Organizations (NGOs) and Government agencies to introduce participatory planning and monitoring methods, most village communities still rely on traditional gatherings where conversation is used as the main channel of communication.

The use of community-based geo-spatial information gathering and analysis tools to support informed decision making is still in its infancy. In Epi, Local knowledge is scattered among the mind of individuals and rarely collated, geo-referenced and visualized in the form of maps. As mapping is a fundamental way for displaying spatial human cognition and for communicating on issues related to the territory, the lack of a best practice for producing community-generated maps hampers increased community involvement in decision-making, a critical entitlement when natural resources distributed over vast areas are at stake.

For Vanuatu, Epi Island has been proposed as the pilot site for the Vanuatu PACC project and the project aims to use P3DM as the main tool to raise awareness on climate change issues affecting the island and allow the communities of Epi Island to identify the problems they are currently facing, their current adaptive capacity and decide on their adaptation interventions in their respective areas. The Vanuatu PACC is taking a no regret Reef to Ridge (RR) approach.

For Epi, it is envisaged that the use of proper community mapping practices such as P3DM could help in raising climate change awareness and developing community-owned and consensual management and adaptation plans. It can also help the communities to better understand their island ecology by visualizing the different watershed boundaries and understand the ecological relationship between the terrestrial and marine ecosystems. This can help the communities of Epi to review the way they interact with their Island ecosystem and shift their paradigm accordingly.



Figure World Map Showing Location of Vanuatu





Figure Map of Epi Island



Figure Map of Epi Area Councils

#### **2 INTRODUCTION AND P3D MODELLING RATIONALE**

Considering successful experiences gained in Fiji Islands and the Solomon Islands in practicing Participatory 3 Dimension Modeling (P3DM) integrated with GPS and GIS applications in the contexts of collaborative natural resource management and customary resource tenure, the current exercise in Epi envisages introducing the practice in the area of integrating Scientific Knowledge and Local Knowledge as the foundation where by Community vulnerability & assessment and adaptation intervention planning is executed.

This P3DM exercise will serve as a pilot intervention and concurrently as a training ground for practitioners in Vanuatu. Incorporating geo-accurate community-based mapping techniques in the planning process offers the opportunity to increase accuracy and relevance of local knowledge and stimulate increased sharing of knowledge among insiders and outsiders. Furthermore, the ownership of the management regimes resulting from the participatory planning process will rest with the local communities on Epi Island and PACC Vanuatu who will be responsible for their implementation. The more complete, accurate, visible and relevant (to the users) the collated information on resource distribution and use -, the more effective the decision-making process will be.

#### 2.1 Goal

The Goal to which this P3D Modeling aims to achieve is to get the communities that are the different gender groupings to participate in the following areas of vulnerability & assessment and Adaptation Planning. This exercise also aims to inform the communities' in the future scientific projections of climate change and also for the community to share their local knowledge on past experiences in the adverse effects of climate change and natural disasters in the areas and share their coping strategies or mechanism

It is envisaged that the goal will be attained via the delivery of the following outputs:

- 1. Phase 1 Preparatory
- 2. Phase 2 Workshop 1 Mapping and model construction
- 3. Phase 3 Workshop 2 Community consultation and Adaptation planning

#### **3 PHASE I - PREPARATORY PHASE**

This phase lasted three months. Activities undertaken included (i) consulting and mobilizing students and stakeholders, (ii) sourcing spatial data and preparing the base map, (iii) choosing the appropriate mapping scales (vertical and horizontal); (iv) procuring workshop materials, (v) selecting trainees and (vi) organizing the logistics. Workshop 1 Mapping- All the materials has to be shipped to Epi Island where the model will be build and prior arrangements has to be made with the appropriate authorities before engaging the students of Epi high school to build the model. Workshop 2 Climate change data input - Transport (land and sea), accommodation, meals was arranged for the participants representing the different communities from the four area councils in Epi. Arrangement was also made with the following departments to be part of the professionals to share their expertise in their respective fields in regards to climate change adaptation - Environment, Forestry, Fisheries, Agriculture, Lands Survey, Climate Change and Public Works. The SHEFA provincial government and the Epi Island council of chiefs were requested to present in the area of governance.

#### 3.1 Identification of the Two Workshops

To tackle the task at hand which was to use the model for climate change community consultation for the whole Island of Epi, it was foreseen that the model has to be already built before transporting participants from all corners of Epi to the workshop. To save time and money, the whole P3DM workshop was divided into two separate workshops. Workshop 1 was the Mapping or model construction phase and Workshop 2 was the climate change community consultation and adaptation planning phase.

Workshop 1 - Construction of the Participatory 3 Dimension Model of Epi Island.

The Works Shop was held at the Epi High School Library which involved year 11 Geography and Year 12 Arts classes. Involvement of the high school students in this mapping exercise has broadened their knowledge in map reading, scaling, terrain information and model construction.

**Workshop 2**- Community consultation workshop using the participatory 3 dimension model of Epi island. The workshop was held at the community Market house at Lamen Bay for three days from the 20<sup>th</sup> March 2013 to 22<sup>nd</sup> March 2013.Participants for the workshop came from all four area councils of Epi Island. Participants identified CC issues that are happening in their respective villages and communities and at the same time discussed coping mechanisms and identified adaptation options to tackle the issues

#### 3.2 Sourcing of Data and Preparation of the Base Map

Preparation of the base map featuring color-coded contours (Figure 3) has been made available. It took approximately three weeks (scattered inputs) to complete the task.

The terrestrial contour digital data was readily available from the Lands and Surveys Department. Nevertheless this data required cleaning and conditioning. The terrestrial contour interval is 20-m starting from 0-m elevation corresponding to the mean high water mark.



Figure Section of the Base Map, Contour lines are color-coded to facilitate tracing

3.3 Choosing the Mapping Scales (vertical and horizontal)

The full island of Epi that was selected for the mapping exercise includes the terrestrial environment, its lakes and surrounding coral reefs and measures 18 km by 20 km. The scales are as follows: 1:20,000 horizontal and 1:6,666 vertical. The larger vertical scale has been chosen taking into consideration the need to enhance the perception of slope and to meet the carton board thickness (3-mm). Joining one and half ply sheets has ensured easier access to the working space. The two tables were joined every evening and on completion of the exercise.

#### 3.4 Procurement of Workshop Inputs and their On-Site Delivery

The success of any Participatory 3D Modeling exercise heavily depends on the earlier planning and procurement of materials. The cardboards were purchased in Australia through a Vanuatu based company called "Earthquip Ltd" while the rest were purchased locally at the local stationeries and hardware shops then all shipped together to Epi Island one month before the workshop commenced.

#### 4.PHASE 2- WORKSHOP 1- MAPPING AND MODEL CONSTRUCTION

#### 4.1 DAY 01 to DAY 05 - Thursday 14th to 18th March 2013 - Epi High School

The first workshop took place at the Epi high school library. The Year 11 Geography class and Year 12Arts class were chosen along with their teachers to participate in the mapping and model construction phase. The school handyman was engaged fulltime since the beginning and the librarian could not avoid participating in this interesting learning exercise as the model took shape.

The females dominated by the numbers but the responsibilities were shared fairly between the different gender groupings. (Refer to participants list for details) The library windows were always crowded by other classes during breaks and after school, as it was very interesting to follow the construction developments day after day.

#### 4.1.1 Consulting and Mobilizing Students and Stake holders

The team visited the Epi High School and asked the teachers and students to play a role in the construction of the relief model of the island. The team introduced the 1st workshop which took place at the school library and involved building the model of Epi Island and they explained to the students and teachers their roles in this particular exercise.

An educational video on P3DM practice was shown to assist students and teachers in visualizing their forthcoming tasks and get them to look forward for what is at hand.

#### 4.1.2 Constructing the Model Base and Base Map

A base made from joining two ply sheets together was constructed by the school's handyman following instructions and help from the facilitators. This was the base where the model was being built on top of and also this sort of base allowed for the model to be easily transported from one location to another or moved around so as to create space for accessibility and public viewing.







Figure Base Map Plywood Platform

Figure Mr. Taito Nakalevu Marking of Constructed by Epi High School Handy Man the Longitude and Latitude on to the **Base Map** 

Figure The PACC Coordinator and Assistant Helping Mr. Nakalevu

Then the base map is placed on top of the model base where the latitude and longitude are marked to the model base.

#### 4.1.3 Introductory Presentations

Mr. Taito Nakalevu, PACC Regional Project Management Unit, introduced the project background, goal, objectives and phases. He also emphasized on the importance of carrying out the work of the model construction and how it will be contributing to the development and planning of Epi Island. He further described the workshop process, planned activities and the expected roles of the trainees during the various phases of the model making process.

Mr. Rodson Aru (RA) then explained to the students about maps and the different types of maps that are found around us. He further explained the different components of a map especially the symbols and their meanings. He briefed on the grids i.e. longitude and latitude, the north orientation of the map, the scale and finally took some time to ensure that the students understood the contours in the map as this was the bases of building the 3rd dimension of the map.

Mr. Ian lercet, (II) the Assistant PACC Coordinator, deliberated on the objective of the exercise which was to build the model of Epi and further brief on what is P3DM and what were the different steps in executing the construction of a model using this technique.

#### 4.1.4 Orientation of Staff, Teachers and Students

Thirty Students from the Epi High School were welcomed by Mr. Ian lercet who introduced the scope of the exercise and described the tasks ahead. He provided a technical introduction on manufacture of the blank model.

After the introduction and a Question and Answer session, the students were divided into three working groups. Trainers were assigned to different groups to supervise the students in implementing their various tasks.



Figure Mr. Aru and Epi High School Students at the Orientation Exercise

The groups were then assigned to execute the 3 main construction stages of the model building process;

(i) Tracing the contours on 3-mm thick carton board,

(ii) Cutting out the single contour layers,

(iii) Gluing and pasting the layers one on the top of the other, and ensuring that placement would occur correctly.

#### 4.1.5The Different Stages of Model Construction

Before entering into the 3 main stages of the model construction the facilitators and the students

must prepare the base Map for tracing. Firstly a mega carbon paper is constructed using many A4 size carbon papers that would form the same size of the base map. The layer of carbon paper is then taped to the bottom of the reference base map (topographic), with the marking side facing out.



#### PLACING CARBON PAPER IN PLACE READY FOR TRACING CONTOUR LINES

Figure Epi High School Staffs Creating the Mega Size Carbon Paper ready for Tracing



Figure Students Carefully tracing out a layer of contour

Figure Mr. Ian Stepping in to ensure the job is done right

Corrugated cardboard sheets are prepared, the exact same size as the reference base map

On each sheet of cardboard, a single contour is traced, using the base map with carbon paper underneath as a reference. Sheets are labeled with the contour elevation and a north-pointing arrow, for proper orientation.





Figure Students Cutting each contour layer at a time

Figure Mr. Aru helping the Student in Cutting

Contours are cut from the cardboard sheets.



Figure Teachers assisting Mr. Ian in Pasting each contour layer Figure Model taking shape as the contour layers piles on top of each other

Contour sheets are superimposed on one another in the correct order and the precise orientation<sub>13</sub>, and then pasted together.



Figure Students pasting soft paper over the contours



Figure Second layer of soft paper is applied

Once dry and secure, the model is covered with a thin paper, pasted using acrylic white or translucent gel medium. This paper smoothes out the contour layers and helps with terrain continuity.



Figure Teacher and Students painting the model



Figure Teacher and Students adding existing features and land marks on to the model

The model is then painted and the student populate existing data such as roads, rivers, streams, airstrips, public buildings and telecommunication towers by painting and pins with tags.

#### 4.1.6 Model Handing Over to PACC PMU Ready for Community Consultation

It took five days for the students and teachers of Epi high school to complete the construction phase. The model is finally completed with the main existing features painted on it. At this stage the whole team looked back over the course of the last past four days and realized that so much learning was acquired by both the facilitators and the participants alike



Figure Mr. Dennis Alvos - Vanuatu PACC Coordinator posing with the school principle and student showing off the finish product

The students of Epi high school now have some idea on what a P3DM is. The geography and development class students and teachers also learnt a lot about 3 dimensional mapping and also now posses some skills in transforming a 2 dimensional map to a 3 dimensional map.

The School principle thanked the students and the staff who participated in the model construction workshop and expressed the school's gratitude for the privilege given by PACC project for providing the opportunity for the students to learn more about mapping and also help them to better understand the topographical features of the island of Epi. He further thanked the team for allowing the model to be kept in the school library and stated that model is now a teaching aid and will continue to be used to teach future students.

The Vanuatu PACC national coordinator thanked the school principle and the school community for the commitment in executing this very important task that will later help the people of Epi to better understand the terrestrial features of Epi Island. The model is now an effective tool that can be utilized by different government departments for executing rapid assessments and awareness raising on issues affecting the Island. The model now provides a bases for community adaptation planning.

The PACC Vanuatu team appreciated the work done by all the participants and awarded them with certificates of appreciation. At the certificate presentation ceremony, the Manager of the Vanuatu climate project management unit challenged the school and all the participants to make use of the skills acquired over the course of the PACC workshop by building a P3D model of 1 other island of Vanuatu every year.





#### Figure Certificate Sample



Figure Year 11 Geography Class 2013



Figure Year 12 Arts and Teachers 2013



Figure Epi High School Teachers 2013

#### 5PHASE 3 - WORKSHOP2-COMMUNITY CONSULTATION AND ADAPTATION PLANNING

#### DAY 01 to DAY 05 - Wednesday 20th to 22nd March 2013

#### 5.1Specific Workshop 2 Objective

The workshop aims to use the P3D model of Epi as the main community consultation tool to effectively execute vulnerability and assessment and formulate Adaptation planning and aligning our process with the No Regret Ridge to Reef (RR) approach.

#### 5.2 Selection of Participants

The Vanuatu PACC extended a public invitation to all the interested persons in Epi to attend. Specific communities leaders that commands the people and resources of Epi Island were contacted to attend this workshop especially the chiefs, the women leaders, the youth leaders and certain community elders that knows the terrain and problems and issues faced by the people of Epi. In other words, the key decision makers at the island level in Epi are contacted to attend this workshop.

#### **5.3 Workshop Logistics**

#### 5.3.1 Venue

The Lamen bay market house was prepared by the market house committee (members are all females) to host the second part of the P3DM workshop referred to in this report as workshop 2. The venue can accommodate about 200 people inside and has a large open area with big trees that provided shade and can accommodate another 100 persons.

They quickly transformed the market house into a meeting venue. The sitting arrangement and the facilitator's spaces was set up. The portable Public Address (P.A) system was set in place and electricity was connected to power the equipment. The venue was decorated with the different fabric colors and flowers.



Figure Pastor Delivering the Word of God

#### 5.3.2 Catering

The market house committee was also hired to cater for the meeting. Morning and afternoon refreshments was provided and Lunch for all the participants. The participants that came from other areas are provided with dinner and morning tea.

Lunch and break was provided for over 150 participants including stakeholders and facilitators during the three days workshop

#### 5.3.3 Participant's Transport

Participants came by utility 4WDs from the different parts of Epi. Some of the participants especially from south Epi had to travel by boat to where the road ends and then by 4WD to Lamen bay. In Epi 4WD single cabin and double cabins are used for public transport.

A total number of six boats and the 8 vehicles were used to transport participants from south Epi, East Epi and west Epi. About four hundred thousand vatu (400,000 vt ) was spend on transportation cost due to long distances and poor road conditions,

#### 5.3.4 Participants Accommodation

Accommodation was provided for the participants who came from distant places and travelling daily to the workshop is not possible for them. The Lamen bay community house was hired and the community provided beddings and other necessities that the participants require such as bathing utensils.

Accommodation including breakfast and dinner was provided for over 80 participants including stakeholders and facilitators during the three days workshop. Other participants were provided daily transportation to their villages close by.

#### 5.4Methodology Used

#### 5.4.1 Formal Opening

At around 8:30am on Wednesday 20th, all the participant, facilitators and presenters assembled. The master of ceremony which was also the chair lady of the Epi Island climate change committee runs through the official opening formalities. The people of Epi welcomed the Vanuatu PACC team and the chiefs of Epi allow the team to conduct climate change business in the island. The village church Elder in Lamen bay delivered the word of God and offered the opening prayer. Mr. Brian Philip representing the Chair of the National Advisory Board (NAB) thank the Chief and the people of Epi for the warm welcome and deliberate on the purpose of the workshop and also the importance of the different gender groupings to contribute to the process of adaptation planning in this workshop.



Figure Mr. Dennis Alvos Opening remarks and setting the Workshop Scene

#### 5.4.2 Setting the Scene

The PACC National Coordinator facilitated all the sessions that day. It begun with a recap of the 1st workshop that took place in March 2012. The EPI vital roads video was projected /screened particularly for the benefit of participants who were not part of the previous workshop. The video also served as a reminder for all participants on what the Vanuatu PACC project is all about.

A second documentary video that captured the 2012 community consultation workshop was also viewed for the first time in Epi. Through this Video, the participants were able to quickly recap on the last workshop's discussions and this in way had effectively set the scene for this workshop.

The participants were briefed by the facilitator about the last workshop in March 2012. The problems and issues that were identified was on a broader context. The aim of that workshop was to raise awareness on climate change and identify the climate change problems and issues faced by the people of Epi and work out how the PACC project can address some of the causes of these problems. That workshop also raised awareness on the Vanuatu PACC project, different project components and how the project process will be rolled out in Epi.

The PACC National coordinator facilitated the questions and answers session that followed after the video presentations and gauged the understanding level of the participants to see if they are all in the same wave length and are ready to build on their current understanding with the new technical knowledge that the team will share with them during the course of this workshop.

The facilitator alluded to the purpose of the current workshop as stated by the opening remarks from the head of delegation Mr. Brian Philips which was to capture local knowledge using P3D model of Epi as a tool were the locals can identify the specific sites of where the problems are and help the professionals to identify the issues that are related to a particular problem in a particular area through interactive discussions with the communities.

A new phrase was introduced by the head of delegation to the communities of Epi called "Ridge to Reef (RR)" and the facilitator further explain the concept of Ridge to Reef as this will be the Vanuatu PACC approach.

#### 5.4.3 Ridge to Reef Approach

The communities learned from the professionals' presentation on this concept. Mr. Reedly Tari from the department of Environment, Mr. Philemon Ala from the department of Forest and Mr. Andrew William from Fisheries explained to the communities the natural relationships between the terrestrial ecosystem and the marine ecosystem.

The presentations emphasized that there is a direct link between the ecosystems that existed inside a particular water shed boundary. Delivering this complex subject is quite a challenge but a lot of illustrations were used by these professional and the P3D model of Epi made it easy as the different watershed boundaries can be easily identified. They explained that the rivers and the streams even the dry creaks act as the transport infrastructure network and water flowing in these valleys are like the transport vehicles.

The Fisheries officer gave an example of this very important relationship when he explain the life cycle of fresh water prawns that live up stream high inland. When the prawns are ready to spawn, they have to make their way down to the sea. After spawning the larvae remain in the sea for 21 days and then make their way back to the estuaries and up the streams or rivers.

The Environment and the Forestry officers explained how improper land use can seriously upset the whole ecology of the Island. Uncontrolled farming methods and illegal logging or cutting down trees and clearing vegetation on steep slopes paves the way for issues of soil erosion and landslides along the ridges. Soil is washed down and transported through the waterways and end up destroying coastal ecosystems such as coral reefs which die from excessive sedimentation.

The important lesson imparted to the resource owners in this workshop was that sustainable resource management is only effective if it is perceived in a holistic manner hence the significance of the ridge to reef approach. If we want to protect our marine resources, we have to also consider how we use our land in that particular watershed boundary and vice versa.

The PACC National coordinator facilitated the question and answer session that followed after this presentation and gauged the understanding level of the participants to see if they are ready to run with this package of technical knowledge in their group discussions which will later follow.

Interactive sessions are next on the agenda. The facilitator explained how the next sessions will work and why the groups are divided according to the 4 Area Councils of Epi. The participants broke out into 4 groups accordingly mixing all genders together. The facilitator stressed on the importance of all gender participation at the group discussion level and assigned the PACC team members to assist group leaders and members in executing these exercises.

#### 5.4.4 Problems and Issues by Area Councils Exercise

The first group work session was for the groups to identify the climate change problems and issues they are facing. They were asked to note down on butcher paper these problems and issues and their respective locations bearing in mind that they will use this record to later populate the P3Dmodel. The problem areas are only limited to village areas and areas used for subsistence and commercial activities.

#### 5.4.5 Current Coping Strategies Exercise

While remaining in the groups after the above stated activity was completed, the groups were then asked to identify some of their current coping strategies employed to address the problems and issues they are facing. The PACC team found out that this could be quite a tricky exercise because climate change is a slow process and happens over a long period of time that a lot of the coping mechanism happens over time without the villagers realizing that they are coping with the problems and issues of climate change and these mechanisms can easily not register in their minds as adaptation activates.

It was only after this exercise that the PACC team relooked at this issue again and begin to Identify some of the real coping strategies that will be covered in the V&A report.

After the two group discussions, the facilitator asked the groups to present their findings and allowed a question and answer session at the end of each group discussion. This allowed for cross pollination of understanding between the PACC team and communities and ensured that the entire group is moving forward together.

The 4 Area Council groups were then asked to populate their problems and issues on to the P3D model using pins with tags consistent with the legend created earlier.

#### 5.4.6 Adaptation Planning Exercise

Before the groups discussed adaptation options, the National Coordinator presented on the budget allocated for the adaptation works in Epi and the current Global Environment Facility (GEF) fund. He also stated the high probability of Vanuatu tapping into the PACC + fund from Ausaid.

The National Coordinator also projected the preliminary designs that the PACC PMU developed and selected as appropriate for Epi. These designs are more aligned to interventions that the communities can build compared to hard core engineering designs that requires expertise from outside Epi and are deemed to be more expensive and the sustainability and replication of such designs might not be favorable when there are substantial cost associated.

He stressed that this approach was for the PACC project to build resilience and sustainability as the communities will be trained to construct the various types of adaptation interventions. The replication option is also easier as the communities will already have acquired the technical knowledge through the pilot exercises. This presentation was geared to set the mind frame of the participants to guide them to decide and plan out their adaption interventions that will address their problems and issue.

The group work session was for the groups to identify the adaptation interventions for the problems and issues they have identified earlier. They were asked to note down on butcher paper these adaptation interventions and their respective locations bearing in mind that they will use this record to later populate the P3DM map.

#### 5.5 Tools Used

- 1. Participatory 3 Dimensional Model
- 2. Participatory Rural Appraisal
- 3. Participatory Learning Approach
- 4. Focus Groups Discussions
- 5. Questions and Answers
- 6. One to one sessions
- 7. Site observations

#### 6 RESULTS

#### 6.3 Problems, Issues and Coping Strategies

The workshop through the participants identified, recorded and mapped out the climate change problems and issues that they are facing in the different areas in Epi. Due to time constraints the workshop was forced to pick up data by Area council instead of Village by Village case. The tables were typed out and present in **annex 3 C** of this report. Further discussions on this topic can be found on the V&A assessment of Epi Island produced by PACC PMU.

The workshop through the participants identified, recorded and mapped out the adaptation interventions that addresses the climate change problems and issues that they are facing in the different areas in Epi. Due to time constraints the workshop was forced to pick up data by Area council instead of village by village case. The tables were typed out and present in **annex 3 G** of this report. Further discussion on this subject can be found on the V&A assessment of Epi Island and the project implementation plan produced by PACC PMU.

#### 6.1 Implementation Partnership Arrangement

After the planning exercise, the question of responsibility and accountability to the adaption plan that was formulated was brought to the floor for discussion. After much discussion a consensus was reached that the Vanuatu government and the people of Epi are jointly responsible and accountable for the outcome of the project.

It was agreed that the Epi island climate change committee be established to act as the feet and fingers of the PACC PMU and also mediate between the PMU and the people on the pilot sites. The committee was appointed by the high chiefs of Epi Island and mandated to ensure that there is no land or resource issues that may affect the outcome of the project.

To show their commitment, chiefs and other leaders in Epi declared publicly and in written letters to the PACC PMU that their resource such as sand, coral, water and quarry materials that will be used by the project will be free of charge from royalties or any other forms of payments.

The Chiefs also stressed that should the project, especially the road relocation portion go through gardens and require that some fruit trees or commercial crops such as kava or peanuts be removed, the owners will be more than willing to remove their crops without claiming any form of compensation.

The Chiefs based their decision on the fact that the people of Epi are in great need for this project and they foresee that the impact of the PACC project in terms of building their resilience and adaptive capacity far weighs the compensation payments in the long run. The chiefs address the new committee and stated that the committee and PACC has their blessing and they will push for this project to materialize.

#### 6.2 Appointment of the Epi Climate Change Committee

The Epi climate change committee came about following a request by Vanuatu PACC team on the need for PMU to have feet and fingers on the ground especially now as we are moving into the physical implementation stage of the project.

The concept was quickly taken up by the chiefs and prominent leaders in Epi as they also envisaged that the committee will also represent the Epi Island council of chiefs in dealing with issues should there be any before and during the process of implementation. The committee is also tasked by the chiefs to

ensure that the people are aware of the Island's commitments that were stated in the implementation arrangements.



Figure The Newly Appointed Epi Island Climate Change Committee

Island based committee made up of representatives of the four area councils and including provincial officer and chairman of Epi council of chiefs

#### **7 BEST PRACTICES**

The tools used in this workshop especially the P3DM was very effective for both the professionals and the communities as it allows for the easy visualization of the terrestrial layout of the entire island. The P3DM made it easy to illustrate the ridge to reef approach as the professionals can refer to a particular watershed boundary and explain the ecological mechanisms that existed in that water shed with the local knowledge input from the villagers. It is a very cost effective tool by which a lot of time and money is saved through the fact the professional need not actually go to the specific water shed boundaries but could conduct assessments quickly on the model with the locals providing the accurate knowledge that is required for that particular assessment.

Using the students to build the model was another time and money saving exercise for this workshop compared to the idea of having the workshop participants to build the model as this will mean that we will need to keep a larger group for a longer period.

The quality and quantity of the local knowledge gathered during the workshop was more accurate as it was acquired in a controlled environment where all the data can be checked by the communities and also the professionals can identify clearly on the model the extent of the boundaries of the data collection and types of date required.

For planning purposes, the data collected can be quantified and linear measurements can be taken off the model as it is built to scale.

The communities and others who are not trained to interpret 2D maps found out that a 3D model is more the way to go in understanding the topography of an island. This helps the decision makers to have a more clearer perspective on mapping out the issues and problems faced and therefore can easily device adaption options that will address these issues.

#### **8 LESSONS LEARNED**

The scale 1:20,000 and the contour interval of 20m used for the model of Epi was okay but the PACC team felt that it would be much more better to build the model in a scale of 1: 10,000. which would accommodate contour intervals of 10m to make the model more bigger so more features can be easily shown in the model especially land use.

The team also noted that bringing participants from the 4 area councils to one workshop was too crowded as there was always time constraint issues and does not allow the team and the participants to be more thorough in tracking deeper the discussion points and plotting the outcomes in the model.

The cost benefit analysis information can also be gathered but again the time frame could not allow this to happen.

#### **9 CONCLUSION**

The workshop achieved its goal in getting the communities including the different gender groupings to participate in sharing their knowledge in the area of vulnerability & assessment and Adaptation Planning. With the assistance provided from the line agencies that participated, we were able to inform the communities in the future scientific projections of climate change and also the communities were able to share their local knowledge on past experiences in the adverse effects of climate change and natural disasters in the areas and share their coping strategies or mechanism

The workshop used the P3D model of Epi as the main community consultation tool to effectively execute vulnerability and assessment and formulate Adaptation planning and aligning the communities' adaptation planning process with the No Regret Ridge to Reef (RR) approach.

The vulnerability and assessment report carries details of the local knowledge gathered during the workshop and also the adaption plans and preliminary typical designs of the different adaptation interventions

## **10 ANNEX**

## 10.1 Annex (A) - Epi High School Participants of Epi P3D model Construction 10.1.1 Yr 11 Geography Students (25) 5 boys & 20 girls

- 1 Collinson Peter
- 13 TousongEddienne
- 2 Ryan Haoul 14 Joana Sandy
- 3 Richie Erick 15 Meriam Moses
- 4 Wallace John 16 ZabethOli
- 5 Joshua George 17 Vicky Naunga
- 6 Jenny Meawo
- 7 Annie Mahit 19 RossinaKeliu
- 8 Josian Kenneth 20 Marcheline Marcel
- 9 Dora Melio
- 10 Joslyn Jimmy
- 22 VionaKareaLiliu
- 11 Grace Kalkaua 23 Ruth Donald
- 12 Naomie George 24 SaleimaAnis
  - 25 Chrissy Joel

18 – Liekari John

21 - BinaKalfau

#### 10.1.2 Yr 12 Arts Students (14) - 6 boys & 8 girls

1 – Robinson Disckson	7 – Marcie Erick
2 – Frank Oscar	8 – Jill Valia
3 – Tommy Robert	9 – SanilaHati
4 – Jessy Mark	10 – Lola William
5 – Morris Alick	11 – Melanie Jacob

- 6 Wexford Leo 12 MerelynIsaiha
  - 13 Jerina George
  - 14 Rachel Kalia

#### 10.1.3 Teachers & Staffs

- 1 Yonson Yona Principal
- 2 Allan Yona Geography Teacher
- 3 Kolika Maki Technical/Vocational teacher
- 4 Yvette Mbau Librarian
- 5 Deputy Principal? Marcel Yona
- 6-Judith Vire
- 7-Patrick ken

### 10.2 Annex (B) Workshop Agenda

TIME	AGENDA ITEM	DISCUSSION POINT	PRESENTER	
THURSDAY 14 MARCH 2013 - WORKSHOP 01 P3DM CONSRTUCTION & POPULATION OF EXISTING FEATURES				
0800-0830	REGISTRATION			
SESSION 1	OPENING	CHAIR OF SESSION 1: Dennis Alvo	)S	
0830 - 0900	Formal Opening			
	• Prayer			
	Official Opening			
	Welcome Address			
0900 - 0915	Setting the Scene / Photo		Ian Iercet/Allan Simion	
0915 - 0930		MORNING TEA		
SESSION 2	MODEL CONSTRUCTION	FACILITOR OF SESSION 2: Ian		
		lercet		
0930 - 1030	<b>ORIENTATION &amp; BUILDING INSTRUCTIONS</b>		Ian Iercet/ Rodson Aru	
1030 - 1200	Model Construction			
1200 - 1300	LUNCH			
1300 - 1500	Model Construction			
1500 - 1530	AFTERNOON TEA			
1530 - 1700	Model Construction			

TIME	AGENDA ITEM	DISCUSSION POINT	PRESENTER			
WEDNESDAY 20	WEDNESDAY 20 MARCH 2013 - WORKSHOP 02 - POPULATION OF CLIMATE CHANGE DATA & ADAPTATION PLANING					
0800-0830	REGISTRATION					
SESSION 1	OPENING	CHAIR OF SESSION 1: Dennis Alvo	95			
0830 - 0900	Formal Opening					
	• Prayer					
	Official Opening	MR. JOTHAM NAPAT DIRECTOR				
	Welcome Address					
0900 - 0915	Setting the Scene / Photo		Ian Iercet/Allan Simion			
0915 - 0930	MORNING TEA					
SESSION 2	CLIMATE CHANGE INPUT	FACILITOR OF SESSION 2:				
		DENNIS ALVOS				

0930 - 1030	PACC PROJECT UPDATE		DENNIS ALVOS
1030 - 1100	TECHNICAL /SCIENTIFIC CC PROJECTIONS		BRIAN PHILIPS
1100 - 1200	DISCUSSION (Capture Vulnerability)		
	FEED BACKS		
	<ul> <li>BREAK INTO THEMATIC GROUPS (identify risk areas - Land use &amp; people) Mapping out Hazard zones</li> </ul>	BY VILLAGES	Dennis Aivos
1200 - 1300		LUNCH	
1300 - 1500	Discussion continues		Dennis Alvos
1500 - 1530	AFTERNOON TEA		
1530 - 1700	Populate Climate Change Data into Model		lan lercet

TIME	AGENDA ITEM	DISCUSSION POINT	PRESENTER	
THURSDAY 21	THURSDAY 21 MARCH 2013 - WORKSHOP 02 - POPULATION OF CLIMATE CHANGE DATA & ADAPTATION PLANING			
0830 - 0900	Populate Climate Change Data into Model		lan lercet	
0900 - 0930	ADAPTATION OPTIONS			
	COASTLINE VEGETATION		BRIAN	
	ROAD RELOCATION, PAVEMENT &	DRAINAGE	SUMPET G	
	AQUA CULTURE & Marine Protecte	d Areas		
0930 - 1000	MORNING TEA			
1000 - 1200	DISCUSSION (Capture Adaptation Options)			
	FEED BACKS			
	BREAK INTO THEMATIC GROUPS	BY VILLAGES	Dennis Alvos	
	(Adaptation Options for each			
	area)			
1200 - 1300		LUNCH		
1300 - 1500	Consensus - Adaption Intervention Plan for		Dennis Alvos	
	Epi Island.			
1500 - 1530		AFTERNOON TEA		
1530 - 1700	Populate Adaptation Intervention into		lan lercet	
	Model			

TIME	AGENDA ITEM	DISCUSSION POINT	PRESENTER	
FRIDAY 22 MARCH 2013 - WORKSHOP 02 - POPULATION OF CLIMATE CHANGE DATA & ADAPTATION PLANING				
0830 - 0900	Populate Adaptation Intervention into		lan lercet	
	Model			
0830 - 0900	PREPARE COMMUNITIES TO PRESENT		lan lercet	
	THEIR V&A AND ADAPTATION PLAN			
	USING THE MODEL	BY AREA COUNCILS		
0930 - 1000	MORNING TEA			
1000 - 1200	PREPARE COMMUNITIES TO PRESENT			
	THEIR V&A AND ADAPTATION PLAN			
	USING THE MODEL	BY AREA COUNCILS	Dennis Alvos	
1200 - 1300		LUNCH		
1300 - 1600	PRESENTATIONS	1. SHEFA SECRETARY GENERAL	Dennis Alvos	
	4 AREA COUNCILS	2. DIRECTOR GENERAL MIPU		
		3. DIRECTOR METEO		
		(CHAIRMAN NAB)		
		4. CHAIRMAN EPI ISLAND OF		

		COUNCIL CHIEF	
1600 - 1630	Formal CLOSING		lan lercet
	Chief EPI		
	SHEFA Province		
	Director General MIPU		
	• Prayer		

## 10.3 Annex (C) - List of community Participants by Area Councils

VE R M ALI A R E A C O U N C I L VARSU AREA VERMAUL AREA

1 Chief willie	38 Apia Rezo	76	NettyKalalia	1	Elder Jimmy	1	Chief Seule Simeon
2 Morris Jack	39 Holi Charlie	77	Lopet Apia	2	Pastor Joe George	2	Jack Kelin
3 Tom Mael	40 Lemaya Apia	78	Susan Orah	3	Elder Tariwo	3	Marcel Yona
4 Charlie Daniel	41 Mausalso	79	Apia kaka	4	Jimmy Tamar	4	YonsenSavo
5 Pastor Willie Molika	42 Tony Ruben	80	serahSaling	5	Joseph Holi	5	Sailas Willie
6 Pastor Apia Keneth	43 Apia Ruben	81	Lorina Patrick	6	WiliieYoan	6	Allan Yona
7 Peter Hory	44 Peter John	82	Isabel Pakoa	7	William Datete	7	Kalo Jacob
8 Timothy Pery	45 MichealLui	83	Kora Maki	8	Philip Omawa	8	Remo Billy
9 Orah Peter	46 Ben Kalo	84	Tetu Samuel	9	Apia Ruben	9	John Vakay
10 Tasso Thompson	47 ElwynSaling	85	Jimmy Awa	10	Apia Joe	10	Obed Jonah
11 Tasso Welawo	48 Roy Willie	86	KaloValia	11	Bruce Elia	11	Masi Erick
12 Norman Avio	49 Franky Harry	87	Rini Samson	12	Esau Avio	12	Rosina Kelin
1 Thomas Alick	50 HoliPulpe	88	Julia Tassom	13	Melany Deny	13	Melani Jacob
3 David Shem	51 Charlie Joel	89	Lilon Peter	14	Collen	14	Krisi Joel
14 Ambatha Willie	52 Freddie Holi	90	Chief Parkuwo Peter	15	Robert Andrick	15	Jenny Mawo
15 Jack Kalala	53 John Tepau	91	walt Timothy	16	PakoaOmawa	16	Irene Yona
16 Atis Jack	54 Nasil Tasso	92	Isabel Donald	17	George Loma	17	ValeriSavo
17 Atis Ben	55 NemlyAlick	93	LeimawaNetty	18	NawoVakumali		
18 Ruben Mawa	56 Ambatha Thomson	94	John Mark	19	Benjamin Kora		
19 AtisOrah	57 Lapaga Valia	95	Hannah Samuel	20	Albert	YAR	SU AREA
20 OrakaKeliu	58 Demas Lui	96	Alfred Samuel	21	Philip James	1	Timothy Andre
21 Valia Jack	59 Alice Abel	97	RemonPulpe	22	Kari Maki	2	Robinson Milla
22 Ben Tom	60 Rani Apia	98	Massing Ben	23	Graham Maki	3	Leiman Luke
23 Jack Fred	61 Lucy Joel			24	Shem	4	Espel Noel
24 MawaKelala	62 Agnes L			25	James Ruben		
25 MorisAvio	63 Lisa W Kalo			26	Obed		
26 Donald Apia	64 Winnie Orah			27	MawaKora		
27 Avio Jack	65 Marinete H			28	Joseph Sam		
28 Joel Leimaya	66 Makin Timothy			29	Chief Parmasusu		
29 AtisAvio	67 Elsie Dauglas			30	Jody		
30 Jack Ruben	78 Elsie John						
31 Longo Tasso	69 Elsie James						
32 Tasso Omai	70 Leitare David						
33 Jack Waiwo	71 Martha Noel						
34 Tasso jimmy	72 Noelin Noel						
35 John Robert	73 Niyata Nermon						
36 Pulpe Tasso	74 Clief Sam						
37 Henry Nangua	75 IleenSanthy						

## 10.4 Annex (D) Group Discussion Feedback Charts

### 10.4.1 Problems, Causes and Solutions

NAME OF AREA COUNCIL	CAUSES	SOLUTIONS
	Pollution	-Gabion Basket
VERMALI		-Planting new trees along sea coast
		-bury empty plastics
		-providing awareness
	Cutting down of trees	-replanting trees
		-reduce the cutting of trees
	Hillside settlements	
		-build underground wells or tank
	Greenhouse effect	-proper drainage planning
		-move inland
		-build water tanks and underground wells
	Damage reef and over	
	fishing	-Tapu long reef
		-create more conservation areas
		-limitation of consumption e.g., fish and trochus
	Flooding	
		-proper drainage
	Increase of pest	-relocation of village
	Difficulties with	-forestry department needs to come down and see for themselves
	telecommunication network (TVL and DIGICEL)	-communicate need to identify an area for this companies to build towers

Global Warming (sea	
level rise and coastal	
erosion)	
	-Planting of mangroves
	-stop deforestation along coastal areas
Heavy rainfall (flooding,	-build sea wall
soil erosion damage to reefs)	-move to higher grounds
	-proper drainage system
	-road maintenance services
Over grazing of animals	-build good strong bridge
and clearing of large	-reforestation
areas for cultivation (soil erosion)	-farming of sea cucumbers
Over fishing	
	-proper agriculture management
	-fencing
Soil erosion – lo water	
source I mekem se I	-conservation
pipes I mekem se water	-farming of sea shells e.g., green shells
I no rongudikam long skul.	-farming of fish
	-farming of coral
	-airport bae I mas stapnomo lo Laman bay be

		baeoli mas finem one new side.
		- Planem mangroves lo coastal area.
VERMAUL	Flooding	-make gardens in flat lands
	Landslide (poor agriculture practice. Eg cultivation on slopping areas	-reafforestation
	Heavy rain causing	
	floods	-Proper drainage system
	Sea level rise / coastal erosion	-relocation
		-planting mangroves
		-coastal reafforestation
	Decrease in marine resources (over harvesting, flooding, population increase	-building sea wall
		-control harvesting-number, size and season
		-conservation areas
		-control population growth
		-respect
	Reduction of food crops	-reseedings marine resources
		-aqua culture
	Increase of pest	
		-food crops variety adaptation

	Poor road condition Heavy rain Lack of maintenance	-hunting -destroy mosquito breeding sites		
	Poor runway Heavy rain	-proper drainage system -tar sealed roads -regular maintenance		
		-proper drainage system -Tar sealed roads		
VARSU	Poor road condition 1. Landslide 2. Big valleys/heav rain 3. Sea level rise	<ol> <li>Plant more trees (special grass), no work closap/side long hills</li> <li>Bridge – drainage (small wan)</li> <li>Relocate new road site, build sea walls e</li> </ol>		
	Dead coral reef 1. Soft mud 2. Man-over harvest 3. Cyclone – earthquake	<ol> <li>Divertem water I go long wan area blong yumi save usum blong wan fish farm</li> <li>Putum ol strainer blong sevem graon mo water I no go long saltwater</li> <li>I mas gat ol conservation areas.</li> </ol>		

	Poor water condition		10.	No work closap lo water source
	1.	Heavy rain	11.	Protectem ol water source
	2.	Land slide	12.	Awareness
	3.	Rain water – pollution		
	4.	Hand pump – salty water	13.	Identify new sites and relocate hand pumps
	Poor cr	ops/market	14	Planem more trees
	1.	Snail	14.	Awareness long ol different types of
	2.	Wild pig		crops we I save adapt or survive lo hot weather
	3.	High temperature	16.	Introducim wan different type of snail
	4.	Land slide		or wan posen we I save kilimol damaging snails.
	5.	Volcano		
			17.	Planem moa grass mo ol trees long ol coastal areas
	Sea level rise			
			18.	More awareness long olpipolblong no cuttemol trees long ol coastal areas mo no karemtumas sand mo coral long same area nomo.
			19.	Buildim sea wall
			20.	Relocate to new areas
YARSU	Sea lev	el rise (coastal	1.	Plant trees e.g., mangrove

erosion)		
	2.	protect any trees around coast
	3.	implement laws to ensure people cut down on the consumption of coral and sand
Marine life (rain water from creek down to sea causes dead reef, land slide)	4.	providing technical help in growing reefs
	5.	Implement laws in community concern to protect the coastal sites.

# 10.5 ANNEX (E) List of Quarry Sites, Sacred Sites, Water Sources and Conservation Areas

#### 10.5.1 Varsu Area Council

- 1. Quarry Palae
- 2. White quarry Baia, lemaru, suwaile
- 3. Coral- Mapuna, nikaura, Lowo&Baia

- 4. Black Stone moriu- mate
- 5. Black Beach Swaile, Big Bay Lokopui&Ngala
- 6. Present Cemetery Areas Near the existing Roads Niku, Mapuna, Moriu, Nivenue, Nikaura, Nuvi , Lokopui, Ngala Mate & Lemaru
- 7. Present Local Conservation Area- Nikaura, Nuvi, Baia, Moriu, Lemaru & Lokopui
- 8. Nasara- Baia, Niku, Moriu
- 9. Red and white clay –Nivenue
- 10. OlfalaStattions Buruvanua, Buluvar, Maboboesupe
- 11. Water source Ngala, Lokopue, Nuvi, Nikaura, Nivenue, Moriu, Baia, Niku, Ngevine

#### **10.5.2 VERMAUL AREA COUNCIL – LOCATION OF QUARY**

- 1. Sarmet
- 2. Masou
- 3. Nelson bay
- 4. Valesdir
- 5. Bute
- 6. Mbuebue

#### Tapu sites (Vermaul)

- 1. Lumbil
- 2. Panga
- 3. Vionaiso (burumba)
- 4. Pluyu
- 5. Old cemetery
- 6. Burumba
- 7. Mafilau
- 8. Sara
- 9. Anduan

#### **10.5.3 VERMALI AREA COUNCIL**

Laman bay – Nduana (custom nasara)

- 1. Wenia, Alak, Malvasi, Ruwo custom nasara
- 2. Ples we yu save finem carrier paras (yevali), Malvasi, Mabobe