

**SECRETARIAT OF THE PACIFIC COMMUNITY**

**Climate Change and Food Security Vulnerability Assessment for  
Divers Bay Village, Ureparapara, Torba Province, Vanuatu**

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*SPC/USAID Project on “Enhanced Climate Change Resiliency of Food Production Systems in  
Selected Pacific Island Countries”*

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# 1.0 INTRODUCTION

## 1.1 Area Description

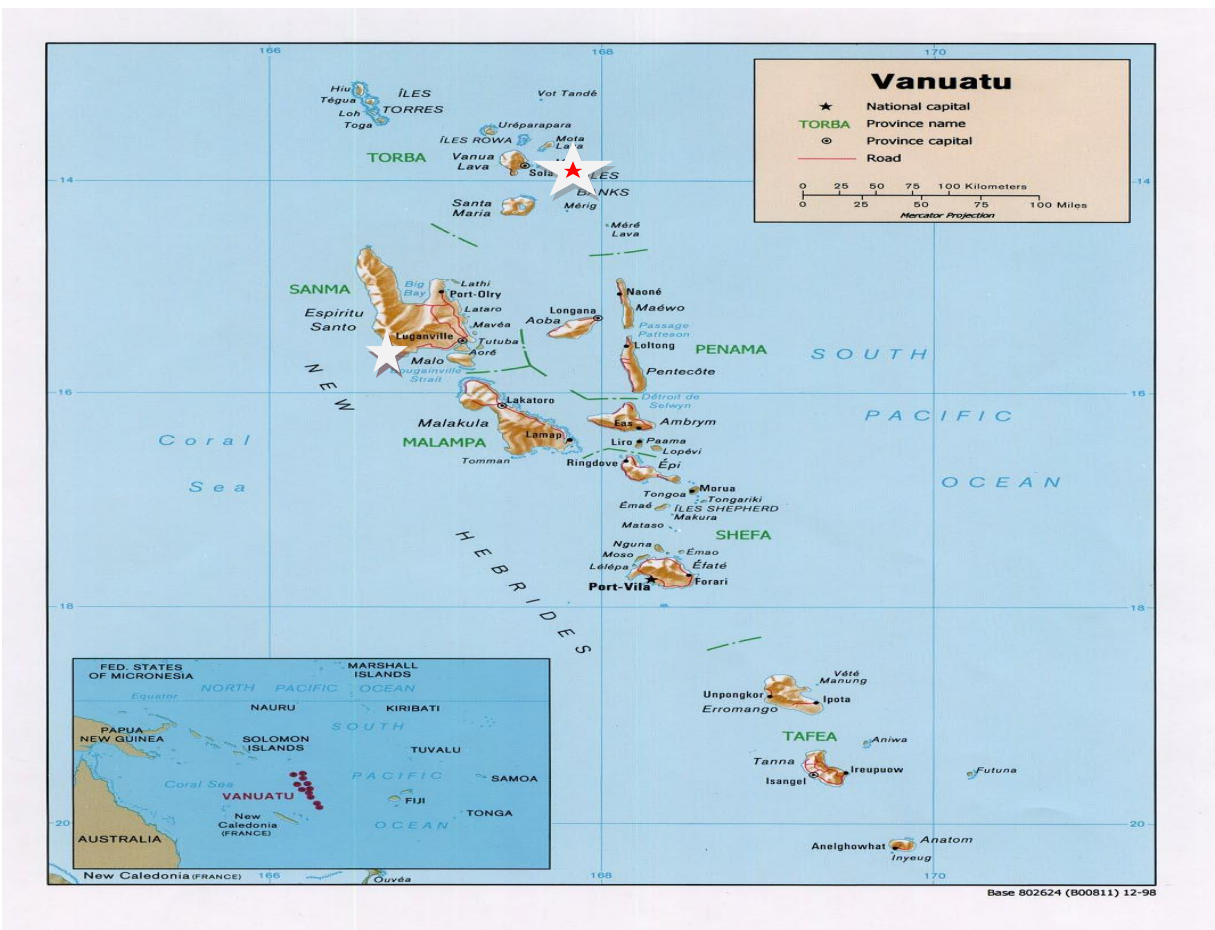
Vanuatu is one of the six countries that were selected as pilot project countries for the SPC/USAID project titled “Vegetation and land cover mapping and improving food security for building resilience to a changing climate in Pacific island communities”. The main goal of the SPC/USAID project is to evaluate and implement innovative techniques and management approaches to increase climate change resilience of terrestrial food production systems for communities in selected PICTS (Fiji, Kiribati, Samoa, Solomon Islands, Tonga and Vanuatu).

### Vanuatu Overview\*:

Population:	234,023
GDP (US\$):	684 million
Rural Population:	75% (% of total population)
Population Density:	19/km <sup>2</sup>
Land Area:	12,189 km <sup>2</sup>
EEZ	680,000 km <sup>2</sup>
Population Annual Growth	2.3%

\*Source: Vanuatu Statistics

Figure 1. Map of Vanuatu showing Ureparapara Island



Source: Vanuatu Government

## **1.2 Project Site**

The project site selected for Vanuatu for the SPC/USAID project is Divers Bay Village in Ureparapa Island. Ureparapara is the third largest island in Banks Island group. Banks together with Torres island group formed the Torba Province, the northern part of Vanuatu. The capital of Torba Province is Sola, Vanua Lava island, the second largest island in Banks. The population of Ureparapara is 436 (2009 Census) and consist of 3 villages. Divers Bay is the biggest village located on the eastern part of the island within the Ureparapara Bay. Divers Bay village is situated in a valley around a strip of flat area toward the coastal part of the island. About half kilometer from the village is a steep cone shape rugged mountain that runs through the island. Accessing Ureparapara is by boat from Sola (3-4 hours), Vanua Lava.

Ureparapara was selected as the project sites based on several reasons; the island is very isolated in terms of service access, vulnerability to climate change and natural disasters and increasing population growth, high dependency on agriculture for subsistence and livelihoods and experiencing high production problems. The main types of crops grown the community includes root crops (taro, sweet potato, yam, cassava) fruits (breadfruits, mango and banana, citrus, pawpaw, coconuts) and vegetables (Bele and eggplants) with a few families keeping indigenous pigs and chickens. Most or all livestock are kept in subsistence production systems.

## **1.3 Objective**

The main objective of the assessment was to conduct climate change vulnerability assessments on the land based agricultural production systems and identify adaptation measures to the impacts of climate change. More specifically:

1. Assess the degree of vulnerability to climate change on food productions systems in Ureparapara;
2. Assess food security situation in Ureparapara;
3. Identify adaptation measures to the impacts of climate change on food production systems.

## 2.0 METHODOLOGY

### 2.1 Site Selection Process

Vanuatu Government recommended ten (10) islands as potential sites for the SPC/USAID climate change project. Because of limited funds to carry out implementation activities in the ten recommended islands, a selection criteria was developed to rank priority potential project site. The following criteria were used to prioritise project site:

- a. Accessibility. For effective delivery of on-the-ground project activities, accessibility was identified as a key criterion for project implementation. On this basis, logistics was considered as important criteria.
- b. Socio-economics. A distinctive population trend is a proxy indication of climate change vulnerability (population density) hence inclusion of population trend as another criteria.
- c. Food production systems. Food production systems vulnerability is some indication of potential areas of food insecurity adaptation site. This includes characteristics of the area in terms of agricultural land and water/irrigation problems are important factors for effective implementation and sustainability of the project. Level of agriculture management practices such as soil improvement practices and potential for application of technologies were also considered as important criteria.
- d. Biodiversity/agro-biodiversity is another criterion noting that rich biodiversity is a reflection of high value for resilience to climate change if protected and sustainably managed.
- e. Topography of the area such as soil type, flood plain and soil erosion problems are indications of vulnerability hence its inclusion in the selection criteria.
- f. Climate change impacts. Likewise if the area is vulnerable to impacts of climate change such as, salinity/drought/flooding, prolonged high rainfall, changes in crop and livestock productivity.
- g. Non-Climatic factors: Non climatic factors were also considered such as problems of pest and disease, reduced crop yields, soil fertility problems were also factored in the selection process.

### 2.2 The Process and Assessment Team

The assessment was conducted from 10<sup>th</sup> - 14<sup>st</sup> June 2013 by a team consisting four (4) SPC technical staff, three (6) Department of Agriculture and Rural Development staff and one (1) Department of Fisheries staff. Prior to the assessment, a briefing and refresher training was conducted with the Santo based Agriculture staffs. Another training was conducted on 11<sup>th</sup> June for the Sola based Officers to familiarize team members on the assessment tools including the household survey questionnaires.

#### 2.2.1 Household surveys

The primary objective of the survey is to collect information on household income and household expenditures, household consumptions and housing characteristics including other living conditions of households. Survey covered 24% of the households. The Survey Questionnaire used in this study is provided in Annex 5. Microsoft Excel was used to analyse data from the survey.

#### 2.2.2 Participatory Rural Appraisals (PRA) Process

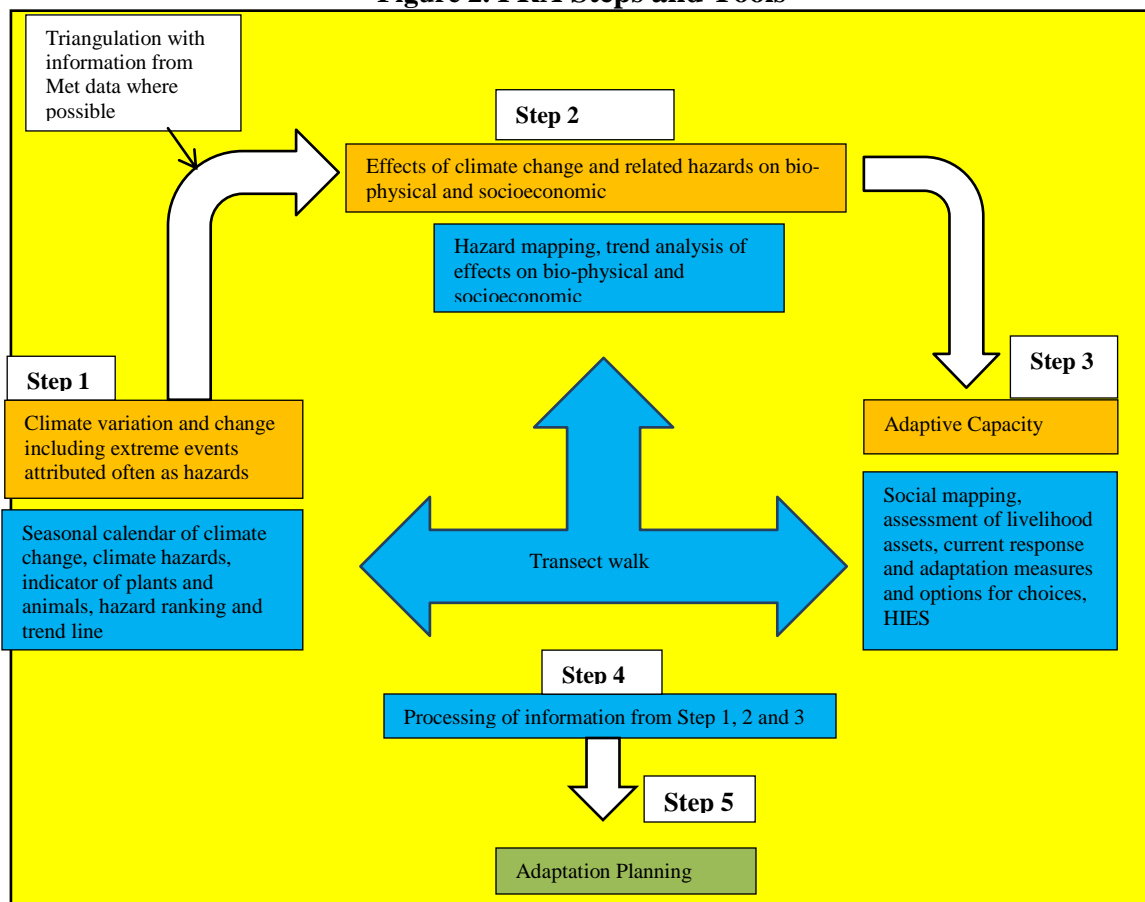
During the assessment, community participants were divided into 3 groups (Men's Group, Women's Group and Youth's Group) with two facilitators from team. Figure 2 shows the steps and tools used in the PRA process. Using the PRA steps and tools, the following definition was used to assess the communities' vulnerability to climate:

*“Vulnerability is a function of character, magnitude and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity”* (IPCC, 2001). This definition is articulated in the following equation for simplicity:  $V=E \times S/A$ . Where:

**V = Vulnerability:** The degree to which a system is susceptible to, or unable to cope with adverse effects of climate change, including climate variability and extremes.

**E = Exposure:** The nature and degree to which a system is exposed to significant climatic variations (TAR, IPCC). The climate variation includes average climate change and the extreme climate variability. Exposure in this assessment is the character, magnitude and rate of climate variation at local level. The more the local climate has changed or deviated from its historical condition or trend, the more the value of exposure (E) will be; the more the value of E means the more the system is exposed to new climate leading to high vulnerability. Through community participation, “E” is assessed through assessment of change in elements of climate over time – temperature, precipitation, etc and the hazards induced by such changes.

**Figure 2. PRA Steps and Tools**



**S = Sensitivity:** Degree to which a system is affected, either adversely or beneficially, by climate-related stimuli. The effect may be direct e.g. a change in crop yield in response to a change in the mean, range or variability of temperature or indirect e.g. damages caused by an increase in the frequency of coastal flooding due to sea-level rise (IPCC, TAR) or floods, landslides, etc. Hence, sensitivity in this assessment is the effect of local climate change and related hazards on local system – biophysical and socioeconomic. Highly sensitive (S) systems will be more impacted compared to low sensitive systems even with a same level of climate change or hazards. Therefore the more the system is sensitive to climate change and related hazards, the more the system is vulnerable to climate change. Sensitivity of a system is assessed



through assessment of effects or impacts or damages of the system from climate change and related hazards.

**A = Adaptive Capacity:** The ability of a system (in this case the “community”) to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (TAR, IPCC).

Using each of the PRA tools, E, S and A were assessed at LOW, MEDIUM, HIGH and VERY HIGH scales through assessment of their elements based on community perception. In terms of numerical, LOW was denoted by “1”, MEDIUM by “2”, HIGH by “3” and VERY HIGH by “4”. Community perceptions were recorded and collated to determine the E Index, S Index and A Index.

### **2.2.3 Transect Walk.**

After completing each of the PRA and household surveys, the team did a transect walk to validate findings of the assessment. The transect walk findings were then combined with assessment results to guide the formulation of the adaptation strategies provided in this report.

### 3.0 RESULTS

#### 3.1 Climate Change Vulnerability Assessment for Divers Bay Village

##### 3.1.1 Analysis of Exposure

Table 1. Divers Bay Village Exposure to Climatic change

Variable	Description	Community Perception	Scale Value
Temperature	• Number of hot days has increased	Very High	4.00
	• Number of cold days has decreased	High	3.00
Rainfall	• Rainfall has become increasingly unpredictable (more frequent)	High - Very High	3.67
Climate induced disasters	• Occurrence of Landslides has increased and sea level rise	Medium - High	2.67
	• Occurrence of drought has decreased	High	3.00
Mango	• Not fruiting for about ten years	Very High	4.00
Breadfruit	• Unlike before, fruiting all year round	High	3.00
Yams	• Shorter Season but smaller tubers and more diseases (Anthracnose)	High	3.00
Cassava	• Smaller tubers and taste change (bitter) and harder tubers; rat problems	Medium	2.00
Banana	• Fruits are smaller and taste changed (saltier); more damage from fowls	Low	1.00
Pigs	• Higher mortality; less pigs now; slow growth; low survival rate	High	3.00
Chicken	• Lowered egg production = less number of chickens; eye disease problem	High	3.67
Fish/Crab	• Less fish/Inconsistent catches	Very High	4.00
Total			40.00
<b>Average Exposure Index:</b>		<b>High</b>	<b>3.08</b>

Table 2. Dives Bay Village Sensitivity to Climate Change

Sector	Hazards	Indicators	Community Perception	Scale Value
Agriculture and Food Security	Landslides & Cyclone	• Agricultural land damaged	High	3.67
	Cyclone & landslides	• Loss of Crop lands	High	3.33
Forest and Biodiversity	Cyclone	• Loss of Forest cover	High	3.00
	Cyclone	• Loss of Forest products	High	3.33
Water	Cyclone and landslides	• Reduced quantity of water	High	3.33
	Cyclone and landslides	• 6 months to recover water quality	High	3.33
	Cyclone and landslides	• Reduced Quality of water	High	3.67
Settlement and Infrastructure	Cyclone and landslides	• Damaged infrastructure	Very High	4.00
	Cyclone	• All infrastructure (houses) damaged	Very High	4.00
Human Health	Cyclone and landslides	• Outbreak of Malaria & diarrhoea	High	3.33
	Cyclone and landslides	• Number of people (majority of the population)	Very High	4.00
<b>Average Index Score:</b>			<b>High</b>	<b>3.55</b>

Table 1 presents the results of the analysis of Divers Bay village exposure to climate change. The average Exposure is high (3.08). Changes in the local climate ranked from High to Very High. Except for banana, most crops assessed were ranked from medium to High. Behaviour of plants and animals were also assessed as proxy indicators of climate change. Behaviour of most plants assessed was also changing. Mango has not fruit for about 10 years. Cassava and yam productivity is reduced with cassava taste is becoming more bitter. It was also noted during the assessment that livestock numbers are decreasing due to high mortality and this is a concern for the communities given their dependency on local production due to their isolation.

### 3.1.2 Analysis of Sensitivity

Table 2 shows the degree of sensitivity of Divers Bay Village to climate change. The results showed that the Sensitivity of the village to adverse impacts of climate and related stimuli ranges from High to Very High (3.55). Five sectors were selected for the assessment (Natural Assets, Physical assets, Social assets, Financial and Human assets). The highest values were assigned to infrastructure and human health. This is due to absence of proper infrastructure and medical health clinic located in the island. All other sectors including Agriculture and Food Security were ranked High.

Table 3. Dives Bay Village Adaptive Capacity to Climate Change

Parameters	Indicators	Criteria	Community Perception	Scale Value
Natural Assets	Agriculture Land	<ul style="list-style-type: none"> <li>Land use and productivity</li> </ul>	M	2.00
	Forests Land & Forest products	<ul style="list-style-type: none"> <li>Availability of product and services</li> </ul>	M	2.00
	Water	<ul style="list-style-type: none"> <li>Availability of drinking water and Water Quality</li> </ul>	L	1.67
Physical Assets	Infrastructure for services	<ul style="list-style-type: none"> <li>Trails</li> </ul>	L	1.67
		<ul style="list-style-type: none"> <li>Drinking water and electricity</li> </ul>	L	1.67
		<ul style="list-style-type: none"> <li>Settlements and Community Hall</li> </ul>	M	2.00
		<ul style="list-style-type: none"> <li>Housing standards</li> </ul>	M	2.00
		<ul style="list-style-type: none"> <li>Access to transportation (land, air, sea)</li> </ul>	L	1.33
		<ul style="list-style-type: none"> <li>Access to Health Posts</li> </ul>	L	1.67
	<ul style="list-style-type: none"> <li>Access to Schools</li> </ul>	M	2.00	
	Information and communication sources	<ul style="list-style-type: none"> <li>Access to mobile phones, radio, TVs, papers, and internet</li> </ul>	L	1.33
Social	Social institutions and service providers	<ul style="list-style-type: none"> <li>Community affiliations to formal/non-formal institutions and engagements of NGOs and GOs with community</li> </ul>	L	1.00
Financial	Financial institutions and sufficiency of incomes	<ul style="list-style-type: none"> <li>Access to Banks, cooperatives and sufficiency for household needs</li> </ul>	L	1.00
Human	Demography, Education, Skilled Labour	<ul style="list-style-type: none"> <li>More elderly and young (lack trained or skilled labour and low education levels)</li> </ul>	L	1.00
Total				22.33
<b>Average Index Score</b>			<b>Low</b>	<b>1.60</b>

### 3.1.3 Analysis of Adaptive Capacity

Table 3 shows the adaptive capacity of Divers Bay village to climate change impacts on the five sectors assessed. The adaptive capacity for each of the sectors is low indicating the limited capacity to adapt to climate change impacts. All social institutions and service providers are outside of the village/island.

### 3.1.4 Vulnerability index of Divers Bay

$$\begin{aligned} \text{Vulnerability (V)} &= \text{EXS/A} \\ &= 3.08 \times 3.55 / 1.60 \\ &= \mathbf{6.84 \text{ (VERY HIGH)}} \end{aligned}$$

### 3.2 Population Characteristics

Table 4 shows the population distribution and characteristics of the households. The results show that the only 15% of the population surveyed attended high school while majority of the population's level of education is pre-school and elementary. highest level of education for the households surveyed is High School, indicating low capacity of the households in terms of educational achievements.

Table 4 Population Demographics

Village	No. of households	Population			Education – elementary plus High School
		Male	Females	Total	
Divers Bay	94	226	211	437	84.6% Pre-school/Elementary and 15.4% High School

### 3.3 Households Income

Table 5 shows average income for households surveyed. On average, 90% of households surveyed indicated sufficient income for their household needs. School fees and church obligations have the biggest impact on financial situation followed by food security. During the assessment, it was noted that due to limited income, most students from Ureparapara attending high school in Gaua, were expelled due to unpaid tuitions. The possible caused of indicating sufficient is due to the fact of their isolation.

Table 5. Households Income

Village	Weekly Income Sources (\$VATU)						Income Sufficiency %	Expenses Impacting financial situation most
	Farming	Cooked food	Handicrafts	Other	Total	Income/ households		
Divers Bay	19900	1300	2500	32500	58700	1087.037	90	School fees (1), Church Obligations (1) and food security (2)

### 3.4 Land Access and Land Use

Table 7 shows land access and land use for households surveyed. All households have access to land with each household having access to about 6.42 acres. In terms of land quality for agriculture production, 77% indicated that their land is of average quality. All households surveyed grow their own food. Majority of the households surveyed also indicated interest for diversifying their fruit tree and timber tree species.

### 3.5 Housing/Housing types and appliances

Table 6 shows the housing and housing types for the households surveyed. Majority of the households share living quarters with most or all living quarters are made up of local thatch materials. Community water supply is not evenly distributed to all households. About 77% of the households have water tanks. All households use outhouse toilet pits and battery lamps are the main source of lighting.

Table 6. Housing types, Water Sources and Facilities

Village	Living Quarters	Water sources		Toilet Facilities	Power & Light	Cooking
		Drinking	Washing			
Divers Bay	<ul style="list-style-type: none"> <li>• Independent (38%)</li> <li>• Share 62%</li> <li>• Bamboo (15%)</li> <li>• Thatch (85%)</li> </ul>	<ul style="list-style-type: none"> <li>• Household tank (77%)</li> <li>• Community water supply (8%)</li> <li>• Unprotected well &amp; Spring (15%)</li> </ul>	<ul style="list-style-type: none"> <li>• Spring (100%)</li> </ul>	<ul style="list-style-type: none"> <li>• Outhouse pit toilet (100%)</li> </ul>	<ul style="list-style-type: none"> <li>• Solar Panels/Generator (38%)</li> <li>• None (62%)</li> <li>• 92% Battery Lamp</li> </ul>	<ul style="list-style-type: none"> <li>• Open fire (100%)</li> </ul>

Table 7. Land Access and Land Use

Village	% HH have land	Average size (acre)	Land Quality	% Grow own food	Interest for tree
Divers Bay	100	6.42	<ul style="list-style-type: none"> <li>• Good (23%)</li> <li>• Average (77%)</li> </ul>	100	<ul style="list-style-type: none"> <li>• Fruit tree &amp; Timber (84%)</li> <li>• Firewood and other (69%)</li> </ul>

Table 8. Energy Availability

Quantity / Person /day	Xan	Sweet potato	Cassava	Banana	Total Local	Rice	Flour	Noodle	Total Import	Tot./ person/day	% Import
g	106.9	114.8	134.1	154.4	510.2	22.5	37.1	9.8	69.4	579.6	24.5%
kcal	91.9	105.7	485.3	92.6	775.5	81.1	135.0	36.0	252.1	1027.6	

Table 9. Protein Availability

Quantity / person/day	Pig	Chicken	Tuna and Deep fish	Reef fish	Total Local	Can fish	Can meat	Chicken	Tot import	Tot./ person/day	% Import
g	4.9	6.5	14.3	4.2	29.9	8.1	2.7	1.1	11.9	41.8	36.70%
kcal	15.9	8	12.3	2.7	38.9	14.9	6.3	1.3	22.6	61.4	

### 3.6 Food Consumption Analysis

#### 3.6.1 Energy and Protein Availability

Table 8 shows energy availability while Table 9 shows protein availability for the village. The results indicated that on average, the energy intake per capita per day is less than the FAO/WHO minimum daily requirement for a person to be food secure. There is also an established tendency for reliance on imported food (rice, flour and noodles) for the community. Similar trend was observed for protein source for both villages, there is a tendency to rely on imported food. This is a concern for the community given their isolation and limited shipping to the islands (1 ship in 3 months).

#### 3.7 Transect Walk Findings

Table 12 shows the summary of the transect walk findings. Transect walk findings were used to validate the results of the assessment. Several issues or problems were observed during the transect walk through the crop lands.

Table 10. Transect Walk Findings

The village & Farming Systems	Main Type of Crops	Livestock
<p><b><u>The Village:</u></b></p> <ul style="list-style-type: none"> <li>• The village is located on a strip of the coastal area within the Bay.</li> </ul> <p><b><u>Crop Lands:</u></b></p> <ul style="list-style-type: none"> <li>• Crop lands are situated about half a kilometre from village</li> <li>• Mixed Cropping/Agroforestry</li> <li>• Flatland is about ½ km from coast to steep slopes.</li> <li>• Plots of Root crops within Agroforestry</li> <li>• Cropping on sloping land</li> </ul> <p><b><u>Issues:</u></b></p> <ul style="list-style-type: none"> <li>• Village is located in valley near the coastal area, vulnerable to natural disasters and sea level rise</li> <li>• Limited access to communication and basic services</li> <li>• Need diversification of agroforestry species</li> <li>• Need proper spacing recommendations</li> <li>• Area is vulnerable to landslides due to steep mountain (need proper farming systems for slopy lands)</li> </ul>	<p><b><u>Major fruit trees are:</u></b></p> <ul style="list-style-type: none"> <li>• Breadfruit</li> <li>• Banana</li> <li>• coconut</li> <li>• Great orange/lemon/citrus,</li> <li>• pawpaw</li> </ul> <p><b><u>Major root crops are:</u></b></p> <ul style="list-style-type: none"> <li>• Sweet Potato</li> <li>• Cassava</li> <li>• Taro</li> <li>• Yam</li> </ul> <p><b><u>Major leafy &amp; vegetables:</u></b></p> <ul style="list-style-type: none"> <li>• Bele &amp;</li> <li>• egg plants</li> </ul> <p><b><u>Issues:</u></b></p> <ul style="list-style-type: none"> <li>• Copra is the main source of income but with the limited transport, copra is usually not sold; limited diversity</li> <li>• Nutrient and pest and disease problems observed on root crops</li> <li>• Fruit fly on citrus fruits</li> <li>• Anthracnose disease affecting yams</li> <li>• Limited diversity of Vegetables; Insect boring on bele leaves</li> </ul>	<p><b><u>Main types of livestock are:</u></b></p> <ul style="list-style-type: none"> <li>• Chicken</li> <li>• Pigs</li> <li>• Cattle</li> </ul> <p><b><u>Issues:</u></b></p> <ul style="list-style-type: none"> <li>• Very limited livestock number observed</li> <li>• Communities indicated that the number of livestock is decreasing resulting in low land based protein source for communities</li> <li>• Need to increase land protein based</li> </ul>

## **4.0 DISCUSSIONS**

### **4.1 Climate Change Vulnerability of Divers Bay**

The study found that the Exposure and Sensitivity to climate change for Divers Bay community is high while their adaptive capacity is low. This has resulted in the climate change vulnerability of the community to be Very High. The results of the analysis indicated that rainfall is increasingly unpredictable by the communities. Likewise, number of hot days is increasing. The communities indicated that the observed changes in the local climate are responsible for observed changes in behaviour of plants and animals. Mangoes are flowering but never reached fruiting stage for the past ten years. Taste of bananas and cassava is also changing. The taste of cassava is becoming more bitterness while bananas are becoming saltier. The actual cause of this is unknown. Mortality rate for livestock is also increasing and were observed to be high during high rainfall.

The study also recorded that landslide is frequently occurring during high rainfall causing agricultural lands and communities to be impacted. Pest and disease incidences are increasing and also coincide with high rainfall. All the five sectors assessed on the impacts of climate change showed that the sectors are highly impacted by climate change and natural disasters.

The study also found that the adaptive capacity of the community to impacts of climate change is low. All sectors assessed were ranked low. The community is situated within a valley of Ureprapara Bay with no access to any form of communication. The types of housing for the communities is mainly thatch houses, with some having bamboo walls. This indicates the vulnerability of the houses to cyclones and other types of natural disasters. On top of that, the community is located on the strip of the coastal areas, very low lying and vulnerable to tsunami, tidal waves and sea level rise.

There is limited transportation to the islands and even the islanders' lack boats/engines. A fibre glass boat has just been donated to the community with two engines. With this boat size, it is difficult to travel during rough weathers. The Vanuatu National Boat comes to the islands ones in 3 months. There is neither medical clinic nor bank located on the islands. The nearest island to access these services are in Sola which is about 3- 4 hours boat ride. In terms of schools, only one primary school is located on the island. The high school that the islands usually send their kids to is on Gaua. All social institutions and service providers are outside of the community, mostly in the neighbouring islands. Income generating opportunity to the islands is almost nil except during visiting vessels/ yachts, offers opportunity to sell local foods and handicrafts.

### **4.2 Food Security situation for Divers Bay**

The four determinants of food security (food availability, food access, food utilization and food stability) were assessed to determine the communities' food security situation.

#### **4.2.1 Food Availability**

The food consumption analysis indicated that the energy supply per person per day is much lower than the FAO/WHO minimum daily requirement for an individual to be food secure. Also, protein availability for the village population is quite low (41.8g/day). The main protein source for the community is from the fish with limited from land based sources. Despite the isolation of the community, there is a tendency to rely on food imports. Given the limited income opportunity for the community, this is a big concern for the community. Nevertheless, subsistence agriculture remains vital for food security and livelihoods of the community. Proxy indicators for plants and animals showed that productivity of most staple crops and livestock is decreasing. Mortality rates for livestock is observed to be high compared to before. This is resulting in less number of chicken and pigs to continuously supply the protein requirement for the households. As such it is important to devise interventions to assist boost food production systems for the community.

#### ***4.2.2 Food Access***

Food access is determined by the household's/individual's access to resources to either produce the food or enough income to purchase a sufficient and safe food. Most households in both villages have access to land to grow their own food. However, the quality and topography of the land is vulnerable to landslides due to the sloppiness of the area. In addition, some households have limited land to continuously cultivate for food production. Income generating opportunity for the community is very low. The only income source for the villagers is copra however, with the irregular shipping to the island is causing most of the copra to rot as the ship comes once in 3 months. The other income opportunity is during visiting of yachts and tour vessels where the islanders can sell local produce and handicrafts. The villagers indicated the need to establish a proper copra house to store copra for a minimum of three months. If quantity and consistency of copra supply from the island, may stimulate more frequent shipping to the island to pick copra.

#### ***4.2.3 Food Utilization***

Food utilisation is still very much reliance on local food production. However, there is a need to strengthen food production for the village population to reverse the tendency for reliance on imported foods. Diversification of food production systems will ultimately help diversify the low diversity of diets observed in the village.

#### ***4.2.4 Food Stability***

In terms of stability of food supply, it is clear from the exercise that food production is already impacted by climate change and non-climatic factors. Behaviour of plants and animals are changing. Fruit trees such as mango are no longer fruiting for about 10 years. Income opportunity for the households is low.



## **5.0 RECOMMENDATIONS AND ADAPTATION STRATEGIES**

The results of this study show that the Divers Bay Villages is already impacted by climate change. The food security of the community is quite vulnerable also. From the results of this study (High Vulnerability to Climate Change and Food Security Risks) and in line with the SPC/USAID project purpose (*Enhanced Climate Change Resilience of Food Production Systems*), below are some adaptation strategies the project will focus on:

- Institutional and social strengthening
- Diversification of food production systems in order to ultimately diversify diet
- Introduction of hardy crop varieties
- Introduction of hardy livestock breeds
- Development of demonstration farms (both crop and livestock)
- Capacity Building in all areas of intervention including climate change and disaster risk reduction programs

## Appendix 1. Master Logframe

Objectives & activities	Objectives Verifiable Indicators (OVIs)	Baseline	End of the Project	Means of Verification (MOVS)	Assumptions
<b>GOAL:</b> Agriculture production and productivity increased					
<b>PURPOSE:</b> Agriculture production capacity strengthened	<ul style="list-style-type: none"> <li>• Crop area increased</li> <li>• Livestock production increased</li> <li>• Crop diversity increased</li> <li>• Production problems reduced</li> </ul>	<ul style="list-style-type: none"> <li>• Low crop production</li> <li>• Limited crop diversity</li> <li>• Production problems</li> <li>• Pest and disease problems</li> <li>• Low livestock production</li> </ul>	<ul style="list-style-type: none"> <li>• Nutrition improved</li> <li>• Crop and livestock production and productivity increased</li> </ul>	<ul style="list-style-type: none"> <li>• Project reports</li> <li>• Project survey</li> </ul>	<ul style="list-style-type: none"> <li>• Limited capacity in agriculture farming techniques</li> <li>• Limited access to services</li> <li>• Strong support from Govt and donors</li> <li>• Strong participation of community members</li> </ul>
<b>OUTPUTS:</b> 1. Diversity and productivity of crops and livestock increased	<ul style="list-style-type: none"> <li>• # of crops varieties introduced and utilised</li> <li>• Increased yield</li> <li>• # of livestock/breeds increased</li> <li>• On farm trials established</li> <li>• Capacity building provided</li> </ul>	<ul style="list-style-type: none"> <li>• Limited crop diversity</li> <li>• Poor agriculture farming practices</li> <li>• Low livestock production</li> <li>• Lack of capacity in livestock production</li> <li>• Low diet diversity</li> </ul>	<ul style="list-style-type: none"> <li>• % increase in crop area &amp; agroforestry</li> <li>• % increase livestock numbers (pigs and chickens)</li> <li>• Diet diversity increased</li> </ul>	<ul style="list-style-type: none"> <li>• project reports</li> <li>• Project survey</li> </ul>	<ul style="list-style-type: none"> <li>• Limited farming techniques</li> <li>• Strong support from Govt and donors</li> <li>• Strong support from partner agencies/stake holders</li> <li>• Strong participation of community members</li> </ul>
2. Community Adaptation Capacity strengthened	<ul style="list-style-type: none"> <li>• Income from agriculture sales increased</li> <li>• Climate tolerant varieties introduced and distributed</li> <li>• Appropriate farming systems adopted</li> </ul>	<ul style="list-style-type: none"> <li>• Limited capacity/knowledge in CC adaptation and DRM</li> <li>• Limited income opportunity</li> <li>• Limited market</li> <li>• Poor access to services</li> </ul>	<ul style="list-style-type: none"> <li>• Income opportunity enhanced</li> <li>• % increase in agriculture sales</li> <li>• Pest and disease problems identified and control</li> </ul>	<ul style="list-style-type: none"> <li>• Project reports</li> <li>• Project survey</li> </ul>	<ul style="list-style-type: none"> <li>• Limited capacity in agriculture farming techniques</li> <li>• Limited access to services</li> <li>• Strong support from partner agencies/stake holders</li> <li>• Strong</li> </ul>

	<ul style="list-style-type: none"> <li>Capacity building on agriculture production systems and CC/DRM provided</li> </ul>	<ul style="list-style-type: none"> <li>Poor agriculture farming practices</li> </ul>	<ul style="list-style-type: none"> <li>and communications</li> </ul>	<ul style="list-style-type: none"> <li>measures provided</li> <li>Appropriate farming practices adopted</li> <li>Agriculture production problems reduced</li> </ul>		<ul style="list-style-type: none"> <li>participation of community members</li> </ul>
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## Appendix 2. Detailed Logframe

Output 1 Diversity and productivity of crops and livestock increased						
Output 1.1 Diversity and productivity of agroforestry strengthened						
Activities	Indicator	Budget Description	Budget Amount	Responsible / Partners	Year	
					1	2
1.1.1 Evaluate and document Agroforestry systems and diversity	Agroforestry systems evaluated and documented	Travel		Lead: Gibson / Jalesi Partners: DARD, Vanuatu Forestry, Community	X	
1.1.2 Demonstration site for agroforestry on sloping land established	At least two pilot farms identified	As in Activity 1.1.1		Lead: Gibson / Jalesi Partners: DARD, Vanuatu Forestry, Community	X	
1.1.3 Introduction of recommended crop varieties incorporated into agroforestry systems	Number of crop varieties introduced and planted	Tools		Lead: Gibson / Jalesi Partners: DARD, Vanuatu Forestry, Community	X	X
<b>Output Sub-Total</b>						
Output 1.2 Increased diversity of vegetable production						
1.2.1 Identify potential nursery site for seedling propagation	Nursery site identified	Consultation cost		Gibson / John / Oneil, DARD, Community	X	
1.2.2 Identify community members (preferably women's group) to participate in vegetable production	Formation of Divers Bay Women's Vegetable growers	Consultation cost		Gibson / John / Oneil, DARD, Community	X	
1.2.3 Introduction of vegetable seeds and other input supplies for vegetable growing	Vegetable seeds and other input supplies sourced, procured and distributed	Vegetable seeds and other input supplies		Gibson / John / Oneil, DARD, Community	X	X
1.2.4 Training on vegetable production provided (from nursery to field Management)	At least 3 trainings provided	Consultation costs		Gibson / John / Oneil, DARD, Community	X	X
1.2.5 Compost production training provided to communities	Training provided to women and farmers	Consultation costs		Gibson / John / Oneil, DARD, Community	X	X
<b>Output Subtotal</b>						
Output 1.2 Diversity and productivity of livestock increased						
Activities	Indicator	Budget Description	Budget Amount	Responsible / Partners	Year	
					1	2
1.2.1 Explore interest for	Livestock types preferred	Travel		Gibson/John,	X	

livestock types	by communities identified	Consultation costs		Oneil, Community		
1.2.2 Identification of hardy breeds (pig and chicken) and introduced to the village	At least 2 each hardy breeds of chicken and pigs identified and introduced	Livestock Transportation costs		Gibson / John / Oneil, DARD	X	
1.2.3 Feasible livestock breeding center established for livestock distribution	Livestock center established within the community Increased availability of improved livestock breeds for distribution to households	Construction materials Labour		Gibson / John / Oneil, DARD, Community	X	X
1.2.4 Development of feasible livestock production model (piggery and chicken) for the community	Potential farmer identified and Livestock production model established	Construction materials Labour (as in Activity 1.2.3)		Gibson / John / Oneil, DARD		X
1.2.5 Introduction of other feasible livestock species (such as goats)	At least 1 other livestock introduced to the community	Livestock costs Transportation		Gibson / John / Oneil, DARD, Community		X
<b>Output Subtotal</b>						
<b>Output 2. Adaptation Capacity strengthened</b>						
<i>Output 3.1 Institutional and social strengthening of the community for CC and DRM</i>						
Activities	Indicator	Budget Description	Budget Amount	Responsible / Partners	Year	
					1	2
3.1.1 Establishment of internet and radio communication access in Sola and Ureparapara	Capacity to respond to emergencies strengthened	Communication equipment Monthly fees		Gibson/ John/ Oneil Barton	X	
3.1.2 Climate change awareness strengthened	Number of awareness / campaign materials distributed	Printing / Supplies		Dean Solofa Gibson/ John/ Oneil	X	X
3.1.3 Food security awareness strengthened	Number of awareness materials / campaigns distributed					
<b>Output Subtotal</b>						
<i>Output 3.2 Enhanced climate change production systems</i>						
Activities	Indicator	Budget Description	Budget Amount	Responsible / Partners	Year	
					1	2
3.2.1 Establishment of climate ready collection crops in Divers Bay and Sola	Climate ready collection centre established in Sola and Divers Bay	Climate ready crops costs Shipment costs		Gibson/ John/ Oneil Barton	X	X
3.2.2 Field try conducted on the climate ready collection varieties	Climate hardy varieties identified	Research costs		Gibson/ John/ Oneil Barton	X	X
3.2.3 Hardy varieties to different climatic situations are propagated and distributed	Hardy varieties identified and # distributed	Transportation		Gibson/ John/ Oneil Barton		X
<b>Output Subtotal</b>						
<i>Output 3.3 Strengthen income opportunity for the community</i>						
Activities	Indicator	Budget Description	Budget Amount	Responsible / Partners	Year	
					1	2
3.3.1 Copra processing facility developed	Sales for copra increased	Copra ware house building materials		Gibson/Livo & Oneil /John, Community	X	
3.3.2 Conduct feasibility study for income generating opportunities	Study identifying income opportunity for the communities	Travel		Gibson/John / Oneil IACT		

3.2.3 Identification of other potential income generating agricultural products	At least 2 commodities for each village identified	Consultation costs		Gibson/John/ Oneil IACT	X	X
3.3.3 Training on food processing and marketing provided	Enhanced capacity	Consultation costs		Gibson/John/ Oneil IACT	X	X
<b>Output Subtotal</b>						
<b><i>Output 3.4 Production problems reduced</i></b>						
<b>Activities</b>	<b>Indicator</b>	<b>Budget Description</b>	<b>Budget Amount</b>	<b>Responsible / Partners</b>	<b>Year</b>	
					<b>1</b>	<b>2</b>
3.4.1 Identification of pests and diseases	Major pests and diseases identified	Travel		Gibson/Atu & Oneil /John, Community	X	X
3.4.2 Control measures sought and provided	Control and eradication methods provided	Consultation costs Transportation /shipment costs		Gibson/Atu & Oneil /John, Community	X	X
3.4.3 Identify non-climatic production problems and solutions identified	Non-climatic factors identified and solutions provided	Transportation		Gibson/Atu & Oneil /John, Community	X	X
<b>Output Subtotal</b>						

### APPENDIX 3. PRA Team Members

No.	Name	Title	Program/Agency	Email address
1.	Gibson Susumu	Food Security Technical Officer	CP&E, SPC LRD	<a href="mailto:GibsonS@spc.int">GibsonS@spc.int</a>
2.	Siosiu Halavatau	Crop Production and Agriculture Extension Coordinator	CP&E, SPC LRD	<a href="mailto:SiosiuH@spc.int">SiosiuH@spc.int</a>
3.	Dean Solofa	Climate Change Officer	CP&E, SPC LRD	<a href="mailto:DeanS@spc.int">DeanS@spc.int</a>
4.	Fereti Atumarava	IPM Officer	PH, SPC LRD	<a href="mailto:FeretiA@spc.int">FeretiA@spc.int</a>
5.	Livo Mele	Director	DARD, Vanuatu	<a href="mailto:lmele@vanuatu.gov.vu">lmele@vanuatu.gov.vu</a>
6.	Oniel Dalesa	DSAP Graduate Research	DARD, Santo	
7.	John Antas	Agri Assistant Officer	Torba Province	
8.	Kasen Alick	Forestry Officer	DOF, Vanuatu	
9.	Jimmy Willie	Fisheries Extension Off.	Torba Province	
10.	Barton Bisiwei	Provincial Agri Officer	Torba Province	

# USAID CC Project

## Vulnerability and Adaptation Survey



### Section1: Background Information

1.1 Household No.:

1.2 Village:  
.....  
.....

1.3 Respondent name:  
.....

1.4 Interviewer name:  
.....

1.5 Date: ..... / ..... / .....

1.6 Time: .....

## Section 2: Demographics

### 2.1 Household composition

<i>Household Member No.</i>	<i>Ethnicity</i>	<i>Relationship to H/ H</i>	<i>Sex</i>	<i>Age(Years)</i>	<i>Marital Status</i>	<i>Highest level of Education completed</i>

### CODES

#### Ethnicity

- 1.Fijian
2. Indian
3. Chinese
4. Others

#### R'ship to HH

1. Hhold head
2. Spouse
3. Child
4. Parent
5. Grandchild
6. Other relation
7. Not related

#### Sex

1. Male
2. Female

#### Marital Status

1. Never Married
2. Married
3. Widowed
4. Separated
5. Divorced
6. Other

#### Education

0. None
1. Kindergarton
2. Elementary
3. High School
4. College
- 5.University
6. Vocational

## Section 2: Household and Housing

### 2.1 – .9 Dwelling Structure and Amenities

#### 2.1 MAIN type of living quarters

- 1-Independent
- 2-Shared building
- 3-Other

#### 2.2 MAIN type of material for walls of the house

- 1-Concrete
- 2-Corrugated Iron/Tin
- 3-Timber/Wood
- 4- Thatch
- 5-Other
- 6-None

#### 2.3 MAIN source of drinking water

- 1Public utility water supply
- 2-Community water supply
- 3-Household tank
- 4-Protected well
- 5-Unprotected well
- 6-Other

#### 2.4 MAIN source of washing water

- 1-Public utility water supply
- 2-Community water supply
- 3-Household tank
- 4-Protected well



- 5-Unprotected well
- 7-Spring, river, lake
- 8-Other

2.5 MAIN toilet facility

- 1-Flush toilet
- 2-Water seal
- 3-Outhouse, pit toilet
- 6-Other

2.6 MAIN form of sewage disposal

- 1-Connected to sewer line
- 2-Connected to septic tank
- 3-Use other means

2.7 MAIN source of power you have access to;

- 1-Public utility
- 2. Generator
- 2-Solar Panels
- 3-Other
- 4-None

2.8 MAIN source of lighting

- 1-Public utility
- 2-Generator
- 3-Solar panel
- 4-Kerosene lamp
- 5-Battery lamp
- 6-Other
- 7-None

2.9 MAIN cooking facility

- 1-Electric range
- 2-Gas stove
- 3-Portable electric stove
- 4-Kerosene stove
- 5-Microwave oven
- 6-Wood stove
- 7-Open fire
- 8-Other

## Section 3: Income

### 3.1 Income Sources

In the table below, please provide the average annual income of the household as a whole, for each of the categories provided below (Please leave the total as blank)

Sources of incomes	Av. income/week (\$)
Selling farm produce	
Selling cooked foods	
Salary/wages	
Selling handicrafts	
Remittances	
Others (small business etc.)	
<b>Total weekly income</b>	

### 3.2 Income Sufficiency

Is the total weekly income sufficient for the household?

Yes (Go to q3.3)

No (Provide the MAIN method the household meets their basic needs)

1-Assisted by extended family members

2-Borrow from neighbors

3-Barter exchange

4-Other

5-None

### 3.3 Financial Impact

Please rank from 1 to 6 (1 being “most impact”) the impact of the following obligations on the household’s financial situation?

	Rank from 1 to 6 (1 most impact)
Traditional obligations	
Church obligations	
Food security (meals, preserved food, etc.)	
School fees	
Health care	
Shelter, clothing, etc.	

## Section 4: Land Access/Use

### 4.1 Land Access

Do you have access to land?

Yes – my own land (Go to q7.3)

Yes – leasing from someone else

No

#### **4.2 – 4.5 Land Use**

4.2 How much do you pay a year for the land? \$ \_\_\_\_\_

4.3 How much land do you have access to? \_\_\_\_\_m (length) x \_\_\_\_\_m (width)

4.4 Do you grow your own food on this land? Yes / No

4.5 How would you describe the quality of land?

1-Good

2-Average

3-Poor

#### **4.6 Trees in Agroforestry systems**

1. What does a forest or a tree mean to you?
2. Do you know what benefits you can derived from forests and trees
3. Do you have trees in your farm? Are they planted or part of the natural stand? If the trees are planted, how were they selected?
4. What are the trees currently planted at your farm (species\local names and nos. of trees)
  - Fruit\nuts trees
  - Timber trees
  - Ornamental trees
  - Fuelwood trees
  - Medicinal trees
  - Others (fodder, soil conditioner\protection, etc.)
5. How the trees were planted (positioning) within the farm lot? Are they integrated with food crops?
6. What benefits have you derived so far from the existing trees?
7. Are you interested to plant more trees in your farm? What kind of trees would you prefer to grow?
  - Fruit\nuts trees
  - Timber trees
  - Ornamental trees
  - Fuelwood trees
  - Medicinal trees
  - Others (fodder, soil conditioner\protection, etc.)
8. Do you already have the skill on how to propagate trees?
  - From seeds (including seed collection seedling production and maintenance

- Vegetative propagation (cuttings, grafting, marcotting, etc.)
- Field planting and maintenance

9. Do you have existing facilities (including labor) to raise your planting materials?

## Section 5: Food Availability

### 5.1 Crops

In a typical **WEEK** how much crops does your household consume, give away, sell, receive as gifts and purchase?

CROP	Total produced by the household Weight (lbs)						Received as gift (lbs)	Purchased from another household/ store	
	Total =a+b+c +d	Household consumption (a)	Preserve d (b)	Given Away (c)	Sold (d)	Sold (\$ Value)		Amount (lbs)	\$ Value
Taro (Colocasia)									
Cassava									
Banana									
Yams									
Taro (Xanthosoma)									
Coconut									
Sweet potato									
Breadfruit									
Other									
<b>Total</b>									

### 5.2 Livestock harvest

In a typical **WEEK** how much livestock does your household consume, give away, sell, receive as gifts and purchase?

LIVESTOCK	Total produced by the household Weight (lbs)					Received as gift (lbs)	Purchased from another household/ store	
	Total =a+b+c	Household consumption (a)	Given Away (b)	Sold (c)	Sold (\$ Value)		Amount (lbs)	\$ Value
Pigs								

Beef								
Mutton								
Chicken								
Ducks								
Other								
<b>Total</b>								

### **5.3 Seafood harvest**

In a typical **WEEK** how much sea food produce does your household consume, give away, sell, receive as gifts and purchase

SEAFOOD	Total produced by the household Weight (lbs)						Received as gift (lbs)	Purchased from another household/ store	
	Total =a+b+c+d	Household consumption (a)	Preserved (b)	Given Away (c)	Sold (d)	Sold (\$ Value)		Amount	\$ Value
Tuna and other deep sea fish									
Reef fish									
Shellfish									
Crab									
Lobsters									
Coconut crab									
Other									
<b>Total</b>									

### **5.4 Frequency of Consumption (Staple Foods)**

How many days in a typical week does your household consume the following produce? Check (√)

Food Items	Mostly (5+)	Sometimes (2-4)	Rare (once or less)	None
taro				
cassava				
Banana				
yams				
Coconut				
Sweet potato				
Breadfruit				
Other				

## Section 6: Imported Foods

### 6.1 Amount and Value of Imported Foods

In the following table, please provide details of the amount of each imported food item the household purchases in a typical MONTH. Also provide an estimate of the value of this food

Imported Food	Quantity imported (quantity in numbers e.g. cases)	Total Costs (\$ Value)
Rice		
Flour		
Ramen Noodles		
Canned fish		
Canned meat		
Soft drinks		
Chicken		
Mutton		

### 6.2 Frequency of Consumption (Imported Foods)

How many days in a typical week does your household consume the following produce? Check (√)

Food Items	Mostly (>5)	Sometimes (2-4)	Rarely (once)	None
Rice				
Flour				
Ramen Noodles				
Canned fish				
Canned meat				
Chicken				
Mutton				

## Section 7: Information, Communications and Extension

7.1 Rank the following media formats in their usefulness to receive information:

Format	Most Useful	Useful	Not Useful
Posters/leaflets			
Radio programme			
Newspaper			
Video programme			
Mobile phone			
Internet			

7.2 Do you own a mobile phone \_\_\_\_\_ yes \_\_\_\_\_ no

7.3 If you own a mobile phone, which service provider \_\_\_\_\_ Digicel \_\_\_\_\_ TCC \_\_\_\_\_

7.4 Do you own a smarthphone? Yes/No.

7.5 Do you know someone who owns a smartphone? Yes/No

7.6 Do you want to receive useful farming tips using text messages? Yes/No

If Yes, are you willing to pay for the text messages at 20cenets a message? Yes/No

7.7 Does your household have a computer? Yes/No

7.8 Do you have access to the Internet? Yes/No

7.9 Do you know your extension officer? Yes/No.

When did you last meet your extension officer? In the last six months? Yes/No.

7.10 Do you belong to a farmer network group? Yes/No. Name: \_\_\_\_\_

7.11 Do you belong to village group? Yes/No Name: \_\_\_\_\_