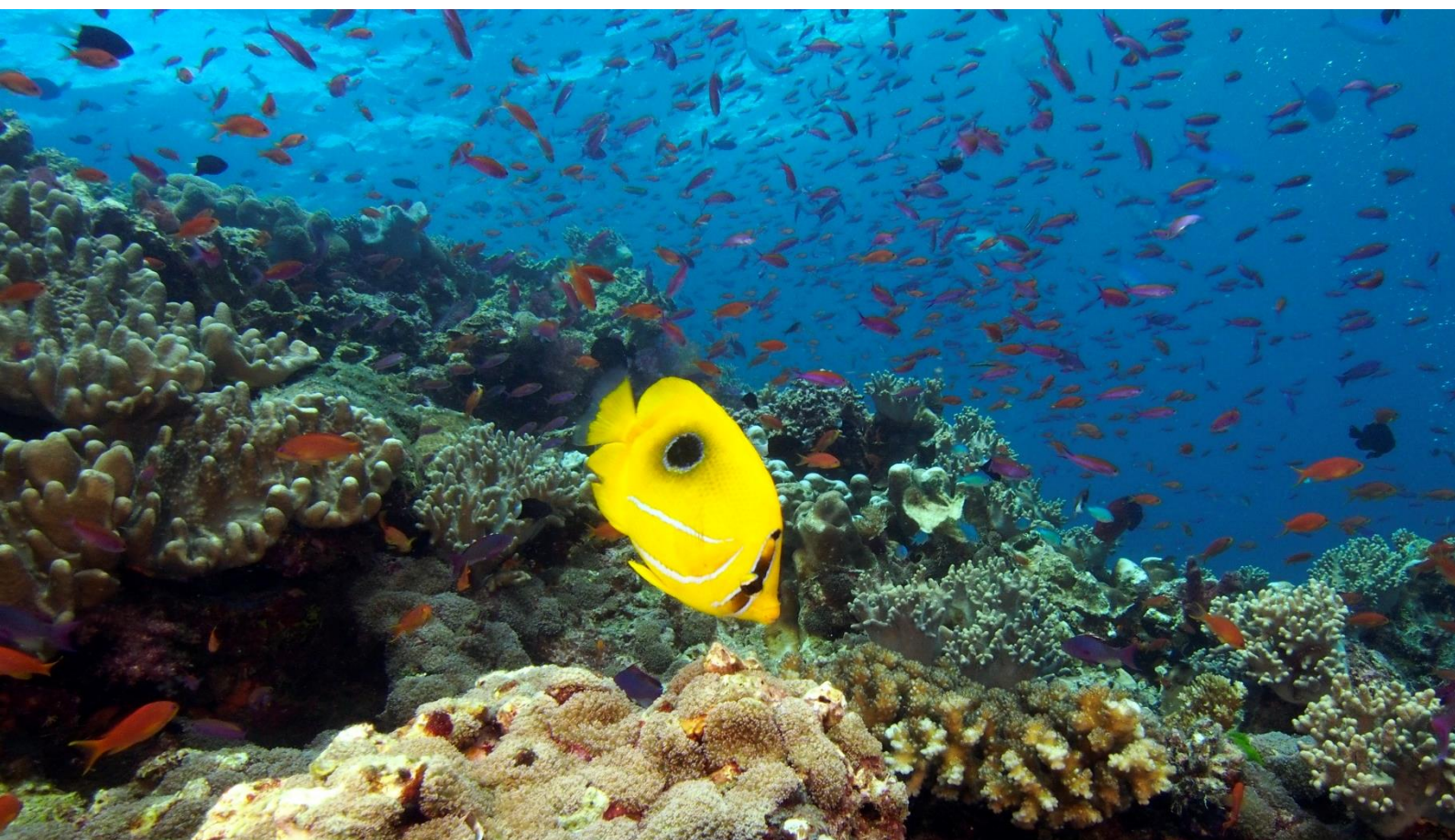




Pacific  
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RESCCUE

## INITIAL DIAGNOSIS OF THE RA PROVINCE PILOT SITE, FIJI



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## Introduction

The production of an initial diagnosis of Ra Province is a key part of the preliminary activities that will be undertaken by the operators at the early stage of project implementation. The overall goal of such a diagnosis is to allow for a precise characterization of Ra Province in relation to RESCCUE's objectives and program of activities. As such, the diagnosis also provides a **baseline**, against which the effectiveness and efficiency of the project can be evaluated. To this end the operator will update this initial "picture" with mid-term and end-of-project diagnoses.

The objectives of the initial diagnosis will determine the subsequent guidance with respect to diagnosis' contents. The **common framework** of RESCCUE allows the operator to carry out initial, mid-term and end-of-project diagnoses on the pilot sites in a coherent and consistent manner. As a guiding framework, it leaves room for adjustment to reflect each pilot site's specificities.

## Objectives

The objectives of pilot sites' diagnoses are fourfold:

1. **Strategic:** the initial and mid-term diagnoses shall help refining the programme of activities on each pilot site, including in the identification of "low-hanging fruits" (i.e. quick and easy-to-implement activities that will generate concrete results and facilitate stakeholders' mobilization around the project);
2. **Monitoring and evaluation:** the initial diagnosis shall set the baseline for mid-term and final project and sub-project (i.e. pilot site) evaluations. To this end, mid-term and end-of-project updates of the pilot sites diagnoses will be undertaken by the RESCCUE operators in 2016 and 2018. These will reflect how and to what extent the project successfully changed the baseline situation;
3. **Communication:** the initial, mid-term and end-of-project diagnoses shall be useful tools for communication about project implementation on each pilot site;
4. **Capitalization/dissemination:** the initial diagnosis shall help to clarify the objectives of each pilot site within the wider, regional project: how is a specific pilot site contributing to the regional learning process? Is it testing, learning, replicating, or initiating country- or region-wide changes in coastal management<sup>1</sup>?

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<sup>1</sup> See Billé R, Marre JBM (Eds). 2015. The RESCCUE approach. RESCCUE working paper, SPC, Noumea.

## **Data sources**

Data were obtained from the Fiji Bureau of Statistics for Ra province from the 1996 and 2007 National Household Census. In both cases, geographic boundaries of Enumeration Areas were also obtained. There were only minor changes to these boundaries between the two census periods in the rural areas; with several Enumeration Areas in 1996 being divided into multiple areas in the 2007 census. Within the urban areas of Rakiraki town many enumeration areas in 1996 were divided in the 2007 census. Accordingly, maps produced rely on the 1996 Enumeration Area boundaries for rural areas whilst all urban areas were merged into a single area for comparison.

## 1. Socio-economic Baseline

### 1.1 Physical environment

Ra province located in the north – eastern coast of Viti Levu in Fiji has a total of 93 *iTaukei* villages, 20 districts or *Tikina*, and has four main tribal boundaries of the *Vanua* known as the *Vanua Rakiraki*, *Saivou*, *Nakorotubu* and *Nailawa* which are all administrated by the Ra Provincial Council. ICM involves 9 of these districts directly

### 1.2 Demographic Information

The total population in Ra province is 29,464 (Fiji Bureau of Statistics 2012). Across Ra province, the age-sex population structure, which is shown below in Figure 1, shows a consistent pyramid similar to the national one. There are a large number at the base of the pyramid with the categories of 0-4, 5-9 and 10-14 years old and this indicates that there is high birth rate, high death rate and low life expectancy in Ra province. Even though comparatively few in number, it is clear that women in Ra province live longer than the men.

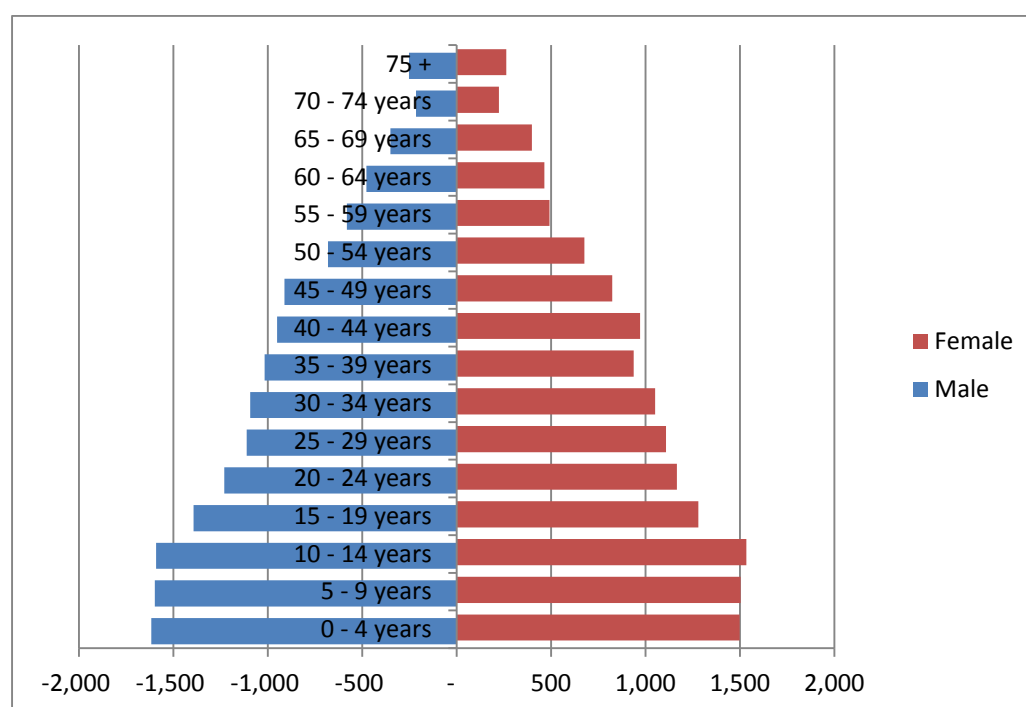


Figure 1 Ra Province population pyramid Source: Fiji Bureau of Statistics (2012)

Trends in population in the intercensal period 1996-2007 by ethnic group and by location (rural and urban) are shown in Figure 2. Some key information points include:

- The total population in Ra Province fell by 4.7% from 30,904 in 1996 to 29,464 in 2007
- By ethnic group the overall decline was driven the Indo-Fijian population which declined by 27.4% from 12,239 to 8,888 between 1996 and 2007.
- The iTaukei population during this period grew by 10.3% from 18,373 in 1996 to 20,259 in 2007.
- The overall urban population residing in Rakiraki town rose by 2.4% from 4,863 in 1996 to 4,952 in 2007. The Indo-Fijian population residing in the urban areas mirrored the trend across the whole province; declining by 25% from 3,285 in 1996 to 2,606 in 2007.
- By contrast the number of iTaukei living in urban areas grew by 33% in the same period

It is worth comparing some of these figures for Ra against the national averages for the intercensal period 1996-2007. The national population grew by 8%. Over the same period, the national rural population declined by 0.8% whilst the urban population grew by 18.2%

Nation-wide, the iTaukei population grew by 20.9% whilst the Indo-Fijian population decreased by 7.4%

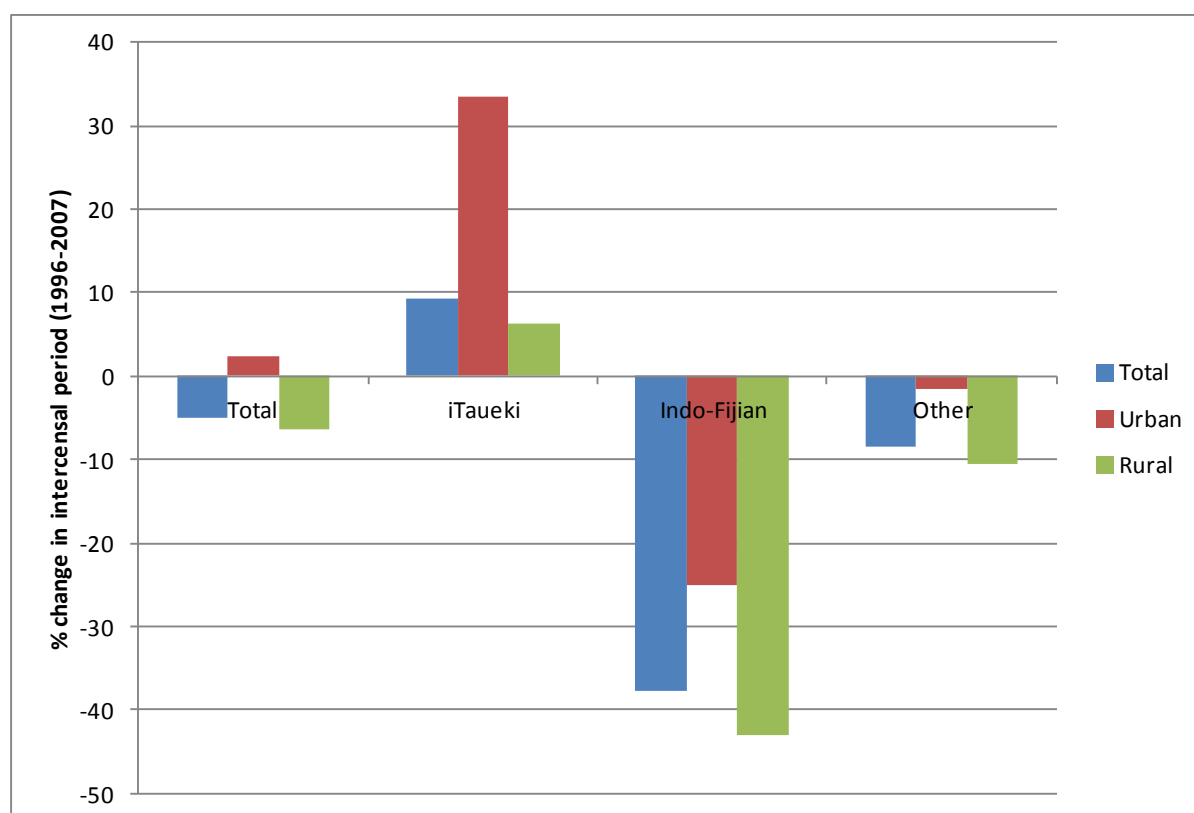


Figure 2 Geographical distribution of population and population change Source: Bureau of Statistics (2012)

### 1.3 Literacy and education

The education and literacy level in Ra province is high as shown in Figure 3. A majority (87%) of the population have received some formal education. When broken down, over 29% had reached Year 8 or less. About 27% reached lower secondary (Form 3 – Form 4) and a quarter (27%) had reached upper secondary school form of education (Form 5 – Form 7). Only a small (4%) percentage have furthered there studies at a tertiary level based on the 2007 census.

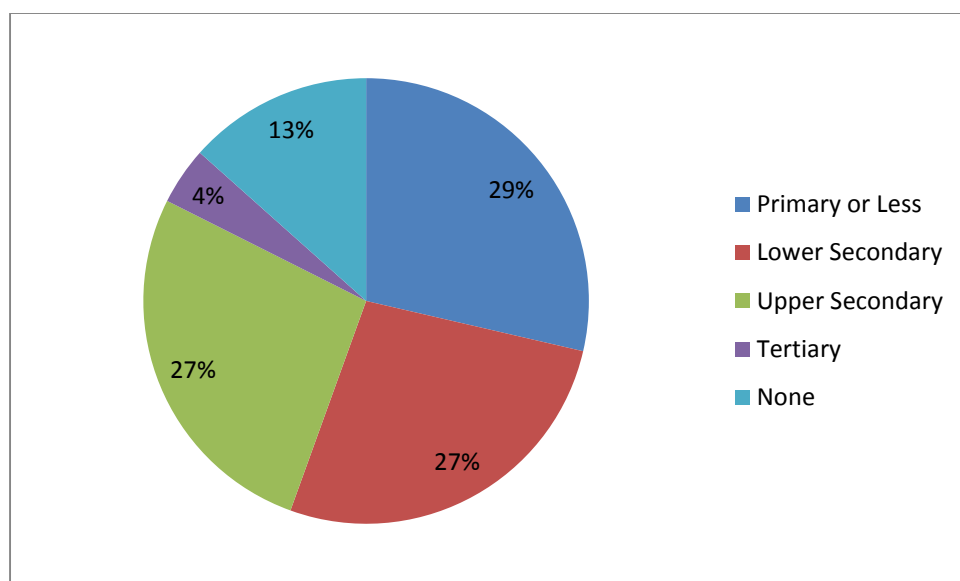
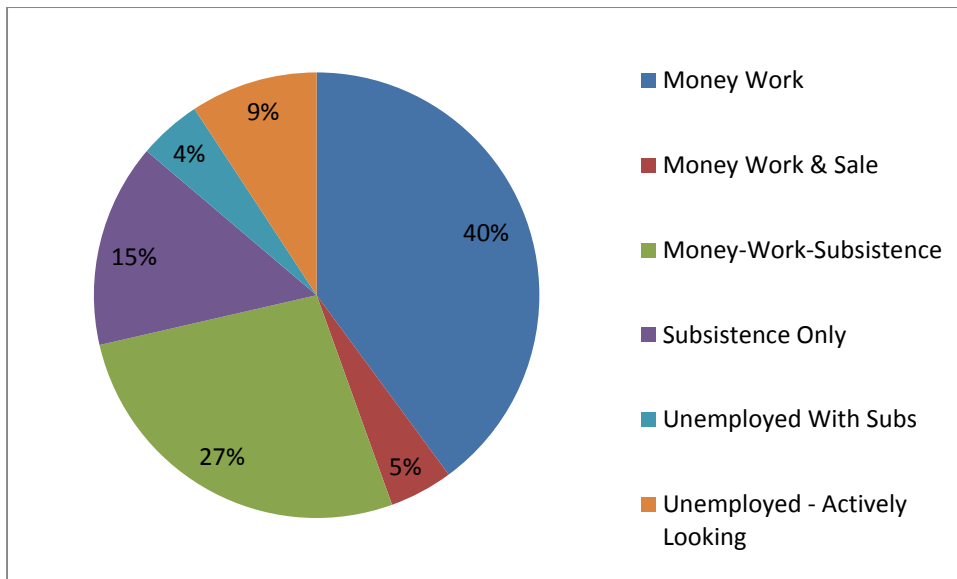


Figure 3 Education level attained in Ra Province Source: Bureau of Statistics (2012)

### 1.4 Employment

Based on the 2007 census, for the total population more than half (68%) of the population in Ra province are not economically active and the large number is mainly due to the inclusion of children in this analysis. It can be clearly seen that subsistence only contributed 15% to the employment level for the entire province. At the end of the scale money derived work and sale was the least form of employment at 5%.

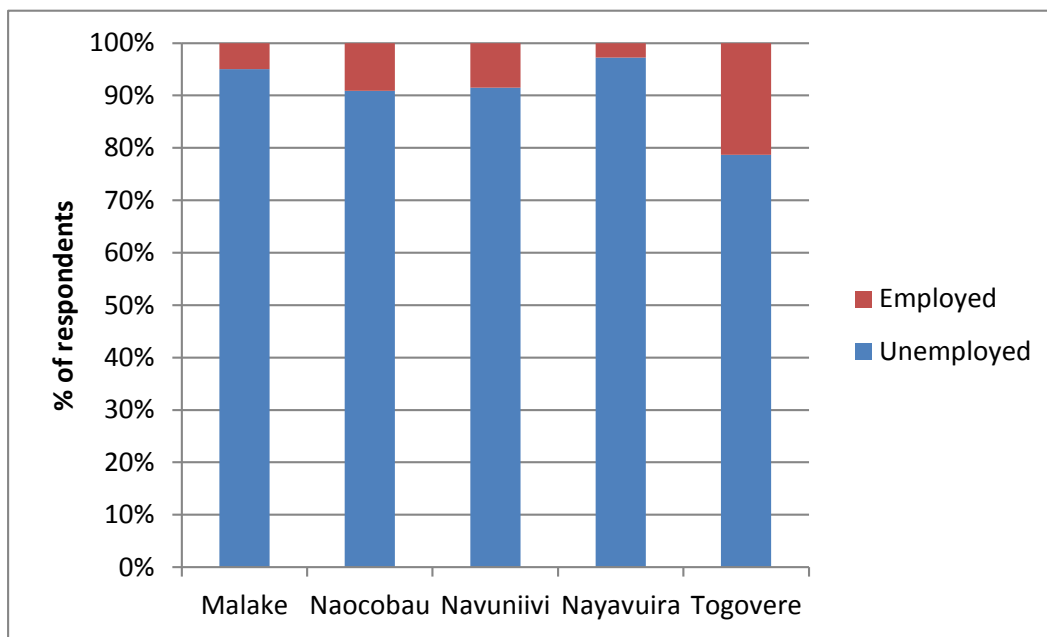




**Figure 4 Employment level in Ra Province**

**Source: Bureau of Statistics (2012)**

Fong, 2014 found that of the three-hundred and forty-nine individuals of working age (>14 years) and not currently in full-time education, eighty-nine percent were not in formal paid employment. There were some differences between villages however in the level of employment. Amongst individuals in Togovere village, 31% have paid employment whilst across all the other villages only 7% of individuals were in paid employment. Togovere village is adjacent both to main Kings highway and, as such has good transport links to labour markets, and the Fiji Water factory which offers local employment opportunities (Error! Reference source not found.).



**Figure 5 Proportion of non-school age respondents that are in the formal paid employment by survey village (Fong, 2014)**

Source: Fong (2014)

Amongst those in paid employment, all but one individual worked eleven or twelve months (as a full-time job) in the preceding year. The median salary for all workers across all villages is FJ\$600 per month.

There are several hotel and touristic destinations that offer employment to the population in the province of Ra, the Tanoa Rakiraki Hotel and the Wananavu Beach Resort. Volivoli Beach Resort. Dream View Villas, Golden Point. The island of Nananiu I Ra just a few kilometres off the coast of Rakiraki town and there are a few more tourist accomodations (i.e. Bethams Beach Cottage, Mc Donald's Cottages, Mokusiga Hotel, Nananu i Ra Resort). Dolphin Island Resort is on Dolphin Island close to Nananu I Ra island.

## 1.5 Natural Resource Use and Dependence

### 1.5.1 Marine resource use and reliance

Fong (2014) noted that from the one hundred and forty-two individuals<sup>2</sup> who reported going fishing or collecting from the sea, nineteen (or 13%) reported holding a fishing license enabling them to collect fisheries resources and subsequently sell their catch (Figure 6). The majority (87%) of these licenses were held by men. Furthermore, all but two of the ninety-four households in the survey reported that one or more household member goes out fishing every month. The median number of fishing trips made by one or more members of the household across all villages is eight. The median number of fishing trips made by households was highest in Malake village (median of twelve trips per month) and lowest in Nayavuiira (median of four trips per month) (Fong 2014).

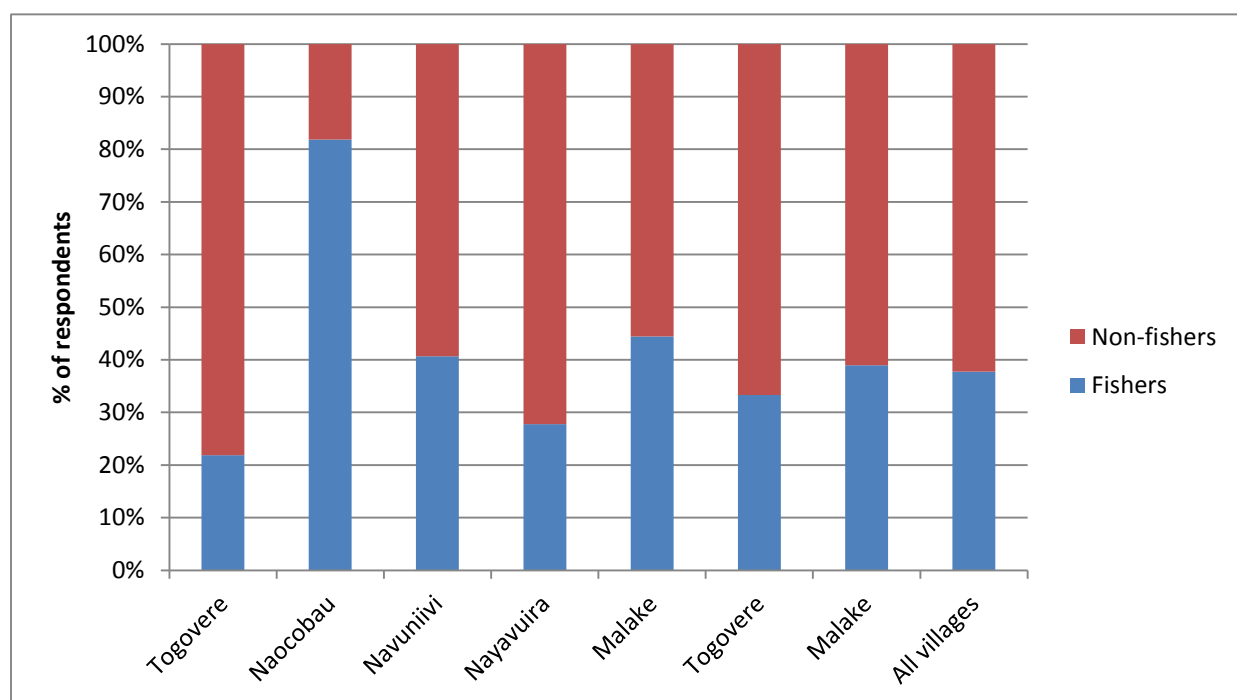


Figure 6 Proportion of respondents by survey village that reported regularly fishing

Source: Fong (2014)

<sup>2</sup> This only includes those individuals aged 14 years and over. Typically children accompany parents when fishing, though are not the main fishers during these trips

The most commonly used fishing methods across all villages are the use of a spear (or spear gun) and hook and line. There is no difference between the use of fishing gear between the wet and dry season, with all households using the same gear across both seasons. The spear (or spear gun) is most commonly used in Malake village where it is used on 67% of fishing trips. Hook and line is most commonly used by households in Nayavui. Nets are only used by households in Togovera where they are set adjacent to the mangrove areas (Fong, 2014).

Reported catches varied widely between households from the same village, using the same gear and fishing in the same season. The average maximum catch per fishing trip reported was 38kg on fishing trips using spear guns amongst households from Nayavui. Overall, across all villages, the average catch from using spears or spear guns was higher than using the other fishing methods (Fong, 2014).

Fong, 2014 highlighted that across all villages, 45% of households reported using more than 75% of their catch for home consumption whilst only 23% reported selling more than 75% of their catch. Whilst all households gave some of their catch away, the proportion overall was small, with 95% of households giving away less than 25% of their catch. The proportion of households in Malake (80%) that reported selling 50-75% or more than 75% of their catch was highest that amongst any of the other villages whilst in 75% of households less than 50% of the catch was consumed at home. By contrast, in Navuni, 77% of households reported using more than 75% of their catch for home consumption.

Milkfish is being farmed by the women of Vitawa village as a food-security project to increase the amount of fresh fish available to village households. This project was initiated in and funded by JICA in 2010, in collaboration with the South Pacific Liaison Office for Fisheries and Aquaculture International (FAI) and the Fisheries Department. The milkfish (*Chanos chanos*) fingerlings are caught from surrounding mudflats and placed in nursery ponds to be cultured then moved to grow-out ponds. The women harvested 250kg milkfish in December of 2014. Similar projects can be replicated in other

Department of Fisheries also has a multi-purpose hatchery in Caboni where tilapia, shrimp, prawn, dairo and other species are going to be bred. Currently only tilapia and prawn are

being bred and supplied to nearby farmers who are mainly subsistence farmers. The aim of the hatchery is to produce seedlings and be able to supply farmers in the western division. The hatchery will also enhance food-security, improve livelihoods and generate income for farmers and communities through fish farming.

### **1.5.2 Farming**

Due to its geographical location and its isolation from urban development centres, most economic activity in Ra exists within the agriculture sector. Land use characteristics determine the agriculture activities that exist in the area. As for commercial agricultural production, the sugarcane belt generally occur along the coastal parts of Rakiraki and Saivou districts and has extend further to the flat plains of Nailawa and major source of income along the Nakorotubu coast is coconut with common subsistence farming occurring mainly on the slopes of the higher terrain in nearly all parts of the province.

Fong, 2014 noted that practically all respondents had access to land for farming with recognized tenure arrangement. All the respondents from the survey reported to have a farm; mainly for subsistence purpose. Also, all the respondents responded that the land they have access to are owned based on traditional rights; the mataqali land owning system in Fiji. Furthermore, the average farm area cultivated by household members in the five study sites is shown in Table 1. Considering all the farming areas, the average farm area cultivated by the households in the five study sites is 0.52 acres.

**Table 1 Average farm area cultivated household members in the five Ra study sites**

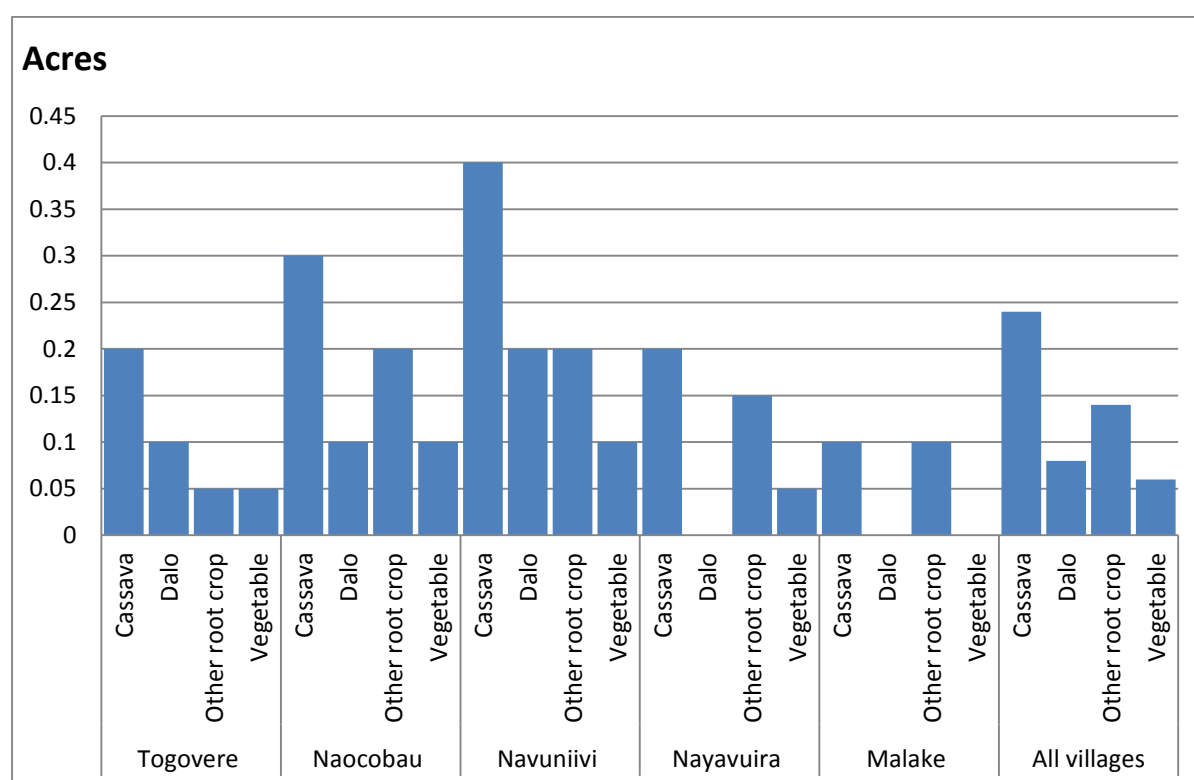
<b>Villages</b>	<b>Average available farming area (acres)</b>	<b>Average actual farming area</b>
Togovere	8.3	0.4
Naocobau	10.7	0.7
Navuniivi	13.8	0.9
Nayavuiria	6.9	0.4
Malake	2.7	0.2
All villages	8.5	0.52

Source: Fong (2014)

Naocobau and Nauniivi are both located towards the west side of eastern Viti Levu, therefore, they have more fertile land compared to the other three villages and as a result

have more average available farming area and farming plays a major role in the livelihood and income of these two villages.

In 2012, the breakdown of the major types of crops cultivated by the five study sites together with the area cultivated for each top 4 crops are shown in Figure 7.



**Figure 7 Crop are in each village**

**Source: Fong (2014)**

All households in the survey reported using the majority of their crop yield for consumption at home.

Overall, across all villages, 95% of households reported using more than 75% of crop harvest for home consumption whilst only 5% reported selling more than 75% of their crop harvest. Whilst all households gave some of their crop harvest away, the proportion overall was small, with 95% of households giving away less than 25% of their catch. The proportion of households in Navuniivi and Naocobau (80%) that reported selling 50-75% or more than 75% of their crop harvest was highest that amongst the other three villages. By contrast, in

Malake, 100% of households reported using 100% of their crop harvest for home consumption (Fong 2014).

### **1.5.3 Livestock and Poultry Production**

Livestock and poultry production information collected from those households in the study by Fong 2014 noted that at least one member of the household is a livestock/poultry holder. Basically, livestock and poultry production in the five villages is mostly for subsistence use. Of the total one hundred and twenty four households interviewed, 88 percent were livestock holders.

Table 2 shows the proportion of livestock and poultry households by type of livestock and place of residence. About 51 percent of livestock households have poultry and only a few of the households have sheep, goats, horse and duck. Pig and cattle are also important with about 23 and 12 percent respectively of livestock holding households reporting ownership. Pig is mostly used as meat during traditional or church feasts. Togovere village which is close to Yaqara Pastoral Farm has the majority of cattle ownership (Fong 2014).

**Table 2 Proportion of livestock and poultry households by type of livestock**

<b>Village</b>	<b>Cattle</b>	<b>Horse</b>	<b>Goat</b>	<b>Pig</b>	<b>Chicken</b>	<b>Duck</b>
Malake (36)	0	0	2	8	21	0
Naocobau (14)	1	1	0	3	5	0
Navuniivi (26)	4	2	0	5	14	0
Nayavuiria (15)	1	0	0	4	6	0
Togovere (33)	9	7	4	9	17	4
<b>% of Household</b>	12	8	5	23	51	3

Source: Fong (2014)

The only issue raised by the livestock owners, all for cattle, horse and goat owners is the continuous dry spells that always affect pastures.

## 2. Environment status in Ra Province

### 2.1 State of the Environment

The rainfall pattern in Ra province is highly seasonal with average annual rainfall greater than 3,200 mm (Atherton et al., 2005). Particularly looking at average monthly rainfall patterns from the nearest Fiji Meteorological Station in Penang, Rakiraki reveals a total monthly rainfall of 591.8 mm in the wet season sampling of February.

Ra province lack solid data on the overall status of the environment however, past technical reports have highlighted some information on the status of some of the critical ecosystem in Ra province. Morrison and Nawadra, 2009 described two unique terrestrial systems in Ra province, Nakauvadra and Yaqara range as critical for conservation due to its role as water source and a proposed REDD+ site. The Biodiversity Rapid Assessment Program conducted in Nakauvadra and Yaqara watershed documented 520 confirmed species, including a number of rare and endangered species. The discovery of the Fiji Ground frog (*Platymantis vitianus*) which was thought to have been extirpated 20 years ago from mainland Fiji (including Viti Levu) was a highlight of the survey.

From the assessment, three of Viti Levu's globally threatened bird species were recorded, the Fiji long-legged warbler (*Trichocichla rufa*), the Black-faced shrikebill (*Clytorhynchus nigrogularis*) and the Friendly ground dove (*Gallicolumba stairii*) along with two rare and endemic stick insects *Nisyus spinulosus* and *Phasmotaenia inermis*. Two plant species of particular interest found were *Degeneria roseiflora* (Viti Levu endemic, rare) and *Neosalsomitra integrifoliola* (rare in Fiji). New records and range extensions were made for a number of species in all taxa. These results suggest that due to its moderate to high biodiversity and relative isolation, the Nakauvadra Range should be targeted for conservation action (Morrison and Nawadra, 2009).

In terms of marine ecosystem, Tikaram and Dautei, 2014 found that overall hard corals, silt, algae and other abiotics were the four dominant categories in terms of substrate cover over the entire study stations of Navitilevu Bay, Togovere, Malake and Naocobau. The dominance of slow growing reef building organisms (such as hard corals) over fast growing non-reef



building organisms (such as algae) at a majority of the study stations namely Navitilevu Bay, Togovere and Malake indicate a generally healthy reef, however significant coverage of algae and silt also indicate anthropogenic influence and shifting state of the reef. A biological survey on two reefs in Nakorotubu in 2006 found that although coral life seemed healthy, fish stocks were average (Bogiva, 2008). This led to the declaration of 10 coral reefs as Marine Protected Areas (MPAs) in 2007, and this was further solidified by the reef-to-ridge concept where chiefs in the interior highlands of Nakorotubu have given their support to their coastal kinsmen (Bogiva, 2008).

Five seagrass species and one subspecies are reported from the Fiji Islands: *Halodule pinifolia*, *Halodule uninervis*, *Halophila ovalis*, *Halophila ovalis* ssp. *bullosa*, *Halophila decipiens* and *Syringodium isoetifolium* (McKenzie and Yoshida, 2007). Tikaram and Dautei, 2014 highlighted that three seagrass species and one sub species (*H. ssp. bullosa*) were recorded from their study. The absence of seagrass on the survey sites within the bay may be due to a number of factors including environmental dynamics such as silt. Seagrass loss being anthropogenic-induced retreats the seagrass beds to shallower depths due to light availability (Tikaram and Dautei, 2014).

For Navitilevu Bay, the siltation may have prevented the growth of seagrass leaving the well-flushed Nayavaira reef flats the most suitable for growth (Tikaram and Dautei, 2014). Dixon (2000) also discusses the light factor whereby a decrease of which leads to increased phytoplankton and algal growth. Thus it can be said that a contributing factor to the absence of seagrass beds (and abundance of macro algae) for Navitilevu Bay and Naocobau is reduced light intensity due to silt. Siltation is increased via anthropogenic activities such as deforestation inland, unnecessary burning of vegetation as well as mangrove removal on the coastline. Additionally seagrass beds can be reduced via macroalgae growth that are boosted by nutrient-enriched water, which enhances algal bloom over the slow-growing benthic macrophytes (Tikaram and Dautei, 2014).

## **2.2 Environmental issues**

This section highlights some of the environmental issues faced by the province of Ra and the list was extracted from the various reports and documentation that the team reviewed. A major issue encountered in this exercise is the unavailability of data for the various components, information from technical and workshop reports were then used.

Being one of the sugar producing provinces in Fiji, the majority of the environmental threats in the province are related to anthropogenic land-based activities.

### ***2.2.1 Unplanned land-based development***

Industrial, commercial, agricultural and settlement expansion have changed the land use of Ra province. Threats to agriculture and agro-ecosystems are caused by unsustainable practices. Examples of unsustainable farming practices include the on-going expansion of commercial cropping onto marginal lands, cropping on fragile soils without land conservation practices in place, deforestation and burning of grasslands, and cultivation of lands right to the edge of rivers and stream. These practices can result in both on site and off site impacts: On site (on agricultural land) impacts are shallow drainage, visible soil loss, topsoil loss, runoff creating water ways, soil fertility loss, underdeveloped crop growth and poor soil structure. Off site (beyond agricultural land) impacts are water pollution, sedimentation (sea & rivers), reduction of river and drainage capacity, flooding and siltation.

Furthermore, most farmers rely on NPK fertilizers for farming and use pesticides or weedicides in their farms. Farming on slopes or inclined areas is also common in Ra province. Sugar cane farm are usually burnt during the harvest period to speed the task of harvesting, clear weeds and undergrowth, destroy insects, solve labour problems, minimize labour costs, increase crop weight, advance milling priority. Burning is one of the more common unsustainable farming practices used in the province of Ra to clear farming areas which always result uncontrollable burning lots of different areas to farm (Jupiter *et al*, 2012).

Apart from deforestation and bad agricultural practices another other development some of the expansion activities involve foreshore reclamation. Some developments have ignored environmental impact assessment (EIA) requirements without any punitive legal action by

the authorities responsible for their regulation. An example is the illegal extraction of gravel from Penang river and other river system over the past years without any proper EIA being conducted. Among the results are losses of mangroves and increased pollution which has adversely affected fish stocks. Recruitment of many fish stocks is reliant on mangrove and other near shore habitats (SPREP, 2014).

### **2.2.2 Pollution**

The land based development has produced a number of pollutants that find their way to the sea, however due to the lack of scientific data this argument is based on community observations and perspectives. Earth-moving activities erode top soil that is carried by run-off that increases the amount of sediments in the sea. Agriculture, particularly sugarcane plantations which is widely cultivated in the province, adds chemicals from fertilizer and pesticides to the run-off. Settlements and resorts produce sewerage whilst sugar mills produce effluents as part of the sugar extraction process. Heavy manufacturing industries are not common in Ra province, the Penang sugar mill is the only industry that has major waste output, which during the crushing season is always discharged into the nearby Rakiraki river. This mix of pollutants increases the sea's nutrient load (Jupiter *et al*, 2012).

In the province of Ra, community waste water management was identified in all of the ICM districts as one of the main issues faced for coastal management (IAS 2013). Wastewater may be defined as any discharge into the environment (effluent or sludge) with or without treatment (human excrement, effluent, flushing water, industrial water and stormwater) (SOPAC, 2002). Village toilet systems in Ra still use drums for septic tanks which over time rusts and the holes on the sides of the drums tend to clog and plug up causing it to flood. There is no management of grey and black water run-off in villages (Fong and Dautei, 2015). Contaminants of concern that are present in wastewater include pathogens (microorganisms), nutrients, heavy metals, suspended solids, biological oxygen demand (BOD), and oil and grease. The discharge of untreated or inadequately treated wastewater from villages and industries like the sugar mills, agriculture, and sewage increase the nutrient levels in sea water which lead to macro-algal outbreaks on the coral reefs resulting in the death of live coral, loss of settlement sites for coral larvae, as well as a loss of habitat heterogeneity necessary to support a diverse range of organisms (Tikaram & Dautei, 2015). As a consequence algal-dominated reefs have been noted to be lower in fish stocks, have

less tourism appeal and coral biodiversity (Goreau & Tacker 1994; McCook 1999). High levels of phosphorus can also lead to a reduction in structural density of stony corals, causing them to lose their strength and crumble (Kinsey & Davies 1979). The major sources of nutrients to Fiji's coastal waters are typically from human waste and chemicals (e.g. detergents, fertilisers). Poor (septic tanks, 1<sup>o</sup> treatment, pit latrines) sewage treatment is carried out in most areas of Fiji (Greenpeace 1997, IAS 2004).

### **2.3.3 Sedimentation**

Though part of natural processes, excessive run-off has an increasingly pronounced effect on the biota of the coastal zone. Sedimentation from earth-moving activities and alteration of the watershed through farming and logging in Ra province is exacerbated by extraction of gravel and boulder material from the creeks and rivers. In large measure, this has enhanced the transport of sediments into the marine environment. Swidden cultivation in Ra province has expanded with the population (Jupiter *et al*, 2012). To open the swidden field, the natural cover is burned exposing the soil to water action that produces more sediments. Sediments smother the corals and sea-grass adversely affecting biological communities. Deposition at the river mouths within major rivers in Ra has been observed to be increasing to the detriment of the fishers who have observed a decline or change in the nature of their catch and is also widely though responsible for decreased river flow capacity and flooding events during periods of heavy rainfall.

### **2.2.4 Gravel extraction**

As development increases in the province of Ra, aggregate demands increase putting pressure on local river gravel sources. Gravel extraction in Ra has occurred in the past in wade-able streams which can be detrimental to the abundance and diversity of fresh water fish species. Wade-able streams have lower reaches that have the highest diversity and abundance of fishes (Copeland, L 2013). In addition it is important to maintain the natural flow of streams to conserve to freshwater fishes. According to the Lands Department in Lautoka and the iTKLB North/Western Office, no licenses for gravel extraction has been issued for the Province of Ra in 2014 to extract gravel in either Crown Land or Native Land areas or rivers, however gravel extraction was identified and highlighted in the district of Saivou in Ra (IAS 2013). It is assumed that contractors go directly to land owners for permission to extract without following the proper procedures. Another assumption is that

contractors use their license to extract from one particular area to extract gravel from other areas. More reported occurrences have been brought up through Ra ICMC (IAS 2014).

### **2.2.5 Overharvesting of coastal resources**

Subsistence fishing is an important aspect of the socioeconomics of many village communities. In 1992, the estimated catch from the province's subsistence fishery was 16,400 metric tons but a more recent study (IAS 2012) put it at 3,515 metric tons. The reduction of fish catch in spite of increasing population and use of more efficient fishing gears can only be explained by the reduction of fish stock. The harvest of undersize catch is widespread. Due to increasing scarcity of fish catch (IAS 2012), the reliance on the natural marine environment for traditional subsistence sometimes comes in conflict with commercial fishery and at times, with industries and tourism.

### **2.2.6 Destructive Fishing Methods and Poaching**

In the province of Ra, destructive fishing methods are also prevalent in fresh water surface sources such as rivers and streams. A freshwater ecosystem includes all living and nonliving things within and immediately surrounding freshwater sources, vegetation, animals and birds that share the area as their habitat. Fresh water is a critical resource, needed for a strong environment, society and economy (Jupiter *et al*, 2012).

The use of traditional poisons like the root, bark or stem of the *Derris elliptica* plant (*duva*) make an easy harvest of the large target fishes but kills all the small fish as well. In a rapid assessment of fresh water fish in the Nakauvadra Range in Ra by Jenkins (2011), one of the major threats identified was the common usage of Derris roots as means of catching fish. The use of these poisonous plants can change the quality of water by depleting oxygen and suffocating all aquatic life. Although it is not really effective in free flowing, highly oxygenated waters, life forms in ponds and slower flowing waters are severely affected. It is indiscriminate and will also kill all juveniles, thus removing future potential populations.

In fresh water streams and creeks, pesticides and insecticides are also used to poison fish. In Ra, the pesticide is mixed with bleach and this solution is passed through plastic pipes to fish, eel and prawn holes in the creek. Every other living creature in the vicinity and downstream is poisoned. Any object, matter or chemical carried down rivers and streams,

or seeping into the ground, either gets deposited on the banks of rivers as a potential threat to surrounding wildlife, or finds itself in the sea or reefs.

At the Ra ICM Planning meeting held in November of 2012 and the Ra ICM Turaga ni Koro workshop held in May 2013, destructive fishing methods was identified in both marine and fresh water systems in Ra (IAS 2013). Examples of these destructive fishing methods were:

- Use of Derris roots (*duva*) in streams, creeks and sea with catches sold
- Use of insecticides, pesticide and other chemicals to poison prawns (fertilizer NPK mixed with bleach)
- Use of crow bars to take apart coral houses of fish
- Use of nets less than 2 inches
- Use of underwater breathing apparatus
- Catches less than the legal sizes

Also in this meeting it was noted that poaching was highest prioritised issue. Poachers are mainly the resource owners themselves either from within or outside their districts and province and also those fishers from outside the province.

### **2.2.7 Climate Change**

Fiji is prone to El Nino events and tropical cyclones due to its positioning relative to the South Pacific Convergence Zone (SPCZ). During an El Nino Southern Oscillation (ENSO) event when conditions are drier and hotter than normal, the rise of sea temperature can bleach the corals. During wet season (November–April) Fiji is normally traversed by tropical depressions and or cyclones as it lies directly in their normal path. The cyclones, which are expected to increase in intensity and frequency, normally intensify wave action that reduces corals to rubbles, wipe out sea grass beds and inundate coastal areas. The continuing sea-level rise (SLR) has already increased coastal erosion and coastal inundation. In some cases, it caused mangrove forest to retreat. All these impacts are bound to affect coastal habitats, fisheries and food security.

### **3. Governance**

#### ***3.1 Government and policy***

##### ***3.1.1 Central government***

Central government is housed in Suva the capital city. The country is divided into four Divisions; Central (which includes Suva and all areas that are subsequently discussed in more detail in later sections of this report), Western, Eastern and Northern. Each of these divisions is headed by a Commissioner. Whilst the administrative importance of these divisions has historically waxed and waned, recent efforts by government have promoted planning, budgeting and resourcing at the divisional level. Within each division there are then a number of provinces. There are 14 Provinces in total in Fiji. Ra Province is part of the Western Division. The central government provides the legal platform and policies for environmental management work including ICM, climate change, sustainable development and other related issues.

##### ***3.1.2 Provincial government***

The functions of central government are decentralized at the provincial level. Each province has a Provincial Administration which is staffed by a number of largely government employees who have oversight of the functions of service provision to the population that reside in that province. The Ra Provincial Administrator is based in Nanukuloa village, approximately 60 kilometers from Rakiraki town, Ra's main urban center.

The Ra Provincial Office is headed by the Roko Tui<sup>3</sup> Ra. Most government functions are controlled at provincial level; though there are notable exceptions such as health care and educational provision which is decentralized to the divisional scale in the first instance. The Provincial Office's role is to look after affairs of the indigenous people in Ra province.

##### ***3.1.3 City and municipal councils***

In addition, there are twelve city (2) and municipal (10) councils that oversee the governance of urban areas. These councils comprise elected officials and are headed by a government appointed Special Administrator. Through the Ministry of Regional

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<sup>3</sup> Based on a decision in 2011 the Roko Tui is no longer necessarily a paramount chief; and is appointed by central government.

Development, rural areas are divided into Local Authorities that have advisory powers and provide a voice to all Fijians irrespective of racial background at the provincial scale. The local authorities also have mandate over the issuance of development licenses in the areas they control and also to foster businesses development.

Rakiraki is the only town in Ra province. Prior to 2006, it was only a business center for people in Ra province, however in October 2006 it was officially incorporated as a town through endorsement of Ministry for Local Government and Urban Development.

#### ***3.1.4 Indigenous I-Taukei***

In parallel to the state run-government there is also a contemporary governance system linked to the indigenous iTaukei. The indigenous population iTaukei exist through family-units in a number of villages; with a number of villages comprising an iTaukei Tikina (district); and with a number of tikina comprising a province. Note however, there is a discrepancy between the iTaukei tikina district and the colonial definition of district which is used as an administrative unit for purposes including, in particular, the conduct of national census. Within each tikina there exists the Tikina Council which is comprised of village chief and village headman from the villages within that tikina. At the top of the Ra iTaukei administrative system within the province sits the Ra Provincial Council which is comprised of indigenous leaders with the paramount chief of the province as the head and the Roko Tui Ra as secretary, providing the link between the Provincial Council and the Provincial Office. The Provincial Council works with the Provincial Office to implement development programs and address development issues within Rau Province.

Typically each rural iTaukei village will have a number of development committees comprised of community members and leaders. Each committee oversees a specific component of the development of that community. Committees typically include education, church, health, environment and village development. Depending on the communal ownership of assets there may also be, for example, a village carrier (vehicle) committee. In addition, women and youth normally have a committee. Committees report to the wider village meetings. Village meetings are held at least monthly; often every fortnight or weekly. Village meetings are chaired by the village chief with the village headman normally acting as secretary. The village headman is now paid by government to perform their role and acts as



a conduit from village to Tikina meetings which in turn pass to the Provincial Council and Provincial Office. Similar governance processes to those in iTaukei villages exist in Indo-Fijian settlements- in which Advisory Councils convene meetings and oversee matters pertaining to development initiatives in the settlement.

The traditional governance system for communities within Ra Province consist of four major Vanua; Saivou, Rakiraki, Nalawa and Nakorotubu, which was the basis for division of districts during the colonial era. This governance system is important as decisions regarding natural resources management and development are made in the various levels of the traditional governance system.

### ***3.2 National ICM Policy***

Fiji's Roadmap for Sustainable Socio-economic Development (FRSSD) 2014-2019 defines the implementation framework for Fiji and the National Climate Change Policy serves as an implementing tool for many of the strategies outlined in the Roadmap, such as:

- environmental protection, sustainable management and utilization of natural resources;
- strengthening institutional capacity for environmental management; and
- strengthening food security.

ICM work supports FRSSD in Fiji and is guided by the Fiji Environment Management Act, 2005. The establishment of the ICM Subcommittee was approved by the National Environment Council under the Fiji Environment Management Act in 2009. Since then, it has been meeting regularly and has produced a "Framework for the Establishment of ICM in Fiji". Upon consultation with stakeholders, the ICMC determined that a more suitable first step would be to develop a framework for a national coastal plan "to review current coastal conditions in the context of tourism development, coral reef degradation, siltation and erosion, harvesting of marine resources, waste management, coastal reclamation and construction and natural disasters among others as well as assess the current legal and institutional governing framework so as to recommend proposals for action and policy towards sustainable coastal resource management for Fiji" (DoE 2011). One of the main recommendations from the Plan is to use the framework to build on experiences from bottom-up planning to develop provincial- level ICM plans that can be consolidated into a national document.

In 2012, ICMC was asked by the NEC to act as the advisory body for the Coral Triangle Fiji project, which is providing via the Asian Development Bank US\$1.3 million for work in coastal management. For the Coral Triangle Fiji project, a work plan has been developed and since the Department of Environment was not allocated funds to implement the project, the

ICM Subcommittee arranged for a group of Fiji NGOs to undertake field activities while the Department of Environment maintained the core Secretariat role. The project document identified Ra as an ICM pilot site with a focus to develop an integrated coastal resource management plan for the province. The main goal of the plan is to help improve the resilience of coastal and marine ecosystems to the impacts of climate change. In early 2012, a two-day national ICM workshop was held in Suva and an output from this meeting was the development of a national ICM Strategy.

At the provincial level, a number of workshops were held with communities across nine coastal districts of Ra province during the second half of 2012. The main goals of these exercises were to review existing community resource management plans from previous Locally Managed Marine Area (LMMA) initiatives for six districts, develop new management plans for three outstanding districts and sharing best practices for addressing issues such as gravel extraction of rivers, burning, poaching, destructive methods of fishing, community wastewater management and unsustainable farming practices. From this ICM Provincial Planning workshop, a provincial ICM plan was developed and also the setting-up of the Ra ICM Committee with the role to oversee the implementation of the ICM plan. The Committee comprises representation from provincial-level government, non-government, communities, and the private sector, and has since met twice in December 2012, and March 2013 respectively.

The main outcomes from the two Committee meetings include the confirmation of a Vision and Mission Statement for the province of Ra; Terms of Reference for the Ra ICM Committee, including roles and responsibilities Committee members; development of a Provincial level Strategy and a work plan for 2013.

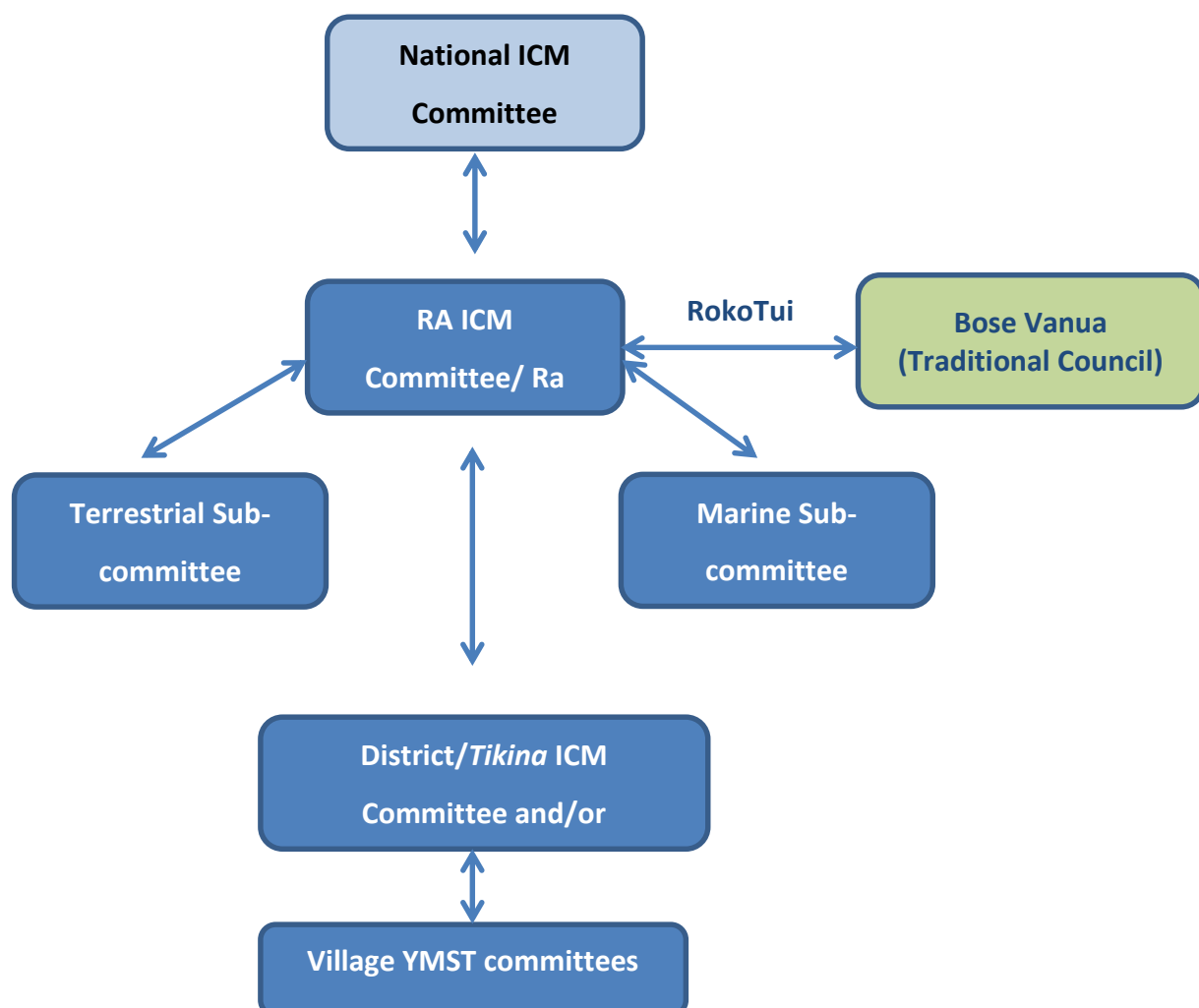
### **3.3 Ra ICM governance structure**

The existing governance structure of the ICM in Ra has been shaped around the existing resource management structures in the iTaukei communities called the Ra Yaubula Management Support Team (YMST). It is housed at the Provincial Office and managed by the *Roko Tui* and his office. There are branching units of the YMST at the district and village levels.

The *tikina* or district YMST consists of *yaubula* committee leaders from each village. They review and update the *Tikina* or District and *Yasana* or Provincial strategic action plans based on the implementation of the village action plans. The smallest management unit is the village-based YMST. This unit holds the most important role, being the implementer of the management plans developed by the district and village levels.

With the adoption of the ICM concept, a more holistic approach to resource management in coastal communities is taken, this time to include all resource users, issues and stakeholders

within a coastal resource area boundary. In addition to YMST members, equal numbers for the business, NGO and government sectors are included. This body approves the action strategies to be implemented in the province of Ra. This committee is then divided into 2 subcommittees, one to look after the terrestrial issues and the other to look after the marine issues of ICM. These committees consist of the relevant government department representatives who work with the District or *Tikina* YMST committees to develop and review action strategies for the coastal management and assist the village YMSTs to implement them.



### 3.4 Communities and other stakeholders

Being located in one of Fiji's main sugar cane farming town, stakeholders in Ra province comprised of a mix of indigenous and cane farmer focused, NGOs and business operators. Table 3 present a brief summary of a stakeholder analysis conducted to understand the key decision makers and key players regarding development and resource management in Ra.

**Table 3 Key stakeholders and drivers in Ra Province**

<b>Category</b>	<b>Stakeholder</b>	<b>Role within Ra province</b>
Indigenous Village	Village Council	Decision making body for village development
	Church	Spiritual growth of congregation
	Village traditional Council	Decision making body on social issues experience by the village
	Development Committee	Plan and implement village development projects
	Resource management Committee	Sustainable development and resource management at the community level
	Land owning unit ( <i>mataqali</i> )	Decision making body for use of indigenous lands
Indigenous District	District Council	Oversee and approve development needs of villages before being passed to Ra Provincial Office
	Church (circuit)	Oversee the operation of village churches under its umbrella
	District (Vanua) traditional Council	Decision making body on social issues experience by the district
Province	Ra Provincial Administrator	Head of government administration at province level and oversee development work.
	Ra Provincial Office	Oversee development needs, indigenous affairs and social system conflicts of villages.
	Rakiraki Town Council	Administer all town matters
	Cane farmers	Main supply of sugar cane to the Rarawai Sugar Mill, situated close to Rakiraki Town. This stakeholder is one of the main stakeholders in Ra province since it contributes a lot to Ra's economy and at the same time account for the majority of environmental threats currently experienced by the people in the province
	Ra Church Division	Oversee the operation of church circuit
	Government extension Offices (Fisheries, Agriculture and Forestry)	Implement government projects on the ground and provide advice to the people in Ra in their respective area of specialty
	Ra Integrated Coastal Management Committee	Oversee ICM activities in Ra province and linking efforts with government policies.
NGOs	Conservation International	Terrestrial ecosystem restoration work in

Category	Stakeholder	Role within Ra province
		Nakauvadra range and other areas of interest and play advisory role on terrestrial issues.
	Wildlife Conservation Society	Vatu-i-ra seascape work within Ra's marine environment and play advisory role on conservation issues.
	Fiji Environmental Law Association	Awareness training on legal aspects of ICM and resource management work.
Private business operator	Hotels, shops and other private businesses	Provide respective business services to the people of Ra province

### 3.5 Brief history of interventions

The environment management work started in Ra province in 2006, though the Locally Managed Marine Areas (LMMA) initiative in Nakorotubu district. The environment work has evolved since then to include other component of environment management work including sustainable development, conservation, climate change and ecosystem restoration. Outlined in the Table 4 is a chronicle of environment work together with their scope in Ra province over the past years.

Table 4 Detail of past Ra environment initiatives

Year	Brief History of Intervention	Coverage	Organization
2006	Marine resource management action planning workshop in Namarai village for initiation of the district of Nakorotubu LMMA project. The project focused on marine resource management and community livelihood.	Nakorotubu district	Institute of Applied Science
2006	Conservation of Vatu-i-ra island, a seabird island that is now globally recognised as an Important Bird Area (IBA) and surrounding fishing ground started.	Navitilevu district	Birdlife International

Year	Brief History of Intervention	Coverage	Organization
	Work involve rat eradication on the island and raising awareness		
2008	Extension of the LMMA work in three other districts in Ra province. Scope of work similar to the initial Nakorotubu site	Rakiraki, Navitilevu and Saivou	Institute of Applied Science
2009	Nakauvadra Community Based Reforestation Project in Ra province started. Project funded by Fiji Water, who is investing in a portfolio of forest carbon initiatives, and has been identified as a potential national REDD+ pilot site. In October 2013 it successfully achieved Gold validation under the Climate Community and Biodiversity (CCB) Standard	Tokaimalo, Naroko and Naiyalayala district	Conservation International
2010	COWRIE (Coastal and Watershed Restoration for the Integrity of Island Environments) project started with the focus to empower communities in Fiji to undertake management decisions towards the restoration/protection of their watersheds with the specific link with coral reef management. Project funded by Coral Reef Initiatives for the Pacific (CRISP)	Naroko and Nakorotubu district	Institute of Applied Science
2012	ICM work through the CTI initiative started in Ra province with funding from ADB. Scope of work include the development and implementation of ICM plan for the province and implementation of demonstration activities	Naiyalayala, Rakiraki, Saivou, Nakorotubu	Department of Environment
2013	Vatu-i-ra seascape initiative started in coastal communities in Ra province.	Nakorotubu and Navitilevu district	WCS
2014	Research on Evaluating Ecosystem-Based Adaptation for Disaster Risk Reduction in Fiji with focus on assessment of disaster risk reduction for flooding in the Ba and Penang River catchments in Viti Levu, Fiji to identify the most cost-effective management options for communities and households	Rakiraki district	Landcare Research NZ and Institute of Applied Science
2015	Restoration of ecosystems services and climate change adaptation (RESCCUE) project aimed at increasing the resilience of communities started in	To be confirmed	Institute of Applied Science

Year	Brief History of Intervention	Coverage	Organization
	Ra province. The initiative, primarily funded by the French Development Agency (AFD) and the French Global Environment Facility (FFEM), supports adaptation to climate change through integrated coastal management with special emphasis on the economic benefits of conserving ecosystems and setting up sustainable, innovative financial mechanisms for environmental management activities to continue after the project ends.		

#### 4. Results of the Baseline Vulnerability Reduction Assessment (VRA)

See full report in Annex 1.

The Vulnerability Reduction Assessment (VRA) was conducted in Nabukadra, Nativi, Nawairuku, Drauniivi and Rewasa villages and also with a team representing the Ra ICM/ Yaubula Management Support Team (KYMST). The five sites represented the three geographical setting of the province based on the Nakauvadra range. Nabukadra and Drauniivi are villages along the coast. Nativi is located in the middle catchment and Nawairuku and Rewasa are in the upper catchment of the Nakauvadra range

The assessment with the Ra ICM/YMST provided more broad information of climate change vulnerability issues in Kadavu Province. The two Assistant Roko Tui, Fisheries extension officer and Agriculture extension Officer were part of this focus group. Given their knowledge of Kadavu from frequent site visits for the majority of the villages and also from issues raised through District and Provincial Council meetings or merely from villagers visiting these government offices, the information that they supplied were valuable in prioritizing sites for RESCCUE's activities.

Focus group interview technique was applied for the collection of the Ra VRA data. For each village, the focus group discussions were conducted in small groups of 4-10 individuals, mainly a representation of all age group. This was done so that all the different views and perceptions within a village are captured. Before all the VRA exercise start, each team briefed the focus group about climate change and its impacts. This was followed by a group exercise whereby major events that have affected the village in the past were recorded and presented. The exercise was conducted so that the group has a clear understanding of the impacts of climate change and observed trends in the severity and frequency of the impacts.

- What happens when there are extremely high wave incidences? How do these affect you and your community, including the ecosystems on which you rely?

- What would happen if these waves were twice as high? How do these affect you and your community, including the ecosystems on which you rely?
- What stands in the way of adapting to increasing high waves (e.g. king tides)? To what extent do you or your community have the means manage these extreme events?
- How confident are you that the improvements in coastal management delivered by the project will continue after it ends?

## VRA Findings

Nearly all of the villages in Ra that were assessed had or could potentially be affected by the impacts of climate change. However, sea-level rise would not affect those villages in the middle and upper catchment. This is reflected in the score matrix below as it is not applicable (NA).

Sea level Rise	
<b>Indicator 1</b>	<i>What happens when there are extremely high wave incidences? How do these affect you and your community, including the ecosystems on which you rely?</i>
<b>Villages</b>	<b>Score</b> <b>1 = Very serious; 2 Serious; 3 = Moderate; 4 = Not so bad; 5 No problem or Not Applicable (NA)</b>
Nawairuku	NA
Rewasa	NA
Nabukadra	1
Nativi	NA
Drauniivi	2
Ra ICM/YMST	2
<b>Indicator 2</b>	What would happen if these waves were twice as high? How do these affect you and your community, including the ecosystems on which you rely?
<b>Villages</b>	<b>Score</b> <b>1 = Very serious; 2 Serious; 3 = Moderate; 4 = Not so bad; 5 No problem</b>
Nawairuku	NA
Rewasa	NA
Nabukadra	1
Nativi	NA
Drauniivi	1



Sea level Rise	
Ra ICM/YMST	1
<b>Indicator 3</b>	<b>What stands in the way of adapting to increasing high waves (e.g. king tides)? To what extent do you or your community have the means manage these extreme events?</b>
<b>Villages</b>	<b>Score</b> <b>1 = No capability; 2 Low capability; 3 = Quite capable; 4 = Capable; 5 Very Capable</b>
Nawaikula	NA
Rewasa	NA
Nabukadra	2
Nativi	NA
Drauniivi	2
Ra ICM/YMST	2
<b>Indicator 4</b>	<b>How confident are you that the improvements in coastal management delivered by the project will continue after it ends?</b>
<b>Villages</b>	<b>Score</b> <b>1 = Not confident; 2 Low confident ; 3 = Moderate; 4 = Confident ; 5 Very confident</b>
Nawaikula	NA
Rewasa	NA
Nabukadra	5
Nativi	NA
Drauniivi	5
Ra ICM/YMST	5

Flood	
<b>Indicator 1</b>	<b>What happens when there are frequent flooding events? How do these affect you and your community, including the ecosystems on which you rely?</b>
<b>Villages</b>	<b>Score</b> <b>1 = Very serious; 2 Serious; 3 = Moderate; 4 = Not so bad; 5 No problem</b>
Nawairuku	2
Rewasa	2
Nabukadra	5
Nativi	2
Drauniivi	1

<b>Flood</b>	
Ra ICM/YMST	<b>1</b>
<b>Indicator 2</b>	<b>What would happen if these flooding events occur much more frequent (e.g. 4 &gt; times a month)? How would this affect you and your community, including the ecosystems on which you rely?</b>
<b>Villages</b>	<b>Score 1 = Very serious; 2 Serious; 3 = Moderate; 4 = Not so bad; 5 No problem</b>
Nawairuku	<b>1</b>
Rewasa	<b>3</b>
Nabukadra	<b>5</b>
Nativi	<b>2</b>
Drauniivi	<b>1</b>
Ra ICM/YMST	<b>1</b>
<b>Indicator 3</b>	<b>What would happen if these flooding events occur much more frequent (e.g. 4 &gt; times a month)? How would this affect you and your community, including the ecosystems on which you rely?</b>
<b>Villages</b>	<b>Score 1 = No capability; 2 Low capability; 3 = Quite capable; 4 = Capable; 5 Very Capable</b>
Nawairuku	<b>4</b>
Rewasa	<b>4</b>
Nabukadra	<b>5</b>
Nativi	<b>4</b>
Drauniivi	<b>1</b>
Ra ICM/YMST	<b>4</b>
<b>Indicator 4</b>	<b>What stands in the way of adapting to flood management? To what extent do you or your community have the means manage these extreme events?</b>
<b>Villages</b>	<b>Score 1 = Not confident; 2 Low confident ; 3 = Moderate; 4 = Confident ; 5 Very confident</b>
Nawairuku	<b>4</b>
Rewasa	<b>4</b>
Nabukadra	<b>4</b>
Nativi	<b>4</b>
Drauniivi	<b>4</b>

<b>Flood</b>	
Ra ICM/YMST	<b>4</b>

<b>Drought</b>	
<b>Indicator 1</b>	<p>What happens when there are extremely drought events? How do these affect you and your community, including the ecosystems on which you rely?</p>
<b>Villages</b>	<p><b>Score</b> 1 = Very serious; 2 Serious; 3 = Moderate; 4 = Not so bad; 5 No problem</p>
Nawairuku	<b>2</b>
Rewasa	<b>1</b>
Nabukadra	<b>2</b>
Nativi	<b>3</b>
Drauniivi	<b>2</b>
Ra ICM/YMST	<b>2</b>
<b>Indicator 2</b>	<p>What would happen if drought goes for a longer period (e.g. 6+ months)? How would this affect you and your community, including the ecosystems on which you rely?</p>
<b>Villages</b>	<p><b>Score</b> 1 = Very serious; 2 Serious; 3 = Moderate; 4 = Not so bad; 5 No problem</p>
Nawairuku	<b>1</b>
Rewasa	<b>1</b>
Nabukadra	<b>2</b>
Nativi	<b>2</b>
Drauniivi	<b>1</b>
Ra ICM/YMST	<b>1</b>
<b>Indicator 3</b>	<p>What stands in the way of adapting to long period of drought? To what extent do you or your community have the means manage these extreme events?</p>
<b>Villages</b>	<p><b>Score</b> 1 = No capability; 2 Low capability; 3 = Quite capable; 4 = Capable; 5 Very Capable</p>

<b>Drought</b>	
Nawaikula	3
Rewasa	3
Nabukadra	5
Nativi	4
Drauniivi	3
Ra ICM/YMST	4
<b>Indicator 4</b>	<b>How confident are you that the improvements in water management delivered by the project will continue after it ends?</b>
<b>Villages</b>	<b>Score</b> <b>1 = Not confident; 2 Low confident ; 3 = Moderate; 4 = Confident ; 5 Very confident</b>
Nawairuku	4
Rewasa	4
Nabukadra	5
Nativi	3
Drauniivi	4
Ra ICM/YMST	4

<b>Cyclone</b>	
<b>Indicator 1</b>	<b>What happens when there are extreme tropical cyclone incidences? How do these affect you and your community, including the ecosystems on which you rely?</b>
<b>Villages</b>	<b>Score</b> <b>1 = Very serious; 2 Serious; 3 = Moderate; 4 = Not so bad; 5 No problem</b>
Nawairuku	2
Rewasa	3
Nabukadra	1
Nativi	2
Drauniivi	2
Ra ICM/YMST	2
<b>Indicator 2</b>	<b>What would happen if these tropical cyclones were as twice strong? How would this affect you and your community, including the ecosystems on which you rely?</b>
<b>Villages</b>	<b>Score</b> <b>1 = Very serious; 2 Serious; 3 = Moderate;</b>

<b>Cyclone</b>	
	<b>4 = Not so bad; 5 No problem</b>
Nawairuku	1
Rewasa	2
Nabukadra	1
Nativi	1
Drauniivi	1
Ra ICM/YMST	1
<b>Indicator 3</b>	<b>What stands in the way of adapting to increasing intensity of tropical cyclones? To what extent do you or your community have the means manage these extreme events?</b>
<b>Villages</b>	<b>Score</b> <b>1 = No capability; 2 Low capability; 3 = Quite capable; 4 = Capable; 5 Very Capable</b>
Nawairuku	2
Rewasa	4
Nabukadra	4
Nativi	3
Drauniivi	4
Ra ICM/YMST	4
<b>Indicator 4</b>	<b>How confident are you that the improvements in tropical cyclone disaster management delivered by the project will continue after it ends?</b>
<b>Villages</b>	<b>Score</b> <b>1 = Not confident; 2 Low confident ; 3 = Moderate; 4 = Confident ; 5 Very confident</b>
Nawaikula	5
Rewasa	4
Nabukadra	5
Nativi	4
Drauniivi	4
Ra ICM/YMST	4

<b>Ocean Acidification</b>	
<b>Indicator 1</b>	<b>What happens when there are continuous coral bleaching? How do these affect you and your community, including the ecosystems on which you rely?</b>

<b>Ocean Acidification</b>	
<b>Villages</b>	<b>Score</b> <b>1 = Very serious; 2 Serious; 3 = Moderate;</b> <b>4 = Not so bad; 5 No problem</b>
Nawairuku	NA
Rewasa	NA
Nabukadra	3
Nativi	2
Drauniivi	2
Ra ICM/YMST	2
<b>Indicator 2</b>	What would happen if these coral bleaching affects 50%> of your iqoliquoli reef? How would this affect you and your community, including the ecosystems on which you rely??
<b>Villages</b>	<b>Score</b> <b>1 = Very serious; 2 Serious; 3 = Moderate;</b> <b>4 = Not so bad; 5 No problem</b>
Nawaikula	
Rewasa	
Nabukadra	1
Nativi	1
Drauniivi	1
Ra ICM/YMST	1
<b>Indicator 3</b>	What stands in the way of adapting to coral bleaching? To what extent do you or your community have the means manage these extreme events?
<b>Villages</b>	<b>Score</b> <b>1 = No capability; 2 Low capability; 3 = Quite capable; 4 = Capable; 5 Very Capable</b>
Nawairuku	NA
Rewasa	NA
Nabukadra	2
Nativi	3
Drauniivi	3
Ra ICM/YMST	2
<b>Indicator 4</b>	How confident are you that the improvements in coral reef management delivered by the project will continue after it ends?
<b>Villages</b>	<b>Score</b> <b>1 = Not confident; 2 Low confident ; 3 = Moderate; 4 = Confident ; 5 Very</b>

Ocean Acidification	
	confident
Nawairuku	NA
Rewasa	NA
Nabukadra	3
Nativi	4
Drauniivi	4
Ra ICM/YMST	4

## 5. Opportunities and pitfalls for RESCCUE implementation

### 5.1 Synthetic summary of first part

Ra province is one of the largest provinces in Fiji in terms of area coverage and population. It is also one of the provinces with more development activities. The main Fiji Water bottling installation is situated in the province together with Fiji's largest cattle farm, Yaqara Pastoral Company Limited. Furthermore, one of the four sugar mills in Fiji is located in the province.

The total population in Ra province is 29,464 and the population pyramid indicates that there is high birth rate, high death rate and low life expectancy in Ra province. Trends in population in the intercensal period 1996-2007 by ethnic group notice decline in Indo-Fijian population by 27.4% from 12,239 to 8,888 between 1996 and 2007. The iTaukei population during this period grew by 10.3% from 18,373 in 1996 to 20,259 in 2007. The increase in iTaukei population in villages might contribute to further resource destruction due to over-dependence in the near future.

In terms of resource use, farming, fishing and livestock rearing are the main livelihood activities in Ra province with a small percentage working in government department, private businesses including hotels and touristic accommodation. The lack of alternative livelihood sources is one of the major issues in Ra province and any future initiative should work towards ensuring this is addressed. Unless dependence on resources is balanced with the carrying capacity of each ecosystem, environment work are always going to fail.

In terms of status of the environment, Nakauvadra and Yaqara range are important terrestrial systems due to their role as major water sources for the people in Ra province. The two mountain ranges are home to a number of rare and endangered species. The

marine ecosystem within Ra marine environment has been under pressure from fishers and coastal dwellers and more importantly, as a result of unplanned and unsustainable land-based activities. Industrial, commercial, agricultural and settlement expansion have changed the land use of Ra province. Threats to agriculture and agro-ecosystems are caused by unsustainable practices such as the use of pesticide, removal of riparian buffers and deforestation.

Given past experiences on natural resource management in Ra province starting with the LMMA concept then ICM, relevant stakeholders in the province still realize the need to complement past experiences with innovative concepts to ensure the sustainability of the province. The new concepts such as improving ecosystem services to cope with climate change effects through the RESCCUE project is anticipated to address this gap in Ra province. RESCCUE will ensure the management of the entire province ecosystem and most importantly, harmonizing community's effort with national government policies and mandates. Also, the RESCCUE project will focus on maximizing benefits of ecosystem services through the implementation of economic and climate change adaptation tools at the community and provincial level.

## **5.2. Opportunities and pitfalls for RESCCUE implementation**

Some of the factors that exist in Ra province which can be tapped to ensure the successful implementation of the RESCCUE project include the following:

### **5.2.1 Opportunities**

- I. Based on the socioeconomic and biophysical information, the current status of Ra province, RESCCUE project could enable communities and other stakeholders to establish or develop ecosystem service improvement strategies. Marine conservation initiative such as the establishment of temporary marine no-take zones within the locally managed marine areas (LMMA) has been an on-going activity. It has been an effective means of not only improving community livelihood by ensuring a sustainable source of protein but empowering them as well. Identify and implement when feasible possible financial instruments that could be considered to assist current LMMA initiatives. An example would be to engage resort owners in Ra in finding out best approach for establishing a PES



- II. The financial and economic emphasis of RESCCUE on the sustainable use of natural resources private sector in particular extractive development initiatives such as mining would allow a space where collaborative and transparent engagement can be facilitated.
- III. RESCCUE will contribute in finding innovative means of improving the socioeconomic and financial status of communities in Ra with appropriate payment of ecosystem services framework.
- IV. The Ecosystem Services Review for Impact Assessment (ESR for IA) framework provides practical instructions to environmental and social practitioners on how to incorporate ecosystem services throughout environmental and social impact assessment. The RESCCUE project, whose ultimate goal is to increase the climate change resilience of Pacific-island ecosystems, in this case Ra province, aims at maintaining and strengthening the services those ecosystems provide communities by building local communities' governance and disaster management capabilities, is in line with the province's vision as stated in the Ra Strategic Development Plan. Support from government, the private sector, NGOs and communities
- V. The implementations of past environmental projects in Ra province have seen the willingness and interest of all stakeholders to ensure the sustainability of the island group's natural resources and the local population. Future similar initiative such as the RESCCUE project will be mostly supported by Ra province stakeholders since the concepts are similar to past successful projects. The idea of participating in the RESCCUE project was unanimously endorsed at the Ra Provincial Council meeting in late 2014.
- VI. Existence of community-based structures - The community-based structures such as the Ra YMST and a more inclusive stakeholder committee such as the Ra ICM Committee would ensure harmonization and synergies of various resource management and development initiatives. Thus, this would lead to a better communication and constructive dialogue between developers, government and the resource owners.
- VII. Increase environment awareness at Province to village Level - As highlighted in the previous section, the resource management work started in Ra in early 2000 with a series of awareness programs and this has resulted in the locals and government

extension officers being aware of their roles and responsibilities to ensure the sustainability of the island-based system. Transforming this knowledge to ensure the continuous provision of ecosystem services and benefits, as outlined in the vision of the RESCCUE project compliments the communities efforts

### ***5.2.2 Low hanging fruits***

- I. Ecosystem restoration- Previous work such as WANI and LMMA projects implemented by IAS, forest replanting by CI and Vatu-i-ra restoration by Birdlife were well received by the communities in Ra and the locals were very supportive of these initiatives. The RESCCUE project can complement these efforts due to people's support and receptive of the concepts.
- II. Improvement of fisheries and costal management- All the environment management work in Ra originated from the LMMA work which focused more on the protection and management of marine resources. RESCCUE project can build on existing success to further improve operation and management of MPAs and other management strategies.

### **5.2.3 Pitfalls**

- The high key personnel turnover at the provincial (Roko, PA etc.) and community (village headman, chief etc.) can be an opportunity or a pitfall for the project. In the context of pitfall, some key personnel for past projects are sometimes replaced without providing a good transition for the replacement and this usually lead to the loss of project work momentum.
- Socio-political issues in all levels of the project starting from project management, provincial and community level might affect the whole project implementation if the precautionary approach is not adopted. Due to the intertwined and close relationship of social structures, institutional relationship and environmental issues in Fiji an understanding of the local context is important to ensure the successful implementation of the RESCCUE project.
- Due to the size of Ra province, area coverage by the project needs to be specific and realistic in terms of accessibility and long term sustainability. It is recommended to focus on coastal and mid-catchment communities in at least four districts. Most development and resource management activities occur in these two landscapes. It is accessible and innovative economic and financial mechanisms to support ICM and resource management can be developed from current conservation and sustainable resource management initiatives in these areas. However, it is prudent and vital that proper consultations with Ra stakeholders are conducted before any RESCCUE innovative activities are implemented.

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## **Annex 1 Ra Climate Change Vulnerability Reduction Assessment Report**

IAS conducted the Ra Climate Change Vulnerability Reduction Assessment (Ra VRA) during 20-24 November, 2015. The purpose of the assessment is to improve understanding of the impact of climate change on local communities in Ra province and identify adaptation strategies that can be implemented by the project to reduce these impacts. This assessment represents the ongoing efforts to document the complicated impact of climate related environmental change on Ra communities that depend on natural resources for their livelihood and wellbeing.

The VRA methodology incorporated in this assessment is based on a framework of “enabling factors” for Community-Based Adaptation (CBA). The VRA is designed to feed into and strengthen planning processes by providing vital, context specific information about the impacts of climate change and local vulnerability. The process of gathering, analyzing and validating this information promotes invaluable dialogue within communities, and between communities and other stakeholders.

This assessment has integrated current and projections of climate impacts in a comprehensive fashion to construct an overall analysis of the communities’ vulnerability and adaptation needs. Along with the results of this assessment, this report includes recommendations enriched by options generated by one of the key stakeholders, government extensions based in Ra.

## VRA Findings

### Sea level Rise

Villages	Indicator 1- What happens when sea level rise.	Effects on community & environment	Score
Nativi	Not Applicable	Not Applicable	Not Applicable
Nabukadra	<ul style="list-style-type: none"> <li>Coastal erosion is experienced along the village coastal front</li> <li>Flooding of parts of the village</li> <li>Root crops on coastal flat areas are destroyed</li> </ul>	<ul style="list-style-type: none"> <li>Some of the buildings foundations are affected.</li> <li>Some parts of the village is seems to be subsiding into the sea.</li> <li>People are forking out more from their pockets so that they can hire machinery to put soil/stones at places that are frequently flooded by sea water.</li> <li>They have lost some low flat wetland that they usually use for planting taro.</li> </ul>	1- Very serious
Draunivi	<ul style="list-style-type: none"> <li>Houses are inundated</li> <li>Coastal trees fall into the sea due to the unstable soil condition</li> </ul>	<ul style="list-style-type: none"> <li>Sea is slowly encroaching on village land</li> <li>A few homes have moved due to sea level rise</li> </ul>	2-Serious
Nawairuku	Not Applicable	Not Applicable	Not Applicable
Rewasa	Not Applicable	Not Applicable	Not Applicable
Ra ICM/YMST	Trees found along the shoreline will disappear	<ul style="list-style-type: none"> <li>Sea level has reached a point where it has gone beyond the</li> </ul>	2-Serious

		seawall <ul style="list-style-type: none"> <li>Wave action has also damaged septic tanks for houses by the beach and is slowly taking the waste out to sea</li> <li>The floor of the houses by foreshore are either wet, falling , or have split.</li> <li>More rubbish brought back to sea by wave action</li> <li>Causing villagers to live in fear</li> </ul>	
<b>Villages</b>	<b>Indicator 2- What would happen if the impact is twice as high</b>	<b>Effect on community&amp; environment</b>	
Nativi	Not Applicable	Not Applicable	Not Applicable
Nabukadra	<ul style="list-style-type: none"> <li>Whole village will be under water.</li> <li>Most of their coconut plantation will also be covered with sea water.</li> <li>Some of the land that they are currently using for planting will be permanently inundated with sea water.</li> </ul>	<ul style="list-style-type: none"> <li>The community will lose their house and other things that have taken them years to build.</li> <li>They will lose one of the main sources of income to their family that is their coconut plantation</li> </ul>	1- Very serious
Draunivi	<ul style="list-style-type: none"> <li>Inundation of the village</li> <li>Sacred grounds such as the burial ground are inundated</li> </ul>	<ul style="list-style-type: none"> <li>coconut trees wither and die</li> <li>coconut getting smaller</li> <li>Village to resettle to another tribal land on a higher elevation</li> </ul>	2- Serious
Nawairuku	Not Applicable	Not Applicable	Not Applicable
Rewasa	Not Applicable	Not Applicable	Not Applicable

Ra ICM/YMST	<ul style="list-style-type: none"> <li>Village will be under water</li> </ul>	<ul style="list-style-type: none"> <li>Most villages will be relocated</li> <li>some would be homeless and lose their land</li> <li>will lead to more urban drift</li> </ul>	1- Very serious
<b>Villages</b>	<b>Indicator 3- Barriers to adaptation activities</b>	<b>Means to manage the event</b>	
Nativi	Not Applicable	Not Applicable	Not Applicable
Nabukadra	<ul style="list-style-type: none"> <li>They have less knowledge on what needs to be done.</li> </ul>	<ul style="list-style-type: none"> <li>They have annual village fundraising in which part of it goes towards raising their village profile.</li> <li>They have the land to relocate plantation..</li> </ul>	2- Low capability
Draunivi	<ul style="list-style-type: none"> <li>- Non-cooperation of community members</li> <li>- Community members do not implement what they have learnt (from past workshops)</li> </ul>	<ul style="list-style-type: none"> <li>- Mangrove seedlings</li> <li>- The effort to implement if they were well informed of their roles.</li> </ul>	2- Low capability
Nawairuku	Not Applicable	Not Applicable	Not Applicable
Rewasa	Not Applicable	Not Applicable	Not Applicable
Ra ICM/YMST	<ul style="list-style-type: none"> <li>Not enough awareness on climate change</li> </ul>	<ul style="list-style-type: none"> <li>People of Ra need to be educated on climate change</li> </ul>	2- Low capability
<b>Villages</b>	<b>Indicator 4: Sustainability after RESCCUE</b>		



Nativi	Not Applicable	Not Applicable	Not Applicable
Nabukadra	There is reassurance of this in the village from its Headman, the Committee and Clan leader.		5- Very confident
Draunivi	There is capability to plant coastal vegetation. Village elders believe that the whole can continue the work.		4- Confident
Nawairuku	Not Applicable	Not Applicable	Not Applicable
Rewasa	Not Applicable	Not Applicable	Not Applicable
Ra ICM/YMST			

## Flood

Villages	Indicator 1- What happens when there is a flood?	Effects on community & environment	Score
Nativi	<ul style="list-style-type: none"> <li>Land slides</li> <li>Murky/dirty water</li> <li>Plantations are destroyed</li> <li>Difficulties in access to village</li> <li>Hanging bridge damaged</li> <li>Houses are damaged</li> <li>Animals drowns (horses, cattle)</li> </ul>	<p>Last flood event - 4 houses washed away</p> <ul style="list-style-type: none"> <li>- River burst its banks</li> <li>- Animals are carried away by the floods</li> <li>- Movement is limited because village roads are damaged</li> </ul>	2- Serious
Nabukadra	There hasn't been such an event.	The village and its households have not been affected.	5- No problem

Draunivi	<ul style="list-style-type: none"> <li>• Water level increase</li> <li>• Water level rises when it coincides with high tide</li> <li>• Erosion of farms</li> <li>• Farms are damaged</li> </ul>	<ul style="list-style-type: none"> <li>• There's a lot of mud along the coast</li> <li>• The muddy walkway at low tide gets more soggy</li> <li>• It's a constraint to using engine powered boats</li> </ul>	1- Very serious
Nawairuku	<ul style="list-style-type: none"> <li>• Village is inundated by water</li> <li>• Land slides</li> <li>• Plantations are damaged</li> </ul>	<ul style="list-style-type: none"> <li>• The road will be damaged; hence, access to and from village will be difficult.</li> </ul>	2 - Serious
Rewasa	<ul style="list-style-type: none"> <li>• Land slides</li> <li>• High sedimentation or turbid waters</li> <li>• Plantations are destroyed</li> <li>• Access to and from village becomes difficult</li> </ul>	<ul style="list-style-type: none"> <li>• It causes the river to be dirty/murky</li> <li>• Habitats where fish breed are destroyed Decrease in food sources</li> <li>• Because of road damage, getting around will be difficult</li> </ul>	2 - Serious
Ra ICM/YMST	<ul style="list-style-type: none"> <li>• costly damages to families, government and businesses</li> <li>• Coral reefs die</li> <li>• No work, transport,</li> </ul>	<ul style="list-style-type: none"> <li>• this will results in unbudgeted spending</li> <li>• changes the plan of many</li> </ul>	1- Very serious
<b>Villages</b>	<b>Indicator 2- What would happen if the frequency increases</b>	<b>Effect on community&amp; environment</b>	
Nativi	<ul style="list-style-type: none"> <li>- More houses will be destroyed</li> <li>- Health risk increases</li> <li>- Root crops will rot faster</li> </ul>	<ul style="list-style-type: none"> <li>- More are prone to sickness</li> <li>- Villagers will be forced to resort to processed food</li> </ul>	1. Very serious
Nabukadra	Possibly, the small water pools and road may get flooded but it is not seen as a high risk.	No effect.	4- Not so bad

Draunivi	<ul style="list-style-type: none"> <li>- Increased sedimentation</li> <li>- High marine life mortality in mangrove and reef habitats</li> </ul>	<ul style="list-style-type: none"> <li>- Constraints to our daily movement</li> <li>- Fishing (gleaning) will be harder</li> <li>- It will be a barrier to school children in terms of transportation</li> </ul>	1- Very serious
Nawairuku	<ul style="list-style-type: none"> <li>• Village will be flooded</li> <li>• Plantations near rivers will be flooded</li> <li>• Increase in landslides</li> <li>• Water will be dirty/murky</li> </ul>	<ul style="list-style-type: none"> <li>• Movement of villagers will be restricted</li> <li>• School children will miss school</li> <li>• Decrease in sources of income</li> <li>• Increase in sickness and diseases (boils, diarrhea)</li> </ul>	1- Very serious
Rewasa	<ul style="list-style-type: none"> <li>• No food</li> <li>• Village to be relocated</li> <li>• Plantations to be relocated</li> </ul>	<ul style="list-style-type: none"> <li>• Social issues will arise, especially in the family</li> <li>• Difficulties in planting food crops</li> </ul>	3
RA ICM/YMST	<ul style="list-style-type: none"> <li>• Village will be flooded</li> <li>• No food</li> <li>• Village to be relocated</li> <li>• Plantations to be relocated</li> </ul>	<ul style="list-style-type: none"> <li>• Movement of villagers will be restricted</li> <li>• Decrease in sources of income</li> <li>• Social issues will arise, especially in the family</li> </ul>	1- Very serious
<b>Villages</b>	<b>Indicator 3- Barriers to adaptation activities</b>	<b>Means to manage the event</b>	
Nativi	<ul style="list-style-type: none"> <li>- Weather</li> <li>- The changing weather pattern is unfavorable</li> <li>- Laxity</li> <li>- Lack of Awareness</li> </ul>	The community are keen to put into practice the adaptation plan	4- Quite capable
Nabukadra	We don't see any hindrance to the issue.	- Villagers are cooperative when it comes to planning adaptation	5- Very capable

		<p>programs.</p> <p>- The clan leaders are on the right track by drafting vulnerability reduction plans.</p>	
Draunivi	<ul style="list-style-type: none"> <li>- Non cooperation</li> <li>- Removal of trees close to stream banks</li> </ul>	- The mangrove cover and health is looking sufficient to combat flooding	1- Low capability
Nawairuku	<ul style="list-style-type: none"> <li>• Non-cooperation amongst villagers at times</li> <li>• Land disputes</li> <li>• Lack of knowledge on how to mitigate flooding</li> </ul>	<ul style="list-style-type: none"> <li>• Homes to be built on stilts</li> <li>• Plantations to move further away from river edge</li> </ul>	4
Rewasa	<ul style="list-style-type: none"> <li>• Land dispute (no approval from landowners for drainage system).</li> <li>• No funding from various governments</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness</li> <li>• Government assistance on small community development projects</li> </ul>	4- Quite capable
RA ICM/YMST	<ul style="list-style-type: none"> <li>• Non-cooperation amongst villagers at times</li> <li>• Gravel extraction</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness</li> <li>• Seek funding or village to fund some immediate mitigation measures</li> </ul>	4- Quite capable
<b>Villages</b>	<b>Indicator 4: Sustainability after RESCCUE</b>		
Nativi			4- Capable
Nabukadra	Leaders of the clan, village committee and headman are very reassuring of the village's capability to	This issue has no effect to the village, thus the village are very confident in their leadership to continue giving the best adaptive	

	continue improving water management to prevent our families from such an event in the future.	management plans to keep the village safe.	
Draunivi	Yes, villagers believe they can continue the good work. They just need proper training and guidance to support the work.		4- Capable
Nawairuku	We can carry out the work but we will need guidance/direction from government & NGOs		4- Capable
Rewasa	Village can carry on the work just need proper awareness and training		4- Capable
RA ICM/YMST	Can carry on the work, just need guidance	More funding and follow up work	4- Capable

### Drought

Villages	Indicator 1- What happens when there is a drought?	Effects on community & environment	Score
Nativi	<ul style="list-style-type: none"> <li>Water source for drinking and washing dry out.</li> <li>Food crops don't grow well (Cassava)</li> <li>Sickness arise in the village</li> <li>We are currently</li> </ul>	<ul style="list-style-type: none"> <li>About 68 households are sharing 4 large tanks in the village. There is not enough water to supply the whole village</li> <li>A lot of sicknesses</li> </ul>	3- Moderate

	drinking from the main river because our water source/dam has dried up	<p>arise due to scarcity of water (e.g. boils, itchiness, headaches etc.)</p> <ul style="list-style-type: none"> <li>• Difficulties in planting food crops due to poor soil conditions</li> <li>• Cracked soils makes it difficult to cultivate for planting food crops</li> <li>• sources of income are affected</li> <li>• Fish die in the creeks and streams</li> </ul>	
Nabukadr a	<ul style="list-style-type: none"> <li>- It affects the kava, taro and vegetable farms</li> <li>- It also dries out the <i>Tilapia</i> fish farm</li> </ul>	Financial aspects to meet educational needs, church and community demands are greatly affected.	2- Serious
Draunivi	<ul style="list-style-type: none"> <li>- Cracks are noticed on the ground</li> <li>- Rivers and streams dry out</li> <li>- Vegetables and root crops wither, die.</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of food</li> <li>- Farmland are prone to uncontrollable fire</li> </ul>	2- Serious
Nawairuk u	<ul style="list-style-type: none"> <li>• Plantations are greatly affected</li> <li>• Water levels decrease</li> </ul>	<ul style="list-style-type: none"> <li>• Decrease in abundance of fish</li> <li>• Sources of income are affected</li> </ul>	2- Serious
Rewasa	<ul style="list-style-type: none"> <li>• Water scarcity</li> <li>• Plantations/farms are affected</li> <li>• Sources of income are affected</li> </ul>	<ul style="list-style-type: none"> <li>• Water source/dams dry up.</li> <li>• Decrease in income generated from sugarcane, mangoes and oranges/lemon is affected</li> <li>• Root crops and other farm produce don't grow well</li> </ul>	1- Very Serious

		<ul style="list-style-type: none"> <li>• A lot bush fires</li> <li>• Hard and cracked top soil</li> </ul>	
RA ICM/YMST	<ul style="list-style-type: none"> <li>• Water scarcity</li> <li>• Plantations/farms are affected</li> <li>• Sources of income are affected</li> </ul>	<ul style="list-style-type: none"> <li>• Skin disease outbreak</li> <li>• Water scarcity</li> <li>• Plantations/farms are affected</li> <li>• Sources of income are affected</li> </ul>	2- Serious
<b>Villages</b>	<b>Indicator 2- What would happen if the frequency increases</b>	<b>Effect on community&amp; environment</b>	
Nativi	<ul style="list-style-type: none"> <li>• No water</li> <li>• Food crops will dry</li> <li>• Sources of income will be affected</li> <li>• Increase in sickness/disease (ringworms, boils).</li> <li>• Farms will be destructed</li> </ul>	<ul style="list-style-type: none"> <li>• A lot of communicable diseases</li> <li>• No plantations</li> <li>• All sources of income in the village will be wiped out- There will be a boost from the leaders to live conservatively. (good management)</li> </ul>	2- Serious
Nabukadr a	It will seriously affect our daily livelihood	The general health of the family will be disrupted and agricultural livelihood will be wipe out.	2- Serious
Draunivi	<ul style="list-style-type: none"> <li>• Damages the environment</li> <li>• More health issues, more people will get sick</li> <li>• People will struggle to find alternative means of survival</li> <li>• Children will suffer the most if the effects are not addressed properly</li> </ul>	<ul style="list-style-type: none"> <li>• Life will get tougher</li> <li>• Increase in forest destruction</li> <li>• Increase in bush fires</li> </ul>	1-Very serious

Nawairuku	<ul style="list-style-type: none"> <li>• Decrease in source of income</li> <li>• A lot of farms will be affected</li> <li>• Water source will dry up</li> </ul>	<ul style="list-style-type: none"> <li>• Forest is destroyed</li> <li>• Decrease in abundance of birds</li> <li>• No fish</li> </ul>	1-Very serious
Rewasa	<ul style="list-style-type: none"> <li>• water source dries up</li> <li>• soil dries up</li> <li>• Sources of income are affected</li> </ul>	<ul style="list-style-type: none"> <li>• When water source dries up, a lot of disease will occur in the village</li> <li>• No planting</li> <li>• No more money generated from crops (sugarcane)</li> </ul>	1-Very serious
RA ICM/YMST	<ul style="list-style-type: none"> <li>• Decrease in source of income</li> <li>• A lot of farms will be affected</li> <li>• Water source will dry up</li> </ul>	<ul style="list-style-type: none"> <li>• No drinking water</li> <li>• Boreholes dry up</li> <li>• People will leave the village</li> <li>• Increase in social problems for example theft</li> </ul>	1-Very serious
<b>Villages</b>	<b>Indicator 3- Barriers to adaptation activities</b>	<b>Means to manage the event</b>	
Nativi	<ul style="list-style-type: none"> <li>• less funding</li> <li>• No information/knowledge</li> <li>• Lack of urgency or care on the issue of climate change in the village</li> </ul>	<ul style="list-style-type: none"> <li>• The community need to work together to find the best option adaptation for them</li> <li>• Awareness</li> <li>• More funding especially for fish pond</li> </ul>	4- Quite capable
Nabukadra	<ul style="list-style-type: none"> <li>• Lack of awareness to villagers on adaptation means during excess events such as droughts</li> </ul>	<ul style="list-style-type: none"> <li>• Villagers are cooperative when it comes to planning adaptation programs.</li> <li>• The clan leaders are on the right track by drafting vulnerability reduction plans.</li> </ul>	5- Very capable



Draunivi	<ul style="list-style-type: none"> <li>• Non cooperation</li> <li>• Village disaster-adaptation plans are not adhered to</li> </ul>	<ul style="list-style-type: none"> <li>• The villagers are experienced farmers</li> </ul>	3- Manageable
Nawairuku	<ul style="list-style-type: none"> <li>• Lack of knowledge in the area of climate change adaptation and mitigation</li> <li>• Land disputes</li> </ul>	<ul style="list-style-type: none"> <li>• More funding</li> </ul>	3- Manageable
Rewasa	<ul style="list-style-type: none"> <li>• No difficulties because villagers listen and lookout for each other very well</li> </ul>	<ul style="list-style-type: none"> <li>• Villagers are not well equipped/informed on what to do during drought events.</li> <li>• Villagers do not know what to plant for sources of food &amp; food during longer periods of drought</li> </ul>	3- Manageable
Ra ICM/YMST	<ul style="list-style-type: none"> <li>• No village unit to pray about it</li> <li>• Too much burning</li> </ul>	<ul style="list-style-type: none"> <li>• Villages need to be well informed .</li> </ul>	4- capable
<b>Villages</b>	<b>Indicator 4: Sustainability after RESCCUE</b>		
Nativi	<ul style="list-style-type: none"> <li>• Villagers can continue with project.</li> <li>• Improvement including regular maintenance and looking for funds to support this work</li> </ul>		3- Moderate
Nabukadra	Leaders of the clan, village committee and headman are very reassuring of the village's capability to continue improving water management to prevent our families from such an event		5- Very confident

	in the future.		
Draunivi	- In realizing that our survival depends on our ability to implement the plan, we are therefore confident that we will put the plan into practice		4-Confident
Nawairuku	<ul style="list-style-type: none"> <li>Villagers believe that they can sustain the project. Just need better awareness and guidance from experts.</li> </ul>		4-Confident
Rewasa	<ul style="list-style-type: none"> <li>Villagers just want to be educated. They believe they can continue the work.</li> </ul>	<ul style="list-style-type: none"> <li>Village to be informed in advance by weather forecast to enable them to prepare for drought events.</li> <li>Villagers want to be educated on the types of crops to plants during drought events</li> </ul>	4-Confident
Ra ICM/YMST	<ul style="list-style-type: none"> <li>Lack of knowledge in the area of climate change adaptation and mitigation</li> </ul>	<ul style="list-style-type: none"> <li>Villages need to be trained in climate change adaptation and mitigation</li> </ul>	4-Confident

### Cyclone

Villages	Indicator 1- What happens when there is a cyclone?	Effects on community & environment	Score
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Nativi	-Food sources are depleted that in turn affects individuals and the community as a whole. -it causes panic and anxiety -it alters the physical village setting	- the effect will be devastating for our vegetable and root crop farms	2- Serious
Nabukadra	Cyclones damage the dwellings and plantations.	Our general social life (family) and food from the farm are affected.	1- Very Serious
Draunivi	- Rooftops are blown off - Farms are damaged - Decimates the whole house - Primary food supply are affected - Kills animals	- People are left homeless - And they struggle to find food	2- Serious
Nawairuku	<ul style="list-style-type: none"> <li>• Increase in water level beside the village</li> <li>• Homes with weak foundations will be blown away</li> <li>• Road will be flooded</li> <li>• Trees will be blown down</li> </ul>	<ul style="list-style-type: none"> <li>• Movement of villagers will be restricted</li> <li>• Loss of human and animal life</li> <li>• Village inundated with water</li> </ul>	2- Serious
Rewasa	<ul style="list-style-type: none"> <li>• No severe damages from tropical cyclone</li> </ul>	<ul style="list-style-type: none"> <li>• plantation and food crops will be affected if cyclone hits the village</li> </ul>	3
Ra ICM/YMST	<ul style="list-style-type: none"> <li>• Village homes are destroyed or damaged</li> <li>• Plantations are affected</li> <li>• Infrastructure damage</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of food</li> <li>• Increase in water borne disease</li> </ul>	2- Serious
<b>Villages</b>	<b>Indicator 2- What would happen if the frequency</b>	<b>Effect on community&amp; environment</b>	

	<b>increases</b>		
Nativi	<ul style="list-style-type: none"> <li>- Nothing will be left of the ecosystem</li> <li>- It will destroy the coral reefs</li> <li>- Farms will be demolished</li> </ul>	- It will wipe out the community	1- Very Serious
Nabukadra	It would affect social life as villagers will struggle to meet family needs as well as community obligations.	More conflict and disagreement	1- Very serious
Draunivi	<ul style="list-style-type: none"> <li>- All houses will be demolished</li> <li>- Fruits and vegetables will be damaged</li> <li>- It could be fatal if we are not ready</li> </ul>	<ul style="list-style-type: none"> <li>- People will really struggle to find food</li> <li>- The reefs will be damaged and will take longer to recover</li> </ul>	1- Very serious
Nawairuku	<ul style="list-style-type: none"> <li>• Lives will be lost</li> <li>• Farms will be damaged</li> <li>• Increase in landslides</li> </ul>	<ul style="list-style-type: none"> <li>• Increase in arguments over food</li> <li>• Movement restrictions due to road block</li> <li>• Increase in landslides</li> </ul>	1- Very serious
Rewasa	<ul style="list-style-type: none"> <li>• Loss of life</li> <li>• Damage plantation</li> <li>• Lot of land slides</li> <li>• Houses will be damaged or destroyed</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of life</li> <li>• Damage plantation</li> <li>• Lot of land slides</li> <li>• Houses will be damaged or destroyed</li> </ul>	2-Serious
Ra ICM/YMST	<ul style="list-style-type: none"> <li>• Lives will be lost</li> <li>• Farms will be damaged</li> <li>• Increase in landslides</li> </ul>	<ul style="list-style-type: none"> <li>• People will really struggle to find food</li> <li>• The reefs will be damaged and will take longer to recover</li> <li>• More conflict and disagreement</li> </ul>	1- Very serious
<b>Villages</b>	<b>Indicator 3- Barriers to</b>	<b>Means to manage the event</b>	

	adaptation activities		
Nativi	<ul style="list-style-type: none"> <li>- Loss of traditional knowledge</li> <li>- Slow reaction to implement adaptive plans</li> <li>- Lack of awareness as there is no adaptive management plan available (we request for such workshops)</li> </ul>	The knowledge and experience amongst the members will ensure that there will be enough food during such events e.g. planting the cyclone-resistant crops	3- Manageable
Nabukadra	We don't see any hindrance.	<ul style="list-style-type: none"> <li>- The village has an adaptation plan ready for implementation when such an event occurs.</li> <li>- The collective communal work (<i>solesolevaki</i>) is an ongoing traditional mean that helps improve livelihood (e.g. farms) in the village when natural disasters happen.</li> </ul>	4- Quite capable
Draunivi	<ul style="list-style-type: none"> <li>- No team work</li> <li>- The village does not have any natural disaster adaptation plan</li> <li>Loss of traditional knowledge</li> </ul>	<ul style="list-style-type: none"> <li>- Farming knowledge and experience</li> <li>- The community have the capability</li> </ul>	4- Quite capable
Nawairuku	<ul style="list-style-type: none"> <li>• Lack of knowledge on various things to do to decrease the effects of cyclones</li> </ul>	<ul style="list-style-type: none"> <li>• Transfer of knowledge from elders</li> <li>• Improved villagers knowledge by educating them on disaster management</li> </ul>	2
Rewasa	<ul style="list-style-type: none"> <li>• No care attitude</li> <li>• Lack of knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• Village awareness/training on natural</li> </ul>	4- Quite capable

		disaster preparedness.	
Ra ICM/YMST	<ul style="list-style-type: none"> <li>No care attitude</li> <li>Loss of traditional knowledge</li> <li>Lack of knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Reinforce homes</li> <li>Have an updated evacuation plan</li> </ul>	4- Quite capable
<b>Villages</b>	<b>Indicator 4: Sustainability after RESCCUE</b>		
Nativi	We have the ability to limit cyclone impacts and have the potential to implement adaptive plans as it is crucial for our survival.	There is reassurance from the community members that we will continue with the plan even after RESCCUE term.	4- Confident
Nabukadra	Leaders of the clan, village committee and headman are very reassuring of the village's capability to continue implementing the vulnerability reduction adaptation plan to prevent our families from the risks of such an event in the future.	Very confident in village leadership in making the right decision to prepare the villages in overcoming this problem	5- Very confident
Draunivi	- We should start assessing our capability as such event decides our survival for the future for we depend on our fishing grounds and land.	Assurance from villagers to continue the work especially when the land and the sea are their source of livelihood.	4-Confident
Nawairuku	When we are educated on climate change we are capable of continuing the project when it comes to an end.	There is reassurance from the community members that we will continue with the plan even after RESCCUE term.	5- Very confident

Rewasa	<ul style="list-style-type: none"> <li>• Yes we can continue the project. Need frequent small community projects on how to look after their resources.</li> </ul>		4-Confident
Ra ICM/YMST	<ul style="list-style-type: none"> <li>• People of Ra can continue the project</li> </ul>		4-Confident

### Ocean Acidification

It was presented to the focus group that coral reefs are highly sensitive to small changes in ocean temperatures. The heat stresses the algae that nourish the corals and provide their vibrant colors. The algae then leave, and the corals eventually starve, an event known as bleaching. Also, a more acidic ocean affects the normal calcium balance, meaning creatures with calcified shells, such as shellfish and coral, may not have enough calcium to grow.

Villages	Indicator 1- What happens when there is coral bleaching ?	Effects on community & environment	Score
Nativi	- Destruction of the reef system and an importance protein source for the villagers	- Fish catch decreases which then affects our meals -our income is decreased	2- Serious
Nabukadra	Some common marine life such as invertebrates and fish disappear.	It reduces our family meals of fish and invertebrates.	3- Moderate
Draunivi	- Destruction of the reef system and an importance protein source for the villagers	- Fish catch decreases which then affects our meals -our income is decreased	2- Serious

Nawairuku	Not applicable	Not applicable	Not applicable
Rewasa	Not applicable	Not applicable	Not applicable
Ra ICM/YMST	<ul style="list-style-type: none"> <li>Massive coral bleaching</li> </ul>	Decrease in fish abundance Sources of income decrease	2- Serious

<b>Villages</b>	<b>Indicator 2- What would happen if it affects 50% of corals in <i>I qoliqoli</i> affected?</b>	<b>Effect on community &amp; environment</b>	
Nativi			
Nabukadra			
Draunivi			
Nawairuku	Not applicable	Not applicable	Not applicable
Rewasa	Not applicable	Not applicable	Not applicable
RA ICM/YMST	<ul style="list-style-type: none"> <li>Increase in illegal fishing/poaching</li> <li>Increase in wave intensity on the shorelines of Ra</li> </ul>	<ul style="list-style-type: none"> <li>Certain families of fish will disappear</li> </ul>	1-very serious

<b>Villages</b>	<b>Indicator 3- Barriers to adaptation activities</b>	<b>Means to manage the event</b>	
Nativi	<ul style="list-style-type: none"> <li>Peoples persistence in using fertilizers in farms</li> <li>Dumping of garbage to sea</li> <li>Destruction of corals by fishers</li> </ul>	- There are plans to introduce coral planting	3- Manageable
Nabukadra	The lack of awareness of the ridge to reef connectivity is a constraint.	The village Fisheries committee as well as qualified experts in this field	2- Quite capable



		has been providing information and advice accordingly for the reduction of the impact of climate change.	
Draunivi	<ul style="list-style-type: none"> <li>- Dumping of garbage to sea</li> <li>- Destruction of corals by fishers</li> </ul>	The village Fisheries committee as well as qualified experts in this field has been providing information and advice accordingly for the reduction of the impact of climate change.	3- Manageable
Nawairuku	Not applicable	Not applicable	Not applicable
Rewasa	Not applicable	Not applicable	Not applicable
Ra ICM/YMST	<ul style="list-style-type: none"> <li>• Burning</li> <li>• Gravel extraction</li> </ul>	More awareness and training	2- Quite capable
<b>Villages</b>	<b>Indicator 4: Sustainability after RESCCUE</b>		
Nativi	We need to form a village level YMST team to ensure natural environment management.	The anticipation and keenness exists amongst villagers but someone has to lead.	4- Confident
Nabukadra	The fisheries committee is keeping a look out by continuously updating and advising the community on the		3- Moderate

	significance of managing the coral reef well.		
Draunivi	We need to form a village level YMST team to ensure natural environment management.	The anticipation and keenness exists amongst villagers but someone has to lead.	4- Confident
Nawairuku	Not applicable	Not applicable	Not applicable
Rewasa	Not applicable	Not applicable	Not applicable
Ra ICM/YMST	Increase information on ocean acidification to villages		4- Confident

#### 4.0 Proposed Adaptation Activities

The priorities mentioned by the local communities should be balanced with the capacity of RESCCUE to address these issues as well as the project funding resources. If the community feels that coastal resource management will be key in CBA, then the appropriate entity should be identified within the ICM and the broader YMST network that have the technical and financial resources that can meet the needs of the community. It is also critical that the local adaptive capacity is strengthened in the context of current and future climate change negative impacts variability. In other words, it is important that development project that enhances the resilience of the community as well as the supporting institutions should be considered.