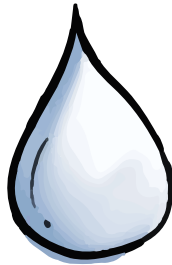


**SCALING UP PACIFIC ADAPTATION (SUPA)**

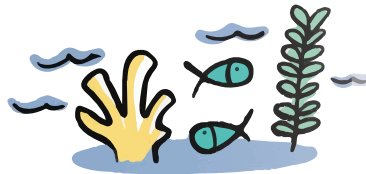
# SCALING UP PACIFIC ADAPTATION (SUPA)



**COASTAL  
PROTECTION**



**WATER  
SECURITY**



**MARINE  
RESOURCE  
MANAGEMENT**



**RESILIENT  
AGRICULTURE**

## SNAPSHOT 2022

Marine Resource Management,  
Water Security Measures, Coastal Protection  
and Resilient Agricultural Measures

**Fiji**

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Our vision:

***A resilient Pacific environment sustaining our livelihoods  
and natural heritage in harmony with our cultures.***

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COUNTRY	FIJI
Capital	Suva
Population	884, 887 (2017 census)
Inhabited islands	110
Land area	18, 274 km <sup>2</sup>
Max height above sea level	1324, Mt Tomaniivi
Physiography	The major islands are mountainous, with the highest peak over 1300 meters and covered with thick tropical forest
Location	Lat. 18°10'S, Long. 178°27'E
EEZ	1,282,980 km <sup>2</sup>
Climate	Fiji has a tropical rainforest climate and a tropical monsoon climate, with wet season from September to April and dry season from May to August.
Rainfall	250 – 400mm per month of rainfall per month in the wet season and 80 – 150 mm in the dry season
Mean Temperature	January and February the hottest months, with daily highs around 30 °C – 32 °C, while the coolest months are July and August with night temperature dropping down to 18 °C - 20 °C
Economy	Fiji is described as a middle-income country although it remains a developing country with large subsistence agriculture sector. Fiji's growth is mainly driven by a strong tourism industry, which earned more than the combined revenues of the country's top five exports (fish, water, garments, timber, and gold). Post Covid, this was overtaken by remittances from overseas workers, mostly seasonal workers.
GDP per Capita	4,646.61 USD (2021)
Currency	Fiji Dollar
Languages	English
Government	Democratic Republic

Figure 1: Country profile for Fiji.

## In Context

Fiji comprises of over 300 islands spread over an EEZ area of 1.29 million km<sup>2</sup>. Despite the multitude of islands spread over its territory the bulk of its population is concentrated on the two main islands of Viti and Vanua Levu. The estimated national population in 2022 was 929, 766, 97% contained within the two islands and of which an estimated 75% are classed coastal dwellers. The impacts of climate poses not only a threat to the island nations biodiversity and natural resources but also the economic sectors such as fisheries, agriculture and tourism that are foundational to development and community livelihood. Fiji is ranked high under the 2022 World Risk Report on vulnerabilities to natural disasters and with climate change will add a further dimension of extremity on the frequency and intensity of such natural events and their effects on populations. Some of these extreme events affecting coastal areas include inundation and erosion, saline intrusion, storm surges and king tides. With warming oceans bleaching of coral reefs and delayed to suppressed recovery impact fisheries and desiccation of land impact the quality of both soil and water.

Fiji is the fifth country that carried out an Impacts Analysis Methodology developed as part of the European Union funded Global Climate Change Alliance Plus- Scaling Up Pacific Adaptation (GCCA+SUPA) Project. In collaboration with WWF Fiji Program, a light version of the impacts analysis methodology was carried out in selected sites to assess past projects adaptation interventions undertaken to address coastal protection, freshwater security, marine resource management and food security. The assessment was to determine post project effectiveness and gaps to inform current, future community adaptation interventions whether there are any comparative differences with community sites that do not receive adaptation support.

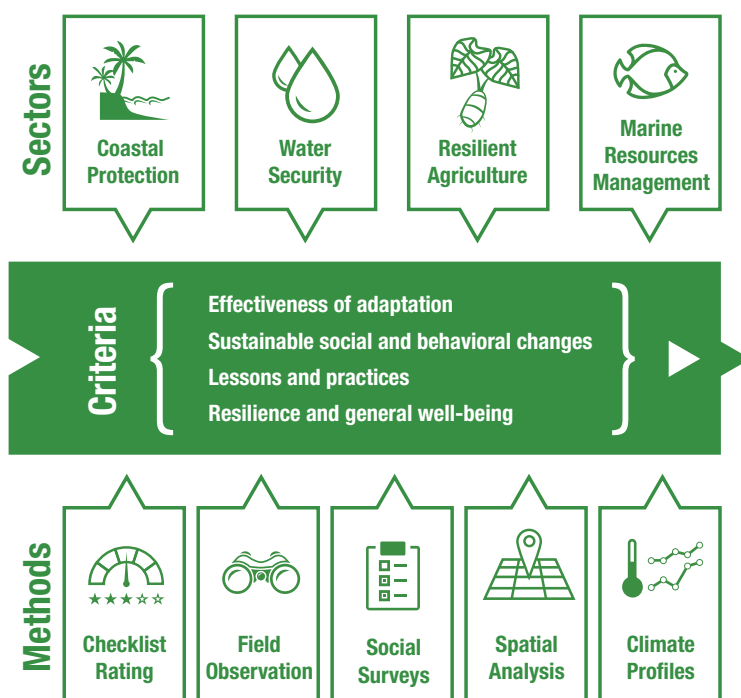


Figure 2: Pathway for determining impacts of adaptation.

CRITERIA	COASTAL PROTECTION
Effectiveness	Trialled measures. Detection of coastal change.
Social-behavioural change	Beach condition and signs of community action to protect adjacent beachfront, people' sense of safety.
Lessons and practices	Vulnerable groups: persons with disabilities, the elderly, women, children access the beachfront for recreation/fishing.
Sustainability	If structural measure is still intact, the extent to which it has/not been maintained, and whether natural assets were enhanced or damaged.

CRITERIA	MARINE RESOURCES MANAGEMENT
Effectiveness	Conservation value
Social-behavioural change	Anthropogenic impacts from tourism/recreational activities, coral damage, sewage pollution, sedimentation.
Lessons and practices	Extent of ownership and management actions for area and species conservation, community education and awareness outreach
Sustainability	Level of protection (statutory or other governance), training for monitoring effectiveness of Ra'ui.

CRITERIA	FRESHWATER SECURITY
Effectiveness	In improving drinking water coverage. Water source and condition as proxy to measuring improved drinking water coverage. (W1). Assess the improved state of water facilities and increase in water availability (W2).
Social-behavioural change	Level of improvement to existing water harvesting storage systems. (W3). Tracks the capacity to either operate, maintain and or local management of the water supply system. (W4). Level of participation, awareness, and sense of improved sanitation standard. (W6).
Lessons and practices	Ascertains if there is improved access to safe water by households, the special needs vulnerable groups: persons with disabilities, the elderly, widows, single mothers, and children. (W5).
Sustainability	If structural measure is still intact, the extent to which it has/not been maintained, and whether natural assets were enhanced or damaged. Water treatment options available. Tracks investment in water security measures at one place over time. (W7)

CRITERIA	AGRICULTURE – AGROECOLOGICAL PRACTICES
Effectiveness	Soil capability. Percent of land available for food production. Percent of farmers who promote soil health practices. (A1) Crop productivity. Percent change in crop production yield. Percent of farmers with access to crop varieties. (A2)
Social-behavioural change	Soil training program. Percent increased access to crop varieties. (A3) Farming practice. Number of families with farms and composition of farmers (A4)
Lessons and practices	Level of awareness. Percent of families with subsistence farms. Noted change in farmers' household income with an improved crop yield. (A4)
Sustainability	Percent farming households with improved/diversified crop productivity. (A5)

Figure 3: Criteria for measuring impact of sector-based interventions.

## Selection of sites

Noting that the Impacts Analysis Methodology is tailored to examine and ascertain the residual impacts of climate change adaptation applied, sites selected were based on the following criteria:

1. Having previous invested project funding focused on addressing a community climate change impact in the last 5-10 years
2. Having both community members and project member teams in country that could share institutional memory with data and project reports relating to sites.
3. As a comparative two additional criteria were added to site selection, sites located on both the dry and wet sides of both main islands and sites having community projects but were not focused on climate change adaptation as part of its implementation design. The final sites are provided in the table below.

CLIMATIC CONDITIONS	Province	District	Community	Adaptation Type
Dry - Maritime	Ba	Nacula	Nacula	Agriculture & Marine
Dry - Mainland		Tavua	Vatutavui	Unassisted
Dry - Maritime	Macuata	Mali	Mali	Marine & Water
Dry - Mainland		Macuata	Wailevu	Unassisted
Wet - Mainland	Cakaudrove	Navatu	Navakaka	Unassisted
Wet - Maritime	Rewa	Vutia	Muanaira	Marine

Figure 4: The final sites' selection.

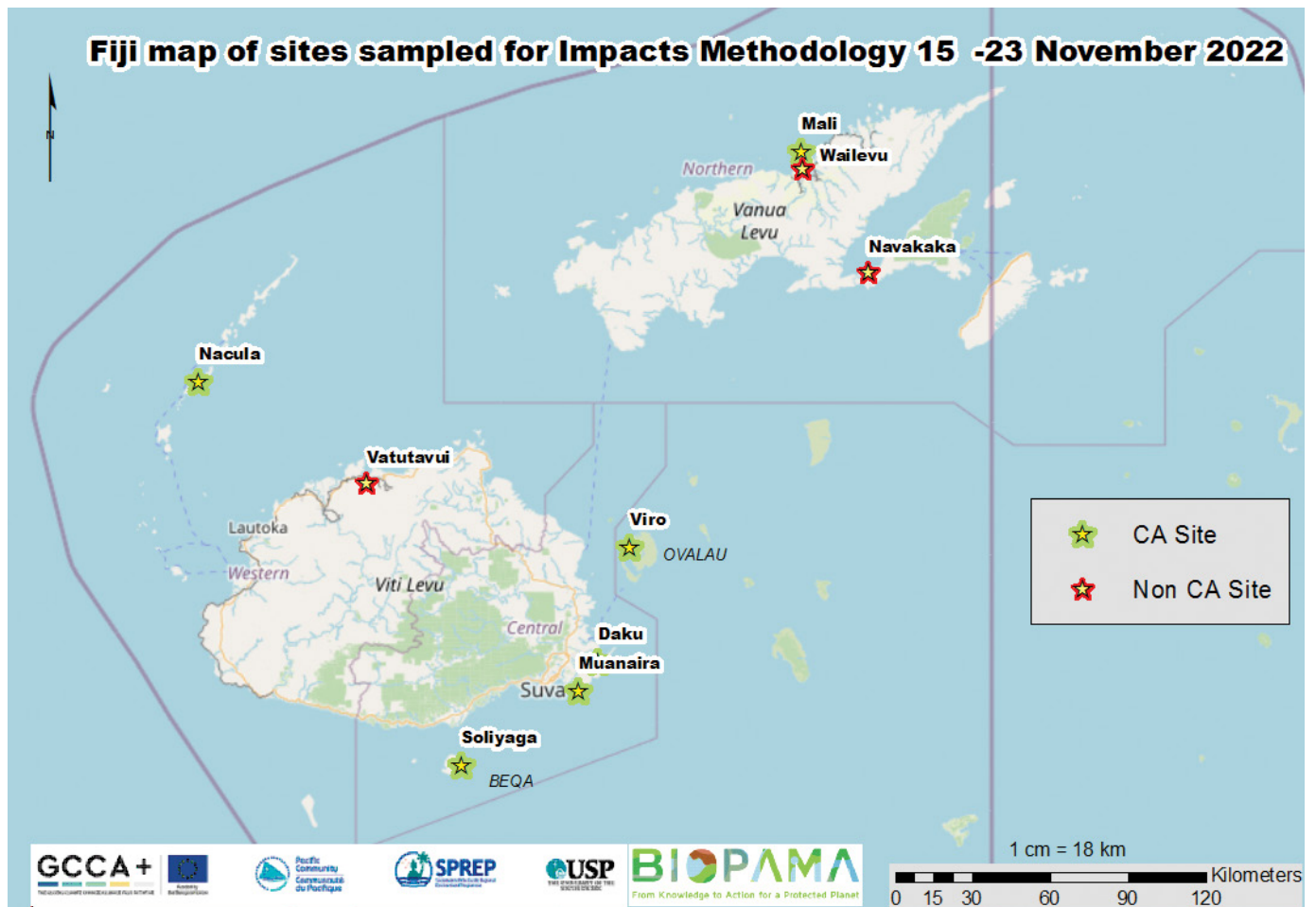


Figure 5: Map of Fiji with the distinct wet and dry part of the two main islands created from the orographic effect of the mountain ranges of Viti Levu and Vanua Levu. Note: CA - Climate adaptation.

## Climate Adaptation Sites

SITE	ADAPTATION MEASURE	TOOLS USED	TITLE OF THE PROJECT	FUNDING AGENCY	YEAR COMPLETED
Mali	<b>Water Security:</b> Water Management, Utilization and Storage	Checklist rating, field observation, focus group  Impacts analysis methodology: Tools applied Out at the field	Restoring the Natural Landscape on Mali Island through Community Landcare	GEF-Small Grants Programme	2012
	<b>Marine Resource Management:</b> Food Security and Sustainable Fisheries		Building Effective Community Driven Governance Systems in Mali District to Enhance Community Access to Food, Income Generating Opportunities and Livelihoods	AUSAID-Fiji Community Development Program (FCDP)	2014
Nacula	<b>Agriculture:</b> Drought Resistant Crops		Adapting to Climate Change by Building Resilience of Pacific Communities and Ecosystems Through Disaster Preparedness, Awareness and Action	German Federal Ministry for Economic Cooperation and Development (BMZ)	2020
	<b>Marine Resource Management:</b> Food Security and Sustainable Fisheries		Community Based Restoration and Sustainable Management of Vulnerable Forests of the Rewa Delta, Viti Levu Fiji.	International Tropical Timber Organization	
Muanaira	<b>Marine Resource Management:</b> Food Security				2020

Figure 6: Overview of applied tools: Field observation, focus group survey.

## Impact Indicators

For assessing impacts across sites the SUPA-ImpactAssessment Checklist was applied for the relevant adaptation measure for either one or more of the categories, Marine, Coastal, Water and Agriculture. This was done for community sites which had received adaptation project funding and in contrast against sites not being recipients of adaptation awareness or support. A scoring system provided by the checklist allows for the assessor to carry out site observations and conduct community consultation, to determine the most appropriate score for each prescribed indicator and listing of characteristics - to aid the scoring. Additional focus group interviews were conducted with

community members knowledgeable about both adaptation and self-assisted interventions undertaken and perceived effectiveness. The focus group interviews utilized a series of prepared prompt questions linked to the checklist to allow for the collation of this additional information. Validation of the assessment results is supported when having practitioners with a positive working relationship in the community lead the conversation, plus the profiling of activities prior to the field assessment are critical when tailoring the focus group and community polling questions.

CRITERIA	INDICATOR CODE	INDICATOR DESCRIPTION	METHODOLOGY
Effectiveness	M1	Conservation Value; Control access to protected zones and management actions for species conservation	<ul style="list-style-type: none"> <li>• Observations and use of Impact Checklist</li> <li>• Focus group interviews</li> </ul>
	W1	Water source and condition as proxy to measuring improved drinking water coverage. Protection of water source, distribution system (& filtration maintenance if any).	<ul style="list-style-type: none"> <li>• Observations &amp; use impact Checklist that include physical attributes of local environment.</li> </ul>
	W2	Assesses the improved state of water facilities and increase in water availability.	<ul style="list-style-type: none"> <li>• Observations &amp; use of impact Checklist.</li> <li>• Spatial mapping of water infrastructure elements with extent water tanks coverage.</li> </ul>
	C1	Structural design built to protect the coast from frequent storm surge, flooding, sea level rise. Degree of physical condition of the structure.	<ul style="list-style-type: none"> <li>• Observations &amp; use impact Checklist that include physical attributes of local environment.</li> </ul>
	C2	Area of beach recharged with sand and beach condition over time pre and after structures were built. Healthy/ eroding signs with the shape of the beach surface, coastal vegetation cover, recruitment of small trees, regrowth and signs of local influence-rubbish, footprints, sand extraction & other users.	<ul style="list-style-type: none"> <li>• Observations &amp; use of impact Checklist.</li> <li>• Spatial mapping of change detection along the focal coastline.</li> </ul>
	A1	Soil capability. Percent of land available for food production. Percent of farmers who promote soil health practices.	<ul style="list-style-type: none"> <li>• Spatial analysis information tool.</li> <li>• Rate uptake of soil health and land-care practices.</li> </ul>
Social-behavioural change	M2	Anthropogenic impact; Boating & recreation activities, signs of sandmining, coral harvesting/bleaching and sedimentation.	<ul style="list-style-type: none"> <li>• Observations and Impact Checklist</li> </ul>
	W3	Level of improvement to existing water harvesting storage systems.	<ul style="list-style-type: none"> <li>• Observations &amp; use of impact Checklist.</li> </ul>
	W4	Tracks the capacity to either operate, maintain and or local management of the water supply system.	<ul style="list-style-type: none"> <li>• Meta data from the social surveys of household and focus group be treated for comparative analysis.</li> </ul>
	W6	Level of participation, awareness, and sense of improved sanitation standard.	<ul style="list-style-type: none"> <li>• Observations &amp; use of impact Checklist.</li> <li>• Meta data from the social surveys of household and focus group be treated for comparative analysis.</li> </ul>
	C3	Ascertain level of community management actions taken to protect the coastline. Scoring on clean surrounding area, beach control access, evidence of beach protection and its vegetation, community coastal replanting and brush protection to help with sand build up, management actions to promote beach accretion and control set up signs to access beach.	<ul style="list-style-type: none"> <li>• Observations &amp; use of impact Checklist.</li> <li>• Meta data from the social surveys of household and focus group be treated for comparative analysis.</li> </ul>



CRITERIA	INDICATOR CODE	INDICATOR DESCRIPTION	METHODOLOGY
	C4	Ascertain level of awareness and community sense of safety with protection of property and land. Expressed as number of people or vulnerable groups whose livelihoods have improved/disrupted as a result, of the adaptation action. Nature of services and type of facilities set up at the reclaimed coast area (if any).	<ul style="list-style-type: none"> <li>• Observations &amp; use of impact Checklist.</li> <li>• Meta data from the social surveys of household and focus group be treated for comparative analysis.</li> </ul>
Social-behavioural change	A2	Soil training program. Percent increased access to crop varieties.	<ul style="list-style-type: none"> <li>• Observations &amp; record of scoring for each variable.</li> <li>• Ref. Impact checklist for Resilient Agriculture form.</li> <li>• Focus group interviews with farmers.</li> </ul>
	A3	Farming practice. Number of families with farms and composition of farmers.	<ul style="list-style-type: none"> <li>• Household Survey</li> <li>• Focus group survey</li> </ul>
Lessons and practices	M3	Extent of ownership/enhanced community consultation; Environmental awareness programme in place, training activities for monitoring and a form of protection put in place (statutory or other)	<ul style="list-style-type: none"> <li>• Focus group interviews</li> <li>• Household Survey</li> </ul>
	W5	Ascertain if there is improved access to safe water by households, the special needs vulnerable groups: persons with disabilities, the elderly, widows, single mothers, and children.	<ul style="list-style-type: none"> <li>• Focus group interviews.</li> <li>• Observations &amp; record of scoring for each variable. Ref. Impact checklist for Resilient Agriculture form.</li> </ul>
	C5	Number of assets and asset value of coastal protection measures, including nature-based solutions; derived co-benefits.	Liaise for with national CC focal point for cost details on fiscal budget of built structures.
	A4	Level of awareness. Percent of families with subsistence farms. Noted change in farmers' household income with an improved crop yield.	<ul style="list-style-type: none"> <li>• Spatial mapping infor. Analyse records of agriculture census data if available.</li> <li>• Focus group interview results.</li> </ul>
Sustainability	M4	Level of protection (statutory or other governance), training for monitoring effectiveness of Ra'ui	<ul style="list-style-type: none"> <li>• Focus group interviews</li> <li>• Observations and use of Impact checklist</li> </ul>
	W7	If structural measure is still intact, the extent to which it has/not been maintained, and whether natural assets were enhanced or damaged; derived co-benefits if any.  Tracks investment in water security measures at one place over time.	Liaise for with national CC focal point for cost details on fiscal budget of built structures, project expenditure reports.
	A5	Percent farming households with improved/diversified crop productivity.	Meta data from the social survey eg. people receiving agricultural extension services, training of individuals in communities to develop emergency plans and its use.

Figure 7: Indicator description and tools for marine resource management (M), freshwater (W), coastal protection (C) and agricultural (A) measures in Fiji.

## Community Poll

Each of the six communities engaged (climate change and non-climate change adaptation project sites) undertook a series of prepared questions to assess the level of awareness and perceptions regarding the impacts of climate change experienced on site. A total of 61 respondents participated from the adaptation community sites and a total of 53 respondents were from the non-adaptation sites

With the terminology “climate change and resilience” all respondents registered being exposed to the word (100%) however it was interesting to note, that for both adaptation and non-adaptation community respondents those indicating being exposed to the word but not understanding what it meant (“Yes but I don’t know what it means”) were roughly the same (adaptation-11% and non-adaptation-10%). It is fairly safe to reason that with Climate Change highlighted-nationally in the media for a number of years and with ongoing community awareness Climate Change as a term is well dispersed amongst the population, even though there might still be a minor sector of the population though exposed to the term Climate Change who may not fully register the meaning and implication of the word.

On further probing whether they consider climate change happening, again it was interesting to note responses were again similar for adaptation (Yes-96%) and non-adaptation (Yes-96%) sites. Both groupings registered less than 5% for respondents with the “Don’t Know” or “Maybe”. It appears that community respondents from both groupings irrelevant of understanding what climate change is do recognize change in their environment. Those falling in the less than 5% category although admitting to observed change may not fully understand how the change observed in their surrounding is linked back to climate change.

On community awareness regarding adaptation work being applied within the community site, respondents from the adaptation communities registered in the affirmative “Yes” at 98%, indicating both high awareness and linkage to adaptation activities applied. For the non-adaptation grouping, responses were mixed with Yes at 80% and No at 20%. The respondents for “Yes” were those members of the community involved in self driven village activities to address changes impacting the community eg mangrove planting in Vatutavui Village to address king tide flooding, stone piling along coast to reduce coastal erosion at Navakaka Village, replanting along the river to reduce sediment overload into the river contributing to flooding for Wailevu Village.

With the follow question on whether the purpose of adaptation measures is understood by the community, the response from adaptation sites were in the affirmative (Yes-98%). For the non-adaptation sites, those responding “Yes” was 77% indicating an understanding of their action to address an observed negative and changing situation within their environment, whilst “No” registered for 23% of respondents in this grouping in most likely not registering the action applied at the village level as an attempt at adaptation as a concept.

On the causes of climate change both community groupings clearly attributed the cause in the majority to “human activity that lead to emission of dangerous greenhouse gases” (Climate Adaptation-73%, Non-Climate Adaptation-69%) and loss of trees (Climate Adaptation-66%, Non-Climate Adaptation-70%). It is interesting to note a portion of respondents attributing Climate Change as caused Ozone Layer Depletion (Climate Adaptation-25%, Non-Climate Adaptation-37%) and may be due to media mixed messaging absorbed by the community.



Community consultation with the village members of Wailevu.

In terms of coping ability and being informed to enable preparedness in changes to water, food or energy, the adaptation sites registered their families being “well to very well informed” at 67% to “Not at all to Not very well informed” at 33%. This later value was spiked from respondents of Muanaira Village, although they are aware of temporary coping strategies this feedback was more to do situations of apparent irreversible change shared such the flooding of mangrove island land, loss of land for cultivation of crops and observed loss of former robust mangrove zones now lost entirely to the ocean. The response for the Non adaptation sites were equally mixed (Well Informed to Very Well Informed- 48% Not very well informed to Not at All Informed- 52%). Those registering being informed indicated this was through the regular public awareness and media highlights on disaster preparedness which a certain extent links to adaptation preparedness.

When queried on perceptions on risk to their respective communities when experiencing extreme weather and climate events, both groupings in the majority registered a perceived medium to high risk (Climate Adaptation-87%, Non Adaptation- 92) This probably suggests higher observed and experienced incidences of either natural disaster such as cyclones or climate related impacts on the community.

With regard to quality of life on whether respondents’ life in the village was better, worse or the same as compared to 5 years ago. Overall for the Adaptation sites the results were mixed- Those indicating no change or the “Same” - 11%, “Better”- 38% and “Worse” - 51%. What is indicative from this result is different community sites experience impacts and intensity in different ways and therefore would respond differently. For Muanaira Village which is currently facing rapid coastal erosion and

inundation of their village and agricultural lands they consider their situation worse whereas Mali and Vuaki villages with activities such as improved agriculture and fisheries through adaptation activities and improvement in community infrastructure such as water, they do acknowledge Climate impacts however feel their situation is not bad as other locations. For the non-adaptation sites Vatutavui in the majority (Over 50%) considered life a bit better, this is primarily due to improvements in water access and ongoing engagement with NGO’s around mangrove replanting, forest replanting and improvement in water tank installation and reticulation as the village used to suffer from water shortages. For Wailevu they consider their quality of life in the majority the “Same” (Over 50%), in general the respondents for this village only major concern was flooding however this was an issue of concern even 5 years back. For Navakaka Village, respondents were mixed, those registering better and those registering worse at above 25% each. On further probing this community indicated their major issue being around inadequate water and lack of proper infrastructure to deliver water equally and adequately and may not be indicative of climate change.

With community access to media and information both adaptation and non-adaptation sites in the majority registered radio as a main form of information (Adaptation - 96% and Non Adaptation - 71%), followed by Television (Adaptation - 70% and Non Adaptation-67%) and then Internet on Mobile Phones (Adaptation - 41% and Non Adaptation - 49%). Again for site specific ranking, those with weak network connections such as Navakaka and Muanaira village, newspapers registered a higher percentage. Village meetings were also registered as an important means to gain information, although not the majority from all villages registered it as an important conduit for information, most ranking this above 20%.



Community consultation on Mali Island.

# Impacts at a Glance

## Marine Resource Management

For the assessment community sites establishing marine protected areas and fisheries management systems with a crosscutting adaptation lens on food security was applied for Mali and Nacula, maritime island communities and with Muanaira, a mangrove island community located within a major delta. The two non-adaptation sites were Navakaka a coastal community that voluntarily established a community marine protected area as part of Fiji Locally Marine Managed Area (FLMMA) and Wailevu, that voluntarily set up a community fishing ban and protected area at the mouth of the river draining out into their fishing ground. All sites have had their community protected areas in place since the last 5 years or more

MARINE RESOURCE MANAGEMENT		ADAPTATION SITES			NON ADAPTATION SITES	
		Mali	Nacula	Muanaira	Navakaka	Wailevu
EFFECTIVENESS	M1	3	3.1	2.6	2.5	3.2
SOCIAL BEHAVIOURAL CHANGE	M2	2.25	2.5	2	2.5	2
LESSONS AND PRACTICES	M3	3	3	1	1	3
SUSTAINABILITY	M4	3.2	3.25	2.25	2	3.25
<b>STATEMENT OF THE OVERALL MEAN IMPACT OF INTEVENTIONS</b>		<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>

Figure 8: Marine Resource Management



Young man from Mali Island displays his catch caught from the village fishing grounds.

From the figure 8 it both the adaptation and non-adaptation sites register both a medium to high impact rating. The lower impact scoring for Muanaira, an adaptation site is due to having lower recorded scores around community governance and management. Muanaira's marine resource management committee (locally called Qoliqoli Committee) has been inactive, do not have a management plan and external pressures impacting on fisheries in the area. Due to the community's fishing ground being close to the capital Suva, community respondents highlighted the high level of illegal poachers and their lack of equipment such as a suitable boat to carry out enforcement with their fish wardens. An additional, problem highlighted has been the pollution coming down the river system and the nearby sewage outflow from the capital city's treatment plant. Navakaka a non-adaptation focused site also registered a lower impact score as it also cited the lack of an active Qoliqoli Committee and a plan implementing priorities such as curbing illegal poachers into the community fishing ground.

It is interesting to note that all communities irrelevant of being an adaptation or non-adaptation site, recorded improvement in fisheries and the intent of food security when community marine protected areas were put into place. All sites recorded an increase in abundance (Mali for instance recorded more lush seagrass meadows and increased presence and collection by the women of the shellfish- Kaikoso (Anadara Sp) however one of the negative result from this apparent abundance was that it also attracted outsiders to illegally poach and fish. All committees whether active or not registered this aspect as a challenge, being unable to enforce compliance due to lack of financing and equipment. What is further apparent from the impact scores is that good leadership and governance especially with the Community Qoliqoli Committees is needed to ensure sustainability of marine resource management activities.

## Water Security Measures

The impact checklist was applied for two adaptation sites Mali and Nacula, island communities with no surface water but dependent on both borehole and rainwater as their primary water source. The non-adaptation site was Navakaka, that has an established water reservoir linked to a natural spring, reticulated through a piping system to the village. Both Mali and Nacula due to their location on the dry leeward side of the main islands have lower annual rainfall and are exposed to periods of drought, especially during a pronounced episode during the dry season or during an El Nino period. This further exacerbates the issue with food security as crop productivity is often affected during this period as well

WATER SECURITY MEASURES		ADAPTATION SITES		NON ADAPTATION SITES
		Mali	Nacula	Navakaka
EFFECTIVENESS	W1	3	3	2.3
	W2	3	2	1.3
SOCIAL BEHAVIOURAL CHANGE	W3	1.5	2	1.8
	W4	2.7	3.3	1.7
	W5	2.8	2.9	2.25
LESSONS AND PRACTICES	W6	3	3.3	1.7
SUSTAINABILITY	W7	3	3	3
<b>STATEMENT OF THE OVERALL MEAN IMPACT OF INTEVENTIONS</b>		<b>3</b>	<b>3</b>	<b>2</b>

Figure 9: Water Security Measures.

The results shown for both adaptation sites demonstrate a high impact value and reflects that effort that had gone in to establish and sustain community water committees, provision of WASH trainings and the community itself building upon what the projects had implemented such as securing more water tanks. Nacula post project through further engagement with government secured a FJD200K investment to build and improve infrastructure from a new spring source to a storage facility. In addition, 35 new 2700-litre rain harvesting water tanks will be installed for earmarked dwellings and upgrading of existing concrete tanks and their rain-gathering mechanisms.

Mali similarly has maintained much of what was implemented by the project- the community water committee and plan, annual tank cleaning and disinfecting etc. The committee had also moved discussion with government to determine a more consistent source of piped water, the current proposed plan will be to connect Mali directly to the mainland water supply system as the island is just a kilometer off the main coast of Vanua Levu. One of the challenges faced by the Mali community is replacing the aging cement water and piping infrastructure. The recent cyclone Yasa also damaged community houses and rainwater tanks, which partly negates the adaptation efforts undertaken previously. One respondent from this community indicated the need for a more robust financing plan to not only look at maintaining water systems for the villages but to also be an emergency fund to replace for instance water tanks and roofing for homes post disaster event. This particular aspect had not

been critically looked at for inclusion during the project design and implementation, as it had focused on raising awareness on WASH, building the capacity of the water committees and working with communities to improve water access and storage capacity.



Household water tank in the village of Nacula.

With the Navakaka community their lower impact scoring was that due to not building upon existing water investments made for the community. One of the causes highlighted by members of the committee was the water committee being inactive nor making an attempt to rectify issues related to the existing

water infrastructure. When the system was set up through government support, the water infrastructure and piping system supported two villages (Navakaka and Nakorovou Villages) and the nearby government nursing station. Over time the households in Navakaka has increased however the system has not changed to accommodate this increase, leading to water shortages or lack of water completely for some households. The village headman through the focus group discussions indicated the existing piping system needed to be fixed, to relook at the piping system connected to the existing water source, building of a better reservoir and storage facilities. In this case it is apparent that two factors currently work against the resiliency of this community if we are to look at the situation through an adaptation lens. The lack of an effective water committee to address growing demands on the existing water source and the maintenance and improvement in water infrastructure.



Household water tank in Nacula village.

## Coastal Protection Measures

Under the coastal protection adaptation measure the impact assessment was undertaken for the adaptation site Muanaira and non-adaptation site Vatutavui. Muanaira has through project funding undertaken replanting measures for their mangrove and coastal areas and as a self- attempt at preventing further coastal erosion, utilized both beach and reef rock to build barriers against incoming waves. Flooding within the village in the last ten years has now become more pronounced and in general the community considers current efforts (replanting and makeshift sea wall) to address the negative impact ineffective. Vatutavui though a non- adaptation site is currently involved in a community replanting project both mangrove and forest tree replanting. Due to the surrounding area being cleared of dry forest and later repeated intensive agriculture for sugar cane, most of the area is now grassland. The community project was to replant native trees onto the landscape to mitigate some of the dry conditions of the area and also demonstrate how mangroves through replanting could help with coastal protection and flooding.

COASTAL PROTECTION MEASURES		ADAPTATION SITES	NON ADAPTATION SITES
		Muanaira	Vatutavui
EFFECTIVENESS	C4	2	1.8
SOCIAL BEHAVIOURAL CHANGE	C2	1.5	1.25
LESSONS AND PRACTICES	C3	1.9	1.9
SUSTAINABILITY	C4	1.7	2
<b>STATEMENT OF THE OVERALL MEAN IMPACT OF INTEVENTIONS</b>		<b>2</b>	<b>2</b>

Figure 10: Coastal Protection Measures

Both community sites registered the same medium impact and this is likely to the complexity when dealing with coastal interventions and sea level rise. As Muanaira is located within a mangrove island in a deltaic system, it is already at sea level some of the activities undertaken have even been deemed ineffective such as replanting with coastal vegetation. What the communities do recognize is the possible effectiveness if replanting is done in conjunction with an infrastructural intervention such as a seawall integrating the replanting effort. Community feedback also highlighted the cost that would be needed to build a proper seawall as the stretch of area impacting the village stretches at least 1.8 km. They indicated

that relocation is an issue that is now being considered by the community at large however there are considerations to be made, such as where to relocate to, as their traditional lands are the one that they are located on and the cost to relocate itself (Village has 100+ households).

For Muanaira due to location, agriculture is strongly linked to coastal protection. The community highlighted that once their plantations due to rich alluvial soils coming down the Rewa River, were very productive that they maintained the major supply of vegetables and crops to the capital Suva. Over time due to increased coastal flooding and salt water intrusion, their



Coastal replanting initiative in Muanaira village, Rewa Province.

plantations are no longer productive, one respondent citing a 150 acres no longer farmed as crops could not thrive. This source of income has resulted in many members of families leaving the village in search of work and income elsewhere. Respondents indicated that they would appreciate further community awareness and support on salt resistant crops to help mitigate some of these changes

All community sites visited indicated some form of coastal erosion, loss and change, what is apparent is that the intensity of the impact varies due to geography and the location of the villages themselves, but what is clear from comparative sites is that replanting alone is not a coastal protection solution. Muanaira indicated planting over 1000 coconut and coastal trees in 2019 which for a time thrived but eventually got washed away. Furthermore, it was highlighted by the community that government had neglected to maintain floodgates in the area which has accelerated some of these changes. Likewise, Vatutavui similarly attempted to plant mangroves in the areas that were now open to flooding during high tide, however this also has been unsuccessful. What is likely needed as a more nature based solution such natural seawalls which utilize infrastructure and incorporates natural coastal vegetation



Community consultation at Muanaira village, Rewa Province.

## Resilient Agricultural Measures

The final assessment carried out was a comparative for resilient agricultural measures applied in Nacula the adaptation site and Vatutavui. Nacula as part of ongoing climate change adaptation and disaster risk reduction project activities attempted to address the issue around food security through encouraging household model organic gardens, the uptake of drought resistant root crops in this case sweet potato-kumala and Yam-uvi. Aside from improving crop productivity with the community, women were engaged in food preservation techniques such as the conversion of root crops into flour to be used in times of emergency such as post cyclonic disasters or periods of prolonged drought, Vatutavui as part of its landscape rehabilitation and replanting programme also incorporated diversification of root crops grown in their gardens for income and food security.

RESILIENT AGRICULTURAL MEASURES		ADAPTATION SITES	NON ADAPTATION SITES
		Muanaira	Vatutavui
EFFECTIVENESS	A1	2.5	2.5
	A2	3.3	3.3
SOCIAL BEHAVIOURAL CHANGE	A3	3.5	3.25
LESSONS AND PRACTICES	A4	3.7	3
SUSTAINABILITY	A5	2.75	2.5
<b>STATEMENT OF THE OVERALL MEAN IMPACT OF INTEVENTIONS</b>		<b>3</b>	<b>3</b>

Figure 11: Resilient agricultural measures

From the impact result it appears that there is not real variation from agricultural related activities in an adaptation and non-adaptation site, as both may have similar objectives around ensuring productivity, dealing with extreme events and maintaining productivity still, ensuring food security and maintain household income. What was highlighted from both community sites and appears important is that crop productivity be maintained and various were recommended by both community sites-

1. Encourage all households to maintain plantations or home gardens
2. Ensure there is diversity on crops and consider hardy crops such as kawai, tavioka and via
3. Where possible incorporate as much drought resistant, salt resistant crops into plantations
4. Utilise preservation and storage techniques to maintain access to food for households at all times



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