



# 3. Marakei



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## PHYSICAL FEATURES

Marakei is one of the northern islands of the Gilbert group, the fourteenth biggest island in the Kiribati group having a total land area of 14.13 square kilometers. A round trip around the island would cover 26 kilometers while the length of the island from the airport and running through the lagoon to Teraereke at southern portion of the island is 9.93 kilometers. Its widest width can be found in the village of Rawannawi and narrowest width at Temotu at the western side of the island. It is one of only two islands in Kiribati that encircles its lagoon. Whereas the lagoon in Teeraina is freshwater and shallow, the Marakei lagoon is saltwater and deep in some areas.

The lagoon contains several moderately deep basins and is almost completely surrounded by the island's two narrowly separated islands. This lagoon opens to sea at two narrow passages known as Baretoa pass located between the villages of Tekarakan and Baretoa in the west, and Raweta pass located between the villages of Bwainuna and Norauea in the east.

The village of Rawannawi lies at the northern end of the island with an airstrip at the northernmost end. Rawannawi is the biggest village and center of government and island council activities with seaport and airstrip.

There is a lot of space and free stretches in between the villages with the longest between Tekarakan and Bwainuna at the southern ends of the western and eastern land strips, respectively. Most travelers from Rawannawi prefer the road going via the village of Tekuanga when going to Norauea or Bwainuna as this is a more frequented route.

Access to the villages is via a gravel/mud paved road that can be bumpy with numerous potholes and unpaved surfaces. Traveling by truck is generally slower than by motorbike and pushbike because of bad road conditions. Access to the lagoon from Rawannawi is more difficult than from other villages as there is more land to go through.

The island has abundant groundwater, except for villages that are located in the narrow parts of the island, Antaai and Temotu. Some households in these areas have established a water system from areas with larger fresh water lenses.

## POPULATION

The population of Marakei in the 2010 census was 2,872; this is 2.8% of Kiribati's total population.

Compared to the 2005 population of 2,741 and the 2000 population of 2,544, the population is growing. The population of Marakei grew by 131 between 2005 and 2010, an annual population growth of 0.9%.

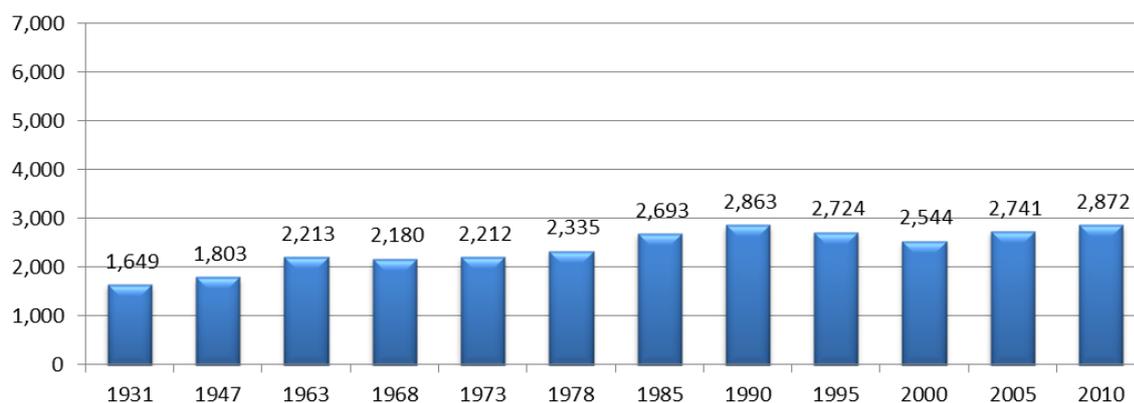
Marakei has a combined land area of 14.13 square kilometers and a population (in 2010) of 2,872, giving a population density of 203 people per square kilometer. Compared with other islands in Kiribati, Marakei is the 6th most densely populated island.

There are 492 households in Marakei, and the average household size is 5.8 people.

Figure 3.1: Map of Marakei



**Figure 3.2: Marakei population 1931-2010**



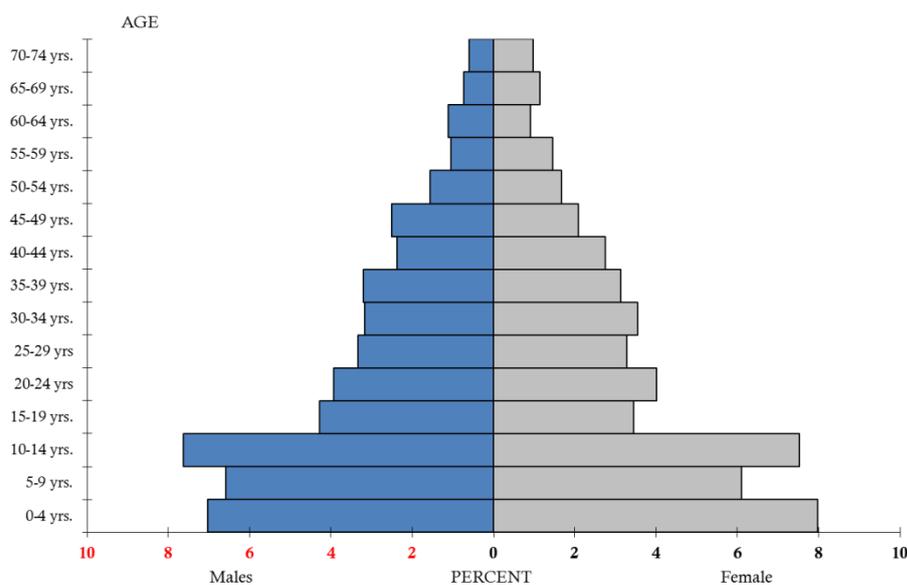
The main village of Rawannawi is home to more than a third of the island’s total population, with the remaining population spread relatively evenly among Marakei’s seven other villages.

**Table 3-1: Marakei population by village**

Marakei	Village	Population
	Rawannawi	1000
	Temotu	164
	Buota	339
	Tekarakan	358
	Bwainuna	310
	Norauea	321
	Tekuanga	217
	Antai	163
Marakei total population		2872

Marakei has a very large youth population, with 43% of the population aged under 15. In Marakei as in Kiribati as a whole there appears to be a “baby boom” underway, with a high population aged 0-5 as shown in Figure 1-3; in Marakei specifically there are also a large number of young people aged 10-14 years. There is no secondary school on Marakei, so there are fewer people aged 15-19 as many young people will be attending high school on another island.

Figure 3.3: Marakei 2010 Population by Age and Sex



Data Source: 2010 census

## LAND AND MARINE RESOURCES

### LAND RESOURCES

The island's main resources are its limited fruit tree resources predominantly coconut trees, pandanus, land crabs, and its vast marine resources. Plant life plays a great role in livelihood of the islanders and as limited as they are, they all have multitude significant uses as sources of building material, traditional medicine and other traditional uses.

Coconut trees (*Cocos nucifera*) provide the mainstay of food, shelter, medicine and income for the people of Kiribati including the people of Marakei. Without fruits, these trees during drought times can still provide toddy spathes that have provided the people for centuries with their main source of vitamin C found in the toddy. The pandanus tree (*Pandanus tectorius*) is second most important fruit tree. The most common pandanus species on the island of Marakei is the 'araoanimaai'.

There are two distinct species of breadfruit, the common breadfruit (*Artocarpus altilis*) and the Mariannas breadfruit (*A. mariennensis*) plus a hybrid of the two. The breadfruit tree comes third after the pandanus as the popular fruit trees in the islands but unfortunately is the most vulnerable to prolonged droughts. Breadfruit are therefore propagated and looked after carefully around the homes where the tree is easier to look after; breadfruit trees are rarely found inland and away from homes.

*Bwabwai* grows well and abundantly in Marakei. Requiring a great amount of water to grow, 'bwabwai' is therefore grown in pits dug to the water table.

Other general terrestrial flora comprise papayas, local fig, bananas, uri (*Guettarda speciosa*), casuarinas, leucaena, non (*Morinda citrifolia*), saltbush (*Scaevola sericea*),

heliotropes (*Tournefortia argentea*), Alexandrian laurel (*Calophyllum inophyllum*), sea trumpet (*Cordia subcordata*), iron tree (*Pemphis acidula*), beach almond (*Terminalia samoensis*), great lettuce tree (*Pisonia grandis*), privet (*Clerodendrum inerme*) and a variety of ornamental plants, grass and weeds. The flower of the *Guettarda* locally called 'te uri' is the national flower of Kiribati. Individually, all these plants play a great role in the subsistence and economic life of the people on Marakei and Kiribati as a whole.

Marakei is not rich in its land fauna, apart from land crabs which are very abundant. Most families raise pigs, chickens, dogs and cats. Birds, rats, lizards, and island insects such as ants are also common. The local pigs and roosters are highly prized domestic animals that all households have to own and they are kept and managed well. Introduced breeds of pigs, chickens and other livestock (goats and ducks) are proving useful to locals. Pigs, chickens and livestock are fed a mixture of local foods (particularly coconut) and imported supplementary feeds. More research is required to develop balanced feeding programmes based on local food crops and to develop livestock breeds which are adapted to live in the atoll environment.

Dogs are kept as pets because of their role in guarding territories, and cats are kept to control rats around the home as rats are abundant throughout Kiribati.

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## MANGROVES

Mangroves proliferate on the island and occupy both coastal and dryland areas, hence can be terrestrial or marine. Four species have been identified. Mangroves are regarded as fish nurseries, habitat for a variety of species including crabs, shellfish, birds, insects and more. Building materials, firewood and medicines can also be obtained from such mangrove forests.

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## MARINE AND FISHERIES RESOURCES

Lagoon resources on Marakei are scarce, the only fish species caught are milkfish and tilapia, with occasional catches of mullet and bonefish. A popular shellfish known as *te rabino* is collected at the eastern side of the lagoon. Because of the narrow passes at both sides of the island lagoon flushing and replenishment are being reduced to the extent that most of lagoon water is stagnant encouraging algal growth and sea urchin populations. Unless both passes are deepened, or additional waterways are added to flush the entire lagoon, resources within the system will eventually vanish.

Reef and pelagic fish species are plentiful despite ciguatera being present at the western part of the island. Parrot, surgeon and other fish species are highly toxic however these should be regarded as breeding stocks. Juveniles and offspring of these toxic species will eventually migrate to other non-toxic reef areas where people can catch them. Flying fish and tuna are plentiful around the island. While ciguatera restricts fishing on Marakei, this also has benefits in that breeding stocks will never run out; heavy recruitment will always occur as long as the ocean water remains clean and free of manmade toxins. Ciguatera should be looked at as a *blessing in disguise* rather than a curse.

Reef and ocean fishing are particularly important on Marakei as lagoon resources are limited. Most households in Marakei engage in a range of fishing activities, collecting shellfish and other foods from the reef, and fishing in the lagoon, the reef, and the ocean.

Table 3-2: Size of Reef/Lagoon Size, Marakei

Island	Reef (square km)	Reef base (square km)	Lagoon (square km)	Land (square km)
Marakei	13.31	10	295.77	14.13

Source: Ministry of Fisheries and Marine Resource Development

Marine resource issues on Marakei include the following:

1. Lack and cost of fishing equipment'
2. The only two channels/passages into the enclosed lagoon are prone to beach accretion and thus blockage of incoming water from the ocean. Even though the Island Council is assisting in maintaining the island, the problem is the lack of equipment or machinery.

## EDUCATION

There are three primary schools and one junior secondary school (JSS) on Marakei. Nikiereere Primary School is located in the village of Rawannawi and accommodates the children of Rawannawi and Temotu. Uaabong Primary School is located between the villages of Raweai and Takarakan for children of the two villages. Taiti Primary School accommodates children from the villages of Bwainuna, Norauea, Tekuanga and Antaai.

Table 3-3: Primary School Enrollments 2011, Marakei

Marakei	No. of Pupils			No. of Teachers		
	2011		Total	2011		Total
	F	M		F	M	
<b>Nikiereere Primary School</b>	114	111	<b>225</b>	7	2	<b>9</b>
<b>Taiti Primary School</b>	91	73	<b>164</b>	4	2	<b>6</b>
<b>Uaabong Primary School</b>	49	60	<b>109</b>	5	1	<b>6</b>
<b>Total</b>	<b>254</b>	<b>244</b>	<b>498</b>	<b>16</b>	<b>5</b>	<b>21</b>

Source: Digest of Education Statistics 2011

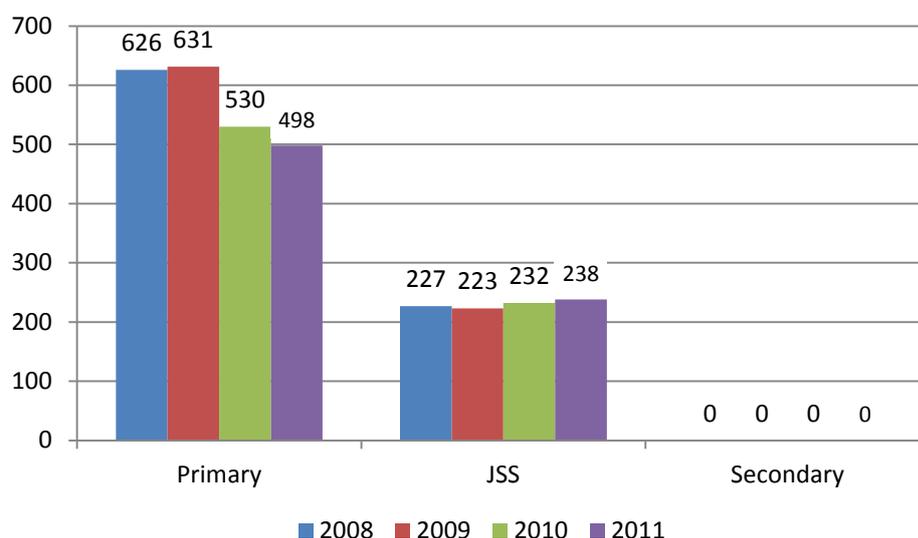
Aontenaa JSS on the other hand caters for all junior secondary aged children on the island and is located in the village of Rawannawi.

In 2011 there were 498 children enrolled the three primary schools; 254 girls and 244 boys. Almost half this total (225 students) were attending the Nikiereere Primary School, 164 were attending the Taitai Primary School while the rest 109 were attending the Uaabong Primary School.

Aontenaa JSS on the other hand catered for 238 students that comprised 111 males and 127 females.

The trend since 2008 has been for primary school enrollments to decline, while JSS enrollments have been stable. This is consistent with the population data in Figure 3-3 which showed that there were fewer children aged 5-9 years than aged 10-15. However this will change in the coming years as the large number of children who were aged 0-4 years in the 2010 census turn 6 and begin to attend school.

Figure 3.4: School Enrollments 2008-2011, Marakei



Data Source: Digest of Education Statistics 2011

The physical condition of schools on Marakei has been a concern for many years, but this is improving with Nikierere School being completely rebuilt in 2012 through the AusAID- funded Kiribati Education Improvement Project.

The general population of Marakei is relatively well educated, with a literacy rate of 92%, and only 10% of the population having never attended school (the average for all other outer islands is 14%). 41% of the adult population have a Primary leaving certificate, 27% have a Form 3 certificate, and 21% have a Senior Secondary certificate. Only 1% hold a Post-Secondary qualification.

## ISLAND ECONOMY

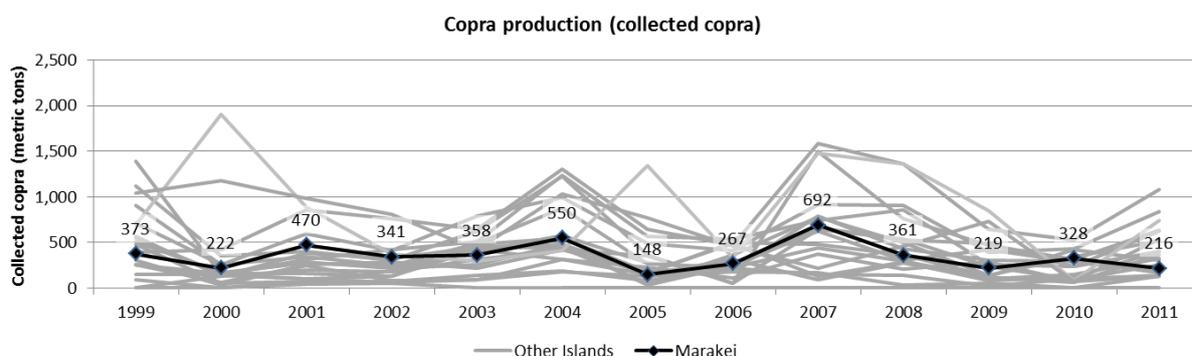
### SUBSISTENCE

Subsistence agriculture prospers on the island. Bwabwai and banana cultivation are popular. Coconut and pandanus thrive on Marakei, but many trees are senile and replanting is occurring at a slow pace. Other fruit crops such as wild figs (te bero) and papaya are cultivated by some households, and small gardens growing the locally adapted varieties of cabbage are becoming more common. Land crab is a popular food item on the island and is caught anytime during the day, however nighttimes are regarded as better than daylight.

### COPRA CUTTING

The best year of copra production for Marakei was in 2003 when their production reached a tonnage of 547 bringing in an income of \$241,000, or \$526 per household. On the other hand, Marakei's worst year of copra production was in the year 2000 when only 133 tonnes of copra was collected from Marakei Island, the low production was presumably due to the drought in that year.

Figure 3.5: Marakei copra production (collected copra) 1999-2010



Source: Kiribati Copra Co-operative Society KCCS

Copra prices have also been slowly increasing from \$0.30/lb in 1990 to \$0.80/lb in 2012. The most recent copra production for Marakei on record was 216 tonnes in 2011 that brought in an income of \$336 per household in that year. Even though this is below the international poverty line, it should be remembered that people on the outer islands of Kiribati do not rely 100% on money to live but actually rely mostly on plots of land owned, and skills to fish, cut toddy and utilize existing food resources; copra is not the only means of income for the people of Marakei.

## REMITTANCES

At the time of the 2010 census, 11% of households on Marakei received income from remittances from seamen. The general flow of seafarer's remittances into the country is continuous and has increased over the years with more engaged in seafaring employment. A further 33% received other remittances, for example from relatives working overseas or on South Tarawa.

## HEALTH

The Ministry of Health and Medical Services through its Medical Assistant and three qualified Nursing Officers stationed on the island at the different clinics deliver health services and health promotion on the island.

There are five clinics on Marakei; the main clinic is at Rawannawi, and there are local clinics in the villages of Tekarakan, Bainuea, Terawarawa and Raweai.

The people of Marakei appear to enjoy good health overall, as the number of clinic visits per person in the year 2011 was only 2.6. Diarrhoea and respiratory infections, which are the most common reported illnesses in Kiribati, are both less common on Marakei than

elsewhere in Kiribati. However the rate of fish poisoning is the highest in Kiribati – 85 clinic visits or 3 per 100 people in 2011 – this is consistent with the large areas of toxic reef on Marakei.

Smoking levels are slightly lower than the Kiribati average, with 44% of adults being smokers. Alcohol is strongly discouraged by village leaders, and only 17% of adults say they drink alcohol “regularly” or “sometimes”. Kava however is a growing problem, 25% of adults drink kava “regularly” or “sometimes” – that is, half of all men as very few women are kava drinkers.

## TRANSPORTATION

Marakei is a relatively compact island and is linked by a continuous road. The Marakei Island Council has its own trucks which are available for hire. Transport hire costs on the outer islands like Marakei have been geared towards the local community being able to afford the hire of a truck for transporting of coconuts and other materials from the bush or other parts of the island as well as the Island Council making a small profit in return. Not surprisingly, service charges to the local community are generally lower than those charged to visiting Government officials or organizations.

It is relatively easy to travel around Marakei by bicycle and about half of all households own a bicycle, with 22% owning a motorbike. The council and individuals also have their own canoes and boats; in 2010, 28% of households owned a canoe and 5% owned a boat. Sea vessels are important for accessing fish resources in the surrounding ocean as reef and lagoon resources are limited in Marakei.

Transportation to and from the island is much more of a challenge for the islanders and for visitors and limits the trade in food and material, cargoes and other commodities. Marakei is located 20 minutes away from South Tarawa by plane and Air Kiribati runs scheduled flights every Wednesday, Friday and Sunday.

Boat transport is also available but does not run to a published schedule. Shipping is a critical service that needs to be provided and maintained between Tarawa and the outer islands, in order to facilitate the transportation of food and material supplies to and from the islands. Private businesses have secured an increasing share of the shipping market. Still, central government attempts, through its shipping line – Kiribati Shipping Services Limited (KSSL) – to serve all islands in the country near and far. Most major service work on the ships excluding the privately owned sea vessels are carried out in Tarawa as the Marakei Shipyard is not equipped as yet to carry out major maintenance work.

## ENVIRONMENT

### WATER

Almost all freshwater, for both drinking and washing, is sourced from the freshwater lens using both protected and unprotected wells. Being north of the equator Marakei receives ample rainfall but still less than Makin and Butaritari. Water can become an issue during drought periods when the freshwater lens gets thinner and seawater contaminates fresh

water. Generally, water supply on Marakei are abundant throughout the year but tend to become brackish during prolonged droughts. There are wells built behind households, away from the coastal areas that provide drinking water to households located at coastlines. Because the water lens is close to the surface fresh water seeps through sand and onto coastal areas and to the sea. Legends tell of a goddess, Nei Naantekimam of Norauea villages that makes fresh water seep through to a beach.

In the villages of Bwainuna and Norauea, the wells are shallow indicating the closeness of a water table to the ground surface. Even though this is advantageous in that it is easy to dig wells, water can easily be contaminated during heavy rains when wells fill up and polluted/contaminated surface water which sinks and mixes with well water. A water project funded by the United Nations Development Programme (UNDP) had been undertaken in these two villages and it involves bringing water in a piped system from safe water aquifers beyond the villages.

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## ENVIRONMENTAL ISSUES

Coastal erosion is a major concern for the people of Marakei, and is most visible in the main village of Rawannawi, where erosion on the ocean side has damaged buildings and killed coconut and breadfruit trees. The erosion has mainly occurred during storm events, where these coincide with high tides.

There are only two narrow channels linking the lagoon of Marakei with the sea, and both have bridges which have changed (and reduced) the water flow making the lagoon more vulnerable to becoming polluted.

Environmental issues on Marakei as identified by participants in the National Summit in May 2011 are listed in the table below.

Table 3-4: Environmental Issues and Impacts, Marakei

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Coastal Erosion	-surge storms	-reduction in land masses	-a well designed seawall	Costly but effective to some extent
	-aggregate mining	-a threat to properties and people welfare	-Environment Act to protect coastal areas on the islands	-regulations takes time but sustainable in the long run
	-extreme high tides	-rows of coastal vegetation and coconut trees disappeared	-coastal vegetation and coconut planting	-planting at coastal areas is not a problem
	-seawall construction	-entire coastline of Rawannawi village disappearing	-review of policy and design of seawall construction	-review takes time
	-boat channel	-Antai village eroded	-funded regular programs on adaptation measures	-costly but effective
	-land reclamation			
	-Coral boulder removal			

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Water	drought	<ul style="list-style-type: none"> <li>-Less ground water to drink</li> <li>-vegetation at coastal areas affected</li> <li>-people and dwellings are at risk</li> <li>-disease from dirty water</li> </ul>	<ul style="list-style-type: none"> <li>-future plans to have concrete cisterns for water catchment</li> <li>-relocation issue to be considered at village and Island council level</li> <li>-dig wells further inland, cover them</li> </ul>	<ul style="list-style-type: none"> <li>-sustainable but takes time</li> <li>-workable, cheap and sustainable</li> <li>-costly but sustainable to some extent</li> </ul>
Little Agricultural Activity	-busy on fishing activities	-there is lack of vegetables on the island, this will affect their diet	-Agricultural activity should be strengthened through Taiwan Technical Mission and Agricultural division	-could all be sustainable
	<ul style="list-style-type: none"> <li>-no ready market for sale</li> <li>-distant from urban market</li> </ul>	<ul style="list-style-type: none"> <li>-non availability of land protein</li> <li>-malnutrition</li> </ul>	- promotion at village and household level	

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Reduction in Marine resources	<ul style="list-style-type: none"> <li>-semi bridge causeway at Raweta and Baretoa slowing cool seawater flushing of lagoon</li> <li>-fish trap under bridge interferes with water flow</li> <li>-increasing number of outboard motors and gillnets</li> </ul>	<ul style="list-style-type: none"> <li>-flying fish decrease in number</li> <li>-shell fish lost (Anadara holoserica)</li> </ul>	<ul style="list-style-type: none"> <li>-widen existing passages to original width</li> <li>-open another channel at Temotu and Raveai on eastern side or partition to the lagoon for aquaculture activities</li> <li>-remove fish trap under bridge at Baretoa</li> </ul>	<ul style="list-style-type: none"> <li>Both are costly but sustainable</li> <li>-easy and sustainable in the long run</li> </ul>
Climate variability	<ul style="list-style-type: none"> <li>-unprecedented storms</li> <li>-bad weather conditions</li> <li>- frequent and prolonged</li> </ul>	<ul style="list-style-type: none"> <li>-homes and physical structures are at risk</li> <li>- loss of fruit trees</li> </ul>	<ul style="list-style-type: none"> <li>-future plans to combat the climate variability</li> </ul>	<ul style="list-style-type: none"> <li>-takes time</li> <li>- requires change in attitude towards adaptation measures</li> </ul>

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
	droughts34			