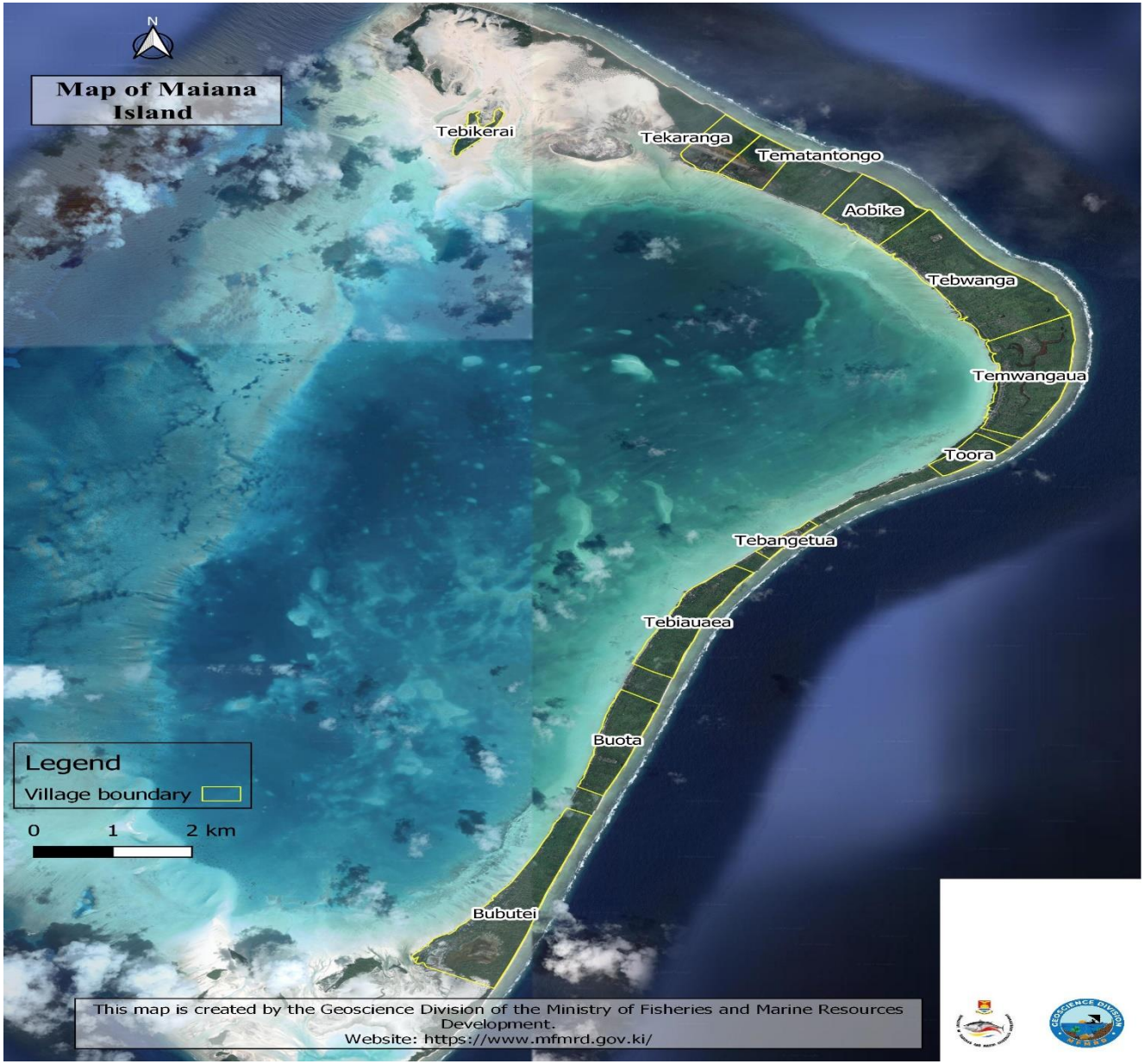
Integrated Vulnerability Assessment

(IVA)

Maiana Island

31 Oct – 7 Nov 2017 & 12-16 November 2020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Map of Maiana Island
Tebikerai
Tekaranga
Tematantongo
Aobike
Tebwanga
Temwangaua
Toora
Tebangetua
Tebiauaea
Buota
Bubutei
Legend
Village boundary
0 1 2 km
This map is created by the Geoscience Division of the Ministry of Fisheries and Marine Resources Development.
Website: https://www.mfmrd.gov.ki/

INTRODUCTION

The Integrated Vulnerability Assessment (IVA) for Maiana was a joint effort between sectors selected within the Kiribati National Expert Group (KNEG). The sectors' assessment was an integral part of the IVA mission sectors' were tasked to perform to assess the situation based on their own sector's perspective. This could also be an opportunity for sectors to incorporate results in their sectors' plans and budget.

The assessment was done several different ways, community consultation through the Participatory Rural Appraisal (PRA)[1] done by the KNEG team, household survey lead by the National Statistics Office (NSO) with local enumerators, and specific sector assessments.

The IVA mission in Maiana would provide baseline information on the important areas that greatly impact people's health and livelihoods. It will also identify the island overall vulnerabilities and how climate change and disasters are affecting them. IVA is a tool that has been standardized as part of the local process which should be conducted to determine the vulnerability status of the island before project implementation activities.

IVA Framework

The IVA Framework is designed as a generic guide for planning, implementing and reporting an integrated vulnerability assessment (IVA) that targets atoll communities in the Pacific Islands region. It is based on a sustainable livelihoods-based approach that combines the assessment of vulnerability to both climate change and disasters. An analysis of previous vulnerability assessments approaches in the Pacific Islands region suggests the importance of merging vulnerability and risk-based assessments. According to the fifth assessment report by the Intergovernmental Panel on Climate Change (IPCC) defines vulnerability as the 'propensity or predisposition to the adversely affected', that includes 'sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC 2007). Similarly, vulnerability is defined by the United Nations International Strategy for Disaster Reduction (UNISDR 2011) as the 'characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard'.

The IVA framework combines the principles and components of the other frameworks that have guided previous assessments in the Pacific (SOPAC 2004; Limalevu 2009; USP 2011; McNamara et al .2012; Nakalevu 2006; Duncan 2001). The framework incorporates the GIZ climate change vulnerability framework and the Sustainable Livelihoods Framework (SLF) (DFID 1999). The broad categories of analysis in generic vulnerability framework (Figure 4) pertain mainly so climate-specific vulnerabilities in terms of exposure, sensitivities and adaptive capacity while the sustainable livelihoods framework (Figure 3) focus is on people's access to various resources (natural, infrastructural, human, finance) to support their livelihood needs and the institutional structures and processes that influence people's resources access and use.

1. The initial IVA Maiana was conducted in 31 October – 6 November 2017 for both PRA and Household Survey. Due to technical difficulties and the loss of PRA data in the initial IVA, PRA for Maiana was recently conducted on 12-16 November 2020. For this, the PRA would reflect a more up to date issues while the Household Survey result was from the initial IVA.

Methodology

Three main key components of an IVA exercise adopted in this IVA data collection exercise which includes; 1) Community consultations using a Participatory Rural Appraisal methodology 2) Household Survey 3) Sector-specific technical assessment. These are the three mechanisms used to produce information (data) that would appraise the current situation because of the vulnerability situation on the island. The parameters used determined the vulnerability status of an island which reflected on the socio-economic and environmental situation as a consequence of a climate change impact and disaster risks interacting with the human security objectives and livelihood assets.

Geographic Overview

Maiana is a low coral atoll in the central part of the Gilbert Islands in the Republic of Kiribati. It is located 28 km to the south of Tarawa and has a total land area of 17 sq km with a total length of 14 km. The average width of Maiana Atoll is approx. 6.92 or 7 km, with the widest of 1km and the narrowest of 0.2km.

The total population of Maiana is 1,982 as of the census 2015, from which 50.4% are male and 49.6% female. The majority of the population is at the age group of 18-49 which accounts for 42.4% of the total population. The village with the most number of people of 484 is Bubutei, the last village southward. The population density is 119 person per sq km. The total number of households is 399 while the sampled households surveyed is 63.

Note: This geographical overview includes a lot of analysis from the 2015 population census report.

Note: It is important to note that the Participatory Rural Appraisal (PRA) and Household Survey are conducted in different periods: PRA was conducted in 2020 while the Household Survey was conducted in 2017.

PARTICIPATORY RURAL APPRAISAL RESULT (PRA)

PRA Maiana was conducted on 12-16 November 2020. According to this assessment, it was found that Energy Security and Coastal Health are the most vulnerable issues that Maiana is facing, having the lowest score of 1.9. The three villages with whose energy security is highly vulnerable are Tebiauea, Buota, and Bubutei Nuka. The remaining villages are also vulnerable when it comes to energy security scoring 2, except for Tebikerai and Bubutei Meang. With coastal health, all villages are affected with erosion especially sites with low elevation (refer to annex 1), and a decline of marine resources and inundation.

Table 1

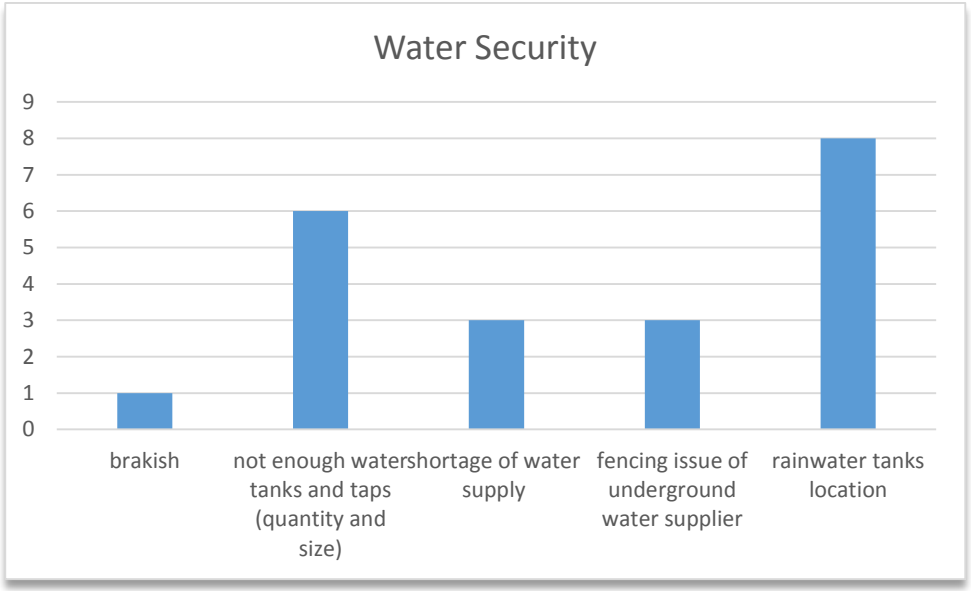
Maiana PRA result													
	Tebikerai	Tekaranga	Tematantongo	Aobike	Tebwanga	Temwangaua	Toora	Tebiauea	Buota	Bubutei Meang	Bubutei Nuka	Bubutei Maiaki	TOTAL
Forest Health	3	5	4	2	3	2	2	2	2	3	3	2	**2.7**
Coastal Health	2	2	2	2	1	2	2	2	1	2	2	2	**1.9**
Water Security	3	3	4	3	3	1	4	3	4	2	4	3	**3.1**
Security of Place	3	3	3	3	3	4	3	2	1	3	1	1	**2.5**
Energy Security	3	2	2	2	2	2	2	1	1	3	1	2	**1.9**
Income Security	2	2	2	2	1	3	2	2	2	3	2	2	**2.1**
Community Health	5	4	3	4	2	4	2	4	2	3	4	3	**3.3**
Food Security	3	2	3	2	1	2	2	3	1	2	3	3	**2.2**
TOTAL	**3.0**	**2.9**	**3.0**	**2.5**	**2.0**	**2.5**	**2.3**	**2.4**	**1.8**	**2.6**	**2.5**	**2.3**	**2.5**

Six of the Human Security Objectives (HSO) above are vulnerable with a score of less than 3, except for water security and community health. It was observed that major issues on the water have been addressed with Kiriwatsan project. So currently, the availability and accessibility plus the quality of water in Maiana are improved. As of community health, it was observed that Maiana as well as other outer islands are safer from the outbreaks and communicable diseases due to the spacious setting of settlements and low population size and density. The arrangement and governance system on Maiana under the elderly (unimwane) system (Bau n Maiana) is very effective in terms of commitment to decisions made by Te Bau n Maiana.

The overall total score of PRA **2.5** shows that Maiana is vulnerable and prone to the impact of climate change and disaster risks.

Water Security

As mentioned briefly in PRA result table 1 above, water availability, accessibility and quality are improved in Maiana. Water Security involves the sustainable use and protection of water systems, the protection against water-related hazards (floods and droughts), the sustainable development of water resources and the safeguarding of (access to) water functions and services for humans and the environment. The past and longed issues with water on Maiana have been addressed with the assistance of Kiriwatsan project. The project managed to identify potable water site to pump it to the overhead tank and to distribute it to the village through water pipes. Although, minor technical issues need to be addressed such as not enough water taps per ward (4-5 houses share a tap), low water pressure due to the height of the overhead tank, and even the size and capacity of the overhead tank is sometimes could not cater for all. Water usage for drinking and cooking is enough, but not for other matters such as bathing, washing, watering plants and others.



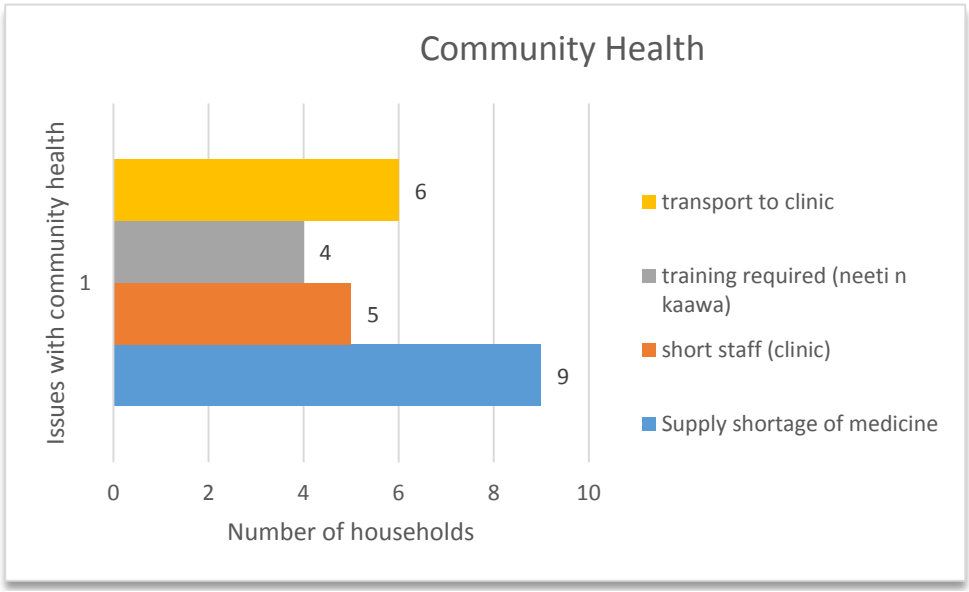
Graph 1: PRA result on the most experienced water issue across Maiana

Tebikerai an islet of Maiana is used to be vulnerable with water security, but acknowledging the government effort through the Italian Fund, Tebikerai water and need for potable water is catered and solved. The desalination plants have been installed in Tebikerai to provide such need for Tebikerai locals on water. The full grid high power solar system installed to power the desalination plant is now extended to households for energy security. Tebikerai is now safe in terms of water and energy security.

However, according to the village/ward consultations, the most vulnerable village/ward on water sector is Tebangetua and Temwanagaua. Tebangetua is where the island council located and it is a ward of Tebiauea. The water issue on Tebangetua is due to low water pressure in which a little or even no water reaching this ward as it is too far from the overhead tank. Most of the island council staffs lived in this area and are relying on an alternative overhead tank owned by the island council hotel. The tank cannot cater to all staffs especially if the hotel is occupied. The hotel tank is also not safe to directly drink from it. All households have their water manual pump that could not be directly consumed as well but need to be boiled.

Temwangaua claimed that they have experienced a regular shortage of water supply from the overhead tank supplier. This was also raised by all villagers, however, Temwangaua stressed their struggle on this claiming that it is the major issue on the water sector, one that needs urgent treatment.

Community Health



Graph 2 PRA result of issues with Community Health

Community health is one of the least vulnerable sector/ Human Security Objective across the atoll. This sector refers to the ability to generate the financial income required to pay for basic needs, health, education, political participation and to live in a healthy environment. In Maiana, community health is close to excellent due to the effectiveness of the Unimwane system (Bau n Maiana) in which every decision made by Te Bau n Maiana was and must be obeyed by all. The only issue raised on community health is literally on health, the infrastructure of health care and the number of staffs, including the shortage of medical supply that has occurred regularly on Maiana.

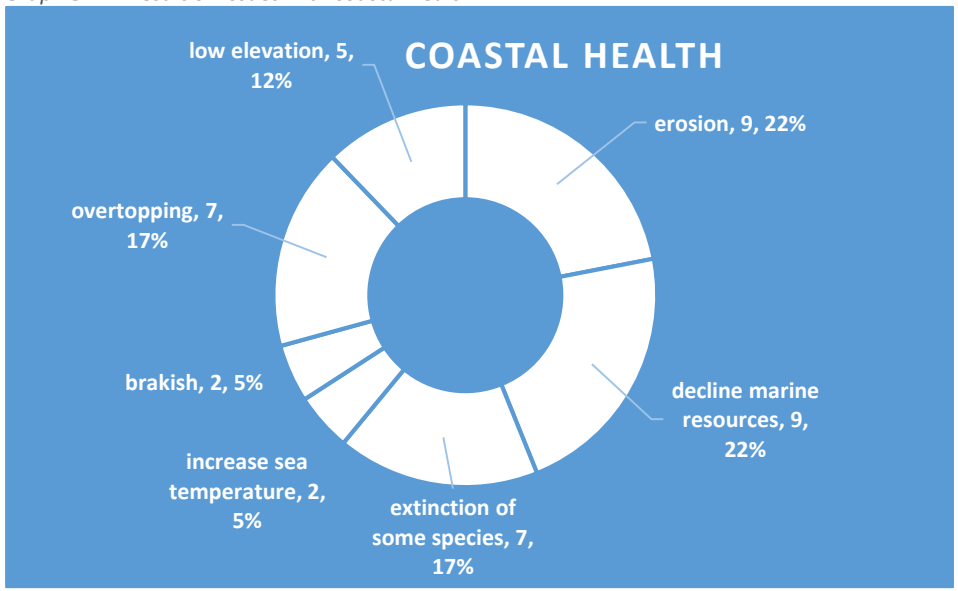
According to the interview with the nurse of Bubutei Nuka clinic on this matter, she claimed that the shortage of medical supply is not because of the demand is high, but the supply from Tarawa is lacking (2020). This is due to the transport technical issues such as the plane is not operates due to mechanical issues, or the weather is terrible, speed boats are delaying their normal run because of high swells, or the engine part needs to be replaced or whatever the case may be. The normal schedule of supplying medicines is very convenient in terms of meeting the demands, a delay for a week or two could challenge this. She also mentioned that supplying medical supplies in a lump sum amount is not possible as the storage for such medicines is poor on the atoll and they could easily be affected.

6 villages have raised their concern on the location of the clinic. They mentioned that it is very hard to get to the clinic when you don't have transport. "Maybe a motor-tricycle ambulance could cater for this" some of the participants mumbled. It is also observed by the surveying team that clinics are located in isolated sites away from the villages. This may due to the incineration process in which it requires isolated sites, but whatever the reason may be, an ambulance (motor tricycle) is needed to get to clinics.

Short staff (nurse) and a lack of upscaling training for local nurses are also issues raised by most villages. A need for another nurse each clinic or to upscale skills and knowledge of local nurses could cater for this. For only sometimes, there is a clash of nurse's critical cases to attend, this is when sensitivity applies on which to attend first and just maybe if there is another nurse, this would not be a problem or become a sensitive matter (participant's response). Local nurses could attend any cases should they have the right skills and knowledge as the nurse has (participants continues), but for now, the relying upon or trust onto local nurses is low as most people always prefer a certified nurse.

Coastal Health

Graph 3 PRA result on issues with coastal health



Coastal Health refers to the status and potential of a coastal ecosystem to maintain its structure, function and resilience under stress, and to continuously provide quality ecosystem services for present and future generations. The PRA result shows that Coastal Health is one of the highly vulnerable sectors on Maiana. Coastal erosion and the decline of marine resources are the main issues challenged Maiana and its people. 9 out of 12 villages/wards claimed that they have experienced coastal erosion and the decline of marine resources. They also came up with narrative reasons and causes of the erosion and especially the decline of marine resources. For instance in Bubutei, te unimwane claimed that natural blockage of an opening between the end of Bubutei Maiaki and a used to be an islet closed a channel from the ocean side to the lagoon reef side (as in photo 2). He said that in the past when there is still an opening or channel, there is abundant of fishes travelling from the ocean to the reef side through this channel. Nature eroded the coastal beaches at the ocean side and bring it along to block this opening. Now that there is no islet but an extended land of Bubutei Maiaki, marine resources are decline and even extinct (te unimwane continues).

Photo 1: Mangrove and seawall remainders - used to be at the tip of the land

According to an interview with some fishermen, they mentioned that fish is abundant in the ocean side more than the lagoon side, but a few have gone fishing there due to the absence of boat channels.

On the erosion part, some villages have claimed that the erosion was caused by the development of the Dai Nippon causeway between Bairiki and Betio. One unimwane in Tebikerai mentioned that long before the construction of the causeway between Bairiki and Betio,

Photo 2: A used to be an opening which is naturally blocked.

there were at least 4 plots of land called Tabontebike, while his land is the fifth from the sea. The length of the severe erosion after the causeway completed is massive, claiming that the mangrove and seawall remainders (plotted in red in photo 1) are used to be at a tip of the land which is now far away from the beach. He continues and mentioned that his land is the fifth away from the sea and now his house is at the edge of the coastal area. This claim needs to be scientifically proven by the experts as well.

Another issue raised that 7 out of 12 villages are experiencing is overtopping. This only happens in times of severe high tides or king tides. This issue also dues with the elevation of the land and according to the Geoscience division (MFMRD) assessment (annexe 1), this is most likely given the average of elevation for the lagoon side only for each village, are less than 2.5 meters, except for Aobike with 2.6 elevations. So any tides that exceed 2.5 meters associated with wind could cause overtopping to places with low elevation.

Extinction of some marine species particularly, ark shell (te bun), strawberry conch (te nouo), lolly fish (te ntabanetabane), and seagrass (te keang) is also experienced in many villages. Related or not with the blockage of the channel from the ocean side to the lagoon as mentioned by the unimwane in Bubutei Nuka, but these species are a catch in the last 5-6 years ago, a lady from Toora mentioned (2020). When asked on whether these species are declining, she continues insisted that no one ever came across these species lately. This requires a further assessment from the concerned sector on whether this is true or otherwise.

Photo 3: Overtopping and eroded side in Tebwanga – this was taken in 2018 during the GCCC verification activity which conducted by ECD.

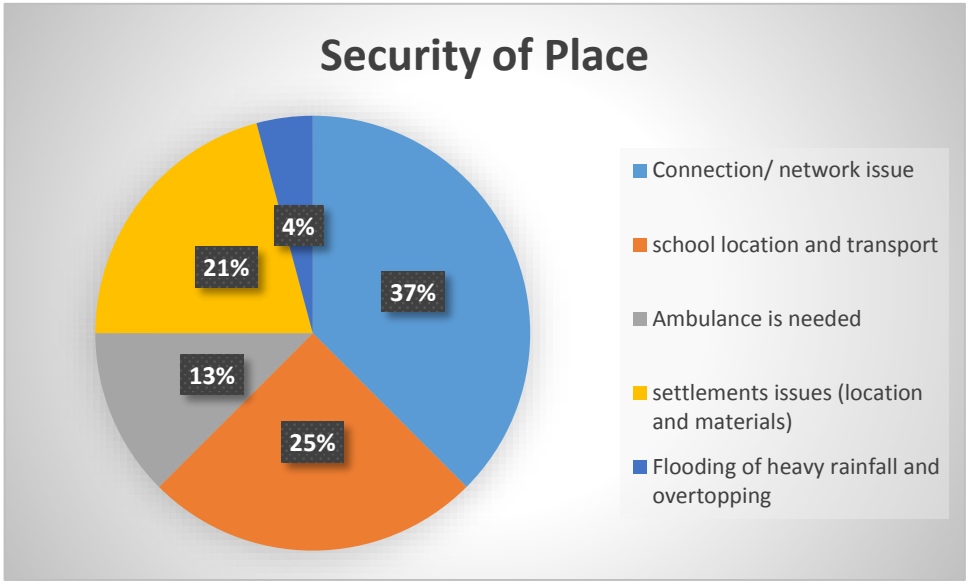
The other issues raised were the increasing sea temperature and brackish of seawater. This is naturally occurring issues that any experts might not have the solution to it. Kiribati Meteorological Service (MET) have proven this based on the data available stated that the sea temperature has slightly increased in the past 28 years at a rate of 0.0015-degree celsius. Even though it is a very minimal increase, the impact it caused is critical.

It was observed during the assessment that most lagoon sides with mangrove plants are more resilient to erosion. Lagoon side without mangroves are critically impacted by erosion and overtopping as in photo 3 above. It was also observed that building local seawalls (te buibui) is not working in these areas as in Tebwanga (photo 3). It is also not clear that mangrove could survive or could be planted in these areas, otherwise, a more robust defending system is required.

The overall score of 1.9 for Coastal Health shows that coastal erosion, overtopping, decline of marine resources and other issues abovementioned are severe and require further assessment or urgent response from the concerned sector. Hence, as for now with the assessment conducted, coastal health on Maiana is highly vulnerable to the impact of climate change and disaster risks.

Security of Place

This sector refers to the right to housing and settlement in the context of climate change risks and hence, refers to the adequate protection of homes and the place within which a community is located in a changing environment. This sector has a total score of 2.5 which means that it is vulnerable to the impact of climate change and disaster risks. The common issue with security of place is on communication as the connection/network is poor in most villages especially furthest villages on both ends of the atoll. There is only one telecommunication service provider (Vodafone) on Maiana, its service and coverage are poor as raised in most villages far away from the Vodafone antenna which is installed in the Tebangetua (island council-based village).



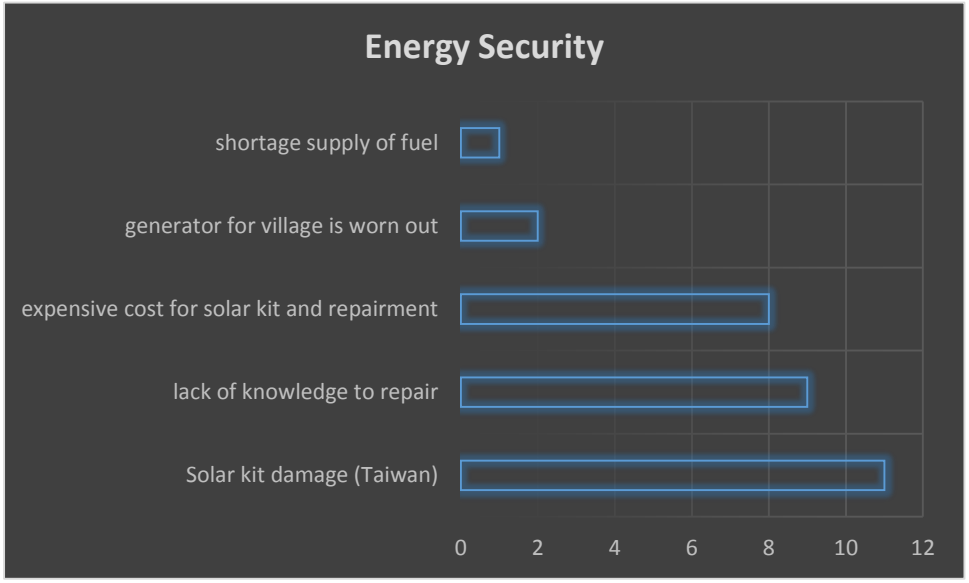
Graph 4 Issues with security of place - PRA result

Another issue experienced by most villages is the location of primary schools. Primary schools are located in non-residential isolated areas in between villages. It was observed by the assessment team during travelling from village to village for consultations, that some students have walked a long distance to and from school. The concern is most of these students where girls walking in non-residential and nothing but bushes areas. Transport for students is sometimes not running due to technical difficulties. It was raised that a week or two down (not running) of the transport has experienced then until now.

Tebikerai has experienced the impact of flooding from rainfall and sea intrusion/overtopping. The backyards (nanoaaua) of most settlements on this islet has suffered from flooding and sea intrusion, their garden washed and belongings were floating during the last flooding events in February 2019 and during king tides in 2015. Housings are locally made and are prone to disaster events which are more frequent and intensified lately. Locals are concerned that their effort for home gardening could be challenged or impacted by next flooding cases. The locals also raised that with sea intrusion, the completion of the seawall which was already built with the support from disaster fund could address this.

The other issue on security of place raised in most villages is the lack of transport to the clinic for medical assistance. This is due to the location of clinics which are also located in isolated, non-residential areas between villages. This is critical as most people do not have a motorcycle nor bicycle making it hard to travel to clinics. A motor tricycle ambulance is highly needed in each clinic to transport patients from their home to the clinic and back, as raised by locals.

Energy Security



Graph 5 Issues with energy security - PRA result

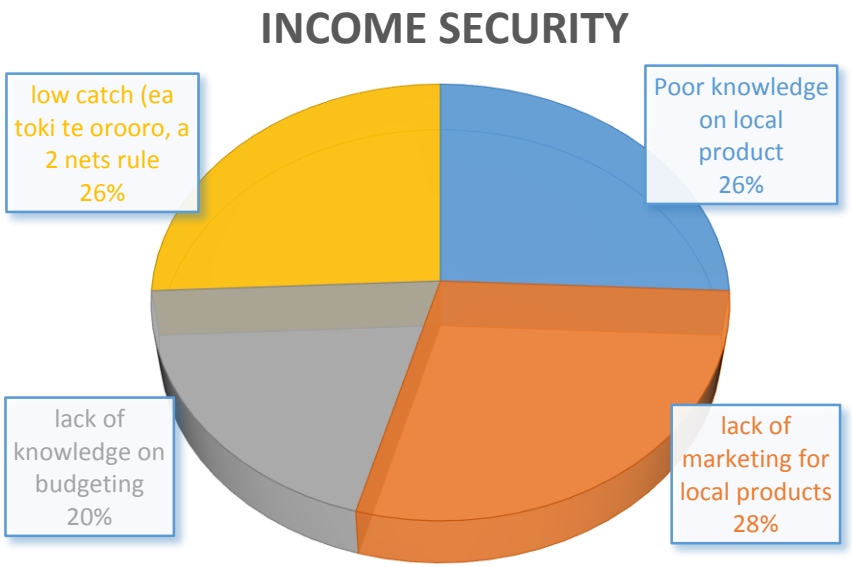
The International Energy Agency (IEA) defines energy security as the uninterrupted availability of energy sources at an affordable price. A resilient community can access the energy required to support their livelihood and human security needs.

The most common issue experienced by 11 out of 12 villages is mainly on solar kits distributed as Taiwan Aid Program. Almost all of these solar kits are old and are coming to the end of their life span, hence no one could be able to repair not even the island council technician. This leads to the second most common issue with the lack of knowledge to repair for any solar kits or solar system. It also leads to a third common issue with the expensive cost of the solar kit and repairing. The other two issues raised during the village consultation is due with a generator, which only church groups and a very few people have. A generator is not used in an everyday activity that requires electricity but only occasionally.

Solar is the most common energy source in Maiana as most of the outer islands does rely on. This is a more affordable source of power/electricity that the people of Maiana are relying on, especially to do chores and activities during night time. The team where stunned to hear concerns of the locals associating an issue with the need of solar lights with their children and their school stuff, to do study at night, to read and to even eat at night. Due to the expensive of solar kits, most households have only one kit that has used in all buia (local house). As energy security on Maiana was interrupted with the aforementioned issues, plus having a score of 1.9, this displays the vulnerability of Maiana people to have a secure, availability and affordable source of energy.

Income Security

Income Security refers to the ability to generate the financial income required to pay for basic needs, health, education, political participation and to live in a healthy environment. A score of 2.1 for this sector reflected the vulnerability of Maiana people to generate income to find resilience measurements within the living environment they resided. This is the second-most vulnerable sector that impacted by four main issues (refer to graph 6).



Graph 6 Issues with income security - PRA result

The main issue of income security is the lack of markets or marketing skills for local products. To name a few of these local products; fruits, fish, handicrafts including virgin oil and others. The production of virgin oil, on the other hand, has been practised on Maiana, where most people are committed to doing steps in producing oil but have limited access to bigger markets in Tarawa. This is different from other handicraft's case in which they require more knowledge and skills to produce.

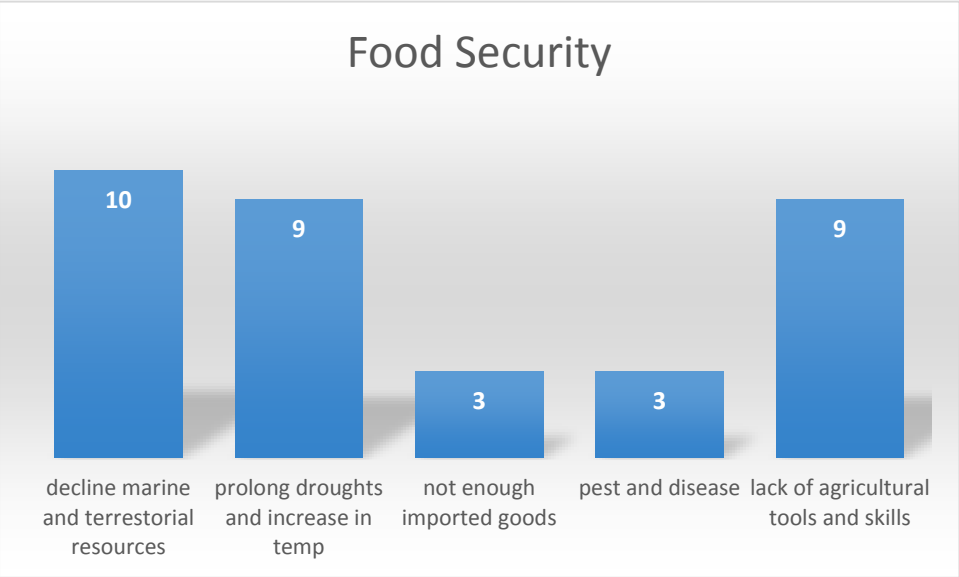
The lack of marketing for local products means that the demand for such products is low on Maiana. Hence, a need to reach bigger marketing places such as a populated Tarawa and Betio, or even abroad within the region or international markets is recognized.

To stress more on the fishing market, as of currently experienced, fishing for economical purposes is now limited due to the fishing restrictions set by the Fisheries Sector and Tourism with the approval of the elderly organization 'Te Bau n Maiana'. This is basically for safeguarding and preserving marine resources underpinned by scientific and technical assessment and advice.

The other issue on income security is the lack of knowledge on budgeting. This includes planning for the future and working to an objective without worrying to miss the mark. Knowledge to stick to the budget and skills to putting money aside or having more disposable income which could lead to achieving financial goals is highly required as raised.

The most affected village with the abovementioned issues on income security is Tebwanga scoring 1, while the remaining villages score 2. This means that the ability to generate the financial income required to pay for basic needs, health, education, political participation and to live in a healthy environment, are challenged in the case of Tebwanga and others. So promoting a better market plus training on budgeting is needed across Maiana.

Food Security



Graph 7 Issues with Food Security - PRA result

The World Food Summit of 1996 defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life" (WHO). A resilient community is one that can produce or access sufficient food as well as having a sufficiently diverse food production base to satisfy dietary needs.

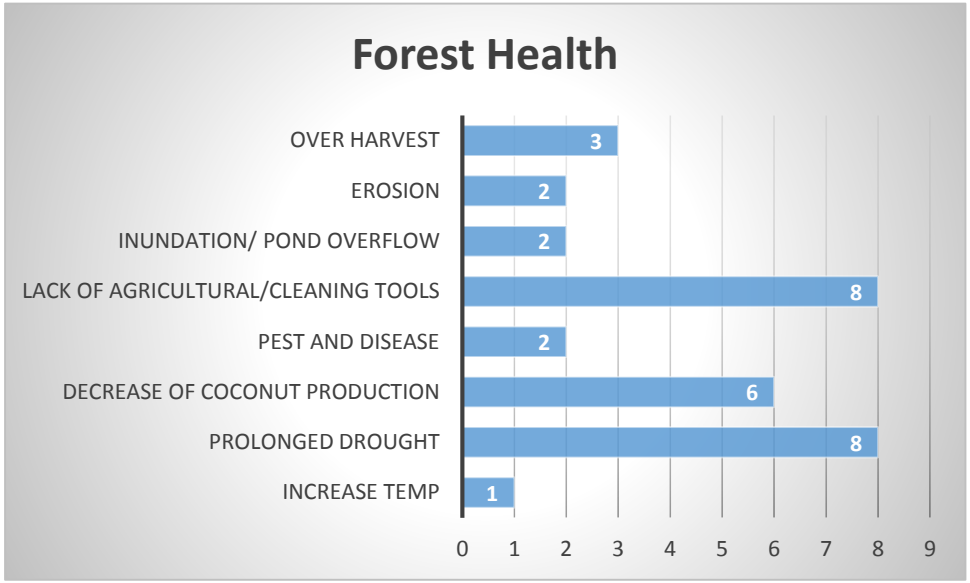
According to the assessment conducted and scoring for each Human Security Objectives (HSO)/ sectors, this sector got a score of 2.2, which confirms Maiana vulnerability on food security. This HSO touches various sectors; Agricultural and Livestock, Importing and Businesses, Nutrition and Health, Environment and Marine Resources and Terrestrial resources to name a few.

The most affected sectors impacted by the changing in the climatic system is the marine and terrestrial resources. Apart from its impact by climate change, there are also human induces that contribute even exacerbate the rate of declining of these resources. To name of few of these induces; are overconsumption using fishing and harvesting methods that could take more than enough for subsistence and economical use, destroying the habitat of some marine species such as coral and mangroves, burning of bushes and others. For such actions, lead to the declining of marine species which are bonefish and goatfish. It also leads to the extinction of; ark shell, strawberry conch and seagrass. Such actions also contribute to poor production and decline of forest resources such as coconut, breadfruits, swamp taro and others.

The next common issues of food security are the impact of prolonged droughts and increasing temperature, and the lack of agricultural skills and tools. Prolonged drought has been experienced in the past and it is currently happening again due to the La Nina period. The locals have raised that the prolonged drought is always associated with the increasing temperature which causing resources health. It is very hard to do agricultural activities at this time of the year, the participants murmured.

Also, the majority of participants involved in the PRA for each village said that they did not practice agriculture because they do not know-how, and because of not having tools. 9 out of 12 villages/wards are raising this claim as their concern, but also to get support and assistance from the Agriculture Officer based on Maiana and from the ministry. Training is needed for planting adaptable plants in the changing climatic system and increasing temperature conditions. Also, should tools are provided, it will encourage farmers and even starters to put more effort onto agriculture. An agriculture officer who joined the assessment team, explains and encourages participants that there is support, and if continue to practice agriculture not only that you will receive tools and training, but to consume healthy and nutritious food.

Forest Health



Graph 8 Issues with Forest Health - PRA result

This sector refers to the status and potential of a forest ecosystem to maintain its structure, function and resilience under stress, and to continuously provide quality ecosystem services for present and future generations. Forest plays an essential part in catering for terrestrial resources enhancing food and income security, bird sanctuary and dispensary for local medicine.

The most common issues on forest health on Maiana are; the impact of a prolonged drought which frequently and currently experienced during this La Nina period; and the lack of agricultural/cleaning tools to nurture and to treat the forest, 8 out of 12 villages have experienced both of these issues. A prolonged drought associated with the increasing temperature has affected the health of heavily dependable plants for income and food security such as coconut, pandanus, breadfruit, swamp taro and other. Decrease of coconut production which was the second most common issue on forest health is also related to the prolonged drought and increasing temperature. Hence, a decrease in coconut production is also due to the age and production capacity of coconuts as these are old and are reaching an age where they could hardly bear fruit. The decrease in coconut production also means a decrease in income from copra.

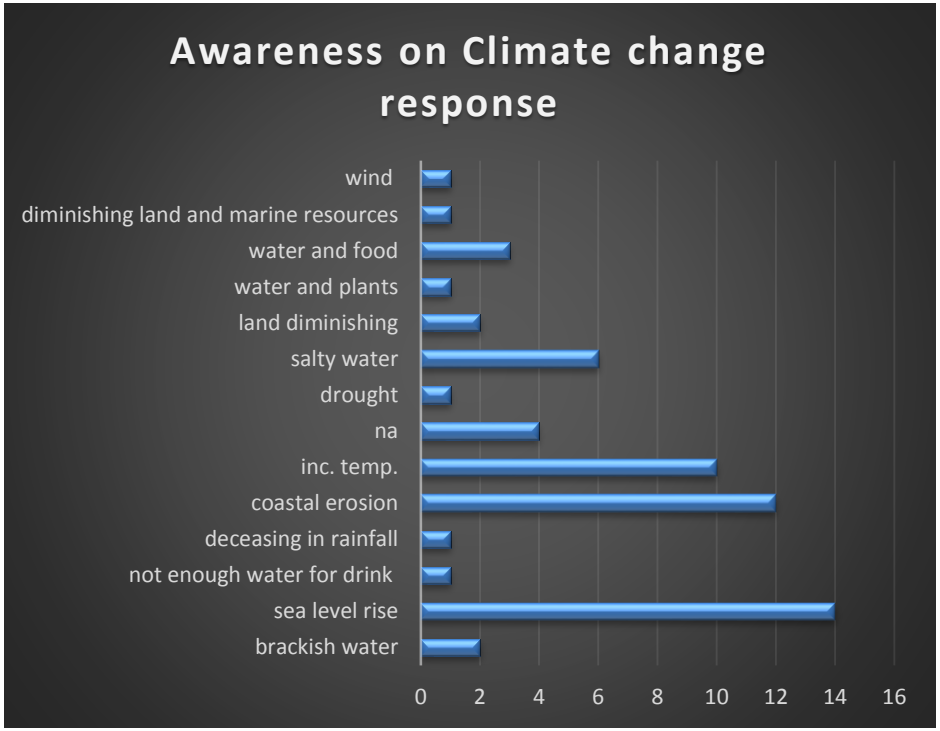
Overharvesting of dependable plants especially coconut plant is another issue raised during the consultations. The most affected people with this issue is the old landowners of forest whom they could hardly climb to harvest coconut fruit but awaits until dropped. The young and those who could climb are the ones that are overharvested coconuts by climbing trees taking coconuts before it naturally drops (te bunbun).

The score of 2.7 for forest health on Maiana portrays that there are problems with forest structure and services. It shows that additional stress by the changing environment could make Maiana forest vulnerable to any other devastating issues. The support from the concerned sector is required, however, the need for behavioural change for the people of Maiana is highly necessary.

HOUSEHOLD SURVEY RESULT (HH)

Household Survey on Maiana was conducted from 31 October – 6 November 2020. The total number of household surveyed on Maiana is 63, almost 20% of the total number of households in Maiana. This survey is conducted by enumerators and supervised by a staff of the National Statistic Office. It was observed in this survey that most men are major respondent with the number of 53, while only 10 houses with female respondents.

General response on climate change and vulnerability awareness



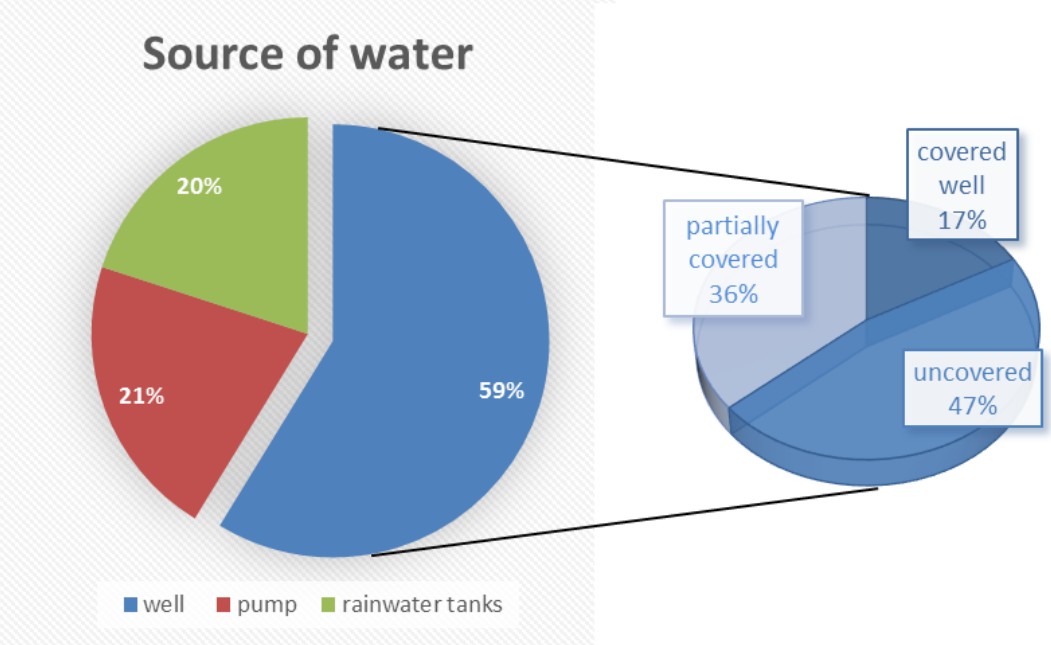
Graph 9 General knowledge and understanding on climate change

When the respondents were asked about whether they have come across or learn about climate change, almost 80% are aware and clear of what is meant to be affected by the impact of climate change and disaster events. The rest have not heard nor learned about climate change ever. So based on the sampled household survey which supposedly represents the whole households on Maiana, the majority have been attended consultations that are directly or indirectly advocates on climate change and its impacts.

The common understanding of climate change on Maiana, is the sea-level rise, as clearly shown in this graph. The majority have mentioned that they have been affected or experienced the implication of sea-level rise. It was also claimed by locals that sea-level rise is the main cause for any other impacts for instance, brackish of water, the salinity of underground water, coastal erosion, and affection of food security and so forth. The next 3 top common issues or impact of climate change that the people of Maiana at least the sampled households raised are all related to sea-level rise.

Increase of temperature is not caused by sea-level rise but the opposite. The global increase in temperature may have contributed to the increase in sea level. This issue is the third common issue, that people of Maiana are also experienced. It also contributes to the diminishing of land and marine resources, impacts the water and food security, and others. This issue naturally occurs along with the changing of other parameters such as the increase in wind speed and change in precipitation pattern which usually changes periodically.

Water Security



Graph 10 Main Source of Water

The main source of water on Maiana is underground/well water. Almost 60% of the households surveyed claimed to be heavily depended on underground water. This is a common practice in most outer islands due to less usage of rainwater harvesting system and water pump associated with the development stage of an island and number of water projects implemented. From the majority number of people depending on water, most of these wells are 'most of the times' uncovered. This is an issue related to hygiene and health overall in safeguarding the quality of water for drinking, cooking and for other means and purposes.

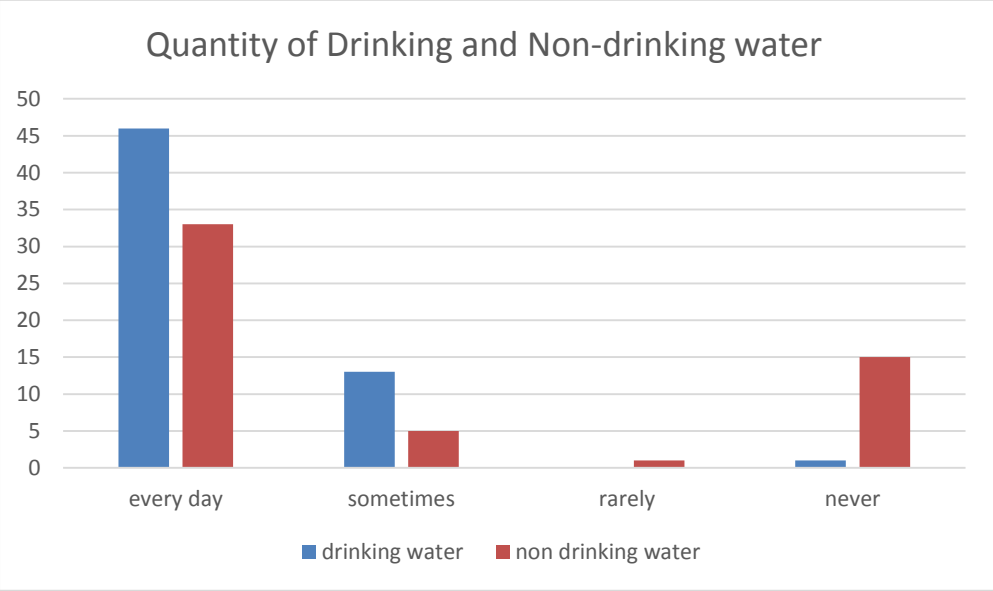
Half of the other 40% are using rainwater tanks while the other half are using the pump (both manual and solar). From the 20% who use rainwater tanks, only 6 households claimed to have used filter screens in harvesting rainwater, while the remaining 10 households with rainwater harvesting system do not have filter screens. With the prolonged drought which was constantly experienced in Maiana, stableness on heavily relying on rainwater is not fixed makes it not a major source of potable water.

The remaining 21% of people are heavily depending on the water pump. 90% of these people are using a manual-hand pump while only a few (church and hotels) use an electric water pump.

However, as this household survey was conducted in 2017 before the PRA conducted lately in 2020, there is a lot that has been done with the water sector on Maiana as abovementioned in the PRA. Water has been improved lately with the implementation of Kiriwatsan Project through pumping water from the potable water site to households. Although there are minor improvements to be made especially on the capacity of the overhead tank and other (refer to the water sector on PRA), the water sector has been improved on Maiana.

The sufficiency of water for drinking is 'everyday' adequate on Maiana, 46 out of 63 means 73% of the households surveyed said it is enough. 16% claimed that water for drinking is 'sometimes' sufficient, while none and almost none said that it is 'rarely' and 'never' enough for drinking water at the household level. This means that water for drinking only is sufficient and adequate for the people of Maiana.

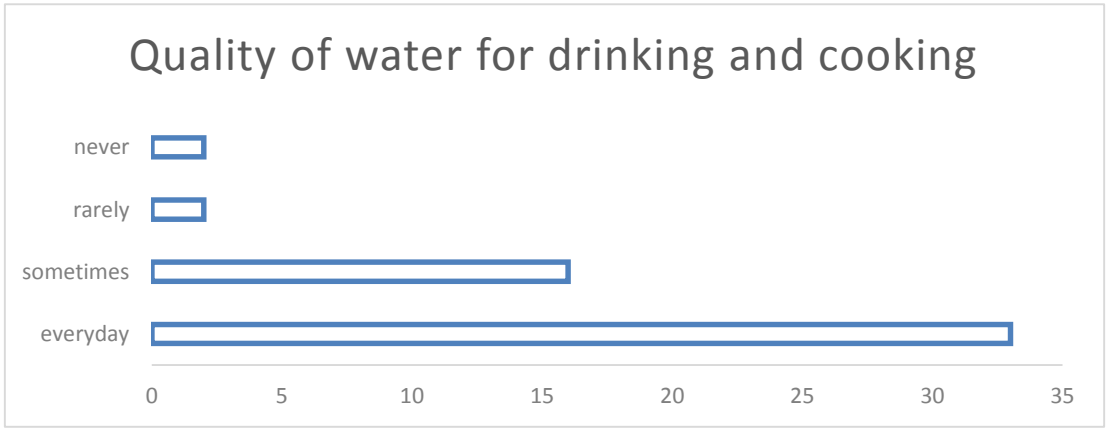
Using water for other purposes such as washing, bathing, watering plants, cooking and other, is also safe in terms of the quantity, as the majority of 52% mentioned. 5 households claimed that only 'sometimes' water is enough apart from drinking. Only 1 household said that it is 'rarely' enough to use water for other purposes from drinking, while 15 households mentioned that it is 'never' enough.



Graph 11 Water supply sufficiency to meet household needs

The quality of water for drinking and cooking is 'everyday' and 'sometimes' safer. Combing these positive responses 'everyday' and 'sometimes' they account for 48 out of 63, meaning 76%. Only 2 households said that it is 'rarely' and 'never' safe to drink water. As the quality of water is key to survival, it is inappropriate not to look into the 4 households who claimed that water is 'rarely' and 'never' safer for drinking and cooking.

However, testing for the quality of water could not be concluded based on taste or the smell of water as the locals fountain their claims on. It requires a scientific method by the water technician and experts with the standard water testing kit which is also part of the Whole of Island Approach called 'sector base activity or verification'. The result of such technical testing supposedly is more accurate in eliminating the margin of errors in the testing of water quality.



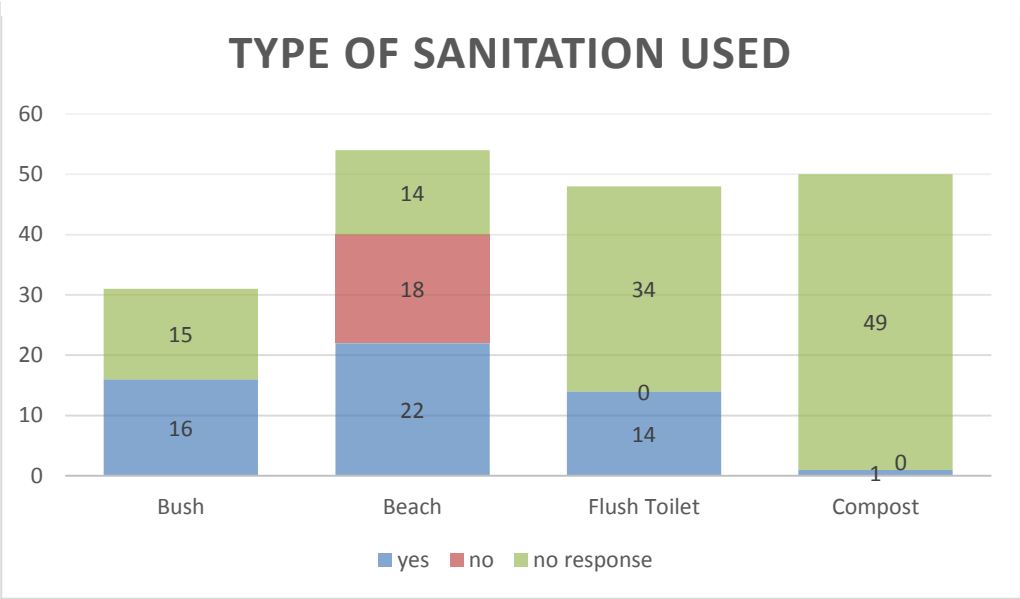
Graph 12 Level of potable water

Also, as abovementioned the overall stage of water and even the graphs of water quantity and quality (graph 11 and 12) might have changed lately as there a lot has been done on water improvement. It is important to repeatedly mention that this household assessment and analysis/graphing are based on the initial IVA conducted in 2017. Through the PRA which was lately conducted in 2020, it was observed that the quantity of water was improved on Maiana as potable water was pumped and distributed to households through taps. The quality of water was also improved as most potable water site in each village was identified first before installing pumping systems. Although there are minor technical improvements needed in the water sector on Maiana, its overall status is becoming better.

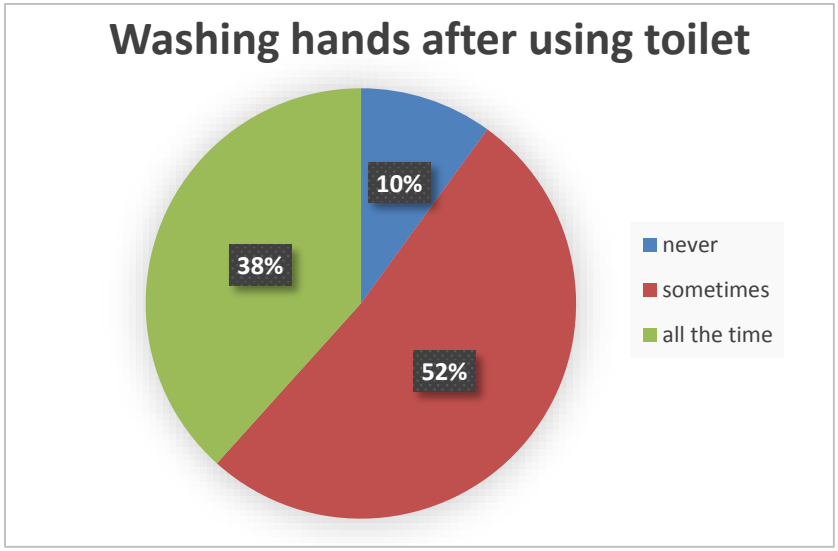
Sanitation and Hygiene.

Sanitation and Hygiene are important topics that usually goes together with Water. The commonly known name for the combination of Water, Sanitation and Hygiene is WASH. Universal, affordable and sustainable access to WASH is a key public health issue within international development and is the focus of the first two targets of Sustainable Development Goal 6 (UNICEF, 2016).

Graph 13 Sanitation component of IVA used on Maiana



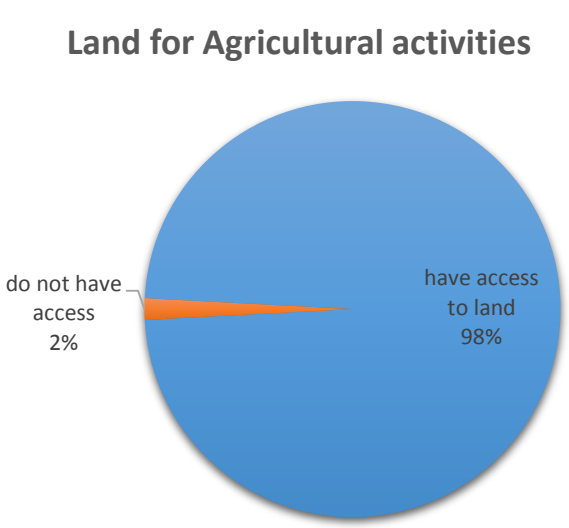
Sanitation and Hygiene are included in the household survey which normally following questions on the water sector. These are sensitive topics that the majority (green labelled in graph 13 on the left side) of respondents on Maiana are not answering due to various reasons, one of them is; ashamed of having no proper toilet and still practicing open defecation, as of 38 households mentioned. 14 households have used the proper flush toilet while only 1 household used compost toilet.



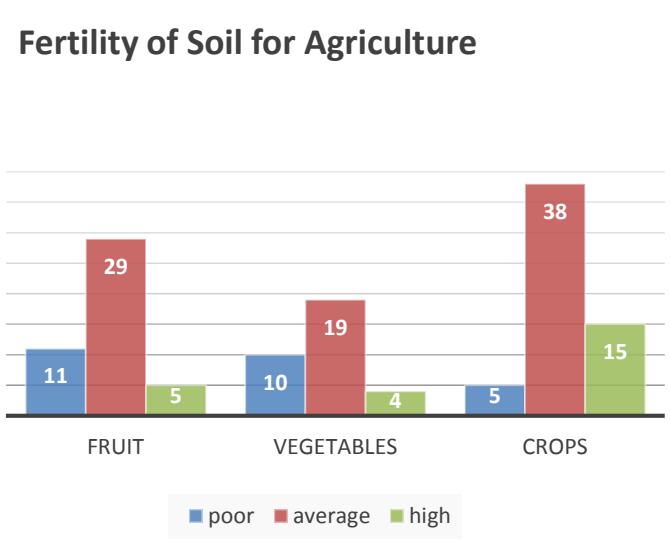
Graph 14 Hygiene part of the IVA used on Maiana

Hygiene side of WASH is a very crucial part that closely related to promoting living a healthy life and enduring this good practice for all groups of people. The result of the assessment on hygiene (graph 14) clearly shows that positive responses which are 'sometimes' and 'all the time' accounts for 90% of the households surveyed. This means that almost all of the households surveyed claimed that they have practiced a basic hygienic lifestyle through washing hands after going to the toilet. Given the number of people still practicing open defecation, this is far from hygienic practices and it is something that requires urgent treatment or supports within the community/village or from the concerned sector of the government.

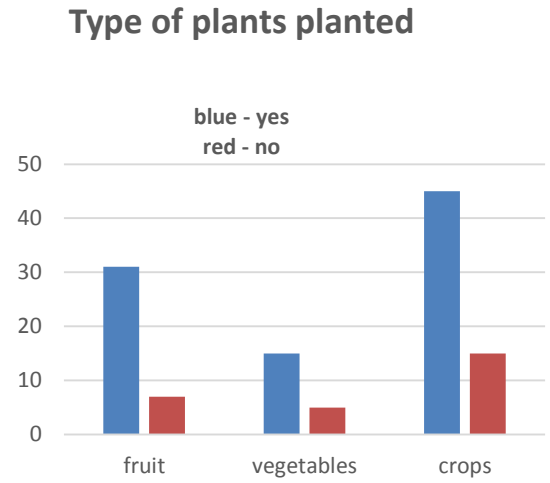
Agriculture



Graph 15 Accessibility to land for agriculture



Graph 15 The fertility status of soil for agriculture



Graph 17 Type of plant planted

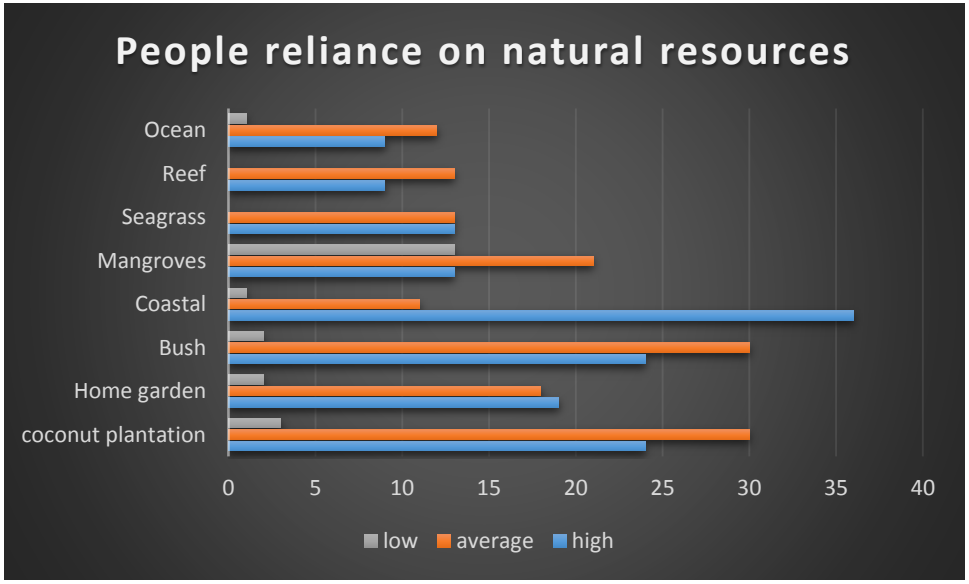
This sector plays an important role in enhancing balance onto food security. It also plays a critical role in promoting nutrition and health consumption at the village, household and individual level. The agriculture sector is also important for the economic growth of a nation, island, village and individual level as well.

Graph 15 shows that amongst the households surveyed, 98% have access to land for agriculture, while only 2% did not have a sufficient piece of land to plant. From that 98%, the majority claims that the fertility of the soil (graph 16) on the land they access for agriculture is average, meaning plants get to grow healthy but have limitations. From the average fertility of the soil, most people are keen to plants other types of crops more than fruit and vegetable. These crops including coconut, breadfruit, and pawpaw could easily grow healthy and productive than fruits and vegetables. This may be due to the limitations of the fertility of the soil or otherwise, there is a certain type of crops, fruits and vegetables that could survive or adapt in the changing environment in tropical conditions.

However, even though there is a great effort on Maiana in the agricultural sector, there is a lot of factors that could or have hindered this. This includes a changing rate of the climate parameters; increasing temperature, changing in precipitation pattern (prolonged droughts), increase in the wind speed and the increase in sea-level. More of adoptive and easily evolving types of plants need to be introduced on Maiana, and all islands of Kiribati.

Natural Resources (Maine and Terrestrial)

The vast area of ocean surrounding Kiribati is an indication of the rich marine resources that are available for use by the population. With the proper use of available traditional methods of harvesting these resources, there is no doubt that the resources are abundant. In fact, a large constituent of diet for the people of Maiana along with the other outer islands is from the sea. Marine resources can be lasting and sustainable only if efforts were made to conserve and use them in a sustainable fashion. Maiana is one amongst the islands of Kiribati blessed with abundant marine resources, it has provided for food on the table for many decades and that it also provides for economic gain for the locals. Because Maiana is very close to the capital island, Tarawa, it makes it easier to access a market for catches.



Graph 18 Natural Resources that people on Maiana relied on

However, during the PRA on Maiana lately in 2020, the team were informed that fishing for lump sum of catches is temporarily closed down for the sake of conservation. Subsistence fishing is allowed with restrictions to fishing methods to be used. Fishing nets are restricted to only 2 with the certain mesh size of not less than 2.5 inches. Splash fishing using gillnet and rod which is commonly practised in Maiana was also banned. According to the Coastal Fisheries Division (2020), the unimwane (Te Bau n Maiana) was enforcing this in middle 2019 base on consultations conducted in the previous years. It is in the best interest of Te Bau n Maiana to act promptly before marine resources are decline or even extinct as experienced with other marine species such as ark shell, strawberry conch and seagrass. 'The Fisheries Conservation and Management of Coastal Marine Resources Regulation' was then officially endorsed later in October 2019.

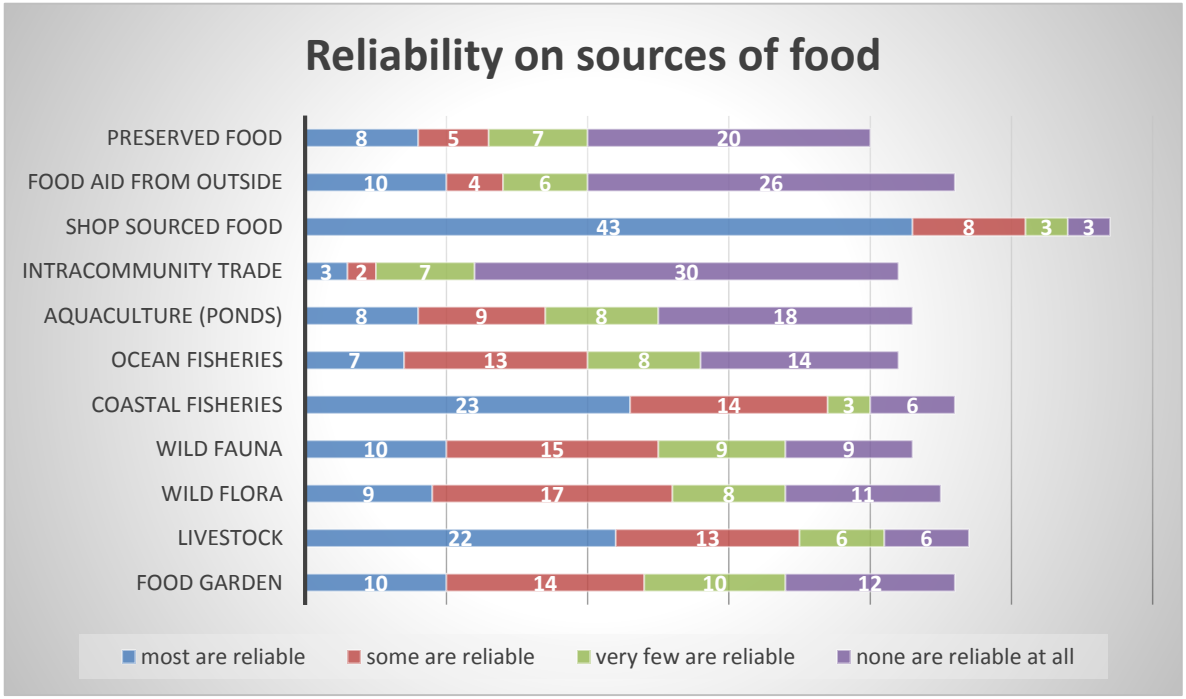
Coastal resources are the major natural resources that people of Maiana heavily depend on as shown in graph 18 above. It is now vulnerable to natural and human-induced activities as repeatedly mentioned in the PRA result and Household Survey as well. It follows that they must be protected so that they continue to provide for daily needs. The abundance of coastal resources enables island populations to harvest seafood such as fish, crabs, shellfish, and prawns. Coastal areas provide much-needed materials, for example, sand, aggregates, gravel for construction purposes, and white sandy beaches for recreation. Coastal zones are important as spawning and nursery areas for fish and other marine micro-organisms.

Vegetation on terrestrial resources is generally composed of a variety of trees, plants and undergrowth to constantly supply and satisfy the people's needs in terms of food, firewood, building materials, medicine, dye, and compost materials for gardening. Home gardening is also practised on Maiana that 19 households surveyed claimed they are depending on for food, medicine and other purposes (graph 18).

Food Security

It was repeatedly emphasized in this report that people are heavily depended on marine resources; coastal and reef fisheries, and ocean fisheries (graph 18). It was also mentioned earlier that most people are relying on agricultural production; home gardens, livestock, wild flora, wild fauna, and aquaculture (ponds). Interestingly, graph 19 shows otherwise that, apart from depending on natural resources both marine and terrestrial, more and more people are shifted and are relying more on shop sourced food; tinned foods, imported grains and others. This practice of relying heavily on imported food is normal on Tarawa, the capital island where the availability or the production of natural resources is outweighed by the high demand with the increasing population.

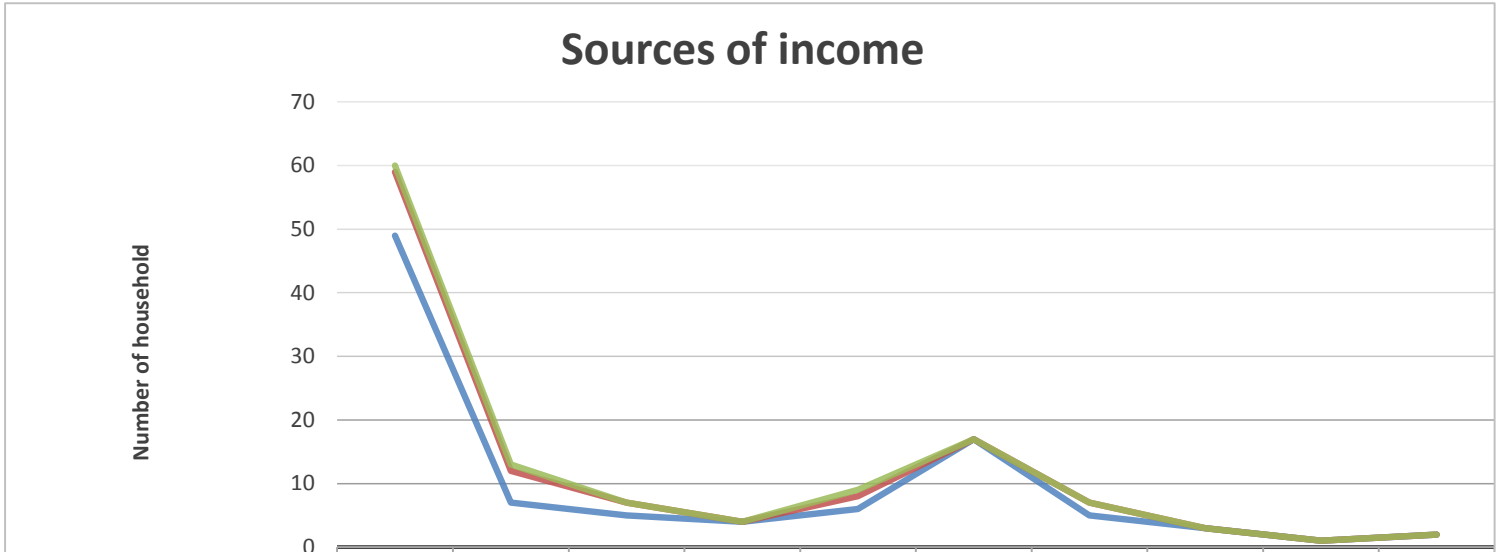
According to the household survey conducted, most people in Maiana are also heavily depended on shop sourced food. 43 households out of 63, almost 70% of the sampled households have claimed this. Several factors are contributing to this new norm including time-consuming as it requires less time to get and to cook shop sourced foods than to go out and fish, or to go out to harvest food from the forest/bushes. Also, due to the competition on prices for cargoes due to the increasing number of retailer shops on Maiana, weighing this could be more convenient to depend on tinned foods. But this is not only the case on Maiana, as most of the outer islands are practising this as well. Imported foods are more convenient, affordable and give lesser time to get and to cook.



Graph 19 Main sources of food security

Income Security

Income Security refers to the ability to generate the financial income required to pay for basic needs, health, education, political participation and to live in a healthy environment. There are several sources of income for the outer island including Maiana as shown in the graph below. According to this graph, it is clear that the main source of income for the majority of Maiana people is Copra. The trend tells that all other sources of income are just minor sources compared to the amount received for copra.



	copra	handicraft	farming	sea cucumber	other fishing activities	salary	small business	council contracts	remittances	other
third most important	1	1	0	0	1	0	0	0	0	0
second most important	10	5	2	0	2	0	2	0	0	0
most important	49	7	5	4	6	17	5	3	1	2

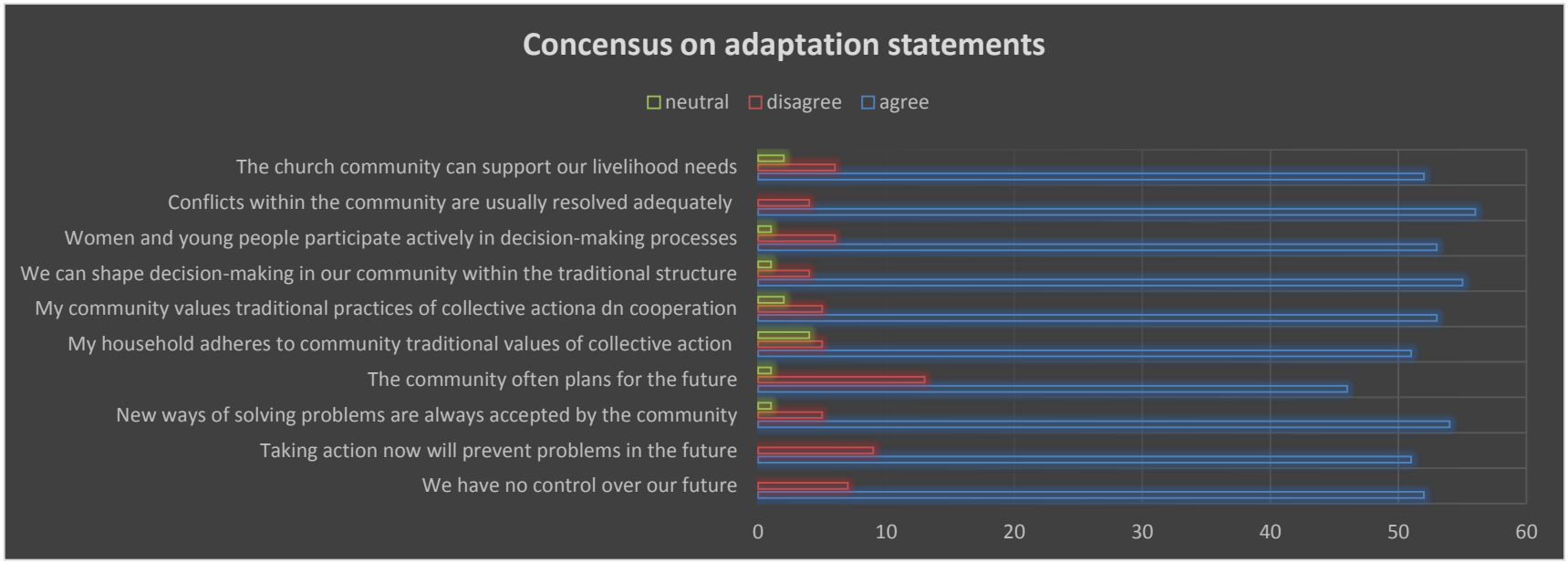
Graph 20 Source of income with the number of households categorization on the importance of these sources

According to the Kiribati Copra Development Limited, the amount of copra production on Maiana within the 5 years from 2015-2019, is 1,742.281 metric tonnage. This corresponds to 1,742,281 kg which means that for a 2 dollar per kg practice, more than 3 million dollars have paid to Maiana for copra only for the given 5 years periods. This is a massive amount that has distributed accordingly to the weight of copra each recipient has.

This might be the reason that people are dedicating their time on cutting copra and doing other activities for copra and less on fishing or harvesting foods, hence rely on imported goods as previously mentioned on food security section. The next source of income is salary. This might only applicable for those who have jobs at the island council or they could have been government officers based on Maiana like Fisheries Assistant, Agriculture Assistant, Island Education Coordinator and others.

Community Health

Community Health is a very critical assessment that examines a community capacity or cooperation in fighting against the impact of climate change, and how to cope with it or to come up with effective and efficient adaptation measures at the community and village level. The household survey has 10 questions that a surveyed person/household have to agree or disagree with it. The result below with Graph 21, states that the majority of the surveyed households have positive responses agreeing to all of these statements. Most of these statements except one are positive in showing the rigid capacity of the community to cope and to adapt to climate change through planning, collectively effort to implement plans, working with experts on innovative measures, and efforts to feed right decisions.



Graph 21 Agree or Disagree on the statement provided for future adaptation measures

The last statement (below statement in the graph) is related to Christianity belief on leaving everything to God's hands. Whatever God's plan for us, we have no control over it. A lot of responses are agreeing to this statement giving that Maiana is like every other Kiribati islands believing and committed to the Christianity beliefs. However, the majority are also agreeing in working together, set plans, feeding decision making with innovative ideas and hope for a better future. So to further analyse this, it also means that Maiana people are agreeing in doing their part, to work together and to set plans to safeguard whatever it could be safe, but they also acknowledge that what the future holds or God's plan for us, that is beyond their effort and it is unlikely to project at the household, community, village or even the island level.

ANALYSIS OF RESULT/ KEY FINDINGS

Water is less of a problem anymore on Maiana. The longed experienced issues on the availability and accessibility plus the quantity and quality of water have addressed through the Kiriwatsan project. However, there are still minor issues to be treated onto the improved water system. A need to provide more taps to ease the accessibility is required, as 4-5 households are sharing a tap. This needs to be assessed first if possible and has no impact on the overall system. All villages on Maiana except Tebikerai have raised this. A score of 3.1 for Water Security shows that the water is alright on Maiana.

Community Health has a score of 3.3 which shows that there is no problem with community capability and capacity to set plans for effective and efficient adaptive measures. A score of 3.3 also shows that people within the villages are fit in or agreed to collaboratively work to implement plans, and to feed critical information to decision-makers. The scoring on community health on Maiana also implies that women and youth have actively participated in decision-making processes and that no one is leaf behind in any plans and decision made. Most importantly, the arrangement of governing system on Maiana under the unimwane (Te Bau n Maiana) is very effective in setting land rules and in conserving natural resources both marine and terrestrial for future generation and use.

Coastal Health on the other hand is one of the most impacted and vulnerable sectors on Maiana. The potential of a coastal ecosystem to maintain its structure and function is affected negatively by the impact of climate change and disaster events. Sea-related issues such as erosion, overtopping and inundation are the most devastating issues experienced with coastal health. Refer to annex 1 for further details on the most eroded and overtopped sites on Maiana.

A score of 2.5 for the **security of place** shows that there are problems faced by the locals for this sector, but there is a chance that they could still live while waiting for solutions on these issues. The most common issue experienced on Maiana in this sector is the poor connection and communication network issue. The level of impact to villages is different as most villages closer to the network antenna are satisfy, while those far away are hardly or even could not use the service. Other common issues are the lack of transport to school and clinics, settlements issues (location and materials), and flooding.

Energy Security is another impacted and vulnerable sector on Maiana. The score of 1.9 shows that urgent support is needed in this sector. The majority of the households surveyed and most villages assessed, stressed that they need support with solar kits, as it is expensive to repair and to purchase new ones. Knowing that there is China Aid that provides new solar kits, Maiana requested if they could have a share so that it could support them with night activities.

Another concerning issue for the people of Maiana is the low production of resources and the lack of markets. **Income Security** refers to the ability to generate the financial income required to pay for basic needs, health, education, political participation and to live in a healthy environment. The lack of markets or capacity to access bigger markets plus the decline in natural resources as mentioned earlier are challenging the ability to general financial income. It was mentioned under the natural resource section that millions have been paid to Maiana for copra production only from 2015 to date. It was then raised by the participants in consultations that the production of coconut is declined. They claimed that this is due to the prolonged drought associated with the increasing temperature that has occurred periodically. So, it is wise for Te Bau n Maiana to conserve resources as in setting a restriction on marine resources harvesting.

Food Security is affected by the decline of marine and terrestrial resources. The weight of impact that the decline of natural resources has, touches many sectors as of this sector food security, plus income security, forest health, coastal health, and security of place. 6 out of 8 sectors are affected negatively by the decline of marine resources which exacerbated by climate change. Conservation and strict monitoring of natural resources are highly required on Maiana. All

stakeholders including the community are responsible to change the way they used to live for the sake of safeguarding these resources from declining or even extinction. The decision of Te Bau n Maiana in enforcing the banning of the splash fishing method is wise and should be extended to other natural resources.

As mentioned earlier, **forest health** is also experiencing the decline of its ecosystem capacity to produce. The majority of the households surveyed and the result of the PRA mentioned that this is due to the prolonged drought and increasing temperature as well. But apart from this, it was also observed that the lack of agricultural and cleaning tools are contributing to the decline of these natural resources, which in this case terrestrial resources.

So in conclusion, declining of natural resources, plus the lack of support onto solar energy usage, and coastal erosion are the major issues on Maiana, They are not only experienced throughout Maiana, but they are intertwined and impacting many sectors. Also, the total vulnerability score of 2.5 that Maiana has, shows that Maiana could easily be impacted or vulnerable to the impact of climate change and disaster risks.

Annexe I

Elevation of sites/infrastructures prone to disasters.

Static data

Point ID	Easting	Northing	Elevation	Code	Location
MNZ01	722874.730	111281.773		BM	In a clear field at the RC compound in Tebikerai
MNZ02	725767.512	110795.189	2.436	BM	In a clear field at the northern end of the village
MNZ03	727767.269	109665.349	2.890	BM	In a clear field at the RC compound in Aobike
MNZ04	728520.793	108833.991	2.896	BM	At the corner of the KUC seawall in Tebanga
MNZ05	729657.512	106714.166	2.600	BM	In a clear field between Temangaua and Toora
MNZ06	726997.898	103856.558	2.725	BM	On the seawall near the Ice-plant at Tebangetua
MNZ07	725642.806	102704.186	2.926	BM	On the RC seawall at Tebiauea
MNZ08	723038.327	96574.991	2.688	BM	At the northern end of the RC seawall in Bubutei

Table 1: Maiana Established Benchmarks

Village	Highest	Lowest	Averge
Tekaranga/Tematantongo	2.600	0.826	1.860
Aobike	3.142	2.086	2.614
Tebanga	3.860	0.599	1.878
Temangaua/Toora	2.741	1.837	2.426
Tebangetua	3.141	0.664	1.639
Tebiauea/Buota	6.699	0.837	1.978


TE MAURI TE RAOI AO TE TABOMOA