Adaptive capacity in Funafuti and Lofeagai communities, Tuvalu

Assessment team:

Ron Simpson, Vilisi Ratukalou, Semese Alefaio

University of the South Pacific

Australian Government

Department of Climate Change and Energy Efficiency

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Introduction

The Pacific Community-level Adaptive Capacity Analysis Framework (PACAF) was designed as a tool to identify determinants of adaptive capacity in the Pacific context. The PACAF was used to assess the adaptive capacity of Lofeagai and Funafuti communities in Tuvalu. The assessment was from the 27th of May to the 7th of June, 2011. This report describes the outcomes of the PACA assessments in the two communities.

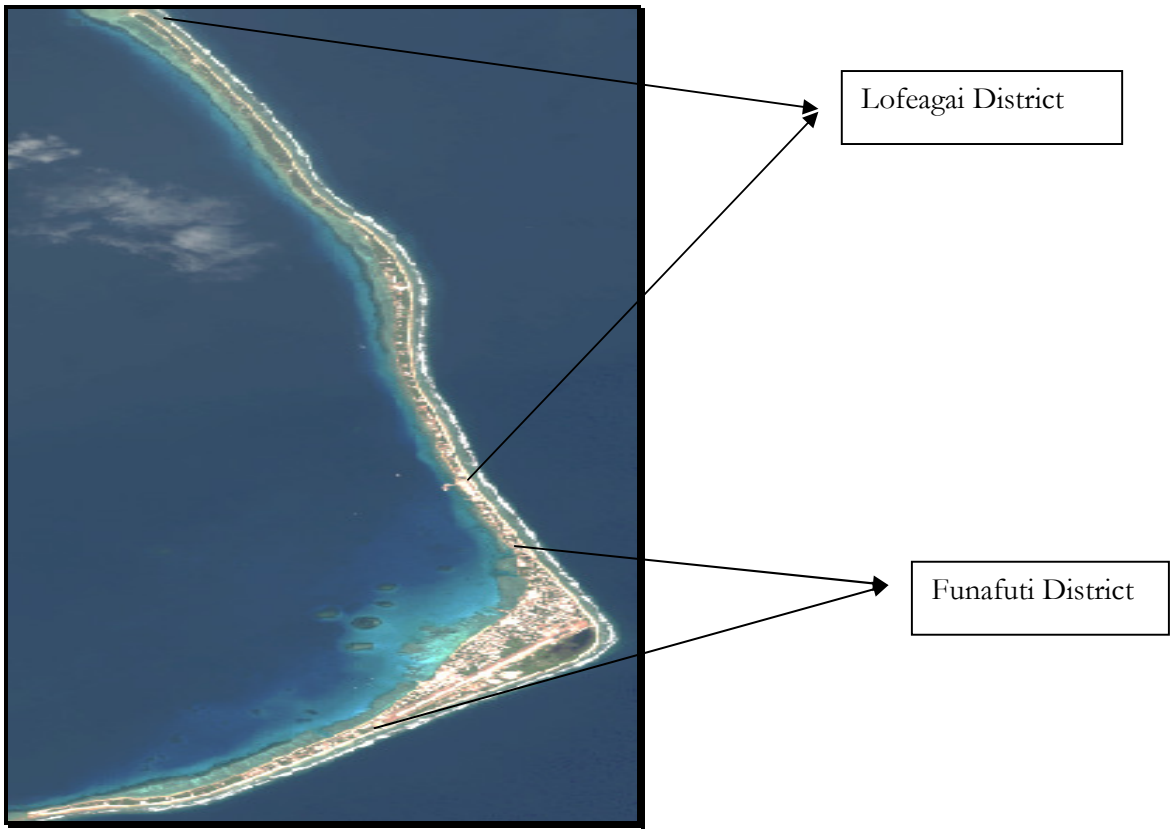
A brief background

Tuvalu is a small isolated atoll island nation, aligned in a northwest-southeast orientation; dispersed within the central Pacific Ocean. It is categorized as a Least Develop Country (LDC) due to its relatively low national income; weak human resources; and extreme economic vulnerability to external stresses. It consists of five true atolls and four raised limestone reef islands, with a total land area of approximately 26 km^2. The highest point in Tuvalu is 4.0m above mean sea level (Paeniu, 2011). Sea level rise ranks highly as a vulnerability factor due to the already experienced unusually high king tides linked to the flooding of dwellings and intrusion of salt water into freshwater lens impacting adversely on food security, water, health and general living conditions of the Tuvalu people. According to the recently completed National Adaptation Programme of Action (NAPA, 2007), drought is on the increase and it is closely associated with the frequency of ENSO, which brings erratic periods of low rainfall to Tuvalu. Such climate related risk coupled with anthropogenic stresses such as over-consumption, infrastructural developments; and rapid population increase has also had a serious impact on per capita access to water.

Case studies

Funafuti is the Capital Island of Tuvalu, a group of nine atolls stretching from 5°38'S, 176°07'E to 10°45'S, 179°38'E, a distance of 680km in a NW-SE direction. Almost half of country's 4,500 people live in the capital, Funafuti, which is made up of different community sectors representing the nine islands communities of Tuvalu. The population density is

extremely high. The entire island could be divided into three main districts; Lofeagai district, Funafuti district and Tekavatoetoe district. Because these districts co-exist adjacent to each other within limited land space, issues and factors faced in one district may have direct relevance to the other districts. Two of these districts are selected communities for this adaptive capacity case study.



Source: Loia Tausi (PACC)

Funafuti community

Funafuti community consists of 252 households that are divided into two - Alapi and Sinala who are the landowners of Funafuti atoll. Funafuti community is the central business district of Tuvalu. Most of the issues and challenges faced in the Funafuti community are also faced in the Lofeagai community although they are geographically less vulnerable.

Lofeagai community

Lofeagai community is made up of people who have migrated to Funafuti Atoll from other parts of Tuvalu. Funafuti community, the indigenous population, was geographically situated where Lofeagai currently is before the Second World War. The geography of this community makes Lofeagai one of the most vulnerable communities on Funafuti due to coastal erosion, salt water intrusion and other natural disasters. The community benefits from the surrounding ecosystems and natural resources of Funafuti Island as a whole.

The AusAID Water Project

Around mid-year 2008 the AusAID Water Project funded the purchase of water tanks for the government and the private households on Funafuti. The tanks were produced on site at Funafuti utilizing a Rotomould 'factory'. A total sum of AUD$585,000 was given to finance this project where a total of 307 water tanks were purchased and distributed to the local communities and to the government departments. On the capital island of Funafuti, water storage has been increased by 10,000 litres per household (water storage tanks supplied by AusAid). Despite this measure, during dry periods, communities often experience water shortages resulting in problems with health, hygiene and sanitation. In early 2009 AusAID provided funding for a further 300 tanks. Following distribution of all tanks (over 600) the water storage capacity on Funafuti would have increased by more than 6 million litres. Over 90% of the Population on Funafuti Island mentioned in the interviews that they needed more water tanks for catchment; particularly in dry seasons. Some families claimed that two tanks were insufficient. Inspite of a better water supply because of the donated water tanks, water shortage is still a problem because many households rely heavily on flush toilets and washing machines which have a heavy demand on water. 2010 results on adaptive capacity shows that approximately 160 out of 252 households in the Funafuti community and 60 out of the 97 households in the Lofeagai community had water tanks which were supplied by the AusAID project. Other water tanks were privately owned cisterns (16 in total) and water tanks supplied by the EU (over 300).

Methodology

This assessment was conducted between May 26th and June 7th, 2011. The target districts of the survey were the Funafuti and Lofeagai. Unlike the other districts, Funafuti was chosen because, unlike the other districts, the population was largely indigenous to the atoll. The people of Lofeagai community on the other hand were from other parts of Tuvalu and were specifically identified by the national government to be among the most vulnerable to the impacts of climate change.

The survey team comprised of two USP representatives, two local consultants from the Funafuti local government (*Kaupule*) and the Pacific Adaptation to Climate Change (PACC) project and 10 local survey assistants.

The initial methodology of gathering data as proposed by the PACC project officer was to hold community workshops at the two districts, and break off into clusters for focus group discussions and interviews with household representatives. In our first meeting however, the team agreed to deviate from this methodology simply because the communities were not able to commit to the proposed meeting times.

Household (HH) surveys

Announcements were thus made through the local radio station, informing the communities that the USP/PACC team would be visiting households for interviews. Surveys were conducted from 9:00 am until late into the night depending on the availability of mature family members. Most of the assessment was conducted in the local language '*te ngangana a te tuvalu',* with the assistance of the local counterparts and the survey assistants. The survey team worked in pairs and assisted the USP assessors with the translations.

Interviews and focus group discussions

Site visits and interviews were conducted with key informants in Funafuti and Lofeagai. internal key informants (IKI) were mostly leaders, elders and change agents within the communities. The external key informants (EKI) that were interviewed were foreigners, government employees, NGO staff and people from the outer islands who were knowledgeable about the situation of communities on the island of Funafuti. Discussions were also conducted with focus groups in the community; such as government employees, women, men and young people.

Likert scales

Likert scale scores for each factor (where required) were assigned by the consultant upon the completion of the entire assessment. These scores were based upon i) likert scores assigned by external key informants during interviews; ii) qualitative data gathered from internal key informant interviews; and iii) questionnaire data.

Personal observation

Observations were made by the assessors throughout the visit and these were recorded and incorporated into this report.

Funafuti Community Results

Community	~ No. of Households	% of households interviewed
Funafuti	252	72%

FACTOR ONE: HUMAN CAPITAL

1 (A) Skills: traditional and modern

The Funafuti community is located on the most developed part of Funafuti atoll and people generally utilise both traditional and modern skills for resource management and social relationships. Many of these skills have evolved over time and some have even been modified to meet the immediate needs. Education has enhanced the application and refining of traditional skills in this community. Over 52% of adults ranging from the ages of 25 to 60 had reached tertiary education levels and so are able to apply this in developing their communities. Many are employed in the local government and private sector as accountants, project officers, medics, tradesmen, sea-men, entrepreneurs, and are well versed with the operation of modern technology, such as computers, GPS and other machinery in their respective fields. Some examples of modern development activities that the Funafuti community currently engages in include sea-wall construction, raising houses on posts and sand extraction (FORAM project).

Figure 1a: Sea wall on Funafuti

Being in the main business district of Tuvalu, opportunities for building capacity and awareness programmes by overseas and local organizations are continually available to enhance modern skills. This is crucial because the science behind pressing issues pertaining to sustainability and development need to be explained and understood; before they can be weaved into traditional knowledge that has existed for centuries.

Table 1a. highlights traditional skills important to adaptive capacity in the Funafuti and Lofeagai communities. These are techniques that have equipped them for every day life and particularly for seasons of climate variability and disasters.

Traditional skills	**Description and comments**	**Application**
Food security		
Toddy extraction	Toddy is sap tapped from coconut shoots, before the tree bears the young coconuts. Extraction takes place on a daily basis. It is boiled and stored in containers for weeks, even months.	Food, beverages and substitute for sugar and honey. Toddy is widely used in Tuvalu, and can be found in a variety of dishes as a sweetener and supplement. When fermented, toddy can also be consumed as an alcoholic beverage. Young children, from a very early age are given food such as rice, mixed with toddy.
Knowledge of specific fish spawning seasons	Specific species of fish have specific spawning seasons; such as groupers, snappers and sea turtles. Moon phases, movement and flight patterns of sea birds and fruit seasons are skills that help in the prediction of spawning seasons of target species.	Fishermen use these natural pointers to target spawning aggregations. Professional advice is being given nevertheless for sustainable harvesting, particularly during spawning seasons. Widely practiced n Tuvalu
Food preservation	Fish is usually smoked in earth-ovens for preservation. Selected species of fish, such as Jacks and Tuna are also preserved using salt. Food such as taro, breadfruit and coconuts are stored as disaster food. Toddy is usually mixed with taro and breadfruit and baked to improve its taste and to preserve it for months. *Pulaka* is similar to dalo, but larger than yams. They grow best in dry conditions and are a main root crop in Funafuti. After cooking, these crops can be sliced up into chips, dried and stored in	Foods are stored for seasons of drought and natural disasters.

	containers for long periods.	
Wind breakers	Made up of coconut fronds weaved together as a barrier to prevent wind damages to houses, gardens and other important structures. During cyclone warning coconut fronds are trimmed off and erected as wind 'deflectors' around the house. Coconut fronds are also secured on thatched roofs to protect the thatch from flying off during strong winds.	Coconut fronds used as barriers are usually tied to poles and are firmly fastened. These are erected for long term purposes to protect gardens from gales and animals. The erecting of fronds as wind 'deflectors' and as a temporary covering for the thatched roofs are incidental uses.
Environmental Calendar	Dolphins jumping in the ocean indicate heavy rain in a week. Breadfruits' producing 4 to 6 fruits on one branch indicate a cyclone in a few months.	Disaster awareness and preparedness.
Studying local bio-indicators for fishing.	This helps them understand the schooling of specific fish and also study the sea-birds and what fishes they follow and their heights above the water. A larger school means the bait fish rise to the surface so birds fly low. But if the school is small, birds fly high to see the fish – but because of climate change things are changing. Birds are migrating because habitats are being destroyed, El nino and La nina, change in sst changes affects marine life behaviour and affects the ecosystem.	Studying nature and biological indicators assist the community in strategic and selective fishing.
Handicraft	Weaving baskets, skirts, fans and mats made from leaves. These are material that are used at home or sold as handicraft, and are made purely from Coconut fronds and panadanus leaves.	Alternative income generation projects.

The Tuvalu *fale Kaupule* realizes that the value of traditional skills and knowledge is paramount to their culture, history and beliefs and therefore need to be preserved, documented and taught to the younger generation. Action plans and workshops through organizations such as the Tuvalu Association of Non-Governmental Organizations (TANGO) have been established to revive and resurrect these traditional skills (Source: EKI).

Overall subjective rating of AC factor 1a:

1	2	3	4	5
Very low traditional and modern relevant skills	Low traditional and modern relevant skills	Some traditional and modern relevant skills	Abundance of traditional and modern relevant skills	High abundance of traditional and modern relevant skills

1 (B) Health Security

Based on interviews with a health focus group and external and internal key informants the health security in Funafuti community is good although people generally said that those n Funafuti was generally less healthy that people in the outer islands of Tuvalu. However, health facilities and services are more accessible in the capital (Funafuti) but there is a need to identifying and address root causes of health problems in Funafuti. The consequence of many families moving to the capital from outer islands and overseas has increased competition for the already limited land space. This, as a few (external and internal) key informants have agreed has only aggravated the spread of airborne diseases such as influenza and tuberculosis and skin diseases. Specialists attribute these health problems to overcrowding, poor sanitation and the insufficient supply of clean water. The problem as perceived by external key informants is that workshops, awareness programmes and funding are not directed at addressing and mitigating the effects of these problems; but focus on targeting other issues which are not necessarily priority issues of concern such as HIV, mental health, smoking etc.

The community generally relies on fresh fish from the lagoon and a limited supply of root crops and fruits planted in their back yards as food source. Rain water is the only source of drinking water and families with less cash face problems accessing water during drought periods. Groundwater is the only other water source for this community although its quality

may be harmful for human consumption. The increased dependency on imported foods, however, and the lack of fresh healthy vegetables and vitamin supplies could be a significant contributor to the increase in diabetic and poor-eyesight cases in Funafuti. Of all the households that were interviewed about 20 people were above 60 years old, the oldest being 88.

Overall subjective rating of AC factor 1b: 4

1	2	3	4	5
Very low health security	Little health security	Some health security	Good health security	Excellent health security

1(C) Change Agents

Based on personal observations and focus group discussions, there are many individuals who are clearly outspoken and have strong problem solving abilities. These individuals, fall between the ages of 35 and 65. Some of the older change agents which are generally men meet at 4:00am on a day every week as a norm, with other older men of the community including chiefs to have informal discussions on issues that affect the island. They suggest and recommend ideas to the chiefs who then carry it up to the *fale Kaupule* where decisions on the land and state are made.

The younger individuals are employees and volunteers at government and NGOs and understand the protocols between community and government; they transfer knowledge in a way that appeals to the local community. They are well grounded as well in traditional and modern skills and initiate and drive community projects. Two of these change agents are involved in adaptation and sustainability development projects on Funafuti atoll and have been doing climate vulnerability assessments at some of the sites. They were pivotal in the data collection and interviews of this adaptive capacity report.

Figure 2a. Focus group discussions with a men's group

Overall subjective rating of AC factor 1c: 4

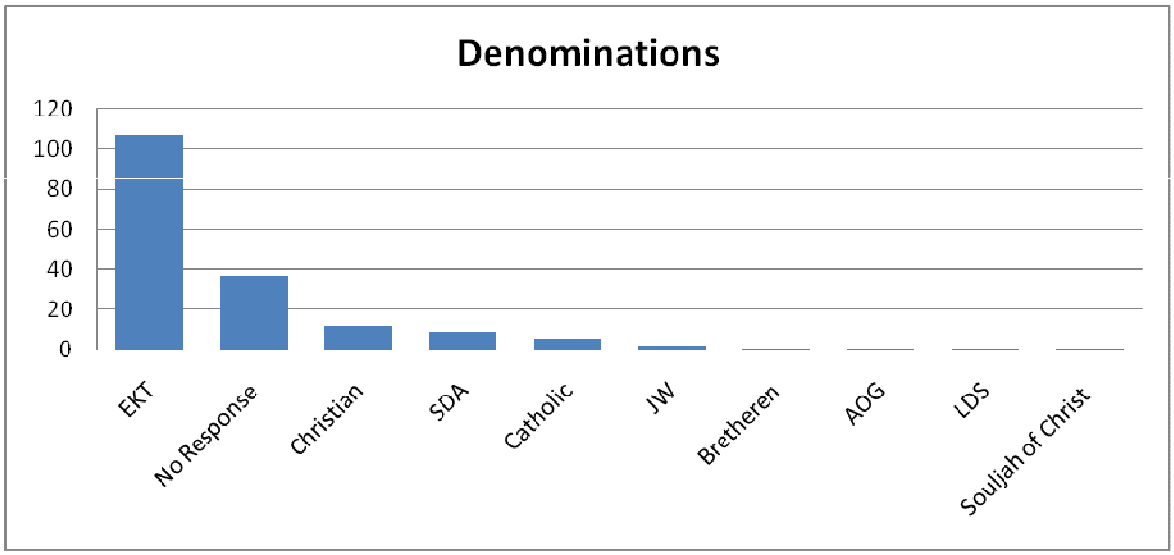
1	2	3	4	5
None	Some but not listened to	Some and somewhat effective	Good ideas are often implemented	Ideas flow freely at meetings and are analysed and implemented

FACTOR 2: SOCIAL CAPITAL – COMMUNITTY COHESIVENESS

2(A) Community Diversity

The Funafuti community is a diverse community. This community consists of two smaller communities, Sinala and Alipi; they are the landowners. Immigration, emigration from overseas and the outer islands has reduced the population of indigenous Funafuti people to approximately 65%. The remainder consists of other Tuvaluans, Asians, Pacific islanders, and Europeans. Most people in this community are literate and have had some formal education and can therefore communicate in English and the local language.

Over 60 percent of the community belong to the EKT (Ekalesia Kelisiano Tuvalu), which is very similar to the Methodist church denomination, 15% of the community were not sure of their beliefs, and the other 15% represent eight other religious organizations (Graph 2a).



Graph 2a

The non-indigenous members of the community do not have land of their own. Land and buildings are leased from the land owners of Sinala and Alapi. Some of the landowners who have attained higher education or secured paid employment have left the village to live overseas and lease out their land and houses with the intention of returning upon retirement.

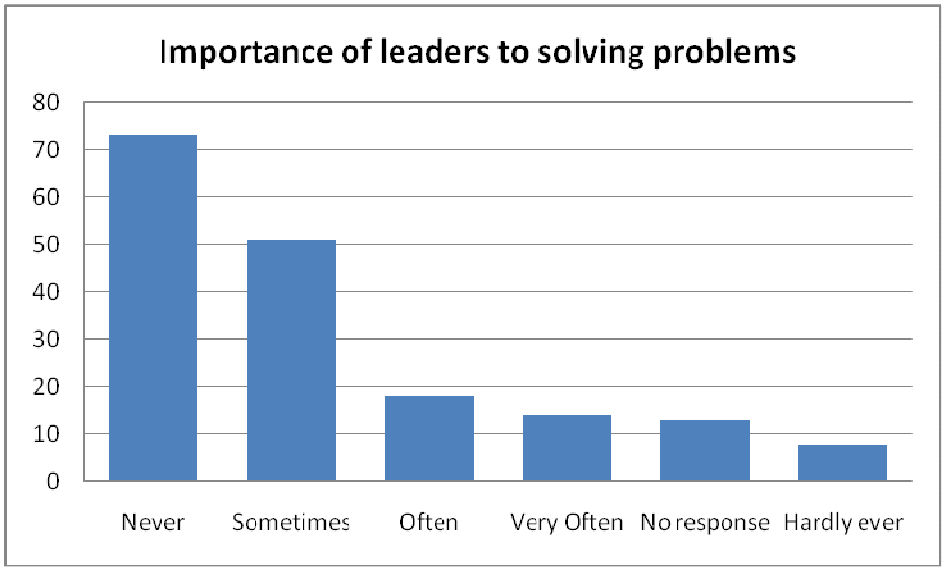
2B Leadership; 2C Strength of the *Vanua* collective action; 2E Good governance; 3B Willingness to accept change

The leadership in the Funafuti community consists of the Assembly of Elders or the local government. This is traditionally called the *Fale Kaupule*. The *Fale Kaupule* is basically composed of the community chiefs, elders, pastors and even parliamentarians; they weigh out and discuss issues that concern the community and the government. All decisions that concern state and community development are raised at these meetings, primarily because most of the land and property belong to the *Fale Kaupule*. This executive body is predominantly made up of older males, their spouses along with other prominent men and women in the community may also sit in the sessions and cast votes on decisions that are made. The voting system is critical and almost all decisions that involve development hinge on the votes.

The *Kaupule* is the executive arm of the *Fale Kaupule* and ensures that all the decisions are carried out at the community level. Each of the main islands has its own *Kaupule* which liaises

with government and generally oversees community affairs. Concerns that are therefore affecting the community are raised to the *Kaupule* or Government directly. On Funafuti, governance and service provision situation is more complex, with the *Kaupule* filling some roles and the Government dealing with matters directly itself.

Graph 2b shows that around 40% of the community (73 people) 'never' see leaders solving problems. This is partly because of the delegated roles of leadership to the 'change agents' and *Kaupule* who are usually the people on the ground. They assist in implementing decisions that have been agreed on already by the executive bodies. It is critical to understand the importance of the roles of the 'change agents' and members of the *Kaupule* in governance and ground work.



Graph 2b

Several EKIs commenting on their perspective on the strength of community leadership mention that the community respect their leaders. Survey results state that close to 50% of the community claim that these leaders sometimes, often and very often address and make efforts to solve problems (see Table). This however does not nullify the presence of leaders in Government who pull their own agendas and have their own views on particular national priorities; and are seen to be ignorant and selfish in the eyes of the average community member. Good leadership and effective delegation increases adaptive capacity.

The following pie chart (Chart 2b) shows that the majority of the community agrees that the PACC project has no affect on the community leadership. There are dozens of other projects being implemented in Funafuti at the same time and so it was difficult to ascertain whether the climate change adaptation project had an impact on community leadership. Further to this, the communities are relatively large and clustered together, and priorities change at different times. IKIs and EKIs mentioned that the communities in Funafuti are consistently being visited by NGOs and foreign institutions to conduct surveys on multiple issues so it is quite difficult to gauge the impact of a specific project. This would probably explain the 20% who 'do not know'. About 10% of the community agreed that the PACC project had influenced the community leadership.

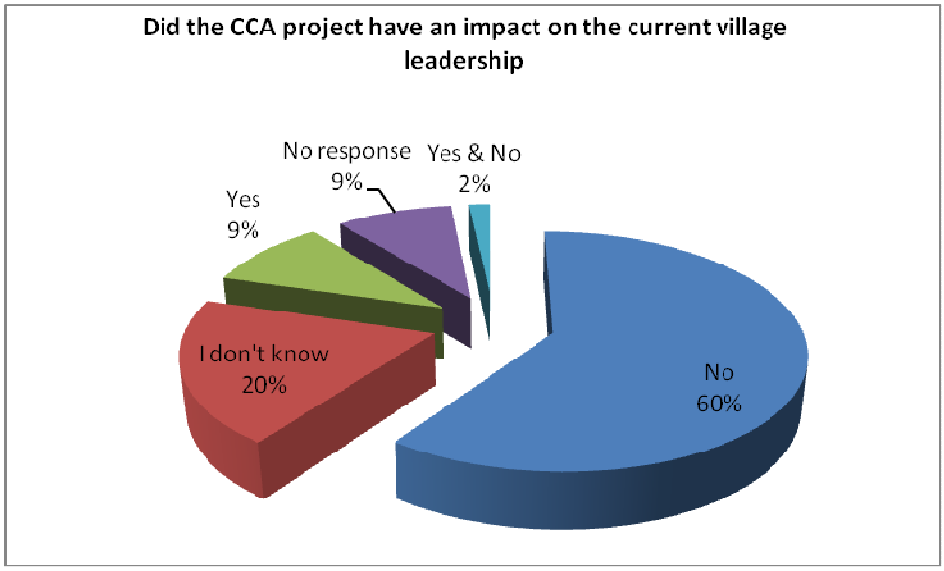
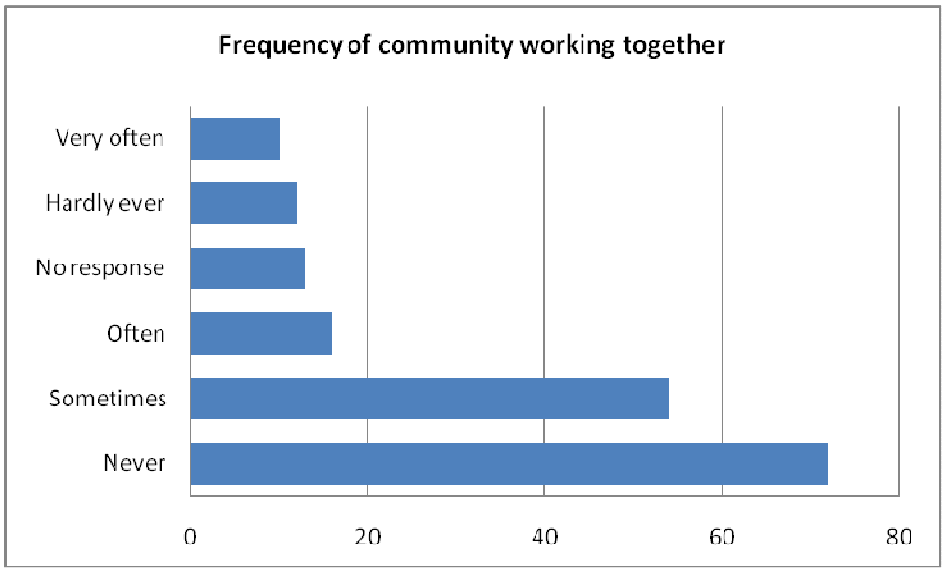


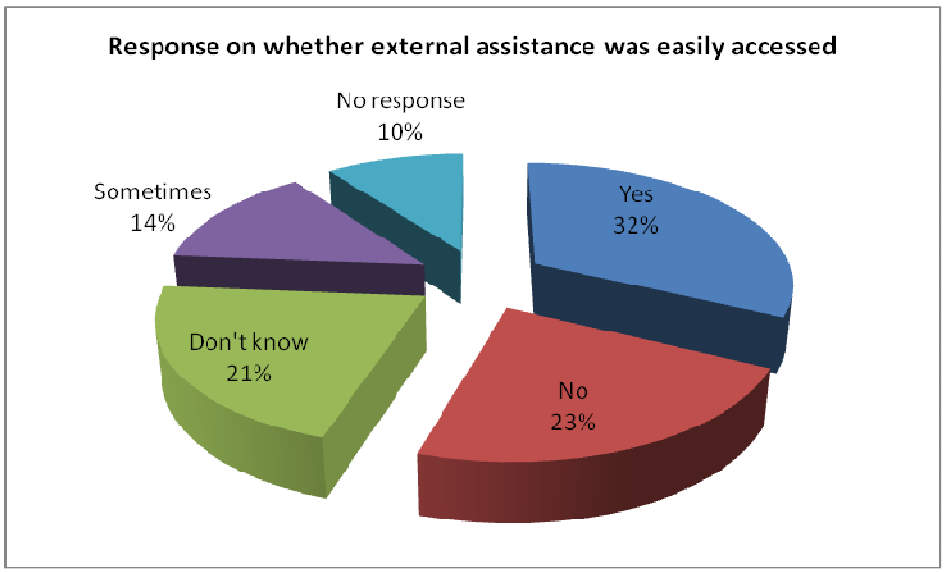
Chart 2b

Community cohesiveness and ability to work together under different projects can be a challenge for the Funafuti community. Being a diverse community – varying in land ownership and socio-economic status - priorities differ. The frequency of community cooperation depends on the demand of projects and requests from the *Kaupule*. Projects that benefit the entire community usually increases the frequency of members working together, such as the PACC project. The following graph shows that most community members think that the community does not work together very often.



Graph 2b.i

Projects bring in money; with this added incentive communities are keen on laying aside household chores to commit to project work. The fact that the Funafuti community is located in the business centre of Tuvalu makes the access to external and foreign aid quite convenient. Pressing issues are water shortage and water quality, waste disposal and coastal erosion. The PACC and TANGO organizations assist government and local communities in addressing and reducing these issues.



The involvement of different projects in this community is quite beneficial for its members. Most of the projects as mentioned above complement each other and even duplicate work done by other projects. Close to half of the population, as illustrated in the following chart, stated that the PACC project did not affect the community's access to external resources. EKIs perceive that the 40% of people who do not know or who do not respond, either do not take part in the project or are unaware of the work of these organizations.

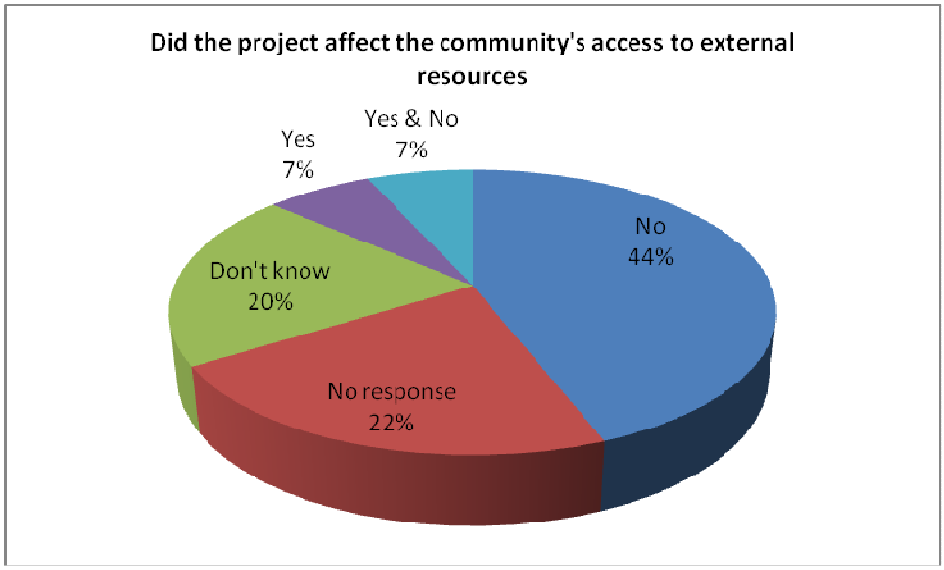


Chart 2b.ii

Subjective rating of Factor 2A

1	2	3	4	5
Few support groups available, ineffective relationship	Some support groups available, ineffective relationships	Fair amount of support groups available, some have effective relationships	Good amount of support groups available, most have effective relationships	Many support groups available, all have effective relationships

Overall subjective rating of AC factor 2B

1	2	3	4	5
No vision, little collective action	Little vision, some collective action	Some vision and implementation	One visionary with good implementation	Several people with vision and implementation skills

Overall subjective rating of AC factor 2C

1	2	3	4	5
Little group feeling, people seldom work together	Some group feeling, people sometimes work together	Moderate group feeling, people sometimes work together	Good group feeling, people frequently work together	Excellent group feeling, people frequently work together effectively

Overall subjective rating of AC factor 2E

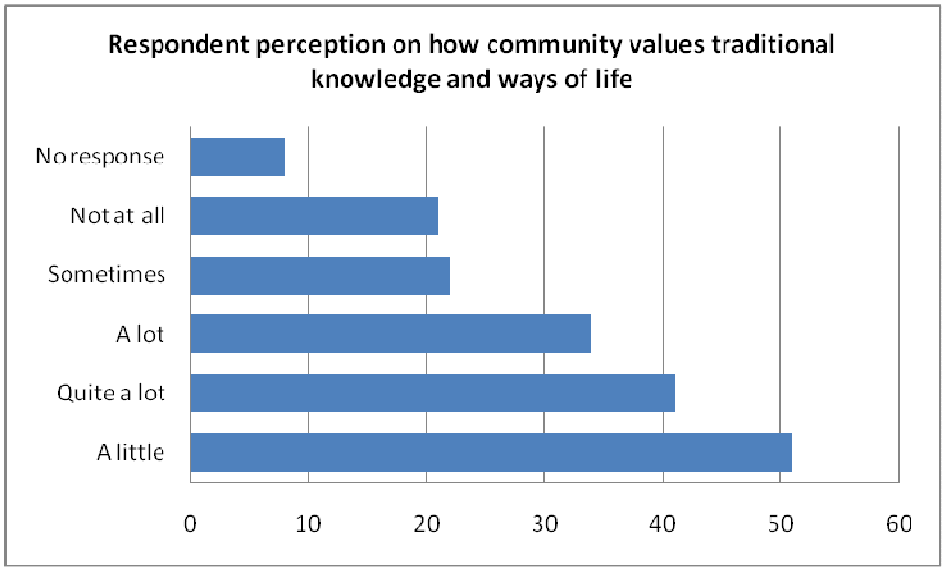
1	2	3	4	5
Poor decision making processes, limited information sharing	Mostly poor decision making processes, mostly limited info sharing	Some good decision making processes, some information sharing	Good decision making processes, good information sharing	Excellent decision making processes, excellent info sharing

FACTOR 3: BELIEF SYSTEMS/WORLD VIEWS/VALUES

3(A) Traditional values, systems and knowledge ('Mana')/Modern, western and church value systems

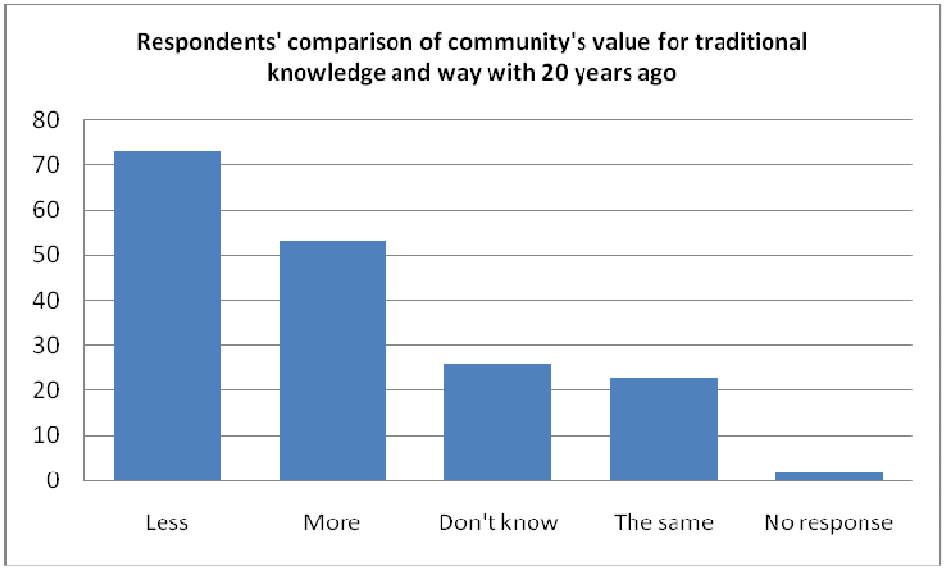
As illustrated in Graph 3a below, a significant number of people (42%) believe that the community values traditional knowledge and many of these applications have been discussed in Factor 1(A).The graph however also shows that around 50 people (28%) perceive that the community have little knowledge on traditional knowledge and ways of life and close to 15% (22 people) mention that the community does not value traditional knowledge at all.

EKIs and focus groups claim that the level of traditional knowledge in the Funafuti (urban) community has declined over the years, as a result of urbanisation.



Graph 3a

Most respondent stated that value for traditional knowledge has declined when compared to 20 years ago. About 72 out of the 177 of the survey respondents' stated that value for traditional ways of life had declined while 52 people thought otherwise. EKIs perceive that both claims may to a certain extent be true. Traditional knowledge may be lost due to the impact of urbanisation; and gained as a result of the influx of people from the outer islands over the past 20 years, as they bring traditional skills and knowledge from their home islands.



Graph 3a.i

Subjective rating of Factor 3A

1	2	3	4	5
Very low abundance of traditional values	Low abundance of traditional values	Fair abundance of traditional values	High abundance of traditional values	Very high abundance of traditional values

3(C) Self agency vs determinism; 3(D) Here and now/future thinking

The community, as discussed in 2(A) have an avid belief in God but as Chart 3c below suggests, many believe that they can control the outcome of their future by making wise decisions today, which is quite a balanced perspective. In the context of the work that PACC, the *Kaupule* and other departments are doing, adaptation and mitigation strategies to some of the environmental problems are stepping stones for the way forward (IKI). These organisations work and push the local governments to meet the priority needs of the communities such as the purchasing of the desalination plant (10 years ago), the installation of guttering systems on houses in Funafuti (two years ago) for better water catchment etc.

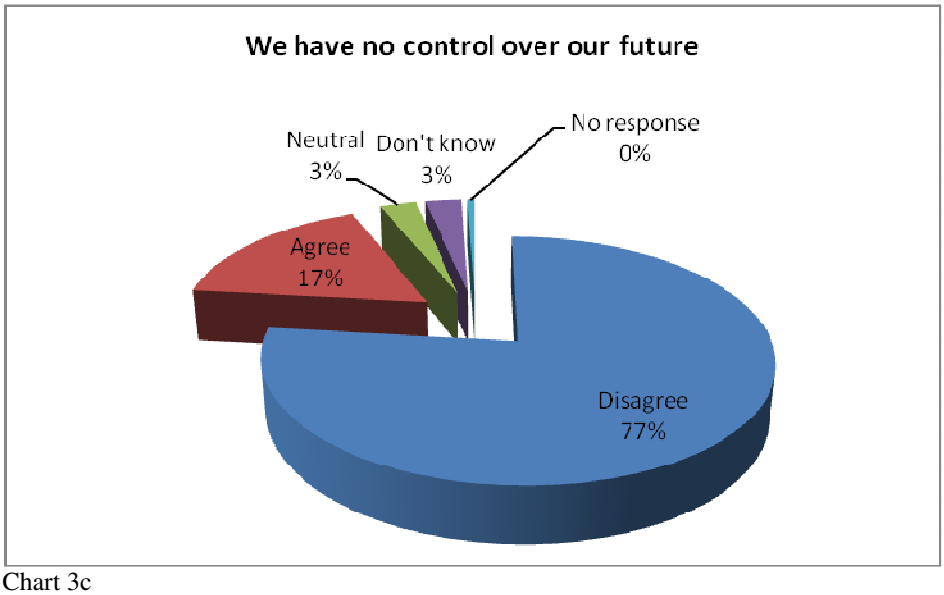
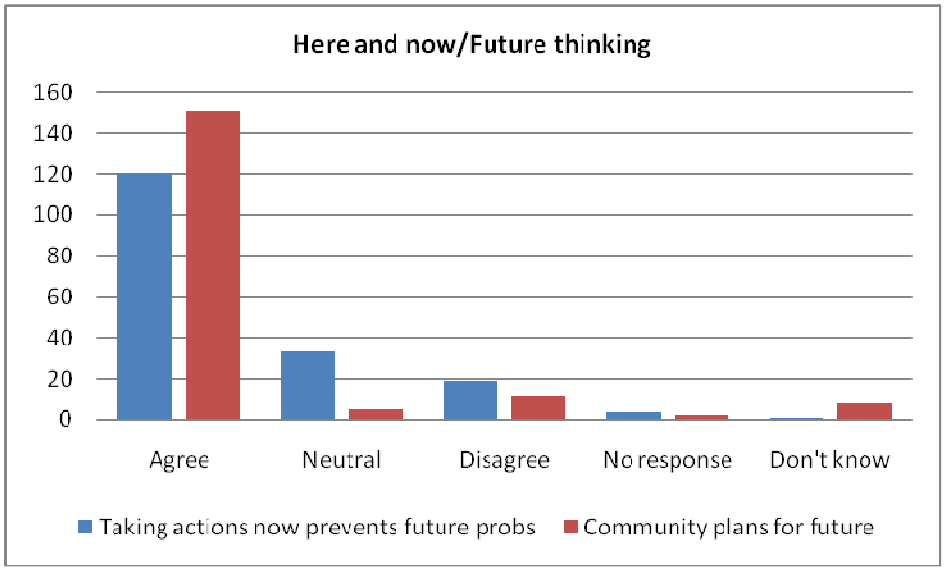


Chart 3c

EKIs say that some negative statements made by overseas media on the impact of global warming on Tuvalu has both informed and discouraged the local people about pending

disasters. These news has at the same time provoked a spirit of 'determinism' within them to prove the world wrong - that with limited resources and reliable partnership organisations a better future can be created for the Tuvalu people. Their belief in God is a very important aspect of their belief system and worldview.



Graph 3c

Through guidance from the *fale Kaupule*, partner organisations and change agents the community is in a position to plan for the future. With the general belief (above table) that taking action now prevents or minimises problems that may be faced in the future the community is thus likely to plan and prepare for seasons of climate variability.

FACTOR FOUR: RESOURCES AND DISTRIBUTION

4 (A) Access to Land

Access to land space is a key issue for the community, particularly for new families moving into the capital from the outer islands for employment and education. There is limited land available for farming and building; and it gets more complicated when people do not have their own piece of land. EKIs and IKIs state that domestic disputes have broken out because of problems relating to land ownership. People cannot plant crops on other people's land unless they are leased; this leads to the problem of high dependency on imported products, which is not usually the best food for healthy living.

Subjective rating of Factor 4a:

1	2	3	4	5
Limited land available	Some land made available to some	Adequate land made available to some	Adequate land made available to most	Unlimited land made available to most

4(B) Access to fishing grounds

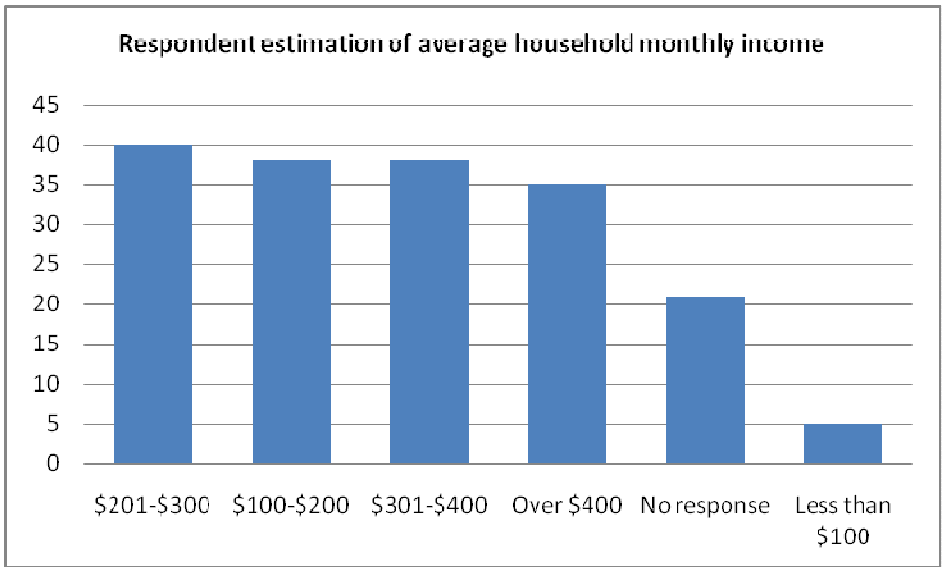
Access to fisheries is at a healthier and abundant level (*pers. observ*) and the community members have equal access to the fishing grounds. IKIs acknowledge however that the gradual increase in population in the capital in recent years has lead to a general decline in coastal fisheries supply. There is a heavy reliance on the Funafuti lagoon for fresh fish, invertebrates and sea weed. Most of the respondents said that the fishing areas are sufficient to provide for their families needs. Some fishermen sell fish as a source of income to the local market and businesses. Sea-men and fishermen also sell deep sea fish to families who do not have boats and proper fishing gear. 13% of the community earn their income through fishing (see Chart 4c).

Subjective rating of Factor 4b:

1	2	3	4	5
No fishing grounds available/no catch present	Some fishing grounds available with limited catch available to some	Adequate fishing grounds with catch present available to some	Adequate fishing grounds with catch made available to most	Rich fishing grounds made available to most

4(C) Access to income; 5 (B) Livelihood options

Employment opportunities are more diverse in the capital than in the outer islands; access to income is therefore quite high (Graph 4c). Most of the respondents claim to earn between AUD100 and AUD400 a month, and above. Casual work is quite common because of developments that are continually taking place in various sectors. Many families rear pigs that are sold to local Chinese businessmen for AUD5 per Kg.



Graph 4c

A large percentage of the working population (74%) are Government employees, entrepreneurs, tradesmen, sea-men and other forms of employment. Land owners on Sinala and Alapi lease out their land and houses to foreigners and non-indigenous Tuvaluans as an added source of income.

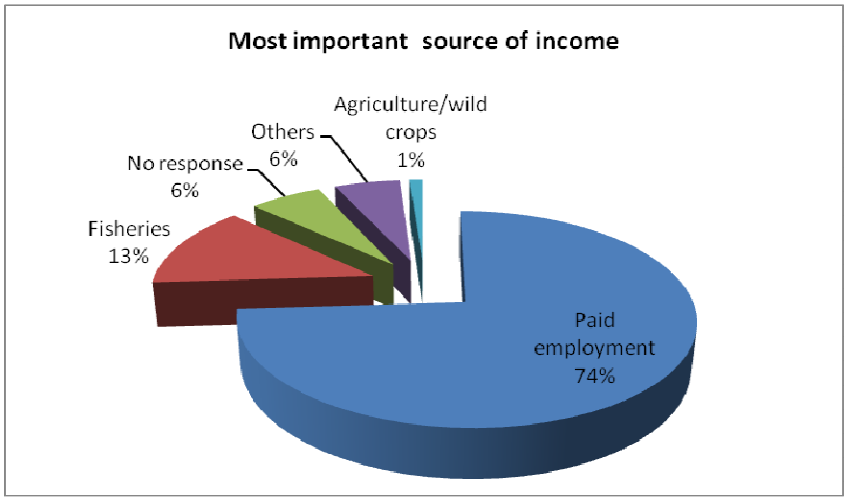


Chart 4c

Subjective rating of factor 4C

1	2	3	4	5
Disposable income earned is less than $100 a month	Disposable income earned is between $100 and $200 per month	Disposable income earned is between $201 and $300 per month	Disposable income earned is between $301 and $400 per month	Disposable income earned is over $400 per month

Subjective rating of Factor 5B

1	2	3	4	5
No income generating options available within the community	One income generating options available within the community	Some income generating options available within the community	Income generating Options available within and outside the community	Readily available income generating options within and outside the community

4(D) Infrastructure and services

The Funafuti community is the most developed community on the island and has access to most standard services. The Funafuti hospital offers health service to the island and to outer island patients. The community has access to a local radio station, and electricity and water is supplied by the Government through water tanks and desalination services.

Telecommunications services are conveniently provided via landline and a mobile service through the Tuvalu Telecom Corporation. Television is available through Fiji's Sky Pacific.

Access to world news and events is also made possible through internet services. Shopping centres are a few minutes walk and the roads are tar-sealed. Funafuti has two primary schools (one of which is the largest in the Pacific hosting over 1000 students) and a secondary school. The main source of water in Funafuti community is rain water. Tanks and guttering services were supplied as aid from the Government. Good infrastructure increases adaptive capacity.

Subjective rating of Factor 4D

1	2	3	4	5
Limited infrastructure made available to all	Some infrastructure made available to some	Adequate infrastructure made available to some	Adequate infrastructure made available to most	Unrestricted infrastructure made available to most

4(E) Drinking water

Most of the survey respondents said that they had access to safe drinking water (Chart 4e). The two main sources of water are i) rainwater and the ii) desalination plant that was introduced between 1998 and 1999. Government and other organizations such as USP since 2004 has provided the community with over 8000 gallons of water, and has improved their catchment systems through the installation of guttering pipes.

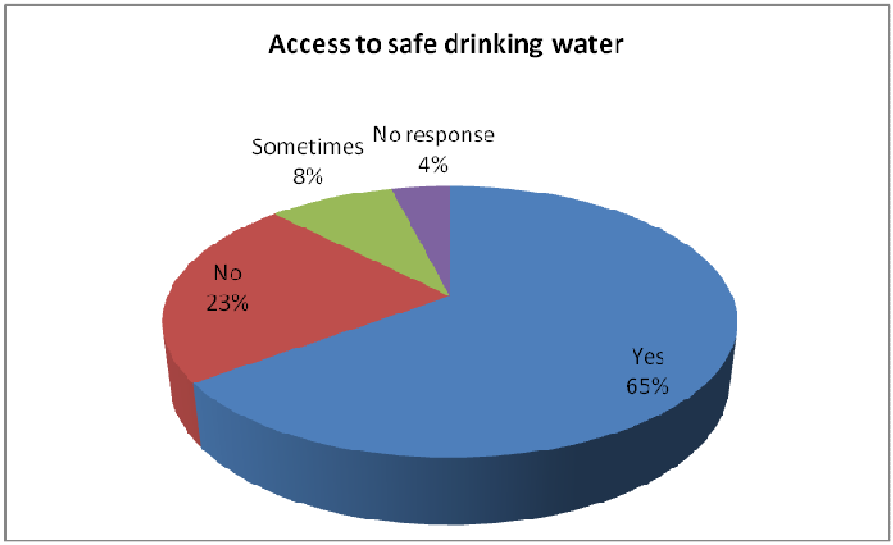


Chart 4e

Whilst the outer islands drink water sourced from underground springs, Funafuti does not have consumable groundwater. Any groundwater found on the island may be hazardous and polluted because of improper septic tank systems, oil leakages and sea-water intrusion. Women in the community (FG) said that they spend more money on water now than in previous years. Drinking water is usually used in washing machines and in flush toilets. Water management is applied only when water levels are low. Legal problems have surfaced in times past because of poor water management. An IKI shared his story on how during drought seasons, people steal water from water tanks belonging to neighbouring households at night, these incidents would end up in disputes.

PACC, TANGO and other organisations continue to host workshops on water conservation strategies. The most recent official workshop was held in March 22nd, 2011 on the World Water Day; this consisted of poster displays, model demonstrations and skill training and capacity building on repairing guttering pipes, tanks, taps and other basic maintenance techniques.

Subjective rating of Factor 4e:

1	**2**	**3**	**4**	**5**
Limited safe drinking water available	Some safe drinking water available	Adequate safe drinking water available to some	Adequate safe drinking water available to most	Unlimited supply of safe drinking water available to most

FACTOR 5: OPTIONS

5(A) Adaptation possibilities (sector specific); 6(B) Ability to analyze information

Community elders and EKI state that the main problem faced by the community is water shortage, followed by waste disposal and coastal erosion and intrusion of sea water. These three are highly regarded as priority issues of concern, not only in the community but on the island atoll of Funafuti. Over-population seems to be the primary factor connecting and aggravating the above issues. Some adaptation options were observed from reviewing previous research data, focus group discussions and dialogues with key informants. These are:

a) Wise management – An EKI said 'whatever we fail to manage, we will lose. Fail to manage water, we will lose it, fail to manage land we will lose it, fail to manage resources we will lose it, fail to manage health, we will lose it'. He mentioned that with the rising cases of various diseases the medical department should focus on 'educating' people and not merely focus on 'treatment'. This is an interesting concept, and is effective across the board.

b) Relocation – EKIs and IKIs said that a good option to solve issues of over-population would be to send people back to the islands; particularly those who are unemployed.

c) Building multiple-storeyed buildings - An EKI mentioned that since she was last in Funafuti 10 years ago there had not been any double-storey houses; now a few of these buildings exist. This could have been an option for the lack of land space and the increase in population that some parts of the island were experiencing. An additional option which now exists are houses on long posts, these offer protection from storm surges.

d) Improving water catchment – during heavy downpour a lot of rain water is wasted (pers. observ.) and causes flood pools and mosquito breeding sites. IKIs said that the available water tanks are insufficient and that Government should use the air-strip as water catchment, like the Marshall Islands. This water can be treated and used for gardening, washing and for feeding pigs.

e) Planting more trees – creates a cooler environment. EKIs and IKIs perceive that emigration is proportional to the removal of trees, because of the erecting of new

buildings. Cutting the trees exposes the soil to sunlight and this reduces the moisture content of the porous soil resulting in the withering of many trees and vegetables. Planting of larger trees such as breadfruit should be encouraged by those who have land.

f) Waste recycling and transportation – Imported products such as cans, bottles, plastic, and diapers only increase the amount of waste in the community. These wastes need to be recycled or transported to islands that have land-fill spaces. The risk of wastes ending up in the lagoon is 'high' if no urgent action is taken by the relevant authorities; this could be disastrous for the community.

g) Plant alternative crops – Crops and vegetables that grow in dry conditions and in porous soil need to be planted more. This increases the vitamin and mineral supplements for families. Examples are *pulaka* (via in Fijian), pawpaw, breadfruit and lettuce-cabbages that were introduced only recently from Taiwan.

Subjective rating of Factor 5A

1	2	3	4	5
No technological adaptation implemented in the last decade/ 5 years	Limited technological adaptation implemented in the last decade/ 5 years	Some technological adaptation in the last decade / 5 years	Successful adoption of 1 or 2 technological options in the last decade / 5 years	Successful adoption of more than 2 technological options in the last decade / 5 years

5(C) Food acquisition options

Survey respondents were asked to rank their food sources according to importance - 69% mentioned that their primary food source was imported food purchased from local supermarkets, 15% stated that fisheries was their primary source and 9% claimed that their gardens were the primary source of food. This shows that about 3/4 of the Funafuti community rely on purchased food. EKIs said that many families depend mainly on imported foods because they are tastier and easy to prepare. Planting space is limited and extreme weather conditions and the lack of proper fishing gear also makes acquiring fresh food difficult.

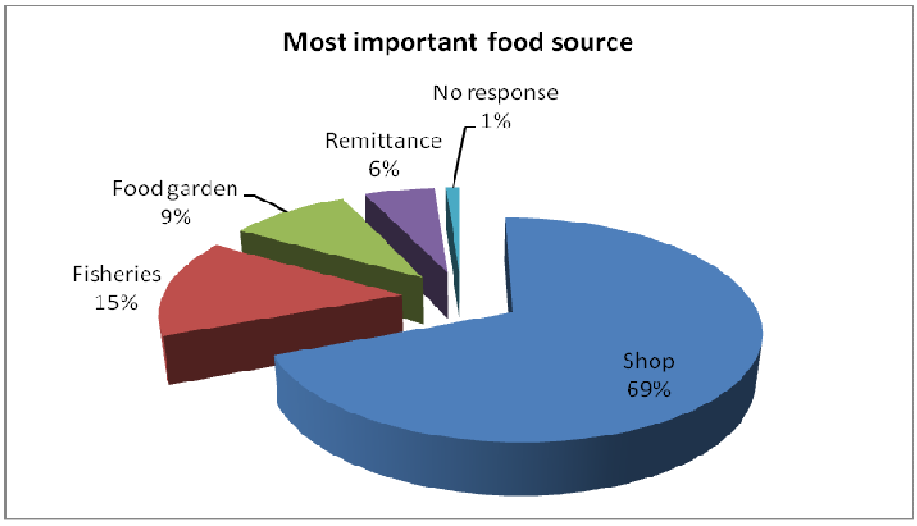


Chart 5c

Subjective rating of Factor 5C

1	2	3	4	5
very limited subsistence and no access to imports	No famine food, limited subsistence, extremely limited access to imports	little famine food, some subsistence, limited access to imports	some famine food, some subsistence, food imports available	famine food, abundant subsistence and abundant food imports available

FACTOR 6: INFORMATION/AWARENESS

6(A) Access/level of access to relevant information; 6(C) Communicated risks and importance

The Funafuti community has a general awareness of climate change. An EKI mentioned that scientific knowledge on climate change at community level began 5 years ago. People saw prominent changes in the weather and sought explanations from employees at the meteorological centre on the science behind the occurrences. Government organizations and others such as USP, TANGO and PACC (established in July, 2009) since then have been instrumental in educating and building capacity on the better understanding of Climate change and its implications on the people of Tuvalu. Many members of the community now have a better understanding of Climate change and the need for proper adaptation strategies. Some have mentioned that through the years they have noticed changes in fruit bearing seasons, spawning seasons, disease and pest (rats and beetles, destroying vegetation) outbreaks, frequent more intense and unpredictable occurrences of cyclones and other natural disasters, and are able to equate these phenomena to Climate change.

FGs and EKIs mention that many respondents are usually frustrated at the amount of awareness workshops and survey questionnaires they have to respond to from various organizations. As far as the community is concerned, everyone keeps asking the same questions.

Subjective rating of Factor 6A

1	2	3	4	5
No knowledge	Very limited knowledge	Limited knowledge	Good level of knowledge	Very good level of knowledge

FACTOR 7: HISTORY OF DEALING WITH CLIMATE STRESSES

During the focus group discussions with the male elders many told stories of past climate stresses that affected the communities in the capital. Many of the issues have been addressed in previous sections as they were highlighted by the respondents; these included stresses such as water shortages, poor waste disposal, coastal erosion, gravel and sand removal etc. Many of these reflected a combination of natural and man-made occurrences. The following are historic incidents whose magnitude and severity were still fresh in the minds of the elders:

- Hurricane Bebe ravaged most islands in Tuvalu in 1972, and is believed to have been one of the most severe and strongest hurricanes that ever passed through the South Pacific. Three people died, three fishing vessels ran aground and most houses on Funafuti were destroyed to the ground, leaving many families homeless. Weeks after the hurricane passed many families lived in temporary canvas shelters, and had to start rebuilding their lives all over again. The elders said that disasters of this magnitude occurred once every 60 years. Seasons seemed to have changed and these disasters, though not as intense as Bebe, are occurring more frequently.
- The collapse of an airplane on the airstrip in 1995 shocked the Funafuti community. The elders mentioned that this was the result of the erosion of part of the runway leading to one side of the plane falling into the ditch. The Government and aviation authority have improved the condition of the runway.
- In 1999 the community experienced the longest period of drought which lasted for more than six weeks. This event forced 2000 people to migrate overseas. This phenomenon triggered decisions by Government to purchase a desalinating plant, which would ensure sufficient availability of water.
- In 2006 there was a serious incident of rat infestation on Funafuti as a result of poor waste disposal. The elders agreed that they had never seen so many rats in their lives on the island. Many recalled that during pig feeding the rats would get to the food before the pigs; such was the severity of the problem. The Government arranged for a rat eradication project for the whole island.

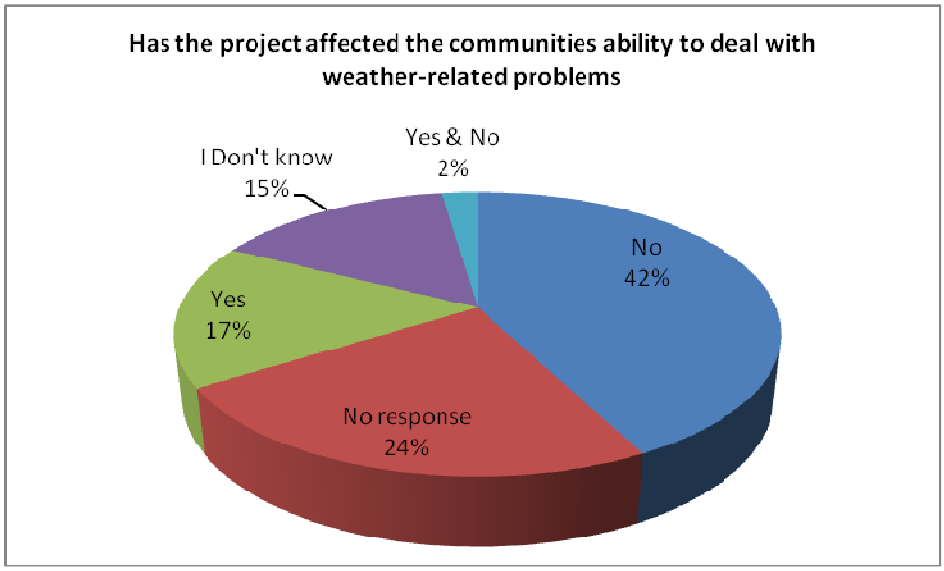


Chart 7a

Since the occurrences of the above disasters the PACC project has been working with the local community on coping and preparing for climate stresses. Since late 2009 the team has been conducting awareness workshops, adaptation strategies and community surveys in Funafuti. The priority need according to EKIs and IKIs has been to minimize the problem of 'water shortage'. The main focus of the PACC projects according to survey respondents has been on 'improving their water supply. While around 20% thought that the project was a great help, 42%of the respondents mentioned that there were still not enough water tanks available to store water; this has caused problems for them during the dry season. The PACC project has been working with the Government and foreign donors to assist these families.

Traditional knowledge and skills tabulated in Table 1a has equipped the community for expected climate stresses. Adaptation possibilities in Section 5 (A) also highlight how the community has handled climate stresses.

Subjective rating of Factor 7A

1	2	3	4	5
Very poor ability. Community is heavily reliant on external assistance to	Fairly poor ability Community is reliant on external assistance to	Fair ability. Community has a number of preparation, coping and recovery	Good ability. Community has a number of effective preparation, coping and	Excellently. Community has a number of highly effective preparation, coping and

recover. Community has few internal preparation, coping and recovery measures in place.	recover but has a few preparation, coping and recovery measures	mechanisms in place. External assistance is usually required for effective recovery.	recovery mechanisms in place. External assistance is sometimes required for effective recovery.	recovery mechanisms in place and is largely self-reliant. External assistance is seldom required for effective recovery.

Lofeagai Community Results:

Community	~ No. of Households	% of households interviewed
Lofeagai	97	82%

Factor one: Human capital

1 (A) Skills: traditional and modern

The Lofeagai community lies on the same island as the Funafuti community and shares many similar issues and challenges relating to Human capital. FG discussions allude to the fact that traditional leadership is closely associated with traditional skills; which is still quite prominent in the outer islands. The Lofeagai community is a diverse community; largely composed of non-indigenous Tuvaluans (see Table 1a). The population of Lofeagai in 2011 was dominated by 95 % of Tuvalu residents; less than 5% were foreigners. Emigration from the outer islands such as Niutao, Nui, Nukufetau etc. into the capital island has contributed to the knowledge and application of traditional skill in Lofeagai.

Population by Home Island

Population by Home Island		
	N0.	%
Nanumea	60	9%
Nanumaga	65	10%
Niutao	41	6%
Nui	34	5%
Vaitupu	77	12%
Nukufetau	146	23%
Funafuti	141	22%
Nukulaelae	48	8%
Others	25	4%
	637	100%

Table 1a. Lofeagai Population by Home Island in 2011

74% of people from the outer islands have found a place to live at Lofeagai in 2011. More than 4% were foreigners. Only 22% percent were indigenous people of Funafuti. This data is

crucial because in spite of the threat of over-population as a result of population influx, the younger generation on the capital are exposed to aspects of traditional expertise that may otherwise be lost in time. This aspect is crucial particularly with the immense influence of modernization over the traditional practices on the communities of Funafuti atoll. Funafuti and Lofeagai communities share similar traditional and modern skills.

Table 1a. highlights traditional skills that have been important to adaptive capacity in Lofeagai and Funafuti. These are techniques that have equipped them for every day life and particularly for seasons of climate variability and disasters.

Traditional skills	**Description and comments**	**Application**
Food security		
Toddy extraction	Toddy is sap tapped from coconut shoots, before the tree bears the young coconuts. Extraction takes place on a daily basis. It is boiled and stored in containers for weeks, even months.	Food, beverages and substitute for sugar and honey. Toddy is widely used in Tuvalu, and can be found in a variety of dishes as a sweetener and supplement. When fermented, toddy can also be consumed as an alcoholic beverage. Young children, from a very early age are given food such as rice, mixed with toddy.
Knowledge of specific fish spawning seasons	Specific species of fish have specific spawning seasons; such as groupers, snappers and sea turtles. Moon phases, movement and flight patterns of sea birds and fruit seasons are skills that help in the prediction of spawning seasons of target species.	Fishermen use these natural pointers to target spawning aggregations. Professional advice is being given nevertheless for sustainable harvesting, particularly during spawning seasons. Widely practiced n Tuvalu
Food preservation	Fish is usually smoked in earth-ovens for preservation. Selected species of fish, such as Jacks and Tuna are also preserved using salt. Food such as taro, breadfruit and coconuts are stored as disaster food. Toddy is usually mixed with taro and breadfruit and baked to improve its taste and to preserve it for months. *Pulaka* is similar to dalo, but larger than yams. They grow best in dry conditions and are a main root crop in Funafuti. After cooking, these crops can be sliced up into chips, dried and stored in containers for long periods.	Foods are stored for seasons of drought and natural disasters.

Wind breakers	Made up of coconut fronds weaved together as a barrier to prevent wind damages to houses, gardens and other important structures. During cyclone warning coconut fronds are trimmed off and erected as wind 'deflectors' around the house. Coconut fronds are also secured on thatched roofs to protect the thatch from flying off during strong winds.	Coconut fronds used as barriers are usually tied to poles and are firmly fastened. These are erected for long term purposes to protect gardens from gales and animals. The erecting of fronds as wind 'deflectors' and as a temporary covering for the thatched roofs are incidental uses.
Environmental Calendar	Dolphins jumping in the ocean indicate heavy rain in a week. Breadfruits' producing 4 to 6 fruits on one branch indicate a cyclone in a few months.	Disaster awareness and preparedness.
Studying local bio-indicators for fishing.	This helps them understand the schooling of specific fish and also study the sea-birds and what fishes they follow and their heights above the water. A larger school means the bait fish rise to the surface so birds fly low. But if the school is small, birds fly high to see the fish – but because of climate change things are changing. Birds are migrating because habitats are being destroyed, el nino and lamina, change in sst changes affects marine life behaviour and affects the ecosystem.	Studying nature and biological indicators assist the community in strategic and selective fishing.
Handicraft	Weaving baskets, skirts, fans and mats made from leaves. These are material that are used at home or sold as handicraft, and are made purely from Coconut fronds and panadanus leaves.	Alternative income generation projects.

The Tuvalu *fale Kaupule* realizes that the value of traditional skills and knowledge is paramount to their culture, history and beliefs and therefore need to be preserved, documented and taught to the younger generation. Action plans and workshops through organizations such as the Tuvalu Association of Non-Governmental Organizations (TANGO) have been established to revive and resurrect these traditional skills (Source: EKI).

Education has been very effective in contributing to the acquiring of modern skills and the modification of traditional skills. Research conducted by the PACC project states that 36% of the population of Lofeagai had education up to primary level, 35% had education at secondary level and 11% at tertiary level (Figure 1b). Exposure to good education for most of the community has enabled them to work for Government and the private sector.

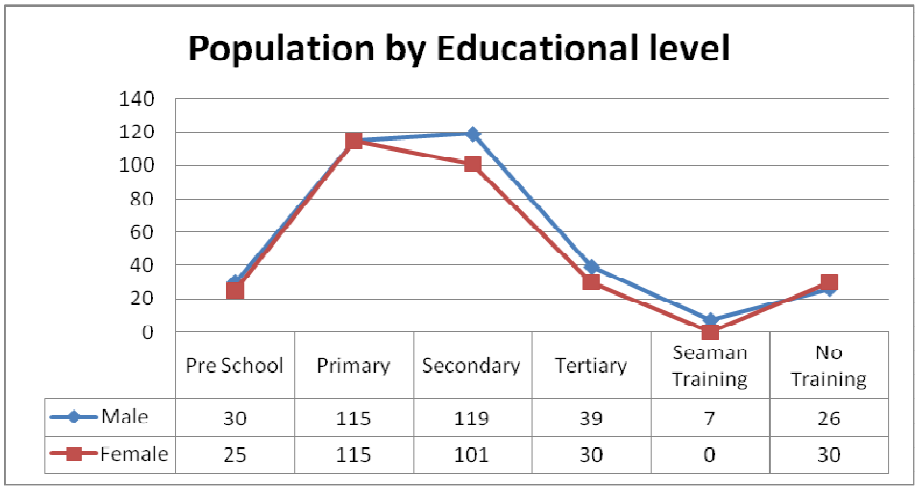


Figure 1b.Education level of the Lofeagai community.

Overall subjective rating of AC factor 1a:

1	2	3	4	5
Very low traditional and modern relevant skills	Low traditional and modern relevant skills	Some traditional and modern relevant skills	Abundance of traditional and modern relevant skills	High abundance of traditional and modern relevant skills

1 (B) Health Security

In the Lofeagai community Health issues are critical and also a challenge; this is due to the increasing population on such a narrow piece of land. The population of Lofeagai has climbed from 399 in 2002 to 637 in 2011. Out of the 637 people, 74% of the population is made up of people other than native Funafuti people (PACC project report, 2011). Overcrowding in the town area has caused more families to settle at Lofeagai. Special extreme cases showed that one HH had 25 people sharing one roof and 17 related people live in another HH. The risks associated with a growing population falls heavily on issues relating to water shortage and health security.

EKIs mentioned that diseases such as diabetes, tuberculosis and influenza are killers in this community. Other sicknesses such as diarrhea and scabies are quite common among children because of poor water supply, poor sanitation and lack of vitamins and minerals in their diet. In fact many respondents relate Health security issues to Poverty, and the lack of sufficient resources.

Table 4	Poverty Status by HH
Well off	1
Less Well Off	20
Average	55
Hardship	14
Worse off	7
Total	97

Table 4 Poverty status by HH

Household Heads were asked to determine the likely status of the family in terms of poverty. Apparently about 22% of the HH claimed that they were in the well off category, 57% of HH stated that they fall in the middle category and 21% are in the bottom category and are facing hardship.

'Burrow pits' dug up by the U.S Marine Corp. during the second world war to construct the Tuvalu air strip still exists and have not been buried yet. A few of these large pits are located along the Lofeagai road. Pig waste, septic seepages, oil leakages and other hazardous material flow into the pits which are usually filled with water; even more so during the rainy seasons. Personal observations and EKI said that children usually play near these pits and get into contact with the polluted water; this causes skin diseases and other infections. Land is so narrow along this part of the island, so everything (burrow pits, houses, road, pig-pens) are all congested; increasing the risk of health problems.

Overall subjective rating of AC factor 1b

1	2	3	4	5
Very low health security	Little health security	Some health security	Good health security	Excellent health security

1(C) Change Agents

There is no formal leadership or decision making body in Lofeagai apart from the organized Lofeagai EKT (religious) community that has a Pastor and a leading deacon. Any interventions by any outside organization should seriously take this issue into account (PACC project report, 2011). Personal observations and interviews with EKIs and FGs prominently imply that there is a lack of initiative and drive within the community. This

could have contributed to the condition that the community is in at present; vulnerable. The fact that Lofeagai is a diverse community predominantly comprising of non-indigenous people neutralizes the effectiveness of any governance structure and the capacity of adhering to the advice and counsel of wise mature individuals; who are usually the visionaries. EKIs suggest that the possibility is high that many young men and women who are potential change agents have moved into the urban centre and overseas for education and work, leaving the community at a disadvantage.

Overall subjective rating of AC factor 1c

1	2	3	4	5
None	Some but not listened to	Some and somewhat effective	Good ideas are often implemented	Ideas flow freely at meetings and are analysed and implemented

FACTOR 2: SOCIAL CAPITAL – COMMUNITTY COHESIVENESS

2(A) Community Diversity

As seen in the previous section the majority of people living on Lofeagai have come onto the main island for education, work and simply to get out of the outer islands. Whilst around 95% of the population is made up of Tuvalu people (Chart 2a), only 22% are indigenous people of Funafuti.

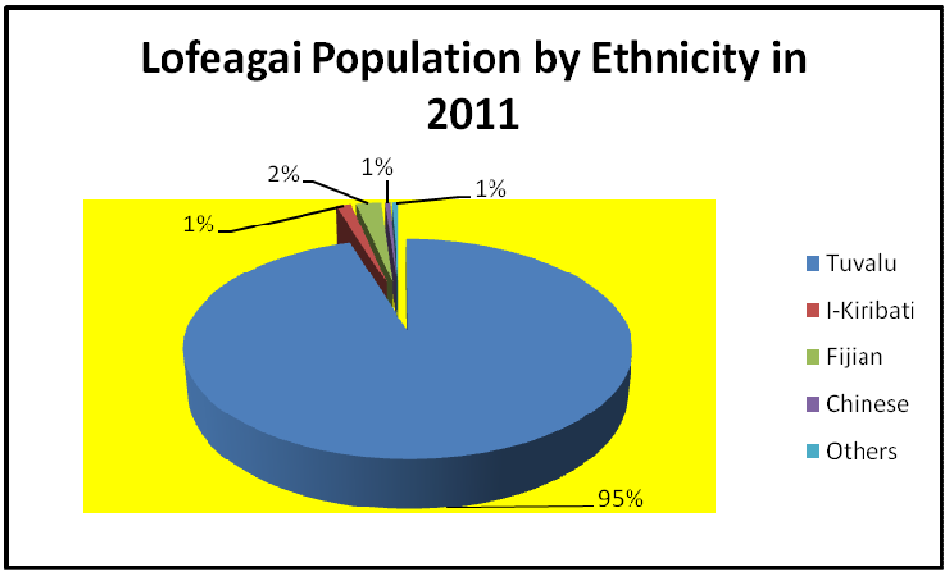
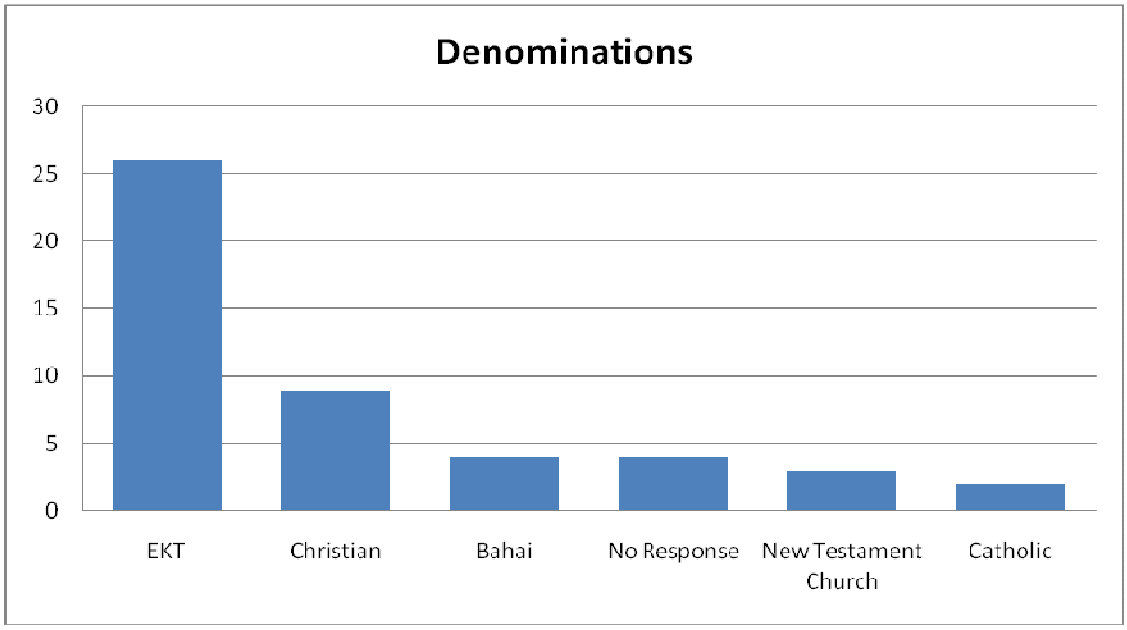


Chart 2a. Population by Ethnicity

Respondents said that the largest church denomination at Lofeagai village was the Ekalesia Kelisiano o Tuvalu (EKT), a Christian church. It accounts for 75% of the total population of Lofeagai. The rest of other denominations are no more than 5% of which there were about nine other separate churches at Lofeagai. EKT appears to be the main engine that unite the people of Lofeagai and also stimulate developments and encourage community spirits and feastings.



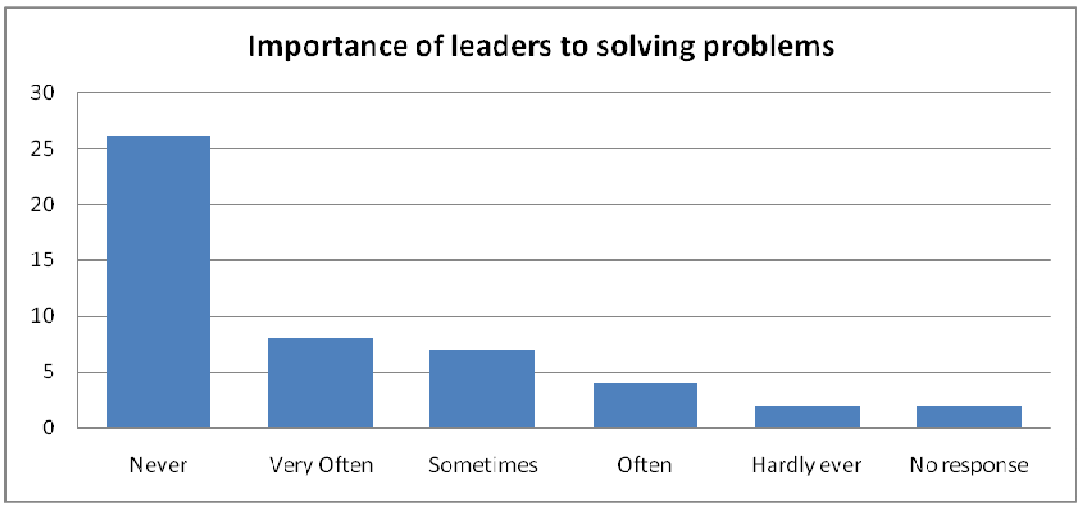
Graph 2a Population by Religion

In any community, family unit plays an important role in the set up of the community. Lofeagai family unit follow a similar pattern as those found in other islands of Tuvalu. The strong kinship ties within the HH provide a strong commitment and work force in attending to basic household services. The unity of Lofeagai community can only be seen when it comes to church affairs. EKT Lofeagai is the dominant religion and draws a congregation of 75%. Activities of the community were related to church affairs. Fundraising, work force and feasting were normal part of EKT Lofeagai congregation get together.

2B Leadership; 2C Strength of the *Vanua* collective action; 2E Good governance; 3B Willingness to accept change

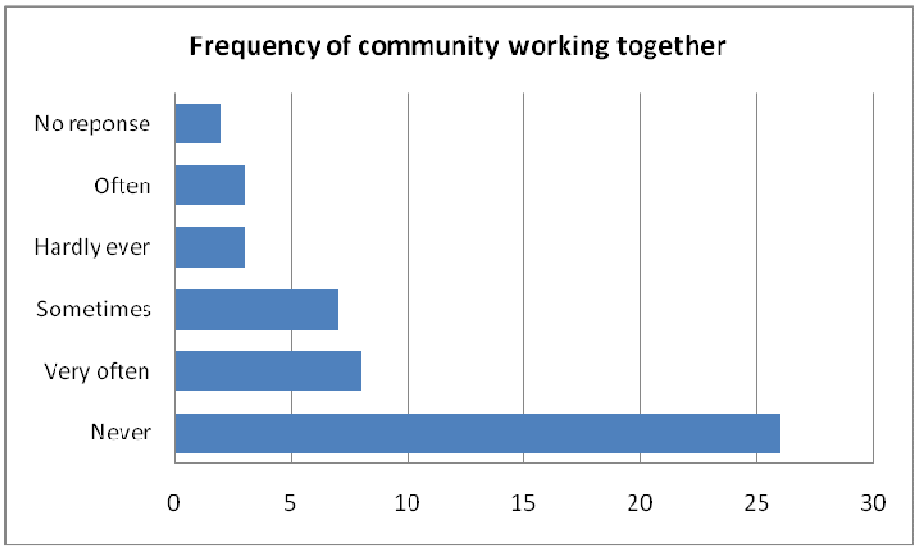
Lofeagai falls under the authority of the Funafuti *Kaupule*. Accessibility to some of the Funafuti resources had to firstly obtain permission from the Funafuti *Kaupule*. There are already by laws restricting access to vulnerable resources such as aggregates and sand, access to conservation areas and types of fishing methods. Residents of Lofeagai pay head tax and other business and traffic licenses to the Funafuti *Kaupule*. As mentioned in the above section 1(C) there is no formal leadership or decision making body in Lofeagai apart from the organized Lofeagai EKT. EKIs perceive that because most of the land in this community is leased, most people are casual on issues pertaining to environment protection and sustainability. The lack of an official governance structure in Lofeagai makes the community less organized and more primitive than the governance structure in the Funafuti urban community.

IKIs mention that Leadership from the *Kaupule* has assisted the community in terms of installing water tanks, house maintenance, financial assistance for the elderly and education assistance for children. The following graph, (Graph 2b) nevertheless shows that the percentage of respondents who think that community leaders are important in 'solving problems' is outweighed by those who think otherwise.



Graph 2b

Working together is a challenge in the Lofeagai community; many respondents believe this is true because of the vague structure of governance in the community. Graph 2c shows that a very high percentage of the community never or hardly ever works together. The lower percentage of respondents that said that the community has worked together were individuals that participated in Government and other workshops organized by the PACC project and TANGO.



Graph 2c

Overall subjective rating of AC factor 2B

1	2	3	4	5
No vision, little collective action	Little vision, some collective action	Some vision and implementation	One visionary with good implementation	Several people with vision and implementation skills

Overall subjective rating of AC factor 2C

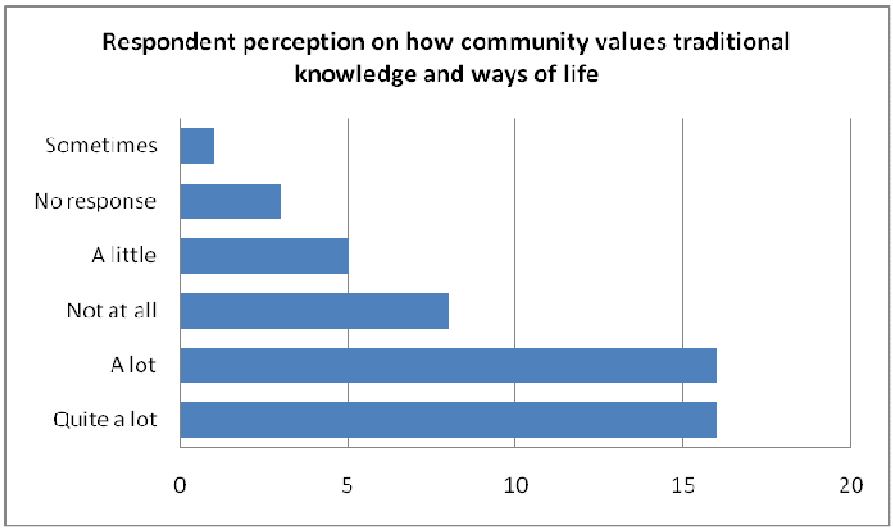
1	2	3	4	5
Little group feeling, people seldom work together	Some group feeling, people sometimes work together	Moderate group feeling, people sometimes work together	Good group feeling, people frequently work together	Excellent group feeling, people frequently work together effectively

Overall subjective rating of AC factor 2E

1	2	3	4	5
Poor decision making processes, limited information sharing	Mostly poor decision making processes, mostly limited info sharing	Some good decision making processes, some information sharing	Good decision making processes, good information sharing	Excellent decision making processes, excellent info sharing

FACTOR 3*:* BELIEF SYSTEMS/WORLD VIEWS/VALUES

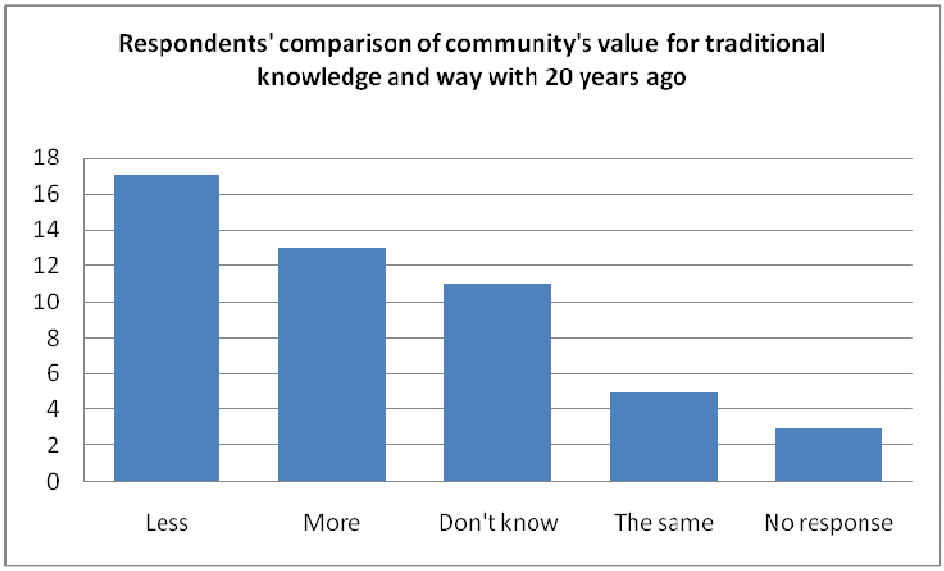
3(A) Traditional values, systems and knowledge ('Mana')/Modern, western and church value systems



Graph 3a.

Graph 3a illustrates that a very high percentage of respondents agree that quite a lot of people in the community value traditional knowledge and ways of life. This confirms Factor 1(A) in that traditional skill is high in this community because of the wealth of traditional knowledge that is brought in from the outer islands.

The value and practice of traditional skill 20 years ago, according to respondents and EKIs was much higher than experienced today. Graph 3b (below) shows that a high percentage of respondents said that there as been a decrease in traditional knowledge when compared to the last two decades. Many of the community members claim that urbanization and lack of documentation and practice has reduced the value placed on traditional knowledge.



Graph 3b

Subjective rating of Factor 3A

1	2	3	4	5
Very low abundance of traditional values	Low abundance of traditional values	Fair abundance of traditional values	High abundance of traditional values	Very high abundance of traditional values

3(C) Self agency vs determinism; 3(D) Here and now/future thinking

The Lofeagai community are quite a determined community inspite of many drawbacks they encounter in their livelihood. IKIs have mentioned that they believe in the law of 'cause and effect' and 'sowing and reaping'. The community, as discussed in 2(A) have an avid belief in God; but as the graph below (Chart 3c) suggests, many believe that they can control the outcome of their future by making wise decisions today, which is quite a balanced perspective; similar to the Funafuti community.

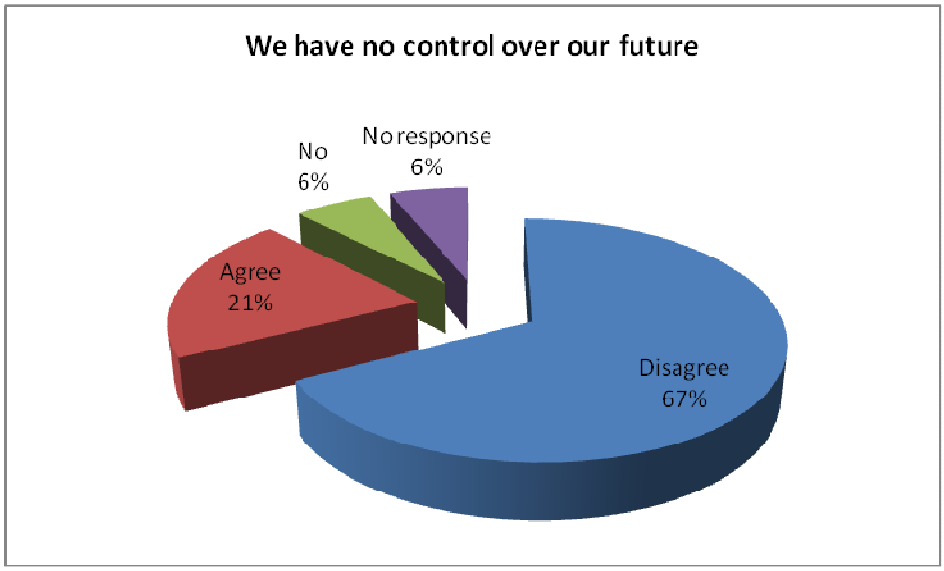
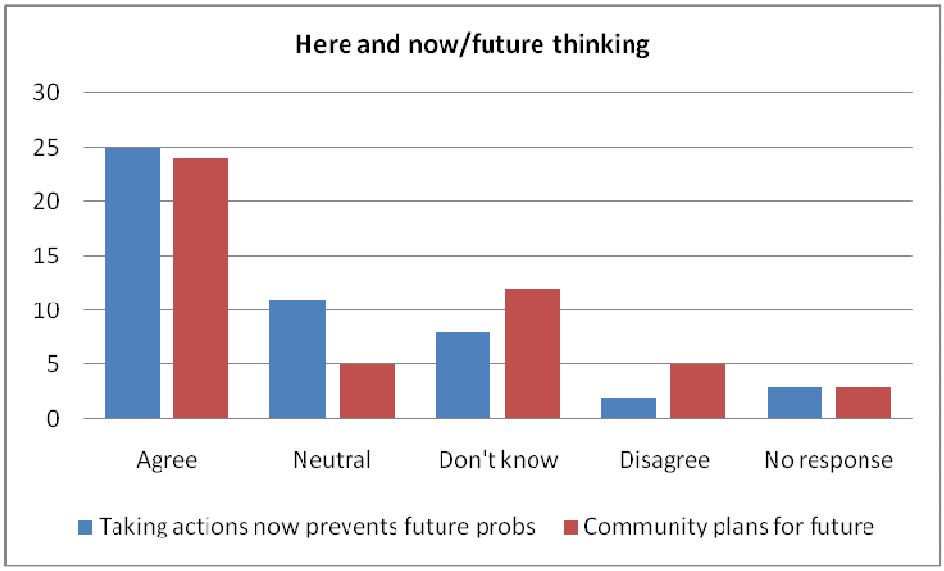


Chart 3c

The community understands that to a large extent they have some control over their future; most of the respondents believe that taking appropriate actions now may prevent and reduce future problems (Graph 3c). Many respondents also agreed that the community plans for the future so as to minimize the impact of natural and man-made disasters.



Graph 3c

The *Kaupule*, project partners and NGOs assist the community with the knowledge and basic material to plan for the future. With the general belief that taking action now prevents or minimises problems that may be faced in the future the community is thus likely to plan and prepare for seasons of climate variability.

FACTOR FOUR: RESOURCES AND DISTRIBUTION

4 (A) Access to Land

Land issue and access is a major issue in this community. The number of residents at Lofeagai in April 2011 was 637 compared to the total recorded in 2002 of 399. The percentage change over the same period was 60%. The PACC project report (2011) mentioned that families from the urban centres and from the outer islands flocked to Lofeagai particularly because the urban centres were quite populated. Should the number of people in this community continue to increase families would be forced to relocate.

Subjective rating of Factor 4a:

1	2	3	4	5
Limited land available	Some land made available to some	Adequate land made available to some	Adequate land made available to most	Unlimited land made available to most

4(B) Access to fishing grounds

The community members have equal access to the fishing grounds, but generally lack the proper fishing equipment to effectively catch fish for food and for money. IKIs acknowledge however that with the gradual increase in population in the capital over the years the community has experienced a decline in coastal fisheries. There is a heavy reliance on the Funafuti lagoon for fresh fish, invertebrates and sea weed. Most of the respondents said that the fishing areas are sufficient to provide for their families needs. Some fishermen sell fish as a source of income to the local market and businesses.

Subjective rating of Factor 4b:

1	**2**	**3**	**4**	**5**
No fishing grounds available/no catch present	Some fishing grounds available with limited catch available to some	Adequate fishing grounds with catch present available to some	Adequate fishing grounds with catch made available to most	Rich fishing grounds made available to most

4(C) Access to income; 5 (B) Livelihood options

Table 4c as explained in Factor 1(B) is the feedback from those interviewed. It seems that about 22% of the HH claimed that they were in the well off category, 57% of HH states that they fall in the middle category and 21% are in the bottom category and are facing hardship.

Table 4	**Poverty Status by HH**
Well off	1
Less Well Off	20
Average	55
Hardship	14
Worse off	7
Total	97

Table 4c Poverty status by HH

Research by the PACC project (2011) indicated that only 21% of the population of Lofeagai was engaged in the formal employment sector. Most of them were employed in the Tuvalu Public Service; a few were employed in non government organizations and some engaged in private business. 19% were recorded as unemployed. 22% were active in village life while 39% were active members in home duties. Apart from the obvious means of employment listed above to cater for family livelihoods, many families rely on the bounty of marine resources such as fish, clams, gastropods, seaweeds, beachdemer etc. for survival and additional income. Pigs are also reared and sold to the local market for 5AUD a kilogramme. Women skilled in creating handicraft items from pandanus and coconut leaves also sell their product such as fans, baskets and mats for extra money.

Subjective rating of factor 4C

1	**2**	**3**	**4**	**5**
Disposable income earned is less than $100 a month	Disposable income earned is between $100 and $200 per month	Disposable income earned is between $201 and $300 per month	Disposable income earned is between $301 and $400 per month	Disposable income earned is over $400 per month

Subjective rating of Factor 5B

1	2	3	4	5
No income generating options available within the community	One income generating options available within the community	Some income generating options available within the community	Income generating Options available within and outside the community	Readily available income generating options within and outside the community

4(D) Infrastructure and services

The PACC project report (2011) emphasized on Lofeagai having some basic infrastructure already in place. The public roads have been well tar sealed and stretched from BP Deport right up to the front of the northern borrow pits. About 6.3 km of tar sealed road. A secondary school building known as Fetuvalu High School was built with aid funds from the EKT. A more recent building was the Church building of Lofeagai EKT. A very attractive piece of architectural work, Lofeagai has some colorful housing designs that display some of the building skills of locals. Electricity supply comes from the Tuvalu Electricity Corporation (TEC). An electricity substation has been set up in Lofeagai village to supply most of the electricity to the HHs. Telephone lines have been laid adjacent to the public roads for those who need connections. Only a few HHs have TV network. Lofeagai does not have an evacuation emergency centre. It does not have a community water reservoir as a reserve for periods of drought.

Lofeagai people commute to main Town area to work, shopping, and banking, etc on a daily basis. There was a bus that belongs to Lofeagai EKT which assisted with public transport. Access to roads is relatively easy.

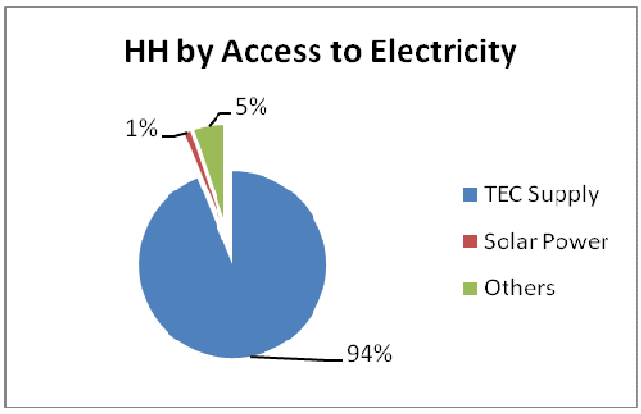


Figure 4d HH accessing electricity supplies

Figure 4d shows that most of Lofeagai HH has access to electricity from the Tuvalu Electricity Corporation. There were 94% of the HH. Only one HH has access to its own solar power. 5% have access to other means of electricity.

Subjective rating of Factor 4D

1	2	3	4	5
Limited infrastructure made available to all	Some infrastructure made available to some	Adequate infrastructure made available to some	Adequate infrastructure made available to most	Unrestricted infrastructure made available to most

4(E) Drinking water

Water management at the HH level is not seriously established. In times of abundant rainfall, no one bothers about conserving water, fixing leaking gutters and pipes and cleaning rain gutters. It was only when there was no rainfall for about a month that HH began to realize the value of water conservation. This has been an ongoing attitude. This (PACC project) survey confirms that there were 16 water cisterns in Lofeagai and there were 168 water tanks for a population of 637. People use water for drinking, making food, bathing, washing, watering the garden, feeding livestock, dish washing, flushing toilets and general cleaning. There was no well. There were only two HH using composting toilets. In times of water shortage, most people purchased their water from the PWD. This is because there is a high demand for water; the supply at Lofeagai is insufficient. Others get their water from Funafuti communal water cisterns. A truck transports water from the Town to Lofeagai.

This volume of water is still regarded as insufficient to cater the need of the present population of Lofeagai community. Water quality is the prime responsibility of private person or HH. The survey confirmed that 69 of the HH claimed that male performed the role of collecting water compared to 34 HH who claimed that Females performed this role. There were 87 HH claimed it was males role to clean rain gutters.

Subjective rating of Factor 4e:

1	2	3	4	5
Limited safe drinking water available	Some safe drinking water available	Adequate safe drinking water available to some	Adequate safe drinking water available to most	Unlimited supply of safe drinking water available to most

FACTOR 5: OPTIONS

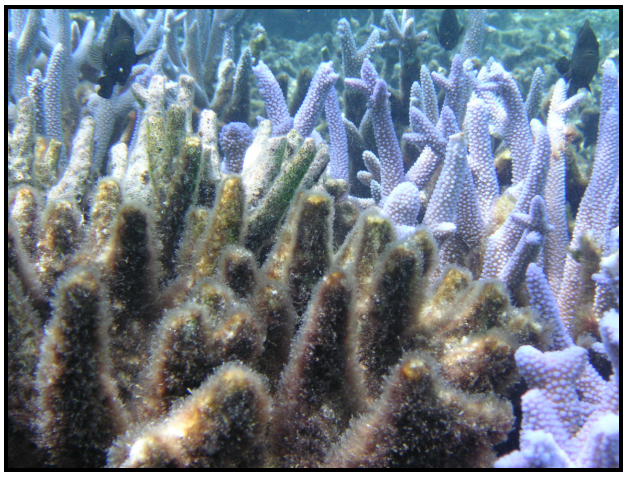
5(A) Adaptation possibilities (sector specific); 6(B) Ability to analyze information

JICA (2010) conducted an assessment of ecosystem, coastal erosion and protection/ rehabilitation of damaged area in Tuvalu. The study was conducted in Funafuti and included Lofeagai coastal area. There were damaged sites at Lofeagai that were identified by this study. The lagoon coastal area beyond BP depot towards Van Camp wreck and the ocean side coastal area.Previous studies on coastal process of Fogafale beach (Lagoon) were conducted by Rearic (1991), Radke (1985), Richmond and Howorth (1989), Carter (1986 b), Fawcett and Partners (1982), Howorth (1986), Woodward (1995) and Xue and Malologa (1995).Climate change has an impact on Lofeagai coastline and damages along the coastline are quite obvious. Plans on removing the existing cross-way are underway to improve the flow and accumulation of sand in the lagoon; sea walls are being designed and constructed to reduce wave pressure; houses are built on poles and are more elevated to reduce the impacts of storm surges and king tides.

PACC is undertaking a planned activity to build a water cistern for Lofeagai community as part of an adaptation measure towards alleviating shortage of water in Lofeagai. The initial reaction by the community would be a normal gesture of welcoming the free gift. There may be some issues around ownership and maintenance levels that need to be ironed out before the intervention begins. No doubt the intervention has positive impacts and planners should note that even with a one water cistern built it will provide additional rainwater but this may not be adequate for the current population.

CRISP has implemented a coral adaptation restoration project in the lagoon adjacent to Lofeagai around the Fetuvalu area. This would greatly boost the recovery of the reef system

in time to come and replenish recruitment of baby fish and invertebrates; if professional guidance and local expertise is continually practiced.



Subjective rating of Factor 5A

1	2	3	4	5
No technological adaptation implemented in the last decade/ 5 years	Limited technological adaptation implemented in the last decade/ 5 years	Some technological adaptation in the last decade / 5 years	Successful adoption of 1 or 2 technological options in the last decade / 5 years	Successful adoption of more than 2 technological options in the last decade / 5 years

5(C) Food acquisition options

Lofeagai residents get their food from a number of sources. Most of the food was obtained from shops and businesses. Other HH derived their food from private fishing and livestocks. They purchase fish from private fishermen. Lofeagai residents were heavily dependent on imported food stuff from shops. This poses a high risk of being affected by diseases from eating unhealthy food. The other impact was that people had to spend a lot of money in buying food from the shops.

Source	HH by Food Sources
Shop	94
Business	63
Fishermen	41
Kaupule Market	32
Funafuti Landowners	3
Private fishing	52
Private livestock	53
Private Garden	24
Neighbour	1
Extended Family	4
From islets	3
From outer islands	2
Others	1

Table 5c. HH by Food Source

Subjective rating of Factor 5C

1	2	3	4	5
very limited subsistence and no access to imports	No famine food, limited subsistence, extremely limited access to imports	little famine food, some subsistence, limited access to imports	some famine food, some subsistence, food imports available	famine food, abundant subsistence and abundant food imports available

FACTOR 6: INFORMATION/AWARENESS

6(A) Access/level of access to relevant information; 6(C) Communicated risks and importance

There is a high public awareness on critical issues such as coastal erosion, strong wind and storms, earthquake and tsunami warnings, sea level rise and droughts. Lofeagai people learn about these issues mainly from the Tuvalu Radio station.87% of HH claimed that they have access to Radio, while 41% have access to Telephone, 45% have access to mobiles and 12% have access to TV (PACC project report, 2011). What is essentially missing at Lofeagai is basic information on how to access vital information when needed. Most People at Lofeagai do not know that there was a seaframe gauge set up at the Deep Sea wharf to measure sea

level rise, wind, temperature etc. But, they are fully aware that they will get help in times of disasters.

Government organizations and others such as USP, TANGO and PACC (established in July, 2009) since then have been instrumental in educating and building capacity on the better understanding of Climate change and its implications on the people of Tuvalu. Many members of the community now have a better understanding of Climate change and the need for proper adaptation strategies.

Subjective rating of Factor 6A

1	2	3	4	5
No knowledge	Very limited knowledge	Limited knowledge	Good level of knowledge	Very good level of knowledge

FACTOR 7: HISTORY OF DEALING WITH CLIMATE STRESSES

The history of dealing with climate stress in Lofeagai is very much the same as the urban community, Funafuti. From the study conducted by PACC and USP, the following factors contributed significantly on the vulnerability of Lofeagai community to the impact of climate change:

- 74% of the 637 people at Lofeagai were non Funafuti, meaning that most of them have limited or no rights to the use of land
- There were 220 people at the Dependent Age group including 193 children aged 1-13.
- 21% of HH fell in the hardship category (poor category).
- 19% of the population was unemployed.
- 15% of HH have roof areas below $50m^2$, meaning they have limited potential to catch rainwater.
- 11% of HH have incomplete rain gutters while 6% have no rain gutters at all.
- 13% of HH have no toilet facilities.
- 7% of HH have no access to communications network.
- 9% of population has not attended any school.
- Lofeagai community does not have a community water cistern for emergencies.

- Lofeagai does not have an emergency evacuation centre.
- Lofeagai does not have a formal governance structure, except a formal church governance set up was in place.
- Coastal erosion was evident in the coastline at lagoon and ocean sides.
- Lofeagai has a total water storage capacity of 7,692KL, which is inadequate to meet the demand of the community. This volume of water will last only 4 months.

Subjective rating of Factor 7A

1	**2**	**3**	**4**	**5**
Very poor ability. Community is heavily reliant on external assistance to recover. Community has few internal preparation, coping and recovery measures in place.	Fairly poor ability Community is reliant on external assistance to recover but has a few preparation, coping and recovery measures	Fair ability. Community has a number of preparation, coping and recovery mechanisms in place. External assistance is usually required for effective recovery.	Good ability. Community has a number of effective preparation, coping and recovery mechanisms in place. External assistance is sometimes required for effective recovery.	Excellently. Community has a number of highly effective preparation, coping and recovery mechanisms in place and is largely self-reliant. External assistance is seldom required for effective recovery.