



**KAP II TA - TOR 4.1, 4.2, 4.3**

# KURIA

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Community Consultation, Risk Assessment & Adaptation,  
and Training



compiled by  
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## **Executive Summary**

A visit to Kuria Island was carried out in fulfillment of the tasks and terms of reference (TOR) of the National Consultant, Dr. Temakei Tebano, similar to the Tamana, Beru, Onotoa and Tarawaieta (North Tarawa) visits. The selection of Kuria was based on the criteria detailed in the Tamana Introductory Chapter report. The training component under Component 4.3 is integrated into Component 4.2 targeting local government community workers such as IPOs, ICWs, Social Welfare officers and representatives of small communities within village set ups.

The three-man team comprised Dr. Temakei Tebano (ThEcoCare Group and current National Consultant to KAP II for Components 4.1 and 4.2 and 4.3), Miss Erimeta Barako (Participatory Planning Officer, MISA) and Ms Titeem Auatabu (Resource Information Officer, Mineral Unit, MFMRD). Also assisting were the IPO, ICW and Social Welfare officers of Kuria Island Council. The key areas discussed fell under water, coastal erosion, reduction in natural resources and sea level rise. Adaptation strategies to overcome or reduce risks and vulnerabilities related to climate change and sea level rise were discussed during all sessions and wrapped up with a drama by the Catholic Youth Group in Tarawa.

The relocation issue, as the last resort, was discussed but the emphasis was on adapting to vulnerabilities at an island level. Details on project funding and how they can be accessed were provided by Miss Barako. Miss Auatabu presented basic information on protecting and looking after and managing our coastal areas through limiting the amount of aggregate mining to ensure surge storms have minimal impact on coastlines.

The media training component was not available for a visit, however, a DVD recording of a drama by the Catholic Youth mentioned above positively contributed to the cause and objectives of the consultation. The bulk of the three day consultation was spent on explaining the causes and factors contributing to global warming with subsequent events such as climate change and sea level rise. With these potential adaptation strategies at a village and island level were fully discussed. These were followed by documentaries on CC and SLR and other relevant videos.

A review on the contributions to the 2007 consultation from various government and private sectors were summarized by Dr. Tebano to give participants a good feeling of what were discussed then. After morning tea on each one-day session Dr. Tebano presented his factual lecture on linkages between and among systems (on power point) and emphasized that all systems are linked in many ways most of which are not understood. Destroying one system will eventually affect other immediate or farther systems sooner or later. The connectivity between and among them is through air, energy, water currents and waves, food chain, and many more. He also strongly supported biblical writings in relation to man's responsibility to care for the Earth. Presentations by Misses Auatabu and Barako completed the days' sessions.

Each presentation by team members was followed with open discussion on risks and vulnerabilities, including problems related to CC and SLR, and potential strategies taking into

account traditional knowledge and workable measures in light of the increased intensity of drought, storm surges and unpredicted bad weather.

Village representations comprised youth groups(s), women interest group(s), fishermen, and other significant groups within each village set up. The selection was done through village councilors who then consulted village elders to make the selection. Twelve villagers from each of six sectors were nominated. The sectors of Norauea and Buariki attended the first day of consultation. Bouatoa and Tabontebike attended day two while Marenanuka and Oneeke villages attended day three. Each day began at 9 am and finished between 3.30 to 4.30 pm. The number of women and men representatives was almost equal in all cases demonstrating a strong role women play in society.

Risk assessment and island profiling were done through site visits and filming. Details on the latter are dealt with by a MISA staff accompanying the team. Toward the end of each day consultation a 40-minute drama previously mentioned was screened after summing up.

Of great interest was the application of knowledge gained from morning lectures. Participants came up with clear suggestions that there is a need to reconsider how best the existing causeway in the middle of the island could be improved in light of diminishing marine resources and serious coastal erosion across the island. Dr. Tebano felt that the details of such a sensitive issue would be best left to the Kuria people to discuss in a positive manner at village Island Council levels. The Tiibi Kauntira, Mr. Tepa was present in all sessions and agreed to the suggestion.

Coastal erosion appeared to be minimal and the areas claimed to be affected seemed to have been caused by recent surge storms and natural beach movement, particularly the north-western end of Oneeke village. Water is not an issue as there is plenty of portable fresh water from ground wells used for all purposes. The wideness of both islets forming Kuria Island guaranties abundant ground water during prolonged drought periods. For how long groundwater reservoirs can sustain life on Kuria is yet to be assessed. Salt water infiltration can dramatically reduce the current potential of ground reservoirs. Rainwater is available in homes made of concrete material and aluminum roofing. These are common in Island Council and Government housing. The marine resources appear to be healthy despite of claims by fishermen that it is not as used to be. Some species of gar fish that were once were plentiful prior to the construction of a causeway had gone presumed to be associated with closure of the passage with a causeway. Bush fires and destructive land clearing activities are aggravating the impact of drought. Coconut trees and other important bushes and fruit trees are dead or are dying in hundreds if not thousands. There is some agricultural activity in terms of vegetable and piggery/poultry raising but insignificant to provide the daily balanced diet needs of Kuria people.

The level of awareness on CC and SLR on the island is low and so adaptation measures have not been thought of seriously. Hence there is a need to intensify training and consultation on CC and SLR complimented with media training in its various forms and important contributions from

government ministries. The participation of IPOs, ICWs and village representatives is an important integral part of the training to ensure that public awareness continues after the conclusion of the project. Contributions from other government sectors in the areas of engineering, water resource and biodiversity are seen crucial for project development on the outer islands on coastal protection and water resource improvement and enhancement.

## ACRONYMS

ACP	Asia-Caribbean-Pacific
AG	Attorney General
CCA	Climate Change Adaptation
CPUE	Catch per unit effort
DRCS	Digital radio concentrator system
EC	European Commission
ECD	Environment Conservation Unit
EDF	European Development Fund
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
IC	Island Council
ICT	Information Communication Technology
ICW	Island Community Worker
IPO	Island Project Officer
JSS	Junior Secondary School
KAP II	Kiribati Adaptation Project II
KCCSC	Kiribati Climate Change Steering Committee
KPC	Kiribati Protestant Church
LDC	Least developed countries
MDGs	Millenium Development Goals
MELAD	Ministry of Environment, Lands and Agricultural Development
MFMRD	Ministry of Fisheries and Marine Resources Development
MISA	Ministry of Internal and Social Affairs
MPWU	Ministry of Public Works and Utilities
MTR	Medium Term Range
SEC	Solar Energy Company
SLR	Sea Level Rise
SPC	Secretariat of Pacific Communities (formerly South Pacific Commission)
TCH	Tungaru Central Hospital
TK	Tiibi Kauntira (Chief Council)
TOR	Terms of Reference
UNCDF	United Nations Conservation Development Fund
UNDP	United Nations Development Program
USA	United States of America
WHO	World Health Organization

## **Chapter 1: INTRODUCTION**

### **1.1 Scope of the Report**

The scope of the report is more comprehensive than previous ones. This is due to a large body of information that is being collected by two accompanying staff, one from MISA and the other from MFMRD. Both staff spent a fair amount of time visiting various sites and institutions interviewing people and filming interesting scenes and objects. This report focuses on the status of natural resources and physical environments, communication and transport and the general discussion and recommendations.

Under natural resources are marine and terrestrial living resources, and non-living resources. Under the physical environment are marine, coastal and land environments. The physical structure is comprised of public and private structures. Each sub-topic is expanded and discussed in light of previous development plans, if any, as well as CCA and SLR and recommendations are suggested for further discussion.

The social and economic factors, health and cultural aspects about the island are dealt with by MISA as part of island profiling.

### **1.2 Selection Criteria**

The selection criteria are discussed fully in the Tamana Report by Tebano, *et al.*, 2008). KAP II senior management presented them in early May to the KCCSC and was approved unanimously in the July meeting.

### **1.3 Rationale of the Kuria Visit**

A visit to Kuria is similar to previous visits that aim to record and report results on discussions and observations on the island's vulnerabilities and risks in relation to climate change, climate variability and sea level rise. This exercise falls under public awareness and consultation, TOR Component 4.2 of the Consultant (Dr. Temakei Tebano) and Training Component 4.3 now under the same TOR. Kuria is the fifth island visited, others will be visited sooner or later.

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### **Itinerary**

#### **22 June, 2008:**

Left Tarawa for Kuria at 3.30pm arrived Kuria 4.20pm. Checked in at quest house, met by Clerk Rangita Nooa and Tiibi Kauntira Tebwa Mamaia. Discussed the program and logistics.

#### **23 June: 9am – 1.30 pm:**

Trained IPO Anne Mwatiota, ICW Katimmwa Uakeia and Social Welfare Tarantea Teannaki. Field trip to Oneeke checking eroded areas, photographed them and recording positions with GPS.

**24 June:**

9.30am -2.30 pm:

Consultation with village residents from Norauea and Buariki. 4.30 pm checked eroded areas, bird sanctuary, cemeteries, etc at Buariki side.

**25 June:**

Consultation with Bouatoa and Tabontebike villages – 9.30 – 3.30pm.

**26 June:**

Consultation with Marenanuka and Oneeke villages 9.30am – 3.30pm.

**27 June:**

9.30 am Visiting schools, fishermen, checking village activities, school compounds, communications, water and solar energy, health and home fuel for cooking and lighting. Afternoon field trip at Buariki to eroded and accreted areas filming and recording locations.

**28 June:**

More field trip to other claimed areas at Oneeke. Report writing.

**29 June:**

Back to Tarawa at 3.30 pm.

## 1.4 Location of Kiribati

The full text on this topic can be cited in previous similar reports on Tamana (Tebano, *et. al*, 2008), Beru (Tebano and Abeta, 2008), Onotoa (Tebano, 2008) and Tarawaieta (Tebano, 2008) (Fig. 1a).

Kuria is one of the medium sized atolls in the central Gilbert Group, by Kiribati standard, and is the sixth island visited in this KAP II outer island consultation exercise.



Figure 1a: Islands in the Gilbert Group, Kiribati.

## 1.5 History and Background

Kuria is an island in the Central Gilbert Group. It has an area of 12.3 square kilometres and a population of over a thousand. It was settled perhaps simultaneously with the rest of the islands in the Gilbert Group beginning more than two millennia ago by successive waves of migrants from Southeast Asia, Tonga, and Fiji. The first Europeans to sight the islands were the Spanish (1606). In the late 1800s many islanders were often taken against their will to work abroad.

The area now called Kiribati has been inhabited by Micronesians speaking the same Oceanic language since sometime between 3000 BC and 1300 AD. The area was not isolated; invaders from Tonga and Fiji later introduced Polynesian and Melanesian cultural aspects, respectively.

Intermarriage tended to blur cultural differences and resulted in a significant degree of cultural homogenisation.

### *Colonial era*

From the early 19th century, Western whalers, merchant vessels and slave traders visited the islands, introducing diseases and firearms. The first British settlers arrived in 1837. In 1892 the Gilbert Islands consented to become a British protectorate together with the nearby Ellice Islands. Together they became the crown colony of the Gilbert and Ellice Islands in 1916. Kiritimati (Christmas Island) became part of the colony in 1919 and the Phoenix Islands were added in 1937. They gained self-rule in 1971, and, after the Ellice Islands gained (1978) independence as Tuvalu, the remaining islands were granted independence (1979) as Kiribati (Wikipedia, 2008).

In most of the northern islands, there are several district leaders, each of whom leads a group of *kainga* (family and immediate members). On Abemama -Kuria - Aranuka one chief was recognised as paramount. The chiefly dynasty of Abemama, Kuria and Aranuka was only consolidated after the arrival of Europeans. The heads of the *kainga* were always consulted on matters affecting the community and could initiate action, but always they were obliged to seek the approval of the chief, who provided overall leadership and regulated relationships amongst the *kainga*.

Abemama, Kuria and Aranuka were united under Karotu, the *Uea* (king) of Abemama in the 1840s, after a number of battles. When Karotu was *Uea* of Abemama only, there was a rebellion against him at Kenna, the most densely populated area of Abemama. He escaped to Aranuka where he lived in a sanctuary at Kauake. On arrival at Aranuka, the Aranukans regarded him as a captive and wanted to kill him.

Ten Temea, who ruled both Kuria and Aranuka at this time, gave the order to kill Karotu. But on the last day before Karotu was to be killed, Ten Tekimai, Ten Tetabo's spy and closest advisor, told Karotu to send Nei Teaa, his beautiful wife, to collect firewood and give it to Ten Temea. Karotu sent his wife to do this, telling her to go with coconut oil and a mat. Temea saw Nei Teaa and instantly fell in love with her and later, he slept with her. This made Temea change his mind and the next morning, he called everyone to the *maneaba* and said, "I have news for you. You will not kill Karotu". Karotu's feet were washed, the club that he was going to be killed with was removed, and a large heap of food was placed in front of him. A huge feast follows. The washing of a person's feet was an act which recognized greatness and high status; the removal of the club and the feast symbolized peace and harmony between the two parties.

Temea knew that Karotu would probably try to kill him when he found out that he had slept with Nei Teaa so he escaped to Maiana. Before he left, he gave Karotu the right to rule Kuria and Aranuka. This paved the way for the unification of these three islands.

In 1878, Binoka became the *Uea*. There were opposition from outside the family and some from his own relatives, due to Binoka's cruelty and to his increasing demands for copra to pay off debts incurred when he bought a schooner. Binoka had a great interest in trade, firearms and the manufactured goods brought by traders. His needs for land increased accordingly. As his commercial plans developed, he bought a ship which he could not pay for easily unless Kuria and Aranuka were fully incorporated under his leadership. He therefore tightened his control over them and they gave him their produce. Binoka ruled with a firm hand and European technology. Binoka ruled until his death, before the arrival of Captain Davis of *Royalist* in 1892. He concentrated on trade, showing his interest in European visitors and the changes brought about by them. He consented to put his three islands under the British protectorate as the British Crown demanded from all chiefs.

#### *Independence to present day*

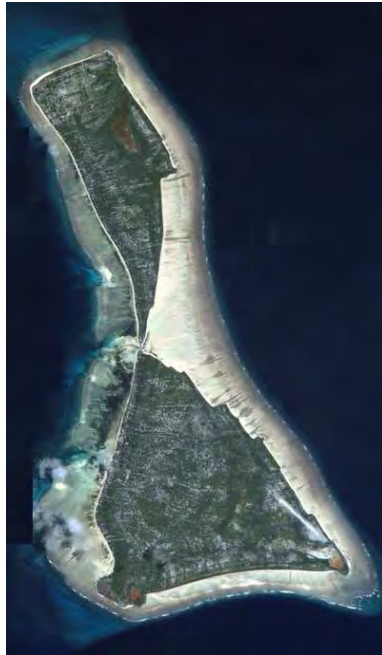
The Gilbert and Ellice Islands gained self-rule in 1971, and were separated in 1975 and granted internal self-government by Britain. In 1978 the Ellice Islands became the independent nation of Tuvalu. The Gilbert Islands became independent as Kiribati on July 12, 1979. Although the indigenous Gilbertese language name for the Gilbert Islands proper is "Tungaru", the new state chose the name "Kiribati", the Gilbertese rendition of "Gilberts", as an equivalent of the former colony to acknowledge the inclusion of Banaba, the Line Islands, and the Phoenix Islands, which were never considered part of the Gilberts chain. In the Treaty of Tarawa, signed shortly after independence and ratified in 1983, the United States relinquished all claims to the sparsely inhabited Phoenix Islands and those of the Line Islands that are part of Kiribati territory.

### **1.6 Geography**

Kuria is located in the Central Gilbert Islands in the Pacific and is part of the Republic of Kiribati. It is approximately 12.3 sq. km and lies on the Equator at 00°16.254'N, 170°23.274' E and 00°12.831'N and 170° 27.164'E (Fig. 1a).

The island is a reef island with no lagoon but had one large inter-islet reef pass between Oneeke in the north and Buariki in the south. A concrete bridge, measuring less than 30 meters, separating the two islets has replaced a coral boulder causeway of around 2 km long. Both mouths of the bridge are filling up with sand making canoeing impossible during low tide. The reef flat surrounding the island is widest at the windward side. Buariki Islet is slightly larger than

Oneeke with higher population and new villages. By Kiribati standard both islets of Kuria are wide as compared to most islands in the Gilbert Group.



*Fig. 1b: Map of Kuria Island, airstrip visible from above.*

## **1.7 Myths and Legends of Kuria Island**

The name of the island of Kuria literally means ‘almost seen on the horizon’. The legend ties in with that for Beru and other neighboring islands. Details can be cited from the writings of Sir Arthur Grimble (*Legends from the Gilbert Islands*) and Sir Harry Maude.

## **1.8 Information Collection Templates**

The templates below reflect on the approaches described above as a result of consulting with appropriate ministries, and the advice of international and regional advisors, a list of problems and vulnerabilities provided by island representatives of the first National Consultation of 2007, ranking and prioritizing them by seriousness by participants. Some modifications were made as appropriate to suit the current consultation and risk assessment on the outer islands. Risk assessment focuses on water, coastal erosion and marine resources. Physical environment and structures, and human resources are added for additional information on island profiling.

Below are the form templates (see Appendix i) to guide the recording of information in a systematic and uniform manner for all islands visited. They contain information collected from Kuria Island in the areas of risks (brackish water, coastal erosion, declining food resources, the physical environment and infrastructure, and human resources. Similar information for other islands will also be recorded.

### *Risk Assessment*

- Island Risk Assessment (*form 1.1*)
- Ranking Risks - Island Level (*form 1.2*)
- Ranking islands for risk response – National Level (*form 1.3*)

### *Island profiling*

- Island Profiling - Natural Resources (*form 2a*)
- Island Profiling – Physical Environment and Infrastructure (*form 2b*)
- Island Profiling – Human Resources (*form 2c*)
- Ranking Resources, Environment and Infrastructure –Island Level (*form 2d*)
- Ranking Resources, Environment and Infrastructure – National Level (*form 2e*)

### Island Risk Assessment *(form 1.1)*

Island [Kuria]	Vulnerability/ Risk	Hazard/ danger	Nature of disaster	Location/Site	Ranking [1=not serious; 2=serious; 3=very serious]	Proposed Adaptation measures [reactive/ preventive]	Responsible agency/ministry
Refers to islands in the Gilbert Group  [reef/raised or atoll – needs to be specified]. Number of villages to be visited, number of participants, sex, age and occupation.	Island residents identify the vulnerabilities and risks they are experiencing in light of climate change and sea level rise.  A list given during the 2007 consultation is checked against this new listing.	Causative hazard type identified	Extent and impact of disaster, who are affected, how are they affected	Identify area(s) on the island where the problem occurs – name of district or village is recorded and marked on a map. Pictures of these sites are videotaped or shot with digital camera.	Implication on urgency of response	Measures and strategies must be proposed by the communities themselves with the assistance of a consultant or members of the visiting team; reactive implies immediate practical actions to mitigate impacts (e.g. planting mangrove, seawall construction, construction of wooden embankments). These strategies are <i>reactive</i> in that they are actions taken to mitigate the effects of erosion for example; Preventive – includes warning systems, planning and regulatory measures.	Government ministries or other agencies that are involved or have similar interest in the programs/issues are identified, results of similar activities from other ministries are put together with the recent findings of KAP II outer islands reports.
<i>Kuria Island, reef island, central Gilberts; 2 main villages 10 workshop participants from each village representing all village sectors.</i>	<i>Fresh water becoming brackish day by day.</i>	<i>Drought</i>	<i>Prolonged drought with no rain for more than ten months, people are fetching water from wells further inland, fruit trees within village compound (breadfruit, fig tree, etc) are turning yellow and dying.</i>	<i>All villages along the western coastline- Oneeke, Marenanuka, Bouatoa, Buariki, Norauea, Tabontebike  Fig. 1b, 1c).</i>	<i>3 not very serious right now.</i>	<i>Proper care by covering top and seal sides at ground level</i>	<i>Ministry of Works and Public Utilities – Public Utilities Board’ Ministry of Internal and Social Affairs; Ministry of Health and Medical Services.</i>
	<i>Coastal erosion</i>	<i>King tides, storm surge and sea level rise.  [aggregate mining on the rise for more</i>	<i>Coastline at Oneeke Islet; seawalls damaged, some homes destroyed, wells contaminated with sea water, some areas eroded and plants and trees fell to the sea.</i>	<i>Oneeke and Tanginimake.</i>	<i>2</i>	<i>Law to regulate aggregate mining on the island; properly designed seawall along currently affected areas- preventive.</i>	<i>Ministry of Works and Public Utilities; MELAD, MISA.</i>

		<i>permanent structures]</i>					
	<i>Declining marine resources</i>	<i>Cool water caused by LaNina; overharvest of some fish species</i>	<i>Protein from sea may not be available for a few days in times of rough weather; malnutrition in children and adults as well</i>	<i>Residents of all villages on Kuria.</i>	2	<i>Law to regulate fishing activities and quota per effort per day - preventive</i>	<i>Ministry of Fisheries and Marine Resources Development; Office of the Attorney General.</i>
	<i>Declining terrestrial resources</i>	<i>Drought</i>	<i>Prolonged drought with no rain for more than ten months; fruit trees within village compound (breadfruit, fig tree, etc) are turning yellow and dying; brackish water cannot be used for watering purposes.</i>	<i>All over the island</i>	3	<i>Watering scheme carting soft water from further inland or use solar pump for purpose.</i>	<i>Ministry of Environment Lands and Agricultural Development; MWPU</i>
	<i>Public structure – church inundation, overtopping and flooding.</i>	<i>Close to coastline rising sea level and storm surge</i>	<i>Location of church makes it vulnerable to storm surge and coastal erosion</i>	<i>All residents of the island</i>	2	<i>The construction of a sea wall along the west coastal area at the location of the church</i>	<i>MISA, PWD</i>
	<i>Private homes wash off by storm surge and bad weather and rising sea level</i>	<i>Sea walls not high enough to protect vulnerable homes along the coastline.</i>	<i>Location of homes and material used to build sea walls</i>	<i>Those who live right on the coastal area</i>	2	<i>Relocation of homes to further inland; assistance on material for concrete and stronger and appropriate construction design</i>	<i>MISA, PWD</i>

**Ranking Risks for Action – Island Level (form 1.2)**

<b>Island</b>	<b>Risk</b>	<b>Ranking score as in form 1.1; 3 highest, 1 lowest</b>	<b>Responsible ministry/agency</b>	<b>Current status of activities</b>	<b>Timing and estimated duration of response (months)</b>
<b>Name of village and area be stated, map of site provided</b>	<b>List of risks.</b>	<b>Risk with highest score appears first, those with lowest score come last</b>	<b>Name of agency or government ministry specifies</b>	<b>Describes whether there had been similar activities carried out before or a new issues; if risk has been responded to describe status of the activities and future direction  (contact MISA and other relevant ministries)</b>	<b>This needs to be factored in with the budget or obtained from relevant agency/ministry.</b>
<i>Kuria</i>	<i>Marine resources</i>	<i>3</i>	<i>MELAD, MISA</i>		
	<i>Water</i>	<i>2</i>	<i>MWPU, MISA</i>		
	<i>Terrestrial resources</i>	<i>2</i>	<i>MWPU, MISA</i>		
	<i>Coastal erosion</i>	<i>2</i>	<i>MFMR,AG Office</i>		
	<i>Private structure</i>	<i>2</i>	<i>MISA, PWD</i>		

**Ranking islands for responses to risks – National Level (form1.3)**

<b>Island</b>	<b>Type of risk</b>	<b>Ranking score (forms 1 and 2)</b>	<b>Implementing agency/ministry</b>	<b>Partners</b>	<b>Start-up date</b>
<b>Provide island name  (and district – Gilbert northern, central, southern</b>	<b>List of risks identified for island</b>	<b>Provide corresponding ranking score</b>	<b>Provide name of agency tasked to carry out the required job</b>	<b>Provide names of agencies and funding donors in the project</b>	<b>Supply exact date of the start-up date for implementation</b>

### Island Profiling – Natural Resources (form 2a)

<b>Terrestrial/Marine Resource</b>	<b>Current Status</b>	<b>Potential cause(s) of problem</b>	<b>Action needed [low/high priority]</b>	<b>Partners</b>	<b>Cost of activity [AU\$]</b>	<b>Source of funding identified</b>
Specifies type of resource – terrestrial or marine; specifies whether fauna or flora; name resource	Refers to observed status by residents whether dying, declining, extinct, etc. Verification needed if can be done during a visit – photos and site visits	Residents' list of causes, verification needed – survey or research may be required; examine existing reports and relevant information.	Consultation, cooperation, team work, regulation, etc. Specify urgency for action	Identify partners who can assist or who are responsible [government or private]	To be determined by agency	To be identified by agency
<i>Finfish and non-finfish resources</i>	<i>Sharks depleted, others declining.</i>	<i>Overfishing, unregulated fishing, heavy harvest during spawning runs.</i>	<i>Byelaws to be set up to regulate fishing activities and protect spawning seasons; quota limits and off-seasons – high priority</i>	<i>MFMRD, OAG</i>		
<i>Water</i>	<i>Becoming brackish and contaminated with sea water – in particular in villages close to the shoreline.</i>	<i>Drought for many months, closeness of villages to coast, increasing population.</i>	<i>Inspection and island visit; low priority</i>	<i>Government, PUB</i>		
<i>Fruit trees (terrestrial)</i>	<i>Dying and scarce</i>	<i>No replanting scheme, drought</i>	<i>Replanting scheme encouraged, home gardening encouraged- high priority.</i>	<i>MELAD</i>		

**Island Profiling – Physical Environment and Infrastructures** (*form 2b*)

<b>Terrestrial/Marine Environment or infrastructures; public or private</b>	<b>Current Status and site/location</b>	<b>Potential cause(s) of problem</b>	<b>Response type required [urgent or not urgent]</b>	<b>Partners</b>	<b>Costs</b>	<b>Source of funding</b>
Specifies type of environment or structure in question – eg. Reef, lagoon, coastline, mudflat, marshland, buildings, causeways, seawalls, land reclamation, etc.	Refers to observed status by residents – damaged, dead, lost, wave over wash, etc. Verification needed if can be done during a visit – photos and site visits	Residents’ list of causes, verification needed – survey or research may be required; examine existing reports and relevant information.	Consultation, Cooperation, team work, etc. Specify urgency for action	Identify partners who can assist or who are responsible [government or private]	To be determined by agency	To be identified by
<i>Kuria Island Council - Tanginimake causeway</i>	<i>Bridge too narrow</i>	<i>Bad design and poor maintenance</i>	<i>urgent response</i>	<i>MISA, PWD, KPC</i>		
<i>Oneeke northern side and coastline</i>	<i>Storm search and king high tide over-wash</i>	<i>Unpredicted impact of CC and SLR; bad choice for village location.</i>	<i>Very urgent response.</i>	<i>MISA, MWPU, Kuria Island Council</i>		

### Island Profiling – Human Resources (*form 2c*)

<b>Population by sex</b>	<b>Age groups</b>	<b>Schools/Public utilities</b>	<b>Government/non-government paid workers</b>	<b>Major occupation</b>	<b>Production/export</b>	<b>Imports</b>
Number of males and females (2005 Census)	Schooling, non schooling, over 50 years old	Name of school (primary, secondary, jss) and number of children; name of public utilities. Types of buildings (concrete or local) within each establishment	Number belonging to each group, level of education	Apart from paid jobs	List	List
<i>see MISA report</i>						

### Ranking Resources, Environment and Infrastructure for Action – Island Level (*form 2d*)

<b>Island</b>	<b>Type of resource, environment and infrastructure</b>	<b>Ranking score (<i>Forms 2a and 2b</i>)</b>	<b>Agency/ministry for further observation and research</b>	<b>Partners</b>	<b>Start-up date</b>
Provide island name (and district – Gilbert northern, central, southern)	List of resources identified for island	Provide corresponding ranking score	Provide name of agency tasked to carry out the required job	Provide names of agencies or ministries who may be involved in the process	Supply exact date of the start-up date for the task
<i>Kuria</i>	<i>Marine</i>	<i>3</i>	<i>Fisheries</i>	<i>MFMRD</i>	<i>Not available</i>
<i>Kuria</i>	<i>Terrestrial</i>	<i>2</i>	<i>Agriculture, MELAD</i>	<i>MELAD</i>	<i>Na</i>
'	<i>Public structure - church</i>	<i>2</i>	<i>PWD</i>	<i>MWPW</i>	<i>Na</i>
'	<i>Private – sea walls</i>	<i>2</i>	<i>PWD</i>	<i>MWPW</i>	<i>Na</i>

**Ranking for Action and Implementation – National Level** *(form 2e)*

<b>Island</b>	<b>Type of resource, environment and infrastructure</b>	<b>Ranking score</b> <i>(Forms 2a and 2b)</i>	<b>Implementing agency/ministry</b>	<b>Partners</b>	<b>Start-up date</b>
Provide island name (and district – Gilbert northern, central, southern)	List of risks identified for island	Provide corresponding ranking score	Provide name of agency tasked to carry out the required job	Provide names of agencies and funding donors in the project	Supply exact date of the start-up date for implementation
Na	na	na	Na	Na	Na

## 1.9 Topography

Kuria Island is a reef island with no lagoon. Its fringing barrier reef surrounds the island all around forming protection from enormous wind and wave actions. The shoreline slightly rises from sea level to over a meter at the highest point. Ruderal vegetation is common along the coastal area with more defined vegetation into the bushland (Thaman and Tebano, 1995). The midland may be slightly higher than the coastal areas by a few centimeters while the ocean beach front is even higher as the waves keep building up the shoreline with more sand and coral debris. The windward and eastern shoreline is protected with rocky shores while the leeward western portion is mainly made up of sandy beach that gently slopes down to a reef flat that in turn connects to a reef crest and a back reef, and finally leading to a drop off and deep ocean. There are *babai* pits along the main road running through main villages but more pits can be found further inland accessible by dirt tracks surrounding the two islets.

## 1.10 Main Settlements

Figure 1c below shows the approximate location of the main villages. The northern village is Oneeke. The southern villages are under Buariki - Marenanuka, Buariki, Bouatoa, Norauea and Tabontebike. Buariki is the administrative headquarter of Kuria Island Council.



*Fig. 1c: Map of Kuria showing villages along the lagoon coastline.*

## Chapter 2: CONSULTATION FINDINGS

The findings of the Kuria consultation on the status of natural resources, coastal erosion, water resources and the marine and physical environments is a combination of data and information gathered during the five days of consultation, field observations and interviews with people of different backgrounds. Interviews were kept as informal as possible.

### 2.1 Status of Natural Resources

#### 2.1.1 Marine Living Resources

Participants claimed that the marine resources, fin-fish in particular, is not as used to be prior to the closure of the inter-islet passage separating Oneeke and Buariki. A species of gar fish known as *te anaa* (*Rhynchorhampus georgi*) had disappeared. Mullet species including *te aua* (*Valamagii* sp.), *te awai* (*Aprion* sp.), *te ikakoa* (*Aphareus* sp.), *te bukinrin* (*Pristipomoides auricilla*) and others were also abundant but now are occasionally caught. There is a general drop and loss of fin-fish resources while reef fish are still regarded as abundant. Shark populations are declining.

There is a small number of traditional canoes used for fishing purposes while the number of motorized skiffs and boats is on the increase. This translates into more efficiency and catch per unit effort (CPUE). There is also a significant number of fishing gill nets of different mesh sizes, some families own up to ten nets (Census, 2005).

Moray eel traps (Fig. 2a) are seen around homes but ciguateric moray eels and other carnivorous fish such as *te ingo* (*Lutjanus bohar*) are common in some toxic reefs. History told of no such problem prior to the blasting of a boat channel. Since the late 1980s ciguatera occurred around the boat channel. Repeated requests through the House of Parliament to rectify the problem only resulted in offering explanations that nothing can be done to solve the problem. The consultation participants also raised concerns over the issue. A response from the team advised that ciguatera is no longer a problem but a ‘blessing in disguise’ in that the toxic areas and fishes therein are the conservation areas and breeding stocks, respectively, for the sustainable fish stocks on Kuria reefs.



Fig. 2a: Moray eel traps, Kuria (photo by Erimeta Barako)

Fish species brought to land by fishermen during the one week stay on Kuria comprised the trevally species of *te aong* (*Caranx lugubris*), flying fish - *onauti* (*Cypselurus* sp.), grouper – *te kuau* (*Epinephelus* sp.) and red snapper – *aratabaa* (*Etelis* sp.) Fig 2b). Skip jack – *te ati* (*Katsuwonus pelamis*) and yellow-fin tuna – *te baibo* (*Thunnus albacore*) are caught in numbers mainly via trolling. Octopus – *te kiika* or *kao* (*Octopus* sp.) is abundant on the reefs and is occasionally fished by skin divers. Likewise, lobsters – *te nnewe* (*Panulirus* sp.) are occasionally landed however the status of their population is uncertain. Giant clams such as *te were* (*Tridacna maxima*) and *te werematai* (*T. squamosa*) are consumed but are rare while *te kima* (*Tridacna gigas*) is depleted. *Te koikoi* (*Barbatia* sp.) and other shellfish are uncommon.

During the same stay period there were no fish in the Ice Plant (Fig.2c) recently opened. Reasons given, among others, were that there was no generator for ice making to preserve local catches. There are milkfish ponds existing (about 12) but are unheard of if they ever contribute to food security at a family level.



Fig.2b: Some fish species in Kuria (photos by Erimeta Barako)

The most common preservation method practised on Kuria is salting, those who have dip-freezers powered by gasoline generators keep their catches fresh. Baking and sun-drying are unheard of. Overall, marine resources on Kuria are being heavily exploited but there is no protein shortage as far as the Kuria people are concerned. However, higher water temperatures associated with climate variability and climate change may seriously impact the living corals important for reef fish sustainability. Warmer water and a change in current patterns may also prevent pelagic fish species such as tunas from coming closer to land hence forcing fishermen to go out to sea farther. The combined effect of all these factors may have a detrimental impact on marine living resources. Adaptive measures in terms of food security must be carefully planned at a village and island level.



Fig. 2c: Kuria Ice Plant funded by JICA (photo by Erimeta Barako)

### 2.1.2 Terrestrial Living Resources

Like most other islands in Kiribati, Kuria has few terrestrial living resources. These include fruit trees, fruit plants and garden plants. Of particular importance for the sustenance of the island's population coconut, *babai*, breadfruit and pandanus, like fish, are the main staples. The most recent drought had a drastic impact not only on plants and trees but on other terrestrial animal resources as well. Of particular interest are *te mwanai* (*Cardissoma* sp.), pigs and chickens.

On Kuria *babai* (giant taro – *Cyrtosperma chamissionis*) is cultivated and utilized on special and important occasions, so as *te mai* (breadfruit – *Artocarpus* varieties) and *te tou* (pandanus – *Pandanus tectorius*) compliment the main staples when in season. Some banana (*Musa*) and papaya (*Carica papaya*) varieties and citrus fruits such as lemon and lime are also grown. Vegetable gardening for Chinese cabbage is practised but on a small scale. *Te karewe* – fresh toddy is popularly drunk but the impact of drought on coconut trees is significant. Toddy provides a daily intake of Vitamin C.

The clearing of bushes and shrubs by gang workers known as *te karoronga* is popular. The burning of coconut leaf compost and dead shrubs is also popular. These activities were witnessed during the one week stay. Acres of land had been destroyed with bush fires deliberately set or by careless deeds. The thick bushes have been cleared and replanted with coconut seedling. Pandanus is more common in villages but appeared not to be doing well away from dwellings.

The storage of coconut for future needs is not heard of, nor the harvest of pandanus to make *tuae* or *kabubu*, pandanus cake and powder, respectively. The making of *bwiro* from breadfruit for long storage purpose is not practised either. These all mean that none of the plant or tree fruits are processed for safe keeping for future use and food security. The imminent impact of prolonged droughts could be serious enough if adaptation measures are not devised soon.

In terms of land-based protein sources, pigs and chicken (Figs. 2d, 2e) are reared and raised for special occasions. While the local pig breed is fed mainly on coconut and fish shortage of these may seriously affect the number of animals available on the island. Complimentary grass feed of *mtea* (*Portulaca samoensis*), *wao* (*Boerhavia repens*) and *booi* (*Portulaca lutea*) may not be available in times of drought. Chickens are domesticated and run wild in villages. Chicken

fencing using local material was the usual practice but the declining availability of material offers no choice but letting chickens roam freely. Pigs are roped on one of the hind legs as pens are getting more and more difficult to make with coconut tree timber. The practice is uneconomical in terms of felling live and useful trees, plots of land are shrinking as they are divided amongst the offsprings.

Land crab was once abundant but the populations are going down making them less popular these days. Crab poisoning had been one of the problems faced by the Kuria people but the consultation participants claimed it does not bother them right now, however there are times when the crabs are not eaten as they cause stomach problems.



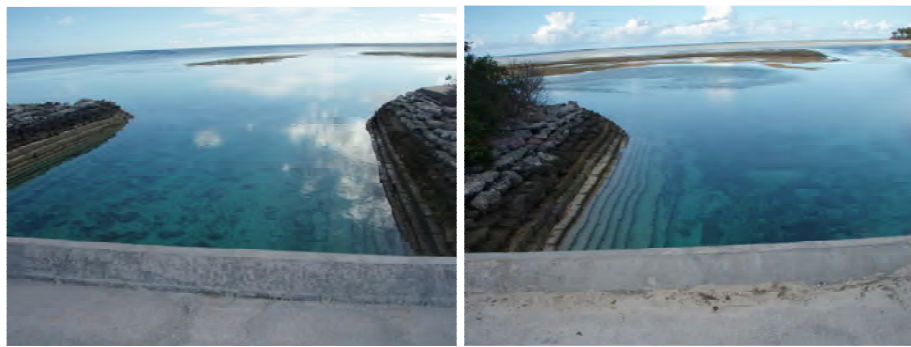
*Fig. 2d: Roaming chicken, Kuria (photo by Erimeta Barako); Fig. 2e: Piglets feeding, Kuria (photo by Erimeta Barako)*



*Fig. 2f: Bird nesting, Kuria (photo by Titeem Auatabu)*

The avifauna resource of Kuria is unique in that it is one of the rare islands where birds nest in thousands. Black noddy and white tern occupy a south-eastern portion of Buariki Islet (Fig. 2f). The birds, although small in size may provide some protein source when marine and terrestrial proteins are scarce. Their habitat must be protected by law. The birds also aid fishermen in locating schooling tuna and trevally.

It appears from information collected that the marine living resources of Kuria can sustain the current human population, however, there is a need to enhance finfish species popularly fished by putting in place management plans to meet the need of future generations. More importantly is a need to re-look at best options that may bring back those resources that are already lost as a result of some activities that are detrimental to the environment and marine resources. This refers to reopening of the existing causeway/bridge to allow water flow and exchange, and the movement of juvenile fish and other living organisms. This will also reduce coastal erosion which is a chronic environmental problem on Kuria. Observations on the current status of the existing bridge is that in five years time, if the estimates are correct, both mouths of the bridge channel will be clogged up with sand and gravel as Figure 2g below shows.



*Fig. 2g: The lagoon and ocean sides of the existing bridge, Kuria (photo by Temakei Tebano)*

### *2.1.3 Non-living resources*

Ground well water remains to be the main source of water for many purposes. Community rainwater tanks and reservoirs are few and not adequate to cater for the need of large number of people over a lengthy period of time. There are also few concrete houses with aluminum roofing except the Kuria Island Council owning more than a dozen buildings built of more long term imported material. However the number of water catchments is small, so much rain has been wasted.

Most wells, if not all, seen are open, the concrete blocks or coral boulders surrounding the outer rim are either too low or broken to stop seepage of dirty water from the surrounding. The 2005 Census showed that out of the 202 households surveyed for sources of drinking water about 200 wells were not covered, 5 were covered and about 30 water catchments were recorded. These figures must have increased over the years however it is clear from observations and surveys that there is a need to improve water system on Kuria particularly in the areas of improving the current status of wells to be properly sealed at ground level and covered as shown in Fig. 2h below; the one on the right is not looked after and contaminated with rubbish (Fig. 2h). Community water catchments need to be increased substantially in terms of more water tanks and more concrete cisterns at appropriate locations accessible by community or family members.

Alternative well sites must be identified and reserved to replace those along coastal areas prone to storm surge and sea level rise.



*Fig. 2h: Communal water system, Kuria (photo by Erimeta Barako)*

Sanitation cannot be separated from a water system as is the main cause of water pollution and contamination. While there is a substantial number of land-based toilets recorded on Kuria how well are they functioning or used is any body's guess (Fig. 2i). There is a need to properly determine the current status of the system to ensure the safety of ground water. In addition, potential ground water sites must be identified and reserved for future use as an adaptation measure in light of more frequent droughts and sea level rise.



*Fig. 2i: Atollete at junior secondary school, Kuria (photo by Erimeta Barako).*

Aggregate mining for construction work remains to be one of the contributing factors to coastal erosion. Much of construction work requiring sand and gravel is done by the Kuria Island Council. Minor construction work at a household level was noted. Reducing or controlling aggregate mining remains with the Island Council itself and its peoples. Alternative sources and a byelaw need to be identified and devised to ensure Kuria's coastline is protected from unprecedented surge and bad storms. These could also affect the quality of water in homes close to the coastline.

## **2.2 Status of the Physical Environment**

### *2.2.1 The Marine Environment*

In the context of this report the marine environment will include the sea surrounding Kuria Island, a reef and intertidal reef zone, marine fauna and flora, traditional navigation skills in relation to weather forecasting and current patterns. Other relevant issues are also discussed.

Kuria does not have a lagoon and hence is a reef island by definition. The two islets of Oneeke and Buariki, now connected with a causeway and small bridge are surrounded with a fringing reef widest at both the windward and leeward sides. Reef flats at the southern and northernmost end are narrow. The southern end of Kuria is connected to Aranuka via a submerged underwater mountain ridge called *te ora* (shallow area) which makes it an excellent fishing ground for pelagic fish, deep water bottom fish and sharks.

Species of *Porites* are ubiquitous in shallow reef flat pools and over reef crests. Branching and brain coral species are also found in pools and at buttress zone beyond a reef crest. Similarly, a turtle grass - *te keang* (*Thalassia hempricchi*) is found across the entire reef flat particularly at the leeward side and in the old passageway area.

Finfish are abundant among corals and in the open sea beyond the reefs. Sea shells and other micro-organisms, although not significant in terms of food items, occupy a range of ecological micro habitats within the entire reef system.

Of great interest is a claim by old fishermen who lament over the lessening usefulness of traditional navigation skills in terms of travelling and fishing seasons. The weather pattern has changed, that is, the southerlies come at the time of the northerlies and vice versa. The current directions also change, meaning that the timing of the eastward or landward bound current bringing pelagic fish close to the fringing reefs has also changed. This creates confusion among the fishing communities on Kuria who have to re-adjust according to the changes brought about by climate change and climate variability. New fishing grounds and new fishing seasons have to be re-discovered to ensure the families are fed.

### *2.2.2 The Coastal Environment*

This section covers the coastal environment comprising erosion, the beach, the rocky shores, aggregates and mining, the coastal strands, bushes and shrubs, rock splicing and coral boulder removal.

The observations of this visit considers coastal erosion on Kuria as not a serious problem as discussed further below. The claimed eroded areas at both Oneeke and Buariki were visited and inspected. Exact locations were recorded using a GPS. Pictures were also taken as proof of what is happening on the island. At Oneeke, there are two sites examined for accretion and erosion. At

the north western side is an accreted area which appeared to have been eroded sometime back. The beach is coming back. The approximate length is around 300 meters (Fig.j).



*Fig. 2j: Accreted north-western end of Oneeke top, bottom and left and right; Kuria, 00° 15.761'N; 173° 22.812'E (photo by Temakei Tebano)*

At the north eastern portion of the same islet, with similar length to that of the accreted area, erosion is still occurring knocking off what appears to be the first row of coastal bushes, strands and coconut trees (Fig. k).

A reconnaissance survey conducted by SOPAC in the southern and central Gilberts from 10<sup>th</sup> through 19<sup>th</sup> August 1992 included Kuria. The general finding of the survey showed that coastal erosion falls under natural and man-made causes. The natural causes included depositional spit complexes at ends of islets, along lagoon shorelines and along shorelines that form sides of inter-islet channels, seasonal and inter-annual variations in climatic and oceanographic factors are higher than normal. Man-made causes include the deleterious effects of causeway construction across inter-islet channels which have cut off the supply of sand from the ocean reef to the lagoon and re-aligned the adjacent lagoon shoreline. Other man-made causes include harbor or channel construction, dredging, creation of borrow pits close to shorelines, dredging of lagoon sediments and land reclamation.



Fig. 2k: Eroded north-eastern end of Oneeke, Kuria, 00° 15.290'N; 170° 24.216'E (photo by Temakei Tebano)

It was recommended that a complete review of the policy and design of seawall construction be undertaken, which currently is the case as far civil engineering is concerned. Possible methods to remedy coastal erosion recommended include re-opening channels closed by causeways, relocation of roads and replanting of mangroves (where appropriate) to stabilize flat areas (Gillie, 1993).

Recommendations in this report are similar to those made by SOPAC but focuses mainly on the practicality of opening up the existing causeway(s) in that it should start with constructing multiple openings with recent culvert and mini-bridge designs or replacing the existing causeways with concrete walkways allowing movements between islets during low tides only, the latter performs two functions – restores eroded coastlines and brings back the lost marine and terrestrial animal species.

### 2.2.3 The Land Environment

This section discusses the location or sites of villages in relation to storm surges and overtopping events, water issues, house gardening, land clearing practices, replanting and location of cemeteries.

Before the British colonial era individual *kaainga* (family and immediate members) lived in hamlets built on their own plot of land. When the British Crown learnt of tribal warfare between *kaingas*, mainly for the purpose of grabbing land from others as was the main wealth, all isolated hamlets were moved and erected in a chosen area which is called *te kaawa* or village. The move was to foster harmony between and among warring tribes hence creating a long and ever lasting peace among all island populations. The preferred village locations were close to the sea at the lagoon side where most fishing activities are carried out, canoes had to be put in and out of the water almost on a daily basis. Rarely villages are close to the sea at the windward side.

The choice of village locations initially was most appropriate then but in light of the current climate change, climate variability and sea level rise homes and other physical structures are at risk and vulnerable to any unprecedented storm and bad weather events.

The increase in human population requires more dwellings and homes, hence the expansion of villages. Development projects, communal or private, in the form of construction work that require aggregate mining and timber material, certainly contribute to the destruction of the environment and the land at large. Productive land shrinks as villages expand. On the islet of Buariki, four new districts have recently emerged as the population grows. Marine and terrestrial resources are constantly being tapped. Water consumption increases and the drawing of more water to meet daily requirements will affect the drinkability of ground water. Compounding these problems is drought that can seriously impact all forms of life. The relocation of many dwellings in the existing villages must be seriously considered at a home, village and Island Council level as an adaptation measure in light of the impending climate change scenarios.

The current water status on Kuria is not a serious matter as Kuria has a vast area of inland where wells can be dug out in the event of prolonged droughts and sea level rise. The storage of rainwater with tanks and concrete cisterns must be encouraged. The current capacity to hold rainwater is insignificant. While the Kuria Island Council owns a number of semi-concrete buildings with aluminum roofing a large number of catchments will suffice to provide government and island council workers with rain water for a long period of time if the thinking is made a reality. Private and communal water catchments must be encouraged.

Equally important is the improvement of the existing wells to protect them from contamination of all forms. The use of hand and solar pumps to provide village households with portable well water can further improve the standard and quality of water as it will no longer be bailed out but pumped out from a properly covered source. Potential ground water sites must be identified and protected from activities such as animal husbandry and gardening, the digging of *babai* pits and cemeteries.

House gardening on Kuria is insignificant; only less than a dozen households are engaged in the activity. Although home gardening can produce a variety of vegetables and fruits there is no ready market for it except a home consumption, this weakens the desire of many families to produce such items. The arrangement with Air Kiribati to provide a special airfreight for the produce may encourage farmers to mass produce Chinese cabbage, lemons and limes, papaya and banana.

The planting of a variety of breadfruit trees will ensure the longer fruiting season hence reducing the consumption of imported rice and flour. Similarly, the planting of pandanus varieties that are good for making *tuae* and *kabubu* must be encouraged. The storing of coconut for future needy times must also be encouraged. These habits do not exist on the island and experts from AMAK or other women groups must be involved.

Animal husbandry, in terms of swine and poultry, must form the basis of land protein availability when other sources are at stake. The agricultural activities must be strengthened to ensure all local produce can sustain the livelihood of Kuria population in times of food shortage.

Of grave concern is the land clearing habit in the forms of clearing bushes and burning compost leaving the land with no plant life except coconut trees and burned ashes (Figs. 2l, 2m). These practices must be discouraged or cut down in size to allow natural vegetation protect and cool the soil for other organisms to dwell and do their respective roles within the bush system. Burning must be done at a very minimal scale as potash obtained from ash is only required in small amounts. The compost from dead coconut leaves and other plant material must be left to accumulate and thicken in the sandy soil. Bush fire deliberately set must be heavily penalized by law and compensated. Community effort to put out bush fires is the best option as used to be prior to and post colonial times.



*Fig. 2l: Land clearing – Kuria (photo by Titeem Auatabu)*



*Fig. m: Cleared land, void of bushes and compost but with burnt ground, Buariki, Kuria (photo by Titeem Auatabu)*

A law dictating burial sites is weakening or non-existent. Village communal cemeteries were common but religion has demanded that the dead from one denomination must be buried at their own distinct cemetery. This arises from different beliefs about dead members that in some denominations those people can still be prayed for eternal salvation, hence any religious function performed for the dead by one denomination must only focus on their own church members who have passed away and not others. This results in family cemeteries near homes or on their own land. These practices may affect the quality of ground water. It is imperative that a law is

strengthened to ensure potential ground water sources are not unnecessarily contaminated or polluted with such activities.

Similarly, the dumping of rubbish (compost and plastic) on the beach is detrimental to the marine and coastal environments. Kuria was reported in 2005 that solid waste management is weak leading to environmental disaster. Proper disposal sites must be identified by the Kuria Island Council to ensure waste sites are properly utilized and co-managed.

#### *2.2.4 The Physical Structures*

This section looks at public and private structures in the context of their vulnerabilities to climate change and sea rise and how the situations can be improved through the design of appropriate adaptation strategies that can be self-contained or assisted by government.

##### *Public Structures*

The only causeway with a small bridge at the southern end of it is at Tanginim'ake. The causeway was built in the early 1980s to make travelling between the two Kuria islets easier. Prior to that period the people wanting to visit Oneeke or Buariki had to wait for a low tide to allow them walk across, others opted to cross by canoe or small boats. The construction of the causeway required material such as coral boulders, gravel and sand (Fig.n). The heavy task commenced and finished within two years. All the material had to be obtained from the surrounding areas. The reef flat areas were cleaned of massive and medium sized coral boulders piled up between the two islets. Rocks along the shoreline (Fig.o) were spliced into sizeable chunks and transported to the construction site. Bulldozers and other heavy machinery were also engaged in such a tedious and laborious undertaking.



*Fig. 2n: Coral rocks and boulders required for construction work (photos by Temakei Teban and Erimeta Barako)*



Fig. 2o: Rock boulders spliced for causeway construction or maneaba beam culvert, Kuria (photo by Temakei Tebano)



Fig. 2p: Public structures like chapels and maneabas must be located away from coastlines (photos by Erimeta Barako)

What is left now of the reef flats surrounding the island is nothing other than coral pebbles, sea-grass, algal turf and mosses. The micro-habitats for marine organisms have gone. With these gone the continuous and uninterrupted forces of current and wave actions on the coastal areas and shoreline are unabated. Aggregate mining for fillings along the causeway added to the removal of coastal protection, hence the coastlines surrounding Kuria are vulnerable to any accelerated sea level rise and extreme tides. What appropriate strategies that can mitigate the consequences from such phenomena are yet to be determined.

Most of the islands visited for this consultation or for other similar purposes noted that land reclamation is most common with church groups. If not for chapel construction it would be for a church *maneaba* or a cleric's (Minister, Priest, Pastor or other) quarter (Fig. p). Like causeways or similar structures land reclamation requires a substantial amount of aggregates but mainly rock and coral boulders to hold the structure against the forces of waves and currents. Their immediate impact is on the neighboring lands that will be eroded in no time. When natural disaster hits the coastal erosion problems will be magnified many folds. As long as these structures remain they will still be the prime catalysts of local erosion.

In a similar manner the construction of buildings for public schools also requires a substantial amount of aggregate material for brick making and other similar jobs. Clinics and dispensaries built of more permanent material and cement also require gravel and sand for their foundation and other cement work. Kuria is yet to receive aid for such buildings and the material requirement for their construction is not new. Are there any alternative materials or sites away from coastal and vulnerable areas where the aggregates can be collected? A thorough study on any potential site is urgently needed.

#### *Private Structures, Seawalls*



*Fig. 2q: Damaged seawall, (photo by Temakei Tebano)*

Seawalls and land reclamations are the two main physical structures that are taking their tolls on the physical environment on most islands visited, in particular the coastal area (Fig. q). On Kuria there were only three seawalls recorded in 2005 and that figure appears to remain the same. As Kuria is a reef island, unlike those islands with lagoons, the leeward coastline in reef islands appear to be more stable than less protected lagoon shorelines. However, the inevitable future impact of rising sea level, compounded with storm surges and unpredictable bad weather, will seriously impact not only the island's leeward area but the ocean side as well. What is required right away is the identification of those vulnerable areas, as done in this exercise, and work closely with experts in the areas of coastal erosion and processes and civil engineering to ensure appropriate structures for coastal erosion are demonstrated to the Island Council and the people of Kuria for adoption and implementation purposes. Construction designs for causeway, seawalls and other concrete structures are available at the MWPU Civil Engineering Unit.

## Chapter 3: COMMUNICATION AND TRANSPORT

### 2.2 Voice Communication, the Media

It is only in recent months that satellite telephones were installed on Kuria as part of improving voice communication on the outer islands. About a dozen telephone connections and CB radios were reported operational on Kuria and more than 100 transistor radios reported in 2005 (Census, 2005). Radio Kiribati and FM98 provide daily local, regional and world news. Weather forecasts are also broadcasted by Radio Kiribati when made available from the Meteorological Office in Betio. Local newspapers like Uekera, TeMauri, Tarakai, Newstar and Kiribati Times rarely make any impact on the outer islands. Their major markets are Betio and South Tarawa. Daily communication with Kuria via telephone or CB radio can be handy in case of unprecedented disasters caused by storm surges and seawater inundation and other similar events.

### 2.3 Road, Sea and Air Transportation

Traditional canoes on Kuria appear to be declining in number, the existing ones are not maintained or left unattended in or outside private canoe sheds (Fig.3a). Motorised skiffs and boats are taking over despite of the unparalleled increase in fuel cost.



*Fig. 3a: Traditional canoes outside shed (photo by Erimeta Barako)*

About a dozen motorized boats are operational on Kuria. These are either owned individually or communally. The impact of the latter on the marine resources could be enormous in light of a more continuous use of crafts by different gang fishers. Gang fishing is more effective than

individual household fishing as in most cases is involved in small scale commercial fishing for local market.

Sea travel is provided by several private and government vessels serving the island almost on a weekly basis. Food and other required supplies are brought in from Tarawa, local produce in terms of shark fins, copra and handicrafts are shipped to Tarawa. Air Kiribati provides air services and links between Tarawa and the outer islands as well as among islands. Air Pacific and Our Airline provide international air links while regional and privately owned container vessels bring in much needed supplies from outside the South Pacific in terms of fuel, food, machinery, construction material and others.

Motorised boats and skiffs can only bring in goods through a blasted channel from medium to large sized vessels, landing crafts serve the same purpose. Road transport is by bicycles, motor cycles (Fig. 3b) and trucks. In the case of evacuation exercises Kuria has both means one via sea and the other by air (Fig. 3b).



*Fig. 3b: Road and air transportation (photo by Titeem Auatabu)*

#### **Chapter 4: GENERAL DISCUSSION AND RECOMMENDATIONS**

Both marine and terrestrial resources of Kuria Island are adequate enough to support the current population density despite of loss of resources via human destructive activities. Yet there is a need to devise a management plan to ensure the resources are unnecessarily over-exploited. The enhancement of marine protein via milkfish farming or other mari-culture activities must be looked into. Equally important is the encouragement of local farmers to plant more fruit trees such as pandanus, *te bero*, *babai* and others to ensure local food are eaten and stored for future use in times of prolonged droughts and bad weather conditions. Traditional preservation methods must be encouraged and demonstrated to ensure the local populace is familiar with them.

Water and sanitation improvement must be one of Kuria's Island Council top priorities. Water catchment must be encouraged and potential water reservoirs are identified for future use when rain water is no longer available. Water and sanitation management must be top priorities to ensure the quality of water and a safe environment. Similarly solid waste sites away from coastal areas must be found and a waste management plan put in place.

It is inevitable that the relocation of some public and private structures be considered sooner than later as unpredictable weather patterns and the impending accelerated sea level rise are becoming more and more real. Physical structures linked to much of the coastal erosion at a local level must be re-looked at in light of their long term disastrous and irreversible impacts to land, people and the resources. Although this may be economically expensive the long term sustainability may be more beneficial to future generations.

To ensure that Kuria is linked to the whole world voice and text communications are improved. Sea and air transport are vital for emergency purposes in case of unprecedented uncontrollable disasters. The current airstrip may need to be extended and properly tar-sealed, similarly a boat channel may require widening and dredging depending on environmental impact assessment findings. Cheap sources of energy such as solar and wind must be enhanced to cut down costs on fossil fuel.

For future direction community consultation on CCA and SLR must continue and development projects in light of these must be considered as Phase 3 of KAP would focus on the practicalities of mitigating and adaptation strategies. Kuria should be poised to face the inevitable challenges brought by climate variability, climate change and sea level rise in the years to come.

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