

(Community Consultation, Risk Assessment and Island Profiling - TOR 4.1 and 4.2)

(Participatory Events and Media Strategies – TOR 1.2.2 and 1.2.3)

compiled by

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Executive Summary

A visit to Tamana Island was carried out in fulfillment of the tasks and terms of reference (TOR) of the National Consultant who was tasked to draw up two national consultations, one in 2007 and the other in 2009 (TOR 1.2.1). The former was implemented from 4th through 7th of December, 2007, the second one will be executed in early 2009. Follow up outer islands consultations, risk assessment, to include island profiling and training, would be carried out in 2008. The first outer island visit under TOR 4.1 and 4.2 was made to Tamana Island. The selection was based on a number of criteria including pilot islands of Government and ministries. Falling under a similar task is another TOR with components 1.2.2 and 1.2.3 IC4 and IC5 specifically geared toward awareness through participatory and media strategies. The training component under Component 4.3 is integrated into both tasks targeting local government community workers and representatives of small communities within village community set ups.

The three member team comprised Ms. Rosalind Kiata (a public awareness consultant responsible for activities under Component 1.2.2 and 1.2.3), Mr. Ribeta Abeta (an ECD officer responsible for CC and SLR activities and processes, MELAD) and Dr. Temakei Tebano (ThEcoCare Group and current National Consultant to KAP II for Components 4.1 and 4.2). The key areas discussed during the visit fell under water, coastal erosion and natural resources. Adaptation strategies to overcome or reduce risks and vulnerabilities related to climate change and sea level rise were discussed in an informal manner during and toward the end of the consultation.

Because the team had to conduct two basic consultation approaches, a workshop on participatory/ media and information delivery, and the other on risk assessment and informal discussion on risks and vulnerabilities, each of the three days allocated were split into morning and afternoon sessions. The first part of the morning session was dedicated to training in all aspects of CC and SLR. This was followed with a participatory media workshop led by Ms. Kiata (TOR 1.2.2; 1.2.3) while the afternoon session was devoted mainly to informal discussion and risk/vulnerability identification and assessment led by Mr. Abeta and Dr. Tebano. Documentaries on CC and SLR, community cooperation to mitigate climate change impacts and other relevant videos were used. The number of participants for each village was twenty five based on the media workshop requirement. Those selected represented village youth groups(s), women interest group(s), fishermen, and other significant groups within each village. The selection was done through a village organizing committee that is basically responsible for village welfare and other commitments. The remaining residents, although were invited to the afternoon sessions appeared to rely on the representations made, only those who have much interest in aspects of CC and SLR bothered to turn up. Among the selected participants were the TK, IPO and ICW who were the local counterparts previously trained at the first national consultation in 2007, visited villages on their return to discuss the same issues raised during the consultation.

The southern village first consulted was Bakarawa. The second being Bakaka (middle village) and the third (northern) village was Barebuka. The representatives from each of the three villages were enthusiastic and energetic. The age of the participants ranged from 21 to less than 60 years old. About three quarters of the participants in all villages were females. The men were out fishing or doing other chores, female population on the island is generally greater than men. Shortage of fish at this time of the year and for the reasons briefly discussed below catching fish for a family is paramount.

Activities within the media workshop varied between potential adaptation measures and making the public aware of risks and vulnerabilities related to CC and SLR through various ways including radio news, posters, drama and songs. It was clear from the performance of the participants that their media workshop had given them much understanding and awareness on whichever aspects of CC and SLR they were informed about by the Chief Councilor, Island Project Officer and Island Community worker in previous months, and at the opening of each consultation preceding the media workshop.

The consultation proper, risk assessment and island profiling that followed in the afternoon focused on discussing issues on the causes of CC and SLR that were presented prior to the media workshops. Other DVDs of documentaries most relevant to CC concepts and real life solving problems, such as water shortage in Kukuit - Kenya, Africa were screened. The most interesting observation was that participants admitted that the concepts and issues on CC and SLR discussed and demonstrated were new to them or even better in their own words *'we still do not believe that these things are happening and we really have not thought of how to respond to them'*. There was a consensus that the residents of Tamana are slowly experiencing brackish water in some villages as all villages lie close to the shoreline. The fruit trees are dying (bread-fruit – *mai*, fig tree – *te bero*) and others. Coconut and pandanus trees are turning brown with poor fruits or fruits fallen off immaturely.

Coastal erosion was also discussed as one the problems (2007 Consultation Report), the sites were identified and checked. The amazing findings were that those affected sites and areas appeared to have or are suffering from aggregate mining. Truck tire tracks were visible at all sites. Heaps of gravel and sand brought to villages for *maneaba* or play courts construction are testimonies of much of human activities that are accelerating local effects.

On marine resources the team had been feeding on skip jack tuna (yellow-fin is rare), octopus and reef fish. There was no fresh flying fish or shark meat seen on any of the workshop lunch tables. Fishermen claim that the last time they had flying fish was two or more months ago. The two spawning runs had been the best harvest times they ever had in months. Shark fishers who were allowed to operate motorized skiffs but only to fish outside of the 10 mile EEZ for yellow-fin tuna and shark have stopped because for the last few months they had not caught enough sharks to pay for the cost of fuel and loan repayment. Reef fish is also scarce.

The issue of relocation within and beyond Kiribati never surfaced as residents are still trying to grapple with their current new experiences and information that are so new to them, mainly sea level rise and global warming. Relocation within the island from a coastline to further inland in case of serious coastal erosion was mentioned but not seriously discussed as land ownership where villages are currently situated may become a complex issue on the island. The issue was left with the Chief Councilor to take up the matter to Island Council meeting.

KAP II and the team have high expectation on the level of awareness on CC and SLR on the island, in light of previous workshops and consultations attended by same or similar officials from each respective island council. Radio programs and local newspapers' news and advertisements have constantly put over the air. Despite of these few potential solutions to immediate problems and vulnerabilities were discussed, advice was offered by the team. The most pressing issues are fisheries and terrestrial plant resources. For each particular fish species identified as threatened all fishing activities on that particular fish, especially during spawning runs, must cease for three days or whichever experts think. The fishermen themselves, in consultation with the Island Council and the Ministry of Fisheries and Marine Resources Development, can initiate the strategy and enforce it before it is made into law as they had done before when they forbade pressure lamps and other effective fishing methods.

On terrestrial resources, fruit trees within village compounds in particular, the obvious strategy is to organize a watering scheme (group or individual households). Home gardening needs to be encouraged. This is left with each village and the agricultural officer on the island to organize.

On water problems, hardness in particular, there was discussion on relocating houses further inland close to a fresh water lens or embark on a communal water scheme where they dig a well further inland and draw good quality portable water from there using handcarts or physically (or using solar pump) pumping water to an overhead tank carried to a village with piping system. Sharing a well amongst residents was also discussed. The water issue is becoming a problem as wells closest to shore are becoming brackish. Those wells that are being affected with hardness are not more than twenty meters from a beach front.

As far as the team is concerned with all the physical evidences they collected, coastal erosion as reported does not seem to have significant impacts on the villages along the coastline itself. It appears that some coastlines around the island are a little bit higher than those lagoon islands. The eroded areas either do not have coral boulders on the adjacent reef flat or along the beach front as they were have been removed to clear the reef flat areas for fishing canoes paddling in and out day and night, or rocks are crow-bared and cut into sizeable dimensions for *maneaba* and house caviars. All of the wells inspected are within five meters or more deep, hence the island coastal area is well above sea level.

Resources that need urgent attention are terrestrial and marine. Both technical and professional advices are required to ensure that these resources are enhanced and properly managed within the

constraints linked to climate change and sea level rise. A Kiribati Protestant church needs to be protected as well as private sea walls in the face of potential storm surges and sea level rise. Water resources and coastal erosion also need to be looked into.

For future outer island visits, in light of the enormous information gathered from Tamana Island and for effective awareness on CC and SLR as the Tamana experience and the Survey Team results pointed at, very little knowledge and awareness on these important issues, as well as to allow outer islands residents to continue thinking of adaptation measures to reduce or counter potential risks and vulnerabilities, it is highly recommended:

1. that there should be more media workshops on other smaller islands such as Makin in the north and Kuria in the central, and one or two bigger islands;
2. that the filming of these workshops is necessary in that the videos can be shown on other islands where the media workshops are not staged;
3. consultation and public awareness on the causes of global warming be strengthened by including at least one official who is versed on aspects of CC and SLR and global warming in general, and supported by relevant videos and DVDs;
4. that this same person in 3 above (or from other ministries of similar caliber) accompanies the outer island visiting team to at least one of each island from the south, central and northern islands, eg. Beru or Onotoa (south), Kuria or Aranuka (central) and Makin (northern).
5. a maximum number of participants from each village be limited to between fifteen and twenty with representations from the youth sector, women, fishermen, church groups, etc. in consultation with a Clerk to the Island Council.
6. a video camera and a good digital camera are a must, the pictures shot can be used for many purposes to promote KAP II.
7. it may be more manageable to take two to three villages in a day by transporting participants from one village to a neighboring village, hence reducing transport costs and having more time spent on consultation than travelling from one village to another.
8. that the Island Council Clerks, IPO's and other Island Council Officials are included in all aspects of consultations, trainings, awareness and training, etc carried out at individual islands
9. at the end of visit they (IC Clerks,IPO,etc) are equipped with tasks to continue the training of locals (spread the gospel) and actively involve in all adaptation strategies developed for each island
10. A GPS is provided to obtain a near to accurate position of vulnerabilities/risks identified at each island for proper documentation

ACRONYMS

ACP	Asia-Caribbean-Pacific
AG	Attorney General
CC	Climate Change
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
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 Councilor)
TOR	Terms of Reference
UNCDF	United Nations Conservation Development Fund
UNDP	United Nations Development Program
USA	United States of America
WHO	World Health Organization

Itinerary

28th February, 2008.

10 am: Depart Tarawa for Tamana, arrive Tamana 3pm, met the Clerk, Island Project Officer (IPO) and Island Community Worker (ICW). Paid truck hire and accommodation charges for one week.

29th February

9 am: Arrived at Bakarawa village *maneaba* at 9.30; 25 representatives were already seated. The team arrived with the Chief Councilor, IPO and ICW. One of the participants stood up and gave a short welcome to the team and IC staff and requested that the team and their IC counterparts have tea. Then the Chief Councilor gave an opening speech, greeting the participants and the team members from Tarawa. He then passed on the floor to the chairperson who then passed on the program proper to the team members. Dr. Temakei Tebano gave a short greeting and introduction of his colleagues and the proposed program for the day. He expressed the conduct of the program that Mr. Ribeta Abeta will talk about climate change and sea level rise in general to give participants some idea of the purpose of our visit. He reiterated that Ms Rosalind Kiata started off the day with a 3-hour media workshop training on CC public awareness and strategies about climate change and sea level rise. Ms Kiata was joined in around lunch time by the remaining team members, Dr. Temakei Tebano (KAP II national Consultant) and Mr. Riiibeta Abeta (Climate Change and Sea Level Rise Officer, Environment and Conservation Division of Ministry of Environment Lands and Agricultural Development). The four groups with different tasks relating to media usage and information disbursement presented their strategies after which lunch was served.

1.30 pm: There were more video shows on climate change filmed by a Japanese and Kiribati couple followed by an African film on one of the villages in Kenya that struggles to mitigate water shortage as one of the vulnerabilities caused by climate change. There was some informal discussion on the vulnerabilities that the villagers have identified. These included water, coastal erosion, withering fruit trees and plants, diminishing fish stocks and relocation away from coastal area. The Chief Councilor wrapped up the afternoon session with a saying 'that we have the responsibility to look after the earth and everything in it, and faith with no action is dead while faith with actions is blessed. The day's consultation ended around 2.30 pm with no specific solutions and that the participants in the presence of the CC promised to revisit their own vulnerabilities and risks start thinking about strategies and actions to reduce or counter them, they will consult the Island Council in matters beyond their reach.

1st March

The day being Saturday was used for site visits around the island. Pictures of badly affected coastal areas were taken. Villages, schools and an island medical care clinic were visited, wells were inspected. Agricultural activities and other village activities were observed.

2nd March

The day being Sunday was a rest day and the team members spent most of the day resting or visiting their friends and families.

3rd March

Consultation with Bakaka community. Same program as for Barebuka. Constructive discussion on issues mentioned above.

4th March

Consultation with Barebuka community. Similar program as for the above villages. Very constructive discussion on issues discussed in previous villages. Lots of questions were asked on fish spawning and how spawning runs may be protected. There was some mention on ban on fishing flying fish during spawning periods (2-3 days) and that a bylaw needs to be drawn up. The same management plan will be applied to other fish (sharks, octopi, tuna , etc.).

5th March

There was nothing planned for the day but some visits were made to affected sites. Lunch with the Island Councilors was arranged by the Councilors themselves through the Clerk who relayed the message to team members. Lunch was served at 12 noon and followed by more informal discussion on climate change and sea level rise, fisheries problems and coastal erosion. Drought was also discussed to some length and it seems that the councilors are well versed with drought related problems and potential strategies to counter problems on drinking water quality (becoming brackish), dying fruit trees and dust from vehicles and road dust. The team made informal discussion on matters relating to above and advised that the Island Council contacts appropriate ministries to help them make their own decisions and take proper course of action.

6th March

The flight back to Tarawa was cancelled and was to be replaced the following day.

7th March

Back to Tarawa, depart Tamana at 2 pm, arrive Tarawa at 4 pm.

Chapter 1: INTRODUCTION

1.1 Scope of the Report

This report is intended to serve various purposes including island profiling, but due to time, personnel and financial constraints on this particular assignment, island profiling would only focus mainly on the physical environment and those aspects that are most related to climate change and variability, sea level rise and adaptation strategies. A review of some past activities carried out on Tamana and other islands visited will be reviewed to ensure that the most pertinent actions on any particular aspect of previous developments related to risks and vulnerabilities identified under this task are taken to the fore for appropriate action by respective ministries of Government.

1.2 Location of Kiribati

Kiribati consists of three main island groups scattered over 3 million km² of the Central Pacific, between latitudes 4° N and 3° S, and longitudes 172° E and 157° W. The total land area is 810.8 km², comprising 33 low-lying coral islands, 10 of which are coral atolls (Figure 1a). The Gilbert Island group consists of 17 islands (including Banaba) with a total land area of 285.7 km². Tarawa Atoll, in the Gilbert group and the location of the capital, consists of more than 20 named islets, the southern six of which are linked by causeways. The distance between Tarawa and outer islands in the Gilbert group ranges between 51 km and 600 km (Thaman and Tebano, 1995).

The Phoenix Island group consists of 8 largely uninhabited islands with a total land area of just 28.6 km² located some 1 750 km east of Tarawa. The only inhabited island of the Phoenix group is Kanton (Canton) Island with the land area of 9 km². The Line Island group consists of 8 islands with a total land area of 496.5 km², extending over a north-south distance of 2 100 km, located at a distance of between 3 280 and 4 210 km east of Tarawa, and some 800 km south of Hawaii. This group includes the largest island in Kiribati, Kiritimati, having an area of 388.4 km². Most of the islands are not more than 2 km wide, or more than 6 m above sea level, except Banaba in the Gilbert group which rises about 87 m above mean sea level. The depth of water wells in most cases varies from 0.5 m to 3.0 m (Thaman and Tebano).

Tamana Island is one of the smallest islands in the southern Gilbert Group and is the first island visited in this KAP II outer island consultation exercise. It is also one of Kiribati Government's pilot islands for its various projects.



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

1.3 Rationale of the Tamana Visit

A visit to Tamana was a follow up from the 2007 National Consultation held at the Otintaai Hotel from 4th to 7th December, 2007. The visit was intended to consolidate the consultation’s island reports on their vulnerabilities and risks in relation to climate change, climate variability and sea level rise. This is also part of a public awareness and risk assessment under the TOR (Components 4.1, 4.2) of the Consultant (Dr. Temakei Tebano) and a collaborative effort with other Kiribati Government ministries to gather and compile reports on island profiles hence giving Government a clear picture of major factors affecting the island and what status its various resources are at. The selection of islands to be visited is based on government pilot island projects, among which Tamana, North Tarawa and Makin (refer to Selection Criteria, Tables 1a and 1b). The visits are envisaged to assist Government respond appropriately to events likely to endanger or impact the daily livelihood of Tamana and other islands’ residents.

Covered under the same visit was another TOR for a National TA for Participatory Events and Media Strategies for CCA Information and Awareness contract (KAP II Components 1.2.2, 1.2.3 IC4 and IC5). The assignment was taken up by Ms Rosalind Kiata, a media expert from FSP-Kiribati. Both programs complement each other in terms of training and participatory risk assessment and are expected to give a significant impact on the Tamana communities in terms of better and greater understanding and awareness on global climate change, climate variability and sea level rise.

The visit was planned according to criteria without any precedence. Islands with more problems in terms of coastal erosion, declining marine resources linked to physical structures such as sea walls and causeways and seriously affected terrestrial resources such as *babai* are given highest priority. The initial

number of islands to be visited was between five and eight but it was suggested, with the advice of an international advisor, Dr. Tim O'meara and the national consultation participants, that most if not all outer islands be visited to give them support and advice on appropriate strategies to counter or adapt to the impacts of climate change and sea level rise.

The selection of islands for consultation visit is based on the following criteria:

1. The December 2007 evaluation and recommendation requested that all islands are visited.
2. Dr. Tim O'Meara (the international advisor) also supported the 'all islands be visited' concept.
3. Government of Kiribati MISA pilot islands are Tamana (south), North Tarawa (central) and Makin (island profile – northern) – the pattern appears to be –southern district, northern district and central district.
4. In the KAP II preliminary selection, the basis is all of the above, plus:
 - An island has the highest problems to include water, coastal erosion, natural resources (marine /terrestrial) – south, central and northern, based on 2007 risk/vulnerability listing summarized in the Consultation report – represents island morphology and geographical location (refer to Table 1a- Selection Criteria; Table 1b – Ranking Score) below.

Table 1a: Selection Criteria

ISLAND	DISTRICT: NORTHERN CENTRAL SOUTHERN	GOVT PILOT ISLAND (KAP I)	OUTER ISLAND PROFILING	CORAL REEF AND MONITORING	COASTAL EROSION & INFRASTRUCTRE [SEAWALLS/CAUSEWAYS]	ENVIRONMENTAL MARINE PROBLEMS	MARINE RESOURCE PROBLEMS	TERRESTRIAL RESOURCE PROBLEMS	WATER	SCORING
Makin	√ N		√√		√			√√	√	6
Butaritari	√N			√	√		√	√√	√	6
Marakei	VN						√	√	√	3
Abaiang	√N			√	√				√	3
Tarawaieta	√C	√√√		√√	√	√	√	√	√	10
Tarawa-Inano	HQ			√	√	√	√	√	√	6
Maiana	√C				√		√	√	√	4
Kuria	√C				√		√	√	√	4
Aranuka	√C				√		√	√	√	4
Abemama	√C				√		√	√	√	4
Nonouti	√C				√		√	√	√	4
Tabiteuea Nth	√S				√		√	√	√	4
Tabiteuea South	√S				√		√	√	√	4
Onotoa	√S				√	√√	√	√	√	6
Beru	√S				√	√√	√	√	√	6
Nikunau	√S				√		√	√	√	4
Tamana	√S	√√√			√		√	√	√	7
Arorae	√S				√		√	√	√	4

Table 1b: Ranking Scores

ISLAND	RANKING SCORE	VISIT NUMBER
South Tarawa	10	1
Tamana	7	1
Tarawaiaeta	6	1
Onotoa	6	1
Beru	6	1
Makin	6	1
Butaritari	5	2
Maiana	4	2
Kuria	4	2
Tabiteuea South	4	3
Aranuka	4	3
Arorae	4	3
Abaiang	4	4
Abemama	4	4
Nonouti	4	4
Tabiteuea North	4	4
Nikunau	4	4
Marakei	3	4

1.4 History and Background

The name of the island of Tamana literally means 'his/her father. The origin of the name goes back to Asia and Africa and even South America where there are place names of 'Tamana' or similar names. In some myths 'Tamana' means 'a stronghold or strong place, or original settlement'. Perhaps tracking back the origin of the word may implicate the origin of the first inhabitants of Kiribati. Around the Pacific region, the word 'tamana' refers to thy father or his/her father with the same spelling. In China 'tamana' is referred to as a knight or warrior. For the Tamana people the name of their island reflects the manhood and masculine of the islanders to gather food (fishing, cutting toddy, etc). It is man's land where lazy people cannot survive. Men fish almost every day when the weather permits, women do women chores, cultivate *babai*, weave mats and house thatches on top of looking after children at home. The men wake up around five in the morning, cut toddy, then take their canoes to the sea for fishing trips using paddles only, they come home before noon with a catch, do men's chores and start cutting toddy around 3 in the afternoon when they go out to fish again. The family salt or bake-cook the fish for long keeping in times of rough weather.

Tamana is the smallest island in the Southern Gilbert Group. The islands of the Gilbert Group were settled beginning more than two millenia 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 islands were administered (1892–1916) with the Ellice Islands as a British protectorate that became (1916) the British Gilbert and Ellice Islands colony. 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. The first waves of Protestant missionaries from overseas that brought in their Samoan pastors had landed first on the islands of Arorae (southernmost) and Tamana. Ever since, Protestantism is the only denomination on both islands (Wikipedia).

Tamana has an area of 4.9 square kilometres and a population of less than 1,000. It does not have a lagoon like most islands in the group, hence is a reef island. The island is located 2°30'S 175°59'E (Thaman and Tebano, 1993). There are three villages, the northern village is Barebuka, central is Bakaka and southern is Barakarawa. Because of increasing island population there are also isolated hamlets away from the main villages. The Island Council station is in the village of Bakaka and both Primary and Junior Secondary schools are at Bakaka Village, these are located further inland where most of the Island Council businesses operate. The only medical dispensary on the island is at the ocean side of Bakaka Village. A newly constructed clinic, donated by European Union in partnership with Kiribati Government, has just been completed and staffed by a medical assistant and a nurse.

Other denominations, besides Kiribati Protestant Church (KPC), are discouraged and it is a grave offence to discredit or speak of other religions apart from KPC. Missionaries set up shop in the

1850s and began saving 'Gilbertese' souls by banning their naughty dances and telling them to stop fornicating and indulging in other forms of pleasure. The Americans and British were interested in the region (the Reverend Hiram Bingham was a Yankee and the first missionary to live there), but by 1917 the American Board of Commissioners for Foreign Missions agreed to withdraw in the face of successful proselytising by the London Missionary Society and aggressive land grabs by the Crown (Britanica Concise Encyclopedia: Kiribati, 2004).

1.5 Literature Review on Previous Projects

Previous reports on various aspects of development within Kiribati indicated that there had been projects conducted on the island in the past years with the involvement of different international agencies. These included among others fisheries, water and sanitation, solar energy, communication, education, social studies and health.

1.5.1 Fisheries Sector

Phase I of the SPC Drop Line:

Tamana was among the four islands that were visited in 1997 by a master fishermen from Secretariat of South Pacific Communities in Noumea, New Caledonia for the conduction of training in deep-bottom fishing techniques for fishermen unfamiliar with the method, and to conduct survey fishing to determine the extent of deep-bottom grounds and stocks at Tarawa and four outer islands, Abaiang, Abemama, Tamana and Arorae. In conjunction with these activities, the Master Fisherman was to evaluate the suitability of local canoe designs and advise on their appropriate fitting out to participate in the deep-bottom fishery, and to assess the potential economic viability of the fishery (Republic of Kiribati and European Commission Joint Annual Report, 2004).

Existing fisheries subsistence fisheries of great diversity are widely practiced, reflecting the I Kiribati reliance on their marine environment and its resources, an affinity common among Pacific territories with only little arable land. Trolling offshore and within the lagoons by sail or outboard- powered craft, shallow-water droplining, gill-netting, hand harvesting of the reef flats, spear-fishing and '*kabara*' or mid-water handlining are all widely conducted. On Tamana and Arorae motorized crafts were not permitted but that has changed since 2004 allowing motorized crafts to fish outside the 10 EEZ for sharks and yellow fin tuna only.

1.5.2 Social Science Study

Doctor Ueantabo Neemia-McKenzie visited Tamana, Abemama, Butaritari and Kiritimati in late 2003 through 2004. He asked the people about the changes that they had experienced in the last 30 years. He found that most people no longer go barefoot since the ground is too warm, coconuts dry faster and coconut oil is no longer useful as a salve since it now melts off their skin. The temperatures has increased and bad weather is more frequent and stronger (Republic of Kiribati and European Commission Joint Annual Report, 2004).

1.5.3 Water System

Water consumption rates, determined by the Water Unit for planning purposes only, range from 30 litres per capita per day in rural areas to 50 l per capita per day in urban areas, based upon consumption rates for cooking and drinking water supply only. People are encouraged to use alternate sources of water (rainwater and groundwater in the vicinity of the village) for sanitary and other purposes (Republic of Kiribati and European Commission Joint Annual Report, 2004).

Prior to the on-going UNDP/UNCDF Project, eleven villages had been provided with solar powered water supply systems; namely, two villages on Tabiteuea North Island were provided with a solar powered water supply system using funds provided by the Norwegian Government, seven villages on Nikunau Island were provided with a solar powered water supply system using funds provided in part (for solar pumps only) by the South Pacific Commission, one village on Arorae Island was provided with a solar powered water supply system using funds provided by the Save the Children Foundation, and one village on Tamana Island (presumably Bakarawa) was provided with a solar powered water supply system using funds provided by the United Nations Development Programme (UNDP). Of these, the seven villages on Nikunau Island had previously been supplied with pumped water using a windmill-powered system installed in the 1960s using funds provided by the World Health Organization (WHO). The windmill pumps were subsequently replaced or supplemented with solar-powered systems installed using funds provided by the South Pacific Commission (SPC). Two other windmill systems remain operational; namely, one windmill in a village on Arorae Island, and one in a village on Tabiteuea South (installed originally by WHO and later rehabilitated by the Public Works Division using funds provided by the Government of Australia). The windmill pumps last about twenty years with proper maintenance, and, hence, most are near the end of their useful life. Few windmill pumps installed in the late 1960s are working today, and most are being replaced with solar pump systems, installed during the UNDP/UNCDF project, which perform as well as, or better than, the wind-powered systems. The only problem that is very often encountered with the solar systems is that of a broken belt, but this can be fixed by the Island Council plumber (Republic of Kiribati and European Commission Joint Report, 2004).

1.5.4 Communication

Government sees a need to concentrate on improving the basic ICT infrastructure first, considering the poor telecommunications link now linking the scattered islands, and Government envisaged to slowly develop the Kiribati Outer Islands Telecommunications Development Plan, using the recovered Digital Radio Concentrator System (DRCS) equipment provided free of charge by TELSTRA to provide the local access network. Telecommunications is a capital-intensive industry and Kiribati. Like any other Least Developed Countries (LDCs), still rely heavily on aid-funds for developing its basic ICT infrastructure. A Satellite terminal + switch + cable has been installed on Tamana as part of improving communication between and among

islands in the group (Republic of Kiribati and European Commission Joint Annual Report, 2004).

1.5.5 Education

Tamana had a primary school only since the colonial era and less than a dozen pre-schools on the island up to 2002. Between late 2003 to early 2004 a junior secondary school (JSS) taking in classes 7 – 9 from primary school was added (Digest of Education Statistics, 2005).

1.5.6 Energy (Solar Energy for Outer Islands 8 ACP KI 2)

Kiribati relies heavily on imported fossil fuels for its commercial and transportation energy needs, but many problems are faced by the energy sector. Diesel generators supply electricity to most of the urban centers like Tarawa. For the outer islands, however, where there is no regular supply of fuel for generators, solar photovoltaic technology has been promoted. Importing fossil fuels for energy generation has been putting an increasing strain on the economy of Kiribati, while the technical expertise and infrastructure needed to utilize the resources better are lacking.

The use of alternative, renewable energy sources will help to offset future dependence on imports and contribute to the overall aim of achieving the maximum degree of energy independence, while providing opportunities for development primarily in the rural sector. Tamana is deriving some benefits through the use of clean energy source, solar energy, provided by the Solar Energy Company. The project was started in early 2004 and continues till these days. One in four families on Tamana has access to a solar lighting that also benefits the children studying at home and the family in particular when doing other household chores at night time.

Implemented by a state owned enterprise, Solar Energy Company (SEC) and supported by technical assistance from a European based consultancy firm this project successfully installed 1,700 solar home units across 12 islands in 2004. As such 20% of homes on outer islands have a solar home system improving the living standards of many of the poorest households in Kiribati.

This project started slowly due to tendering difficulties and a 12 month extension of the financing agreement was requested in 2004 and granted early 2005. This will enable the installation of solar home units in community meeting places to be completed and issues affecting sustainability of SEC to be addressed. The EDF Monitoring Mission in July 2004 reported that the quality of project results were good in terms of impact, training and installations. It highlighted concerns regarding sustainability of SEC noting three factors; the tariff level charged to customers, collection of the tariff and quality of the maintenance which has a direct impact on the collection level.

The tariff level is set by Government and users currently pay a monthly fee of AUD \$9.00. It has been calculated that a monthly fee of AUD \$14.00 is required to cover SEC's operational costs. SEC would still require additional money for new solar systems and for replacing the solar panels and supporting structures. An Evaluation on a previous EDF funded project undertaken in 1999 and a project survey carried out in 2004 estimated that a tariff level of AUD \$12.00 per month would be affordable. Alternatively, by doubling the number of solar systems on outer islands and ensuring a minimum of 90% collection, the tariff could remain at AUD \$9.00 as SEC's operational costs would reduce per system. Renewable energy is a non focal sector of 9 EDF and although no funds have been allocated, decommitted funds from closed projects would most usefully be recommitted to purchase additional solar systems. There is no Government Energy Policy in place and solar energy is currently not used on the main island of South Tarawa (Republic of Kiribati and European Commission Joint Annual Report, 2004).

1.5.7 Health (Improvement of Health Services on the Outer Islands)

The Financing Agreement was signed by the European Commission in December 2004 and by the Government of Kiribati in April 2005. During the long planning and programming period all involved personnel from the key stakeholders have changed. The project is aimed at developing primary health care systems and facilities; however the Government of Kiribati has indicated that the project should take account its new growth centre policy one aspect of which is the development of a second hospital on the Southern Gilbert island of North Tabiteuea and overall development of Christmas Island. The Government is keen to see activity take place on the outer islands in the project's first year especially the construction of clinics and dispensaries. At project start-up it will be important to apply the lessons learnt from the Kiribati Training Programme including ensuing management roles and functions within government and other stakeholders are clearly defined (Republic of Kiribati and European Commission Joint Annual Report, 2004).

This project directly aims at making progress towards achieving a number of the Millennium Development Goals. The MTR verifiable indicator of 'number of health facilities improved' could be modified to reflect directly the MDGs addressed by the project, in particular child mortality which is monitored in Kiribati by the Ministry of Health and WHO. Tamana Island is one of the beneficiaries among other islands. A newly completed dispensary was opened last year (2007) with water catchments and a solar-operated pump.

1.6 Outer Islands Consultation – TOR Component 4.1

Aim: To outreach village and grassroots communities on the rural outer islands to informally assess their potential risks and vulnerabilities related to climate change and sea level rise; to assist in the training of local government personnel to allow them continue with community consultation, and to integrate CC and SLR portfolios into island profiling.

Assumption:

After numerous workshops, trainings and other similar exercises, the outer islands communities are well versed with issues on CC and SLR and that they are in the process of identifying their own risks and vulnerabilities with practical adaptation measures for the immediate, medium and long term scenarios. This assumption was based on the many consultations, workshops, trainings that have been carried out in previous years by various ministries such as MELAD, MWPU, MFMRD and KAP which involved outer island participants (Island Council/Government employees) who are expected to go back to their respective islands and communities and pass on the knowledge and skills they have gained.

This is all hypothetical, to say the least. Preliminary results of the Survey Team show that there is very little information or awareness on CC and SLR in the rural communities. My latest visits to two outer islands confirm that claim, meaning that all the effort and money put in those activities bore no fruits – wasted.

Expected Outputs:

1. The risks and vulnerabilities in light of CC and SLR are fully understood and discussed openly by participants.
 2. Risks and vulnerabilities are listed.
 3. Adaptation measures are listed and informally discussed.
 4. Problem areas are identified and partners, in case of tasks beyond the local communities, are identified.
 5. Local government personnel are adequately trained to continue with community consultation and training on CC and SLR
 6. Verbal/written evaluation of the consultation.
-

1.7 Methodology/Approach

Planning Process

Seek advice from Island Councils (IC) and Ministry of Internal and Social Affairs (MISA) on how the consultations could be conducted, cost of services, hire of vehicles and other equipment – help in budgeting

Consult other ministries for possible input to the Consultation.

Consultation Proper

Should be based on the informal ‘bottom-up approach’ where:

- A good proportion of villagers participate [adults members only]
 - No cultural status to dominate, that is, youth, women and all members of society are treated as equal.
 - Vulnerabilities and risks identified by island residents are informally discussed and documented.
 - Adaptation measures are discussed and partners identified.
 - Other information on resources, projects, etc, for the purpose of country profiling is sought from participants and government ministries.
 - Survey of villages and other sites of interest are to be made, photos taken where seen appropriate.
 - Report back to KAP II and recommend any changes to the approach.
-

Training of local government personnel (Component 4.3)

This component, although is not under the current TOR of the Consultant, is being incorporated into the consultation planning for outer islands. Targeted under this training component are Island Project Officers (IPO), Island Community Workers (ICW) and Tiibi Kauntira (TK - Chief Councilors); included under the training and consultation are representatives from various village groupings such as youth, women, fisher-folks, church groups, village groups and other recognized groups within a village and island set up. The training involves lectures on all aspects of CC and SLR, group work on risks and vulnerabilities being identified through informal discussion, with adaptation measures and strategies. Video documentaries clarifying main

concepts and aspects of CC and SLR, real life pictures on storms affecting Kiribati and other Pacific islands are used.

1.8 Team Work

In order to provide maximum benefit to the rural audience, a combined program taking into account of the requirements of assignments of respective consultants is important, hence individual approaches need to be blended and a new program worked out.

First Visit

Prior to visiting Tamana Island, various ministries were contacted to determine if they were prepared to participate and contribute, in which case how their contribution are going to affect the overall program. Two ministries responded and a preparatory planning meeting was convened, with approval of the Manager and Coordinator.

The meeting was held and chaired by Dr. Temakei Tebano. In attendance were Dr. Timothy O'Meara, Ms Kabure Yee-ting (MFMRD – Mineral Unit), Mr. Riibeta Abeta (CC & SLR Officer, MELAD) and Ms Rosalind Kiata (KAP II Consultant on Media and Public Awareness).

The participating ministries clarified that they did not have specific programs and would go along with whichever program is agreed on. The requirement of the Media/Public Awareness Component was a workshop while the other was informal discussion on the issues discussed above. It was agreed that a brief clarification on CC and SLR will open up the sessions followed by the Media Workshop (all morning, 9-12.30). Informal discussion will be in the afternoon; team members can be part of the workshop and contribute in areas falling under their ministerial domain.

1.9 Observation at Tamana Island.

In the Executive Summary of the Tamana Report, it was stressed that awareness on CC and SLR is minimal if not non-existent. Residents are still grabbling with trying to understand what is all happening now. There are extreme and frequent events such as heavy rains and droughts, bad storms and extreme high tides, declining natural living resources, coastal erosion and brackish water. The actual situation is that there had not been any form of communication or community consultation effective enough to change the state of thinking and behavior to realize the importance of adapting to the impact of CC and SLR.

1.9.1 Imminence to modify the approach

Having felt and realized the problem at an island level, the visiting team thought and suggested that the next visits focus more on community awareness in the areas of: causes of global warming; impact of climate change and sea level rise on small islands like Kiribati; the need to

think about adaptation measures to reduce risks and vulnerabilities from such phenomena. These thoughts were communicated to KAP II Office and acted on accordingly.

1.10 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 Tamana 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 [Tamana]	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>Tamana Island, reef island, second farthest in the southern Gilberts; 3 main villages25 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, Barebuka, Bakaka and Bakarawa (refer to map of Tamana, Fig. 3)</i>	<i>2 –serious if the rains do not come in another 6 months or longer.</i>	<i>Freshwater sources from further inland are tapped with the use of solar pumps for overhead tanks - reactive</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</i>	<i>Seawalls damaged, some homes destroyed, wells contaminated with sea water, some areas eroded and plants and trees fell to the sea.</i>	<i>Southern village of Bakaraw [refer to map of Tamana- Fig. 3] also refer to photos from the island.</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>rise for more 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 Tamana</i>	<i>2</i>	<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>	<i>3</i>	<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 and wash off</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>	<i>2</i>	<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>	<i>2</i>	<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)

Island	Risk	Ranking score as in form 1.1; 3 highest, 1 lowest	Responsible ministry/agency	Current status of activities	Timing and estimated duration of response (months)
Name of village and area be stated, map of site provided	List of risks.	Risk with highest score appears first, those with lowest score come last	Name of agency or government ministry specifies	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)	This needs to be factored in with the budget or obtained from relevant agency/ministry.
<i>Tamana</i>	<i>Terrestrial resources</i>	<i>3</i>	<i>MELAD, MISA</i>		
	<i>Water</i>	<i>2</i>	<i>MWPU, MISA</i>		
	<i>Coastal erosion</i>	<i>2</i>	<i>MWPU, MISA</i>		
	<i>Marine resources</i>	<i>2</i>	<i>MFMR,AG Office</i>		
	<i>Public structure</i>	<i>2</i>	<i>MISA, PWD</i>		
	<i>Private structure</i>	<i>2</i>	<i>MISA, PWD</i>		

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

Island	Type of risk	Ranking score (forms 1 and 2)	Implementing agency/ministry	Partners	Start-up date
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

Island Profiling – Natural Resources (form 2a)

Terrestrial/Marine Resource	Current Status	Potential cause(s) of problem	Action needed [low/high priority]	Partners	Cost of activity [AU\$]	Source of funding identified
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>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>Finfish and non-finfish resources</i>	<i>Sharks and flying fish 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>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)

Terrestrial/Marine Environment or infrastructures; public or private	Current Status and site/location	Potential cause(s) of problem	Response type required [urgent or not urgent]	Partners	Costs	Source of funding
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>KPC Church</i>	<i>Old and less than 50 meters from highest tide mark</i>	<i>Site selection</i>	<i>urgent response</i>	<i>MISA, PWD, KPC</i>		
<i>Sea walls</i>	<i>Old, design not proper, not high enough, on edge of beach</i>	<i>Site selection for dwelling</i>	<i>Not urgent</i>	<i>MISA, PWD</i>		

Island Profiling – Human Resources (form 2c)

Population by sex	Age groups	Schools/Public utilities	Government/non-government paid workers	Major occupation	Production/export	Imports
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
408, 477	3-21, 40+	<i>Margret Field, Nawai JSS</i>	<i>around 50 government and island council</i>	<i>fishing, toddy cutting, weaving and cutting copra</i>	<i>copra, shark fin, handicraft</i>	<i>food items, machinery and fuel</i>

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

Island	Type of resource, environment and infrastructure	Ranking score (<i>Forms 2a and 2b</i>)	Agency/ministry for further observation and research	Partners	Start-up date
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>Tamana</i>	<i>Terrestrial</i>	<i>3</i>	<i>Agriculture, MELAD</i>	<i>MELAD</i>	<i>Na</i>
“	<i>Marine</i>	<i>2</i>	<i>Fisheries</i>	<i>MFMRD</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*)

Island	Type of resource, environment and infrastructure	Ranking score (<i>Forms 2a and 2b</i>)	Implementing agency/ministry	Partners	Start-up date
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

1.11 Topography

Tamana Island is a raised limestone island with no lagoon. Its fringing reef surrounds the island and thus protecting it from being easily washed off by gale storms and surges. The shoreline slightly rises from sea level to over a metre as the highest point. Ruderal vegetation is common along the coastal area with more defined vegetation into the bushland. Most of the western coastal area is dotted with settlements leaving the southern end with lush vegetation and the northern end with a domestic airfield (Thaman and Tebano, 1995).



Figure 1b: Aerial photo of Tamana Island

1.12 Main Settlements

Figure 1c below shows the location of the main villages, other settlements and establishments within the island's geographical location.

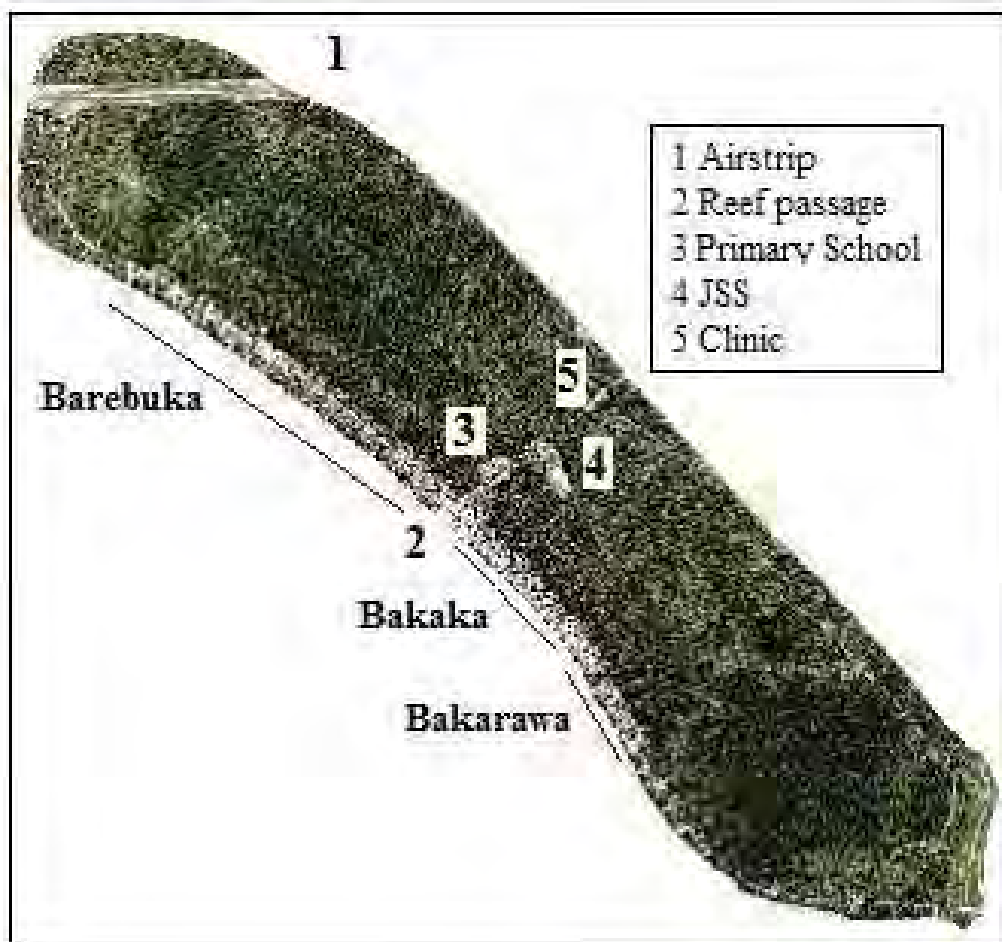


Fig. 1c: Map of Tamana showing villages along the south-west coastline; primary and junior secondary schools are in the middle of the island while a new medical clinic is further toward the ocean side; an airstrip is visible at the northern end; the main road runs through the villages and toward either end of the island. (Map was kindly provided by the Mineral Unit of the Ministry of Fisheries and Marine Resources Development, Government of Kiribati).

Chapter 2: CONSULTATION FINDINGS

2.1 Status of Natural and Human Resources

Like most other atolls and raised islands in Kiribati, Tamana has few resources. Of particular importance for the sustenance of the island's population coconut and fish are the main staples. Without overstressed marine and scarce terrestrial land resources Tamana people will find it difficult to cope with their harsh environment especially at this particular point in time when prolonged drought and high temperatures are taking their tolls on all forms of life. People are finding themselves toiling in the sun for shorter hours as compared to ten or more years ago.

Babai (giant taro – *Cyrtosperma chamissionis*) is utilized on special and important occasions only, while *te mai* (breadfruit – *Artocarpus* varieties) and *te tou* (pandanus – *Pandanus tectorius*) form the main staples when in season which normally sets around September to March (beginning of low sun or rainy season till beginning of high sun or dry season). Some banana (*Musa*) and papaya (*Carica papaya*) varieties and citrus fruits such as lemon and lime are also grown but the porous sandy soil makes agriculture difficult hence composting and the use of natural fertilizers such as pig and chicken manure helps sustain the cultivation of Chinese cabbage and other vegetables.

2.1.1 Marine Resources

Flying fish and shark are declared overfished by the Tamana fishermen (*form s1.1; 1.2*). The consultation participants, with a good proportion of fishermen, claimed that flying fish had not shown up for the last six months. Similarly, shark fishers stop fishing outside of the 10 mile EEZ using motorized skiffs. Three families made loans for their shark fishing gear and motorized skiff with the aim to exploit shark fin for Asian lucrative markets. Words went around the island saying that the loans have not been paid up for the last few months.

Tamana lacks most sessile and benthic edible organism that lagoon islands have. Shellfish of major subsistence and commercial importance on lagoon islands include *te koumara* (*Gafrarium pectinatum*), *te koikoi* (Saguin clam - *Asaphis violescens*), *te katura* (*Spirula spirula*), *te bun* (*Anadara holoserica*) and the gastropod *te nouo* (*Strombus luhuanus*). *Te kiika* (*Octopus species*) and *te nnewe* (*Panulirus sp.*) populations on the outer reef edge are declining in numbers, as well as other arthropod and crustacean. Mangroves do not grow on the island and so mangrove crab and shrimp are nonexistent. Mantis shrimp or *te waro* (*Mantis sp.*) which is common in lagoon islands are not found on Tamana. Giant clams – *te kima* or *aubunga* (*Tridacna gigas*) and the smaller species, *te were* (*T. maxima*, *T. squamosa*) are depleted. Lobsters are still caught in numbers at night but the population has drastically gone down due to high demand from hotels and motels on Tarawa.

There are no edible sea-grass such as *Caulerpa racemosa* (*te kureebe*) seen on the island reefs, most probably out of season at the time of investigation. However, *Holothuria atra* (*te nautonga*) is quite abundant on the reef flat from lower beach mark right to a reef crest at both the leeward and windward sides. Residents have no idea of the organism being edible.

Tamana Island representatives claimed during the December 2007 consultation that among other urgent issues the scarceness of their marine resources require urgent attention as they touch the daily lives of all Tamana residents (Tebano, 2007). Among other reasons given was the impact of increasing water temperature that is causing fish by avoiding warmer coastal waters hence fishermen have to go farther into the ocean on their man-powered paddling canoes. Corals are showing signs of stress and attract fewer fish. The presumed impact of climate change in terms of warmer water is yet to be checked, however, the more obvious direct impact of humans and fishermen in terms of excessive fishing cannot be overlooked. The unregulated amount of catch landed per day per family compounds the problem of over-stressing resources.

A contradictory observation by spear fishers and octopus gatherers claimed that the water off the reef is cooler than before and they are not staying in the water as they used to. This claim appears to be more plausible in that LaNina brings in cool winds and subsequent water surface and near surface most accessible by divers. The former claim must have been misleading to the cause of declining fish stocks on the island.

Demand for fish resources (dried and salted fish in particular) from relatives on Tarawa (the capital island) put pressure on the Tamana fishermen to catch more fish. Shark dried skin (locally known as *te uakun*) is also a favorite for the islanders. Hence more resilient fishermen stay out in the open water to catch more fish for domestic and relatives' requirements.

Tamana Island is one of the leading examples in the Gilbert Group whereby the use of modern and unsustainable fishing gears and equipment such as electric and pressure lights, gill nets and motorized skiffs are banned. Recently, the introduction of powered skiffs to fish sharks in the 10 mile EEZ has led the shark population dropped enormously that fishermen are no longer fishing for them, expenses in terms of fuel and bait are unbearable and uneconomical.

With the exception of some higher islands, there remains a strong dependence on marine resources to meet daily needs of many Pacific families – providing foods, tool, transport, and waste disposal. This may be slowly weakening in certain areas with the increase in international trade, but it remains a fundamental characteristic of the smaller atoll-dominated Pacific Island countries such as Kiribati.

2.1.2 Terrestrial Plant Resources

The natural terrestrial vegetation types found on Tamana are limited to coastal strands vegetation, small strands of inland forest. Secondary and cultural vegetation types include *te nii* (*Cocos nucifera*) coconut-palm-dominated agricultural lands, including *babai* pits, houseyard and village gardens, areas of ruderal vegetation. There is little (or none at all) natural inland forest, almost all of it has been replaced by coconut plantations or cleared for schools, dwellings and other purposes. Papayas and some varieties of pandanus are grown within or along the edge of a compound, so as breadfruit varieties. Decorative flower plants and vegetable gardens are common around homes.

Prolonged droughts are affecting vegetation in many ways, most significantly coconut trees, breadfruit and pandanus trees, the major fruit trees on the island (*forms 1.1; 1.2*). It was reported during the December 2007 consultation mentioned above that all kinds of trees and plants are dying, coconut trees in particular. The watering of houseyard plants and trees was not reported and it is assumed the impact of drought compounds the neglect of residents leaving plants and trees to the cruelty of the sun.

2.1.3 Agricultural Land Resources

Since the western coastline is occupied by villages the central part of the island is grown with coconut, pandanus and *babai*. This is also the most productive part of the island where a huge reservoir of fresh water lens lies (Fig. 3). The coastal area is convenient for various reasons including fishing, bathing and defecation.

Fragility of ecosystems is often compounded by their small size. Limited land resources make many terrestrial and near shore resources, including freshwater, vulnerable to over exploitation and pollution from poorly planned waste disposal. Limited land resources have become especially troubling for low lying atolls, in view of the projected rates of sea level rise over the next 50-100 years.

2.1.4 Animals Resources

Domesticated pigs and chickens provide *meat* on special occasions. Dogs also provide a hearty meal and are becoming popular in *maneaba* gatherings. Cats are kept as pets and rats are still a problem on the island. Coconut crabs are plentiful in *babai* pits, these are a delicacy to the islanders. Avifauna includes white and black terns, black noddy and occasional visits by frigate birds and herons. Geckos and lizards are common in homes, so as other smaller and inconspicuous animals such as ants and bugs.

2.1.5 Minerals/Water Resources

Kiribati is naturally endowed with several types of mineral resources. These range from terrestrial minerals such as phosphate and gypsum to offshore cobalt-rich crusts and manganese nodules in the country's EEZ. In the period 1900-1979, phosphate mining was undertaken in Banaba. This ceased in 1979 after the major deposits of fossilised sea-bird guano became exhausted. However, there are still a few un-mined areas on the island. Recently mining companies have shown an interest in mining this remaining phosphate on Kiribati. Tamana has no guano of its own being a reef island unlike Banaba.

The other terrestrial and coastal resources include sand, coral, gravel and limestone aggregate that are feeding into the upsurge in construction activities. This is true for Tamana and the rest of the islands in Kiribati. The only obvious underground resource on Tamana, common to all islands apart from top soil, is underground water. Tamana has a vast reservoir of fresh water with densest lens in

the middle of the island (refer to Fig. 1b). A portion of midland is occupied by schools (primary and junior secondary) and some island council offices and quarters.

Private and community water catchments are few and only last two or three months at most. Most wells (private and public) are not properly maintained or properly looked after to avoid contamination. Because all three main villages on the island are located along the western coastline wells are only a few meters away from the breaking waves (*forms 1.1; 1.2*). The quality of water in terms of its drinkability decreases with time. Fresh water replenishment from rain that penetrates into the porous sandy soil and into the reservoir has not been happening for a long time (estimated from early 2007).

One village on Tamana Island (presumably Bakarawa) was provided with a solar powered water supply system using funds provided by the United Nations Development Programme (UNDP) in the early 1960s. Similar projects followed but there are signs of discontinuation in the supply of portable water drawn with solar pump. Pipes remain visibly half buried but nothing comes out of them.

Many wells in Bakarawa village are affected; some are no longer used for drinking purposes. Hamlets outside of the village toward the southern end are facing a difficult time but are coping by fetching drinking water from neighbors' wells or from further inland. Other villages, Barebuka and Bakaka are coping. Most houses have no or only one 5,000 L plastic tanks which have been empty for many months.

All households are dependent on well water for all purposes such as drinking, washing and agriculture. Over 100 wells are open, that is, uncovered while around 80 are covered (Fig. 2a). Very few have more than two tanks. Concrete catchments are not maintained and most of them are abandoned and replaced with plastic tanks (Fig. 2b, 1c). Most development plans are pivotal on the availability of fresh water. Clean water and proper sanitation enhance the health and productivity of the work force and have particular implications for the children and future generations.

The availability of water has been a long-standing problem throughout Kiribati. Natural sources of permanent potable water are limited to groundwater in freshwater lenses. These freshwater lenses are floating on the higher-density seawater beneath the atolls. They are highly vulnerable due to loss of land and inundation resulting from climate change. Other sources of water include hand-pump wells, roof catchments and galleries. Groundwater resources in Kiribati are commonly contaminated from human and other solid wastes. This arises from rapid population growth and urbanization, inadequate use of proper toilet facilities and lack of infrastructure in the sanitation sector. Due to the shallow water tables, seepage of waste into the fragile groundwater system is a common occurrence in Kiribati.

As a result, there is a need to assist with water and sanitation problems in Kiribati in south Tarawa and the rural outer islands on the following issues:

- development of policy and legislation;
- water sector action plans for Kiribati;
- undertaking of pilot projects, research and feasibility studies to address water and sanitation issues;
- improvement of infrastructure within the water and sanitation sector, eg. proper maintenance of toilets;
- climate change adaptation including leakage control, water conservation and development of alternative sources of water.

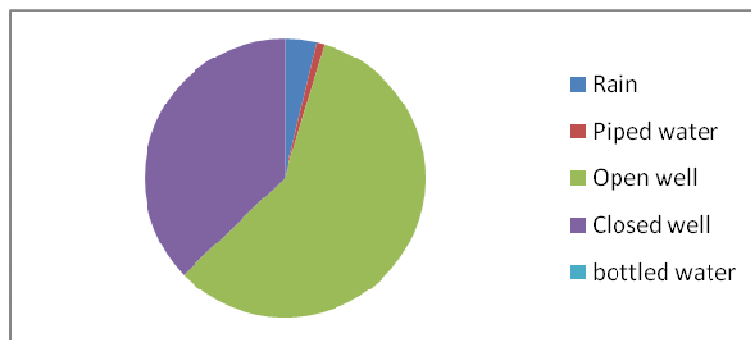


Figure 2a: Proportion of sources of drinking water



Fig. 2b-: Abandoned concrete water catchment



Fig. 2c: Plastic water catchment

2.1.6 Energy

Kiribati relies heavily on imported fossil fuels for its commercial and transportation energy needs, but many problems are faced by the energy sector. Diesel generators supply electricity to most of the urban centers like Tarawa. For the outer islands, however, where there is no regular supply of fuel for generators, solar photovoltaic technology has been promoted. Importing fossil fuels for energy generation has been putting an increasing strain on the economy of Kiribati, while the technical expertise and infrastructure needed to utilise the resources better are lacking.

The use of alternative, renewable energy sources will help to offset future dependence on imports and contribute to the overall aim of achieving the maximum degree of energy independence, while providing opportunities for development primarily in the rural sector.

Biomass plays an important role for domestic purposes such as cooking in the outer islands and for most families in South Tarawa. Timber products including coconut palms constitute the biomass resources in Kiribati. Increasing population and the overexploitation of fuel-wood has resulted in the loss of suitable supplies. On Betio, fuel-wood has to be purchased to meet the growing demand.

One alternative source of energy, wind power, is used for pumping water. However, due to problems of maintaining the equipment, it is not utilised for any other purpose. Photovoltaic systems have also been installed in rural homes.

Electricity generated via solar units for family households are increasing in number and one in three families would have a solar lighting system costing around \$9 a month. Other appliances connected to a solar system would cost more. This is a continuation of the solar project that began in late 2003 through 2004. Village and individual generators are also available for *maneaba* and household lighting and for other purposes (Fig.2d).

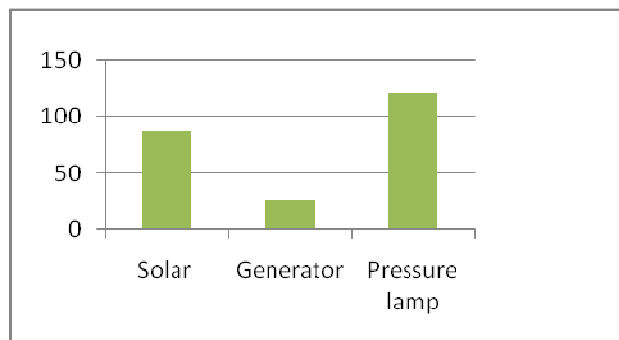


Fig. 2d: Sources of energy and lighting

2.1.7 Human Resources

The total number of people on Tamana in 2005 was less than 1,000 individuals, was recorded as 875 (2005 Census). Of this number 825 were of I-Kiribati origin, 44 were of mixed origin while 2 were expatriates (Figure 2e; form 2c). It appears that since 1968 up to 1990 the population growth has been steady to around 1,400. As of 1995 Census the population steadily declined from 1,800 to 870. The decline is expected over the years (Fig. 2f). The reason undermining the trend can be attributed to student movement to other islands especially at the high school and tertiary levels, seamen working on foreign merchant ships, and a general urban migration looking for employment at Tarawa or beyond.

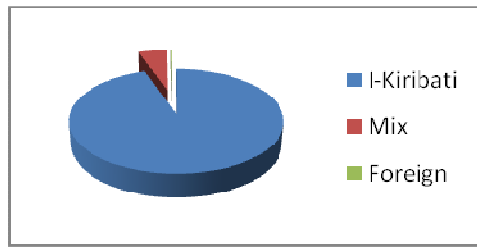


Fig. 2e: Composition of Tamana population

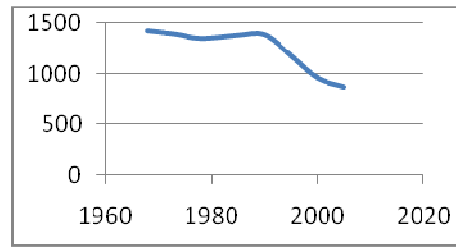


Fig. 2f: Population trend

Of significant interest is the dominant number of females on the island. Out of the total number of 875, more than half of the population (467) is female; the remaining (408) is male (*form 2c*). The dominance of women population has been on the island for many years and the trend appears to continue in a similar direction.

The negative growth rate between 2000 and 2005 was calculated to 1.9%; was 4.1% between 1995 and 2000. This trend is expected to slow down over the years. Life expectancy is over 70 years and women dominate in this age group. Overall only 5% of total population on Tamana would reach the age of 70 which is still lower than most developed countries.

Chapter 3: SOCIAL SERVICES AND ECONOMICS

3.1 Social Services

Items falling under this sub-heading are education, health, sanitation, transport and communication.

3.1.1 Education

Formal education on Tamana is in the forms of pre-school, primary and junior secondary (JSS) (Forms 1, 2 and 3). By late 2000 to early 2003 all islands in Kiribati had one JSS which automatically absorb primary school leavers and preparing them to senior secondary or technical schools. The largest proportions of children are engaged in these educational institutions. Children between 2 to 5 years go to pre-schools, those aged 6 to 9 attend primary and continue to junior secondary at ages between 10 and 14 (Fig. 3a). This forms one of the highest age groups within Tamana population. The post-school age group may begin as early as 18 if they did not continue to senior secondary and tertiary levels, the dominant age group on the island (Census 2005).

The 2005 Digest of Education Statistics showed that there were 166 children enrolled at the Tamana Margaret Field Primary School with 7 registered teachers. Out of that number were 97 males and 69 females. The Nawai Junior Secondary School admitted 59 students with 6 registered teachers; the proportion of males to females is 29 to 30. Similar enrolment numbers are expected for the following years as far as unconfirmed official records. Those who passed entry into senior secondary schools have to migrate to South Tarawa or other islands within the Gilbert Group where government and private schools are situated. Continuation into tertiary education may require settling in South Tarawa or travelling to countries outside of Kiribati. Tamana had produced a number of professionals in the academic and medical circles.

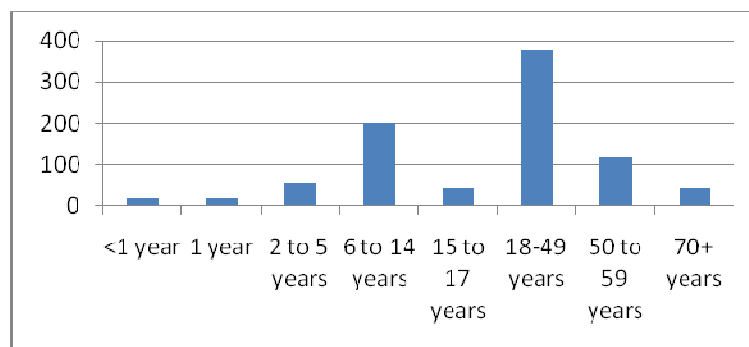


Fig. 3a: Broad age groups

3.1.2 Health

Tamana people are considered healthy by Kiribati standard as residents need to be active in order to survive the harsh environment, the scarceness of terrestrial and marine food sources. Alcohol consumption is banned and so the population concentrates more on food collection and daily house

chores. Less than half of the adult population smokes, men have to paddle their canoes to fishing grounds which indirectly keeps them healthy.

Kiribati Central Hospital, situated at Nawerewere, revealed that non-communicable diseases such as diabetes and hypertension exist among age groups of between 44 and 65 on the island of Tamana and two other neighboring islands, Onotoa and Beru (Fig. 3b-1 and b-2). Apart from hereditary causes a change in diet and lifestyle in which the consumption of imported food items exceeds traditional foods, and coupled with little exercise, is the main culprit (Tebano – Teriboriki 2008 pers. comm.). The adoption of a cash economy which is the backbone of trade is the driving force behind all of these changes. Warmer days force people to do less outdoor activities and exercises; brackish water consumed by people increases the level of salt in the body fluid hence contributes to hypertension.

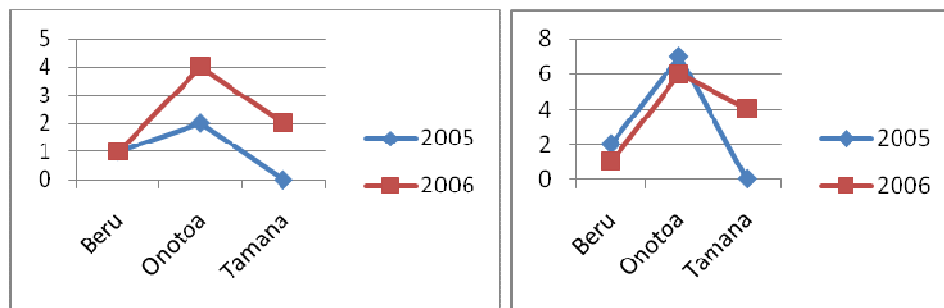


Fig.3b: 1- diabetes cases; 2 – hypertension cases

Cultural upbringing where little vegetable and fruits are consumed also contributes to the earlier onset of diabetes in many adult populations. Fresh and semi-fermented toddy are the readily available sources of Vitamin C and A, respectively, but sugar is easier to obtain; a local fruit *Morinda citrifolia* (*te non*) and other wild plants are now rarely consumed. Papaya, bananas and citrus fruits (lemon and lime) which are also good sources of vitamins are rarely planted on the island despite their availability from the Agricultural Unit on the island. Chinese cabbage grows well in compost soil but also rarely grown as it requires daily watering and attention.

3.1.3 Sanitation

A significant number of households still rely on the beach and bush for sanitation purposes. Although there are a variety of toilet designs available on the island the habit of open toileting still remains (2005 Census). A substantial number of land toilets are operational and village welfare groups still encourage residents to adopt one of the affordable designs. A latrine that uses little water for flushing is most common. The figure below (Fig. 3c) depicts the proportion of toilet designs currently operational on the island.

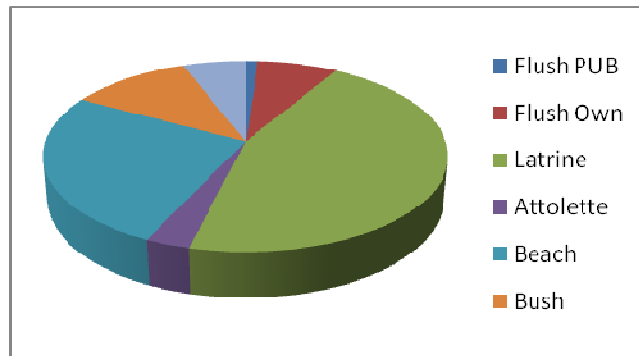


Figure 3c: Types of toilets available on Tamana

3.1.4 Culture and Lifestyle

The people of Tamana are neither poor nor rich by world standard, however residents are healthy and active. A day cannot go by without any form of gathering, it could be either a birthday gathering, wedding, welcoming or farewelling someone (mainly family members and visitors) and name them. Kindness and friendliness are known to be cradled on Tamana Island. Openness and humor add to the gentle and lovely nature of the islanders. Residents live a subsistence living and make some cash through selling fish, copra and shark fins, or receive remittances from relatives working abroad or on Tarawa. Those who work for the Island Council receive small salaries in comparison with those working as senior officials in government ministries or private companies. Entrepreneurship in retailing shops privately or village owned is becoming popular as imported food items are becoming part of daily living. The use of alcohol is prohibited by island rule purported by old men. Smoking is a widespread habit and is regarded as part of traditional custom to provide or offer a cigarette or a locally rolled Irish tobacco to a visitor or several tobacco sticks to a village or gathering.

The villages are run by the old men (*unimwane*) who preside over all village and island affairs. Middle-aged men assist by enforcing all rules laid out by the *unimwane* or by implementing certain binding commitments as a result of the decision making of the *unimwane*. Within a village and island set up, there are also other groupings such as youth, women interest and welfare groups, church groups and fishermen groups. Recently there are ‘*yagona*’ groups that gather every now and then especially when the *yagona* itself is in stock by some island dealers. Currently, one kilogram of *yagona* costs \$70. In Fiji the same amount costs between FJ\$40-50. The impact on social and economic aspects is worrying as men are spending a significant amount of time around a bowl and thus reducing the amount of time they would spend on other more important domestic chores.

3.1.5 Transport

The smallness of the island does not require regular road transportation system like South Tarawa. Bush bikes or bicycles are most common, mopeds and trucks are also available. A one-man or two-

man canoe are used for fishing trips, the introduction of motorized skiffs are used mainly for fishing excursions outside of the 10-mile EEZ. Government and private shipping companies provide sea transportation means, this can be irregular depending on cargo and copra capacities coming in or going out. Chartered boats for school children and other purposes is common. A domestic government-owned airline, Air Kiribati is providing air links between Tamana and South Tarawa (the capital) as well as with neighboring islands. Fares are generally higher than sea fares.

3.1.6 Communication

The main means of information and news is via a transistor radio (battery or solar operated). Communication via telephone or CB radio (2) is also available. Radio news is broadcast by either the Government’s Broadcasting Commission or a privately owned FM 89 radio. Videos and DVDs provide visual and audio entertainments. Four local newspapers, Temauri (KPC), TeTarakai (Betio Fishermen Association), Te Uekera (Government) and Newstar (Private) provide weekly news on local, regional and international news and sports mostly in local language.

3.2 Economic Aspects

3.2.1 Trade

Since 2000 and previous years up to 2005 the balance of trade had been on the imports exceeding the exports (Balance of Trade, 2006, unpublished report). The price of copra which is the main export commodity has been fluctuating thus making the balance of trade less favorable for Kiribati economy. The 2005 trade balance has been the highest in the history of Kiribati that amounted to \$9.4 million as compared to \$7.9 million for 2006 (Fig. 3d).

Overall, Tamana contribution to offset trade imbalance is insignificant but the impact of trade on economies of small islands can be immense.

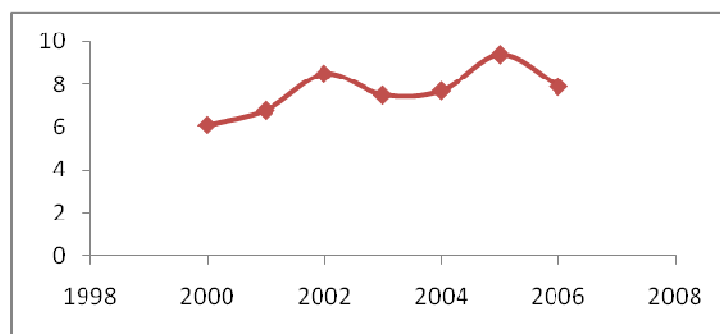


Fig. 3d: Kiribati balance of trade (A\$ million)

3.2.2 Imports

The main import commodities to Kiribati include foodstuffs, machinery and equipment, fuel and miscellaneous manufactured goods. Plastic wares are most popular among local shops that import

from some Asian countries. Including plastic bags, these wares are potential hazard to our fragile environment. Import partners include Australia 33%, Fiji 27.1%, Japan 18.1%, NZ 6.9% (Balance of Trade, 2006, unpublished report). Imports exceed export value by about 7 times (Fig. 3d).

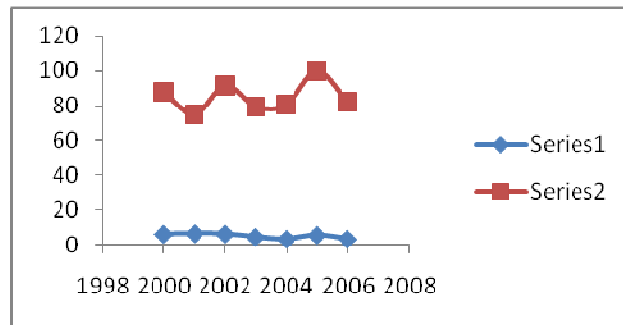


Fig. 3e: Import and Export levels (Series 1 – imports; series 2 – exports).

3.2.3 Exports

Export commodities include copra, coconuts, seaweed and fish. Pet fish from Kiribati is popular in Hawaii and the mainland of USA. Export partners are US 22.8%, Belgium 21.5%, Japan 14.3%, Samoa 7.8%, Australia 7.5%, Malaysia 6.7%, Taiwan 5.6%, Denmark 4.6% (unpublished Trade Balance report, 2006). The export value is predicted to remain in future until Kiribati finds some other means of balancing the trade deficit (Fig. 3d) by aggressively looking into light manufacturing and reducing heavy dependence on imported food through encouraging domestic markets on more nutritious local food items.

3.2.4 Income Revenue

The end of phosphate revenue from Banaba in 1979 had a devastating impact on the economy of Kiribati and indirectly on the outer island on which development assistance is derived in the areas of road, island council facilities and other public infrastructure. The Revenue Equalization Reserve Fund, a trust fund financed by phosphate earnings over the years, is still an important part of the government's assets and contained more than U.S. \$600 million in 2007. Kiribati has prudently managed the reserve fund, which is vital for the long-term welfare of the country.



Figure 3f: Sources of revenue

In one form or another, Kiribati gets a large portion of its income from abroad. Examples include fishing licenses, development assistance, tourism, and worker remittances. External sources of financing are crucial to Kiribati, given the limited domestic production ability and the need to import nearly all essential foodstuffs and manufactured items. Historically, the I-Kiribati were notable seafarers, and today about 1,400 I-Kiribati are trained, certified, and active as seafarers. Remittances from seafarers are a major source of income for families in the country, and there is a steady annual uptake of young I-Kiribati men to the Kiribati Maritime Training Institute. Tamana has a significant number of men working on overseas vessels who send money back to their relatives.

Official development assistance amounts to between U.S. \$15 million and \$20 million per year. The largest donors are Japan, the EC, Australia, New Zealand, and Taiwan. U.S. assistance is provided through multilateral institutions. Remittances from Kiribati workers living abroad provide more than \$11 million annually.

Most islanders, like I-Tamana, still engage in subsistence activities such as fishing and growing of food crops like babai, bananas, breadfruit, and papaya. The leading export is the coconut product, copra, which accounts for about two-thirds of Kiribati's export revenue. Other exports to which Tamana contributes include shark fins and handicraft. Kiribati's principal trading partners are Australia and Japan. The Australian dollar (AUD\$) is the official currency used in Kiribati replacing the pound sterling used during the British colonial era.

Chapter 4: THE PHYSICAL ENVIRONMENT AND STRUCTURES

4.1 The Physical Environment

4.1.1 Coastal Erosion

For the most part, coastal erosion appears to be mostly linked with aggregate mining. On inspecting the declared eroded areas the most obvious signs are truck tracks. Gravel sand and coral boulders are being gathered for *maneaba*, sports courts and housing purposes. One of the village *maneabas* was being rebuilt and gravel and sand are being mined and stcked within the *maneaba* compound. Residents agreed that eroded areas are unlikely to be caused by storm and sea level but by aggregate mining that is prevalent on the island. (Fig. 8; Plates 4-1, 4-2, 4-3 and 4-4).

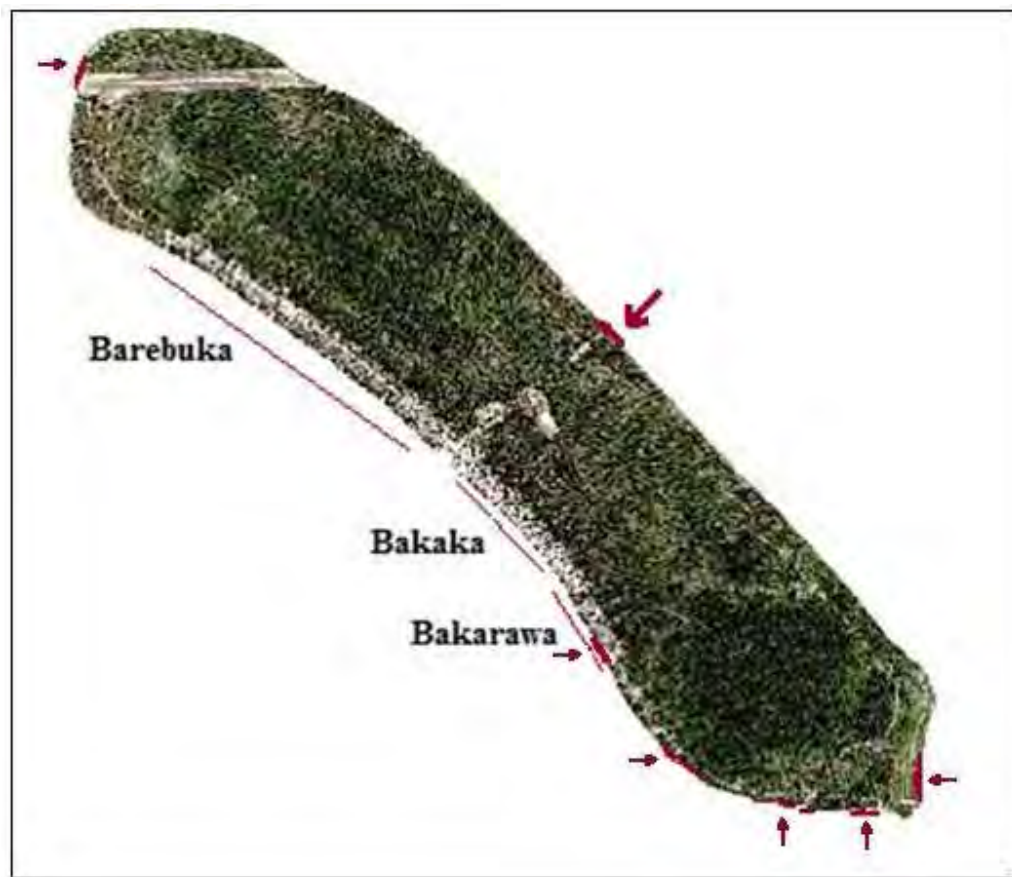


Fig. 4a: Map of Tamana showing eroded areas along the coastline; exact positions not available.



Coastal erosion is one of the major problems facing Kiribati. Being a small low-lying and relatively flat country, Kiribati is entirely coastal. Therefore most activities such as recreation, liquid and solid waste disposal, extraction of sand and gravel rock for construction and building of roadways take place along the shorefront of all islands in Kiribati, Tamana is no exception. However, due to the lack of understanding of the wave and current dynamics around the islands and the misconception that the coasts will recover, these atoll environments are under severe stress and are affected by significant erosion, pollution and damage to marine coastal biodiversity.

Activities that contribute to the increasing problem of erosion on Kiribati include fill reclamation for road construction, blasting of reefs for boat channel construction, and aggregate mining for construction purposes. Coastal erosion is most acute near the urban centre of South Tarawa, where population density, unregulated shorefront development and overexploitation of coastal resources are the highest.

As Tamana has only a small landmass any erosion along its coastline can cause substantial loss of arable and agricultural land and leaving not enough room to move back to.

4.1.2 The Coastal Zone

Overall the coastal area appears to be stable except for some sites where aggregate mining is taking its toll and unabated by the Island Council. There is no effective law to safeguard the island's coastal areas and the current 2007 Environment Act may be too weak to effect the main cause of coastal erosion on the island. Tamana, being a reef island, is slightly higher than most atoll islands. But the current amount of construction work being carried out will not help reduce the rate at which aggregate mining is being done. The only practical solution to the current problem is to get the people and Island Council sit together and discuss the best strategies to address the problem. One potential strategy is to encourage people to do mining inland where they excavate identified infertile areas, mine sand and gravel and replace them with compost for agricultural purposes.

Sand movement at the adjacent western end of the airstrip has been going for decades. The resident claimed that the beach had just been eroded for the past months but it had not come back as expected (Plate 1). Speculations include a change in weather patterns that probably also affect wind and current directions that would normally bring the beach back.

4.1.3 The Marine Environment

The oceanic water surrounding the island is currently cooler than used to be as far as spear fishers and lobster gatherers are concerned. The effect of LaNina bringing in easterly cool trade winds could be linked to this claim. There is little sign of people defecating on the beach as there is strong village clean up rules. The water is clear and the waves bound the white beaches every day. There are no coral boulders visible on the reef flat adjacent to the main villages at the western side of the island. This is obvious during low tide; the boulders could have been removed to clear the movements of canoes particularly at night. As briefly mentioned earlier, the construction of the island's chapel must also have taken quite a good proportion of the boulders for lime making. At the windward side there are quite a number of coral boulders ubiquitous during low tide. Coral growth is limited to the shallow and narrow portion of the reef backdrop. A variety of green algal species are abound with calcareous brown algae among and inside reef crevices. Other slimy algae form a slippery mat across the entire windward and leeward reef flats. Tide pools provide both nursery and grow-out habitats for *Holothuria atra* (*nautoonga*) and other marine organisms.

4.2 Public and Private Physical Structures

4.2.1 Public Physical Structures

One of the public structures likely to be impacted by storm surge and coastal erosion is a Kiribati Protestant Church chapel standing between the villages of Barebuka and Bakaka. It is only less than 50 meters from the coastline (Plate 4-5). The structure is more than 50 years old, made of local lime made from burning coral reef boulders collected from the reef flat of the island. On close inspection, there are cracks within the concrete block which need to be repaired. One hundred meters in the southward direction is the Government/Island Council center of activities. The compound is occupied by Island Council offices, a police head office and a general store. At the western end is a small clearing with a concrete block in the middle that holds a flag pole, this is where government celebrations such as Independence Day parades are held (Plate 4-6). At the beach front toward a reef flat is a boat/canoe reef channel. The area is showing some erosion and is being filled with concrete blocks and coral boulders. It is likely to be most impacted by surge storms and high king tides. There are no plans yet put in place for the two public structures on how to protect them from any potential storm and sea level rise.



Most private seawalls along the leeward side are being repaired but are showing signs of physical damage caused by previous surge storms, the recent one hit Tamana toward the end of 2006. The frequency and stronger surges may cause irreparable damage to most seawalls hence plans need to be put in place right now to ensure these structures withstand unpredicted events such as increased sea level accompanied by higher and stronger waves.

The vulnerability is trait of the Pacific islands countries has received increasing attention over the last decade. Exposure to natural disasters and to external global perturbations (for instance in climate change, trade, and capital markets) and a heavy reliance on a limited range of economic sectors, creates a high degree of vulnerability. Moreover, the factors contributing to islands vulnerability appears to have increased in recent years. The baseline of assets and lives at risks is also increasing as population and infrastructure located in coastal areas expand and Pacific island economies open to global economy. Small islands in Kiribati need to develop advance plans to curb or reduce their vulnerability associated with global warming and globalization in general.

4.2.2 Private Structures

Out of 196 respondents surveyed in 2005, 24 households claimed that they had seawall, the remaining 187 households did not have seawalls. Because settlements along the west coastline are more or less stable no new hamlets are expected hence new seawalls are unlikely. Most seawalls are maintained while others show signs of disrepair as a result of household occupants being away from home for many years. These are the areas that are likely to be flooded during extreme tides and surge storms.

Close inspection of the sea walls on Tamana Island revealed that coral boulders have been used in their initial construction and remain so in any repair work needed. Freshly mined boulders are quite conspicuous on repaired sea walls. The reef flat void of boulders is testimony of intensive aggregate mining for various projects prior to 2000. As a result of human activities in terms of aggregate mining the main villages and shoreline of Tamana are left vulnerable in the event of unprecedented

storms and bad weather. The only plausible solution to the problem is for the whole Tamana community to sit down with the Island Council and plan out what is best to protect the island's fragile ecosystems.

Chapter 5: ADMINISTRATION AND POLITICS

5.1 Administrative divisions

Kiribati was formally divided into districts until its independence. The country is now divided into two island groups which have no administrative function, including a group that unites the Line and the Phoenix islands (ministry at Ronton, Kiritimati). Each inhabited island has its own council (3 councils on Tarawa: Betio, South-Tarawa, North-Tarawa; 2 councils on Tabiteuea). The island groups include:

- Gilbert Group
- Line and Phoenix Group.

Each of the 21 inhabited islands has a local council that takes care of the daily affairs. Tarawa Atoll has three councils: Betio Town Council, Te Inainano Urban Council (for the rest of South Tarawa) and Eutan Tarawa Council (for North Tarawa). Tamana has its own council that performs its functions laid out by central Government under a Local Government Act (Kiribati and European Commission Joint annual Report, 2004).

The Island Council is run by a Tiibi Kauntira (TK -Chief Councilor), one of the village elected councilors, a vice chief and the remaining members of an Island Council. Councilors are elected by their villages through ballot voting and each councilor holds the position for a 4-year term but may be replaced any time in the case of death, migration or non performance. There was mention in the last few months that Government is going to change the election process for chief councilors and that a chief councilor will be elected by the registered voters and not by the elected councilors as currently practised.

The staff of the Council comprised a Clerk, a Cashier and an Island Project Officer; these are paid by a central administration. Other staffs include a Council Local Cashier, an Island Community Worker, carpenter, plumber, drivers and laborers. The judiciary section is staffed by Court Clerk paid by the Attorney General's Office, magistrates and judges who are also paid by the AG's office. Policing and law enforcement is done by government police officer(s) assisted by village special constables.

5.2 Politics

The Kiribati House of Parliament, *Maneaba ni Maungatabu*, is run under a parliament system that is headed by the *Beretitenti* who is both head of a current government and Head of State nominated from among elected island representatives by the people of Kiribati.

Currently there are 3 political parties, Boutokan te Koaua (current government with Mr. Anote Tong as President), Maneaban Te Mauri Party (opposition) and Temauri party (independent). A member from Tamana, MP Kabetite Mwetaka is the current Chair of the Public Accounts Committee overseeing government ministries spending and to report on any irregularities that need to be scrutinized. MP Mwetaka has been a strong supporter of Boutokan Te Koaua Party and has been in politics for more than ten years.

Chapter 6: GENERAL DISCUSSION ON NEEDS AND FUTURE DIRECTIONS

As the country develops and more goods are consumed, the issue of domestic waste disposal becomes critical. This is especially the case in South Tarawa but is also problematical on outer islands. The Government has developed a basic waste disposal framework and waste management on South Tarawa has been greatly improved through a recycling program supported by UNDP. A similar but smaller approach for small islands like Tamana will ensure that unmanaged solid and liquid waste does not seriously impact underground water lens and the environment in general (Republic of Kiribati and European Commission Joint Annual Report, 2004).

The importance of climate and sea-level change and variability requires the adoption of immediate adaptation measures in particular for coastal management and environmental vulnerability assessment. Aggregate mining for construction as population and migration increase will have a highly detrimental impact on coastal areas increasing their vulnerability to erosion. Coastal erosion also threatens settlements, arable land, water lenses and the coastal ecosystem. Control of aggregate mining requires alternative sources for mining aggregate and effective implementation of the 2007 revised Environmental Act 1999 needs to be put in action soonest.

The success of the current project, particularly after its conclusion, depends largely on the contribution of each local government in continuing similar activities in the areas of public awareness and consultation and risk assessment with proper implementation adaptation strategies put in place. The appropriate personnel are the IPOs, ICWs, Clerks to Island Councils who have attended the 2007 Consultation and training in Tarawa and who are still part of the outer islands consultations and trainings. A monitoring mechanism developed by government through its appropriate ministry is necessary to ensure local government activities are supported and enhanced.

Environmental Impact Assessment (EIA) procedure is integrated through all prescribed developments however monitoring equipment and expertise is very limited and requires additional support if environmental impact is to be monitored effectively. In addition, being prone to storm surges and drought there is a need to set up efficient disaster prevention and preparedness mechanisms, including climate adaptation measures, prediction mechanisms and monitoring systems with a view to reducing the consequence of disasters. Outer islands that lack functional coordination

for such vital services need to be included in all planning processes to ensure that they are aware of the necessary procedures when required.

Water and sanitation cannot be overlooked as they are vital for the existence of all forms of life, humans in particular. There is a great need to overhaul outer islands' water systems to ensure all have access to good water for domestic and agricultural purposes. Water catchments in all forms need to be encouraged with technical and financial assistance provided. Wells need to be protected from any form of contamination and this may require strict regulations on what form of water source meets the required health standard. Toilets facilities also need to be reviewed to determine the most acceptable type among those currently exist on the island. Attitude change toward toileting to discourage the use of beaches and bushes for such purposes requires constant and well supported drives by local communities and church groups.

Marine resources are the main protein staples on Tamana as agricultural land is very limited due to smallness of the island and the devastating impact of drought. Proper management of all types of edible and non-edible marine resources needs to be put in place as soon as possible. Fisheries and expert advice is greatly needed to help fishermen manage their own resources. Lack of protein may be detrimental on the health of the population. Likewise, agricultural and terrestrial resources also need to be managed through proper planting techniques and the selection of most appropriate plant species that thrive on atoll harsh conditions. Home gardening is lacking on the island and the replanting of main fruit trees such as coconut, pandanus and breadfruit need to be encouraged.

All physical infrastructures (public and private) on Tamana are prone to storm surge and bad weather. Any increase in sea level over the next decades will undermine the welfare of coastal communities. A long term planning process involving appropriate government ministries and non-government organizations needs to be put in place to ensure adaptation measures are undertaken.

Heavy dependency on imported food items is not healthy for the people of Kiribati in the long term and Government must make strenuous effort to reduce or retract the trend by embarking on programs that promote the consumption of traditional and local foods. This translates to health and the ability of each family to save money in order to fund personal and local projects that will allow them adapt to climate change, climate variability and sea level rise. Diabetes and hypertension are two non-communicable diseases prevalent on the island most probable to be linked to heavy dependency on imported polished foods and less exercise due to warmer days. Dependency on fossil fuel must be drastically reduced through the implementation of projects that promote the use of clean energy sources such as solar, wind and wave.

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IPO- Tekimwa Iona (Tamana)

The Ministry of Finance and Economic Planning

The Ministry of Education Youth and Sports

The Ministry of Fisheries and Marine Resources Development

The Ministry of Health and Medical Services

Appendix i: Form Templates

Island Risk Assessment (*form 1.1*)

Island	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
<p>Refers to islands in the Gilbert Group</p> <p>[reef/raised or atoll – needs to be specified]. Number of villages to be visited, number of participants, sex, age and occupation.</p>	<p>Island residents identify the vulnerabilities and risks they are experiencing in light of climate change and sea level rise.</p> <p>A list given during the 2007 consultation is checked against this new listing.</p>	<p>Causative hazard type identified</p>	<p>Extent and impact of disaster, who are affected, how are they affected</p>	<p>Identifies 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.</p>	<p>Implication on urgency of response</p>	<p>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.</p>	<p>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.</p>
<p><i>Example: Tamana Island, reef island, 3 main villages, 30 participants per village; representatives from women groups, fishermen, youth, religious and other groups.</i></p>	<p><i>Coastal erosion</i></p>	<p><i>Sea level rise- storm surge</i></p>	<p><i>Homes abandoned and people are homeless ,</i></p>	<p><i>Bakaka and Bakarawa villages [refer to a map of Tamana] also refer to photos from Tamana Island.</i></p>	<p><i>3</i></p>	<p><i>Mangrove planting and seawall construction</i></p>	<p><i>Ministry of Works and Energy and Public Utilities; MELAD</i></p>

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

Island	Risk	Ranking score as in form 1.1; 3 highest, 1 lowest	Responsible ministry/agency	Current status of activities	Timing and estimated duration of response (months)
Name of village and area be stated, map of site provided	List of risks.	Risk with highest score appears first, those with lowest score come last	Name of agency or government ministry specifies	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)	This needs to be factored in with the budget or obtained from relevant agency/ministry.

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

Island	Type of risk	Ranking score (forms 1 and 2)	Implementing agency/ministry	Partners	Start-up date
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

Island Profiling – Natural Resources (form 2a)

Terrestrial/Marine Resource	Current Status	Potential cause(s) of problem	Action needed [low/high priority]	Partners	Cost of activity [AU\$]	Source of funding identified
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

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

Terrestrial/Marine Environment or infrastructures; public or private	Current Status and site/location	Potential cause(s) of problem	Response type required [urgent or not urgent]	Partners	Costs	Source of funding
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

Island Profiling – Human Resources (form 2c)

Population by sex	Age groups	Schools/Public utilities	Government/non-government paid workers	Major occupation	Production/export	Imports
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

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

Island	Type of resource, environment and infrastructure	Ranking score (Forms 2a and 2b)	Agency/ministry for further observation and research	Partners	Start-up date
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

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

Island	Type of resource, environment and infrastructure	Ranking score <i>(Forms 2a and 2b)</i>	Implementing agency/ministry	Partners	Start-up date
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

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