ISLAND REPORTS

ISSUES IN RELATION TO CLIMATE CHANGE

T-MAKEI SERVICES

June 23, 2011

Authored by: Dr. Kambati Uriam

PREFACE

It is with greatest pleasure that I present to the Office of Te Beretitenti (OB) and the planners of the next KDP this overview of the islands and people of Kiribati and the issues for each island in relation to Climate Change This Islands Report is a fulfilment of the ToR of the consultants commissioned by the OB to provide information for participants during the National Summit to enhance a meaningful dialogue on the KDP & Climate Change, and to inform planners of the next KDP the experience and sentiments of communities throughout Kiribati concerning their life and how they fared on their respective islands amidst the effects of the changing weather patterns on their habitat. Although much of the content of this national synopsis are extracts from 2 main reports - (i) *Socio-Economic Profile* of individual islands compiled and produced by MISA (2007), and (ii) *KAP II Reports* (Risks Assessments and Adaptation) compiled for and produced by the OB (2008) – the reports from discussion groups during the National Summit on the KDP and Climate Change (16-20 May, 2011) as well as data collected by research assistants kindly provided to us from the office of ThEco-Care Group (before and after the Summit) had been used also in the compilation of this *Islands Report*.

The Report is in 2 parts. Part I is a synopsis of Kiribati - a condensed and bird's-eye view of Kiribati and the issues common throughout the islands, and Part II is a summary of the key issues for each Island in relation to Climate Change. As presented during the National Summit as a brief summary of the preliminary findings of the consultants on issues related to Climate Change, the Report stressed the fact that while most of our problems are not new many have become more pronounced because of Climate Change. Emphasised also in the Summit presentation was the need to review and consider earlier policies and strategies, during and even before colonial days, on issues that still haunt us these days: the past is indeed a quarry of wisdom to learn from.

This Islands Report, though is a view of the islands and the people and their issues up to the end of April 2011, the seriousness and urgency of any issue cannot be fully understood unless it is placed or seen against the history of Kiribati as a whole, for history is usually a collective story of human endeavours to live life in its fullness, especially the endeavours to remedy the concerns that prevent the fulfilment of human aspirations and wholeness. Seen against this backdrop one realises that many of the issues and concerns mentioned in this Report are not novel after all, though the causes may be, but what is more significant is the different perspectives on those issues, the approaches to the issues, and the myriad of factors that shifted the focus or changed the issues altogether.

Kiribati will celebrate its 32nd year of existences as a nation this year. Being young and new amongst other nations it has the luxury of learning from the mistakes of others and improve on the success of others. But Kiribati is not just simply a young nation; it is small, very small and poor in terms of natural resources. And like all other young and poor nations that came into being after World War II, Kiribati is fragile that any change from the usual in the weather pattern and in the behaviour and number of its inhabitants will initiate a chain of

undesired reactions very difficult to contain. A proper management of its population and its limited resources therefore is imperative if Kiribati were to continue to exist into a foreseeable future.

Small and situated right in the middle of a vast expanse of water Kiribati is often missed or unnoticed by bigger and wealthier countries of the world. In the early days of European contact with the islands of the Pacific, the islands of Kiribati were the least visited for they were literally barren and unappealing to visitors with little or nothing to offer. No major world power was interested in these islands for they certainly would be a liability and a burden on their imperial coffers. And although Kiribati became a British protectorate in 1892, it was really part of an agreement with Germany to gain German support for Britain's real interest and claims in Africa. What the islands had – whales, coconuts, women and able-bodied men – they were taken away forcibly from them from the beginning of the 19th century, but especially so in the 1860s with the Peruvian slave traders operating in the southern islands of Kiribati.

In modern times, Kiribati's voice, more often than not, is not heard on the international scene, and where she is heard she is courted only by a few not for her worth but for their own use and interest. She accepts and takes what is out there for grabs, most of which are not of the highest bid or quality but the less desired and the cheapest. The people of Kiribati may have little or nothing to offer materially to world communities, but at least, through their simple way of life they could be example of a society that finds life and the fullness of living not so much in what they can own privately but in how wisely they use and share the limited resources they have with one another.

Acknowledgements

Many people have been involved in the writing of this report and I wish to thank them all. To the Director of *t-makei services*, Dr. Temakei Tebano, I thank him for the invitation to co-ordinate this work and especially for his help in the writing of this Islands Report; the task has certainly enlarged my own understanding of the reality of life encountered by many people in Kiribati and what it means to be an individual of these islands in this tumultuous and challenging period in the history of Kiribati.

I would also like to thank the Director of ThEco-Care Group, Dr. Komeri Onorio, for offering me a space in their building to write up this Report, but especially for the release of his staff, Ten Teaua and Nei Rosalind Kiata, to help in the collection of the required data. Their persistence, friendliness and assistance helped considerably in the writing and completion of this report.

To my wife, Neina, for allowing me to be part of this project and especially for accepting to be lonely on Abaiang for most of the early part of this consultancy, I salute and praise her for her endurance and understanding

OBJECTIVE

The objective of this activity is to co-ordinate the production of Island Reports which will encourage meaningful participation of participants in the National Summit, and document the results of consultation with Island representatives as input to the Kiribati Development Plan and the National Framework for Climate Change Adaptation.

TERMS OF REFERENCE

The following are the terms of reference (ToR) for this Islands Report Co-ordination:

1. Extract and summarise key issues for each island in relation to climate change, from *Island Profiles* and *Island Risk Assessments* provided, considering also the circulated questions;
2. Prepare a draft Islands Report for each outer Island and for South Tarawa, with gaps to be filled during the National Summit;
3. Make contact with island representatives before the National Summit to seek their assistance in completing Island Reports;
4. Run Workshops during the National Summit with representatives from each island to collect key information to complete Islands Report;
5. Complete documentation of draft Island Reports as soon as possible after the National Summit;
6. Support island representatives to undertake further consultation and obtain signoff of the draft Island Reports after the National Summit.

PROCESS

Copies of *Island Profiles* & *Island Risks Assessments* reports were provided to the consultants to study and extract key issues from for the National Summit and for the writing of the Islands Report. Unfortunately islands risk assessments had been carried out only on a number of islands, (not all islands were covered in the study) hence, only 9 *Island Risk Assessments* documents were available to us. And MISA, whom we were told had all the Island Profiles report only had 8; the rest we were told by MISA were taken away by one of its former staff who was part of that project to do the study of all the remaining islands. Since we did not have the studies for all the islands of Kiribati to our disposal from the OB nor from MISA, it was necessary therefore to employ 2 research assistants to help in the collecting of data of the islands not available. Through their meticulous research a mountain of data was collected which included the missing *Island Profiles* from the MISA office (unfortunately nothing could be found on Kiritimati and South Tarawa). From the data collected Dr. Kambati Uriam and Dr. Temakei Tebano constructed this narrative report.

CONTENTS

PART I OVERVIEW OF KIRIBATI

'IF ONE DRAWS a circle around the island of the Pacific, at its centre will be found the perfect models of the south sea islands of Romance: a necklace of sixteen low coral atolls straddling the equator and almost touching the 180th meridian.' These are the Gilbert Islands. The islands, together with Banaba, number 17 in all, from Makin in the North to Arorae in the South- a distance of about 880km. Only 5 have no lagoon, hence are reef islands. The Gilbert Islands are predominantly low lying coral atolls except for Banaba which is a raised reef island. The average width of the islands is several hundred meters from one side to the other; the widest being about 3km. Tabiteuea, a 70km chain of some 45 islets estimated at about 30 square kilometres, is the longest in the Gilberts. Tamana which is less than 10km from one end to the other is the smallest.

The islands usually have rainy days in September to February and dry season between March and August; but this weather pattern is changing in recent years. Even before these changes, severe droughts could hit the islands, and in the past they made hunger and privation familiar.

The group is sub-divided into three clusters, *te itera meang* (of the north*), nuka* (central) and *maiaki* (south), between which the inhabitants, though they form but one people speaking the same general language, differ slightly in customs, institutions, and dialect. The northern cluster is composed of Makin and Butaritari, divided only by a strait about 5km wide. Makin is the smaller of the two, but compact, with fertile soil, and is considered the metropolis. The seven islands, Marakei, Abaiang, Tarawa, Maiana, Abemama, Kuria and Aranuka, form the central cluster. Though Abemama, Kuria and Aranuka belong to this central cluster geographically and politically, the three form a group of their own. Nonouti, Tabiteuea, Beru, Nikunau, Onotoa, Tamana, and Arorae form the third division. Although islands belong to a cluster, all are independent of one another.

Much of our knowledge of the prehistory of Kiribati is highly conjectural, based mainly on very little evidence available from archaeological diggings, linguistics, and ecological studies. Nonetheless the following conjecture can be made about the islands of Kiribati. The peopling of Micronesia and indeed Oceania as a whole was mainly from Southeast Asia via Melanesia. The first settlers of the Gilberts could, then, have been any Melanesian migrants from northern Vanuatu from about 2000 to 1600 B.C. The first groups were followed by more powerful fair skinned groups. These later arrivals were different from those that settled Tonga and Samoa. Their migration from Southeast Asia would have occurred from about the close of the first millennium A.D to the beginning of the second millennium. The first islands of the Gilberts to be settled were Banaba and Tarawa. From these two islands, the dark-skinned and the fair-skinned latter arrivals moved to the rest of the islands in the Gilberts.

The dark-skinned settlers had a culture quite distinct from those that came later. They were masters of black magic and sorcery, and were cunning in warfare. Their gods were Nareau, Nakaa, and Tabakea, who were *beroro* (dark-skinned), and wooly haired with flapping ears.

Banaban myths suggest that the first inhabitants practiced cannibalism, for when Auriaria, a god of the fair-skinned later arrivals, landed on Banaba, Nei Aromangati and Nei Noumangati were thinking of eating him and his companions. Such a habit was abolished when Auriaria *raira* (overturned) Banaba burying Tabakea (the former god) underneath it, that is reformed the islanders old practices and established himself. With his sister-wife, Nei Tituabine, Auriaria replaced Tabakea as the *anti* (guiding spirit) and protector of the people of Banaba.

In this era of the dark-skinned people, a dynasty arose. This was the house of Noubwebwe. The rule of this house was established long before the coming of the later arrivals, fair-skinned intruders from Samoa. To this house of Noubwebwe may be credited the first serious consolidation of the people into a whole – a particular people.

Unfortunately for this house of Noubwebwe, they were overthrown in the early years of contact with fair-skinned intruders who came from Samoa, who reduced them to slavery to prevent any further attempt to rouse their loyal subjects on other islands. The new ruling house was known as the house of Kirata or Ten Tebau. This happened some generations before the main bulk of the 'Samoans' migrated into the Gilberts.

The gods of these later arrivals were their deified ancestors, Auriaria and Tabuariki, as well as Nei Tituabine and Nei Teiti. Tabuariki was associated with agriculture as he was the god of thunder. Auriria, Au the *riaria* (feared, great or terrible), was the god of war. Being two great hero-gods, their associations were easily confused, such that both could be consulted in times of war as well as for a successful harvest.

The islands affected directly by these 'Samoans' were Tarawa, Beru, Nikunau, Nonouti, Tabiteuea, Makin, and Butaritari. From them, the rest of the islands in the Gilberts were influenced. In oral traditions, this period of settlement from Samoa is known as 'Uruakin Kaintikuaaba' (Breaking of Kaintikuaaba) from about 1270 A.D. It is the progeny of the inter-marriage of this last wave of fair-skinned (Samoans) with the earlier inhabitants (dark-skinned and earlier fair-skinned groups) that are the present people of Kiribati.

The character of the people varies from one cluster to another. The people of the north are more open, cheerful, noisy and in strong contrast to the reserved, suspicious, irritable and somewhat wild and apparently ferocious people of the southern cluster. The central cluster shares the two extremes. But each island community still has its own distinctive characteristic: on Abemama, Kuria and Aranuka, for example, a strict subordination, the kind offered in respect to the uea (king), is practised and encouraged; while on Nonouti, Tabiteuea, Onotoa, Nikunau and Beru, one can see a saucy boldness and rude independence in the manners of the people, the kind one would find in a proud and self-sufficient chief. At the same time also, the people of the southern cluster are unpredictable and can be easily offended; but even then, they are also easily appeased, for as they always say; 'A coward is he, who, for the fear of his opponent, settles his animosity into a long continued rancour'.

The cultural patterns that emerged reflected the islands and the sea that was home to the people. And while neighbouring communities would have similar ways of doing things or relating to one another, each island community was disctinct from the other. Inter-island travel and intermarriage caused island communities to exchange and share many of their particular traits and customs, and by the time the *maneaba* and its system of government was established in most of the islands following the 'Wars of Kaitu and Uakeia', from around1560, a common way of life – te katei ni Kiribati – was emerging.

The Phoenix and Line Islands were not permanently settled until much later, when the British and later the Kiribati government encouraged people to resettle there. Currently there is only one permanently settled island in the Phoenix Group (Kanton, population 31). However the population of the Line Islands continues to grow, with Kiritimati having the second highest population of any island in Kiribati, 5791 people.

Because manual labour and experience (knowledge and skills learnt over time and passed down) were important for survival, men and the elderly, especially the old men were important. With the acceptance of the *maneaba*, the tabernacle of acestors in the male line, as the centre of activities and ceremonies in the villages the *katei* (way of life) that emerged was that of the maneaba: male dominated, male oriented, and gerontocratic in its rule. A number of islands, though, through their influential warriors managed to break away from this mould and began their own ruling houses, especially in the northern and central islands.

With life unbearable at times because of extended droughts on some islands, infanticide and abortion was practiced and accepted as a check on the population, to lessen the strain on the limited resources. It is no wonder that stealing was and still is considered a very serious offence in the islands. Thieves were publicly shamed or executed, made *kaunga* (slaves) to make a living from the lands of their new masters in exchange for their services and favour, or sold to passing vessels

Rorobuaka (middle-aged men) and women from early adulthood were taught to be competitive. In their daily activities the quality of their labour was expected to exceed that of their peers in the village, and where they seemed to fall behind their group they were rebuked and shamed by their parents. But while competition was encouraged young men and women were also expected to conform to the rules of the village and to be alert to the feelings of their rivals, for it is not the fittest that survives in these harsh environments, but rather the one who shares with another.

Bubuti, a reciprocal relationship, is practised throughout the islands. Those who enter into the relationship can *bubuti* (request) almost anything from their kindred: labour, for instance, to help them build a house; a canoe to go fishing; or even food and other immediate needs. In former times on some islands, through the custom of *eiriki* and *tinaba*, one could also *bubuti* a sexual favour. But the custom has its own rules and, strictly speaking, only those that have

buakonikai (lands) can *bubuti* (request), that is, enter into such a relationship. In the past those that cannot *bubuti* are those who have no land. They are nothing for they cannot offer anything – they are the *kaunga* (slaves) who depend for their livelihood on the favour of the *utu* (family) upon whose lands they labour. Today, everyone can *bubuti*, but more often than not, because of the growing difficulties for many people to satisfy their basic needs, it is a begging with shame to a superior rather than a request made with honour and pride to an equal (as in the past).

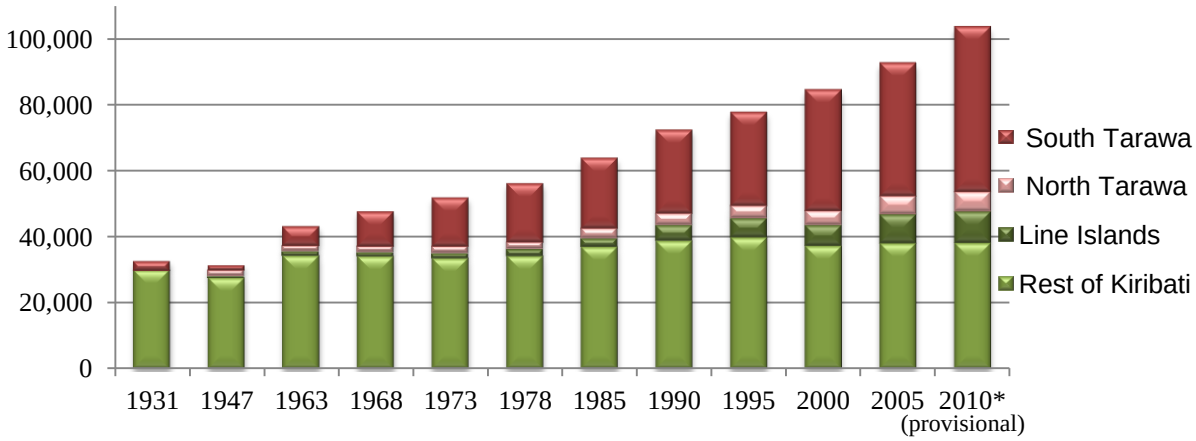
POPULATION

Early population estimates of the islands were made by passing European vessels, and, generally, were much too high. The Ethnographer, Horatio Hale, of the United States Exploring which visited the islands in 1841, for example, estimated the population of the Gilberts at 60,000, and on another occasion at 85,000. In 1852, Richard Randell, a trader on Butaritari, suggested 46,000. Ichabod Handy, a whaler, in 1855 suggested 30-35,000. The population estimate in 1892, when the islands became a British Protectorate, was 26,500. Taking into consideration the resources of the islands, the wars between the islands, the occasional droughts on many islands, infanticide and abortion to control the population, emigration, and the known estimates, it is not unreasonable to suggest a population of between 20,000 and 25,000 before the close of the 19th century.

The first census which was carried out in the islands in 1931, commissioned by H. E. Maude, recorded a population of 29,751 for the Gilberts. In 1978, the population was 56,213; in 2000, the population was 84,494; and in 2010, the population was 103,466. Back in 1931 there were fears that the population had already stretched the limited resources of the islands. A failed settlement scheme to the Phoenix Islands in 1938 was an attempt to lessen the burden of overpopulation of the islands in the Gilberts, some of which were showing signs that they had exceeded their sustainable population. More recently Kiribati people have been encouraged to settle in the Line Islands of Kiritimati, Tabuaeran and Teraina.

By the 1960s, with islands like Tamana marketing only $2,200 of copra and other products but purchasing over $12,000 of consumer goods, and Onotoa selling copra and handicrafts to the value of $2,882 but purchased $18,360 of goods, the fears seemed to be valid after all. Today, with rice and flour as the daily staples of the people in all the islands, everyone should be very afraid: population growth is an issue that must be taken seriously.

Kiribati population trends 1931-2010



ISLAND PRELIMINARY DATA BY SEX, FOR 2010 CENSUS

ISLAND	MALE	FEMALE	2010	2005	Population growth (or decline) 2005-2010	
TOTAL	51002	52464	103466	92533	10933	12%
BANABA	117	94	211	301	-90	-30%
MAKIN	910	903	1813	2385	-572	-24%
BUTARITARI	2288	2119	4407	3280	1127	34%
MARAKEI	1341	1397	2738	2741	-3	0%
ABAIANG	2822	2849	5671	5502	169	3%
NORTH TARAWA	3045	3079	6124	5678	446	8%
SOUTH TARAWA	24104	25906	50010	40311	9699	24%
MAIANA	1001	1032	2033	1908	125	7%
KURIA	515	471	986	1082	-96	-9%
ARANUKA	520	537	1057	1158	-101	-9%
ABEMAMA	1684	1677	3361	3404	-43	-1%
NONOUTI	1297	1301	2598	3179	-581	-18%
TAB NORTH	1762	1931	3693	3600	93	3%
TAB SOUTH	680	624	1304	1298	6	0%
ONOTOA	724	737	1461	1644	-183	-11%
BERU	1055	1041	2096	2169	-73	-3%
NIKUNAU	1003	904	1907	1912	-5	0%
TAMANA	587	624	1211	875	336	38%
ARORAE	621	651	1272	1256	16	1%
TEERAINA	914	787	1701	1155	546	47%
TABUAERAN	1019	971	1990	2539	-549	-22%
KIRITIMATI	2976	2815	5791	5115	676	13%
KANTON	17	14	31	41	-10	-24%
TOTAL	51002	52464	103466	92533	10933	12%

HEALTH

The government through its Medical Assistanst and qualified Nursing Officers stationed at clinics on the individual islands promote and maintain the health and welfare of the people. This includes general examination of patients, giving out treatments, and also referring patients to the central hospital in South Tarawa as necessary.

Concept of health as being able to live to the next day and to perform your tasks.

In general, the population in the outer islands of Kiribati is healthy. Most of the common diseases are the common cold, headache, and sore throat. Conjunctivitis and diarrhoea in children is common in some of the very hot, dry, and dusty islands. However, with populations growing on most islands, and reports of insufficient fruits and vegetables, with little to no catch in the usual fishing grounds, the health of people on most islands is compromised.

South Tarawa issues – waterborne diseases, diabetes, malnutrition, domestic violence.

WATER

The main water source for drinking and sanitary purposes in the islands is groundwater and to a small extent, rain. On outer islands, piped water is basically an introduced water system where PVC pipes provide the means of transporting manually pumped water from wells to cooking areas and toilets. Full piping systems are rare on the outer islands and can be found mostly in Council households and Government buildings.

South Tarawa water shortages especially in droughts, and cost of water.

Groundwater in atolls occurs as a lens of freshwater floating in hydrostatic balance on salt water below it. Toward the center of the atolls, the water is generally potable and this is where most of the wells used for drinking are dug. Wells for other general purposes such as washing, cleaning and gardening are dug next to households for easier access. The fresh water wells however are subject to brackishness during times of drought. During these times, potable water can be fetched from as far as a kilometer away.

Rainwater tanks are becoming quite popular in the islands and where available, the rainwater is still a guarded commodity that is rarely used except for cooking and drinking. Rainwater is normally saved for times of drought when the wells turn brackish. During rainy seasons, rainwater can be used for washing, cooking, cleaning and bathing. Most of the water tanks are owned by church groups, the Island Council, the Government and individuals who own houses with corrugated metal roofing. Cement rainwater water catchments are being replaced with short-lived plastic tanks, the latter is costly in the long term. Many tanks have collapsed under the heat of the sun durng prolonged droughts.

CLIMATE

The climate of Kiribati is tropical. It is hot and humid all year round with easterly trade winds prevailing and moderating the temperatures throughout the year. The strong influence of El

Nino and La Nina events on the climate is prevalent throughout Kiribati. El Nino, simply defined, is the warming of the sea-surface temperatures in the equatorial Pacific Ocean that influences the atmospheric circulation and consequently rainfall and temperature in specific areas around world. Depending on this complex interplay of sea surface temperatures (SSTs) in the equatorial Pacific ocean, atmospheric circulation is affected which either then moves eastward or westward producing either of the two events, El Nino or La Nina. These in turn either result in rain on the islands of Kiribati (during El Nino) or drought (during La Nina) depending on where the atmospheric circulation is headed.

Generally in Kiribati, the wet season falls between the months of September to February, while the dry season begins in March and ends in August. The temperature ranges between 28˚ Celsius at dawn to 32˚ Celsius in the early afternoon but has been known to get hotter than 32˚ C. Cool ocean breezes play an important role in keeping the temperature down during hot days.

Kiribati atoll soils are derived from the underlying coral reef and thereby consist mainly of calcium and magnesium carbonates. The soils tend to be shallow and highly alkaline with large soil (grain) particles rendering it highly permeable with low capacity to hold water. Because the soil is highly alkaline, fertility is dependent on organic matter for the concentration and recycling of plant nutrients and for soil water retention in such excessively well drained soil. Kiribati soils especially those in the Gilbert group are classed as among the poorest in the world.

The soils existing in Kiribati are described as having an AC type profile. The A-horizon consists of sand containing a variable quantity of humus. It is usually about 25 cm deep, has a pH of 7.6-8.0, and is dark grayish to black in color. This rapidly gives way to coarse white and pink gravely sand of the C-horizon, which consists almost exclusively of calcium and magnesium carbonates and has a pH of 7.8-8.3. The soil type is one of coral sediment with varying topsoil that is poor in nutrients. The soil has a high amount of free calcium, locking up most of the necessary nutrients. The soils are very highly permeable and have a low moisture-retaining capacity. The topsoil may have clay-sized particles constituting up to 5 percent of the volume of soil but such particles are formed by the breakdown of the algae shells by carbonic acid in humus. Atoll soils are generally low in N and K, and P tends to be fixed. Deficiencies of micro-minerals (nutrients) such as Cu, Zn, Fe and Mn are very common, however, the levels of sodium, boron and molybdenum are adequate, while sulphur may be borderline in some areas.

LAND AND MARINE RESOURCES

The main resources of the islands are predominantly coconut trees, pandanus, breadfruit, land crabs and its vast marine resources. Plant life plays a great role in livelihood of the islanders and as limited as they are, they all have significant uses as sources for the following:

- Subsistence and commercial materials and products

- Ingredients for medicines
- Symbols of individual welfare
- Ingredients in traditional cultivation
- Soil improvement
- Provision of shade and groundcover
- Materials for handcrafts and toys

Coconut trees provide food, shelter, medicine and income for the people. Coconuts have adapted well to atoll and dry conditions and will still remain standing after years of drought even though they may not be producing fruit. The pandanus tree (*Pandanus tectorius*) comes second after the coconut as one of the very important tree crops on the islands that people hack their living out of.

There are two distinct species of breadfruit, the common breadfruit (*Artocarpus altilis*) and the Mariannas breadfruit (*A. mariennensis*) plus a hybrid of the two. The breadfruit tree comes third after the pandanus as the popular fruit trees in the islands but unfortunately is the most vulnerable to prolonged droughts. *Bwabwai*, a form of taro, grows well and abundantly in the northern and central islands. Requiring a great amount of water to grow, *bwabwai* is therefore grown in pits dug to the water table and needs a lot of care, especially in the southern islands. This has made the *bwabwai* a luxury food item in the southern islands, it is not included in the daily staple food but instead cultivated and reserved for very important functions.

Other general terrestrial flora comprise papayas, local fig, bananas, uri (*Guettarda speciosa*), casuarinas, leucaena, non (*Morinda citrifolia*), saltbush (*Scaevola sericea*), heliotropes (*Tournefortia argentea*), Alexandrian laurel (*Calophyllum inophyllum*), sea trumpet (*Cordia subcordata*), iron wood tree (*Pemphis acidula*), beach almond (*Terminalia samoensis*), great lettuce tree (*Pisonia grandis*), privet (*Clerodendrum inerme*) and a variety of ornamental plants, grasses and weeds.

Kiribati is not rich in its land fauna which comprises the common pigs, chickens, dogs, cats, birds and island insects such as rats, lizards, ants and crabs amongst others. The marine fauna on the other hand is rich in its share of fish, octopus, flying fish, tuna, sharks, lobster, and oil fish to name a few.

Land is owned by individual landowners and inheritance is as willed by the parents. Due to the increasing population, lands on the outer islands are precious with some preferring to leave their lands as family lands for all members to utilize as required.

EDUCATION

There are 5 types of schools within the formal education system in Kiribati, namely primary, junior secondary, combined junior/senior secondary, senior secondary and tertiary. The primary and junior secondary schools were established on the outer islands by the

Government for accessibility by all children of school age. However, pre-schools are not yet included in the Government school system. The Island Councils have to provide and outfit their own pre-schools and pay their own pre-school teachers. The national/universal junior secondary schooling program started in1998 initially with four schools established on different islands and by 2002, all islands in Kiribati had one JSS established which meant that all primary school pupils were able to continue their schooling at junior secondary school.

Formal education officially commences at age 6 and children attend primary school until they reach Class 6 at the age of 11. At the age of 12, the children then automatically enter Junior Secondary School. They remain in JSS for 3 years (Form 1-3) before competing for a place in Form 4 in one of the various Senior Secondary Schools located mostly in South Tarawa and the outer islands of the Gilbert group including Kiritimati in the Line group.

Attendance at primary schools is very good on most islands, with more than 80% of children attending school. Fewer than 2% would have left school and the remainder, around 3%, have never been to school. Some of the reasons for not attending school would be disability (only South Tarawa has a school for the disabled), expense of transport or uniform for some parents, and plain parental ignorance of the importance of education. The movements or transfer of parents from island to island disrupted the schooling of many children as well forcing them to leave school in the middle of school terms. Early and matched marriages, including elopement are some of the other reasons for some to quit school.

Senior secondary schools in Kiribati

	Name of School	School Type	Location
1	Chevalier School	Senior Secondary (SS)	Abemama
2	Church of God High School	SS	South Tarawa
3	George Eastman High School	SS	Nonouti
4	Hiram Bingham High School	SS	Beru
5	Immaculate Heart College	SS	North Tarawa
6	Kauma High School	Combined Junior & Senior (CS)	Abemama
7	King George V & Elaine Bernacchi	SS	South Tarawa
8	Meleangi Tabai High School	SS	Tabuaeran
9	Moroni High School	CS	South Tarawa
10	Sacred Heart High School	SS	South Tarawa
11	St Joseph's College	SS	Abaiang
12	St. Francis High School	SS	Kiritimati
13	St.Louis High School	SS	South Tarawa
14	Stephen Whitmee High School	SS	Abaiang
25	Teabike College	SS	Tabiteuea North
16	William Goward Memorial School	SS	South Tarawa

Generally throughout the country, the JSS schools, which were all established in the late 1990s are in better/good conditions and adequately furnished while primary schools are generally lacking in furniture.

ENERGY

The main source of lighting in the outer islands is the pressure lamp and lanterns, and nowadays, with the introduction of generators and solar systems, these two later introduced sources of light can now be found in the islands. The chart (right) shows that 325 (74%) of the 437 households stated the pressure lamp as their main source of light.

In 2000 the solar system was introduced to the outer islands by the Kiribati Solar Energy Company Limited (KSECL). An electric grid operated by the Public Utilities Board (PUB) unfortunately is presently providing electricity and lighting only to those on South and North Tarawa (not all of North Tarawa). In 2007, 332 solar systems were installed in the outer islands of which 35 were not operational.

Outer island solar systems

	SOLAR HOME SYS		*MANEABA SYSTEM*			TOTAL
	Operational system	NOT Operational system	M200	M300	M600	
Makin	75	1			5	**81**
Butaritari	75	0			2	**77**
Marakei	288	35	5	2	2	**332**
Abaiang	82	17		6	3	**108**
Tarawa Ieta	199	83	4	3	3	**292**
Maiana	87	1		2	2	**92**
Kuria	75	1		2		**78**
Abemama	75	0		3		**78**
Aranuka	73	2		3		**78**
Nonouti	140	70	2		3	**215**
Beru	75	0			1	**76**
Nikunau	74	1			2	**77**
Tab North	119	1		3		**123**
Tab South	75	1			1	**77**
Onotoa	80	1	3	4		**88**
Tamana	74	1			2	**77**
Arorae	75	0			1	**76**
Banaba	77	1	1		2	**81**
	1818	**216**	**15**	**28**	**29**	**2106**

Pressure lamps are normally owned by the majority of households on the outer islands as it is not only used as a source of light for the homes but is also mobile enough to be moved to required places and locations such as in night fishing expeditions known locally as '*te kibee'*. Where before this kind of fishing required two people (the fisherman and someone to carry plaited coconut fronds), the pressure lamp has conveniently allowed only one person to carry the lamp and fish at the same time without needing another to carry extra loads of coconut fronds.

Firewood is never an issue in the outer islands when it comes to cooking. However, with more and more people now using kerosene stoves for cooking, and other types of fuel for their motorcycles and trucks, the demand for fossil fuel is rising in most of the islands.

ISLAND ECONOMY

A subsistence economy is one where people perform traditional activities to meet their individual and group needs for security, and have no reason to accumulate wealth except to ensure their future survival. There is a high degree of sharing and reliance on existing natural

resources, development and maintenance of the natural environment and skills to harvest and maintain these resources. The nature of the subsistence economy is reflected in the social organization of families, where each member of a *utu* performs a different set of activities that are assigned based on sex and age. It is important for the survival of the group that each member fulfils the roles and responsibilities assigned to him/her.

Typical subsistence activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai, weaving mats, making thatch, rolling string, fetching water, collecting firewood, making fish traps and hooks, cleaning and washing, cooking and house construction amongst others. Most of these activities are performed by the adult members of the family, while it falls upon the younger members to collect firewood and fetch water, clean the dishes, the compound, and assist the adult members to do the easy part of their chores. Unfortunately, subsistence living is slowly disappearing and being replaced by a cash economy where most subsistence activities are now not only catered towards subsistence living but also to generate income to pay for the basic necessities of rice, sugar, flour and tinned food.

Where most of the fishing was done for subsistence, it is now sold where there is a surplus, given freely to relatives, preserved for later consumption or sold , often to council staff. Due to the increasing dependence on imported goods that are sold to the public by small stores, the importance of cash as a medium of exchange, has now dominated bartering and sharing that were once strong traditions of Kiribati.

Other than fishing, copra cutting is the mainstay of the people on the outer islands. Seasons of drought and rain are greatly reflected in the copra production for the islands that has been fluctuating over the years. Butaritari, Abaiang, North Tarawa, Maiana, Kuria, Aranuka, Nonouti, Beru and Nikunau all had the year 2000 as the year when they had the least copra production.

EMPLOYMENT

The Island Councils serve as the biggest employers for people on the outer islands, employing islanders as village wardens, village nurses, drivers, hotel keepers, and office (typing, treasurer, clerk), assistants etc. Depending on the need, Councils may from time to time engage contractors and laborers to undertake short carpentry or auto-mechanical jobs. Seasonal employment is usually available when Government or large Council projects are undertaken, especially those which require the service of casual labourers.

Manual labor is also regularly needed in the stevedoring of visiting supply ships, which make regular runs to the outer islands carrying food, fuel, timber, and other general goods. Shipping services to the Northern and Central islands are more frequent than to the Southern islands, or to Tabuaeran and Teraina in the East. Ships are offloaded on reaching the island by casual laborers. On the return trip, these ships are loaded with copra, empty fuel drums and some local produce like salted fish, mats, *bwabwai* (taro) and *kamwaimwai* (a sweet

syrup made from coconut toddy) for relatives in South Tarawa or for the ship officers themselves. Stevedoring provides an alternative way to earn income.

Apart from a handful of jobs offered by the Island Councils in their limited services, the opportunity for paid employment for the islanders is almost non-existent.

TRADE AND COMMERCE

Commercial/cash trading is an introduced concept in Kiribati society and has become an important part of the lives of the people. To carry out any business activity involving trade, requires that one purchase a business license from the Island Council, the cost of which varies depending on the type of business to be carried out. The most common business licenses on record are those of wholesaling, retailing, hawkers and fishing.

The bulk of supplies that are normally shipped to the islands by scheduled or chartered island trips consist of rice, sugar, flour, tinned food, tobacco and fuel. Most of the times, these are transported as ordered from the island and also come in the form of floats otherwise, all of these are transported whenever there is a scheduled trip to the island by the Kiribati Shipping Company Ltd or any other vessel from Tarawa. Only in times when there is lack of cargo on the island are foodstuffs and other commodities freighted by air.

Cargo ships from overseas bring imported products only to Betio in South Tarawa, and to Kiritimati island. These are then distributed to the rest of the islands all over Kiribati. Product prices are the same throughout the Gilbert Group, which contrast to product prices in the Line Group that generally tend to be higher due to the cost of having to re-transport them from Tarawa to Kiritimati Island over a greater distance compared to the outer islands in the Gilbert Group. There are certain commodities whose prices are controlled by the Government. These products include rice, sugar, flour, tobacco and fuel whose prices are subsidized and set by the Government and which all businesses are required to follow if they are to operate legally.

REMITTANCES

The general flow of seafarer's remittances into the country is continuous and has increased over the years with more engaged in seafaring employment. There are now three major employers of seafarers from Kiribati:

1. South Pacific Marine Services (SPMS)
2. The Kiribati Fishing Services (KFS)
3. Central Pacific Producers Limited (CPPL)

Seafarers are employed as general deck workers on German ships through SPMS while Japanese employees are employed to be fishermen on the Japanese fishing vessels through KFS. Others working on Japanese or Korean fishing boats are recruited through CPPL. The seafarer's salaries are paid straight into the individual accounts in Kiribati or family accounts. Money is also sent back to churches depending on individual seafarer obligations. Families

are dependent on decisions made by their seafarer husband or son on how much remittance they will receive.

Remittance sent back to Kiribati in 1974 was AU$800,000 with an additional AU$200,000 brought back in the form of leave pay at the end of contracts. Remittances grew to $1.3 million in 1979, $9.7 million in 1998 and $12.29 million in 2003 (MFED 1987). Of this $12.29 million, 86% came from those employed by SPMS while 14% came from those employed by KFS. With more recruiting agencies and more men and women employed overseas the amount of remittance is increasing.

TRANSPORTATION

The most common form of land transport in outer islands is the pushbike followed by motorbikes and trucks. Motorcycles rank second in popularity, as they are generally more expensive than pushbikes. The Island Councils have JSS trucks and the Council charges a small fare for pupils and inter-village travelers in order to raise funds to meet the truck's operational cost and maintenance. A project within MISA known as the Health Services Communication Improvement Fund (HSCIF) is a maintenance fund supplying spare parts for these JSS trucks and motorcycles for health workers on each island.

Even though pushbikes are the main means of transportation for the islanders, motorbikes are however also popular as they make traveling a lot easier plus they can also be hired out to visiting officials at a cost of $20.00 per day. Pushbikes can also be rented out but most of the time, visiting officials do not have the time to go cycling around the island to carry out their work with most preferring motorbikes or trucks as their transportation during their visit.

In most cases trucks are hired when there are island functions requiring most of the communities to attend, and to transport coconuts, wood, gravel or sand. Trucks can also be hired by visitors to tour the island.

Kiribati is a country of fragmented islands dispersed over a vast ocean area that extends almost 3,000 kilometers across the central Pacific, bordering the Marshall Islands in the east and French Polynesia in the west. This fragmentation and vastness of ocean give rise to major communication and transport problems that have been, and will continue to be the greatest development challenge for government. Shipping is a critical service that needs to be provided and maintained between Tarawa and the outer islands, in order to facilitate the transportation of food and material supplies to and from the islands. Government has been the major shipping operator since colonial times, and continues to dominate this service, although private businesses have secured an increasing share of the market.

The Kiribati Shipping Services Company Ltd. (KSSCL) is a Government company that provides the basic shipping services to all the outer islands of Kiribati. However, there are also an increasing number of privately owned boats providing shipping services to the outer islands including 'Bwaan te Tangira' owned by the Onotoans, 'Te Ataana' privately owned

by a Phillipino resident, and others. Most major service work on the ships excluding the privately owned sea vessels are carried out in nearby Fiji as the KSSCL is not equipped as yet to carry out these service jobs on their sea vessels. The privately owned vessels on the other hand are also serviced in Fiji or locally as some are made from local imported materials such as big housed catamarans.

Land and sea transportation within most islands is not a major issue as most Island Councils have their own trucks and people have their own pushbikes and motorbikes. The councils and individuals also have their own canoes and boats which are used for fishing and there is hardly any problem with transportation on the island and to and from the island. The issue of transportation relates to inter-island travel, particularly so for people in the Phoenix and the Line islands.

COMMUNICATION

Until a few years ago, the main mode of communication between the islands was with HAM radio communication systems operated by TSKL. Each island has one such system based at the Island Council headquarters on the island. Members of the public normally used this system for inter-island communication, as does the Island Council and central government in Tarawa. However, despite the fact that the system has been dependable and effective, there were a few problems relating to its use:

i. the system is not safe for sharing of private information, since the frequency used can be accessed by anyone with such a radio, and the radio equipment is operated by a TSKL agent;
ii. the use of the radio is dictated by a schedule, hence only available for 1-2 hours daily, and only from Mondays to Fridays;
iii. the radio operator lacks the skill to undertake major repair works if the radio breaks down. Communication with an island could be cut for at least one week during which the radio is sent to Tarawa for repairs or awaits a technician from South Tarawa.
iv. Since there is only one radio, people from distant villages must take long journeys in order to use it.

In order to address these problems TSKL decided to slowly introduce a new technology, a satellite-based telephone system which connects directly to the telephone system in Tarawa. The new system also supports the use of facsimile and internet, and therefore was considered a major accomplishment. This system on the outer islands is powered by 450 solar panels that harness this solar to 1000 amp. batteries.

All islands in Kiribati are equipped with several CB radios at the different sectors on the island:

- Police quarters
- Island Council office operated by the radio operator employed by the Council

- Health Centers
- Air Kiribati

The Police and Medical radios are used solely by the individual officers for their own inter-department calls for supplies and emergencies while the Air Kiribati and health centre radios are used for communicating passenger and flight details and health matters. These CB radios by their nature are not used by the public unless it is an emergency of some kind when the Island Council radio and telephone cannot be accessed or is broken.

RELIGION

The majority of the people in Kiribati are Christians; they are either Roman Catholic or Reformed. These two dominant Christian groups, the Roman Catholic Church and the Kiribati Protestant Church account for more than 80 percent of the total population.

Although the Churches have nothing to do with the forces that reshape the contours of our islands and threaten our ecosystem, it is the correlation between the activities of their members, their fundraising in particular, the destruction of ecosystems, the depletion of resources, and the plight of many people. With many of their members unemployed, most of them earning less than $10 a week, the welfare of many of their members is bleak as many of them give more than 80 percent of their meagre income as village or national church levy to support the acitivities of their Churches. And to get extra cash for these church levies, as well as to support and fulfil their family obligations, many members, especially the unemployed would take more than they need from the land and the sea. In doing thus, they, too, contribute directly or indirectly to the destruction of certain places and the depletion of resources.

Addressing the issues that make life unbearable for the people means addressing the causes as well that drive or contribute to the issues in the islands, and this include ideas or ideologies that have led to destructive or inconsiderate attitudes toward the environment and the resources.

The first is the misunderstanding of the meaning of *dominion* given to man in the Genesis creation narrative. This is often missinterpreted as power over the whole of the created order (Gen. 1:26-28). Most people do not read the meaning of that dominion in Gen. 2: 15 – to work and take care of God's garden. This missunderstaning of the Genesis account is anthropocentric, theologically untenable, and very destructive to the environment and to life as a whole.

The second is the demand of the Churches of funds from their members, and the act of giving by the members to their Churhes. Most of the monies required by the major Churches, the Roman Catholic, but the Kiribati Protestant Church in particular, could be lessened if their unnecessary programmes and manpower are trimmed to the essential at both the village and national level. As to the act of giving, many Christians perform this good work for all the wrong reasons: to receive material blessings in this world, for them and their children; and

more importantly, to secure a place in the heavenly kingdom away from the eternal fires of hell. To do something good for the wrong reason is to commit an unpardonable sin – unpardonable because it disregards the counsel of wisdom and conscience, and it is based on a wrong motive. In Scripture this is known as sin or offense to the Holy Spirit, and is unpardonable.

This wrong understanding of giving in the Churches is further enhanced with propaganda which is unbibilical and unchristian: *give generously to the Churches and God will reward you handsomely here and in the afterlife*. Christian giving should be a response to the gracious act of God, to what God had done for humanity and the whole created order – the redemption of our fall and providing for us, through the life but moreso in the passion and death of Jesus, a means of recognizing evil at its worst and the goodness of God at its best. We give generously to the Church, then, as an act of love, our love for God who first loved us. And so we give what we are able to and can afford. This is a giving or offering more precious and acceptable to God, and not destructible to life and God's creation. Those Christians who continue to give to the Church in order to receive material blessngs in this life and a place in heaven in the afterlife may usefully be reminded that they will get neither, and that that type of giving is destructive to both themselves and to God's creation.

To make matters worse, some Church leaders are poor stewards of the monies made available to them from the toil and blood of the members. The record of the Kiribati Protestant Church is the worst of all the Christians Churches when it comes to managing and using Church money or funds given or entrusted to them. A legislation to protect Church funds from misuse and mismanagement by Church leaders is perhaps long overdue.
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CLLIMATE CHANGE ISSUES FOR PEOPLE IN THE NORTHERN DISTRICT

1. Kaotin te koburake n taari iaon te aba (seawater intrusion to lowlands)
2. Kanakin te mataniwiin te aba ae koarakoara (serious coastal erosion)
3. Kekeraken te kabuebue (increasing humidity)
4. Korakoran rikiraken te nganaga n te ika (increase in fish poisoning)
5. E rinnako taari nako nanon te aba (seawater seepage into land)
6. Bibitakin tein te aba (changing landcape)
7. E bwaka marin taari (te bun, koikoi, ika etc...) (reduction and overexploitation of marine resources)
8. Korakoran rikiraken te nganaga n te ika (seriousness in fish poisoning)
9. Maten taiani kai (nii a bwaka urukauia) (dying trees amd plants)
10. Rinin taari n taian rua (n tain te ooniia) (Seawater seepage into babai pits at spring tide)
11. E a tarika te ran (e aki kainanoaki te taoro ngkana ko kaburoa kanam te ika n ranin te manibwa) (brackish water, no need to add salt to cooked fish)
12. E rootaki mauia aroka; te mai, te nii etc... (Fruit trees affected, coconut, breadfruit trees, etc)
13. Ea bitaki ke ni buretata tein kanoan te bong (aumeang ma te aumaiaki) (normal weather and seasonal patterns change)
14. Rootakin nanon ruua n te bwatakataka (bwabwai pits dried up)
15. E mwaiti te aoraki ni irekereke ma te bubu ao te kabuebue man korakoran riringan taai, (spead of diseases related to dust and high temperatures)
16. E bitaki aron butin te ika ao marin te aba (n aron are Ko taneiai n anaa te ikari n tain te oti ao e a bitaki bwa ai akea) (changing spawning runs of fish, or failure to spawn)
17. E a raka mwaitin te kimoa ae bubura ao n urubwai (home rat population increases with more destruction)

18. E a bitaki te kai ni borau (traditional navigations confused)
19. Bitakin aron ao tain mwamwaingingia ika (fish migration and spawning runs altered)
20. Maten taian ane (corals dying)

CLIMATE CHANGE ISSUES FOR THE CENTRAL DISTRICT

- Te kanaki n te aba (coastal erosion)
- Uruakin auti ma boono (destruction of seawaals and houses)
- Rakan kabuebuen taai (increase in temperature)
- Namakinaki bitakin kanoan te bong e.g taai ni karau e aki bwaka te karau, mwanangaia ika e rotaki naba (climate change felt; rainy seasons do not come, fish migration affected)
- Tarikan mwanika (brackish water in wells)
- A mate kain-amarake (dying fruit trees and plants)
- E a karako te ika ao amwaraken taari e.g nouo, te bun (reduction in marine resources and fish, shellfish)
- Rikiraken aoraki n aron te bekanako, waimata, etc (increase in diarrhea, sore eyes)
- Te kanaki ni mataniwin te aba (coastal erosion)
- Te mautakataka/rongo (drought)
- Rotakin maiun aroka (trees seriously affected)
- Kerikaakin marin taari (te nama, etc) (reduction in marine resources)
- A koro ika nte aba n aron te ingimea (Banaba) (stranded tuna fish, eg.Banaba)
- Maten te tiwiita (dying seaweed)
- Rikiraken te nganga (increase in fish poisioning)
- Maten ika (fish dying)

CLLIMATE CHANGE ISSUES FOR THE SOUTHERN DISTRICT

- Rikiraken te botanaomata (population growth/increase/explosion)
- Kanakin mataniwin te aba (coastal erosion)
- Rikin taabo tabeua (accretion in some areas)
- A bua manin abara tabeua (nimareburebu, kanebu, rirongo, a mwaiti riki) (loss of plants and insects including nimareburebu (Hernandia nvmphaeaefolia), kanebu, rirongo, and many others)
- Bibitakin te aira (change in sea current patterns)
- Bibitakin aron te Aumaiaki ao Aumeang (Changing wet and dry seasons)
- Kerikakin marin taari (ikabuti) (reduction in marine resources)
- E a moanna n tarika te ran (well water getting brackish)
- Rakan te iabuti (sea level rise)

CLLIMATE CHANGE ISSUES FOR PEOPLE IN THE LINE ISLANDS

1. Rikiraken te kabuebue ao te mwautakataka are e a rooti maiun marin taari ao te nei ni baneawa ni ikotaki ma maiun aroka ao kaai n amarake. (increase in temperature affecting marine resources, milkfish and fruit trees)
2. Rikiraken iabutin taari (tokan taari iaon te aba) are e a kariki uruaki ao rootaki n aron; [sea level rise (seawater intrusion) causing desyructions and damages such as:)
    i. te kawai ma te buriti (road and bridge)
    ii. auti ni maeka (homes)
    iii. kaai n amarake (fruit trees)
    iv. te seaweed (seaweed)
3. Bonon taian rawa n rororake (closure of boat passages)
4. Kanakinakoan mataniwin te aba (coastal erosion)

5. Buakakan te ran ni mooi (mangen aia bwai ni mwakuri kain England ao America) (contaminated and polluted drining water caused by British and American tools and ammunition)

COMBINED KEY ISSUES FOR ALL THE ISLANDS: RISKS & VULNERABILITIES

Risks & Vulnerabilities	Affected Islands
Kerikakin marin taari n aron te were, tarabuti, ikabuti, ntabanebane, kereboki ao a mwaiti riki. *Depletion of marine resources, sea-cucumbers, bech-de-mer and other fish species eg tarabuti, ingimea,etc*	Butaritari, Abaiang, Marakei, North Tarawa, Makin, Kiritimati, Tabuaeran, Teraina, Beru, Banaba, Tamana, Arorae, Makin, Maiana, Kuria, Aranuka, Abemama, Nonouti, TabNorth & South, Onotoa, Beru, Nikunau, Tamana, Arorae.
Kanakinakon mataniwiin te aba *Coastal erosion*	Makin, Butaritari, Marakei, Abaiang, North Tarawa, Maiana, Kuria, Aranuka, Abemama, South Tarawa, Kiritimati, Tabuaeran, Teraina, Nonouti, Tabiteuea (North & South)Onotoa, Beru, Nikunau, Tamana and Arorae.
E a rikirake te kabuebue *Many islands have voiced their concerns about the increasingly hot atmosphere experienced.*	Makin, Butaritari, Marakei, Abaiang, North Tarawa, Kiritimati, Tabuaera,, Teraina, Banaba, Maiana, Kuria, Aranuka, Abemama, Nonouti, TabNorth & South, Onotoa, Beru, Nikunau, Tamana, Arorae
Koburaken taari mai iaan tano nakon nanon te rua ni babai *Intrusion of sea-water into the babai pits*	Makin, Butaritari
E a rikirake te nganga man te ika *Fish poisoning is increasing*	Makin, Butaritari, Marakei, Abaiang, North Tarawa, Maiana, Kuria, Aranuka, Abemama
A mate kaai ma kai-n-amwarake man te mwautakataka *Dry spells have caused trees to die (root and food crops)*	Makin, Butaritari, Marakei, Abaiang, Marakei, Tamana, Kiritimati, Beru, Onotoa, Tabnorth, TabSouth, Nikunau, Tamana, Arorae, Maiana, Kuria, Aranuka, Abemama, North Tarawa
Rinnakon taari n ruua ni babai ao mwanibwa ni mooi n tain te iababa *Flooding of sea water during high tides into the babai pits, wells and other infrastructures*	Makin, Butaritari, Beru, North Tarawa, Marakei, Abaiang,

Risks & Vulnerabilities	Affected Islands
E a tarika te mwanibwa ni mooi *Brackish well –water*	Kiebu (Makin), Tamana, Beru, Onotoa, TabNorth & South, Beru, Nikunau, Tamana, Arorae, Abaiang, North Tarawa, Maiana, Kuria, Aranuka, Abemama
Bitakin te Aumeang ao Aumaiaki e roota naba mwaingingiia ika ao kaai ni borau. *Unpredictable weather eg El Nina and La Nino seasons have changed and the impact affects the seasons of the migratory fish and navigation activities.*	Makin, Butaritari, Marakei, Abaiang, North Tarawa, Kiritimati, Tabuaeran, Teraina, North Tarawa, Maiana, Kuria, Aranuka, Abemama
E buakaka ranin te mwanibwa bwa imwiin taunakin bwaai n aia tai ni maeka kain Amerika ao Engiran *Water pollution (rusting waste buried underground by the Americans and British during their occupation on the island).*	London (Kirimati)
Boitin kaaban auti ni maeka bwa tena n asbestos *Asbestos (poisonous roofing on all houses occupied by the phosphate miners left by the British Phosphate Commission)*	Banaba
Akean te ran ngkana e uruaki te mitiin are e onika taari nakon te ran ae mam *Water shortage or lack of water, desalination plant broken*	Banaba
E a mao kanakin te koumwara , te katura ao te bun *Bitter taste found on shell-fishes flesh*	Beru, North Tarawa, Maiana, Abemama, Nonouti
Bitakin karan rakai *Bleaching of corals*	Nonouti, Tab North & TabSouth, Onotoa, Beru, Nikunau, Tamana, Arorae

Risks & Vulnerabilities	Affected Islands
E a karako mwaitin te bakoa, ao te ingimea *Fish stock declining, shark and tuna*	Tamana, Arorae (bakoa/shark) North Tarawa, Maiana, Kuria, Aranuka, Abemama (ingimea)
Uruakin te auti ma te bono *Destruction of houses and sea-walls*	Maiana, Kuria, Aranuka, Abemama, North Tarawa, Abaiang
A mate tiwiita *Seaweeds dying*	Maiana, North Tarawa, Abemama
A mate(betirake) ika aika uarereke ni karokoa ae e bubura man korakoran te kabuebuen are e roota taari. Tens of thousands of small dead fish to bigger ones floating on the surface of the water (sea) due to the increasingly hot climate affecting the sea.	Kuria, Aranuka, Abemama, Banaba

SUMMARY OF FINDINGS

Most of the islands have limited land area and resources, and with the continual destruction of coastal areas and sea water getting inland destroying babai and fruit trees, the people will rely more and more, as they already are, on cargo and food imported from overseas. Already on most islands drinking water is a problem: many wells have become too brackish for human consumption.

Coconut, which is the main commercial agricultural produce and is used in the production of copra, is now more scarce on most islands, as more and more people compete to harvest it. This problem is particularly noticeable on drought stricken islands and on small islands with big populations like Makin – there are not enough coconuts for everyone.

For all the islands population growth is a major issue. Generally speaking the more the population grows the higher the pressure on the limited land and marine resources since both resources, fruit trees and reefs and mudflats, are comparatively small. This has already happened – a lot more people now are engaged in collecting fruits and in ocean flat fishing, and indeed the volume of their fruit collected and catch have decreased.

We have yet to complete the calculation of the value of the annual imports of food (and other items) to the outer islands against their exports; however, our preliminary findings have already indicated that the balance of trade for each island is already a trade deficit. Although people would have some money earned from their handicrafts, copra, seaweed, or fishing, much of the money spent to buy these imported foods and items come from remittances and bubuti (begging) from relatives or neighbours who have paid jobs in the islands. With populations ever growing on most islands, coupled with dying fruit trees and poor yields from the surviving trees because of extended droughts and sea water getting inland, many people will indeed struggle to survive from one day to the next. In fact, this is already happening in all of the islands in the Gilberts group where the bulk of the population lives.

Government is trying its best to help the people revive the soil on their lands, introduce new crops and planting techniques to ensure that there is food for today and tomorrow, but with extended droughts, land washed away by coastal erosion, and salt water in an already poor soil there is not much hope for the soil and plants in most of the islands. The fact that there is an outcry when cargo is delayed or run out from the shops is a clear indication that most people depend on imported food items and cannot survive from their land produce alone. It seems that most, if not all, of the islands have passed their optimum population density.

Water, which is very basic for survival and habitation, has always been an issue in the islands. Most islands are just thin strips of sand, stone, and rock; and if freshwater is at its best toward the center of the atolls, with coastlines washed away by erosion there will not be enough land mass to have a centre some distance away from the coast. The status of drinking water on most islands is not improving, some becoming more severe than others because of coastal erosion and extended droughts.

And finally, what is obvious from the *Assessment Reports*, the *Islands Profile Reports*, and the KDP presentations and discussions during the National Summit was that there is competition for attention and funds between development - to enhance economic viability, sustainability, and self-sufficeincy - and social services. The balance between these is unequal in earlier Development Plans: social services getting more than their fair share of the funds. It seems that earlier development plans were shopping lists of social service projects that government hoped to finance from overseas donors and partners. Many of these projects became too ambitious or difficult to sustain, and someresulted in construction of infrastructure which proved impossible to maintain.

INSERT PARAGRAPH ON COMPETITION FOR FUNDS

Most of the issues in the islands can be made bearable, and many will forever remain with us for as long as we remain in these atolls. However, adapting to the changes to our shoreline, our reefs, our mudflats and oceans, to our fruit trees and groundwater, to our health and welfare (and the list goes on) is just addressing one side of the coin. The real culprits are the causes that gave rise to the issues in the first place, and they must be sought and clearly identified.

It is unfortunate that some of the issues today were one-off solutions to problems of yesterday, or unsuspected side effects of earlier development activities or social services. Some of the issues, however, are the price of being 'modernised', being part of the world community of nations, being an independent state, trying to keep up with the Joneses. Some are the mistakes of the past we just cannot unwind, out of pride and myopia. Every issue is important, every cause is important, and if possible every one of them should be addressed. Indeed, some problems are more important than others, but who says that life is problem-free?

Our forefathers have learnt to live with many of their problems for hundreds, perhaps thousands of years, and they must have solved many of them or they would have left a long time ago and we would not be here. But life was never meant to be easy in these islands, and in the traditions (myths and legends) life, we are told, was lived not so much by trying to solve every problem but rather by continually changing to accommodate the problems, by adapting through trial and error. With small islands and a small population, most of our issues could be managed. For those who continue to think that it is about time to start packing and

prepare to move may usefully be reminded that *small* and *appropriate* are still beautiful, especially for and in these small islands.

PART II ISLAND PROFILES & ISSUES

The bulk of what is presented below is the summary of the effects of Climate Change extracted from *Island Profiles* and *the Island Risk Assessments* documents. It includes also the views of the people of the respective islands that came for the National Summit in late April, 2011. While most of the islands do have their own unique issues and particular solutions for them, many of the issues are so common throughout the islands that the report of one island could have been a report on any island.

While most of the individual island reports focus on the impacts of the changing weather patterns on the land and the encircling reers and surrounding waters, most of the observable changes to the land and environment are mentioned, with no direct reference to Climate Change as the root cause of the issue identified. Where the majority of the inhabitants of an island have been convinced that the cause of the issue is something other than Climate Change, this is noted and mentioned in the text. This is important because not all issues and problems in the islands are directly connected to Climate Change. Some of the issues have been in these islands long before scientists and the general public began to talk of the 'greenhouse effect', 'of global warming', or of Climate Change. But having said that, it is also important to point out from the outset that while a lot of the issues are not directly connected to Climate Change, the impact of Climate Change on the land, on food crops, on the habitat and the whole ecosystem affected in one way or another the way people think, interact, and perform their daily chores, including their health and wellbeing.

The summary of the major issues for each island is presented in a chart form at the end of each island report. It is unfortunate that 2 islands are not included amongst the summaries below. These two are South Tarawa and Kiritimati, and simply because there are neither risk assessments nor Islands profile reports written up for them. To construct a risk assessment report and a socio-economic profile of the two islands would require more time and effort. These two islands aside, the summary of all the islands are presented below.

MAKIN

PHYSICAL FEATURES

Makin is the second smallest island in the Gilbert Group, located at Latitude 3^{o} 20' N and Longitude 172^{o} 59'E. It has a land area of 7.89 square kilometres with a width varying from 50 m to 2 km. There are five main islets, the largest two of which, namely Makin and Kiebu, are inhabited. The five islets are arranged in a linear formation from north to south, typical of small coral islands which do not have lagoons. Makin used to have a small lagoon, though the lagoon has now become shallow, most probably due to the construction of a causeway.

Makin is divided into five islets by shallow reef passages. The island resembles a large exclamation mark, with the largest islet, Makin, located in the northernmost tip of the island. The island is protected from the ocean by a narrow strip of fringing reef which encircles the land. Some parts of Makin and Kiebu islets are swampy and are used by the villages to grow *bwabwai* (*Cyrtosperma chamissonis)* banana, and other food crops. Unfortunately these swampy areas are vulnerable to seawater intrusion which occurs once in a while during excessive high tides.

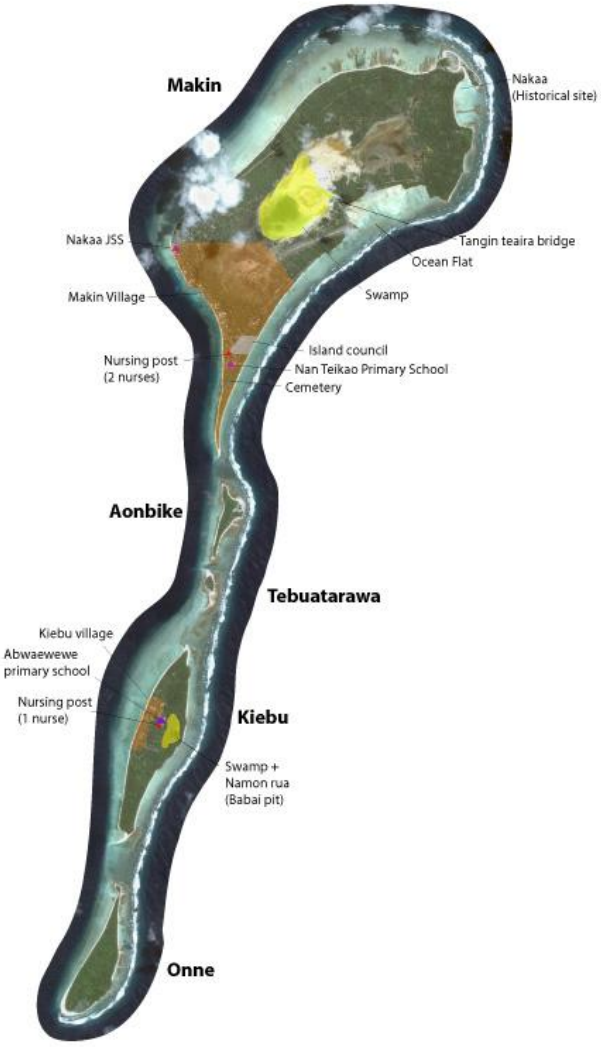
Like other coral islands and atolls Makin has sandy and porous soil, with an average height of about 2 meters above sea-level. However, due to its high annual rainfall, vegetation grows well on Makin, resulting in good fertile soil. Most of the important food crops such as coconut, *bwabwai* (giant taro), pandanus and breadfruit grow well without much need of cultivation.

The main source of drinking water is the freshwater lens. There are over 70 wells on Makin and 17 rainwater catchments. Most wells are not covered or protected and in close proximity to *bwabwai* pits and therefore prone to contamination. At Kiebu islet, one communal *bwabwai* pit is located very close to a saltwater pond. When it rains the pond overflows causing damage to the *bwabwai* plants. More recently, the increasing incidence- of unusually high tides have caused the intrusion of saltwater into the communal pit, resulting in salt contamination and damage of food crops.

Makin has an equatorial climate where temperatures are high all year round and there is a distinct wet and dry season. The temperature ranges between 28˚ Celsius at dawn to 31˚ Celsius in the early afternoon. Cool ocean breezes play an important role in keeping the temperatures down during hot days. Due to its geographic position Makin is generally wetter than most islands in Kiribati.

The wet season, according to records, falls between the months of September to February, while the dry season begins in March and ends in August. This pattern has changed dramatically. Droughts come unexpectedly and rain comes when El Nino moves closer to the Western Pacific.

Figure 1: A geographical map of Makin

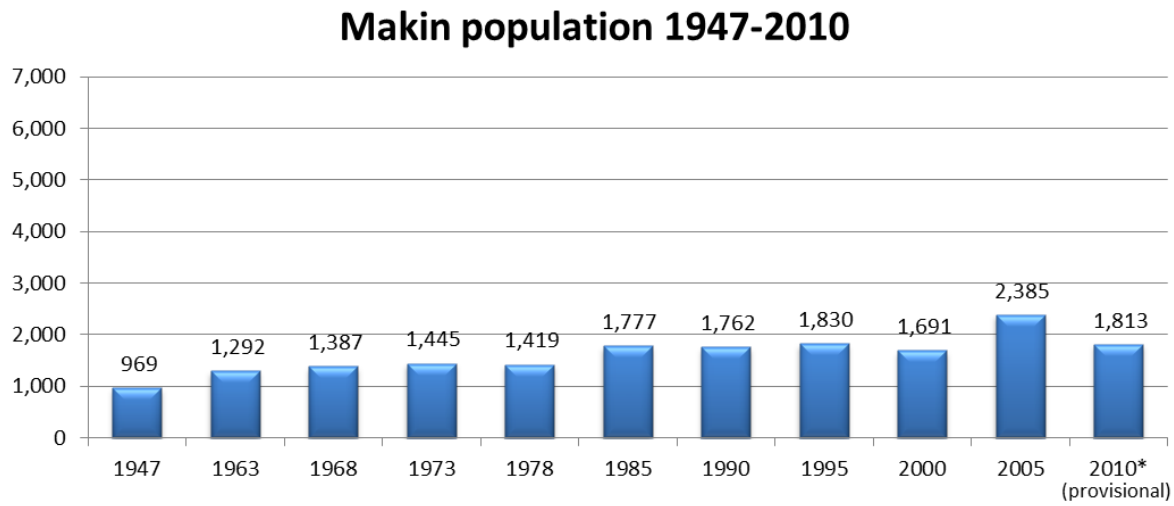


Note: Refer to Makin Frofile 2008 for problem areas and sites of significance.

POPULATION

More than two thirds of the population resides on Makin islet, the main administrative and commercial centre of the island; it has more land space for food crops, large water lens, and a large fishing area.

In the 2010 census, the population of Makin was 1,813. Compared to the 2005 census of 2,385, there is a decrease, but this anomaly is explained by the fact that there was a sudden return of Makin people to the island in 2005 to celebrate various occasions.



The population of Makin grew by 7.2% between 2000 and 2010, an annual population growth rate of 0.70%.

Makin has a combined land area of 7.89 square kilometers and a population of 1,813 (2010 census), giving a population density of 230 people per square kilometer. Compared with other outer islands in Kiribati, Makin is the sixth most densely populated island.

LAND AND MARINE RESOURCES

Land is owned by the families of former chiefs and by the people in general. In the past the reef and offshore areas were also owned by families. The head of the family had a right to distribute and prohibit access to the reef (Lambert B: Land Tenure in the Pacific 1971). This practice no longer exists and the people are free to fish in any part of the reef and offshore areas.

Land use on Makin, like other islands in Kiribati, is unplanned. A substantial portion of the island is occupied by village settlements. These are normally located on the lagoon side (leeward) and at the center of the island. The villages consist of houses that are built in linear formation following the general pattern of the island. The main-road is built through the village and runs along the length of the island. Each village contains individual family households that consist of a separate kitchen, toilet, and a sleeping house. At the center of the villages, households are closer to each other with a distance of about 2-3 meters between them. At both ends of the villages households are more sparsely distributed.

A large portion of the land is used up by wild bush and cultivated *bwabwai*. The dominant tree in terms of numbers is the coconut, which grows everywhere. Other plants include pandanus (*te kaina*), breadfruit trees (*te mai*) and bananas that grow mostly in village areas. The vegetation grows well because of high annual rainfall and good topsoil. Inhabited houses are well built and clean but unoccupied ones are deteriorating with tall grass and fallen leaves everywhere. On Kiebu islet, the only *bwabwai* pit (Namonrua) that provides *bwabwai* to the community overflows during heavy rainfall.

There are two types of land ownership on Makin. The first system is where land is communally owned by the islanders, and everyone has the right to harvest the produce of the land. To ensure that everybody has equal access to the resources, no one is allowed to establish residence on the community land outside village boundaries. The second system is where individuals own small plots of land and only they and their immediate family members have the right to their land.

The table below shows the size of Makin's reef, lagoon and land area in square kilometers. Makin has 5.97 square kilometers of reef. This is a small reef area compared to other larger islands in Kiribati. The island is of simple coral formation and therefore has no real lagoon, however one of the larger ocean passages which cuts through the island has become shallow at one end, creating a small mud flat which still links the ocean with a narrow passage. Shell fish can be found on the mudflat at low tide, and abundant schools of small fish live among the roots of the mangroves during high tide. These resources provide an important source of food to the people of Makin village.

Size of Reef/Lagoon Size

Islands	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Makin	5.97	5.40	0.34	7.89

Makin fishermen are forced to rely mainly on deep ocean fishing for their livelihood like other reef islands without lagoons such as Nikunau, Tamana and Arorae. In times of rough weather people simply do without fish; those with cash buy tinned foods from the shops to supplement their diet.

EDUCATION

In 2006 a total of 327 pupils were enrolled in two primary schools, namely Abaewewe and Teikao. Of this number 171 were girls and 156 were boys. The total number of teachers in both primary schools was 11, out of which 3 were based at Abaewewe and 8 at Teikao.

For the whole island there is only one Junior Secondary School, Nakaa Junior Secondary School (named after the legendary guardian of the gateway to the place of the dead). As of 2006 the number of pupils enrolled in all forms totals to 192. Of this figure 70 were in Form 1, 49 were in Form 2, and

73 were in Form 3. With a teaching staff of 13, the Teacher to Pupil ratio at JSS was 1 teacher to every 14 pupils.

The number of pupils who were in class 5 of primary school in 2005 was 58. This is the same number that we would expect to enroll for class 6 in 2006. Surprisingly the figure increased to 61 in 2006, reflecting a difference of 3 over the previous year's figure. Using the same method for JSS we observe that there were 55 pupils in Form 2 in 2005, who went on to Form 3 in 2006. However in 2006 the number was 72, showing an increase of 13.

Total enrolment in all schools for 2005 and 2006 were 172 and 190, respectively. In other words, the school population is growing, possibly because of migration of families to Makin, or because students are repeating the same form. Repeat of same form particularly at JSS level is common. The reason for repeating class is to ensure that students' performances improve for selection examinations.

Nakaa Junior Secondary School and Teikao Primary School are on Makin. Abaewewe Primary school is in Kiebu village. Schools are small due to the size of the Islands population. The condition of classrooms, teacher living quarters and other school buildings is generally poor. School buildings are of the local and permanent type and, as such, one would expect that local buildings will be better serviced due to the availability and low cost of materials. While repair and maintenance work on local buildings is more frequent, there is often insufficient funding to address full maintenance requirements at any one time. On the other hand, permanent buildings have not received any maintenance work for many years. As a result some had deteriorated so badly that local authorities are forced to use local materials to patch up damaged walls.

At Nan Teikao Primary School, negligence of a simple repair work to the roofing of a classroom complex has resulted in the collapse of full sections of the building – the cost of which may now run in tens of thousands dollars. School furniture is generally lacking, and it is not unusual to find pupils learning while sitting or lying on the ground. Some significant development assistance have been offered by resident diplomatic missions (such as Australia and New Zealand) who have provided rainwater tanks and school furniture to both the primary and JSS schools on Makin.

In 2006 Teikao Primary school had 221 students with 9 teachers while Abaewewe Primary School had 95 students with 3 teachers. By individual school Teikao had a ratio of 1 teacher for every 25 pupils while - 35 - Abaewewe had 1 teacher per 32 pupils. Combined the ratio for the two schools was 1 teacher per 26 pupils. This is the same with the national ratio for all primary schools in Kiribati which was 1 to 26 in 2006. Nakaa Junior Secondary School had 13 teachers with a total number of 300 students. The Teacher to Pupil ratio is 1:35 on average.

WATER

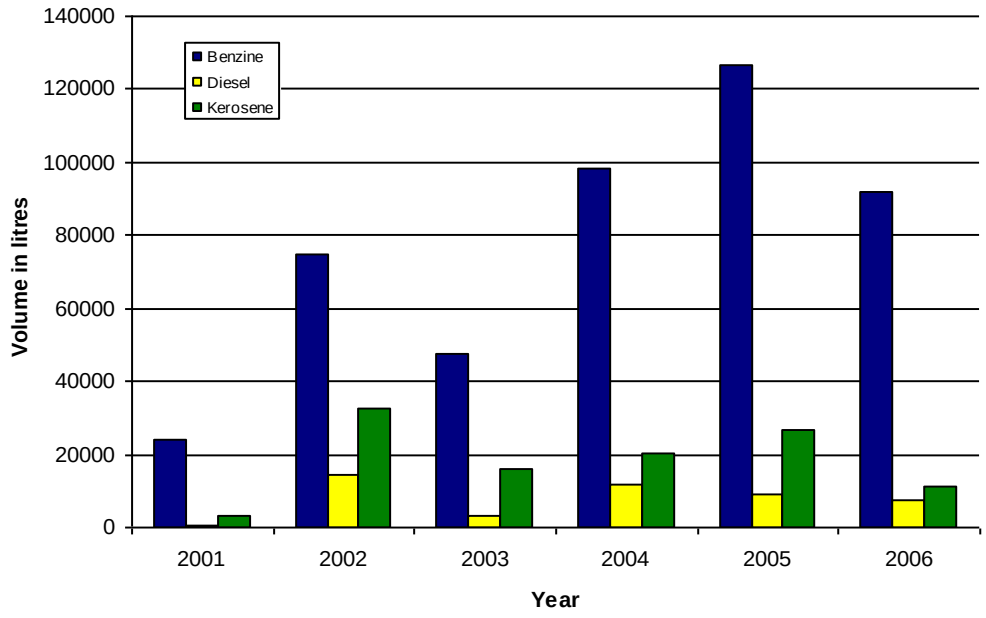
The main water sources for drinking and sanitary purposes are rainwater and groundwater respectively. The groundwater drawn out from open wells is also used for drinking purposes, but due to the close proximity of some open wells to pit latrines, people are often advised to boil water before drinking. The 328 households on Makin, according to 2005 census, have access to one or more sources of water, for drinking and other domestic uses. The 2005

census recorded that 48 households have access to rainwater, 79 to piped water, 133 to open wells, 182 to protected wells and 235 have access to both open and protected wells. According to records from the Ministry of Public Works (2007), Makin has benefited from various water development projects in the form of poly tanks, rainwater catchments, hand pumps and several solar pumps. The hand pumps were installed in the households, with solar pumps and water tanks installed in the schools, the churches and the community. In total there are 63 hand pumps, 44 poly tanks and 3 solar pumps. The purpose of these projects is to improve water accessibility and provide clean drinking water to the population. On Kiebu, a rainwater system has been installed to collect rainwater from a church building and distribute it to the entire village. The project was funded by Canada Fund. With a high annual rainfall, drinking water is not a problem on Makin.

ENERGY

Firewood, mainly in the form of coconut husk, dry coconut leaves and common wood is never lacking on Makin. In the olden days dried coconut meat was burned to provide lighting in the homes at night, while woven coconut leaves were used in night fishing. Nowadays people are resorting to the use of modern technology to provide energy to meet their private and public needs. The new technologies however use fossil fuel which is imported from overseas.

Kiribati Oil Company Limited (KOIL) imports fuel from overseas and distributes it to all the islands in Kiribati. Kerosene, benzene and diesel provide energy for cooking, lighting and transport. The 2005 census recorded that out of 328 households 39 owned power generators and 283 have pressure lamps. There were also 2 trucks, 48 motorcycles and 20 outboard motor engines. Electrical appliances include 195 radios, 3 computers and 8 CB radios, and all these equipment and machinery require fuel for their operation. The chart below shows the volume (in litres) of three major types of fuel sent to Makin between 2001 to 2006.



Source: KOIL data 2006

ISLANDS ECONOMY

Subsistence Economy

Typical subsistence activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai. These activities are performed by the adult members of a family, while the younger members are expected to collect firewood and fetch water, clean the *kaainga's* compound, and assist the adult members to do the easy part of their chores.

Most of the fishing is done for subsistence but where there is a surplus this is either given freely to relatives or sold to others. Due to the increasing dependence on imported goods which are sold to the
general public by small stores, the importance of cash as a medium of exchange is well appreciated by
the population. However the lack of infrastructure prevents most people from engaging seriously in selling surplus produce like fish in order to make money. Furthermore, as a subsistence economy everyone is expected to be well skilled and knowledgeable in many things in order to survive in the harsh island environment. While some people may be more skilled in one thing compared to others, the concept of specialization which is a strong feature of cash-based economies is absent on the islands.

Copra cutting

Copra production remains the most important commercial activity on Makin, which provides a reliable and sustainable source of income for many of the islanders. Annual copra production for Makin for the past 16 years shows there has been a slow increase in copra production during that period. Looking back 16 years one could observe the marked fluctuations in production level. These are the result of several factors among which are the changes in copra price and climatic conditions which affect production. As an example, production soared to a record high of nearly 500 tons in 2004 when a new Government came to power and increased the price of copra to AUD$0.60 cents a pound. In contrast, the sharp decline of production in 1993 was caused by a nationwide drought which lasted for more than several months.

Almost all households on Makin (over 90%) own coconut and breadfruit trees, two of the most important traditional fruit trees. Many households (60-80%) also grow pandanus, banana, and pawpaw trees, while *babai*, *te bero*, kumara and cabbages are grown but by a small percentage of families. Among the food crops mentioned here, only coconut and banana are sold to generate income. However unlike copra production which is done on a large scale and well organized with a special government agency (Copra Board) to oversee its operation, banana production is still small with most of the operation overseen by small businesses. It is therefore difficult to obtain the amount of money generated from the sale of banana over the past few years.

Employment

The Island Council serves as the biggest employer for Makin islanders, employing 39 staff in 2010, including five staff employed by the Ministry of Internal and Social Affairs (the clerk, assistant clerk, treasurer, assistant treasurer and Island Project Officer) and 34 island reisdents employed as village wardens, village nurses, drivers, hotel keepers, and office

assistants. Seasonal employment is usually available when Government or large Council projects are undertaken, especially those which require the service of casual laborers. The most common projects which generate jobs for the young men of Makin include construction of buildings and roads and other large infrastructure.

Trade and Commerce

As a small island with undeveloped infrastructure, under-utilized resources, and a dualistic economy

characterised by a high dependency on imported consumables, the size of trade and commerce on Makin is rather small but important. The most common n imported items are food, tobacco and fuel, which are normally shipped to Makin on boats. Among the imported food, rice, flour, sugar and tinned food make up the bulk of the supply.

Remittances

With limited employment and income-generating activities, many people on Makin depend to a great

extent on remittances sent to them by relatives working in Tarawa or overseas. According to a survey conducted in 2006 by the Kiribati Statistics Office it was found that a household on Makin receives an average of AUD$678 in remittances and gifts. With 328 households on Makin, this means that over $200,000 flows into the island's economy every year.

Agriculture

By Kiribati standard Makin is one of a small number of islands that have the greatest potential for agricultural development. This is due to the island's high annual rainfall and good soil. Beside coconut, a good variety of fruit and vegetable crops such as breadfruit, banana and pumpkin also grow well on the island. Recent projects carried out on the island by the Agricultural Division include coconut rehabilitation and the cross-breeding of a stud boar with local sows. The former met with little success but the later has an overwhelming demand by the islanders who have asked for more stud boars to the island to mate with their local sows. Pigs have cultural importance as they are the main dish in large family and village functions, where the size of a whole cooked pig, predetermines the success of a function.

The predominant food crops on Makin are *bwabwai*; banana, pandanus, coconut and breadfruit. Each family has its own bwabwai pits, breadfruit and toddy trees. Home gardening is not common but some households have their own vegetable gardens where they grow tomato, cabbage, cucumber and eggplant mainly for home consumption. Some people sell their bananas to business agents in Tarawa.

The main animals reared by the islanders are pigs and chickens, for home consumption. In 2005 the total number of pigs on Makin was 1083, with 93.5% of households owning at least 3 pigs. There were approximately 2465 local chickens. The people of Makin believe that they can produce more meat and vegetables for export to Tarawa if the problems of transport, communication and marketing are resolved. They also believe that training on vegetable and livestock production is important if trade in primary produce is going to be successful.

Fisheries

Since Makin is small, without a real lagoon, fishing is restricted to the ocean flat and deep ocean. The 2005 census records show that out of 328 households on Makin and Kiebu village 244 (74.3%) fish on the ocean flat while 204 (62.1%) venture in small canoes and boats to fish in the deep ocean surrounding Makin. According to locals, fishing on the reef flat can be dangerous because of the presence of the Crown-of-thorns starfish (*Acanthaster plancii*).

Fishing is a daily activity for the men. A Council fishing bylaw on Makin prohibits fishermen from catching flying fish in the offshore waters close to land. Despite its small size (land and reef) Makin's offshore tuna resources are plentiful. A survey carried out in 1995 by the Fisheries Division shows that 91% of Makin's households were harvesting the sea in one way or another, both for domestic sale and to satisfy their subsistence needs. It was found that the majority of fishing households (fulltime and part-time) were accessing the open sea to harvest tuna, flying fish, shark and other pelagic species.

Handicrafts

The making of handicrafts for commercial purposes remains insignificant, mainly due to the lack of a ready market to sell them. Tourism, which is often the reason for handicraft production, is virtually non-existent. The most common handmade local products are those that have daily use, such as mats, strings, and various forms of baskets. These are normally given away as gifts to visitors, in particular mats made from pandanus leaves.

HEALTH

Health Facilities & Staff

There are two clinics and one health center on Makin. The clinics are located in each village, Makin and Kiebu; the health center is located in Makin. There is one Medical Assistant (MA). The MA is in charge of 2 nurses and 4 nursing aides. The MA and nurses are paid by the central government while the nursing aides are paid by Makin Island Council. The health center and clinics have facilities to accommodate patients who are admitted for medical supervision. These health facilities are as follows:

i. *Health Center***:** 1 health center, 3 wards, 3 cooking houses and 3 toilets
ii. *Anrawa Dispensary/clinic***:** 1 clinic, 3 wards, 3 cooking houses, and 3 toilets
iii. *Kiebu Dispensary/clinic:* 1 clinic, 2 wards, 2 cooking houses, 2 toilets and 1 maneaba.

Maintenance of medical facilities on Makin has been neglected, resulting in the deteriorating condition of both local and permanent buildings. The main cause of this problem is the lack of maintenance funds.

Common Health Problems

The most common diseases on Makin Island are fever, cough, headache, stomach ache and diarrhoea. Malnutrition accounts for around 1 % of reported illnesses.

TRANSPORTATION

Land Transport

The main transport infrastructure on Makin is made up of 7.29 miles of road that covers the main islet of Makin, and 1.4 miles on Kiebu. The road is normally 3 to 4 meters in width, enough for the use of small to medium size vehicles. Roads on the outer islands are unpaved, with the surface overlaid with coral mud that dries and hardens in the sun. The

same mud however quickly softens during heavy rains, resulting in the creation of small and large potholes on the road. Because Makin is a wet island, its road is subject to constant damage and it is a huge burden to the Island Council to maintain it, especially without proper equipment and with insufficient funds. To assist in the maintenance and repair work on the road, the central government have provided a small backhoe and tipper truck to Council, but these have now become the problem of Council to maintain.

Sea Transport and Shipping

Inter-village travel between Makin and Kiebu islets is done through the use of canoes and small boats.

It is possible to walk between the islets during low tide but the distance is the main deterrent. The separation of Kiebu and Makin islets affects children the most, in particular those who have to attend junior secondary school. Whereas there is a primary school on Kiebu, the junior secondary school is located on Makin islet, and children must travel every day or stay with relatives on Makin. Those who do not have access to transport either miss a lot of classes or just simply drop out of school.

In 2006 central government provided a skiff and outboard engine to the community to use it specifically to serve the needs of JSS pupils. In, Makin 48% of households own a canoe, while Kiebu has 37%. In comparison, those owning a skiff are typically low in number with Kiebu having 3% while there are none on Makin.

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
1. Sea water intrusion into *bwabwai* pits	Storm surges causing sea water intrusion to bwabwai pits; -channel dug from the land to drain rain water into the sea during colonial era by prisoners at Tekiinimakin; impact of causeway/bridge built across inlet lagoon causing slow water movement from land to sea	-*bwabwai* plants died and therefore need replanting; -seawater comes into the channel at high tides filling bwabwai pits destroying their livelihood; -namo-n-rua (communal *bwabwa*i pit) is greatly affected, the main source of bwabwai for the people	-replanting of bwabwai by a group known as karoronga or kawawa is popular practice -PWD has built a one way cage to allow fresh water to drain out and reduce seawater coming in -a longer term solution needs to be invented, perhaps adding another cage on the other side of the channel. There may be a slow recovery due to removal of the causeway (it has been replaced by a bridge) and deepening the lagoon	-the process is on going to maintain and sustain the livelihood of bwabwai plants for islanders; -the community tries to replenish the bwabwai plants; -the one way cage is not very effective

2. Coastal erosion	Aggregate mining and land reclamation	-decrease in land masses -not enough land space for land owners to live -line of coconut trees at coastal areas falling into the sea and lost productivity -high salinity at Makin north	-It is planned to have a separate regulation to oversee aggregate mining that complements the Revised Environment Act 2007 -replanting, demarcation and consultation re: mangroves took place in 2010	-this had not come to fruition -Makin people including island council officials are willing to monitor, whist ECD officers from Tarawa will come and monitor on planned schedule
3. Reduction in natural resources	-construction of an inland causeway in late 1980s. -causeway recently turned into a bridge -blasting of a boat channel giving rise to ciguatera poisoning - increasing human population results in increasing demand for resources	less marine food for islanders; -damages to marine life will continue, leading to a shortage of marine food for islanders -death of edible marine species for the islanders such as mud worm and shellfish -decrease in mangrove crab, sipunclids, shellfish and other marine resources	-adaptive measures in terms of food security must be carefully planned at village/island level; -families can be encouraged to cultivate and plant indigenous plants plus exotic plants (Taiwan Technical Mission to assist) which are adapted to Kiribati climate -encourage domestic trade in land edible plants and marine species from respective islands	The reduction in natural resources will continue unless all islanders agree to adopt the measures listed, and there is a fair input of capital from sources available locally and abroad

4. Unexpected prolonged droughts	-global warming	-will affect vegetation, fruit trees and ground water	-plan to have concrete cisterns for rain water catchment for every household and at communal compounds -plan to provide water tanks for every household and sheds that have aluminium roofing; - encourage effective family planning programs to sustain water consumption, awareness on looking after water	-in times of drought there will be plenty of rain water stored for islanders - effective family planning programs focusing on individual family freedom of choice and advocating negative impact of overpopulation, overcrowding and dwindling resources

5. Kiebu village – scarcity of ground well water	-Kiebu is an islet quite distant from main island settlements - increasing number of people living on the islet	-scarcity of drinkable ground water for people living on the islet - huge impact on health of school children	-need immediate permanent rain water catchment, such as water tanks for each household and a concrete water cistern; - awareness on importance of looking after reservoirs and water systems - assisting villagers to bring well water from distant sources to the village; - need to control vandalism and negligence	-rain water being stored will serve the community of Kiebu for a very long time -concrete cisterns persists for years

BUTARITARI

PHYSICAL FEATURES

Butaritari is one of the northern islands in the Gilbert group. It has a total land area of 13.49 sq.km; 2.6 km at its widest point at Ukiangang village and 0.26 km at its narrowest point at Kuma village. Iti total length is 69.27 km. Being located north of the equator Butaritari has a wet climate compared with the central and southern islands. Consequently, its terrestrial flora is lush and diverse, hence agriculture is benefiting its people.

Butaritari, like most of the outer islands, has one main road that running along the entire island connected to Keuea and Kumaa villages by Teibo causeway; there are also numerous access roads and sidetracks leading to inner land and bushes and other areas of importance. Apart from Tanimainiku, the rest of the villages are located linearly alongside the road on the lagoon side. Tanimainiku is located north of Tanimaiaki and is connected to Keuea village by Teibo causeway.

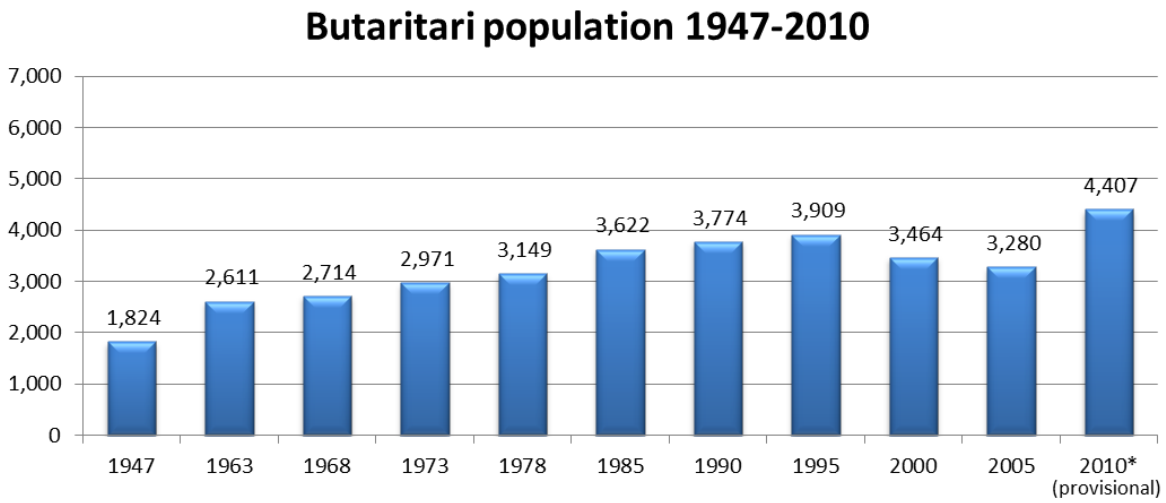
Butaritari is hot and humid all year round with easterly trade winds moderating the temperatures. September to March is the rainy season, with high humidity and strong winds. According to locals Butaritari is the most humid island in the Gilbert group.

POPULATION

Provisional results for the 2010 census show a total population of 4,407. The 2005 statistics recorded a total population of 3280 people on the island.

The population of Butaritari grew by 27.2% between 2000 and 2010, an annual population growth rate of 2.74%. The lower than expected population in 2005 is likely to be connected to the higher than expected population recorded in Makin.

Butaritari has a combined land area of 13.49 square kilometers and a population of 4,407 (2010 census), giving a population density of 327 people per square kilometer. Compared with other islands in Kiribati, Butaritari is the third most densely populated island after South Tarawa and North Tarawa.



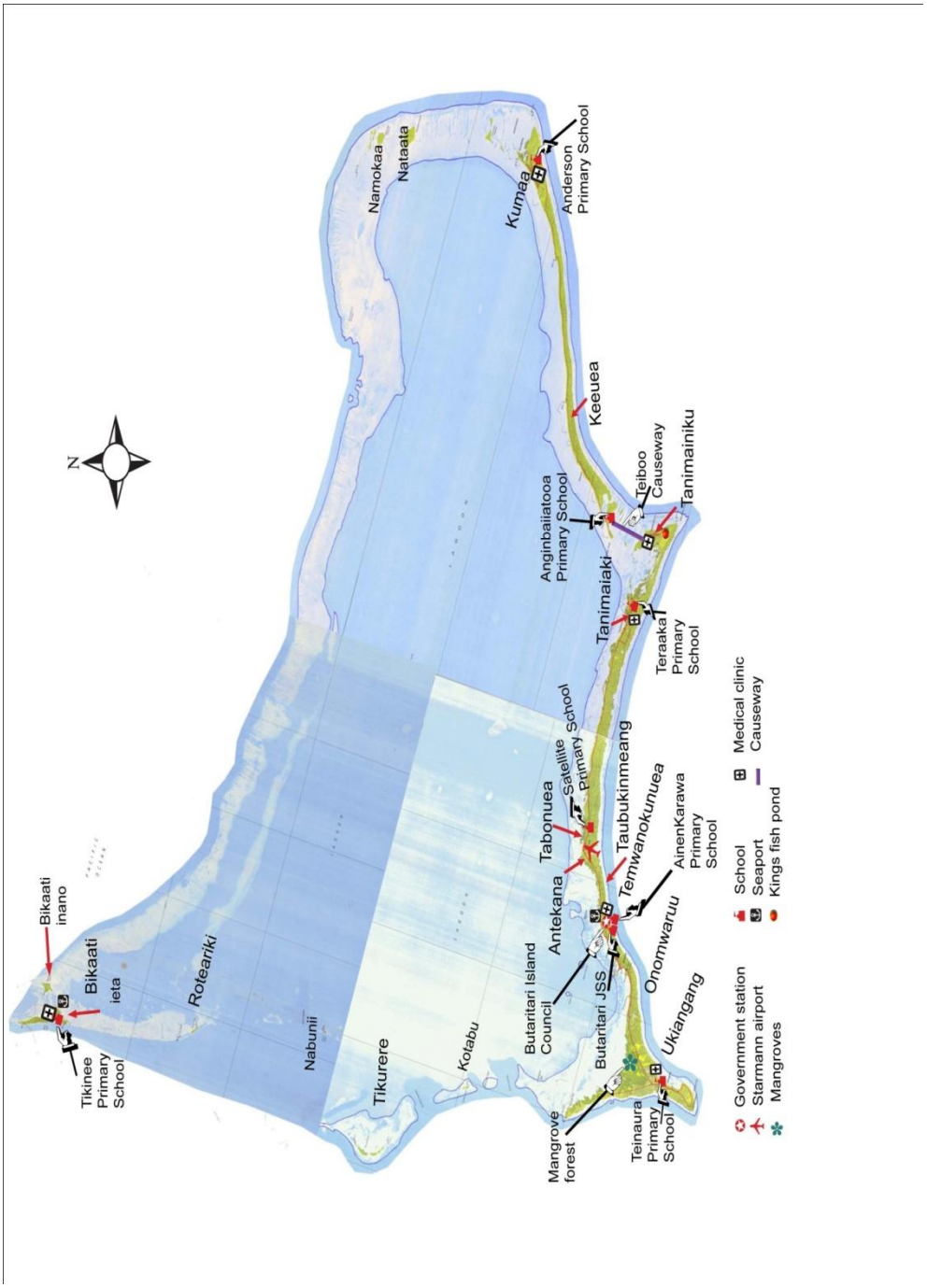
Detailed analysis of the 2005 census shows that out of the total population of 3280, there were 1621 males and 1659 females scattered throughout the island's eleven (11) villages of Kumaa, Keeuea, Tanimainiku, Tanimaiaki, Tabonuea, Antekana, Taubukinimeang, Temwanokunuea, Onomwaruu, Ukiangang and the islet of Bikaati.

Population and Density by village (2000 & 2005)

Villages	Village Land Area	Population 2000	Density 2000	Population 2005	Density 2005	Density Change %
Kuumaa	0.54	368	681	635	1176	73
Keeuea	0.24	181	754	221	921	22
Tanimainiku	0.14	245	1750	229	1636	-7
Tanimaiaki	0.59	279	473	250	424	-10
Tabonuea	0.46	297	646	244	530	-18
Antekana	0.11	222	2018	161	1464	-27
Taubukinimeang	0.15	255	1700	266	1773	4
Temanokunuea	0.15	330	2200	386	2573	17
Onomaruu	0.21	412	1962	347	1652	-16
Ukiangang	1.18	674	571	338	286	-50
Bikaati	0.1	201	2010	203	2030	1
Total	3.87	3464	895	3280	848	-5
Butaritari	13.49	3464	257	3280	243	-5

Source: PopGis 2005 SPC Noumea

Fig 1: A geographical map of Butaritari



Note: Refer to Butaritari Iasland Profile 2008 for problem areas and sites of significance.

The highest density occurs at Temwanokunuea which is the central village that accommodates the Local Government station (Butaritari Island Council) and the rest of the Government services such as communication, health, financial services and a decent boat harbour. Kumaa at the farthest northern tip of the island is the second largest village, has an area of 0.54 sq. km next to Tanimaiaki village with a village area of 0.59 sq. km. Kumaa accommodates 635 people. The second-most

populated village is Temwanokunuea with land area of 0.15 sq.km and 386 residents.

Of the 3,280 population in 2005, there were 1,571 or 48% in dependent age groups which is almost half of the total population. 1,444 or 44% of the population were aged less than 15, 127 or 4% are elders aged 64 years and over. Butaritari, like the rest of the islands, has a young population with the majority aged between 0 and 19 years old comprising 53% of total population.

LAND AND MARINE RESOURCES

Land and Agricultural Resources

Butaritari has a lush biodiversity with diverse land resources. Like other islands in Kiribati, the dominant fruit trees are coconuts however Butaritari people are more dependent on bananas for a living. Butaritari has rich biodiversity that is reflected in having 4 species of mangrove found at Ukiangang mangrove forest.

Marine Resources - Reef and lagoon areas

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Butaritari	82.61	11.7	295.77	13.59

Butaritari has abundant marine resources due to its vast lagoon and reef areas. Even with the abundance of marine resources, there are still resource issues on Butaritari such as:

- Lack of fishing equipment;
- Remoteness of the island makes it hard for them to access fish markets in South Tarawa and Betio;
- Absence of an ice-plant has made salting their only way of preserving fish;
- Depletion of lagoon resources such as sea cucumbers;
- Introduction of an invasive species of seaweed.

ENVIRONMENT

The most threatening environmental issue on the island is coastal erosion, and flooding of agricultural land during high sea surges. Other issues also exist; there is no systemfor safe dumping of rubbish and a lack of proper sanitation facilities that will not affect the water lens. Environmental issues however include those of introduced invasive species of weeds and seaweed and, before culverts were built into the Teibo causeway, loss of some marine species. A fish species called *te kimokimo* disappeared months after after the construction of the causeway, only to reappear after the culverts were added to the causeway in 2005.

Survey results done by KAP II community consultation team in late 2007 showed that coastal erosion is greatest around the villages of Tanimaiaki/Tanimainiku and Keuea villages. This was presumed to be caused by accretion linked to Teibo causeway. Other eroded coastlines are linked to human destruction in terms on aggregate mining for concrete buildings and other construction work. Land reclamation also contributed to coastal erosion along Butaritari village lagoon coastline. Other noted eroded areas were probably caused by the removal of mangroves.

WATER

The 2005 census showed that 93% of households (522) depend on water from unprotected wells. 13% of households (73) use protected wells as a source of water while only 16% (87) were using rainwater and 5% were using piped and shop water. Many households depend on multiple water sources.

EDUCATION

Butaritari has two types of school (excluding pre-school), primary and junior secondary schools. The seven primary schools are strategically located within or between villages so that each village has easy access to at least one school. Teinaura Primary School serves Ukiangang pupils while AinenKarawa serves Onomwaruu, Temwanokunuea, Taubukinimeang and Antekana. A “satellite school” accommodates Classes 1-3 children from the village of Tabonuea. Satellite schools on the outer islands cater for Class 1-3 children, based on a community’s requirement and Government’s understanding that children at this age are too small to walk long distances. Teraaka serves children from Tanimaiaki village while Anginbaiiatooa caters for pupils from Tanimainiku and Keeuea. Anderson Primary School serves Kuumaa pupils while Tikinee caters for Bikaati pupils. In 2006, a total of 672 children were enrolled in the seven primary schools. This number comprised 356 (53%) boys and 316 (47%) girls.

Butaritari JSS students on the other hand had 388 students enrolled for the year 2006. Education statistics showed that of the 388 students enrolled, 108 (28%) were enrolled in Form 1 comprising 53 (49%) females and 55 (51%) males. 130 (34%) were enrolled in Form 2 comprising 75 (58%) females and 55 (42%) males while the remaining 150 (39%) were enrolled in Form 3 and comprised 98 (65%) females and 52 (35%) males.

ISLAND ECONOMY

Subsistence Economy

Typical subsistence activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and *bwabwai* (giant taro), weaving mats, making thatch, rolling string, fetching water, collecting firewood,

making fish traps and hooks, cleaning and washing, cooking and house construction amongst others.

Copra Cutting

Where copra cutting is the mainstay of the people on most of the outer islands, it is not so for the people of Butaritari. This is due mostly to the rainy climate of the island that does not allow sun drying of the copra (instead copra has to be roasted/baked in an oven), the damage to coconuts by rats and the land tenure which is based on family owned lands as against individually owned lands. Oven drying of copra was used by the islanders until bananas became a popular income generating activity that replaced copra cutting. However, copra cutting is carried out on the island but not to the same extent as in the southern and central islands.

The best year of copra production for Butaritari was in 1995 when their production reached a tonnage of 330 bringing in an income of $132,000. On the other hand, Butaritari's worst year of copra production was in the year 2000 when its annual production was a mere 66 tonnes that brought in an income of $29,700. Copra prices by the year 2000 had all risen to $0.60/lb whereas it was $0.40/lb in 1995.

Food exports

Some small-scale private businesses sell bananas, pumpkins and other produce from Butaritari on the main island of Tarawa. This may indicate that there is potential for more income from local foods if problems of storing, transporting and marketing can be addressed.

HEALTH

Each village has its own Village Welfare Group, which is helping the medical staff on the island. Members are representatives of different groups or associations, such as youth, *unimwane* (old men's) association, women, pastors or catechists and medical personnel. There is an overarching village welfare-working group that coordinates the work of all the other village groups. Some of the activities carried out by this working group include the following:

- Fundraising;
- Construction of toilets;
- Ensure that cleanliness is observed by villagers;
- Assist medical staff in preparing and taking patients to airport who are to be admitted to Tungaru Central Hospital in South Tarawa;
- Construction of safe and protected wells; and
- Assist the island council in the general maintenance of its buildings.

Records show that the most common diseases on Butaritari Island are fever, cough, headache, stomachache and diarrhoea. There are no cases of sexually transmitted

diseases, or these are not reported. Serious illnesses are referred to Nawerewere Central Hospital. Malnutrition is uncommon indicating that there is enough local fruit and green vegetables on the island.

ENERGY - FUEL

Butaritari fuel energy needs in 2007, totaled 2,531 drums comprising 1,650 (65%) un-leaded petrol (ULP) drums, 336 (13%) automotive diesel oil (ADO) drums and 545 (22%) drums of dual purpose kerosene (DPK), a total of 330,000 litres of ULP, 67,200 litres ADO and 109,000 litres of kerosene (DPK).

TRANSPORTATION

The most common form of land transport is the pushbike followed by motorbikes and trucks.
A total of 299 bicycles were recorded and unfortunately, statistics did not record the number of motorbikes as owned by the households on the island for the same year.

Land and sea transportation on the island is not an issue as the Butaritari Island Council has a truck and people have their own pushbikes and motorbikes. The Kiribati Protestant Church and the 'Boboti' CS Ltd also have their own trucks for their own use and for hiring out to the general public. The council and individuals also have their own canoes and boats which are used for fishing and for transportation between the villages.

The issues of transportation include the following:

a. Insufficient transport services to and from the island
b. No regular freight service, which limits the potential for local food exports
b. High cost of pushbikes, motorbikes and boats
c. Lack of properly equipped mechanical workshops

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Water	droughts	-destroying vegetation and fruit trees -brackish water -Bikaati village has less ground water/wells for residents to drink -Anginibaiatooa Primary School lacks groundwater and rainwater -coconut trees bear less fruit	-future plans for concrete cisterns -provision of aluminium roofing for houses to allow water catchment in water tanks -increase water catchment for residents -Bikaati village – immediate provision of water systems i.e over-head tanks, solar pumps and piping system including permanent water catchment -Anginibaiatooa Primary School urgently in need of concrete water catchment	-once all these are accomplished, it is hoped that it will be sustainable

Coastal Erosion	-global warming -aggregate mining -sea level rise? -Teibo causeway (1980s) -land reclamation	Reduction in land masses -a threat to properties and welfare of the people -rows of coconut trees and vegetation disappearing from the beach -number of bwabwai pits flooded	-relocation of people further inland -funding of projects to protect and manage coastal areas -limit aggregate mining -mangrove planting and coastal vegetation planting -replace causeway with bridge - better designs of channels	-challenging -costly and takes time for islanders to get the message -questionable -takes time, need the cooperation of residents to monitor to ensure sustainability - bridges costly but sustainable -costly but may have side effects
Seawater seepage into bwabwai pits	-seawater erosion -extreme high tides - storm surges -aggregate mining -land reclamation	-Tanimaiaki/Tanimaiaki, Ukiangang and Bikaati villages –bwabwai plants killed -bwabwai pits left unattended, thus dry -less supply of bwabwai to feed land owners	-reduce aggregate mining -erection of concrete blocks to prevent further flooding -plant exotic plants as a substitutes such as cassava and others thru Taiwan Technical Mission and Agricultural Unit -relocation of bwabwai pits further inland	- sustainability of these techniues is questionable -costly but effective to some extent - can be sustained over time but requires positive attitude
Reduction in marine resources	-closure of inter island passage with Teibo causeway -increase in human population	-bonefish species declined, some disappeared -mangrove crab (ma`nai) decline in numbers -shark is rarely landed due to overfishing	-reopening of the passage -control fishing -by-law and regulations to protect marine species	-costly but sustainable -hard to control behaviours of people -sustainable once enacted

	- unregulated fishing	-octopus and lobsters are unheard of		
Water Less Agricultural Activity	droughts -superficial commitment to agricultural activities -shortage of feed for pigs/piglets due to delay in receiving orders from abroad -limited funding -mismanagement of livestock	-destroying vegetation and fruit trees -unbalanced diet -brackish water -no supply of land protein -Bikaati village has less ground water/wells for residents to drink -Anginibaiatooa Primary School lacks groundwater and rainwater -coconut trees bear less fruits	-future plans for concrete cisterns -increase awareness and importance of livestock and agricultural activity through Agricultural Division and Taiwan Technical Mission -increase water catchment for residents -provide funding -use of local plants, marine seaweed mixed with breadfruit to supplement imported feed -Bikaati village, immediate provision of water systems i.e over-head tanks, solar pumps and piping system including permanent water	-once all these are accomplished, it is hoped that it will be sustainable -Can be done, cheap and sustainable, needs creativity
	-pigs slaughtered before they are bred			

			catchment -Anginibaiatooa PS urgently in need of concrete water catchment	
Coastal Erosion	-global warming -aggregate mining -sea level rise? -Teibo causeway (1980s) -land reclamation	Reduction in land masses -a threat to properties and welfare of the people -rows of coconut trees and vegetation disappearing from the beach -number of bwabwai pits flooded	-relocation of people further inland -funding of projects to protect and manage coastal areas -limit aggregate mining -mangrove planting and coastal vegetation planting -replace causeway with bridge - better designs of channels	-challenging -costly and takes time for islanders to get the message -questionable -takes time, need the cooperation of residents to monitor to ensure sustainability - bridges costly but sustainable -costly but may have side effects
Seawater seepage into bwabwai pits	-seawater erosion -extreme high tides -surge storms -aggregate mining -land reclamation	-Tanimaiaki/Tanimaiaki, Ukiangang and Bikaati villages –bwabwai plants killed -bwabwai pits left unattended, thus dry -less supply of bwabwai to feed land owners	-reduce aggregate mining -erection of concrete blocks to prevent further flooding -plant exotic plants as a substitutes such as cassava and others thru Taiwan Technical Mission and Agricultural Unit -relocation of bwabwai pits further inland	- questionable -costly but effective to some extent -this can be sustained -it takes time but requires positive attitude

Reduction in marine resources	-closure of inter island passage with Teibo causeway -increase in human population - unregulated fishing	-bonefish species declined, some disappeared -mangrove crab (ma`nai) decline in numbers -shark is rarely landed due to overfishing -octopus and lobsters are unheard of	-reopening of the passage -control fishing -by-law and regulations to protect marine species	-costly but sustainable -hard to control behaviours of people -sustainable once enacted
Less Agricultural Activity	-superficial commitment to AA -shortage of feed for pigs/piglets due to delay in receiving orders from abroad -limited funding -mismanagement of livestock -pigs slaughtered before they are bred	-no balance diet -no supply of land protein	-increase awareness and importance of livestock and agricultural activity through Agricultural Division and Taiwan Technical Mission -provide funding - use of local plants, marine seaweed mixed with breadfruit to supplement imported feed	-it can be sustained -Can be done, cheap and sustainable, needs creativity

MARAKEI

PHYSICAL FEATURES

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

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

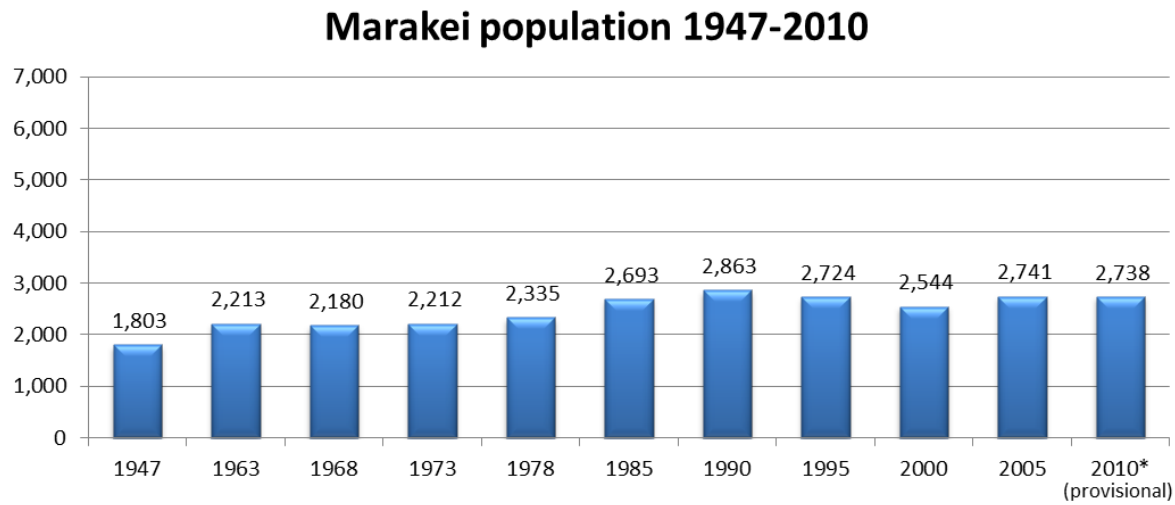
Rawannawi lies at the northern end of the island with an airstrip at the northernmost end. Rawannawi is the biggest village and center of government and island council activities with seaport and airstrip.

There is a lot of space and free stretches in between the villages with the longest between Tekarakan and Bwainuna at the southern ends of the western and eastern land strips, respectively. Most travelers from Rawannawi prefer the road going via the village of Tekuanga when going to Norauea or Bwainuna as this is a more frequented route.
Access to the villages is via a gravel/mud paved road that can be bumpy with numerous potholes and unpaved surfaces. Traveling by truck is generally slower than by motorbike and pushbike because of bad road conditions. Access to the lagoon from Rawannawi is more difficult than from other villages as there is more land to go through.

The status of water is rarely an issue except for villages that are located in the narrow parts of the island, Antaai and Temotu; it is more a matter of not being able to establish a water system from areas with larger fresh water lenses.

POPULATION

The population of Marakei in the 2010 census was 2,738 people. Population has been more or less stable at around this level since 1985. Overall population density in 2010 was 194 people per square km.



Marakei has a total land area of 14.13 sq. km of which approximately 1.22 sq. km (PopGis 2005) comprises the village areas therefore 12.91 sq. km is freely owned individual arable land. Locals live in village areas giving the idea from statistics such as that in the above table that people on Marakei are congested in the villages when they are actually not. It is more a voluntary need to live in village communities rather than being forced to live in congested circumstances. Marakei households are placed linearly to each other and have heaps of space at the front and back including lands in the bush areas, not counted for in the village land areas.

The majority of the population in 2005 was of the mature age 18-49 numbering 1055 (38%) and the majority of this figure, 427 were residing in Rawannawi while the least 47 were residing in Temotu, the southern village next to Rawannawi. Overall, 1075 (39%) reside in Rawannawi, 362 (13%) reside in Tekarakan, 311 (11%) reside in Norauea, 9% each live in the villages of Raweai and Bwainuna, 8% live in Tekuanga, 6% live in Antaai and the rest 4% live in Temotu.

In 2005, infants less than one year old numbered 74 (3%) of the total population, slightly more than the elderlies who numbered 64 (2%) of the Marakei population. The age dependency group is defined as those unable to live on their own and generally those below 15 years and those over 64 years of age. There are 1301 (48%) of people in the age dependency group. 92% of these are those aged 14 or younger while 8% are the older folk. On the other hand, those that are not dependent on others for their livelihood number 1440 (52%) whom the very young and very old folks have to depend on for their livelihood.

Marakei, like the rest of the islands has got a young population with the majority aged between 0 years and 49 years old summed up to 2420 (88%) of the total 2741 population. Compared to 2000 statistics as portrayed in the population pyramid (below), increases are evident starting from those 5-9 year old males and females up to females 70-74 years old

(further illustrated in the table following the population pyramid). The most significant changes can be seen in those aged 5-9 females and males, 15-19 females and males, 25-29 females, 30-34 males' 45-49 females and 55-59 males. Of the 1301 people in Marakei in the age dependency group, 659 (51%) are males and 642 (49%) are females.

The 2005 census recorded a total population of 2741 people on the island, an increase of 197 people since the 2000 census when the population was 2544. Of the 2741 population, there are 1375 males and 1366 females scattered throughout the island's eight villages as well as those working at the Marakei Island Council. The population density on Marakei in 2005 was 194 people per kilometer.

Population Density by village since 2000

Village/Marakei	Village Land Area	Pop 2000	Pop 2005	Density 2000	Density 2005	Density Change (%)
Rawannawi	0.47	1052	1075	2238	2287	2
Temotu	0.17	116	116	682	682	0
Buota	0.09	257	259	2856	2878	1
Tekarakan	0.13	390	362	3000	2785	-7
Bwainuna	0.14	128	246	914	1757	92
Norauea	0.09	254	311	2822	3456	22
Tekuanga	0.02	148	207	7400	10350	40
Antaai	0.11	199	165	1809	1500	-17
Total	*1.22*	*2544*	*2741*	*2085*	*2247*	*8*
MARAKEI	14.13			180	194	8

Source: PopGis 2005 SPC Noumea

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Fig 1: A geographical map of Marakei

LAND AND MARINE RESOURCES

Land resources

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

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

There are two distinct species of breadfruit, the common breadfruit (*Artocarpus altilis*) and the Mariannas breadfruit (*A. mariennensis*) plus a hybrid of the two The breadfruit tree comes third after the pandanus as the popular fruit trees in the islands but unfortunately is the most vulnerable to prolonged droughts (*R.R. Thaman 1990*). Breadfruit are therefore propagated and looked after carefully around the homes where it is easier to look after and are rarely found inland and away from homes except for northern islands that have a lot of rainfall with breadfruit grow wild around homes and in the bush.

Given that these fruit trees are vulnerable to prolonged droughts, they are carefully tended especially on islands with less rain. *Bwabwai* grows well and abundantly in Marakei. Requiring a great amount of water to grow, 'bwabwai' is therefore grown in pits dug to the water table.

Other general terrestrial flora comprise papayas, local fig, bananas, uri (*Guettarda speciosa*), casuarinas, leucaena, non (*Morinda citrifolia*), saltbush (*Scaevola sericea*), heliotropes (*Tournefortia argentea*), Alexandrian laurel (*Calophyllum inophyllum*), sea trumpet (*Cordia subcordata*), iron tree (*Pemphis acidula*), beach almond (*Terminalia samoensis*), great lettuce tree (*Pisonia grandis*), privet (*Clerodendruminerme*) and a variety of ornamental plants, grass and weeds. The flower of the *Guettarda* locally called 'te uri' is the national flower of Kiribati. Individually, all these plants play a great role in the subsistence and economic life of the people on Marakei and Kiribati as a whole.

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

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

Water Resources

Fresh water supplies from wells rely on the amount of rainfall. Being north of the equator Marakei receives ample rainfall but still less than Makin and Butaritari. Water can become an issue during drought periods when freshwater lens get thinner and seawater contaminates fresh water. Generally, water supply on Marakei is abundant throughout the year but tends to become brackish during prolonged droughts.There are wells built behind households, away from the coastal areas that provide drinking water to households located at coastlines. Because the water lens is close to the surface fresh water seeps through sand and onto coastal areas and to the sea. Legends tell of a godess, Nei Naantekimam of Norauea villages that makes fresh water seep through to a beach.

In the villages of Bwainuna and Norauea, the wells are shallow indicating the closeness of a water table to the gruond surface. Even though this is advantageous in that it is easy to dig wells, water can easily be contaminated during heavy rains when wells fill up and polluted/contaminated surface water sinks and mixes with well water. A water project funded by the United Nations Development Programme (UNDP) had been undertaken in these two villages and it involves bringing water in a piped system from safe water aquifers beyond the villages. The status of the system is not known.

Mangroves

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

Marine and fisheries resources

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

Reef and pelagic fish species are plentiful despite ciguatera being present at the western part of the island. Parrot, surgeon and other fish species are highly toxic however these should be regarded as breeding stocks. Juveniles and offspring of these toxic species will eventually migrate to other non-toxic reef areas where people can catch them. Flying fish and tuna are plentiful around the island. While ciguatera

restricts fishing on Marakei, this also has benefits in that breeding stocks will never run out; heavy recruitment will always occur as long as the ocean water remains clean and free of manmade toxins. Ciguatera should be looked at as a *blessing in disguise* rather than a curse.

272 (62%) of the Marakei households fish on the ocean flats, 278 (64%) on the lagoon flats, 243 (56%) fish in the ocean, 297 (68%) in the lagoon and 291(67%) of the 437 Marakei households engage in net fishing for their livelihoods.

The Marakei reef area is 13.31 sk. km; reef base 10; lagoon 295.8 sq. km; land 14.13 sq. km. Blessed with an enclosed lagoon, Marakei people do not have any problems whatsoever when it comes to fish. When the ocean is rough, the lagoon then provides other marine resources for food

Size of Reef/Lagoon Size

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Marakei	13.31	10	295.77	14.13

Marine resource issues on Marakei include the following:

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

EDUCATION

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

Schools on Marakei

	School	Location	Student locations/villages
1	Nikiereere Primary School	Rawannawi	Rawannawi and Temotu
2	Uaabong Primary School	Raweai	Raweai and Tekarakan
3	Taiti Primary School	Norauea	Bwainuna, Norauea, Tekuanga and Antaai
4	Aontenaa JSS	Rawannawi	All 8 villages of the island

In 2005, 581 children enrolled the three primary schools comprising 273 (47%) females and 308 (53%) males. 248 of the 581 children were attending the Nikiereere Primary School, 130 (22%) were attending the Uaabong Primary School while the rest 203 (35%) were attending the Taiti Primary School.

Aontenaa JSS on the other hand catered for 222 students that comprised 109 (49%) males and 113 (51%) females. 193 (87%) of these students had attended school, 25 (11%) had left school and the rest 4 (2%) had never attended the junior secondary school at all.
In 2006, the Education Digest statistics showed that 9 more children had enrolled in the primary schools of Marakei increasing the number from 581 (2005) to 590 pupils (2006) distributed among the three stated primary schools on the island. This figure (590) comprised 278 (47%)_females and 312 (53%) males. 117 (20%) of the 590 children were in Class 1, 108 (18%) were in Classes 2 and 3, 98 (17%) were in Class 4, 70 (12%) were in Class 5 and 89 (15%) were Class 6.

On the other hand, Aontenaa JSS had 222 students enrolled comprising 114 (49%) females and 108 (51%) males. 78 (35%) were in Form 1, 56 (25%) were in Form 2 and the rest 88 (40%) were in Form 3.

Compared to school enrolment in 2005, the primary school children increased by 9 more pupils in 2006 while the JSS students remained as they were, 222 students. With the improvement in inter-island transportation and services, children and parents alike are migrating all the time for visits and searches for better opportunities in the urban areas.

Table 5: Teacher:Pupil ratio

Schools	F	M		Teachers	Student:Teacher Ratio
Nikiereere Primary School	114	141	255	10	26:1
Taiti Primary School	102	94	196	7	28:1
Uaabong Primary School	62	77	139	6	23:1
Overall	278	312	590	23	26:1
Aontenaa JSS	114	108	222	13	17:1

Source: 2006 Education Digest

ISLAND ECONOMY

Copra Cutting

The best year of copra production for Marakei was in 1991 when their production reached a tonnage of 543 bringing in an income of $179,190. On the other hand, its worst year of copra production was in the year 2000 when its annual production was 222 tonnes that brought an

income of $99,900. Copra prices by the year 2000 had risen to $0.60/lb; however from overall figures on copra production for the year 2000 indicated low production presumably due to drought in previous years.

Copra prices have also been slowly increasing from $0.30/lb in 1990 to $0.60/lb in 2005. The most recent copra production for Marakei on record was 256 tonnes in 2005 that brought in an income of $153,600which would roughly give the 437 households an income per day of $0.96. Even though this is slightly below the international poverty line, it should be remembered that people on the outer islands of Kiribati do not rely 100% on money to live but actually rely mostly on plots of land owned, skills to fish, cut toddy and utilize existing food resources. This daily income of $0.96 is more than enough to buy a kilogram of rice and flour for their young ones, who have taken to imported rice and flour faster than the adults. On the other hand, copra is not the only means of income for the people on the island.

Agricultural products

Agricultural activites prosper on the island. Bwabwai and banana cultivation are popular. Coconut and pandanus replanting are taking a slow pace as are other fruit crops such as wild figs (te bero) and papaya. Land crab is a popular food item on the island and is caught anytime during the day, however nighttimes are regarded as better than daylight.

Remittances

The general flow of seafarer's remittances into the country is continuous and has increased over the years with more engaged in seafaring employment. There are now two major employers of seafarers from Kiribati:

1. South Pacific Marine Services (SPMS)
2. The Kiribati Fishing Services (KFS)

HEALTH

The Ministry of Health Family Planning and Social Welfare through its Medical Assistant and three qualified Nursing Officers stationed on the island at the different clinics deliver health services and health promotion on the island. The following lists the medical facilities on the island and their status:

1. Rawannawi: Good – the KiriEu project has not come to the island yet to establish new clinics. Wards have just been renewed in September but the clinic does not seem to be large enough for the people of these two villages considering that Rawannawi is the biggest village on the island with 39% of the total population and 43% including Temotu sharing the same clinic. An attempt was therefore made to establish a local clinic at the northern end of Rawannawi to assist in the needed medical requirements that has however ceased as the approval and supply process from the MHMS has been slow. A Medical Assistant is in charge of the facility that caters for the villagers of Rawannawi and Temotu.

2 Raweai: Good – as above. A Nursing Officer is in charge and the clinic caters for the villagers of Raweai only.

3 Tekarakan: Good – as above. A Nursing Officer is in charge and the clinic caters for the villagers of Tekarakan only.

4 Norauea: Broken down and unusable No nursing officer due to the clinics condition thus the villagers of Norauea and Bwainuna, who share the clinic now have to seek medical aid from the other clinics on the island.

5 Antaai Good - the KiriEu project has not come to the island yet to establish new clinics. A Nursing Officer is in charge and the clinic accommodates the medical needs for the people of Tekuanga and Antaai.
The Eu project (KiriEu) is expected to start building the new clinics on the island at the end of 2008.

TRANSPORTATION

Shipping
Shipping is a critical service that needs to be provided and maintained between Tarawa and the outer islands, in order to facilitate the transportation of food and material supplies to and from the islands. Private businesses have secured an increasing share of the shipping market. Still, central government attempts, through its shipping line – Kiribati Shipping Services Limited (KSSL) – to serve all islands in the country near and far.

Statistics also showed that in 2005 there were 139 canoes on the island owned by 137 (31%) of the 437 households and only two (2) boats/skiffs. Both these sea vessels are used for accessing fish resources in both the surrounding ocean and inner lagoon of Marakei. Most major service work on the ships excluding the privately owned sea vessels are carried out in Tarawa as the Marakei Shipyard is not equipped as yet to carry out major maintenance work.

Issues facing Transportation
Land and sea transportation on the island is not an issue as the Marakei Island Council has its own trucks and people have their own pushbikes and motorbikes. The council and individuals also have their own canoes and boats which are used for fishing; there is hardly any problem with transportation on the island. Marakei is located 20 minutes away from South Tarawa by plane.

The issues relates to transportation to and from the island for the islanders and for visitors as well as for food and material, cargoes and other commodities.

Bicycle (pushbikes) prices are also controlled by the Government. Transport hire costs on the outer islands like Marakei have been geared towards the local community being able to afford the hire of a truck for transporting of coconuts and other materials from the bush or other parts of the island as well as the Island Council making a small profit in return. Not surprisingly, service charges to the local community are generally lower than those charged to visiting Government officials or organizations.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Coastal Erosion	-surge storms -aggregate mining -extreme high tides -seawall construction -boat channel -land reclamation -Coral boulder removal	-reduction in land masses -a threat to properties and people welfare -rows of coastal vegetation and coconut trees disappeared -entire coastline of Rawannawi village disappearing -Antai village eroded	-a well designed seawall -Environment Act to protect coastal areas on the islands -coastal vegetation and coconut planting -review of policy and design of seawall construction -funded regular programs on adaptation measures	Costly but effective to some extend -regulations takes time but sustainable in the long run -planting at coastal areas is not a problem -review takes time -costly but effective
Water	drought	-Less ground water to drink -vegetation at coastal areas affected -people and dwellings are at risk -disease from dirty water	-future plans to have concrete cisterns for water catchment -relocation issue to be considered at village and Island council level -dig wells further inland, cover them	-sustainable but takes time -costly but sustainable to some extend -workable, cheap and sustainable

Little Agricultural Activity	-busy on fishing activities -no ready market for sale -distant from urban market	-there is lack of vegetables on the island, this will affect their diet -non availability of land protein -malnutrition	-Agricultural activity should be strengthened through Taiwan Technical Mission and Agricultural division - promotion at village and household level	-could all be sustainable -sustainable
Reduction in Marine resources	-semi bridge causeway at Raweta and Baretoa slowing cool seawater flushing of lagoon -fish trap under bridge interferes with water flow -increasing number of outboard motors and gillnets	-flying fish decrease in number -shell fish lost (*Anadara holoserica)*	-widen existing passages to original width -open another channel at Temotu and Raveai on eastern side or partition to the lagoon for aquaculture activities -remove fish trap under bridge at Baretoa	Both are costly but sustainable -easy and sustainable in the long run
Climate variability	-unprecedented storms -bad weather conditions - frequent and prolonged droughts	-homes and physical structures are at risk - loss of fruit trees	-future plans to combat the climate variability	-takes time - requires change in attitude towards adaptation measures

ABAIANG

PHYSICAL FEATURES

Abaiang is approximately 36.72 km long with its widest width (0.92 km) found in the village of Tabontebike and narrowest (0.07 km) in the village of Tanimaiaki. Riboono and Nuotaea are in the northernmost and western part of the island, respectively. The former has a length of 1.95 km while the later is 5.24 km long.

The mainland of Abaiang extends from the northern village of Takarano to the southern village of Tabontebike. There are other uninhabited islets apart, from Riboono and Nuotaea, water and remoteness from the mainland are main issues. They however are used for fishing, copra cutting, campsites, and recently, the islets of Oobwaa and Teirio have had small motels built on them.

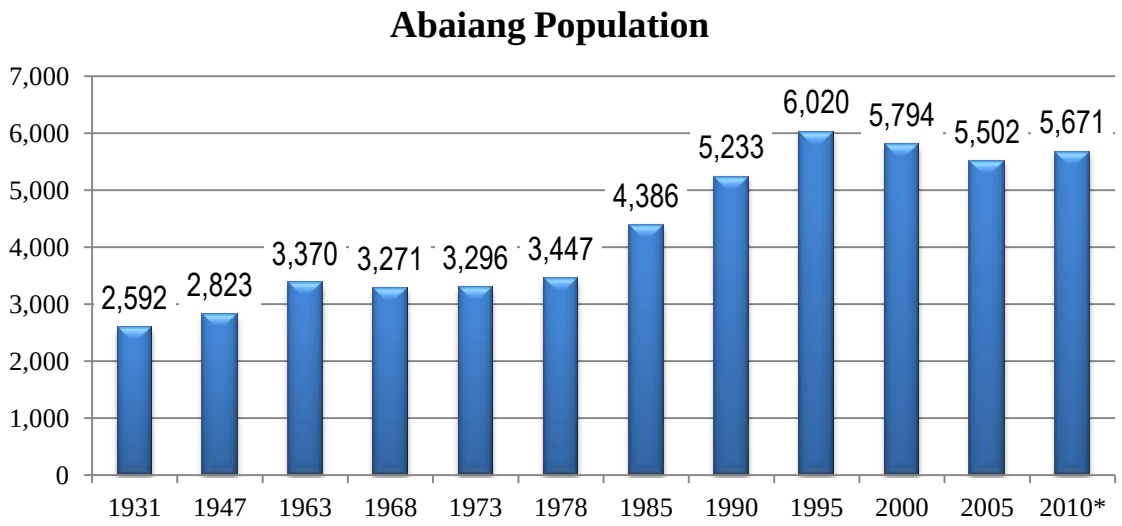
Abaiang is suffering from coastal erosion specifically in the village of Tebunginako. Interestingly, Abaiang has no causeways, yet, coastal erosion has been the biggest physical problem for many years now. Tebunginako is one of the widest parts of the island and includes a peninsula that has been created by erosion of the coastline on the lagoon side of the village. The erosion resulted in land disappearing over the years until it reached an inland lake that was initially used as a milkfish pond, in turn creating a peninsula with the lake as a cove. A causeway was built to bridge the gap between the Roman Catholic campus and the villagers, who have relocated themselves further inland.

As far as stories going back to pre-colonial times, Tebunginako village used to be a campsite for fishing and copra cutting. There was an islet off the coastline that is being eroded away and has almost disappeared. There was also seawall work along that coastline which now can be seen; the seawall caused accretion and eventual closure of a reef-mud area between the islet and the mainland, hence Tebunginako came in existence.

Even though there are no causeways on the island, beach movement occurs with changing direction of wind, currents and waves. The removal of mangrove forests from around the area may have assisted in exposing the entire coastline from wave and wind actions in the last couple of years. Causeways built in North Tarawa can affect water circulation around Abaiang as the two islands are closely connected and both sit on an underwater seamount running in a north - south direction. Human activities could have been the trigger for the erosion at Tebunginako, along with rising sea levels.

POPULATION

The 2010 census recorded a total population of 5671 people on the island. Population density is 324 people per square km. The population of Abaiang grew rapidly between 1973 and 1995, but has remained relatively stable since.



*2010 census results are provisional

The population in Abaiang has been supplemented by a number of senior secondary schools on the island including the establishment of a JSS in 2000. St, Joseph's College (Tabuiroa) is a Roman Catholic school, initially a combined junior and senior high school that later changed to senior only when the JSS was established on the island.

In the 2005 census, there were 5502 people on Abaiang, made up of 2746 (49%) males and 2756 (51%) females scattered throughout the island's 14 villages.

Population Density by village 2005

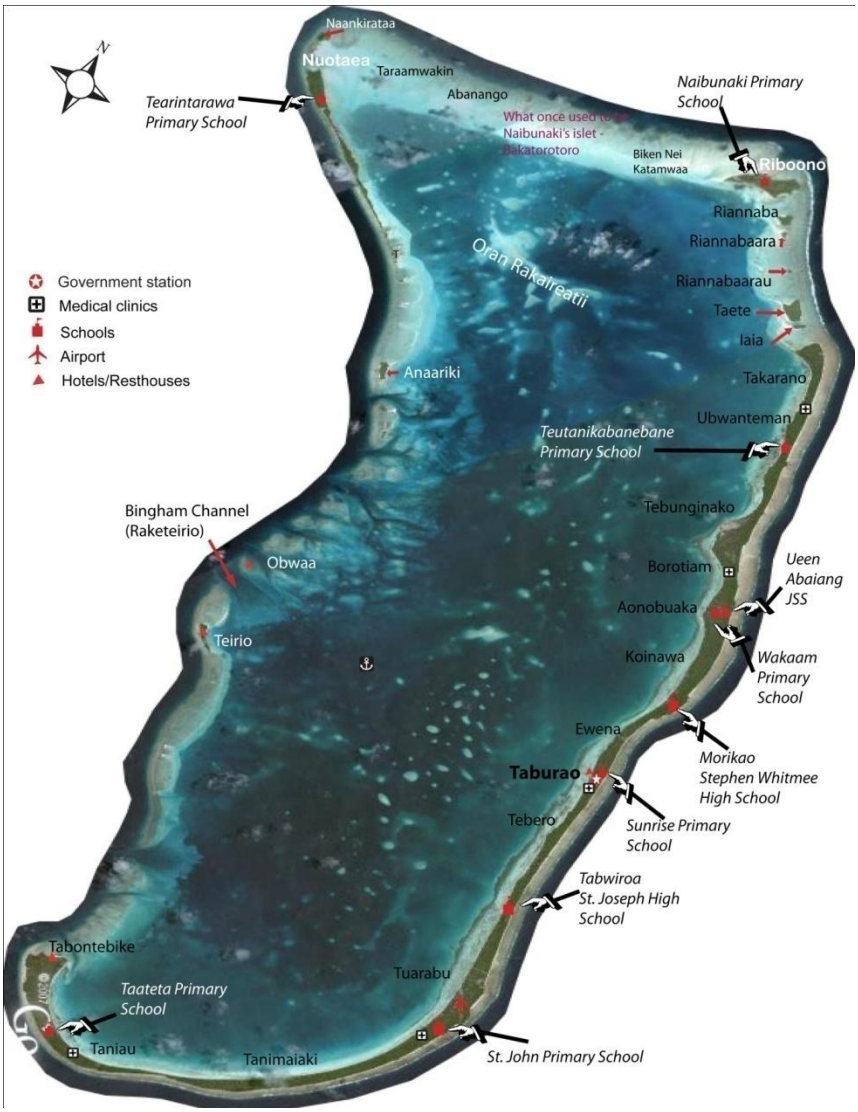
Village	Village Land Area	Pop 2000	Density 2000	Pop 2005	Density 2005	Density Change %
Nuotaea	0.06	538	8967	481	8017	-10.6
Ribono	0.09	265	2944	271	3011	2.3
Takarano	0.29	322	1110	300	1034	-6.8
Ubwanteman	0.16	119	744	112	700	-5.9
Tebunginako	0.11	379	3445	358	3255	-5.5
Borotiam	0.15	286	1907	338	2253	18.2
Aonobuaka	0.14	295	2107	372	2657	26.1
Koinawa	0.14	460	3286	453	3236	-1.5
Morikao	0.52	546	1050	400	769	-26.7
Ewena	0.2	192	960	219	1095	14.1
Taburao	0.37	91	246	221	597	142.9
Tebero	0.27	197	730	167	619	-15.2
Tabwiroa	0.32	391	1222	324	1013	-17.1
Tuarabu	1.02	607	595	484	475	-20.3

Tanimaiaki	0.38	239	629	276	726	15.5
Taniau	0.48	361	752	287	598	-20.5
Aoneaba	0.11	81	736	48	436	-40.7
Tabontebike	0.51	425	833	391	767	-8.0
Villages	5.32	5794	1089	5502	1034	-5.0
ABAIANG	**17.48**		**331**		**315**	-5.0

Source: PopGis 2005 SPC Noumea

There are actually fourteen villages on the island but the census records included high school locations such as Saint Joseph's College (Tabwiroa) and Stephen Whitmee High School (Morikao), the council station and another school location as villages when they are actually part of the adjacent villages.

A geographical map of Abaiang



Note: Refer to Abaiang Island Profile 2008 for problem areas and sites of significance.

Abaiang Population distribution by age group in villages

	Broadage Age Group								
	Total	**<1**	**1**	**2-5**	**6-14**	**15-17**	**18-49**	**50-69**	**70+**
Kiribati	92533	2403	2167	8819	20804	6589	41131	8628	1992
Males	45,612	1,235	1,114	4,483	10,693	3,334	20,045	3,971	737
Females	46,921	1,168	1,053	4,336	10,111	3,255	21,086	4,657	1,255
ABAIANG									
Nuotaea	481	15	18	48	113	21	207	45	14
Ribono	271	12	5	32	59	17	110	33	3
Takarano	300	7	10	43	52	22	135	23	8
Ubwanteman	112	3	5	9	38	1	48	8	0
Tebunginako	358	5	15	43	85	21	138	42	9
Borotiam	338	11	10	42	82	24	130	30	9
Aonobuaka	372	10	5	38	97	34	145	31	12
Koinawa	453	9	13	40	125	26	179	47	14
Morikao	400	2	2	15	17	137	211	15	1
Ewena	219	2	2	25	59	16	80	27	8
Taburao	221	5	7	23	63	7	91	19	6
Tebero	167	3	4	20	39	11	72	15	3
Tabwiroa	324	2	4	9	23	134	141	10	1
Tuarabu	484	10	8	51	107	37	218	40	13
Tanimaiaki	276	5	8	36	51	12	128	30	6
Tebwanga	287	5	8	29	58	20	132	23	12
Aoneaba	48	1	0	3	12	2	18	10	2
Tabontebike	391	9	14	44	86	17	181	32	8
	5,502	**116**	**138**	**550**	**1,166**	**559**	**2,364**	**480**	**129**

Source: 2005 Census of Population, NSO/MFED, 2007

In 2005, nearly half of total population in Abaiang was of the mature age, 18-49, numbering 2,364 (43%). The majority of this age group is found in the villages of Tuarabu, Morikao, Nuotaea, Tabontebike and Koinawa. Tuarabu is the most populous village on the island and is also where Tabuiroa College is locaed. Morikao is where the KPC Saint Whitmee High School stands. Nuotaea being one of the two islets of Abaiang with a population of 481, 9% of the total island population and the second most populous village after Tuarabu with a population of 484. Tabontebike is the 5th populous village after Abaiang and is the southernmost end village of the island. The smallest number of people were those in the one year age group numbering 116, 2% of the total population. Aging numbered 129 (2%). Those aged 6-14 numbered 1,166 (21%) and these are children of primary to junior secondary school ages.

The age dependency group is defined as those unable to live on their own and generally those below 15 years and those above 64 years of age. A total of 2171

(40%) of the Abaiang population are categorized under the dependency group of which the majority of 1970 (91%) are the young and youth aged 0-14 years old. The 201 (9%) are those aged 65 and over. 51% of these age dependent group are males while the remaining 49% are females.

LAND AND MARINE RESOURCES

Land Resources

Abaiang is faced with major constraints in agricultural production. Poor soils limit the number of agricultural crops that can be grown and the existing physical features limit the land area where agricultural or livestock activities can be extended or expanded. The island's main resources are its limited fruit tree resources predominantly coconut and pandanus trees. Topped up with the climate in general including changes in weather patterns with long periods of drought and a possible rise in sea level, it is questionable whether any kind of agricultural activity is possible at all. Fortunately, the islands are not desert islands yet and thus plants and animals have better chances of surviving and adapting to the changes.

Water resources

Even though Abaiang is located in the northern group, it still suffers from drought. Water becomes an issue during times of drought. Although water supply is abundant throughout the year, well water is prone to brackishness during prolonged droughts.

There are freshwater reservoirs on the island that can provide freshwater during long periods of drought. Tebero village is has a vast underground reservoir it shares with the neighboring villages of Taburao and Tuarabu which experience easily experience water brackishness at the first signs of drought. This may also be linked with large number of people living in these villages. Terikinikua site in the village of Ubwanteman is also another water reservoir that helps people during drought periods. The middle of the village of Koinawa frequently experiences water brackishness and people have to rely on the freshwater reservoirs that can be found at both ends of the village. The village of Aonobuaka normally has to move further inland towards the ocean side to get fresh water during drought periods. Most households do not have toilets, and most people use the beaches or the bush as toilets.

Marine resources

Size of reef and Lagoon area

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Abaiang	**182.15**	**28**	**74.2**	**17.48**

Accessing lagoon and deep sea resources requires owning a canoe or a boat, fishing gears, a dive certificate and other necessities. Open water fishery is not as popular as lagoon fishery Abaiang is is in close proximity to Tarawa which makes it an obvious choice to carry out some of the initial marine resource into commercial species such as seaweed and pearl farming, and raising ocean clams for the international aquarium market. The islets of Nuotaea and Ribono are rich in '*te were*' (*Tridacna maxima*); however, this shellfish is being overfished over the years due to high demand on Tarawa and, more recently, China.

The fishing catches are generally used for subsistence living only and where there is surplus, this is either shared with neighbors, or sold to local consumers mostly Government and island council employees. They can also be salted and preserved for later consumption or sent to relatives in South Tarawa and Betio.

Issues facing fishing and development of marine resources

Some marine resource issues on Abaiang include:

a. Lack and cost of fishing equipment
b. Remoteness of the island makes it costly for them to access fish markets in South Tarawa
c. Inconvenient location of ice-plant (at Tabontebike) has made salting their main way of preserving fish
d. Depleting lagoon resources in the nearby lagoon and sea area especially 'te were' and sea cucumbers
e. Establishment of legally binding bylaws for use of marine resources by visiting ships/companies and the island community as well; however, the Local Government Division within the Ministry of Internal and Social Affairs has already looked into this and is finalizing a Marine Act for the outer island Councils.

ENVIRONMENT

Drought is an ever-present threat to Abaiang. Drought kills off land vegetation and where it does not, the fruits are affected in size and thus production and income decrease.

Coastal erosion on Abaiang has been a major environmental problem since the locals can recall with 13 erosion sites on Abaiang.

i) Tabontebike at the southernmost tip of the mainland - concern for this site is that the beach crest will be eroded (breached) and therefore will result in the flooding of the backshore areas. The accelerated erosion at this site appears to be direct result of aggregate mining.
ii) The second erosion site is at Tabontebike located on the eastern coast of the island where the rest house is and further down north, accretion is occurring.

iii) The southern coast at the lagoon side of Taniau village is also eroding, threatening private structures.
iv) The northern lagoon coast of Tanimaiaki at Teraereke is also affected by coastal erosion.
v) Apart from small breaks, the whole coastline from Tuarabu to Taburao on the lagoon side is eroding.
vi) Both lagoon coasts at the end of the village of Ewena are eroding while the central part is accreting.
vii) The whole lagoon coastline of Koinawa is eroding.
viii) The whole lagoon coastline of Borotiam is also eroding away.
ix) The erosion at Tebunginako is extreme and has now reached the fishpond (which is no more) creating a peninsula with the Catholic campus standing on one side of the bay and the village on the other side.
x) The village of Ubwanteman presently does not suffer from coastal erosion but further towards Takarano, there is extreme erosion from Akina to Tamoa where trees are already standing on the beach and public roads are on the verge of destruction.
xi) Further north, erosion again starts at Kainiwenei and ends at the southern end of the village of Takarano.
xii) At the northern tip of Takarano, extreme erosion has been experienced and is still ongoing especially towards the ocean side of the tip of the island. On the lagoon side at the same tip of Takarano, it has eroded and accreted over the years.
xiii) The ocean side of Riboono at Nakirikiri and lagoon side at Tebikouea are also eroding.

The whole of Abaiang suffers from various events related to coastal erosion or some other phenomena.

The most extreme erosion that is threatening communities and their assets is at the village of Tebunginako where a village *mwaneaba* has fallen, a fishpond is now turned into a bay/cove, villagers have re-located further inland and a church building on the verge of destruction. The history of erosion in this village is tied to the closing of a channel at the end of the village in either the late 1960s or early 1970s after which, shellfish resources soon died and erosion started south of where the channel was built while accretion occurred north of where the channel was closed. Presently, the villagers are in disagreement over the re-opening of the channel as the southern villagers support the idea and the northern villagers (who are experiencing accretion) do not agree.

The table shows places that are being affected in by climate change and sea level rise.
The coordinates also include general profiles such as shrines etc:

ABAIANG GPS CO-ORDINATES

No	Name	Co-ordinates	Co-ordinates	Description
1	Nei Arauri	N 01º57.230	E 172º54.522	'Nei Arauri'shrine

2	Terawarawa	N 01º57.047	E 172º54.520	Eroding
3	Temwanoku	N 01º56.985	E 172º54.538	Eroding
4	Tabontebike	N 01º56.855	E 172º54.314	Tip of Takarano decades ago
5	Tabontebike	N 01º56.925	E 172º54.504	Tip of Takarano presently
6	Takabono	N 01º56.956	E 172º54.598	Natual beach movment – comes and goes
7	Akinimao	N 01º56.980	E 172º54.880	Eroding – initial erosion started in the last northerlies?2005
8	Tabonterere	N 01º56.867	E 172º55.082	Eroding
9	Kainiwenei	N 01º56.734	E 172º55.246	Eroding
10	Maiakin te Clinic	N 01º56.687	E 172º55.281	Eroding northern end of Takarano
11	Maiakin te Clinic	N 01º56.583	E 172º55.378	Eroding southern end of Ubwanteman
12	Maiakin te Clinic	N 01º56.531	E 172º55.447	Eroding – public road at risk
13	Akina	N 01º56.283	E 172º55.595	Eroding – public road at risk
14	Terinikua	N 01º56.200	E 172º55.729	Freshwater well for Ubwanteman
15	Akina	N 01º56.335	E 172º55.605	Eroding
16	Tamoa	N 01º56.383	E 172º55.562	Eroding
17	Auainano	N 01º55.090	E 172º56.815	Channel that was closed in the 1960s that has caused erosion to Tebunginako
18	Terikiai	N 01º53.776	E 172º58.056	Eroding
19	Ranbwa	N 01º53.653	E 172º58.276	Eroding southern end of Tebunginako
20	Ranbwa	N 01º53.691	E 172º58.280	Freshwater site at Borotiam
21	Tautau	N 01º52.772	E 172º59.015	Beach erosion at the southern end of Aonobuaka – comes and goes
22	Teatuantau	N 01º53.315	E 172º58.636	Eroding
23	Bwantawa	N 01º52.151	E 172º59.196	Eroding – public road at risk
24	Tematanikaaw a	N 01º51.785	E 172º59.331	Eroding – public road at risk
25	Teabike	N 01º51.109	E 172º59.867	Beach movement – comes and goes – Ewena
26	Mwanoku	N 01º51.485	E 172º59.560	Eroding – public road at risk
27	Tebureieta	N 01º49,468	E 173º00.977	Eroding – public road at risk
28	Mwanoku	N 01º50.335	E 173º00.365	Eroding – public road at risk
29	Kikao	N 01º50.254	E 173º00.483	'Nakurabe' well – freshwater site at Ewena
30	Tekakantang (Nna)	N 01º48.180	E 173º02.084	Beach movment - comes and goes – Tebero
31	Tabontebike	N 01º43.613	E 172º59.379	Eroding – Iceplant at risk
32	Tabontebike	N 01º43.589	E 172º59.424	Accretion
33	Nei Nikuao	N 01º43.370	E 172º59.202	'Nei Nikuao & Nauboika' shrine
34	Tanikabaai	N 01º43.331	E 172º59.126	Eroding and prone to surges and inundation
35	KPC Tabontebike	N 01º43.539	E 172º59.324	Eroding and prone to surges and inundation
36	Moote Tetei	N 01º42.853	E 173º00.290	KPC church at Tabontebike
37	Oiri	N 01º42.726	E 173º00.304	'Nei Moote Tetei' – freshwater site at Taniau
38	Oiri 2	N 01º42.728	E 173º00.340	Eroding and prone to surges and inundation
39	Barekarawa	N 01º42.965	E 173º00.128	Eroding and prone to surges and inundation
40	Tekabwarinuea	N 01º42.943	E 173º00.438	Eroding – KPC church at risk at Taniau
41	Teabananti	N 01º44.856	E 173º00.438	Eroding – RC campus at risk at Tanimaiaki
42	Banna	N 01º44.765	E 173º02.266	Eroding -Tanimaiaki
43	Maiakin te Clinic (Tebero)	N 01º49.021	E 173º01.387	Eroding at Tebero
44	Terau	N 01º46.326	E 173º02.681	Eroding - Tuarabu

45	Buota	N 01º47.300	E 173º02.530	Eroding - Tuarabu
46	Aonnaa	N 01º48.043	E 173º02.157	Eroding - lagoon side of airport at Tuarabu
47	Tanikabaai (Tekawewe)	N 01º43.370	E 172º59.195	Eroding - Tabontebike

Note: The above sites exclude the islets of Riboono, Nuotaea and the other islets of Abaiang. In effect, the whole of Abaiang is suffering extreme erosion and inundation to the point that some public and private assets are at risk. (Refer to Abaiang Island Profile 2008 for detailed map of problem areas and areas of significance.)

EDUCATION

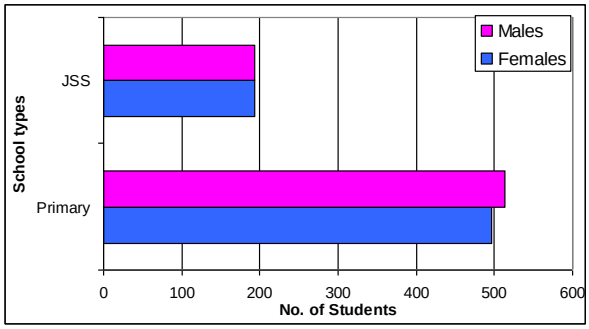
There are eight (8) primary schools on Abaiang, one junior secondary school and two senior high schools, St. Joseph and Stephen Whitmee. The following table lists the number of schools, primary, junior secondary and senior high schools on the island of Abaiang:

Schools on Abaiang

	Name of School	Type	Villages catered for
1	Satellite school	Primary Class 1-3	Takarano
2	Te Uta ni Kabwanebwane	Primary	Takarano, Ubwanteman & Tebunginako
3	Wakaam	Primary	Aonobuaka, Borootiam & Koinawa
4	Sunrise	Primary	Taburao, Ewena & Tebero
5	St. Paul	Primary	Tuarabu
6	Unity of Taateta	Primary	Tanimaiaki, Taneau and Tabontebike
7	Naibunaki	Primary	Riboono (islet)
8	Tearintarawa	Primary	Nuotaea (islet)
9	Ueen Abaiang	Junior Secondary	All on Abaiang including islets
10	Stephen Whitmee (Morikao)	Senior Secondary	Kiribati Protestant congregation
11	St. Joseph (Tabuiroa)	Senior Secondary	Kiribati Roman Catholic congregation

The mainland of Abaiang has 6 primary schools scattered to accommodate the 16 villages while the two islets of Riboono and Nuotaea each have their own primary school. The junior secondary school (JSS) is located between the villages of Koinawa and Aonobuaka, at the ocean side of Wakaam Primary School. JSS students from the two islets have to stay with relatives on the mainland. The two high schools of Morikao and Tabuiroa accommodate students from all over the country who have gained entrances into the schools and are therefore a mix of students from Abaiang and other islands of Kiribati.

Proportional enrolment in primary and JSS



In 2006, a total of 1009 pupils were enrolled in the 8 primary schools.These schools comprised 496 (49%) females and 513 (51%) males distributed amongst Classes 1-6. 17% of these 2006 pupils were in Class 1, 20% in Class 2, 18% in Class 3, 16% in Class 4, 16% in Class 5 while 14% were in Class 6. On the other hand, there were 386 JSS students that comprised 50% each of the females and males. Of these 386 students, 33% were in Form 1, 27% in Form 2 and 40% in Form 3 (Education digest 2006).

Primary school enrolment at different levels:

	Class 1		Class 2		Class 3		Class 4		Class 5		Class 6		
AGES	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	
5	8	5											13
6	80	57	2	3									142
7	10	7	79	74	6	20							196
8			12	22	50	56	3	8					151
9			3	5	15	24	42	50	7	5			151
10					2	3	18	22	46	37	14	7	149
11					1	1	9	5	36	20	34	27	133
12									3	5	26	16	50
13									2	1	2	9	14
14										1	3	6	10
	98	69	96	104	74	104	72	85	94	69	79	65	1009

JSS enrolment at the different levels:

	Form 1		Form 2		Form 3		
Ages	**F**	**M**	**F**	**M**	**F**	**M**	
10							
11							
12	63	64					127
13			62	44			106
14					68	85	153
		127		106		153	386

Source: Education Digest 2006

ISLAND ECONOMY

Copra

The best year of copra production for the island was in 1992 when their production reached a tonnage of 609 bringing in an income of $213,150. Given that there were also 853 households engaged in copra cutting in 1992, this would have roughly brought in a household income of $250 for the whole year. In turn, the households would have earned $0.70/day.

The most recent statistics on the island copra production was at 159 tonnes in 2005 which means that the 853 households were earning less that they were in 1992.

The worst year of copra production was in the year 2000 when its annual production was a mere 36 tonnes that brought an income of $16,200 even though copra prices by the year 2000 had risen to $0.60/lb.

Of course, copra is not the only means of income for the people on the island as there are other means of income such as remittances, stevedoring, council contracts, fishing and handicrafts. Sea cucumber export is also a rising income earning opportunity for people on Abaiang that is leading to depletion of sea cucumbers along the waters of the islands.

Remittances

In Abaiang, a lot of the money received for the year 2008 was school fees and pocket money for students in the two high schools on the island, Stephen Whitmee High School (Morikao) and St. Joseph College (Tabwiroa. Other income sources were copra, the Central Pacific Producers (CPP) ice-plant and sea cucumber agents. The amount of money transferred by telmo in to Abaiang in 2008 totaled $323,628for the whole year: The highest amount received for the months was in October when the amount TT'd into the island was $37,498.75. On the other hand, the smallest amount TT'd to the island in January of the same year was $14,845.95

Agriculture

The main agricultural activities include cutting toddy, cultivation of bwabwai, planting of breadfruit, bananas, pawpaw, 'te bero' and pandanus for subsistence living. Every household apart from visitors' households have their own bwabwai pits, either near by the village or in the bush. Usually '*bwabwai*' (giant taro) is considered as a reserve food particularly for important community functions but in Abaiang, it can also be part of the staple diet depending on the number of '*bwabwai'* cultivated.

Breadfruit is planted with fruits used as part of the daily diet. Most households have their own breadfruit trees that are usually planted along the main road in villages or near homes so that they can be looked after during the early stages of growth. Unlike coconuts and other tree crops, breadfruit is the most vulnerable to drought and thus has to be kept nearby for management during drought times.

HEALTH

There are eight (8) clinics on the island of which two are located on each of the islets of Nuotaea and Riboono and the rest six scattered within the 18 villages of Abaiang as follows:

Abaiang clinics

No.	Clinic location	General information
1	Tabontebike	Supervised by a nursing officer and is accessed by the Tabontebike community
2	Tanimaiaki	Nursing Officer in charge and caters for the Tanimaiaki and Taneau community
3	Taburao	A bigger health centre located near the Island Council, Medical Assistant is in charge as assisted by a nursing officer and is accessed by people from the villages of Taburao, Tuarabu, Tebero and Ewena
4	Koinawa	Nursing officer in charge and clinic accessed by people from the villages of Koinawa and Aonobuaka
5	Borotiam	Nursing officer in charge and clinic is accessed by the Borotiam and Tebunginako community
6	Takarano	Nursing Officer in charge and accessed by Takarano and Ubwanteman community
7	Riboono (islet)	Supervised by a Nursing Officer
8	Nuotaea (islet)	Supervised by a Nursing Officer

TRANSPORTATION

Land and sea transportation on the island is not an issue as the Abaiang Island Council has three trucks and people have their own pushbikes, motorbikes, canoes and boats. The issues lean more toward a bad road that is riddled with potholes and prone to dust during periods without rain, and to flooding during rainy periods, as well as the high cost of both land and sea vessels.

There is a regular air and shipping service between Abaiang and Tarawa but cost is an issue for inter-island travel and particularly for export of local produce and handicrafts.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Coastal Erosion	-Global warming -aggregate mining -high sea surges -closing of a channel at the end of the village of Tebunginako in the late 1960s and early 1970s	-reduction in land masses especially at Tebunginako village -13 sites affected including islets-Tabontebike,Taniau,Tanimaiaki,Tuarabu, Ewena,Koinawa,Borotiam,Tebunginako, Takarano,Kainiwenei,northern tip of Takarano,Ribono at Nakirikiri and lagoon side at Tebikouea	-relocation of villages further inland -mangrove planting -use national and SOPAC expertise embedded within Mineral Unit at MFMD	-questionable -sustainable -sustainable but costly
Water	- frequent and prolonged droughts	-dry vegetation -water turns brackish -kills land vegetation -fruits are affected in size -decrease in income	-concrete cisterns to be built -water tanks and aluminium roofing should be provided to residents -buy own iron roofing	-once obtained all will be sustainable in the long run - encourage self reliance
Reduction in marine resources	-sea cucumber of various types are being overfished -exported overseas -bwaraitoa shellfish not abundant -pearl not abundant -"te were" is being depleted by overfishing	-decrease in income generation -positive impact in terms of export potential -positive impact in terms of export potential -less *were* for islanders to eat -less stock for sale	-white teat is bred in artificial tanks -bwaraitoa shellfish is bred for future use -bred and deployed to other islands -opt for other fishing activities	-takes time -takes time to yield -takes time Encourage islanders through awareness programs coordinated by govt. - Encourage conservation

NORTH TARAWA

PHYSICAL FEATURES

Tarawa, the capital island of Kiribati is one of the two islands in Kiribati that has been split into South and North. South Tarawa is the main urban centre of Kiribati and North Tarawa is generally regarded as another of the outer islands.

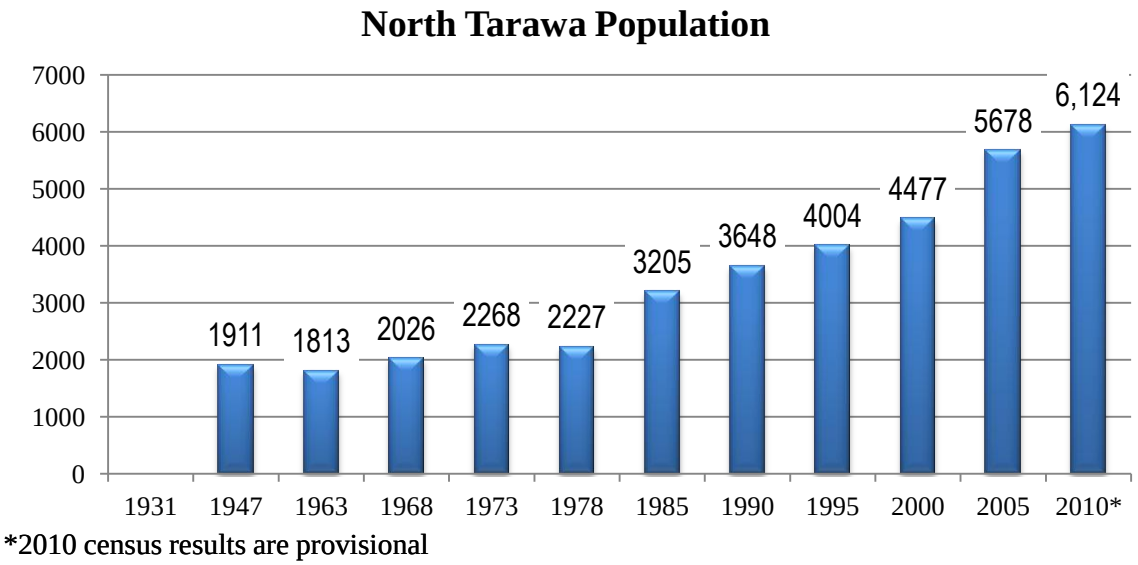
North Tarawa has a land area of 388.39 sq.km. It is made up of several islets with the Government station located in Abaokoro. Its lagoon is also shared with South Tarawa and Betio that is abundant with a variety of marine resources that are slowly being depleted due to harvest from the population in South Tarawa and Betio. The widest part of North Tarawa can be found in the village of Buariki and the narrowest width in the village of Tearinibai, next to Buariki.

Abaokoro accommodates the main service infrastructures such as the Council offices, junior secondary school and medical centre amongst other services. With the increasing congestion of people in South Tarawa, people are slowly migrating up to North Tarawa most notably Abatao and Buota, the nearest two villages that can easily access South Tarawa by walking to Tanaea or traveling by vehicles. Where there is not yet a bridge or causeway from Abatao to Buota, the gap between Buota and South Tarawa was bridged in 1995 when a bridge was built between the two villages of Buota and Tanaea. The location and difficulty of accessing the Government Station in their native North Tarawa has made the people in the villages of Abatao and Buota more dependent on services provided from South Tarawa such as transport and schools, especially the junior secondary school.

Apart from the bridge from Buota to Tanaea, small causeways connect the villages of Tebwangoroi and Taratai, Tebwangoroi and Nuatabu. Not counting the islets, there are 15 villages in North Tarawa namely: Buariki, Tearinibai, Nuatabu, Tebwangoroi, Taratai, Nootoue, Abaokoro, Marenanuka, Tabonibara, Kainaba, Nabeina, Tabiteuea, Abatao and Buota.

POPULATION

The 2010 census recorded a total population of 6,124 people in North Tarawa. The area of North Tarawa is 15.26 square kilometres hence the population density is 401 people per square kilometer.



*2010 census results are provisional

The population trend of North Tarawa is one that is increasing by each passing year. This should not come as a surprise considering that it adjoins South Tarawa where the country's population is concentrated. To relieve congestion and in search for permanent settlements, the population of South Tarawa are buying land and slowly migrating up north to the nearest villages of Buota and Abatao where jobs and other services can still be accessed without too much difficulty. With the increasing availability of boats and ferries, some government workers now travel to work from North Tarawa.

Of the 5,678 people resident in North Tarawa in the 2005 census, 2756 (49%) males and 2922 (51%) females scattered throughout the island's fourteen (14) villages from Buariki to Buota.

A geographical map of North Tarawa

Note: Refer to North Tarawa Island Profile 2008 for problem areas and sites of significance.

North Tarawa Population Density by village (2000 & 2005)

Village Name	Village Land Area (Sq. Km)	Pop 2000	Density 2000	Pop 2005	Density 2005	Density Change %
Buariki	0.65	533	820	597	918	12.01
Tearinibai	0.52	221	425	317	610	43.44
Nuatabu	0.15	183	1220	199	1327	8.74
Tebwangaroi	0.27	34	126	34	126	0
Taratai	0.28	179	639	203	725	13.41
Nootouee (Eretiboou)	0.49	699	1427	845	1724	20.89
Abaokoro	0.26	248	954	294	1131	18.55
Marenanuka	0.17	70	412	71	418	1.43
Tabonibara	0.1	227	2270	300	3000	32.16
Kainaba	0.06	149	2483	219	3650	46.98

Nabeina	0.1	297	2970	414	4140	39.39
Tabiteuea	0.33	342	1036	391	1185	14.33
Abatao	0.25	379	1516	421	1684	11.08
Buota	0.48	916	1908	1373	2860	49.89
North Tarawa	**15.26**	**4477**	**293**	**5678**	**372**	**27**

Source: PopGis 2005 SPC Noumea

The age dependency group is defined as those below 15 years and those over 64 years of age, too young as yet or too old to manage or live on their own and therefore have to depend on others for their livelihood. Of the 5678 population, there are 2262 (40%) of people in the age dependency group, nearly half of the total population of the island. The majority 2096 (93%) are those younger than 15 and 166 (7%) are elderlies, those older than 64 years old.

Village population by Age groups

Village	Broadage Age Group								
	Total	<1	1	2-5	6-14	15-17	18-49	50-69	70+
Buariki	597	18	12	53	127	45	268	63	11
Tearinibai	317	6	10	32	78	17	129	34	11
Nuatabu	199	4	6	18	48	14	81	23	5
Tebwangaroi	34	0	2	3	8	1	18	2	0
Taratai	203	5	11	19	48	10	81	25	4
Nootoue	845	24	9	45	119	237	344	53	14
Abaokoro	294	4	3	24	95	24	110	29	5
Marenanuka	71	3	3	7	14	4	31	8	1
Tabonibara	300	8	4	32	75	17	131	28	5
Kainaba	219	4	6	19	52	13	102	19	4
Nabeina	414	19	10	43	98	17	173	50	4
Tabiteuea	391	8	3	34	106	26	172	34	8
Abatao	421	12	16	38	112	19	180	40	4
Buota	1,373	37	36	135	331	68	620	114	32
North Tarawa	**5,678**	**152**	**131**	**502**	**1,311**	**512**	**2,440**	**522**	**108**

Source: NSO MFED Bairiki Tarawa

The majority of the island population in the statistical year of 2005 was between the ages 18-49 numbering 2262 out of the 5678 population with the highest number residing in the village of Buota, the first village from South Tarawa into North Tarawa.

In 2005, of the 5678 population 2756 (49%) were males and 2922 (51%) were females thus the males were outnumbered by the females by 166 (2922-2756)

LAND AND MARINE RESOURCES

Land Resources

In contrast to Butaritari that has a rich bio-diversity, North Tarawa land resources are generally the same as those on the other islands that is to say, limited. As with the rest of the islands in Kiribati, the most common resource trees on the island are coconuts and pandanus but where other islands are making a living out of copra, North Tarawa seems to have been left out of the copra scheme or else the people are not interested in copra cutting as they have other means of generating income such as in sales of pandanus roof thatches and local food to South Tarawa.

Water

The majority of households have open wells as their main source of water. In the census of 2005, 757 (87%) households main source of water are open wells, 20% (170) households use closed wells as their main source of water while a mere 12% (105) were using rainwater as their main source of water and the remaining 3% were either using piped or shop water as their main source of water.

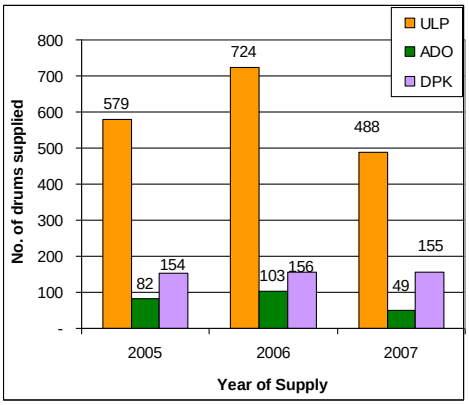
Although North Tarawa is blessed with a broad island and a continuous supply of potable water, pit toilets on the island are creating a health hazard for many of the wells.

Energy

Firewood is abundant on the island and the people have also been known to sell firewood to the people in South Tarawa where firewood is a problem. But people also rely on fossil fuel for their energy.

North Tarawa fuel energy needs since 2005 as provided from KOIL 2007, totaled 2,490 drums comprising 1,791 (72%) un-leaded petrol (ULP) drums, 234 (9%) automotive diesel oil (ADO) drums and 465 (19%) drums of dual purpose kerosene (DPK). At 200 liters per drum, North Tarawa has received a total of 358,200 litres of ULP, 46,800 litres ADO and 93,000 litres of kerosene (DPK) since 2005 according to KOIL statistics.

Fuel supply 2005-2007



Marine Resources

Reef and lagoon size

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Tarawa	129.03	375	533.91	31.2

Issues facng fishing and development of marine resources

Even with the vast reef and lagoon base that is abundant with fish, North Tarawa issues are generally the same as issues on South Tarawa:

- Depleting marine resources in the lagoon and ocean due to overharvesting
- Absence of an ice-plant has made salting their only way of preserving fish
- Pollution of lagoon water through mass use of the beaches as a waste area

ENVIRONMENT

The most threatening environmental issue on the island is coastal erosion, and flooding of land during high sea surges. Other issues also exist in the form of unsafe dumping of rubbish and lack of proper sanitation facilities, leading to pollution of the water lens.

Because of extended droughts environmental issues are always arising such as increased salinity of wells, dying of tree crops, dusty roads that give rise to other health issues such as coughing and conjunctivitis etc. These are recurring issues on atoll islands located astride the equator and North Tarawa is no exception. Another disadvantage of it adjoining South Tarawa is the ease with which pests and diseases to reach the people and their tree crops. In the case of the bwabwai beetle, the last Agricultural record was that it had reached Nabeina but this was in the 1990s and no review has been carried out since then, so the beetle could have reached Buariki for all anyone knows.

EDUCATION

North Tarawa has three types of school not counting the pre-school and these are primary schools, a junior secondary school and a senior high school. The 10 primary schools are strategically located at the most convenient locations for villages to each share a primary school where necessary. On the islets where it is a problem walking the reef passages or channels, schools are located on individual islets.

School enrolment

	Name of School	Location	Type	No. Students enrolled	Percentage
1	BT Uekeraa	Buariki and Tearinibai	Primary	182	16
2	Nein Tebwaara	Nuatabu and Taratai	Primary	76	7
3	Ueen Nooto	Nootouee	Primary	102	9
4	Bwaan Nei Kanna	Abaokoro	Primary	52	5
5	Aratokotoko	Buota	Primary	263	24
6	Amoange	Marenanuka and Tabonibara	Primary	108	10
7	Nangin Tookato	Kainaba	Primary	40	4
8	Nuun Teweia	Nabeina	Primary	79	7
9	Raweaitina	Tabiteuea	Primary	112	10
10	Maamatannana	Abatao	Primary	105	9
	Total Primary			**1119**	**100**
11	EutanTarawaieta	Abaokoro	Junior Secondary	213	
12	Taborio (Immaculate High School)	Nootoue	Senior High	202	

A total of 1119 children enrolled in the above 12 schools of North Tarawa in 2006 that comprised 507 (45%) females and 612 (55%) males, further clarified in the above chart. 213 teenaged children attended Eutan Tarawaieta JSS while 202 young men and women attended the Immaculate Heart College at Taborio. The JSS students comprised 118 (55%) females and 95 (45%) males while the IHC students had 111 (55%) females and 91 (45%) males.

The JSS truck transports JSS school children from the northern end village of Buariki and southern village of Tabonibara daily during school days. JSS students from the rest of the island, especially those living on the islets have to stay over at the mainland Abaokoro to attend the JSS as the islets cannot only be accessed by the JSS truck, but they are also too far and risky with tides for children to walk.

Table 6: North Tarawa Primary School enrolment by Age, Gender and Class

	Class 1		Class 2		Class 3		Class 4		Class 5		Class 6	
Age	F	M	F	M	F	M	F	M	F	M	F	M
5	19	20										
6	96	94	6	3	1							
7	11	11	72	73	4	8	1					
8		1	11	24	61	89	7	4				
9			2	2	18	23	48	59	5	4		
10		1	1	1	4	6	9	10	44	60	8	5
11					2	2	4	6	12	18	53	61

12										2	8	19
13										1		3
14												2
	126	**127**	**92**	**103**	**90**	**128**	**69**	**79**	**61**	**85**	**69**	**90**

Source: Education Digest 2006

Eutan Tarawaieta JSS school enrolment by Age, Gender and Form

	Form 1		Form 2		Form 3	
Age	**F**	**M**	**F**	**M**	**F**	**M**
11	6	3				
12	17	11	6	2		
13	7	15	22	11	1	3
14	1	2	6	9	20	16
15			5	3	20	10
16					6	10
17					1	
	31	**31**	**39**	**25**	**48**	**39**

Source: Education Digest 2006

ISLAND ECONOMY

Copra Cutting

North Tarawa does not seem to cut copra as much as those on the other outer islands even though there are copra sheds in most of the villages. One of the reasons is due to the fact that the lands are so dispersed over the mainland, islets and South Tarawa so that it is more a problem trying to access these faraway lands to cut copra. On the other hand, easy accessibility of South Tarawa has provided other income generating activities such as in sales of cooked local food (bekei, ibo, toddy, pandanus etc), firewood, de-husked coconuts and thatches. However, others still cut copra but not as much as in the other outer islands.

The best year of production for North Tarawa was in 1992 when their production reached a tonnage of 254 bringing in an income of $88,900. Copra prices for that year, 1992, were quite low at $0.35/lb. On the other hand, its worst year of copra production was in the year 2000 when North Tarawa's annual production was nil. If droughts were the only reason for the decline in copra production, the copra charts would have provided good indicators for times of drought in the country and individual islands.

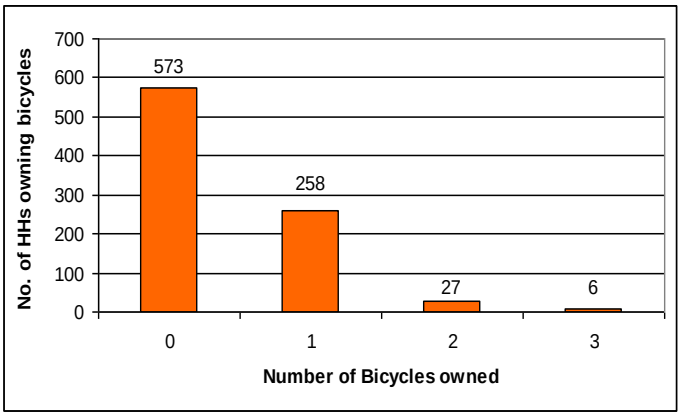
Employment

The Eutan Tarawa Island Council serve as the biggest employer for the people of North Tarawa, employing 64 people in 2010 including as village wardens, village nurses, drivers, hotel keeper, and office (typing, treasurer, clerk) assistants etc.

Apart from a handful number of jobs offered by the Island Council in its limited service, opportunities for paid employment for the islanders is otherwise very limited. The Cooperative does not exist on the island and thus there are hardly any other means of employment on the island. The Immaculate Heart College at Taborio,

adjoining Nootoue employs some islanders as cleaners, cooks, matron, master and watchman.

Households owning bicycles



573 (66%) of the 867 households according to the 2005 statistics do not own bicycles or pushbikes, 258 (30%) have one pushbike, 27 (3%) have two bicycles while the rest have three or more bicycles. A total of 340 bicycles were recorded and unfortunately, statistics did not record the number of motorbikes as owned by the households on the island for the same year.

Land and sea transportation on the island is not an issue as the Eutan Tarawa Island Council has a truck and people have their own pushbikes, motorbikes and trucks as well. The issues of transportation, nevertheless include the following:

a. High cost of pushbikes, motorbikes and boats
b. Lack of properly equipped mechanical workshops
c. High cost of daily monitoring of islets

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Coastal Erosion	-aggregate mining -seawall construction -causeway construction	-reduction of landmasses at some areas -loss of bwabwai pits and fruit trees -water sources affected	-mangrove planting -limit aggregate mining -Nooto village is keen to have its waters protected -properly designed seawalls -opening up of causeways	-sustainable -questionable -can be sustainable -expensive but sustainable -costly but sustainable
Reduction in Marine Resources	-overfished by TUC/BTC fishermen -imaginary boundary at sea between North and South Tarawa did not eventuate -use of a variety of fishing gears by S/Trw fishermen -unregulated harvest of resources -gang and family fishing for cash revenue	-discrepancy of islanders' attitude toward conservation with South Tarawans -limited marine resources for them to live and fish -lobsters and octopus declining in numbers -*te ibo* exploited for S/Trw market -bone fish and finfish decline from heavy and non-stop fishing -shellfish – *te bun* depleted -cone shell – *te nouo* overharvested -sharks depleted -red snapper decline -flying fish heavily exploited	-by-law to protect fishing grounds -identification of fishermen -a well constructed management plan and regulatory measures -draft bill for protected species and areas -demarcation of fishing zones	-take time to effect -take time to effect -on the way, but questionable in terms of effectiveness -can work if all parties agree

		-*te mania, te koikoi* decline -all sea cucumber species depleted		
Water	drought	-less ground water -vegetation and fruit trees affected	-concrete cisterns to be built to withstand long droughts -watering systems to be in place -aluminium roofing for residents for tanks	-long term plan and costly but can be sustainable
Capacity building on Climate Change and Sea Level Rise	-no consultation previously conducted -no funding for training at island council level	-islanders are unaware of Climate Change and Sea Level Rise -island council employees not familiar with training of village people	-intensifying training and consultation -media training -contributions from respective govt. Ministries towards CC and SLR	-sustainable through funding sources -must continue at paced intervals

MAIANA

PHYSICAL FEATURES

Maiana is to the south of Tarawa, measuring 14 km in length. It is an island with a medium sized lagoon. It is protected from the ocean waves by a narrow strip of fringing reef at the windward side and submerged reef at the leeward side. Some parts of the island are swampy; some are dugout pits in which residents grow *bwabwai*, banana, and other food crops. At times swampy areas are vulnerable to seawater intrusion that occur every high spring tide. Most of the important food crops such as coconut, giant taro, pandanus and breadfruit grow well and require minimal cultivation.

The main source of drinking water is from groundwater reservoir which can be tapped by digging wells 3-5 meters into the ground. The quality of groundwater is easily affected by droughts, heavy rains replenish them. There are over 330 wells on Maiana and 38 rainwater catchments. Most of the uncovered wells are close to *bwabwai* pits and therefore prone to contamination. More recently, the increasing incidences of unusually high tides have caused saltwater intrusion into communal pits, resulting in salt contamination and damage of food crops. This is becoming a source of grave concern to the people of Maiana who are depended on *bwabwai* as a source of food for many generations.

POPULATION

The 2005 census recorded a total population of Maiana of 1,908 that spread out amonst 10 villages.

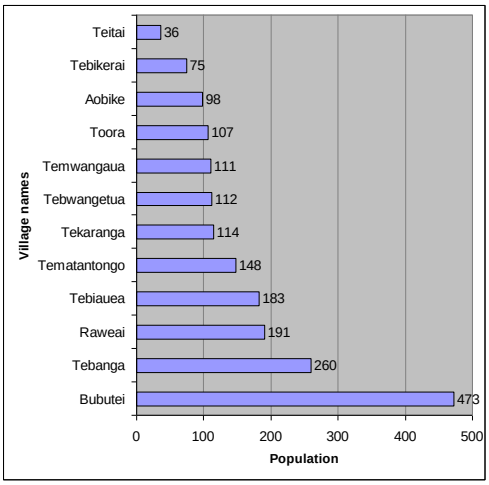
The Table below presents the population density by village, showing each individual village and its population and how it is heavily populated with the land area of the village itself. This density is calculated based on the size of the village boundary. Tematantongo has very high density as compared to other villages with its density of 1,644 people per square kilometers. In fact Tematantongo has only about 148 people; however Bubutei has the highest population of 473, yet has a very low density of only 503 people per square kilometer. Incidents as these happen over the mere area of the village, where it can be concluded that Bubutei has a bigger land area than Tematantongo. The village with the least density is Tebiauea with only 354 people living over a square kilometer.

Population Density by village

Village Name	Pop 2005	Density 2005
Tebikerai	75	750
Tekaranga	114	1036.36
Tematantongo	148	1644.44

Aobike	98	490
Tebwanga	260	530.61
Temwangaua	111	292.11
Toora	107	891.67
Tebangetua	112	1400
Teitai	36	720
Tebiauaea	183	345.28
Raweai	191	353.7
Bubutei	473	503.19

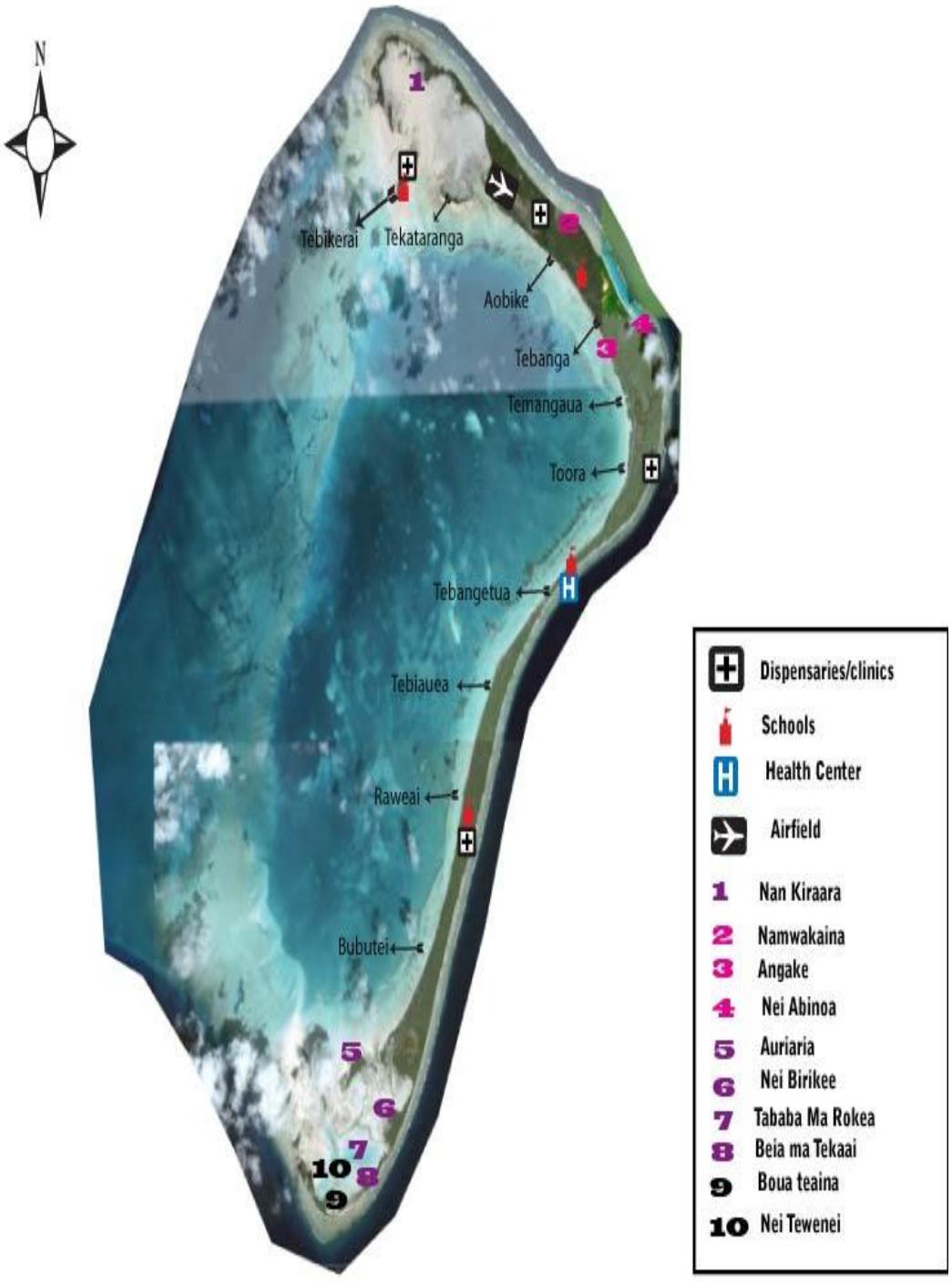
Population by village



Source: 2005 Census of Population, NSO/MFED, 2007

The population chart above compares the distribution of population by villages and showing that a large proportion of people (473 of 1908) live in Bubutei village. Bubutei village is not the main center of activities on the island, Tebangetua is. The later is headquarter of the Maiana Island Council and center for government and island council services. A Junior Secondary School is located here. Out of Maiana's total population of 1908 in 2005, males constituted 50.3% (1200), females 47.3% (1185). In terms of ratio there are roughly 100 males per 98 females.

A Geographical View of Maiana



Note: Refer to Maiana Island Profile 2008 for problem areas and sites of significance.

LAND AND MARINE RESOURCES

Land Resources

A large portion of the land is overgrown with wild bush and cultivated *bwabwai,* breadfruit and pawpaw. The dominant fruit tree is coconut which grows everywhere. Other plants include pandanus (*te kaina*), breadfruit trees (*te mai*) and bananas that grow mostly in village areas. The vegetation grows well because of fairly high annual rainfall, however banana ultvation is minimal as compared with northern islands. Inhabited homes are well maintained and tidy while unoccupied ones are deteriorating with time with tall grass and fallen leaves around them.

Water resources

The 2005 census recorded that 38 households have access to rainwater; none to piped water, 330 to unprotected wells, 75 to protected wells, and almost three quarter of the total number of households have access to both unprotectd and protected wells.

Groundwater reserves on Maiana are threatened by saltwater pollution through surface intrusion. Already the freshwater pond which serves as an important food-producing area for most villages has been overflowed with seawater several times, causing destruction to *bwabwai*, banana, coconut and other food crops. Surface intrusion of seawater leaves the groundwater reservoir completely vulnerable to pollution and contamination; this is slowly spreading out to other groundwater reservoirs. Despite issues of creating seawalls around the island, seawater still seeps in through porous sand and is not being contained to minimize damage to crops and water supplies.

Marine Resources

Maiana has 27 square kilometers of reef. This is obviously a big reef area compared to other larger islands in Kiribati. The island is of simple coral formation and therefore has a very big lagoon with area of 73.95 square kilometers. Shell fish could be found on the mudflat at low tide, and abundant schools of small fish live among the roots of the mangrove during high tide.

Size of Reef/Lagoon Size

Islands	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Maiana	27	73.95	16.7

Source: Ministry of Fisheries, Marine Resource Development, Tanaea

The enormous reef area, combined with a fairly large lagoon area, pose a great advantage to the people whose major source of protein is fish

ISLAND ECONOMY

Copra Cutting

Copra cutting is an important activity which provides a steady source of income for many people on Maiana and every other outer island people. At $0.60 cent per kilogram the total revenue from copra was approximately $250,000 in 2003, $245,000 in 2004 and $126, 000 in 2005. This means that from copra production each household generates on average a total of $664.90 in 2003, $651.90 in 2004 and $355.90 in 2005.

Copra remains the main export commoditiy from the island. Other smaller commodities include sharkfns and sea cucumber which will run out soon if conservation measures are not put in place.

Copra production and revenue 2003-2005

Year	Tons	Total income	Income Per H/hold
2003	350	$ 250,000.00	$664.90
2004	500	$ 245,000.00	$651.90
2005	200	$ 126,000.00	$355.90

Source: National Statistics Office, 2007

Employment

The Island Council serve as the biggest employer for Maiana islanders, employing about 20 islanders as village wardens, village nurses, drivers, hotel keepers, and office assistants. The most common projects which generate jobs for the young men of Maiana include construction of buildings and road and other large infrastructure.

Agriculture

The predominant food crops on Maiana are *bwabwai*; banana, pandanus, coconut and breadfruit. Each family has its own bwabwai pits, breadfruit and toddy trees. Home gardening is not common but some households have their own vegetable gardens where they grow tomato, cabbage, cucumber and eggplant mainly for home consumption.

The main animals reared by the islanders are pigs and chickens, for home consumption. In 2005 the total number of pigs on Maiana was 1192, with 95.2% of households owning at least 3 pigs on average. There were approximately 1544 local chickens. The people of Maiana believe that they can produce more meat and vegetables for export to Tarawa if the problem of transport, communication and marketing are resolved. They also believe that training on vegetable and livestock production is important if trade in these primary produce is going to be undertaken.

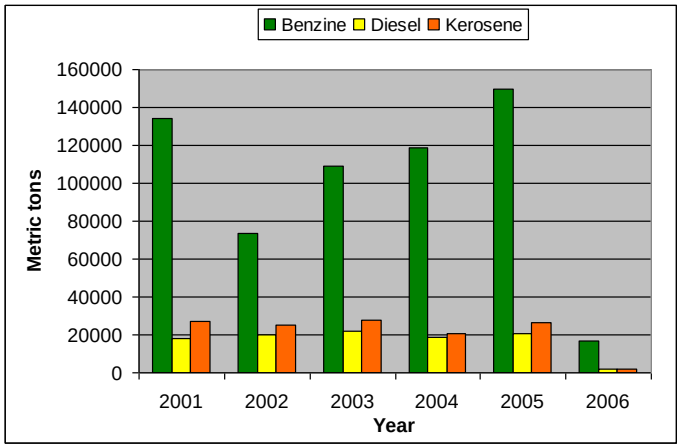
In terms of replanting fruit trees, there is little agricultural activity on the island. Coconut and pandanus replanting are done in pockets at household level. Boosting agriculture requires incentives from government and ngos in the form tangible

rewards. More importantly is programs that will encourage indviual land owners to work their land for their own good.

Energy

The 2005 census recorded that out of 354 households 56 owned power generators and 346 have pressure lamps. There were also 4 cars, 145 motorcycles and 19 outboard motor engines. Electrical appliances include 243 radios, 5 computers, 2 own Television and 20 CB radios.

Fuel distribution to Maiana 2001-2006



Source: KOIL data 2006

In terms of volume, unleaded petroleum (commonly known as benzine) has been the most commonly used fuel on the island, followed by kerosene and diesel. The chart shows that the volume of fuel sent by KOIL to Maiana Island between 2001 and 2006 has generally increased, with unleaded petroleum constituting 75% of total requirements, kerosene 13% and diesel 13% (average of combined fuel requirements from 2001 to 2006). It is anticipated that the proportion of unleaded fuel will increase as the use of automotive machines and equipment (portable generators, outboard engines, motorbikes, etc.) becomes more widespread.

ENVIRONMENT

Coastal erosion is a major environment issue for the people of Maiana. Many areas on Maiana have been seriously eroded, resulting in the relocation of infrastructure (road, buildings, etc.) or the recurrent high expenditure of maintaining seawall protection.

Whether it is true or not, the people of Maiana do strongly believe that the construction of causeways on the neighboring island of Tarawa is the cause of serious coastal erosion on Tebikerai. This, despite the fact that there is a causeway/bridge on Maiana itself, which has caused erosion and land accretion in the areas located within the immediate proximity of the structure.

EDUCATION

Maiana has 4 schools comprising 3 Primary Schools and one Junior Secondary School. On Tebikerai village Karewea Primary School is located. Abitabu primary school is located between the villages of Aobike and Tebanga while Urintebura is located at Raweai. The Junior Secondary school, Tewaiwai, is situated in the Tebangetua village which is the main administrative center for the island. Other public services are also headquatered here.

In 2006 Karewea Primary school had 18 students with 2 teachers; Abitabu Primary School had 180 students with 7 teachers whereas Urintebura primary school has about 169 students and 6 teachers. By individual school Karewea had a ratio of 1 teacher for every 9 pupils; Abitabu had 1 teacher per 25 pupils; and finally Urintebura had 1 teacher per 28. Combined the ratio for the two schools was 1 teacher per 26 pupils.

Number of enrollment over 2003-2006

Year	2003	2004	2005	2006
Student enrolled	341	428	281	350

Source: Digest 2006, MEYS, statistics unit

Maiana has three primary schools with differing enrolment figures for 2006. In 2006 a total of 350 pupils enrolled at Karewea, Abitabu, and Urintebura. Of this number 165 were females, 202 males. The total number of teachers for all the three primary schools combined was 15, 2 were based at Karewea, 7 at Abitabu and 6 at Urintebura.

Primary enrollment by gender, 2006.

Primary School	Female	Male	Total
Karewea	11	7	17
Abitabu	78	102	180
Urintebura	76	93	169
Total	165	202	367

Source: Digest 2006, Statistics unit, MEYS, Bikenibeu.

Maiana has one Junior Secondary School, Tewaiwai. Apparently there are no values for the 4 years of enrollment. There were 108 children with ages between 12 and 14 years. The table below shows 122 enrolled implicating that there were also late enrolments due to various reasons including travelling.

Junior Secondary Enrollment by form

Island	Form 1	Form 2	Form 3	Total
Maiana	47	46	29	122

Source: Digest 2006, Statistics Unit, MEYS, Bikenibeu

Of the total number 47 were in Form 1, 46 were in Form 2, and 29 were in Form 3. With a teaching staff of 9, the Teacher to Pupil ratio was 1:14.

Enrolment in Primary and Junior Secondary Schools, Maiana 2005 and 2006

Primary School								Junior Secondary School			
Year	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	TOTAL	Form 1	Form 2	Form 3	TOTAL
2005	71	53	75	58	44	49		47	46	29	
2006	65	72	56	74	56	44		47	46	29	

Source: Compiled from the Digest of Education Statistics, MOE, 2005 and 2006

HEALTH

There are five clinics and one health center on Maiana. Clinics are selectively located to ensure all villages are catered for and served. The Health Center is located in Tebangetua, main administrative center for the island. There is one Medical Assistant (MA) with 2 nurses and 4 nursing aids. The MA and 2 nurses are government employees, nursing aids are island council employees.

The Health Center and clinics catr for patients admitted for medical observation with referrals sent to Nawerewere Hospital in South Tarawa. These health facilities are as follows:

- *Main Health Center*: 1 Dispensary/clinic, 3 wards, 3 cooking houses and 3 toilets
- *Tebikerai Dispensary/clinic*: 1 clinic, 3 wards, 3 cooking houses, and 3 toilets
- *Bubutei Dispensary/clinic:* 1 clinic, 2 wards, 2 cooking houses, 2 toilets
- *Aobike Dispensary/clinic*: 1 clinic, 3 wards, 3 cooking houses, and 3 toilets
- *Tekaranga Dispensary/clinic:* 1 clinic, 2 wards, 2 cooking houses, 2 toilets
- *Temangaua Dispensary/clinic*: 1 clinic, 3 wards, 3 cooking houses, and 3 toilets

Records show that the most common diseases on Maiana Island are ARI (Acute Renal Infections) which are basically coughing, cold, soar throat, bronchitise; acute fever, conjunctivitis, diarrhea and dysentery. These diseases were the most prevalent among the patients who visited or were admitted to the clinics and health center on Maiana in 2006.

TRANSPORT

The most common form of land transport is the bicycle, of which there were 199 in 2005. A total of 48 motorcycles were recorded in 2005.

Sea travel is vital for Maiana peple to access urban markets. There are regular ferries calling at Maiana almost every week. There are also smaller vessels that make trips despite of treacherous sea conditions. Two tragic incidences have occurred; main causes include unregulated cargo weight, and rough sea and unskilled motorists. To avoid more sea accidents, canoes should be barred from running shipping services through not issuing marine licenses that vessels of sea-worthiness are given.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Water	drought	-Brackish water unhealthy for people -destroying plants and fruits -Tebikerai village would not stand prolonged droughts -all village wells close to shoreline are saline	-concrete cisterns to be built For residents -immediate water enhancement -plastic tanks	-sustainable in the long run -needs training but can be sustainable -sustainable for short and immediate terms, expensive in the long run
Little Agricultural Activity	-village busy with all sorts of fishing -yagona usage makes people lazy	-non availability of land protein and vegetables for a balanced diet -malnutrition and liver disease	-encourage agricultural activity thru Taiwan Technical Mission and Agricultural division -awareness program on impact of yagona on people	-can be sustained -difficult but possible
Capacity Building on CC and SLR	-no consultation previously conducted -no funding for training at island council level	-islanders are unaware of Climate Change and Sea Level Rise -island council employees not familiar with training of village people	-intensifying training and consultation -media training -contributions from respective govt. Ministries towards CC and SLR	-sustainable through funding sources -must continue at paced intervals

Coastal erosion	-land reclamation by KPC and RC i.e Bubutei,Tebiauea and Tebanga -sea wall construction -sea level rise -extreme high tides	-a threat to properties and people`s welfare -coconut trees and vegetation disappearing from the beach -Tekaranga and Tematantengo needs immediate attention	-by-law that regulates the protection of coastal areas specific for Maiana island -a project planned to protect these villages to construct concrete seawall	-sustainable but hard to materialise -costly and may have side effects
Dirty Lagoon Seawater closer to Land	-dumping of degradable and non-degradable rubbish -sea cucumber gutting in the lagoon -use of sea and beach for toileting purposes	-unhealthy and unclean seawater for bathing -affects shellfish and marine resources in lagoon	-concerted effort from village and island council to counteract these unnecessary actions -by-law to protect marine environment from land-based pollutants in all forms	-takes time to materialise -possible but needs working on right now

ABEMAMA

PHYSICAL FEATURES

Abemama has a land area of 7.89 square kilometers with a width varying from 50 m to 2 km. The island has 3 main islets two of which are smaller in land area. The largest and main islet has 11 villages holding the most population. Abatiku, an islet located at the north-western reef holds hundred odd inhabitants while Biike just south of it has one or three families.

The island is blessed with an abundance of lagoon fish, shellfish, worms, and some seaweed famrs. Abemama has a massive lagoon area. .

Causeways were constructed to link all villages on the main islet making transportation easy. The island resembles an incomplete “G” letter, with two reef passages; one is located in between Abatiku and Tabiang village at the north-western end. The other is between Biike and Kenna, the later being the southermst end of the main islet. The island is surrounded with an expsed reef at the windward side and submerged reef at the leeward side where Biike and Abatiku are sitting. Most of the important food crops such as coconut, giant taro, pandanus and breadfruit grow well.

POPULATION

The 2005 census recorded a total population of Abemama is 3404. The population spreads out amongst 13 villages, including Abatiku village. The table below presents population density by village. It shows Bangotan-Te-Kabaia has the highest density per square kilometer of 1,768 people. Tekatirirake comes second with 1,723 people, while Tanimaniku is third with 1091 people. Kauma has the least density of 264 people per square kilometre.

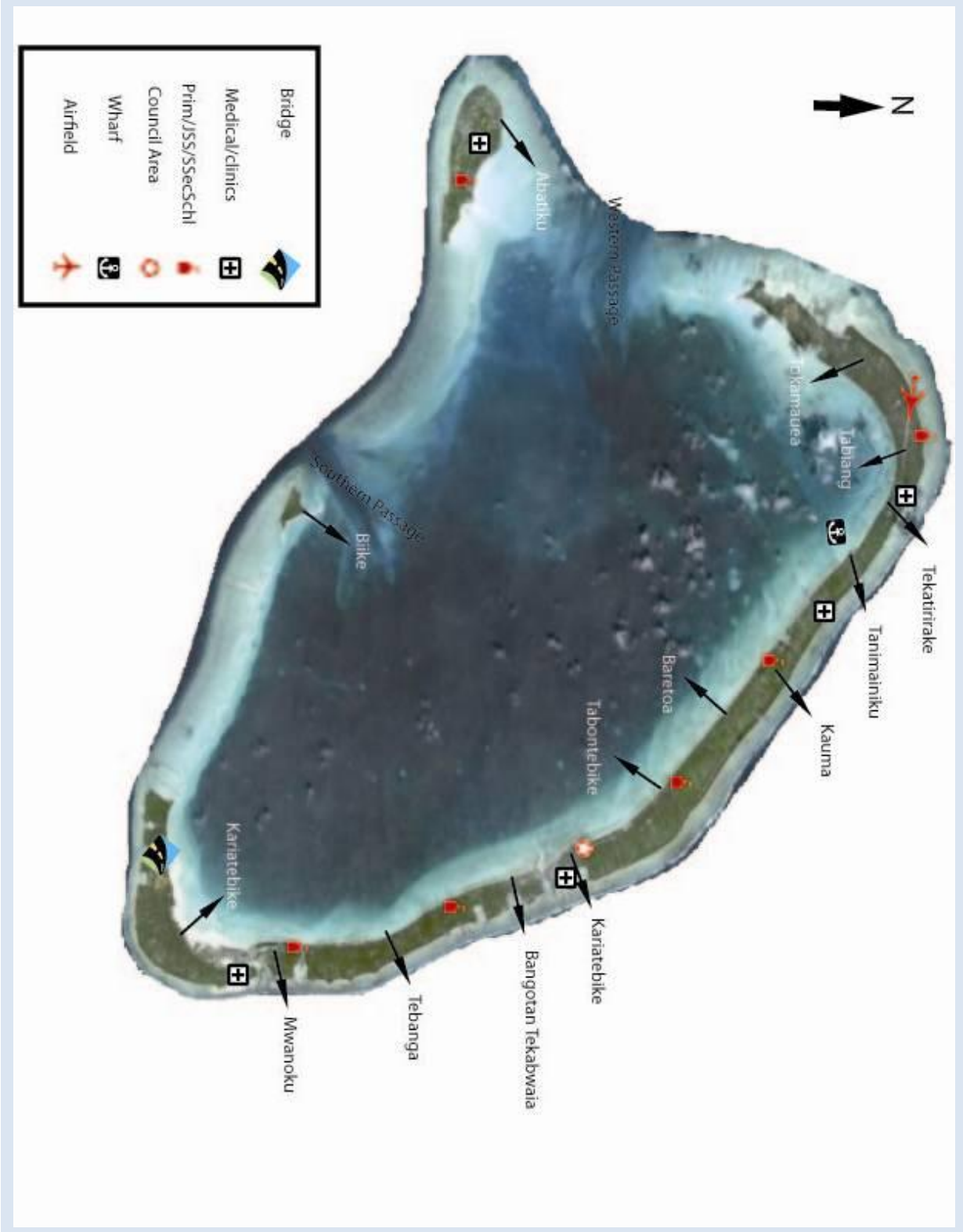
Population Density by village

Village name	Village Land Area	Population 2005	Density 2005
Abatiku	0.66	191	289.39
Tabiang	0.75	591	788
Tekatirirake	0.13	224	1723.08
Tanimainiku	0.24	262	1091.67
Kauma	0.65	172	264.62
Baretoa	0.49	310	632.65
Tabontebike	0.37	305	824.32
Kariatebike	0.41	140	341.46
Bangotantekabaia	0.19	336	1768.42
Tebanga	0.86	246	286.05
Manoku	0.31	247	796.77
Kabangaki	1.03	363	352.43
Biike	0.09	17	188.89

Source: 2005 census Data, National Statistics Office, MFPED, Bairiki

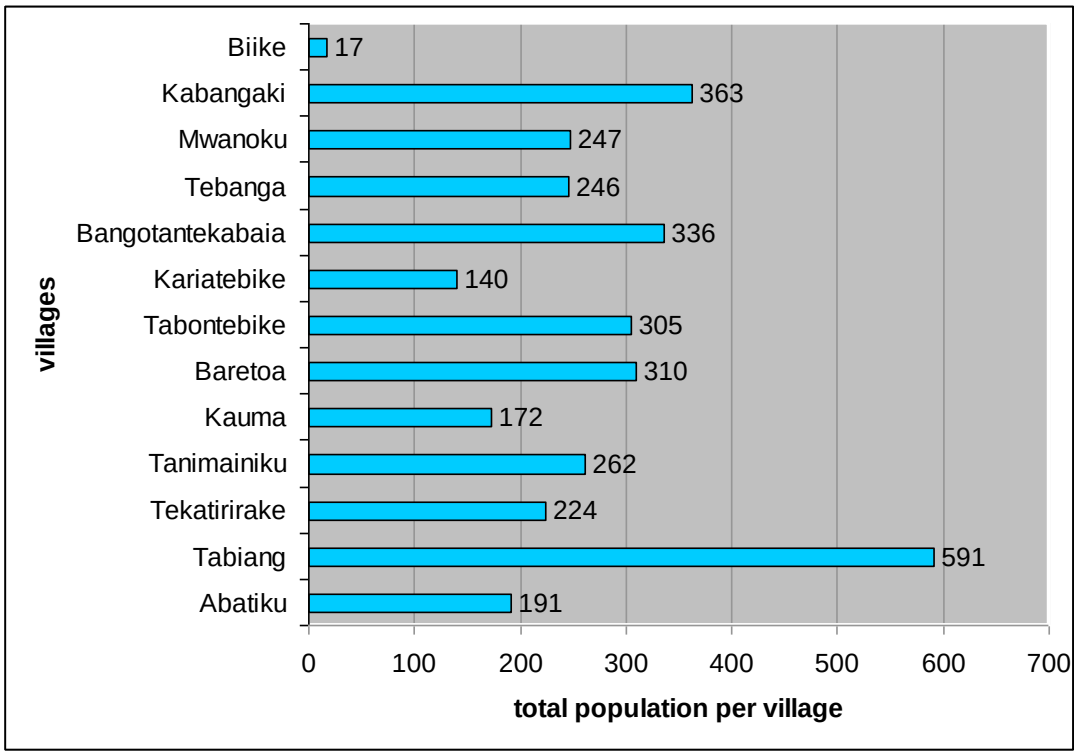
With a total land area of 27.37 square kilometers and a population of 3404 (2005 census), Abemama has a population density of 124 people per square kilometer.

A physical view of Abemama



Note: Refer to Abemama Island Profile for problem areas and sites of significance.

Population by village



Source: 2005 Census of Population, NSO/MFED, 2007

Of Abemama's total population of 3404, males made up 50.3% (1712) and females 49.7% (1692), amost of same ratio. Age-group 15-19 years constitute 20% in both genders. Age-group of 65-69 and above constitutes the smallest proportion, yet old females were 72 compared 41 males. Abemama has a young population with around 20 years dominating.

LAND AND MARINE RESOURCES

Land resources

Land is owned by the families of former chiefs and the people in general. About a quarter of the land area is leased by the Island Council for its clinics, health center, schools, airfield runway and its administrative station. A small area is also leased by the various religious groups and the Cooperative Society.

Two of the small isolated islets – Abatiku and Biike are owned by a number of people who use them for copra cutting and raising of pigs except for the fact that Biike itself is owned by the royal blood family. Settlement on Biike is somehow only under the authorization of the royal family kinship. Abatiku however, is an islet with quite a few numbers of households, small clinic, a primary school, and two compounds for RC and KPC denominations.

A large portion of the land is used up by wild bush and cultivated *bwabwai*. The dominant tree in terms of numbers is the coconut, which grows everywhere. Other plants include pandanus (*te kaina*), breadfruit trees (*te mai*) and bananas that grow mostly in village area.

Water resources

The main water sources for drinking and sanitary purposes are rainwater and groundwater respectively. The groundwater drawn out from open wells is also used for drinking purposes when rain is not available. Most wells are not protected but boiling wel water for drinking is common. Abemama has vast sources of groundwater throughout the island, however prolonged droughts affect water quality.

Marine resources

Abemama has 67.86 square kilometers of reef. This is a big reef area compared to other larger islands in Kiribati. The island is of simple coral formation and therefore has great lagoon; there are ocean passages which cuts through the island have become both entrances into the interior of the island lagoon.

Table 3: Size of Reef/Lagoon Size

Islands	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Abemama	67.86	23.2	152.49	27.4

ENVIRONMENTAL ISSUES

Coastal erosion is a major environment issue for the people of Abemama. Many locations on Abemama have been seriously eroded, resulting in the relocation of infrastructure (road, buildings, etc.) or the recurrent high expenditure of maintaining seawall protection. Abemama is one of the slands in the Gilbert Group with causeways; one at Kariatebike, the ther is at Kenna. The impact of causeways are being felt but people and island councils are pretending not to knw them and continue destroying mangrove forests, collect sand and gravel from foreshores thus aggrevating sand and material movement cause by causeways. Hence blaming climate change as the causative agent is not a good excuse, human destruction of the environment in many ways for many reasons are the main culprits.

Abemama CC & SLR impact GPS coordinates

	Lat/Lon hddd°mm'ss.s"	Description
1	N0 18 53.0 E173 54 20.3	Erosion at Kenna islet
2	N0 18 42.8 E173 54 21.1	Point two of above
3	N0 18 46.3 E173 54 40.0	Point three of above
4	N0 18 43.2 E173 54 40.6	Freshwater site at Kenna islet
5	N0 18 44.4 E173 55 00.7	Accretion at Kabangaki

6	N0 18 43.7 E173 55 01.0	Kabangaki erosion at base of Kenna bridge
7	N0 18 42.9 E173 55 00.7	Point two of above
8	N0 18 41.7 E173 55 01.3	Kabangaki erosion further to the ocean side of Kenna bridge
9	N0 18 35.8 E173 55 05.4	Point two of above
10	N0 18 47.2 E173 55 13.9	Kabangaki erosion at Tabotine
11	N0 18 49.7 E173 55 22.7	Point two of above
12	N0 18 47.2 E173 55 13.7	Accretion Point two of 5
13	N0 18 50.3 E173 55 40.0	Kabangaki erosion at KPC area
14	N0 18 53.4 E173 55 51.4	Point two of above at RC area
15	N0 18 54.4 E173 55 52.8	Clinic at Kabangaki
16	N0 19 51.8 E173 56 12.3	Point two of above
17	N0 19 53.8 E173 56 14.1	Freshwater site at Mwanoku
18	N0 19 57.9 E173 56 16.1	Tekatia Primary School
19	N0 20 03.6 E173 56 12.8	Tekatia erosion near Mwanoku
20	N0 20 14.4 E173 56 20.2	Freshwater site 2 at Mwanoku
21	N0 20 14.2 E173 56 24.3	Freshwater site 3 at Mwanoku
22	N0 20 30.1 E173 56 23.8	Freshwater site 4 at Mwanoku
23	N0 20 15.9 E173 56 21.6	Freshwater site 5 at Mwanoku
24	N0 21 27.8 E173 56 23.8	Freshwater site at Tebwanga
25	N0 22 40.5 E173 55 57.1	Freshwater site at Bangotan te Kabwaia
26	N0 22 44.1 E173 55 37.2	Erosion at Bangotan te Kabwaia
27	N0 23 16.5 E173 55 25.5	Point two of above
28	N0 23 13.2 E173 55 40.8	Accretion at Taberiki - Bangotan te Kabwaia
29	N0 23 43.2 E173 55 38.6	Chevalier College –RC
30	N0 24 18.2 E173 55 21.8	Health centre at Kariatebike
31	N0 24 31.9 E173 55 10.6	Freshwater site 2 at Tekatiriake
32	N0 24 48.6 E173 55 11.9	Freshwater site at Tekatiriake
33	N0 24 22.81 E173 55 6.7	Erosion Point A at Kariatebike
34	N0 24 39.9 E173 54 54.6	Tabontebike erosion Point B of above
35	N0 24 42.8 E173 54 53.9	Migrating beach at Tekanawa - Tabontebike
36	N0 24 49.6 E173 54 52.8	Point two of above at Tekanawa - Tabontebike
37	N0 25 22.1 E173 54 42.1	Bwaretaiti JSS
38	N0 25 25.7 E173 54 40.4	Barebutanna Primary School
39	N0 25 25.4 E173 54 38.0	Accretion at Barebutanna - lagoon side of primary school
40	N0 25 52.7 E173 54 40.9	Freshwater site 2 at Baretoa
41	N0 25 43.6 E173 54 26.9	Freshwater site 3 at Baretoa
42	N0 26 05.0 E173 54 14.2	Freshwater site at Baretoa
43	N0 27 30.5 E173 52 30.5	Accretion at Tekatirirake
44	N0 27 36.6 E173 52 24.9	Tekatirirake erosion point A
45	N0 27 42.2 E173 52 26.5	Kauma Adventist High School
46	N0 27 46.9 E173 52 18.1	Freshwater site 3 at Tekatiriake
47	N0 27 49.4 E173 52 15.0	Freshwater site 4 at Tekatiriake

48	N0 28 03.9 E173 52 21.8	Freshwater site 5 at Tekatiriake
49	N0 27 56.3 E173 52 05.2	Freshwater site 6 at Tekatiriake
50	N0 27 56.9 E173 52 04.3	Freshwater site 7 at Tekatiriake
51	N0 28 02.9 E173 52 04.1	Freshwater site 8 at Tekatiriake
52	N0 28 00.7 E173 52 01.1	Freshwater site 9 at Tekatiriake
53	N0 28 04.8 E173 51 53.8	Clinic at Tekatirirake
54	N0 28 17.9 E173 51 43.0	Freshwater site 10 at Tekatiriake
55	N0 28 25.4 E173 51 32.4	Point three of above
56	N0 28 38.1 E173 51 18.3	Accretion at Tanimainiku
57	N0 28 40.1 E173 51 19.9	Tanimainiku erosion at the dock
58	N0 28 44.2 E173 51 17.2	Public road at risk from erosion at Tanimainiku
59	N0 29 02.6 E173 50 52.1	Point two of 57
60	N0 29 02.6 E173 50 51.4	Accretion2 at Tanimainiku
61	N0 29 10.2 E173 50 52.7	Tetongo Primary School
62	N0 29 17.1 E173 50 59.1	Erosion at Tabiang on ocean side of Tetongo Primary School
63	N0 29 35.9 E173 49 59.9	Nanon Te Rawa High School - KPC
64	N0 29 31.8 E173 49 26.3	Point two of above at northern end of airport
65	N0 29 14.0 E173 49 42.5	Clinic at Tabiang
66	N0 27 52.1 E173 48 19.9	Point two of above seawall
67	N0 27 50.9 E173 48 18.9	Seawall closure of inner lagoon at northern end of Tabiang village
68	N0 27 04.6 E173 48 13.2	Point three of above at northern tip of Tabiang towards the lagoon area
69	N0 26 58.9 E173 48 14 .4	Accretion at tip of Tabiang
70	N0 23 36.5 E173 46 18.9	Accretion at Abatiku
71	N0 23 33.5 E173 46 27.6	Erosion at Abatiku from BKL and copra shed
72	N0 23 14.6 E173 46 45.3	Point two of above
73	N0 23 32.8 E173 46 18.0	Freshwater site at Abatiku
74	N0 23 9.26 E173 46 55.55	Abatiku Primary School
75	N0 23 17.89 E173 46 37 69	Abatiku medical clinic

Note: For detailed locations of eroded areas refer to Abemama Island Profile 2008.

EDUCATION

Abemama island has 5 schools comprising of 4 Primary Schools and one Junior Secondary School and 3 Senior or High Schools. One primary school located on Abatiku, CICD based on Tabiang village, one located on the Tekatirirake village, Kauma High School based on Kauma village, one primary school and a JSS situated on Tabontebike, Chevalier high school located on Kariatebike, and finally last primary school situated on Tebanga village. Schools size depends upon the villages or the island's population.

Proportion of primary enrollment over the 2003-2006.

Gender	2003	2004	2005	2006
Female	253	238	226	261
Male	257	260	270	249
Total	510	498	496	510

Source: Statistics Department, Ministry of Education and Technology, Bikenibeu.

Junior Secondary School enrollment over the survey years: 2003-2006

Gender	2003	2004	2005	2006
Female	77	82	104	91
Male	38	48	96	96
Total	**115**	**130**	**200**	**187**

Source: Education Digest 2006

There are 3 senior secondary schools on Abemama, of which includes the Kauma High School, Christian Community Institute for Community Development (CICD), and Chevalia High School. Among these three schools, Kauma is somehow only surveyed because it is a high school, while the other two are more like institutes as in the case for CICD. As for Chevalier College data is not available with the Ministry of Education and reasons underlying the particular issue is not known.

Senior Secondary School enrollments over 2003-2006

	2003	2004	2005	2006
Total	115	130	200	186

Source: Education Digest 2006

In 2006 a total of 573 pupils were enrolled in two primary schools, namely Abatiku, Tetongo, Barebutanna and Tekatia. Of this number 273 were girls and 300 were boys. The total number of teachers in both primary schools was 19, out of which 2 were based at Abatiku, 5 based at Tetongo, 6 based at Barebutanna and 6 at Tekatia primary school, just as the way the table analyzes below.

For the whole island there is only one Junior Secondary School, Boutoka te Baretaiti Junior Secondary School. As of 2006 the number of pupils enrolled in all forms totals to 210. Of this figure 60 were in Form 1, 75 were in Form 2, and 73 were in Form 3. With a teaching staff of 11, the Teacher to Pupil ratio at JSS was 1 teacher to every 19 pupils.

Kauma High School on the other hand (provided that data is only available for it), it has a total 186 number of students enrolled in 2006. The total in distribution to the categorized forms, 95 were in form 4, 64 in form 5, and 27 in form 6 and have 10 teachers who are in charged or teaching them. Ratio of teacher to students is that 1 teacher per 19 students.

There are other recognized high schools besides Kauma high school, of which one is KPC owned school called Christian Institute for Community Developments and

Chevalier High School were not included within the Statistics unit of the Ministry of Education from 2005 and 2006, therefore have combined the JSS and High School data as a better description of the islands overall secondary enrollment rate.

Enrolment in Primary and Junior Secondary Schools, Abemama 2005 and 2006

Primary School							Junior Secondary School			Senior Secondary School		
Year	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Form 1**	**Form 2**	**Form 3**	**Form 4**	**Form 5**	**Form 6**
2005	108	88	92	80	72	70	86	71	69	95	54	26
2006	111	82	94	97	73	116	60	75	75	95	64	27

Source: Compiled from the Digest of Education Statistics, MOE, 2005 and 2006.

ISLAND ECONOMY

Copra

Copra cutting is an important activity which provides a steady source of income for many people on Abemama. At $0.60 cent per kilogram the total revenue from copra was approximately $960,000 in 2003, $440,000 in 2004 and $120,000 in 2005. This shows that from copra production each household generates on average of $1,801.13 in 2003, $825.51 in 2004 and $202.7 in 2005.

The table below shows the annual copra production for Abemama for the past 16 years, it shows there has been a slow increase in copra production during that period. Looking back 16 years one could observe the marked fluctuations in production level. These are the result of several factors among which are the changes in copra price and climatic conditions which affect production. The worst year of production was in 1993 caused by a nationwide drought which lasted for more than a year.

Copra production and revenue 2003-2005

Year	Tons	Total income	Income Per H/hold
2003	1600	$ 960,000.00	$1801.13
2004	1100	$ 440,000.00	$825.52
2005	600	$ 120,000.00	$202.70

Source: National Statistics Office, 2007

Remittances

With limited employment and income-generating activities, many people on Abemama depend to a great extend on remittances sent to them by relatives working in Tarawa or overseas. There are 592 households on Abemama, and over $13660.00 flows into the island's economy in 2006 and at 2007 only amounted to $4420.00, from money and gifts sent back by families and friends living and working outside Abemama.

There are two forms of remittances according to the 2005 census. One includes seamen remittances or money they earn from working on overseas vessels or other similar jobs, the other refers to sending money to lend to family, gifts, birthday money, allowances and more.

Agriculture

The predominant food crops on Abemama are *bwabwai*; banana, pandanus, coconut and breadfruit. Each family has its own *bwabwai* pits, breadfruit and toddy trees. Home gardening is not common but some households have their own vegetable gardens where they grow tomato, cabbage, cucumber and eggplant mainly for home consumption.

The main animals reared by the islanders are pigs and chickens, for home consumption. In 2005 the total number of pigs on Abemama was 1735, with 93.5% of households owning at least 3 pigs on average. There were approximately 2465 local chickens. The people of Abemama believe that they can produce more meat and vegetables for export to Tarawa if the problem of transport, communication and marketing are resolved. They also believe that training on vegetable and livestock production is important if trade in these primary produce is going to be undertaken.

TRANSPORTATION

Because Abemama is slightly a wet island, its road is subject to constant damage and it is a huge burden to the Island Council to maintain it, especially without proper equipment and insufficient funds. To assist in the maintenance and repair work on the road, the central government have provided a small backhoe and tipper truck to Council, but these have now become the problem of Council to maintain.

The most common form of land transport is the bicycle, of which there were 309 in 2005, and motorcycles, with a total of 199 motorcycles recorded in 2005. Abatiku in record has the highest number of bicycle over the other villages, while the Tekatirirake has the highest number of motorbikes over other villages.

Inter-village travel between main island and the two islets; Abatiku and Biike is done through the use of canoes and small boats, since the villages are separated by sea. It is possible to walk between the islets during low tide but the distance is the main deterrent. The separation of Abatiku and the main islet affects children the most, in particular those who are old enough to attend junior secondary school and senior

secondary school. Whereas there is a primary school on Abatiku, the junior secondary school is located on Tabontebike village, and children must travel every day to attend school. Those who do not have access to transport either miss a lot of classes or just simply drop out of school. In 2006 central government provided a skiff and outboard engine to the community to use it specifically to serve the need of JSS pupils.

HEALTH

There are 4 clinics and one health center on Abemama. The clinics are located each in the villages of Abatiku, Tabiang, Tekatirirake and Kabangaki villages, while the health center is located in the island's administrative center, Kariatebike village. There is one Medical Assistant (MA) who is the highest ranking medical staff on the island. The MA is in charge of 2 nurses and 4 nursing aids. The MA and nurses are paid by the central government while the nursing aids are the responsibility of the Island Council of Abemama (same goes for all the islands of Kiribati).

The health center and clinics have facilities to accommodate patients who are admitted for medical supervision. These health facilities are as follows:

i. Health Center: 1 health center, 3 wards, 3 cooking houses and 3 toilets;
ii. Abatiku Dispensary/clinic: 1 clinic, 2 wards, 2 cooking houses, and 2 toilets;
iii. Tabiang Dispensary/clinic**:** 1 clinic, 2 wards, 2 cooking houses, 2 toilets and 1 mwaneaba.;
iv. Tekatirirake Dispensary/clinic: 1 clinic, 2 wards, 2 cooking houses 2 toilets;
v. Kabangaki Dispensary/clinic: 1 clinic, 2 wards, 2 cooking house and toilets

The most common diseases on Abemama are conjunctivitis, fever, diarrhea, in 2006. On the other hand, chicken pox, meningitis, fish poisoning and sexually transmitted infections (STI) were the least important causes of illness on the island, for which no cases were reported in 2005.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Coastal erosion	-Causeway construction -high tides -storms	-relocation of infrastructure (road, buildings etc)	-sea wall protection	-sustainable, but costly
Climate Variability	-Global Warming	-underground water purity will be affected (if climate goes dry) -depletion of land resources and vegetation will occur -marine resources will decrease overtime	- in need of a future plan to combat these adversaries overtime	-unpredictable
Less Agricultural Activities	-superficial commitment to AA -shortage of feed for pigs/piglets due to delay in receiving orders from abroad -limited funding -mismanagement of livestock -pigs slaughtered before they are bred	-no balance diet -no supply of land protein	-increase awareness and importance of livestock and agricultural activity through Agricultural Division and Taiwan Technical Mission -provide funding - use of local plants, marine seaweed mixed with breadfruit to supplement imported feed	-it can be sustained -Can be done, cheap and sustainable, needs creativity

KURIA

PHYSICAL FEATURES

Kuria is made up of two islets with the main islet consisting of Marenaua, Bouatoa, Buariki, Tabontebike and Norauea. These villages are connected to Oneeke by a ten meter bridge replacing the old causeway that ran acroos the former reef passage between the two islets. The two islets are pretty wide as compared to most islands in the Gilbert group. The widest portion measures 4.26 km from lagoon to the ocean side. Total land area is of 15.48 sq.km, 4.26 km at its widest, and 0,06 km at its narrowest point. Length from north south is 8.94 km. There are two natural two brackish-water ponds at east-southern tip of the main islet.

Five villages lie alongside the shoreline of the main islet, one is at Oneeke (see map for details). A causeway (now replaced with a bridge) connecting two islets is presumed to cause the disappearance of 'te anaa', a short mouted garfish (*Euleptorhanphys viridis*) that was abundant before the closure of the passage. Structures are obviously the causes of problems relating to reduction of marine resources or coastal erosion, the main causes of problems relating to these resurces are people who are ignorant and short-sightedness to consider seeking advice from experts in island affairs, geology, fisheries and all other arres.

Important food crops are coconut, giant taro, pandanus and breadfruit; these grow well in the porous and top soil of Kuria. A gravel road stretches across and around Kuria main islet so as Oneeke. These provide access to most inner parts of both islets.

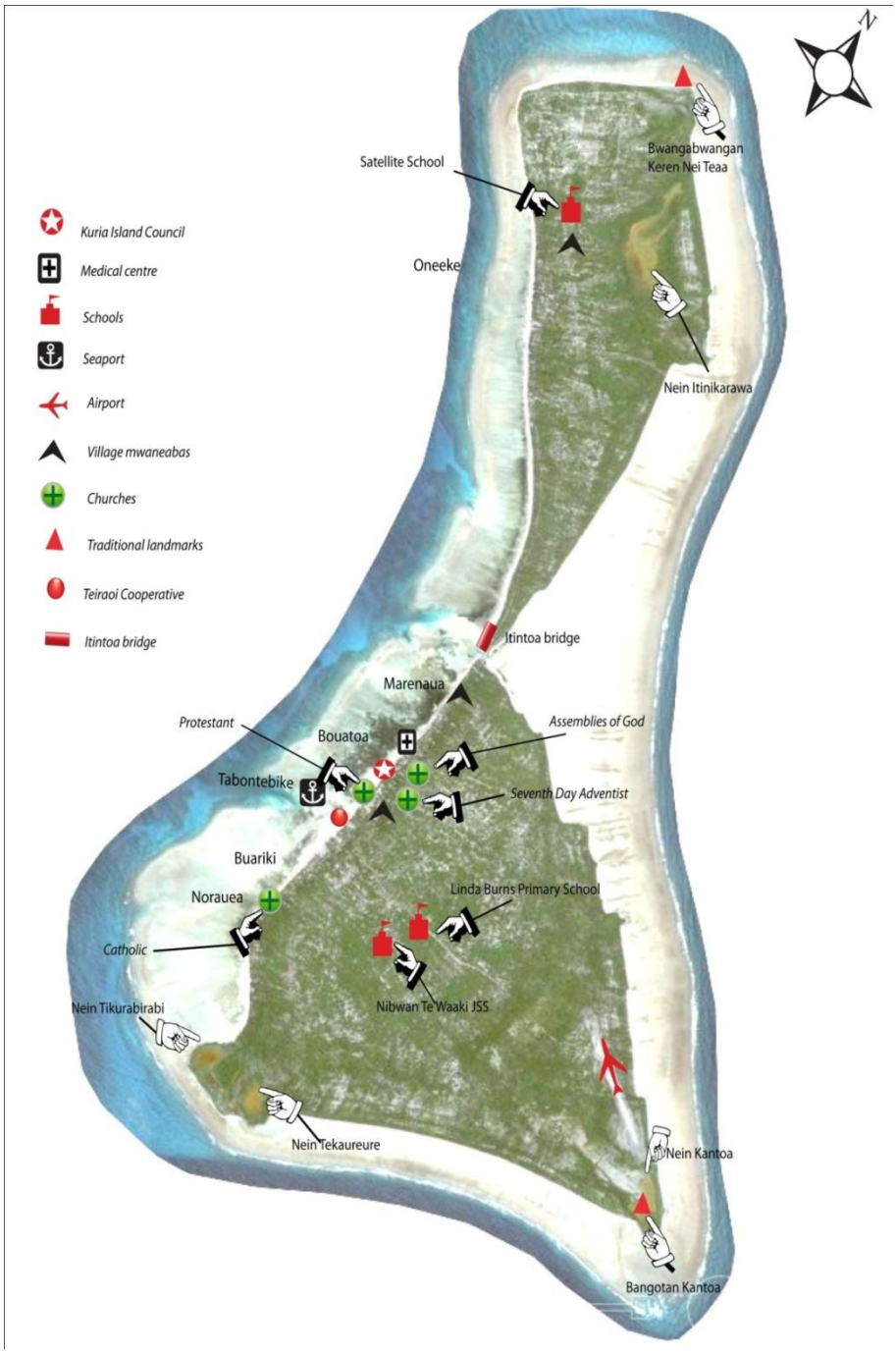
Kuria has no lagoon, similar to Makin Island, hence shellfish is scarce but reef fish and other edible marine organisms are plentiful. Pelagic fish are abound despite of ciguatera exisiting on the western reefs of the main islet. Rich in marine resources with a popular humped back red snapper (*Lutjanus gibbus*) and black trevally (*Caranx lugubris*) greasy and fatty. Locals have attributed the deliciousness of their fish to a reddish/orangish algae that is found in the sea of Kuria at certain times of the year. The appearance of the reddish algae according to locals is an 'oily season'; all fish this time are fatty and oily.

POPULATION

The 2005 census recorded a total population of 1082 people on the island, an increase of 121 people since the 2000 census when the population was 961. Of this 1082, there are 526 (49%) males and 556 (51%) females scattered throughout the island's 6 villages, as well as government employees working at the Kuria Island Council, schools and medical facilities on the island.

From the 2005 census, the population of Kuria increased by 121 people since the 2000 census, a population change of nearly 13%. Its population trend has been fluctuating over the years with the population initially booming by 131% in 1963 which was around the time when the Island Councils were being established and the chiefly system abolished during colonial times. During these years, without the traditional support from the island communities in the central islands, the chief/king and family had pretty much started selling land to other islanders for income. A lot of people from the southern islands purchased land during this time.

A geographical map of Kuria



Note: Refer to Kuria Island Profile 2008 for problems areas and sites of significance.

Population Density by village 2005

Villages	Village Land Area	Pop 2005	Density 2005	Density Change %
Oneeke	0.49	188	384	22
Marenaua	0.51	246	482	5
Tabontebike	0.28	119	425	23
Buariki	0.59	199	337	-23
Norauea	0.3	219	730	0
Bouatoa	0.59	111	188	0
Total village area	2.76	1082	392	
KURIA	**15.48**		**70**	**16**

Source: PopGis 2005 SPC Noumea

Kuria Population distribution by age group in villages

	Broadage Age Group								
	Total	**<1**	**1**	**2-5**	**6-14**	**15-17**	**18-49**	**50-69**	**70+**
KIRIBATI	92533	2403	2167	8819	20804	6589	41131	8628	1992
Males	**45,612**	**1,235**	**1,114**	**4,483**	**10,693**	**3,334**	**20,045**	**3,971**	**737**
Females	**46,921**	**1,168**	**1,053**	**4,336**	**10,111**	**3,255**	**21,086**	**4,657**	**1,255**
Oneeke	188	3	5	29	53	8	71	18	1
Marenaua	246	7	6	23	56	13	108	25	8
Tabontebike	119	1	4	15	36	9	44	10	0
Buariki	199	9	6	26	49	7	83	16	3
Norauea	219	3	4	27	47	12	92	23	11
Bouatoa	111	1	0	12	36	7	33	21	1
KURIA	**1,082**	**24**	**25**	**132**	**277**	**56**	**431**	**113**	**24**

Source: 2005 Census of Population, NSO/MFED, 2007

The most populous villages is Marenaua followed by Norauea. These two villages are on the main islet Kuria, are most accessible to the Kuria Island Council located at Bouatoa village which is the main hub for the island. Island Council and government businesses and services are here.

The dependency age group are those below 15 years and those within and above 64 years of age. 504 (47%) are dependency age group, of which the majority 458 (91%) beween 0-14 years old implying a young population. The remaining 9% include those aove 65. 48% of those between 0-14 years are males, 43% are females. Elders comprised 3% and 6% males and females respectively. Kuria, like every other outer island has a young population with the majority aged between 0 and 49 years old.

LAND AND MARINE RESOURCES

Land resources

Poor soil limits the number of agriculture crops that can be grown, the existing physical features limit the land area where agricultural or livestock activities can be extended. The island's main resources are its limited tree resources predominantly coconut trees, pandanus and breadfruit.

Water

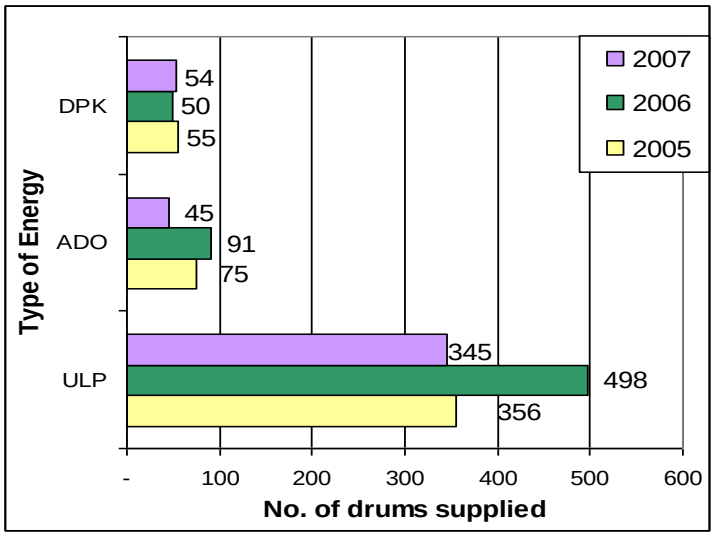
The only and main water source for drinking and sanitary purposes on the island is groundwater and to a small extent, rain. Supply of water from the wells are dependent on the amount of rainfall that falls and Kuria, located in the central group, still suffers from drought but not to the extent that the southern islands suffer. Still, water becomes an issue during times of drought when the freshwater lens sitting atop the seawater in wells is depleted without rain restoring the lens.

Energy

The common form of fuel is firewood, mainly in the form of coconut husks, dry coconut leaves and dead wood of existing vegetation and trees. However, people still use kerosene stoves especially during rainy days or functions.

Kuria fuel energy needs since 2005 to 2007 as provided from KOIL totaled 1569 drums comprising 1199 (76%) un-leaded petrol (ULP) drums, 211 (14%) automotive diesel oil (ADO) drums and 159 (10%) drums of dual purpose kerosene (DPK). At 200 liters per drum, Kuria has received a total of 239,800 litres of ULP, 42,200 litres ADO and 31,800 litres of kerosene (DPK), a total of 313,800 litres of fuel energy for the years 2005 to 2007.

Fuel Supply 2005-2007



Marne resources

Size of Reef/Lagoon Size

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Kuria	13.02	12.7	Nil	15.5

Locals rely on marine resources for their livelihood. Fishing catches are generally used for subsistence living only, surpluses are either shared with neighbors, sold to local consumers mostly government and island council workers, sometimes surplus fish is sold to teachers of both primary and junior secondary schools.

Issues facing fishing and development of marine resources include the following:

- Lack and cost of fishing equipment;
- Poor inter-island transportation has eventually led to the closing down of their ice-plant
- Depleting ocean resources in the nearby ocean area especially 'te anaa', the long-billed garfish (*Rynchorhamphus georgi*)
- Establishment of legally binding bylaws for use of marine resources by visiting ships/companies and the island community as well.

The depletion and disappearance of the long billed garfish is locally blamed on the establishment of the bridge connecting the mainland Kuria to Oneeke.

ENVIRONMENT

The most threatening environmental issue on the island is coastal erosion, and flooding of land during high sea surges. Other issues also exist in the form of safe dumping of rubbish, lack of proper sanitation facilities that will not affect the water lens and a dusty environment during years of drought.

The recent increase in coastal erosion around the island has motivated the Kuria Island Council and island community to make plans to remove the 'Itintoa' bridge, blaming it for the issue. Not only is this bridge blamed for the increased coastal erosion around the island since construction but also for the disappearance of a fish known locally as 'te anaa', the long-billed garfish (*Rynchorhamphus georgi*).

EDUCATION

There are only three schools on Kuria:

1. Linda Burns Primary School
2. Nibwan te Waaki JSS
3. Oneeke Satellite School

Both Linda Burns Primary School and Nibwan-Te-Waaki JSS are situated on Kuria main islet. Oneeke takes Classes 1-3.

In 2006, a total of 309 pupils enrolled in the 3 schools on the island is 173 (56%) of these pupils were enrolled at the Linda Burns Primary, 121 (39%) at the JSS on mainland Kuria while the rest 5% were enrolled at the Satellite Primary School on Oneeke. In all, females totaled 160 (52%) while males totaled 149 (42%) of the total of 309 students.

Teacher pupil ratio

	Females	Males	Total	No. Teachers	Ratio
Primary Schools	97	91	188	9	**21 : 1**
Nibwan te waaki JSS	52	69	121	7	**17 : 1**
			309	**16**	

Source: 2006 Education Digest

HEALTH

One Medical Assistant and 2 qualified Nurses are stationed on the island. Like other government employees working with the island council, these health officers as well as teachers are shuffled every 2-4 years. There is one main clinic on the island located on the mainland Kuria and another smaller clinic on the islet of Oneeke. This main clinic caters for the five villages on mainland Kuria, the Oneeke clinic caters for patients on Oneeke.

Each village has its own Village Welfare Group, whose responsibility is helping the medical staff promoting health issues and activities. The foremost active members of these welfare groups are the women who when their assistance is required will seek support from their male counterparts.

ISLAND ECONOMY

Subsistence

Typical subsistence activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai, weaving mats, making thatches, rolling string, fetching water, collecting firewood, making fish traps and hooks, cleaning and washing, cooking and house construction amongst others.

Copra

The production of copra is an important economic activity on the Island. It was the major source of income before seaweed farming was introduced. It is a common occurrence for copra funds to be depleted and this has led to complaints by copra cutters on Kuria. The majority of the people derive income from copra cutting activities with coconut being the most common agricultural crop on the island.

The best year of copra production for the island was in 1992 when their production reached a tonnage of 670 bringing in an income of $234,500.00. Given that there were also 202 households on the island that were engaged in copra cutting in 1992, this would have roughly brought in a household income of $1,160.89 for the whole year. In turn, the households would have earned $3.18/day in the same year. The most recent statistics on the island copra production was at 219 tonnes in 2005 which means that the 202 households were earning more than half less that they were in 1992

The worst year of copra production was in the year 2000 when its annual production was a mere 166 tonnes that brought an income of $74,700.00 even though copra prices by the year 2000 had risen to $0.60/kg.

Agriculture

Agricultural activities on Kuria include cutting toddy, cultivation of bwabwai, planting of breadfruit, bananas, pawpaw, ‘te bero’, pandanus and vegetable home gardens, provision of pigs and chickens, animal health schemes, provision of seeds, seedlings (coconuts) and breadfruit cuttings, and coconut replanting schemes. Generally, the latter scheme (coconut replanting) however has not been fully supported by the islanders as it is deemed a waste of time and effort due to most of the replanting schemes not bearing as much fruit as one would love them to bear. Besides, people have their own traditional cultivation methods that are most of the time linked to phases of the moon and considered more successful than the agricultural methods of spacing amongst others that only result in a lot of wasted space according to the islanders.

Employment

The Island Council is the biggest employer for the people of Kuria, engaging about 30 islanders. Apart from a handful number of jobs offered by the Island Council in its limited budget, the opportunity for paid employment for the islanders is otherwise non-existent. The Cooperative also employs a few other people to run its only branch situated on mainland Kuria.

TRANSPORTATION

The main road runs around the two islets (mainland Kuria and Oneeke) including a network bush tracks. Pushbikes and motorcycles are the most common means of transport on the island. There are also four trucks on the island– two owned by each the Kuria Island Council and Teirao Cooperative Society.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Coastal Erosion	-surge storms and natural beach movements	-north western end of Oneeke village is affected -Buariki is also affected	-not quite a problem ,but contributions from other govt. Sectors in the areas of engineering, biodiversity, water resource will enhance coastal protection	-quite alright, contributions will be sustainable when accomplished
Reduction in marine Resources	-causeway in the middle of the island -closure of the passage -overfishing	- gar fish had gone -lost of marine and terrestrial resources	-reconsider construction methods, review policy and design of causeway and reopening of the causeways to bring back lost marine and terrestrial resources	-sustainable but costly
Water	drought	-Fruit trees and vegetation affected	-water reservoirs be identified for future use -water catchment is encouraged -water and sanitation management ensures quality of water -waste management plan be in place	-when accomplished it will be sustainable, however costly
Less Agricultural Activity	-superficial commitment to AA -shortage of feed for pigs/piglets due to delay in receiving orders from abroad -limited funding	-no balance diet -no supply of land protein	-increase awareness and importance of livestock and agricultural activity through Agricultural Division and Taiwan Technical Mission -provide funding - use of local plants, marine	-it can be sustained

	-mismanagement of livestock -pigs slaughtered before they are bred		seaweed mixed with breadfruit to supplement imported feed	-Can be done, cheap and sustainable, needs creativity
Capacity building on CC and SLR	-no consultation previously conducted -no funding for training at island council level	-islanders are unaware of Climate Change and Sea Level Rise -island council employees not familiar with training of village people	-intensifying training and consultation -media training -contributions from respective govt. Ministries towards CC and SLR	-sustainable through funding sources -must continue at paced intervals

ARANUKA

PHYSICAL FEATURES

Aranuka is made up of two islands with the mainland Aranuka harboring the two villages of Buariki and Baurua. Takaeang is the other inhabited islet that lies 7.68 kilometers west of mainland Aranuka. The mainland, Aranuka is 10.77 km, 1.31 km at its widest, and 0.1 km at its narrowest.

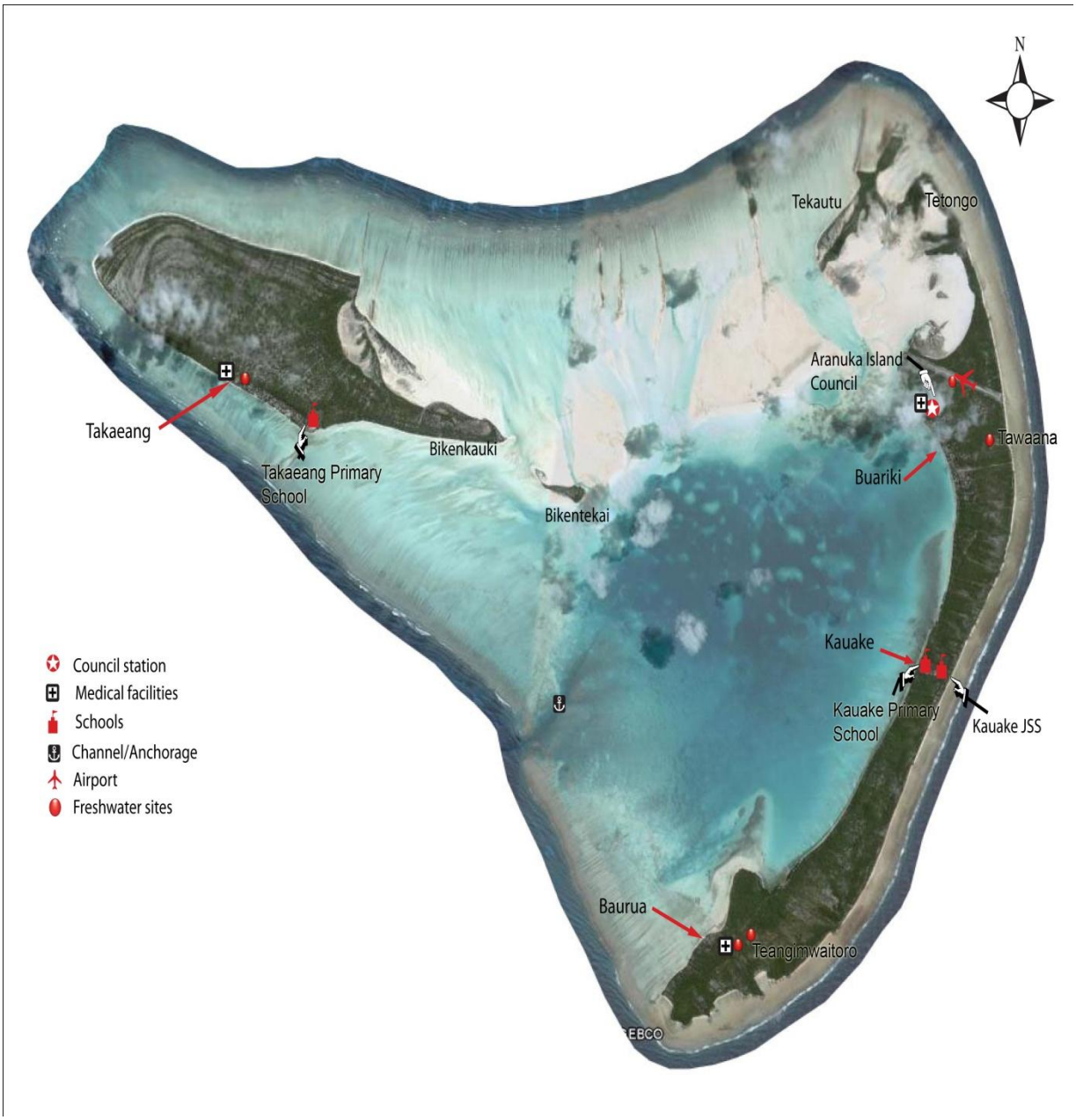
Buariki is the central village on the island where the Aranuka Island Council, Junior Secondary School (JSS), Primary and main medical facilities are located. However, according tolocals, there is a fourth village called Kauake, as stated in their island anthem, joined to the village of Buariki and thus counted in the census as one village with Buariki.

There is only one road that runs alongside the lagoon-side of the island where villages are located and a network of access and feeder roads running from the main road to other parts of the island. These pathways generally are enough to accommodate pushbikes and motorbikes but not big trucks. All villages are located on the lagoon side on both sides of the main road, easily accessed by walking, with bicycles, motorbikes and trucks.

Aranuka has a lagoon, not so rich in shellfish. There is a passage into the lagoon, available for the boats in moderate weather, through the middle of the reef on the southwestern side of the atoll. There are several dangerous points in the passage where tidal streams can be very strong. It is also well known for its old stand of *Rhyzophora stylosa* mangroves that have grown as tall as coconut trees and are now a breeding site for birds. These mangroves can be found towards the northern end of mainland Aranuka.

As the central village, Buariki is the most populous, is where the seaport is, nearest to the airport and center of all government ans island council activities. Takaeang is isolated from the rest of villages by a strip of mudflat at the lagon side and reefflat at the ocean side. I t can be accessed on foot during loe tide or by canoe and boat dring high tide. Akaeang is surrounded with abundant marine resources.

A geographical view of Aranuka



Note: Refer to Aranuka Island Profile 2008 for problem areas and sites of significance.

POPULATION

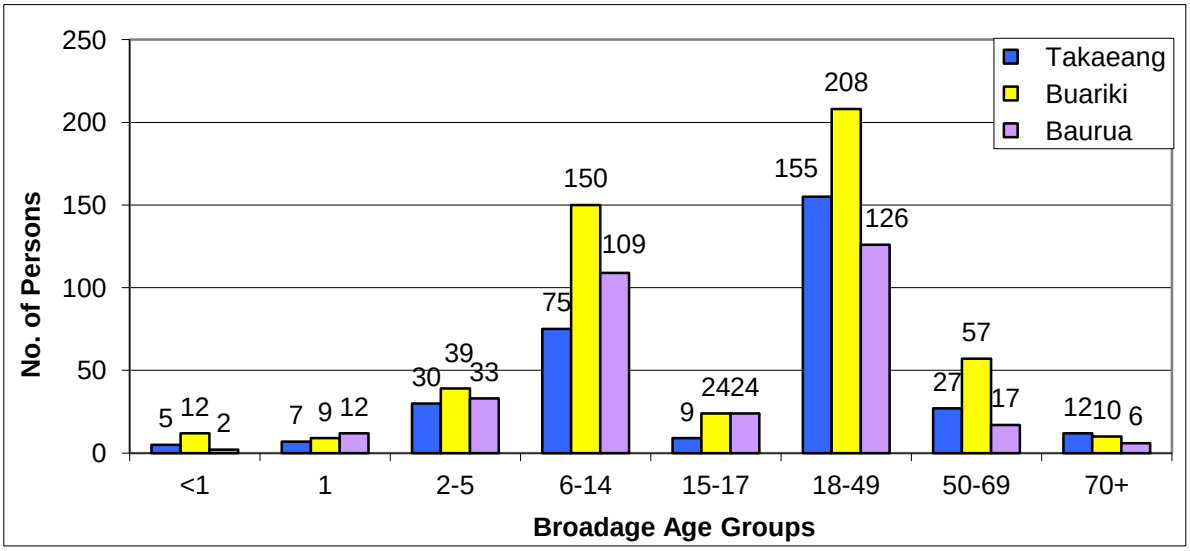
The 2005 census recorded a total population of 1,158 people on the island, an increase of 192 since the 2000 census when the population was 966. Of this figure there are 526 (49%) males and 556 (51%) females scattered throughout the island's 6 villages. Government and island council employees working for Aranuka Island Council, JSS and primary schools, medical facilities and other services are based at Buariki village.

Population Density by village 2005

Villages	Village Land Area	Pop 2000	Pop 2005	Density 2000	Density 2005	Density Change %
Takaeang	0.22	234	320	1064	1455	36.75
Buariki	0.27	575	509	2130	1885	-11.48
Baurua	0.22	157	329	714	1495	109.55
	0.71	966	1158			
Aranuka	11.61			83	100	19.9

Source: PopGis 2005 SPC Noumea

Aranuka Population distribution by age group in villages



Source: 2005 Census of Population, NSO/MFED, 2007

The most populous of is Buariki, being the main village together with Kauake. Buariki accommodates 44% of the 1,158 island population, the remaining 56% is shared among other villages incuding Takaeang and Baurua. 42% of the population comprised ages between 18-49 years old followed by 29% of the 6-14 year old. The smallest proportion is made up of young children aged < 1 year old with a count of 19 or 2% of the total population.

The dependency age group are those <15 years and > 64 years of age makes up 524 count or 44% of the population. The majority with count of 483 (92%) are children and youths aged 0-14 years old. The remaining 41 (8%) are those >65 years old.

LAND AND MARINE RESOURCES

Copra

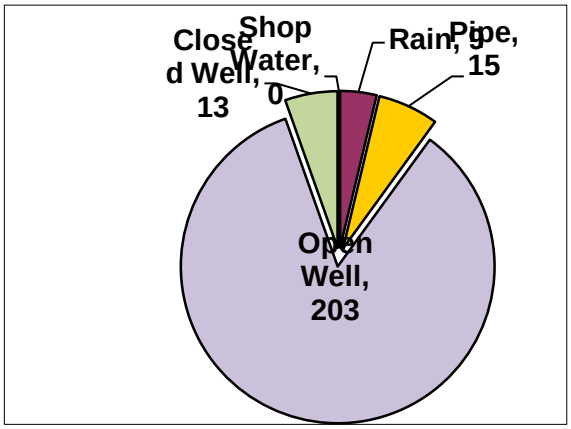
Copra remains the main commodity for exports. Droughts affect copra production making it hard for locals to buy much needed food items. Rainy season boots copra production and household income increases substantially.

Agriculture

Aranuka is faced with major constraints in agricultural production. Poor soil limits the number of agricultural crops that can be grown and the existing physical features limit the land area where agricultural or livestock activities can be extended. The island's main resources are its limited fruit tree resources predominantly coconut, pandanus and breadfruit. Pigs, chickens, dogs, cats, birds and island insects such as rats, lizards, ants and crabs amongst make up the most common fauna on the sland.

Water

The only and main water source for drinking and sanitary purposes on the island is groundwater and rainwater for drinking when raining. The fresh water wells however are subject to brackishness during prlonged droughts. During drought potable water may be fetched from as far as a kilometer away.



Household source of water

Supply and quality of water from the wells are dependent on the amount of rainfall and how the wells are protected. Boiling well water is common. Aranuka being located in the central group still suffers from drought periods. However, water remains an issues when drought hits.

Marine resources

Size of Reef/Lagoon Size

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Aranuka	22.25	15.5	35.86	11.6

The main and major source of protein to atoll islanders is ocean and reef fish as hardly any other animal apart from pigs and chickens can live and survive in the atolls plus they take time to grow and are kept for special functions or family celebrations.

Issues facing fishing and development of marine resources include the following:

f. Lack and cost of fishing equipment
g. Establishment of legally binding bylaws for use of marine resources by visiting ships/companies and the island community as a whole.

ENVIRONMENT

The most threatening environmental issue on the island is coastal erosion, and flooding of land during high sea surges. Other issues also exist in the form of safe dumping of rubbish, lack of proper sanitation facilities that will not affect the water lens and a dusty environment during years of drought

Aranuka CC & SLR site coordinates

No.	Position	Description
1	N0 07 34.5 E173 36 52.0	Erosion Point B of 2 at Baurua
2	N0 07 37.3 E173 36 53.5	Erosion Point A of 1 at Baurua
3	N0 07 33.9 E173 36 56.4	Baurua Medical Clinic
4	N0 07 37.7 E173 36 56.1	Copra shed at Baurua
5	N0 07 38.8 E173 36 54.7	Accretion at Baurua
6	N0 07 36.6 E173 37 04.6	Fresh Water site at southernTeangmwaitoro Baurua
7	N0 07 41.1 E173 37 12.5	Fresh Water at northernTeangmwaitoro Baurua
8	N0 09 22.7 E173 38 15.5	Kauake JSS & Primary
9	N0 10 46.8 E173 38 27.6	Freshwater site at Iakobo at Tawaana Buariki
10	N0 10 48.7 E173 38 04.4	Substitute resthouse at Buariki
11	N0 10 46.32 E173 38 3.2	Erosion Point A at iceplant Buariki
12	N0 10 49.47 E173 37 59.6	Erosion Point B of 11 at Buariki
13	N0 11 07.0 E173 38 02.1	Freshwater site at airport Buariki
14	N0 12 14.4 E173 37 44.8	Erosion Point B of 16 at Tetongo
15	N0 12 07.5 E173 37 43.9	End of road towards centre of very tall mangrove forest at Tetongo

16	N0 12 03.8 E173 37 37.7	Erosion Point A of 14 and also a flooding point at Tetongo
17	N0 12 02.4 E173 37 37.7	Mwaneaba resting place at Tetotongo
18	N0 12 03.5 E173 37 33.0	Erosion Point A at Tekautu islet
19	N0 12 13.6 E173 37 29.0	Erosion Point B of 18 at Tekautu islet
20	N0 10 17.1 E173 34 01.7	Erosion Point B of 22 at Takaeang
21	N0 10 12.7 E173 33 49.0	Takaeang Primary School
22	N0 10 12.1 E173 33 46.9	Erosion Point A of 20 at Takaeang
23	N0 10 22.9 E173 33 25.5	Freshwater site at Tiroam Takaeang
24	N0 10 26.5 E173 33 15.6	Takeang medical clinic

Note: Refer to Aranuka Island Profile 2008 for details of problem areas and areas of significance.

EDUCATION

There are two types of schools on the island, primary and junior secondary. Both Kauake Primary and JSS are located on mainland Aranuka and accommodate all primary children from mainland Aranuka (Buariki and Baurua villages) while the junior secondary school accommodating children from all over the island including those from the islet of Takaeang. Takaeang Primary School catrs for primary aged children from the islet only.

Generally throughout the country, the JSS schools which are late additions during late 1990s are of permanent material, in better/good conditions and adequately furnished; on the other hand primary schools generally lack status and furniture, a combination of local and imported material. Poor aintenance casues a lot of frustrations amongst parents, teachers and children, the later are most affected.

Primary schoolers have to contend with sitting on the floor during school days thus mats woven from coconut and pandanus fronds are often contributed by the children (parents) and teachers alike for the children to sit on. These mats are much needed especially since most primary classroom facilities do not have concrete floors. But most classrooms are have basic equipment such as blackboards, teaching aids and others.

These are three schools on Aranuka:

1. Takaeang Primary School

2. Kauake Primary School
3. Kauake Junior Secondary School

In 2006, a total of 338 children enrolled in the 3 schools. 74% attended primary while 26% attended Kauake Junior Secondary school. 190 (56%) of these pupils enrolled at Kauake primary, 59 (18%) at Takaeang primary and the rest 89 (26%) were attending the JSS on mainland Aranuka. Together, the females totaled 177 (52%). Males totaled 161 (42%) of the 338 students. 55% of those attending Kauake Primary School were females and 45% were males. 51% of those attending Takaeang primary school were females while 49% were males. Similarly, 47% of those attending Kauake JSS were females, 53% were males.

There are no Satellite schools on Aranuka that cater for the youngest pupils from Classes 1 to 3. The current primary schools at each islet are sufficed for children needs on both islets.

Teacher:Pupil Ratio

School	Females	Males	Total	No. Teachers	Ratio
Primary Schools	135	114	249	10	**25 : 1**
Kauake JSS	42	47	89	7	**13 : 1**
			338	**17**	**20 : 1**

Source: 2006 Education Digest

HEALTH

The Health Centre is located at the Aranuka Island Council area in Buariki while each of the villages of Baurua and Takaeang have their own clinics.

ENERGY

The total number fuel drums supplied to Aranuka between the years 2005 and 2007of was 1376. These fuel drums comprised 1071 (78%) un-leaded petrol (ULP) drums, 164 (12%) automotive diesel oil (ADO) drums and 141 (10%) drums of dual purpose kerosene (DPK). At 200 liters per drum, Aranuka has received a total of 214,200 liters of ULP, 32.800 liters ADO and 28,200 liters of kerosene (DPK), a total of 275,200 liters of fuel energy for the three consecutive years.

ISLAND ECONOMY

Subsitence activities

Typical subsistent activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai, weaving mats, making thatches, rolling string, fetching water, collecting firewood, making fish traps and hooks, cleaning and washing, cooking and house construction amongst others.

Copra cutting

The production of copra is an important economic activity on the Island. It was the major source of income before seaweed farming was introduced. It is a common issue for copra funds to be depleted and this has led to complaints by copra cutters on Aranuka.

The best year of copra production for the island was in 1992 when their production reached a tonnage of 521 bringing in an income of $182,350.00. The price of copra at the time was $0.35 per pound. Given that there were also 211 households on the island that were engaged in copra cutting in 1992, this would have roughly brought in a household income of $864.20 for the whole year. In turn, the households would have earned $2.40/day in the same year. The most recent statistics on the island copra production was at 209 tonnes in 2005 which means that the 211 households were earning more than half less that they were earning in 1993 as the copra prices had increased then to $0.60 per pound. Either way, if there were the same or less number of households in 1993, they would have earned more in 1992 than in 2005. However, even with the low production in 2005, the 211 households would still have earned $1.60.

The worst year of copra production was in the year 2000 when its annual production was a mere 134 tonnes that brought an income of $60,300.00 even though copra prices by the year 2000 had risen to $0.60/kg. Droughts have much impact on coconut trees and other fruit tees.

Agriculture

The main agricultural activities include cutting toddy, cultivation of bwabwai, planting of breadfruit, bananas, pawpaw, 'te bero', pandanus and vegetable gardens for subsistence living. Every household has its own bwabwai pit, either near by the village or in the bush.

Livestock

Livestock on the island is limited to pigs and chickens of both local and exotic breeds. There were 803 pigs on the island in 2005 of which 97% of these are local pigs, 2% are crossbreds and 1% are exotic breeds.

Fisheries

As islanders, households have been harvesting the sea in one way or another, initially to satisfy their own subsistence needs, to send salted fish (fish jerky) to relatives in other parts of Kiribati mostly South Tarawa and lately for domestic sale to others unable to fish, most of the time Council staff living at the Council quarters in Buariki.

Employment

The Island Council serves as the biggest employer for the people of Aranuka, employing about 30. Apart from a handful number of jobs offered by the Island Council in its limited services, the opportunity for paid employment for the islanders is otherwise non-existent.

TRANSPORTATION

The most common form of land transport is the pushbike followed by motorbikes and trucks. As a wide island, the main road, constructed around the villages close to the lagoon side extends all the way around the island making it easy for round trips on both mainland Aranuka and the islet of Takaeang.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Coastal erosion	-high sea surges -sea wall construction	-there is little impact, but it is a threat to properties -disturb the welfare of the people -rows of coconut trees and vegetation disappear from the beach	Design of seawalls need to be considered	-may sustain but have side effects
Water	-drought	-kills vegetation -fruit trees are affected in size -decreased income -brackish water for drinking and purposes -dry vegetation vulnerable for bush fire	-future plans for concrete cisterns -water tanks for ironed roofed houses	-sustainable but costly -can be sustained
Reduction of Marine resources	-illegal ships fishing in the seawaters	-unpredicted number of catch for future generations	-Local government division within MISA to make an Act to allow Island Councils bylaws to be legal and effective	-takes time to materialise

NONOUTI

PHYSICAL FEATURES

Nonouti is the third largest island in the Gilbert Group according to land area (19.85 sq.km) and the fifth largest in the country when counting Kiritimati (1st largest) and Tabuaeran (2nd largest). It is 36.72km long, 0,92 km at its widest, and 0.07 km at its narrowest point. There is an islet on the northwest side of the atoll called Noumatong. Noumatong is uninhabited and is reserved as a bird sanctuary. The eastern area of the atoll consists of tiny islets and islands which form a continuous line with a length of 35 km and a width of 15 km.

The lagoon is sprinkled with shols and sandbanks. A narrow opening in the western reefs allows access to the large lagoon by medium sized vessels. The northern part of the island has several interisland reef passages now connecting some northern villages with causeways.

The main source of drinking water is underground water that is tapped through wells dug 3-5 meters into the ground. The quality of groundwater, especially at the northern and southern portions of the island are easily affected by prolonged droughts which are common and frequent. Not only is the livelihood of the population dependent on the quality of groundwater but terrestrial fauna and flora.

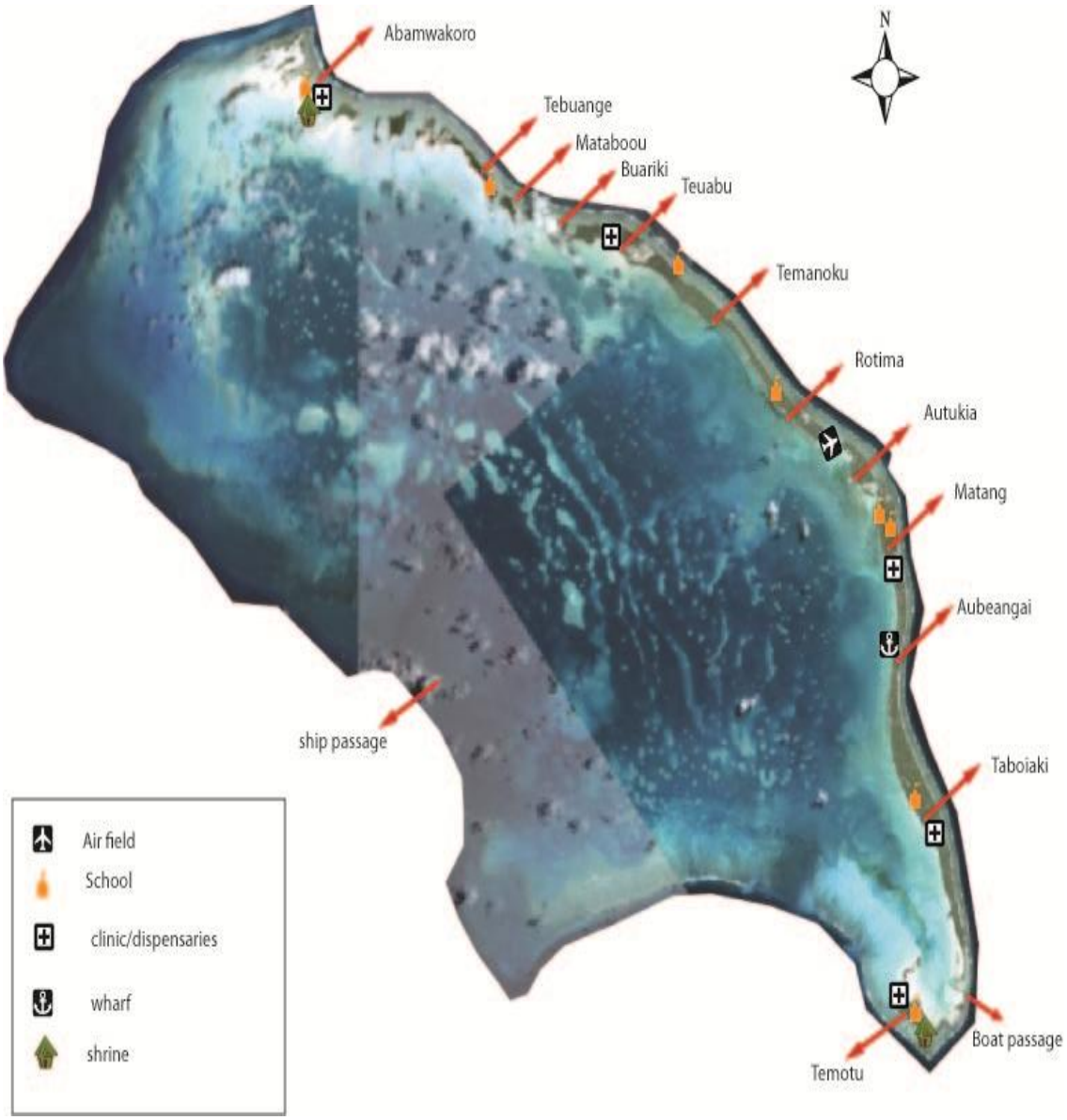
POPULATION

The 2005 census recorded a total population of Nonouti of 3179.

Population Density by village

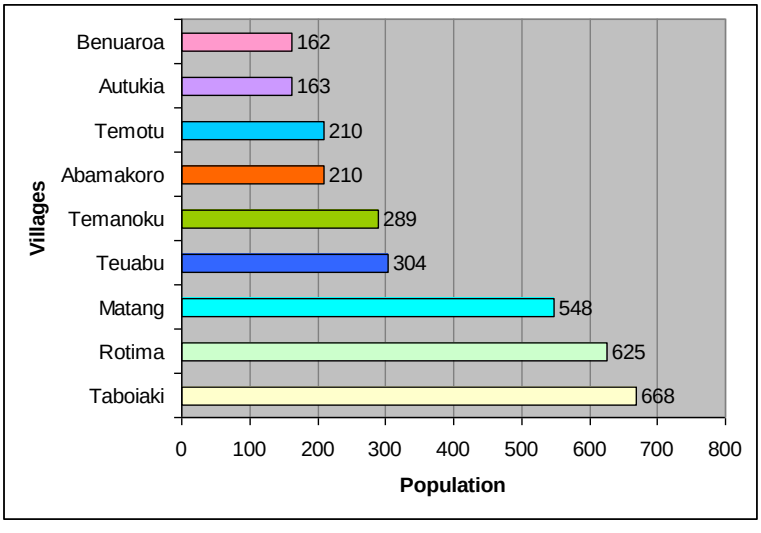
Village Name	Village Land Area	Pop 2005	Density 2005
Abamakoro	0.02	210	10500
Benuaroa	0.05	162	3240
Teuabu	0.27	304	1125.93
Temanoku	0.34	289	850
Rotimwa	0.22	625	2840.91
Autukia	0.07	163	2328.57
Matang	0.26	548	2107.69
Taboiaki	1.73	668	386.13
Temotu	0.14	210	1500

Overall for Nonouti as an island, the actual land area of the island itself which is 29.2 divided into the total population 3174 giving what has previously noted as 160. Such villages have very limited land area yet more people are living in that particular limited space which happens in most of the islands. Population is not well distributed over the island's land area.



Note: Refer to Nonouti Island Profile 2008 for problem areas and sites of significance.

Population by village Source: 2005 Census of Population, NSO/MFED, 2007



It is clear from the chart that a large proportion of the people live in Taboiaki village numbering 668, 21% of the 3179 Nonouti population. Taboiaki is the largest village

of Nonouti and thus holds the most population of the island. Benuaroa (a combined name for the islets of Mataboou and Tebuange) village held the least number of the island's population of 162, 5% of the total population.

Matang village is the administrative centre of the island and as such has better infrastructure and facilities. It also comes third in village population after Taboiaki and Rotimwa with a population of 548 or 17% of the island population.

In 2005, out of Nonouti total population of 3,179 males constituted 51% (1,622) and females 49% (1,557).

LAND AND MARINE RESOURCES

Land is owned by the families and the people in general. A small area is also leased by the various religious groups and the Cooperative Society. Islets between the village of Tebuange and Abamwakoro are owned by many families with connections to ncestors that used to live on the islaet. Noumatong is a bird sanctuary and is protected as a conservation area, cared for and looked after by Nonouti Island Council. The people living on the islet of Abamwakoro are given the authority of guarding Noumatong and Tabontenaa from poachers.

Villages consist of lines of houses that are built in a linear formation following the general pattern of the island. The main-road is built through village and runs along the length of the island. A large portion of the land is used up by wild bush and cultivated coconut, few *bwabwai,* breadfruit, *te bero,* and pandanus tree. The island is covered in shrubs and fruit trees. Other plants include pandanus (*Pandanus tectorius*), breadfruit trees (*Artocarpus altilis*) and bananas (*Musa sp.)* that grow mostly in village area'

Water resources

The 2005 census recorded that 22 households have access to rainwater, 1 to piped water, 476 to open wells, 81 to protected wells and 557 have access to both open and closed wells.

The islets of Tebuange and Abamwakoro suffer from brackish water during prolonged droughts. Abamwakoro sufferes the most as the islet is narrow. Fresh is fetched from the neighbouring islet of Tabukaokao.

Abamwakoro, Tebuange and Matabou (later two are sub-villages of Benuaroa) are facing saline intrusion into their underground freshwater lens. Cases in point are Mataboou and Tebuange that are badly affected by causeways built there thus resulting in coastal erosion and loss of land. Because the thickness of land dictates underground fresh water lens loss of land at northern end of Mataboou where a village was originally located has forced villagers to move further inland abandoning their former homes. Similarly, coastal erosion at the southern portion of Tebuange

has caused worsened seawater intrusion to bwabwai pits and extending towards a village. Consequently, Tebuange villagers will have to move back to the former village site sooner.

Central and southern villages are alo being affected via causeways and airstrip constructions. Compounding the impact of these manmade destructions are reclaimed lands by individuals or major denominational groups that expand their compounds for more space but at the expense of other people's properties and lives.

The island council is also compounding the erosion through its endless construction works for classrooms, buildings, and other physical structures. Impacts of natural events on physical landscape and natural resources are minimal as compared to human adverse destruction. The long term impact of the latter will linger on for years to come. Hence people should talk more of controlling their own destructive actions than impacts of climate change and sea level rise, the latter may be a long way of but through our actions seawater find it easier to seep through or overtop our weak and disapearng beaches.

MARINE RESOURCES

Size of Reef/Lagoon Size

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Nonouti	42	25.4	420	19.85

Source: Ministry of Fisheries, Marine, Resources Development, Fisheries division.

Due to its large reef area Nonouti has a wide variety of fish resources. Nonouti has such an abundance of fish resources in the lagoon that most of the people engage in net fishing most of the time and rarely go deep or line fishing. Of course, there are those who go fishing in the ocean for sharks and tuna but according to the people of Nonouti, most do not see any reason to go far to harvest the fish when they can get it near in the lagoon and faster using a net. It is extremely rare for the people on the island to suffer fish shortage.

Generally, the main issues concerning fisheries include:

a. Lack of fishing equipment
b. Depletion of the different species of sea cucumber especially the white teat fish and other
c. Remoteness of the island makes it hard for them to access fish markets in South Tarawa
d. Increase of algae in the lagoon waters has prompted people to fish further for sea worms
e. Change in lagoon fish sites and migration

ENVIRONMENT

Coastal erosion and inundation during storm surges and high tides is becoming a reality that the people have very low awareness of and see no other solution than to build more seawalls or relocating to other unaffected parts of the village or island. Many locations on Nonouti have been seriously eroded, resulting in the relocation of infrastructure (road, buildings, etc.) or the recurrent high expenditure of maintaining seawall protection.

Nonouti, is one of the biggest island in the Gilbert group and thus over the years the construction of causeways has been carried out to connect the mainland to those on the islets. This has resulted in a lot of coastal erosion problems over the years. Topped up with land reclamation by the churches and individuals, parts of the island are eroding while others are accreting.

The bird sanctuary of Noumwatong is undergoing serious erosion at western side due to stronger currents from the western open sea; because of the closure of reef passages along the main island there are no counter water currents from those passages because of causeways. So far five passages have been closed off, one at Routa, Tereiango, Tebuka, Buariki and the most recent one is Benuaroa-Mataboou passage. Noumwaatng will eventually become a sandbar and further reduced to nothing in the years to come. Consequently, birds are slowly moving to the next uninhabited islet, Tabontenaa. It is not only on these two islets that serious erosion is taking place but also along the coastal region of the lagoon side of the whole island.
Bad inundations have been experienced in the village of Teuaabu at the section of Kaaran, Tekatuai and Tekaaroboi where people have walked in knee deep seawater that seeped in from the lagoon side during one of the high tides in recent years. This area still gets flooded every high tide along with other areas of the same village. The destruction that these floodings do are extreme in the sense that they result in salty wells, dying fruit trees especially breadfruit and ‘bwabwai’ and great discomfort to villagers especially those whose homes are at ground level.

The community on the islet of Abwamwakoro has been living on brackish water for generations and find the idea of being relocated amusing as they have lived like that for as long as they can remember and have adapted well to the status of their water supply to the point that they get running stomachs when they drink fresh water from the mainland or rain. The people have never considered relocation and have rarely asked for water projects. However, foreigners especially nurses, teachers and pastors working on the islet have found it necessary to seek assistance in the provision of rainwater tanks for their livelihood.

CC & SLR site coordinates - Nonouti

No.	Description	Description

1	Accretion - seawall built and mangroves planted	S0 47 54.2 E174 27 10.9
2	Erosion and flooding	S0 47 55.6 E174 27 10.4
3	Erosion and flooding Point B of 2	S0 47 59.8 E174 27 09.8
4	Kabanei primary School	S0 47 59.5 E174 27 13.3
5	Accretion and migrating beach	S0 48 03.4 E174 27 08.3
6	Temotu medical clinic	S0 48 07.7 E174 27 05.4
7	Freshwater site – Temotu	S0 48 17.8 E174 27 25.3
8	Eroding even though heaps of gravel on the beach	S0 48 31.0 E174 27 27.6
9	Point B of 8	S0 48 29.9 E174 27 25.6
10	Erosion and flooding at Tenanoraoi	S0 46 26.2 E174 28 15.0
11	Point B of Erosion 12	S0 46 25.6 E174 28 14.9
12	Erosion point at KPC Seawall	S0 46 24.9 E174 28 14.4
13	Freshwater site at Tenanoraoi	S0 46 24.2 E174 28 15.3
14	Medical clinic at Taboiaki	S0 45 08.0 E174 27 50.8
15	Bontemps, Leray and Weber landing memorial	S0 44 44.1 E174 27 28.0
16	Freshwater site at Tabiang	S0 44 39.7 E174 27 32.7
17	Biggest traditional mwaneaba	S0 44 14.4 E174 27 12.3
18	Tebukanimatang freshwater site Taboiaki	S0 43 17.5 E174 27 08.4
19	Freshwater site at Tebwaatabuki Taboiaki	S0 42 22.6 E174 27 04.0
20	Council resthouse freshwater site	S0 40 29.8 E174 27 06.0
21	Erosion Point A at Matang	S0 40 28.3 E174 26 54.2
22	Tauraoi Primary School	S0 40 23.29 E174 27 7.25
23	Nonouti JSS	S0 40 20.51 E174 27 7.05
24	Erosion Point B of 21	S0 40 16.8 E174 26 49.0
25	Erosion Point A at Matang	S0 40 11.2 E174 26 47.0
26	Erosion Point B of 25	S0 39 58.8 E174 26 45.5
27	Freshwater site at Matang - Rakentaai	S0 39 32.9 E174 26 55.7
28	Freshwater site at Autukia, Tabontebwaa	S0 39 02.9 E174 26 17.2
29	Freshwater site at Tanrio Autukia	S0 38 55.8 E174 26 13.0
30	Freshwater site at Ararata Autukia	S0 38 51.7 E174 26 10.2
31	Freshwater site at Tekariaria Autukia	S0 38 44.1 E174 26 20.7
32	Erosion at airport at Rotimwa	S0 38 27.1 E174 25 48.6
33	Erosion Point B of 32 at Rotimwa	S0 38 18.22 E174 28 18.81
34	Erosion Point A at Rotimwa	S0 38 08.3 E174 25 06.6
35	Tetaake private residence at risk from erosion	S0 38 02.9 E174 25 00.2
36	Freshwater site at Rotimwa	S0 38 01.8 E174 25 00.9
37	Point B of erosion 34	S0 38 01.4 E174 24 58.7

38	KPC Rotimwa seawall extension	S0 38 00.7 E174 24 56.4
39	Erosion from KPC seawall Point A	S0 37 59.6 E174 24 56.3
40	Point B of erosion 39	S0 37 53.6 E174 24 50.6
41	Accretion at Rotimwa after erosion at 40	S0 37 53.4 E174 24 48.4
42	Erosion at Rotimwa Point A	S0 37 52.9 E174 24 48.2
43	Erosion Point B of 42	S0 37 48.7 E174 24 44.2
44	RC mwaneaba at risk from erosion	S0 37 49.3 E174 24 46.6
45	Rotimwa medical clinic	S0 37 44.5 E174 24 38.3
46	Migrating beach at Katekaa Temwanoku	S0 36 20.9 E174 23 27.8
47	Erosion at Temwanoku Point A	S0 36 20.0 E174 23 23.8
48	Freshwater site at Temwanoku	S0 36 17.3 E174 23 22.1
49	Point B of 47	S0 36 19.3 E174 23 11.6
50	Freshwater site at Temwanoku	S0 36 13.1 E174 23 12.2
51	Nearest house to freshwater site 50	S0 36 17.7 E174 23 06.3
52	Erosion at Temwanoku Point A	S0 36 16.4 E174 23 05.9
53	Point B of erosion 52	S0 36 12.3 E174 23 00.5
54	Freshwater site at KPC Temwanoku	S0 35 59.8 E174 22 45.5
55	Erosion at Temwanoku Point A	S0 35 56.6 E174 22 35.9
56	Erosion at Temwanoku Point B of 55	S0 35 49.3 E174 22 29.2
57	Erosion at Temwanoku Point A	S0 35 31.0 E174 22 13.9
58	Point B of 57 at Temwanoku	S0 35 23.90 E174 22 1.82
59	Primary School Temwanoku	S0 35 16.0 E174 21 51.9
60	Flooding point at Temwanoku	S0 35 16.4 E174 21 44.9
61	Flooded area Temwanoku	S0 35 17.4 E174 21 44.6
62	Flooded area ends Teuaabu	S0 35 00.9 E174 21 19.1
63	Accretion at Teuaabu	S0 34 55.2 E174 21 09.7
64	Flooded area at Teuaabu	S0 34 53.3 E174 20 58.2
65	Point of flooding of 64	S0 34 51.7 E174 20 55.6
66	Teuaabu medical clinic	S0 34 45.3 E174 20 46.7
67	Point B erosion of 68 at Teuaabu	S0 34 49.9 E174 20 34.2
68	Point A erosion of 67 at Teuaabu	S0 34 52.9 E174 20 22.1
69	Freshwater site at Mataboou	S0 34 13.0 E174 18 52.5
70	Erosion at base of unfinished causeway at Mataboou	S0 34 13.0 E174 18 46.5
71	Medical clinic at Tebuange	S0 34 06.1 E174 18 40.3
72	Point of flooding at Tebuange	S0 34 05.4 E174 18 36.3
73	Freshwater site at Tebuange	S0 33 52.1 E174 18 30.7
74	Freshwater site at Tebuange	S0 33 52.2 E174 18 28.2
75	Tebuange Primary School	S0 33 44.7 E174 18 28.7
76	Erosion Point A at Tebuange clinic	S0 34 6.14 E174 18 41.4
77	Erosion Point B of 76 at Tebuange	S0 33 30.0 E174 18 14.4
78	Erosion Point C at western end of Tebuange	S0 33 14.7 E174 17 38.0
79	Erosion Point B at western end of Tebuange	S0 33 15.1 E174 17 37.4

80	Erosion Point A at western end of Tebuange	S0 33 18.1 E174 17 36.4
81	Flooding point and area at Abamwakoro	S0 32 55.0 E174 14 59.9
82	Erosion Point B of 86 at Abamwakoro	S0 32 46.7 E174 15 02.4
83	Freshwater site at Abamwakoro - brackish	S0 32 45.3 E174 14 52.3
84	Abamwakoro Primary School	S0 32 45.9 E174 14 48.8
85	Abamwakoro medical clinic	S0 32 47.1 E174 14 47.3
86	Erosion Point A of 82 at Abamwakoro	S0 32 41.7 E174 14 44.6
87	Erosion Point B of 86 at Abamwakoro	S0 32 39.6 E174 14 37.1
88	Initial erosion point of 82 at Abamwakoro	S0 32 39.3 E174 14 45.1
89	George Eastman High School	

Note: For details of problem area and areas of significance refer to Nonouti Island Profile 2008.

EDUCATION

Nonouti island has 9 schools comprising of 7 Primary Schools and one Junior Secondary School and one Senior/high school. Teitinikarawa primary school is located on Abamwakoro village, another primary school known as Tebuange is stationed on Tebuange village, Routa Primary is located in between Teuabu and Temwanoku village, George Eastman high school is placed in Rotimwa village, Nonouti JSS and Tauraoi primary school are both stationed on Matang village, Amy primary school is placed on Taboiaki village, while Kabane primary school is located on Temotu village. Schools sizes depend upon the size of the villages/area's population.

The condition of classrooms, teacher living quarters and other school buildings is generally poor. School buildings are of the local and permanent type and, as such, one would expect that local buildings will be better serviced due to the availability and low cost of materials.

School furniture is generally lacking, and it is not unusual to find pupils learning while sitting or lying on the ground. To try to provide much needed funds the school administration and parents sometimes launch fundraising activities in order to generate income to meet the cost of teaching materials and stationery.

Enrollment by each primary school

Primary Schools	**Student total**	**Teachers Total**
Teitinikarawa	23	2
Tiantaake	32	2
Routa	167	6
Peace Corps	20	4
Tauraoi	121	6
Amy	176	5

Kabanei	47	3

Source: 2006 Digest, Ministry of Education, Bikenibeu.

JSS enrollment by 2003-2006

2003	2004	2005	2006
114	172	197	209

Source: 2006 Digest, Ministry of Education, Bikenibeu.

Apart from Junior Secondary School, Nonouti has also a senior secondary school called George Eastman High School, it is owned by the Kiribati Protestant Church. According to the 2005 census there are 273 children aged 16-18, out of that total 267 enrolled that is approximately 98% senior secondary attendance, however the number of enrollment goes down to 197, a variance of 50 people who may have dropped out, transferred to another school, married, school fee problems, or any other forms of reasons that were not taken into consideration as one of the survey objectives. Investigations and thorough analysis is needed prior conclusions.

George Eastman High School enrollment

2003	2004	2005	2006
114	172	267	197

Source: 2006 Digest, Ministry of Education, Bikenibeu.

In 2006 a total of 611 pupils were enrolled in seven primary schools, namely Teitinikarawa, Tiantaake, Routa, Peace Corps, Tauraoi, Amy, and Kabanei. Of this number 335 were males and 276 were females. The total number of teachers in all the 7 primary schools is 28, out of which 2 were based at Teitinikarawa, another 2 in Tiantaake, six stationed in Routa, 4 situated in Peace Corps, another 6 in Tauraoi, the other 5 stationed at Amy, and the 3 others located at Kabanei primary school.

For the whole island there is only one Junior Secondary School, Nonouti Junior Secondary School (named after the island itself). As of 2006 the number of pupils enrolled in all forms totals to 209. Of this figure 76 were in Form 1, 70 were in Form 2, and 63 were in Form 3. With a teaching staff of 8, the Teacher to Pupil ratio at JSS was 1 teacher to every 26 pupils.

Enrolment in Primary and Junior Secondary Schools, Nonouti 2005 and 2006

Primary School							**Junior Secondary School**			**Senior Secondary School**		
Year	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Form 1**	**Form 2**	**Form 3**	**F 4**	**F 5**	**F 6**
2005	164	93	95	135	92	128	82	79	54	91	65	41
2006	153	91	74	91	87	90	76	70	63	91	65	41

Source: Compiled from the Digest of Education Statistics, MOE, 2005 and 2006.

The percentage of pupils who completed JSS in 2006 is 80% out of the total number of students who enrolled in 2005 completed JSS. Primary completion average is 70% while secondary completion average is 12%

Number of Pupils, Teachers and Ratio

School	Pupils	Teachers	Ratio
Teitinikarawa Primary Schoool	23	2	1:12
Tiantaake Primary School	32	2	1:16
Routa Primary School	167	6	2:28
Peace Corps primary school	20	4	1:5
Tauraoi primary school	121	6	1:20
Amy Primary School	176	5	1:35
Kabanei primary School	47	3	1:16
Nonouti JSS	209	8	1:26
George Eastman High school	197	15	1:13

Source: Digest of Education Statistics 2006

HEALTH

There are six clinics and one health center on Nonouti. The clinics are located each in the villages of Teuabu, Temotu, Taboiaki, Rotimwa, Matang, and Abamwakoro, while the health center is located in the island's administrative center, Matang village. The MA is in charge of 2 nurses and 4 nursing aids. The MA and nurses are paid by the central government while the nursing aids are the responsibility of the Island Council of Nonouti.

The health center and clinics have facilities to accommodate patients who are admitted for medical supervision. These health facilities are as follows:

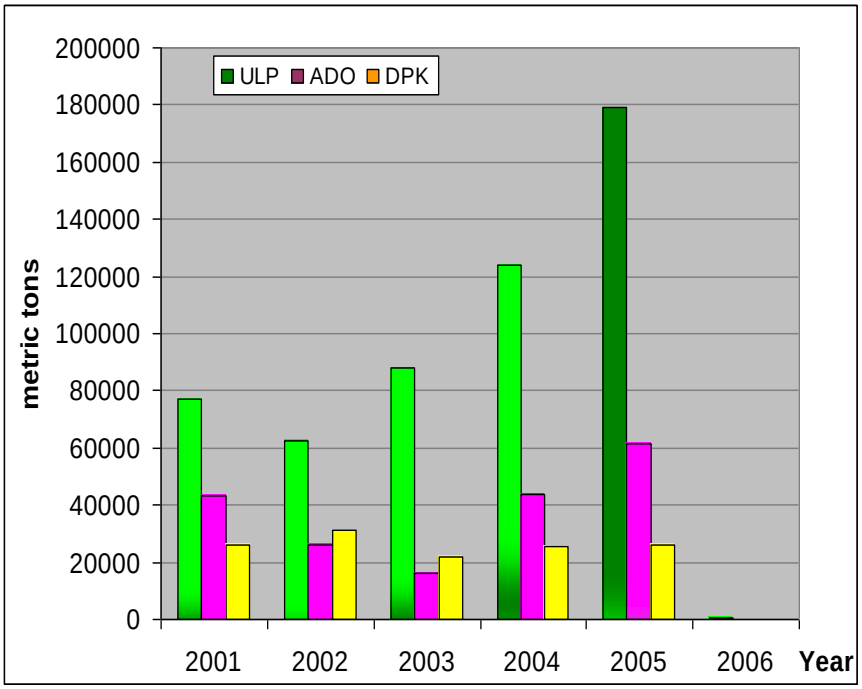
i. *Health Center*: 1 health center, 3 wards, 3 cooking houses and 3 toilets
ii. *Teuabu Dispensary/clinic*: 1 clinic, 3 wards, 3 cooking houses, and 3 toilets
iii. *Temotu Dispensary/clinic:* 1 clinic, 2 wards, 2 cooking houses, 2 toilets and.
iv. *Baroronga Dispensary/clinic*: 1 clinic, 3 wards, 3 cooking houses, and 3 toilets
v. *Tebobonga Dispensary/clinic:* 1 clinic, 2 wards, 2 cooking houses, 2 toilets and
vi. *Abamwakoro Dispensary/clinic*: 1 clinic, 3 wards, 3 cooking houses, and 3 toilets
vii. *Matabou Dispensary/clinic:* 1 clinic, 2 wards, 2 cooking houses, 2 toilets and

The health center and clinics are built from permanent construction materials, while the wards, cooking houses and toilets are of local material. Various surveys on the condition of medical facilities undertaken over the course of the past few years show that maintenance of medical facilities on most of the islands including Nonouti have been neglected, resulting in the deteriorating condition of both local and permanent buildings. The main cause of this problem is the lack of maintenance funds. The most common diseases on Nonouti Island are fever, cough, headache, stomach-ache and diarrhea.

ISLAND ECONOMY

Energy

The chart below shows the volume (in liters) of three major types of fuel sent to Nonouti by the year 2001 to 2006. In terms of volume, unleaded petroleum (commonly known as benzine) has been the most commonly used fuel on the island, followed by kerosene and diesel. The chart shows that the volume of fuel sent by KOIL to Nonouti Island between 2001 and 2006 has generally increased, with unleaded petroleum constituting 67% of total requirements, kerosene 23% and diesel 103% (average of combined fuel requirements from 2001 to 2005). It is anticipated that the proportion of unleaded fuel will increase as the use of automotive machines and equipment (portable generators, outboard engines, motorbikes, etc.) becomes more widespread. Conversely, around the year 2006 Nonouti had a very less share of only 532 tons of benzene, 220 for Kerosene and 108 tons for diesel, reasons underlying the circumstances are particularly unknown.



Subsistence

Typical subsistent activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai. These activities are performed by the adult members of a family, while the younger members are expected to collect firewood

and fetch water, clean the *kaainga's* compound, and assist the adult members to do the easy part of their chores.

Copra cutting

Copra cutting is an important activity that provides a steady source of income for many people on Nonouti. At $0.60 cent per kilogram the total revenue from copra was approximately $240,000 in 2003, $1,020,000 in 2004 and $120,000 in 2005. This means that from copra production each household generates on average a total of $472.40 in 2003, $2007.90 in 2004 and $222.20 in 2005.

Copra production and revenue 2003-2005

Year	**Tons**	**Total income**	**Income Per H/hold**
2003	400	$ 240,000.00	$472.15
2004	1700	$ 1020000.00	$2007.90
2005	200	$ 120,000.00	$222.20

Source: National Statistics Office, 2007

The lowest production figure for Nonouti was 147 tons in 2000, and the most productive year was 2004 when it soared to 1700 tons. The jump in production was caused by a rise in copra price introduced in 2004.

Apart from copra in other words coconut, there are other types of crops of which outer island people also cultivate as their necessity means of their diurnal food supplier. Such food crops include breadfruit, pawpaw, sweet potatoes, pandanus, cabbage, *tebero* and *bwabwai*.

Remittances

With limited employment and income-generating activities, many people on Nonouti depend to a great extend on remittances sent to them by relatives working in Tarawa or overseas. The general flow of seafarer's remittances into the country is continuous and has increased over the years with more engaged in seafaring employment. There are now two major employers of seafarers from Kiribati: 1. South Pacific Marine Services (SPMS) and; 2. The Kiribati Fishing Services (KFS).

Agriculture

The predominant food crops on Nonouti are *breadfruit*; banana, pandanus, and coconut. Each family has its own bwabwai pits, breadfruit and toddy trees. Home gardening is not common but some households have their own vegetable gardens where they grow tomato, cabbage, cucumber and eggplant mainly for home consumption. Some people sell their local crops to business agents in Tarawa.

The main animals reared by the islanders are pigs and chickens, for home consumption. In 2005 the total number of pigs on Nonouti was 2293, with 93 % of households owning at least 4 pigs on average. There were approximately 3471 local chickens.

Fisheries

Since Nonouti is big with a real big lagoon and reef area, fishing is not restricted to the ocean flat and deep ocean only but provides two category option of fishing choices, the ocean and lagoon. The 2005 census records show that out of 540 households on Nonouti where 249 (74.3%) fish on the ocean flat while 315(62.1%) venture in small canoes and boats to fish in the lagoon surrounding Nonouti.

TRANSPORTATION

The main transport infrastructure on Nonouti is made up of 24.79 kilometers of road. The road is normally 3 to 4 meters in width, enough for the use of small to medium size vehicles.The most common form of land transport is the bicycle, of which there were 290 in 2005. Motorcycles ranks second in popularity, with a total of 128 motorcycles recorded in 2005.

Inter-village travel between Nonouti and the isolated islets is done through the use of canoes and small boats, since the villages are separated by sea. It is possible to walk between the islets during low tide but the distance is the main deterrent. The separation of Nonouti and several other islets affects children the most, in particular those who are old enough to attend junior secondary school. Whereas there is a primary school on Abamwakoro, the junior secondary school is located on Matang islet, and children must travel every day to attend school. Those who do not have access to transport either miss a lot of classes or just simply drop out of school. In 2006 central government provided a skiff and outboard engine to the community to use it specifically to serve the need of JSS pupils.

TABITEUEA NORTH

PHYSICAL FEATURES

Tabiteuea North extends from the northern village of Tekabuibui to the southern village on the islet of Aiwa. Other islets include Kabuna, Tenaatoorua and Bangai. There are numerous small islets in between these inhabited islets making this portion of the islnd the most productive in trems of marine resources. Aiwa marks the boundary between North and South Tabiteuea. TabNorth as is known has a total land area of 25.78 sq.km, 2.18 at its widest point (Tekaman), and 0.13 km at its narrowest point.

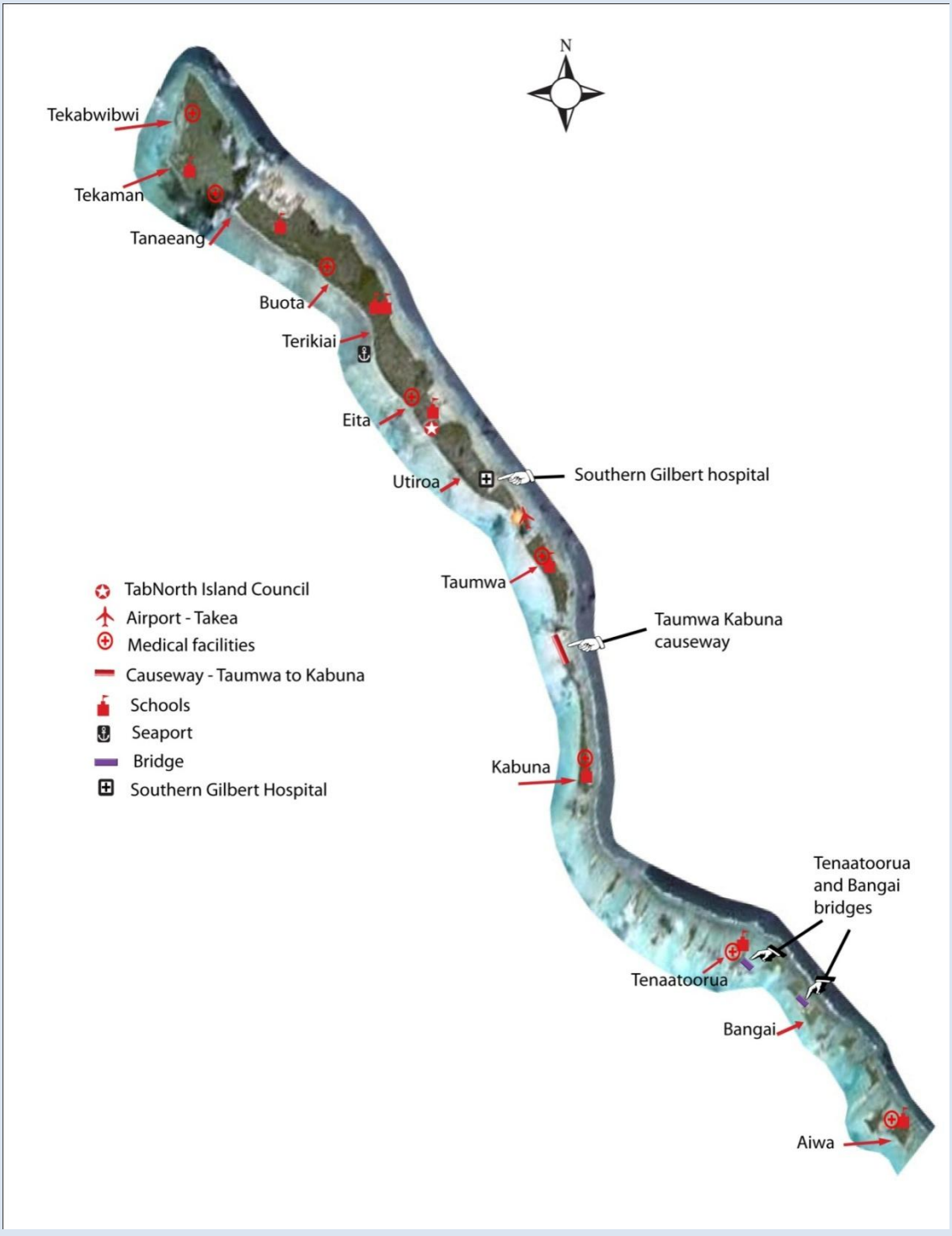
Located in the southern Gilberts, it is among those of the dry islands in the country suffering from the impact of re-occurring droughts over the years. Giant taro, *'bwabwai'* pits are located quite a distant into midland for freshwater lens.

Coral islands and atolls are lowl, averaging 2 meters above sea-level. Sandy and porous soil makes agriculture difficult for most home gardening. The main source of drinking water is the underground water that is tapped through wells dug 3-5 meters into the ground. The quality of groundwater is easily affected by ong droughts but quickly replenished during heavy rainy season. Boiling well water is common on the island. Not only is the livelihood of the population is dependent on the quality of groundwater but terrestrial fauna and flora. Coconuts dominate atoll vegetation along with other common shrubs along coastal areas. Saltbush and other vegetation flourish along island coastlines.

POPULATION

The 2005 census recorded the total population of the island as 3,600. The most populous of the twelve villages on the island was the village of Eita that constituted 23% of the total population. The villages of Utiroa and Tanaea respectively came as the next two most populous villages on the island. Utiroa constituted 16% while Tanaeang constituted 14% of the total population. The rest of the people were dispersed among the rest nine villages. The least populated village was the islet of Bangai where only 35 (1%) people resided just as Tenaatoorua and Aiwa, other two islets are a lot less populated than villages on mainland Tabiteuea North.

Figure 1*: A Geographical map of Tabiteuea North*



Note: Refer to Tabiteuea North Island Profile 2008 for problem areas and sites of significance.

Population Density by village

Village	Village Land Area	Pop 2000	Pop 2005	Density 2000	Density 2005	[Density Change %]
Tekabwibwi	0.12	97	145	808	1208	49.48
Tekaman	0.26	233	248	896	954	6.44
Tanaeang	0.32	494	514	1544	1606	4.05
Buota	0.49	336	343	686	700	2.08
Terikiai	0.43	269	255	626	593	-5.2
Eita	0.69	732	814	1061	1180	11.2
Utiroa	0.85	567	571	667	672	0.7
Tauma	0.4	198	204	495	510	3.03
Kabuna	0.24	206	204	858	850	-0.97
Tenatorua	0.15	100	122	667	813	22
Bangai	0.37	25	35	68	95	39.99
Aiwa	0.1	108	145	1080	1450	34.26
Village total	**4.42**					
TAB NORTH	***25.78***	**3365**	**3600**	**131**	**140**	**6.98**

At the island level, Tab North has a combined land area of 25.78 square kilometers and a population of 3600 (2005 census), giving a population density of 140 people per square kilometer.

Population by Age groups and Village

Island/Village Gilbert Group	Broadage Age Group								
	Total	<1	1	2-5	6-14	15-17	18-49	50-69	70+
TOTAL	**92,533**	**2,403**	**2,167**	**8,819**	**20,804**	**6,589**	**41,131**	**8,628**	**1,992**
MALE	**45,612**	**1,235**	**1,114**	**4,483**	**10,693**	**3,334**	**20,045**	**3,971**	**737**
FEMALE	**46,921**	**1,168**	**1,053**	**4,336**	**10,111**	**3,255**	**21,086**	**4,657**	**1,255**
				TABITEUEA NORTH					
Tekabwibwi	145	1	4	15	37	8	56	20	4
Tekaman	248	8	7	22	76	12	91	25	7
Tanaeang	514	10	17	53	149	41	179	52	13
Buota	343	9	12	39	95	20	127	38	3
Terikiai	255	6	3	26	80	13	108	15	4
Eita	814	11	6	59	151	205	316	53	13
Utiroa	571	16	6	56	161	36	222	52	22

Tauma	204	4	4	24	50	12	88	18	4
Kabuna	204	4	5	17	62	12	78	22	4
Tenatorua	122	4	3	13	24	9	54	13	2
Bangai	35	2	3	5	2	2	18	3	0
Aiwa	145	5	3	13	37	8	64	12	3
TabNorth	**3,600**	**80**	**73**	**342**	**924**	**378**	**1,401**	**323**	**79**
Percentage	**100**	**2**	**2**	**10**	**26**	**11**	**39**	**9**	**2**

Source: 2005 Census of Population, NSO/MFED, 2007

Nearly half, 43%, of the island population are in the dependency age group of which the majority 1,419 (90%) are the young aged 0-14 years old while 10% aged 65and above.

Out of the 3600 population on TabNorth, males constituted 49% (1,764) and females 51% (1,836) resulting in a ratio of 96 males per 100 females.

LAND AND MARINE RESOURCES

Land

Like other islands in Kiribati, land on Tabiteuea North is owned by families through inheritance or other customary means. Land is divided among the heirs on the dead owner, with male heirs taking precedence over females. There are also lands given away as gifts and for nursing an aged or the dying elder. Some lands were won in battle by the victors and this happened after the religious war on Tabiteuea in 1881. However, the increased migration of natives to other islands has sometimes resulted in landowners dying elsewhere without immediate families looking or caring for the island. As such, lands that have not been divided between sons and daughters are left as family lands, awaiting the presence or representatives of all the children of the deceased to divide it.

Marine resources

Table 5: Size of Reef/Lagoon Size

Islands	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Tabiteuea	39	49	532	25.78

A variety of shell fish can be found on the lagoon and reef flats at low tide or sometimes in deeper lagoon waters, and abundant schools of small fish swim and live among the roots of the mangroves. Then there is the famous sea worm and sea cucumbers that are also fished off the lagoon flat that are two of the main income generating resources on the island. Eels, turtles, common mojarra, lobsters and crabs etc can be found in abundance in the surrounding ocean and lagoon. All these marine resources by far provide an important source of food and income to the people of the island.

Status of Fish Resources

It is difficult to quantify the fish resources of TabNorth, or any island for that matter. However, it is generally accepted that the bigger the reef area the larger the fish resource, particularly reef fish. Consequently, with a large reef and lagoon area, it can only be concluded that TabNorth has a vast and diverse number of marine resources. Free migratory fish such as skipjacks and yellow fin tuna (*Katsuwonus pelamis, Thunnus albocores*), flying fish (*Cypserulus sp.*) and shark (*Ginglymostoma ferrugineium*) amongst others are always abundant at both leeward and windward open seas.

A variety of shell fish can be found on the lagoon and reef flats at low tide or sometimes in deeper lagoon waters, abundant schools of small fish swim and live among the roots of the mangroves. Then there is the famous sea worm and sea cucumbers that are also fished off the lagoon flat, are two of the main income generating resources on the island. Eels, turtles, common mojarra, lobsters and crabs etc can be found in abundance in the surrounding reefs and lagoon.

ENVIRONMENTAL ISSUES

Coastal erosion is becoming a major environmental issue for the islands of Kiribati including TabNorth. Many locations on TabNorth have been seriously eroded, resulting in the relocation of infrastructure (road, buildings, etc.) or the recurrent high expenditure of maintaining seawall protection.

The islet of Tenaatorua is suffering mild erosion all around; Bangai is suffering mild erosion at the southern end and extreme erosion at the northern end where the bridge stands. Aiwa on the other hand is also suffering mildly from coastal erosion on the northern lagoon side of the island only. Tenaatoorua freshwater is slowly becoming brackish, Bangai residents are now fetching from either Aiwa or another nearby islet while Aiwa is using their only freshwater well located at Tebwatua. Like the islets of Nonouti, fruit trees have been greatly affected by the heat and lack of water to the extent that there are very less coconuts and the toddy cutters have to give up most of their toddy trees as the spathes are either too small to get anything out of or the toddy itself is not forthcoming. Flooding is rare on the island except for the village of Kabuna where flooding occur every high tide towards the southern end of the village. Accretion and erosion go hand in hand and where there is erosion, accretion is occurring in other places. Kabuna suffers from erosion starting from where the causeway ends at the village area to nearly halfway of the village. The southernmost tip is accreting or has been for years now.

The island's limited land area and resources will face increasing pressure as the population continues to grow. Coconut, which is one of the main commercial agricultural produce used in the production of copra, is now scarce, as more and more people compete to harvest it.

Climate change and sea level rise are creating dreadful realities to the outer islands including TabNorth requiring that people are better informed and prepared for solutions that could eventually mean relocation to other parts of Kiribati or overseas migration.

TabNorth CC & SLR GPS Coordinates

No.	Lat/Lon hddd°mm'ss.s"	Description
1	S1 06.261 E174 39.914	Eroded area at Tekabwibwi
2	S1 06.337 E174 39.836	Eroded area/End of Seawall at Tekabwibwi
3	S1 06.501 E174 39.774	Eroded area/End of Seawall
4	S1 06 59.1 E174 39 54.7	Clinic at Tekabuibui
5	S1 07 44.9 E174 39 48.4	Primary School
6	S1 08.039 E174 39.878	Erosion at Tekaman
7	S1 07.732 E174 39.663	Erosion at Tekaman
8	S1 08 07.6 E174 40 12.0	Clinic at Tanaeang
9	S1 08.785 E174 41.342	Erosion at Buota
10	S1 09.049 E174 41.750	Erosion at Buota
11	S1 08 47.2 E174 41 24.2	Primary School at Buota
12	S1 09.230 E174 42.151	Erosion at Buota
13	S1 09.411 E174 42.499	Fresh Water
14	S1 09.456 E174 42.525	Erosion at Bareatau Buota
15	S1 09.661 E174 42.748	Erosion at Bareatau Buota
16	S1 09 38.6 E174 42 44.7	Clinic at Buota
17	S1 10 08.9 E174 43 33.5	Takoronga Primary School
18	S1 10 7.55 E174 43 37 21	Takoronga JSS
19	S1 10.478 E174 43.618	Accretion at Eita
20	S1 10.740 E174 43.650	Accretion at Eita
21	S1 10.734 E174 43.661	Fresh Water
22	S1 10.901 E174 43.678	Erosion at Tekaawa Eita
23	S1 11.399 E174 44.070	Erosion at Aonuka Eita
24	S1 11 58.7 E174 44 45.6	Clinic at Eita
25	S1 11 52.4 E174 44 45.9	Teabike High School
26	S1 11 57.4 E174 44 56.7	Temwamwaang Primary School
27	S1 12 22.6 E174 44 59.6	Erosion at Tekaraa - Utiroa
28	S1 12 22.2 E174 44 59.0	Erosion at Tekaraa - Utiroa
29	S1 12 24.6 E174 45 01.6	Point two of above two
30	S1 12 29.3 E174 45 06.4	Erosion at Ierutarem from the KPC area
31	S1 12 37.9 E174 45 14.6	Point two of above at Aontebono
32	S1 12 37.5 E174 45 14.0	Boobooti store at risk from erosion – Utiroa
33	S1 12 46.8 E174 45 24.0	Kairaoa erosin and accretion at Utiroa
34	S1 12 49.6 E174 45 26.8	Buarai erosion at Utiroa that continues to Takea erosion points
35	S1 12 49.91 E174 45 57.39	Southern Gilbert Hospital
36	S1 13 34.4 E174 46 29.6	Point 2 of above
37	S1 13 46.2 E174 46 36.5	Takea erosion on the lagoon side of the

		airport
38	S1 13 58.0 E174 46 42.5	Point two of above at Tetiribuki
39	S1 14 13.6 E174 46 56.7	Uribia erosion at Taumwa
40	S1 14 12.3 E174 46 58.7	Clinic at Taumwa
41	S1 14 13.3 E174 47 01.6	Taumwa Primary School
42	S1 14 30.4 E174 47 25.1	Freshwater site at Taumwa – Tebeetao
43	S1 14 30.4 E174 47 25.6	Boundary site of above that is brackish
44	S1 15 43.77 E174 47 28.8	Point B erosion of 45
45	S1 16 07.8 E174 47 44.5	Erosion at Tabouea - Kabuna
46	S1 16 59.0 E174 47 58.8	Point two of above at Tebuunrang
47	S1 17 07.3 E174 48 01.6	Naaniman erosion on the ocean side near the clinic and primary school in Kabuna
48	S1 17 09.38 E174 48 0.9	Kabuna medical clinic
49	S1 17 11.6 E174 48 00.3	Primary school at Kabuna
50	S1 17 40.2 E174 47 50.5	Erosion at Kabuna - Nanon te rawa
51	S1 17 40.32 E174 47 50.5	Flooding point at kabuna
52	S1 17 47.9 E174 47 48.2	Point 2 of above
53	S1 18 04.1 E174 47 48.7	Erosion at Tabontekee - Kabuna
54	S1 18 08.1 E174 47 45.7	Point 2 of above
55	S1 18 11.1 E174 47 43.8	Accretion at Tabontekee - Kabuna
56	S1 20 27.1 E174 51 04.9	Clinic at Tenaatoorua
57	S1 20 25.29 E174 50 59.9	Tenaatorua Primary School
58	S1 20.492 E174 51.190	Eroded area at Tenaatoorua
59	S1 20.538 E174 51.149	Flooded area at Tenaatoorua
60	S1 20.586 E174 51.113	Eroded area/RC Tenatorua
61	S1 21 34.6 E174 52 33.1	Erosion at Bangai
62	S1 21 36.1 E174 52 30.9	Point 2 of above
63	S1 23.298 E174 53.976	Flooded area at Aiwa
64	S1 23 15.76 E174 54 7.23	Aiwa medical clinic
65	S1 23 15.55 E174 54 9.43	Aiwa Primary school
66	S1 23 16.3 E174 54 22.6	Freshwater site at Aiwa islet

Note: The following coordinates may not be north oriented for better display of climate change impacted areas.

EDUCATION

There 10 schools on TabNorth of which 8 are primary schools strategically located to accommodate two villages at a time, one junior secondary school and a senior high school, Teabike High School. All schools are owned by the Government and thus there are Government funds for maintenance work required for the schools from time to time.

In 2006, a total number of 959 children were attending one of the various primary and junior secondary schools on the island.

	Name of School	Village Location	Type	Villages schools cater for
1	Burannikoraoi	Tekaman	Primary	Tekaman and Tekabwibwi
2	Taunibong	Buota	Primary	Tanaeang and Buota
3	Takoronga	Terikiai	Primary	Terikiai and Eita
4	Temwamwang	Eita	Primary	Utiroa and Eita
5	Auriaria	Taumwa	Primary	Taumwa
6	Kabuna	Kabuna	Primary	Kabuna
7	Ueen Maungan te Raoi	Tanaatoorua	Primary	Tenaatoorua
8	Nukantewaa	Aiwa	Primary	Aiwa
9	Takoronga	Terikiai	Junior secondary	All villages
10	Teabike	Eita	Senior High	All islands

Eita and Utiroa are the biggest villages on the island and thus Eita shares both Takoronga and Temwamwang primary schools to ease the student load were Eita and Utiroa to share only one primary school. Bangai on the other hand accommodates a very few of the population and thus not yet eligible to have a primary school on its own. Children from Bangai therefore attend primary school in either Tenaatorrua or Aiwa.

The following tables show the breakdown of school enrolment at the different levels in both the primary and junior secondary schools on the island.

Takoronga JSS

	Form 1		**Form 2**		**Form 3**		**Total**
Ages	**F**	**M**	**F**	**M**	**F**	**M**	
10							0
11							0
12	59	45					104
13	3	2	36	55			96
14				1	45	47	93
	62	47	36	56	45	47	293

]

Primary Schools

	Class 1		**Class 2**		**Class 3**		**Class 4**		**Class 5**		**Class 6**		
Ages	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**Total**
5	5	7											12
6	50	40		4									94
7	9	15	48	39	6	2							119
8	1	2	12	17	33	18	4	1					88
9			2	1	17	24	17	25	4	2			92

10					5	5	23	20	22	16	6		97
11				1			7	4	18	19	12	24	85
12							2		5	9	10	15	41
13										1	22	10	33
14										1	4		5
15													0
	65	**64**	**62**	**62**	**61**	**49**	**53**	**50**	**49**	**48**	**54**	**49**	**666**

Education levels of mature TabNorth community

Villages	Total 25+	None	Preschool	Primary	Junior secondary	Senior Secondary	Graduate
Tekabwibwi	67	8	1	50	7	1	0
Tekaman	103	2	5	80	7	9	0
Tanaeang	194	5	0	158	10	21	0
Buota	142	10	0	99	15	18	0
Terikiai	106	0	0	75	11	20	0
Eita	221	38	0	112	33	23	15
Utiroa	243	35	0	134	38	32	4
Tauma	88	0	0	67	14	7	0
Kabuna	83	3	0	67	8	5	0
Tenatorua	56	4	0	40	7	3	2
Bangai	17	0	0	16	1	0	0
Aiwa	63	6	0	43	6	3	5
Total	**1383**	**111**	**6**	**941**	**157**	**142**	**26**
Percent	**100**	**8**	**0**	**68**	**11**	**10**	**2**

Source: SPC PopGis 2006

HEALTH

There are nine clinics on the island of which two are located on the islets of Tenaatoorua and Aiwa and the rest 7 scattered within the mainland villages:

No.	Clinic location	General information
1	Tekabwibwi	Supervised by a nursing officer and caters for Tekabwibwi community
2	Tekaman	Nursing Officer in charge and caters for Tekaman and the northern part of Tanaeang
3	Buota	Nursing officer in charge and caters for southern part of Tanaeang and Buota communities
4	Terikiai	Nursing officer in charge and clinic accessed by people from Terikiai and northern part of Eita
5	Eita	A bigger health centre located near the Island Council, Medical Assistant is in charge as assisted by a nursing officer and is the main health center that accommodates patients requiring supervised medication. Caters for southern Eita and Utiroa
6	Taumwa	Nursing Officer in charge and caters for Taumwa community
7	Kabuna	Supervised by a Nursing Officer for the Kabuna community
8	Tenaatoorua	Supervised by a Nursing Officer for Tenaatoorua community
9	Aiwa	Supervised by a nursing officer for Aiwa community

Each village has its own Village Welfare Group, which is helping the medical staff on the island in the promotion of health activities.

A new hospital at TabNorth caters for southern islands. TabNorth residents are so fortunate to be close to one of the mre equipped health center in the country. In terms of employment and other commercial avtivities such as providing basic needs for the hospital for patients add benefits that would not have been there without extra health services.

ISLAND ECONOMY

Copra production remains the most important commercial activity on TabNorth that has provided a reliable and sustainable source of income for many of the islanders. It was the major source of income before seaweed farming was introduced and recently, sea cucumber export.

At $0.60 cents per pound the total revenue from copra was approximately $245,700 in 2000, $253,800 in 2001, $220,050 in 2002, $599,500 in 2003, $927,500 in 2004 and $358,800 in 2005. Accordingly the copra production in 2005 that brought in an income of $358,800 would in effect have generated an average annual household income for Tabiteuea (North and South) of $429.70. In turn, this annual average means that in 2005, the households on Tabiteuea were able to generate $1.28 from copra alone.

Tabiteuea Copra production and revenue 2000-2005

Year	2000	2001	2002	2003	2004	2005
Production	546	564	489	1199	1855	598
Copra price	0.45	0.45	0.45	0.5	0.5	0.6
Income	$245,700.00	$253,800.00	$220,050.00	$599,500.00	$927,500.00	$358,800.00
Income/HH	$294.25	$303.95	$263.53	$717.96	$1,110.78	$429.70
Income/Day	$0.88	$0.91	$0.79	$2.14	$3.32	$1.28

Source: National Statistics Office, 2007

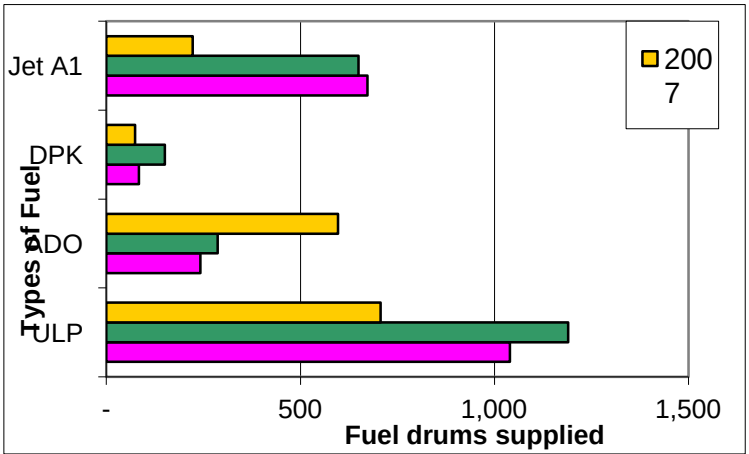
The total copra production of Tabiteuea over the span of 5 years (200-2005) was 5251 tons

ENERGY

The common fuel is firewood, mainly in the form of coconut husk, dry coconut leaves and common wood, but people are also resorting to the use of modern technology to provide energy to meet their private and public needs. The new technologies however use fuel that is imported from overseas through the Kiribati Oil Company Limited (KOIL).

Figure 13

The total number of fuel drums sent by KOIL to TabNorth between 2005 and 2007 totaled 5,917. Given that the fuel drums each contain 200 liters of



fuel, the total volume received by TabNorth 2005-2007 was 1,183,400 liters. The supply increased by 10% in 2006 only to decrease again the following year in 2007. It is anticipated that the proportion of unleaded fuel will increase as the use of automotive machines and equipment (portable generators, outboard engines, motorbikes, etc.) increases by the island community.

TRANSPORTATION

The popular household means of land transport on the island are bicycles and motorcycles as these vehicles are cheaper when compared to car or trucks and most suitable in accessing other parts of the island that cars/trucks would otherwise not be able to get to. The main road that runs along the length of the island is wide enough for the bigger vehicles and the network of paths that run from it into the bush are too narrow for them. In a lot of cases, there are hardly any pathways thus making motorbikes and bicycles the most suitable.

Travel to the islets of Tenaatoorua, Bangai and Aiwa is done by boat even though it is possible to walk between the islets during low tide. However, the distance would mean several hours of walking from the end of Kabuna and thus not agreeable to those visiting on an official basis. If one had time to walk though, it would be quite an experience as the islets in between Kabuna and the inhabited ones are full of local history and the natural environments of islands.

Canoes and boats are therefore not only used for fishing but also provide the main means of inter-island transport between mainland TabNorth and the islets of Tenaatorua, Bangai and Aiwa.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Coastal Erosion	-aggregate mining -high tides -existing causeway	-impacted 66 sites on the island -Tenaatorua Bangaiand Aiwa heavily hit -brackish water -less coconuts - give up toddy trees as spathes are either too small to produce juice -land masses reduces -flooding at Kabuna and Tekabwibwi -rows of trees falling - fruit trees affected	-seawall construction -mangrove planting -control aggregate mining -reopening of causeways -replanting	-sustainable but costly -sustainable, cheap -requires stringent by-law -expensive but sustainable
Water	-droughts -high temperatures	-vegetation destroyed -less production -less income	-increase concrete cisterns -water systems overhead tanks	Costly but effective

		-	With solar pumps and piping -refer to KIRIBATI WATER AND SANITATION PLAN	
Agricultural Activity	-superficial commitment to AA -shortage of feed for pigs/piglets due to delay in receiving orders from abroad -limited funding -mismanagement of livestock -pigs slaughtered before they are bred	-no balance diet -no supply of land protein	-increase awareness and importance of livestock and agricultural activity through Agricultural Division and Taiwan Technical Mission -provide funding - use of local plants, marine seaweed mixed with breadfruit to supplement imported feed	-it can be sustained -Can be done, cheap and sustainable, needs creativity

TABITEUEA SOUTH

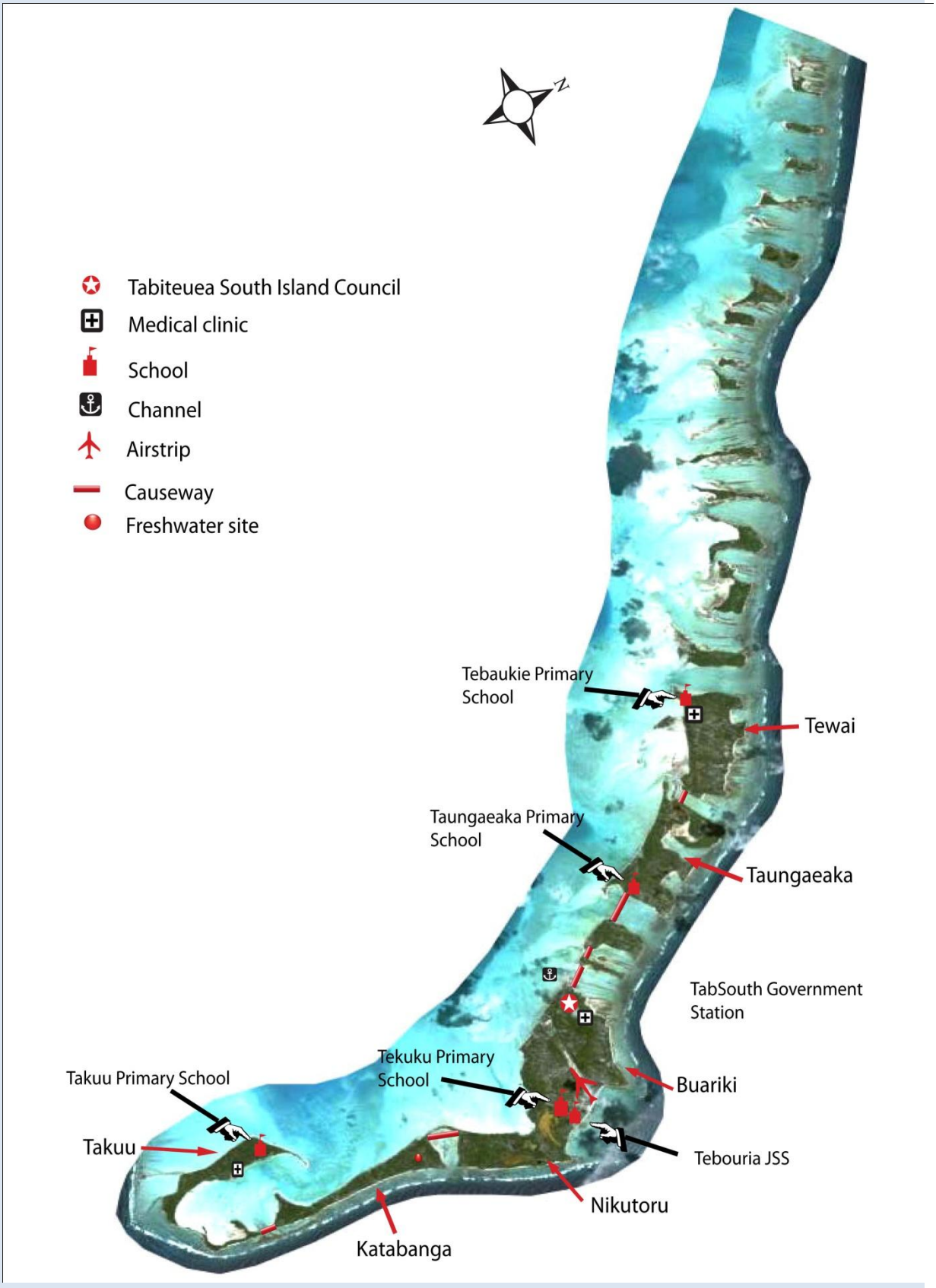
PHYSICAL FEATURE

Tabiteuea South is made of 6 villages with Tewai in the north, Taungaeaka, Buariki, Nikutoru, Katabanga and the islet of Takuu. Mainland TabSouth has a causeway connecting Taungaeaka to Buariki, and Tewai to Taungaeaka. Takuu still has to be linked via a bridge being proposed. TabSouth is11.85 sq.km, 1.89 km at its widest, 0.02 km at its narrowest, and about 29.87 km in length.

Inhabited islets of TabSouth include Tewai from the far north, followed by Taungaeaka, Buariki, Nikutoru, Katabanga, and the southernmost islet of Takuu. The remaining islets are not habited but used as copra cutting and fishing excursions by families owning lands there.

There are 7 causeways that link the islets making up Tabiteuea South. Katabanga-Takuu causeway broke down and has also not been repaired since. There are two causeways linking Taungaeaka to the islet before the village of Buariki.

Figure 1: A Geographical map of Tabiteuea South



POPULATION

The 2005 census recorded the total population of the island as 1,298. The most populous of the villages on the island is the capital village of Buariki that constituted 34% of the total population. Tewai constituted 26%, Nikutoru 13%, Takuu 12%, Taungaeaka 9% and Katabanga 6% of the 1,298 population.

Population Density by village

Village	*Village Land Area*	Pop 2000	Pop 2005	Density 2000	Density 2005	Density Change %
Tewai	*0.26*	290	331	1115	1273	14.14
Taungaeaka	*0.15*	123	117	820	780	-4.88
Buariki	*0.23*	436	447	1896	1943	2.52
Nikutoru	*0.23*	164	168	713	730	2.44
Katabanga	*0.74*	20	77	27	104	284.94
Taku	*0.31*	184	158	594	510	-14.13
Total	***1.92***	**1217**	**1298**	**634**	**676**	**7**
TabSouth	***11.85***	**1217**	**1298**	**103**	**110**	**7**

At the island level, Tab South has a combined land area of 11.85 square kilometers and a population of 1,298 (2005 census), giving a population density of 110 people per square kilometer.

Population by Age groups and Village

Island/Village	*Broadage Age Group*								
Gilbert Group	*Total*	*<1*	*1*	*2-5*	*6-14*	*15-17*	*18-49*	*50-69*	*70+*
TOTAL	***92,533***	***2,403***	***2,167***	***8,819***	***20,804***	***6,589***	***41,131***	***8,628***	***1,992***
MALE	***45,612***	***1,235***	***1,114***	***4,483***	***10,693***	***3,334***	***20,045***	***3,971***	***737***
FEMALE	***46,921***	***1,168***	***1,053***	***4,336***	***10,111***	***3,255***	***21,086***	***4,657***	***1,255***
Tewai	*331*	*11*	*11*	*42*	*86*	*11*	*126*	*34*	*10*
Tuangaeka	*117*	*4*	*3*	*9*	*33*	*5*	*50*	*12*	*1*
Buariki	*447*	*16*	*11*	*45*	*127*	*16*	*174*	*45*	*13*
Nikutoru	*168*	*5*	*4*	*16*	*45*	*11*	*63*	*15*	*9*
Katabanga	*77*	*4*	*2*	*10*	*25*	*1*	*31*	*1*	*3*
Takuu	*158*	*4*	*2*	*19*	*38*	*6*	*64*	*17*	*8*
Total	***1,298***	***44***	***33***	***141***	***354***	***50***	***508***	***124***	***44***
Percent		***3***	***3***	***11***	***27***	***4***	***39***	***10***	***3***

Source: 2005 Census of Population, NSO/MFED, 2007

The age dependency group is defined as those unable to live on their own and generally those below 15 years and those over 64 years of age. 638 (49%), nearly half of the island population are in the age dependency group of which the majority 572 (90%) are the younger folk aged 0-14 years old while the rest 10% are the elderlies, aged 65 and older.

LAND AND MARINE RESOURCES

Land resources

All lands on TabSouth are owned by families or relatives of dead title owners. Rithgful owners plant their allocated plots with coconut trees, pandanus, and other fruit trees. Bwabwai pits are also dug where fresh groundwater is aboundant. At village compounds fruit trees are also planted within or alongside compound boundaries. Of the 11.85 sq. km. land area of Tab South 1.92 square kilometers is used as village settlements. There are lands given away as gifts and for nursing an aged or dying elder.

Water resources

Being a dry island, water becomes an issue during drought times when the freshwater lens sitting atop the seawater in wells are depleted without rains restoring the lens. The village of Takuu suffers brackishness and with the nearest freshwater site being approximately 8km away by land in Katabanga, the people have to suffer drinking their only means of water, brackish as it is. The only shortcut to fetching water from Katabanga by those on Takuu would be by using canoes or boats to cross 3 km of lagoon to get to the freshwater site at Katabanga. The community of Tewai also suffers greatly from water but not because there is not enough freshwater but because the community prefer living on the adjacent islet of Buatua than on mainland Tewai. However, the distance to freshwater by those on Buatua is not as far when compared to the Takuu community.

Marine Resources

Size of Reef/Lagoon Size

Islands	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Tabiteuea	39	49	532	25.78

The most popular fishing location is the lagoon and it's flats during low tide having 145 (55%) and 131 (50%) households using it as their main fishing location. The lagoon flat is the exposed area of the lagoon during low tide that can stretch for miles and is a favorite fishing location for shellfish and sea worms. The other reason that most people popularly frequent the lagoon flat for fishing is because the methods of fishing and equipment required and used are simple and cheap.

ENVIRONMENT

Coastal erosion is a fast rising major environmental issue for the islands of Kiribati including TabSouth. Many locations on TabSouth have been seriously eroded, resulting in the relocation of infrastructure (road, buildings, etc.) or the recurrent high expenditure of maintaining seawalls for protection.

Flooding during high tides has only been experienced in the village of Tewai at Buatua and Taungaeaka. These floods usually end in dying fruit trees, bwabwai and brackish water. Taungaeaka also suffers from erosion starting from where the causeway ends at the village area to nearly halfway of the village. Takuu at the southern end of the island suffers from extreme erosion where rows of trees have fallen with a few left standing on the beach.

Brackish wells are also a common occurrence during long periods of drought. The islet of Takuu is suffering mild erosion all around and their freshwater is becoming brackish, Takuu residents are now fetching water from Katabanga or mixing their existing well water with the rain while Katabanga is using their only freshwater well located at Tawaea. Fruit trees have been greatly affected by the heat and lack of water to the extent that there are very less coconuts and the toddy cutters have to give up most of their toddy trees as the spathes are either too small to get anything out of or the toddy itself is not forthcoming.

Tab South CC & SLR impact GPS coordinates

No.	Lat/Lon hddd°mm'ss.s"	Description
1	S1 26.765 E175 01.345	Erosion at Taraamarawa Tewai
2	S1 26.767 E175 01.381	Erosion at Taraamarawa Tewai
3	S1 26.539 E175 00.461	Eroded area/Tebaukie Primary School
4	S1 26.802 E175 00.784	Flooded area at Buatua Tewai
5	S1 26.860 E175 01.894	Eroded and Flooded area at Unitia Taungaeaka
6	S1 31.408 E175 04.318	Erosion at Tabonteaba Katabanga
7	S1 31.325 E175 03.902	Takuu Primary School
8	S1 31.059 E175 04.107	Erosion at Tabonteaba Takuu
9	S1 31.064 E175 04.047	Erosion at Takuu
10	S1 31.239 E175 03.862	Erosion at Takuu
11	S1 31.509 E175 03.932	Medical clinic at Takuu
12	S1 31.874 E175 04.013	Erosion at Takuu
13	S1 30.028 E175	Fresh Water site at Katabanga

	04.277	
14	S1 28 34.86 E175 4 11.81	Tebouria JSS Buariki

Note: Refer to TabSouth Island Profile for problem areas and sites of significance.

EDUCATION

There 5 schools altogether on TabSouth of which 4 are primary schools strategically located to accommodate one or two villages at a time. There is one only one junior secondary school, Tebouria JSS. All schools are owned by the Government and thus there are Government funds for maintenance work required for the schools from time to time or year to year.

Figure 9: Primary School enrolment

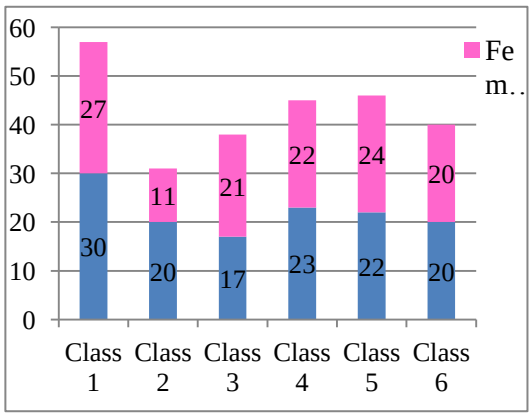
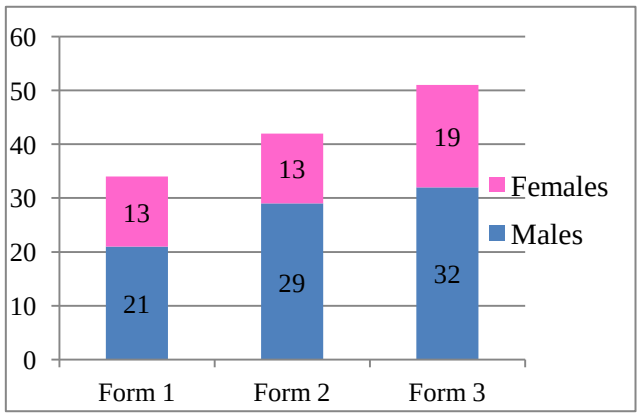


Figure 10*: *JSS enrolment



A total of 275 children were attending the various primary schools on the island. 51% of the 275 children were males and 49% were females. 22% of the 257 were attending Class 1, 12% Class 2, 15% Class 3, 18% Classes 4 & 5 while the rest 16% were in Class 6.

A total of 384 students on the island in 2006 from which 33% (127) were attending Tebouria JSS, 11% were attending Takuu Primary School, 3% were attending Taungaeaka Primary School, 20% were attending Tebaukie Primary School and the rest 32% were attending Tekuku Primary School in the village of Buariki.

	Males	**Females**	**Teachers**	**Ratio**
Taku Primary	25	19	2	22:1
Taungaeaka Primary	6	6	2	**6:1**
Tebaukie Primary	45	33	2	**39:1**
Tekuku Primary	56	67	6	**21:1**
Tebouria JSS	82	45	5	**33:1**
Total	**214**	**170**	**17**	**23:1**

Source: 2006 Education Digest

HEALTH

There are 3 clinics on the island and one of these is the Health Centre, complete with a dispensary and wards. Generally, each outer island has one main Health Centre looked after by a Medical Assistant (senior and trained than Nursing Officers). They are normally a combination of local and permanent materials.

Health Facilities & Staff

No.	Clinic location	General information
1	Buariki	Supervised by a Medical Assistant and caters for Buariki and adjacent villages
2	Tewai	Nursing Officer in charge and caters for Tewai and neighboring villages
3	Takuu	Nursing officer in charge and caters for Takuu and adjacent villages

Each village has its own Village Welfare Group, which is helping the medical staff on the island in the promotion of health activities.

ISLAND ECONOMY

Copra production remains the most important commercial activity on TabSouth that has provided a reliable and sustainable source of income for many of the islanders. It was the major source of income before seaweed farming was introduced and recently, sea cucumber export.

Tabiteuea Copra production and revenue 2000-2005

Year	2000	2001	2002	2003	2004	2005
Production	546	564	489	1199	1855	598
Copra price	0.45	0.45	0.45	0.5	0.5	0.6
Income	$245,700.00	$253,800.00	$220,050.00	$599,500.00	$927,500.00	$358,800.00
Income/HH	$294.25	$303.95	$263.53	$717.96	$1,110.78	$429.70
Income/Day	$0.88	$0.91	$0.79	$2.14	$3.32	$1.28

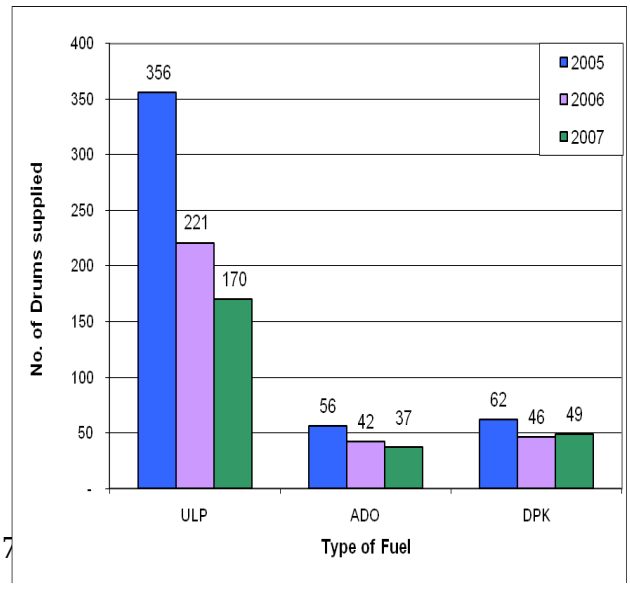
Source: National Statistics Office, 2007

Energy

Firewood is still the main fuel, mainly in the form of coconut husk, dry coconut leaves and common wood for the people. The new products in the islands, however, use fuel that is imported from overseas.

KOIL imports fuel from overseas and distribute it to all the islands in Kiribati. The total number of fuel drums sent by KOIL to TabSouth between 2005 and

Figure 15: Energy



2007 totaled 1,039. Given that the fuel drums each contain 200 liters of fuel, the total volume received by TabNorth 2005-2007 was 207,800 liters

TRANSPORTATION

The popular household means of land transport on the island are bicycles and motorcycles as these vehicles are cheaper when compared to car or trucks and most suitable in accessing other parts of the island that cars/trucks would otherwise not be able to get to. The main road that runs along the length of the island is wide enough for the bigger vehicles and the network of paths that run from it into the bush are too narrow for them.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Coastal Erosion	-high tides -sea surges -storms -aggregate mining	-rows of trees at the beach disappearing and fallen -brackish water at impacted areas -14 impacted areas, especially at Takuu village -Takuu villagers had to fetch water from another village Katabanga which is 16km in distance -since the place to fetch the water is far villagers of Takuu have to drink their brackish water -Tewai and Taungaeaka suffer floods during high tides but worse with strong winds -dying trees at Buariki (capital village),Nikutoru and Katabanga -reduction in landmasses	-community had consulted the island council to deal with the problem -elevation of flood prone sites carried out using bagged coastal sand and gravel (containers woven coconut fronds) -Tewai villagers prefer to live at Buatua islet with freshwater sites -construction of sea walls -increase planting at coastal areas -water systems to be in place -mangrove planting to prevent coastal erosion -Opt for income generating opportunities i.e sea reources	-not effective -cost effective but containers wear out very soon -sustainable unless land owners of Buatua accept them Costly and may have side effects -maitainable

Agricultural Activity	-superficial commitment to AA -shortage of feed for pigs/piglets due to delay in receiving orders from abroad -limited funding -mismanagement of livestock -pigs slaughtered before they are bred	-no balance diet -no supply of land protein	-increase awareness and importance of livestock and agricultural activity through Agricultural Division and Taiwan Technical Mission -provide funding - use of local plants, marine seaweed mixed with breadfruit to supplement imported feed	-it can be sustained -Can be done, cheap and sustainable, needs creativity
Water	-droughts -high temperatures	-kills vegetation -fruit trees affected in size -production decrease -income decrease	-built in concrete cisterns -increase water catchments -water tanks overhead tanks and solar pumps with piping systems -refer to KIRIBATI WATER AND SANITATION PLAN	-sustainable in the long run but costly -sustainable in the long term

ONOTOA

PHYSICAL FEATURES

Onotoa is a low lying atoll with a land area of 15.62 sq.km. It has 7 villages with Tabuarorae, an islet, located at the southernmost end of the island followed by Aiaki, Otoae, Temao, Buariki, Tanaeang and Tekawa at the northernmost end of the island. The villages are located along the lagoon coastal area throughout the island. The combined islet of Otoae and Aiaki are now easily accessible after construction of a causeway from Temao to Aiaki. Tabuarorae still has to be connected to the rest of the mainland.

POPULATION

The 2005 census recorded a total population of 1644 people on the island, a decrease of 24 people since the 2000 census when the population was 1668. Of this 1644, there are 827 males and 817 females scattered throughout the island

Population Density by village (2000 & 2005)

Village	Village Land Area	Pop 2000	Density 2000	Pop 2005	Density 2005	Density Change %
Tekawa	0.07	169	2414	164	2343	-3
Tanaeang	0.1	192	1920	249	2490	30
Buariki	0.13	205	1577	213	1638	4
Temao	0.05	401	8020	348	6960	-13
Otowae	0.16	189	1181	238	1488	26
Aiaki	0.2	240	1200	186	930	-23
Tabuarorae	0.06	272	4533	246	4100	-10
Villages	**0.77**	**1668**	**2166**	**1644**	**2135**	-10
ONOTOA	**15.62**		**107**		**105**	**-1.4**

Source: 2005 PopGis

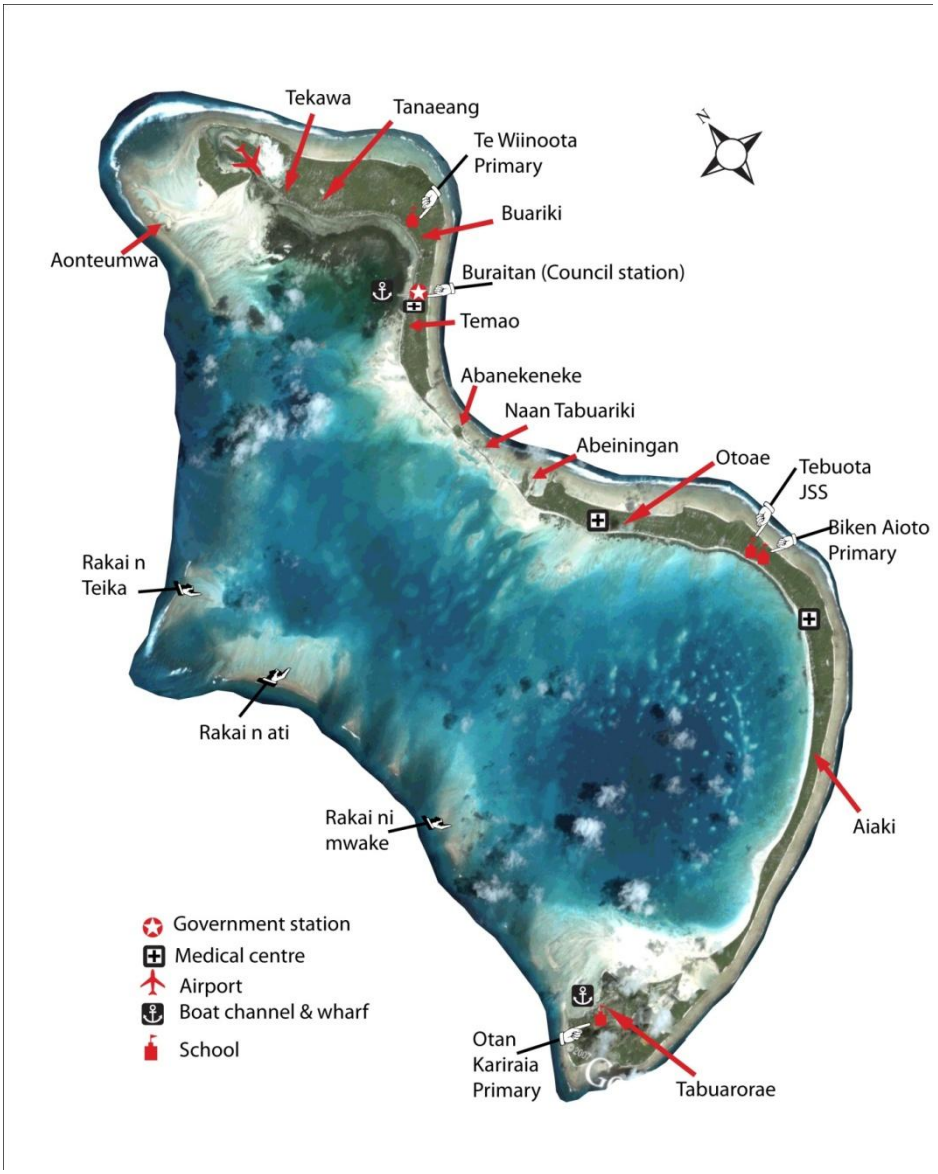
Most of the mature population aged 18 to 49 numbering 340 can be found in the village of Temao where the most population is residing. The oldest 54 people aged 70 years and over are distributed amongst the seven villages of Onotoa just as the rest of the different aged population are distributed. Of the 1644 total population, there are 761 (46.3%) of people in the age dependency group (age dependency group defined as those below 15 years and those over 64 years of age). From this figure of 761, there are 671 younger than 15 and 90 elderlies older than 64 years old (PopGis 2005).

Onotoa population distribution in villages

Village	Total	<1	1	2-5	6-14	15-17	18-49	50-69	70+
Tekawa	164	5	2	16	38	8	64	25	6
Tanaeang	249	6	2	25	73	16	89	31	7
Buariki	213	1	6	21	57	5	85	31	7
Temao	348	3	7	33	107	15	140	31	12
Otowae	238	4	7	28	67	6	101	22	3
Aiaki	186	1	2	13	46	6	74	36	8
Tabuarorae	246	4	4	31	62	7	103	24	11
ONOTOA	**1,644**	**24**	**30**	**167**	**450**	**63**	**656**	**200**	**54**

Source: NSO 2005 census

A geographical map of Onotoa



Note: Refer to Onotoa Island Profile for problem areas and sites of significance.

LAND AND MARINE RESOURCES

Land resources

Land is owned by families. Inheritance is the common form of conveyance of title with the eldest receiving more lands and male heirs given preference over females. Land is also conveyed as gifts. Some lands have been disposed by sale. Land are therefore inherited as willed from the parents and has changed dramatically where once it used to be a preference that lands were willed to male heirs only because of the tradition of women going to live with the husbands.

Water

The main water sources for drinking and sanitary purposes on the island are groundwater and rain. From the 2005 census, all 332 house-holds main source of water are from open wells. Toward the center of the Onotoa, the water is generally potable and is where most of the wells used for drinking are dug. Wells for other general purposes such as washing, cleaning and gardening are dug next to households for convenient use. The fresh water wells however are subject to brackishness during drought times. During these times, potable water can be fetched from as far as a mile away.

Livestock

Livestock on the island comprise pigs and chickens of both local and exotic breeds. The local pigs and

chickens were documented as having been introduced in the early days before Kiribati became a British protectorate and later exotic breeds were introduced as part of the Division of Agriculture's plans to develop agriculture and livestock on the outer islands of Kiribati. Local pigs vary in color and sizes and are very short, rarely reaching a height of 1 metre whereas the introduced local breeds if managed properly grow higher than a meter and actually are nicknamed as 'horses' by the locals who never cease to marvel at the height and size that these exotic breeds can grow to. Cross bred with a local breed, the progeny are normally faster growing taller pigs with higher food conversion rates and good breeding qualities e.g. more piglets per litter.

Exotic breeds of pigs and chicken have been introduced for cross-breeding with the local breeds. The most in demand are the exotic breeds of pigs that locals would like to own and cross with their own local pigs and to a lesser extent, exotic chicken breeds. Generally, pigs are more popular as domestic animals because they are the major source of meat during family, church and island feasts. It is extremely rare in the whole country for one to kill a pig solely to eat pork as they are kept specifically for important feast and functions when whole baked pigs grace these feasting tables and is the most sought after food at such times. As portrayed in the above chart, most of the households (276) do not own exotic breeds however 44 households own 1-3 exotic pigs while 7 households own more that 3 but less that 11 of these exotic breeds. 191 (57.5%) households own 1-3 local pigs while another 111 (33.4%) own 4-10 pigs and minimum households owning more than 11 pigs. There are a total of 1,071 pigs (*NSO 2005 census*) distributed throughout the island as owned by the households in the 7 villages of Onotoa.

Chickens on the other hand totaled 2,220 of which there were 1,898 (86%) local, 206 (9%) crossbredand 116 (5%) exotic chickens. Chickens are free-ranged and most are kept domestically for households own meat protein supplements and like pigs for special occasions. As free range chickens, they inter-mingle with chickens from other households resulting in crossbred chickens. Where the hens are kept for laying eggs to produce more chickens, the roosters are kept to breed with the hens as well as for their feathers that are popularly used in decorating fish lures. As is quite prevalent in the islands, the free-range management of chickens on the outer islands has impelled marking of chickens to declare ownership of the chickens. These markings include chopping off certain claws of the chickens or tying certain colored pieces of cloth to the feathers or legs.

Unlike pigs, free ranged chickens are liable to fines or confiscation by Council whereas free-ranged pigs on the other hand are considered an offense against the law, liable with fines or confiscation of the pigs. The confiscated pigs can be released to owners at a fee of $20.00 and where not, they are auctioned off to the general public. There are no known diseases specific to Onotoa livestock but factually, the pigs and chickens alike are free from infectious diseases such as the well known avian influenza in chickens.

Marine resources

Size of Reef/Lagoon Size

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Onotoa	21.56	54	75.38	15.62

The villages of Aiaki and Tabuarorae in the south and Tanaeang and Tekawa in the north of the island are conveniently near to the large sand flats where the popular sea-worms (*Sipunculus indicus*) can be found in abundance. Unfortunately, these are not harvested from the sea as much as in some of the outer islands such as Tabiteuea but instead are harvested mostly as bait. One major reason why mud-worm is declining is that the vast mudflat area opposite the Temao-Otoae causeway is covered with algae, void of worms and clam (*Tridacna maxima*). The water is stagnant and polluted as there is no fresh oxygen from the ocean through the passage. Lagoon fishing comprises eel trapping, diving, trolling and gill-netting.

Issues facing fishing and development of marine resources include the following:

f. Lack of fishing equipment
g. Depletion of the different species of sea cucumber especially the white teat fish
h. Remoteness of the island makes it hard for them to access fish markets in South Tarawa
i. Absence of an ice-plant has made salting, their only way of preserving fish

ENVIRONMENT

The most threatening environmental issue on the island is soil erosion that has been greatly exacerbated with the increasing sea level, increased marine aggregate resource mining and land reclamation. Other issues such as safe dumping of rubbish and effects of drought in bushfires are but some of the issues that is facing Onotoa and the rest f Kiribati.

Drought on the other hand is an ever-present threat to crops and human health. Coastal erosion is a rising reality and concern. The construction of the causeway in the early 1990s joining Temao to Otoae has been one of the contributing factors to the increasing erosion experienced around the island, not to mention the initial dying of lagoon marine resources when it was first constructed without culverts. A couple of culverts have since been incorporated into the causeway but still, more are needed to allow the currents to return to original forms, this rather superficial and near impossible. The negative impact of the causeway on coastal erosion and marine resources will remain unless it is completely removed. It is going to be costly in the short and long terms to try and recover the original form or irreversible and the multitiude of problems associated with will remain.

In addition, the Otoae-Tabuarorae causeway will compound the existing problem impacting marine resources, coastal processes with subsequent disappearance of Tabuarorae. There is so much damage being done on the island as a result of human ignorance and greed as is also occurring in other islands in the group. Short term benefits will be outweighed by serious problems for next generations.

Table 6: CC & SLR Onotoa GPS Coordinates

No.	Lat/Lon hddd°mm'ss.s"	Description
1	S1 56.717 E175 34.117	Eroded area
2	S1 57.113 E175 34.385	Eroded area
3	S1 56.642 E175 34.308	Eroded area
4	S1 56.616 E175 34.385	Eroded area/KPC Tabuarorae
5	S1 56.800 E175 34.781	Causeway
6	S1 56.477 E175 34.916	Accretion
7	S1 56.481 E175 35.339	Migration Beach
8	S1 56.966 E175 34.179	Fresh Water
9	S1 56.669 E175 34.283	Eroded area
10	S1 54.264 E175 36.904	Accretion
11	S1 53.974 E175 36.901	Accretion
12	S1 53.782 E175 36.898	Eroded area
13	S1 53.640 E175 36.878	Eroded area
14	S1 49.124 E175 33.269	Eroded area
15	S1 48.637 E175 32.805	Eroded area
16	S1 48.581 E175 32.457	Eroded area

17	S1 48.539 E175 32.281	Eroded area
18	S1 48.603 E175 32.404	Eroded area/RC Tanaeang
19	S1 48.355 E175 32.130	Fresh Water
20	S1 48.465 E175 32.132	Eroded area/KPC Tekatana
21	S1 48.200 E175 31.845	Eroded area
22	S1 48.279 E175 31.916	Eroded area
23	S1 52.572 E175 36.031	Eroded area
24	S1 52.485 E175 35.790	Eroded area
25	S1 52.346 E175 35.465	Eroded area
26	S1 52.259 E175 35.259	Eroded area
27	S1 52.215 E175 35.108	Eroded area/KPC Otoae
28	S1 52.184 E175 34.968	Eroded area/RC Otoae
29	S1 52.076 E175 34.703	Eroded area
30	S1 53.574 E175 36.873	Eroded area
31	S1 53.247 E175 36.753	Eroded area
32	S1 51.976 E175 34.591	Eroded area
33	S1 51.732 E175 34.169	Eroded area
34	S1 50.152 E175 33.002	Eroded area
35	S1 50.041 E175 32.984	Eroded area
36	S1 49.848 E175 33.017	Eroded area
37	S1 49.032 E175 33.232	Eroded area
38	S1 48.960 E175 33.206	Eroded area
39	S1 48.887 E175 33.176	Eroded area
40	S1 48.662 E175 33.323	Fresh Water
41	S1 49.433 E175 33.160	Eroded area
42	S1 47.982 E175 31.665	Eroded area

Note: Refer to Onotoa Island Profle 2008 for problem areas and sites of significance.

EDUCATION

In 2006, there was a total of 309 pupils attending the three primary schools on Onotoa. Of this there were 148 females and 161 males. 71 (23.2%) of the 306 students were enrolled at Biken Aioto Primary School, 47 (15.4%) were enrolled at Otan Kariraia (Tabuarorae) and the majority of 191 (62.4%) were enrolled at the mainland primary school, 'Te Wii n Oota'.

There are 3 primary schools on Onotoa namely 'Te Wii n Oota' located between Buariki and Tanaeang, 'Ootan Kariraia' located at Tabuarorae islet and 'Biken Aioto' located between Otoae and Aiaki. Pupils from the villages of Tekawa, Tanaeang, Buariki and Temao attend the 'Te Wii n Oota' Primary School, Aiaki and Otoae pupils attend the 'Biken Aioto' Primary School and 'Ootan Kariraia' Primary School

accommodates the Tabuarorae pupils. Tebuota JSS is located near to Biken Aioto primary school, located between the villages of Otoae and Aiaki for equal access to students from both ends of the island.

Number enrolled in different schools

	No. of pupils			**No. of teachers**		
Onotoa	***2006***		***Total***	***2006***		***Total***
	F	**M**		**F**	**M**	
Bikenaioto Primary School	32	39	71	4	1	5
Otan Kariraia Primary School	21	26	47	2	1	3
Tewinoota Primary School	95	96	191	4	3	7
Total	**148**	**161**	**309**	**10**	**5**	**15**

Source: Education Digest 2006

ISLAND ECONOMY

Subsistence

Typical subsistent activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai, weaving mats, making thatches, rolling string, fetching water, collecting firewood, making fish traps and hooks, cleaning and washing, cooking and house construction amongst others.

Copra

In 2005, the copra production of 175 tonnes would have provided an income in that year of $105,000.00, which would have brought the population in 2005 of 1644 with $63.90 each. This however counts the whole population regardless of their ages but given that there were also 332 households in 2005, the income per household for 2005 would have been $316.70 which could be further broken to come to an income from copra at $0.90 per day for a given household on Onotoa in 2005.

Copra cutting is the mainstay of the people who were known for the tradition of storingcoconuts for years in ‘ookai’ or attics (‘bata). Being an island vulnerable to droughts, the people over the years learned to harvest and cut copra according to their needs. The golden-brown kernels indicate a nut is ripe, left untouched until the next big family function or drought comes.

There are 418 toddy trees cut by the 332 household that provides the main tree vitamins for subsistence livelihoods as well as fermented toddy for relaxation and income generation. Drought is an ever-present issue on the island that hampers the growth and production of coconut trees. Copra cutting is however the main income generating activity on the island.

Overall, the production has not fallen beneath 100 tonnes per year since 1990 but has fluctuated between the 100 tonnes and 600 tonnes. In 2005, the copra production of 175 tonnes would have provided an income in that year of $105,000.00, which would have brought the population in 2005 of 1644 with $63.90

each. On the other hand, copra is not the only income that the people on the island as there are other means of income such as remittances, fishing and handicrafts.

Agricultural activities

Agricultural activities are greatly hindered by drought and the tradition of egalitarianism thus agricultural activities are restricted to teaching home gardens, provision of pigs and chickens, animal health schemes, provision of seeds, seedlings (coconuts) and pandanus cuttings, and coconut replanting schemes. The latter scheme however is not fully supported by the islanders as it is deemed to be a waste of time and effort due to most of the replanting schemes not bearing as much fruit as one would love them to bear. Besides, people have their own traditional cultivation methods.

Fisheries

Fishing is a routine activity for the men who carry it out when the seas are calm, and whenever home fish reserves have run out while others fish whenever they can as a hobby and to pass the time away. There is an ice plant on Onotoa that can support export of fresh fish to other parts of Kiribati. Fish jerky however, is a common product throughout the island although it is only exported to relatives in other parts of Kiribati mostly to those in South Tarawa, sold to visitors to the island or presented as gifts to guests. There are many different kinds of fishes that serve as food for the I-Kiribati and frequently special methods are utilized for certain species or groups of species. These methods are standard amongst the fishermen but individual variation does exist (*Preston E. Cloud Jr.*
1952) which are most of time kept within families.

As islands, households have been harvesting the sea in one way or another, initially to satisfy their own subsistent needs and to send salted fish (fish jerky) to relatives in other parts of Kiribati mostly South Tarawa and lately for domestic sale to teachers, island council and government employees, and the community at large. The rabbit faced spine-foot (*Siganus rostratus*) known locally as the ‘nimnai is abundant in its lagoon amongst a great others. The small clams (*Tridacna cumingi*) where they used to be abundant have reportedly declined after the establishment of the causeway from Temao to Otoae that had stemmed the flow of water through this area which used to be abundant in the small clams locally called ‘te were’.

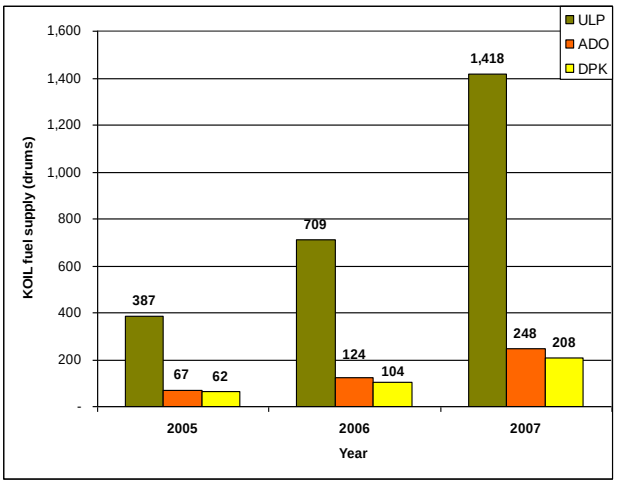
Sailing canoes operated by a single or two men are used for trolling which may be undertaken in the
lagoon, but the usual site is in deep water just outside of the west reef of the atoll especially the region
where there is a large westward projection of this reef. Normal trolling baits are mullet and flying fish

while lures comprise hooks with feathers attached. Trolling catches include an identified species of tuna: Tawatawa Mackerel tuna *Euthynus affinus (yaito?);* Bwaara Wahoo *Acanthocybium solandri;* Rakuriri Pacific sailfish *Istiophorus gladius;* Kamaa Rainbow runner *Elegatis bipinnulatus;* Ati Skipjack tuna *Katsuronus pelamis.*

Spearing equipment initially comprised a long wooden spear with a metal point lashed at one end but
nowadays, it involves a simple elastic sling device and a steel rod of about ¼ inch in diameter and a
maximum of 5 feet long and requires skill to operate to good use. Some of the fishes caught with this
method include: Rereba Trevally species *Caranx sp;* Ikamaawa Parrot-fish *Scarus frontalis;* Bwawe, Takabe, Ingo, Sea perches and snappers (*Lutjanus sp.);* Kungkung Blacktip soldier fish *Myripristis kuntee; Holocentrus;* Koinawa Convict surgeon fish *Acanthurus nigricans (xanthopterus?);* Mako Ring tailed surgeon fish- *Acanthurus triostegus;* Moray eels ; Nimwanang, nimako, nrekereke and more.
Shark fishing, hook and line, night fishing for flying fish as well as reef fishing, fish traps and net fishing are some of the other fishing methods carried out by the islanders. Shark fishing however is not as common as shark fishing in the more southern islands of Tamana and Arorae. Shark meat is highly regarded by the people many of whom actually prefer it to other fish such as tuna or trevally amongst the many. The most delicious part of it is said to be the tough skin which requires special cleaning and which is sliced, dried and kept as shark skin jerky to be boiled days, months or years later.
The night fishing for flying fish using coconut fronds as sources of light is slowly dying with the introduction of pressure lamps and other sources of light. Onotoa has not as yet been surveyed for fishery and marine resources, catches and marketing.

ENERGY

Firewood is never an issue on the island due to its limited population and woodland that is abundant with drought affected trees, dying and drying up. Fossil fuel is also used on the island.



Fuel supply

Onotoa received 283,600 liters of benzene, 49,600 liters diesel and 41,600 liters of kerosene. As illustrated in the chart the import of these energy sources have just about doubled since 2006 meaning that there is also an increase in the use of such fuel sources on the island since 2005. The ULP is used solely to run vehicles such as trucks and motorbikes as well as an energy source for generators

and outboard motor engines. Kerosene is used mainly as fuel for kerosene stoves and also as fuel for 'bottled' night lights, lanterns and pressure lamps

Trade and Commerce

Private enterprising contradicts the traditional principle of self-reliance and conservation of wealth thus buying from private traders is considered wasteful as it may help these traders to be elevated in social and economic standing. However, this tradition is ever so slowly dying out. To carry out any business activity involving trade on Onotoa, requires that one purchase a business license from the Onotoa Island Council of which the cost varies depending on the type of business to be carried out. The most common business licenses on record are those of wholesaling, retailing, hawkers and fishing.

HEALTH

The 7 villages of Onotoa each have a medical facility or clinic including a central one located at the Council Office in Buraitan. All clinics are staffed with qualified nurses and assisted by nursing aides, the latter are employed by the Island Council. A Medical Assistant (MA) oversees the central clinic at the Island Council while another MA oversees the medical clinic in Tabuarorae.

Health Facilities & Staff

The 7 villages of Onotoa each have a medical facility or clinic including a central one located at the

Council Office in Buraitan. All clinics are staffed with qualified nurses and assisted by nursing aides, the latter are employed by the Island Council. A Medical Assistant (MA) oversees the central clinic at the Island Council while another MA oversees the medical clinic in Tabuarorae.

Common health problems on Onotoa

Similar health data from the outer islands seem to have the same health results in which the most common form of health problem is categorized under 'Others' and followed by acute respiratory infections (ARI). There a variety of health problems that could be grouped into 'others' of which some include general sores/injuries/wounds etc. However, these were not clarified in the data collected and thus cannot be further elaborated to show what the problems are. The same goes for other ARI as it involves the respiratory tract and would also include ailments such as pneumonia. On its own, ARI, according to WHO (February 2009), is still the leading cause of acute illnesses worldwide and remain the most important cause of infant and young children mortality, accounting for about two million deaths each year.

In relation to sexually transmitted infections (STI), the Ministry of Health and Medical Services believes that due to fear of social ostracism, STIs and HIV AIDS are usually difficult to detect since people keep them secret. Therefore while there may be no record of patients with such diseases, there is no guarantee that there are actually

no people infected and living with such illnesses on the island. People are more likely to hide the fact that they are suffering from a STI than acknowledge that they require treatment and counseling.

Remittances

The general flow of seafarer's remittances into the country is continuous and has increased over the years with more engaged in seafaring employment. There are now two major employers of seafarers from Kiribati, South Pacific Marine Services (SPMS) and The Kiribati Fishing Services (KFS). The Norwegian Cruise Line is also employing some of the population for work on overseas cruise ships. However, the latter intake effect on remittances still has to make an impression especially when compared to remittances received from SPMS and KFS seafarers.

Agriculture

There is an Agricultural Assistant and a Nurseryman on the island whose responsibility is to carry out the Agricultural headquarters outer island plans in agricultural and livestock development. Agricultural activities are greatly hindered by drought and the tradition of egalitarianism thus agricultural activities are restricted to teaching home gardens, provision of pigs and chickens, animal health schemes, provision of seeds, seedlings (coconuts) and pandanus cuttings, and coconut replanting schemes. The latter scheme however is not fully supported by the islanders as it is deemed to be a waste of time and effort due to most of the replanting schemes not bearing as much fruit as one would love them to.

The predominant food trees on Onotoa are the coconuts, pandanus, breadfruit, pawpaw and bwabwai. Pawpaw has grown very popular since introduction due to its' easy propagation and tasty fruit and it being promoted as a Vitamin A source after pandanus. Pawpaw, just as pandanus is, provides a variety of color to food especially during feasts or guest welcome gatherings. Bananas are similar to 'bwabwai' in their requirement for water which can be scarce on the island during times of drought and are therefore closely managed. 'Te bero' (local fig) is another of the tree crops that is hard to cultivate and propagate as it can only be grown from cuttings.

Bwabwai is kept solely for ceremonial occasions with cultivation methods closely guarded secrets that are inherited from the parents. Pandanus, on the other hand, are abundant in variety and amongst these, there are certain pandanus varieties that have assigned uses such as for pandanus paste ('tangauri' and 'tuae'), pandanus powder ('kabubu'), pandanus strips ('kaakaa'), weaving and cigarette paper. There are no proper inspection codes as yet for transport of foodstuff, plant materials and animals on the ships and planes that visit the island and thus agriculture is vulnerable to introduced pests. The threat from 'bwabwai' beetle has been solved through strict regulations of 'bwabwai' being taken from South Tarawa to the outer

islands and anyway, there are rarely bwabwai plants grown in South Tarawa after the ‘bwabwai’ beetle wiped out most of the bwabwai on the island in the early 1970s.

TRANSPORTATION

The most common form of land transport is the pushbike followed by motorbikes and trucks.

Land Transport

Island Council trucks provide the main transport for Primary and JSS students to and from their schools and general use by the Council. The most common form of land transport is the pushbike followed by motorbikes and trucks. Motorcycles ranks second in popularity, as they are generally more expensive than pushbikes. Due to the high cost of truck vehicles, difficulty in transportation, there were only 3 trucks on Onotoa during the census survey. Two of these trucks are owned by the Island Council of which one was donated by the people of Taiwan for the purpose of transporting primary and junior secondary pupils to and from school while the other is owned by the KPC in Buariki. for the KPC truck is used for church functions and local hire. Council charges a small fare for pupils and inter-village travelers in order to raise funds to meet the truck’s operational cost and future maintenance - $0.20/trip while the KPC truck take on member passengers freely and hires it out to the general public including visiting government officials.

Sea Transport and Shipping

Government has been the major shipping operator since colonial times, and still continues to dominate this service, although private businesses have secured an increasing share of the market. Still, central government attempts, through its shipping line – Kiribati Shipping Services Limited (KSSL) – to serve all islands in the country near and far. There is also an increasing number of privately owned boats that are also providing shipping services to the outer islands including ‘Bwaan te Tangira’ owned by the Onotoans, ‘Te Ataana’ owned by a Phillipino resident, and others. ‘Bwaan Te Tangira’, provides shipping services all islands as well Banaba, excluding those in the Line and Phoenix group.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Reduction in Marine resources	-illegal fishing boats fishing at Onotoa sea waters -increasing number of gang fishing, family, church and village fishing groups for fund raising and income -motorizes skiffs being used -increase of fishing gears by the people -over fished of all sea cucumber for export purposes	-shortage of marine food for the islanders in marine species such as most lagoon fish declining, mangrove crabs, mud worm disappearing, lobster and octopus population decline -tuna species being fished by illegal ships -decrease in income	- a need of effective bylaw regulating marine resources, catch, and commercial species in particular -penalty for foreign ships	-takes time but sustainable -penalising foreign ships is quite difficult because of vast ocean in surveillance
Coastal erosion	-aggregate mining -	-reduction of land masses is very minimal -flooding destroying vegetation	-control and limit aggregate mining	-sustainable if people agree and obey

Water	-drought	-kills off vegetation -fruits are affected in size -decrease in production thus decrease in income for islanders	--future plans for concrete cisterns -increase water catchment for residents -provision of water tanks KIRIBATI WATER AND SANITATION PLAN will look into the following:- ➢ Development of policy and legislation ➢ Water sector plans for Kiribati ➢ Undertaking of pilot projects and feasibility studies to address water and sanitation issues ➢ Improvement of infrastructure within the water and sanitation sector e.g proper maintenance of toilets ➢ Climate change adaptation including leakage control , water conservation and development of alternative sources of	-can all be sustained but costly and takes time to materialise

			water	

BERU

PHYSICAL FEATURES

Beru is one of the southern islands in the Gilbert group .Its total land area is 17.63 sq.km, is 1.1 km at its widest point in the village of Tabiang**,** and 0.16 km at its narrowest at Weneete**.** It is about 13.7 km from end to end.

Beru has one main road that runs along the island that sidetracks into the bush and other areas of the island. These sidetracks are used for accessing lands and the side of the island if one so wishes, most of the reef/ocean side of the island as villages are placed along the lagoon side of the island.

The Island Council is located at Tabukiniberu with the medical centre next to it. The rest of the government facilities such as telecom, agriculture, fisheries, post office, banking etc are located.

There are four features of Beru that are of importance and interest:

- 'Nein Tabuariki': 'Tabuariki's lake' is located at the southern end of the island in the village of Taboiaki. This is where the edible algae can be fund that accumulate and float in the lake and which the islanders harvest in mosquitoe nets for food.
- Te nei ni man: 'The lake of fauna' is located at the northern end of the island near the village of Autukia. During rainy seasons or when the climate is not that dry, the lake will be full of fish mostly the milkfish (*Chanos chanos*). During times of drought, the lake turns into a salt reservoir.
- Nuka causeway closes off the lagoon at the southern part of the island and joins the villages of Nuka and Teteirio. It has been standing for a couple of decades now resulting in quite a rich diversity of marine resources in the closed off lagoon.
- Kaariraia causeway closes off the lagoon at the northern part of the island and joins Tabiang with Weneete and Tebikeeriki. This was a recent addition to the infrastructure of Beru and the closed off lagoon is now accommodating milkfish as introduced by the island council. Both closed off lagoons are under the control of the Beru Island Council.

POPULATION

The 2005 census recorded a total population of 2169 people on the island, a decrease of a significant 562 people since the 2005 census when the population was 2732. Of this 2169, there are 1056 males and 1113 females scattered throughout the island's 9 villages of Autukia, Tabiang, Aoniman, Rongorongo, Nuka, Teteirio, Tabukiniberu, Eriko and Taboiaki.

Population Density by village (2000 & 2005)

Village	Village Land Area	Pop 2005	Density 2005
Autukia	0.71	204	287.32
Tabiang	0.89	416	467.42
Aoniman	0.29	101	348.28
Rongorongo	0.32	315	984.38
Nuka	0.45	348	773.33
Teteirio	0.06	74	1233.33
Taubukiniberu	0.09	97	1077.78
Eriko	0.15	265	1766.67
Taboiaki	0.17	349	2052.94
Total Village	**3.13**	**2169**	**693**
Total Land	17.65	2169	123

Source: PopGis 2005 SPC Noumea

A majority of the population in 2005 were of the mature age 18 to 49 numbering 892 with the highest residing in the village of Tabiang, followed closely by Nuka and Taboiaki. Beru has a higher number of elderlies over 70 years at 95 (4%) compared to those one year old or younger who total 69 (3%).

There are 867 (40%) of people in the age dependency group (age dependency group defined as those below 15 years and those over 64 years of age). There are 729 younger than 15 and 138 elderlies older than 64 years old. In 2005, females were outnumbered by the males by 57 (1113-1056).

LAND AND MARINE RESOURCES

Land resources

The island's main resources like the rest of the islands are its limited tree resources predominantly coconut trees, pandanus and its limited marine resources. Beru is not rich in its land fauna and comprises the common pigs, chickens, dogs, cats, birds and island insects such as rats, lizards, ants and crabs amongst others. The marine fauna has its share of fish, octopus, flying fish, tuna, sharks, lobster, and oil fish to name a few.

At the northern end of Beru are ponds/lakes called 'Nein Tabuariki'. In this lake, are found six different kinds of algae that are locally called 'bokaboka' but the proper name is 'meritaua'. According to the locals of Beru, there are six different types namely:

- Takarokaron mataia uea
- Te makano
- Te ota
- Te taribi
- Te taninga ni baa
- Te non

These algae suspend in muddy water at different depths. The most commonly harvested ones are the 'red eyes of kings – 'takarokaron mataia uea' and the green one called 'te makano'. Research done by Dr. Matakite Maata in the late 1990s and Dr. Temakei Tebano in early 2000 show that there are more than a dozen algal species in these ponds including harmful ones. Some species are commercially harvested in some parts of the world for food and cosmetics among other products.

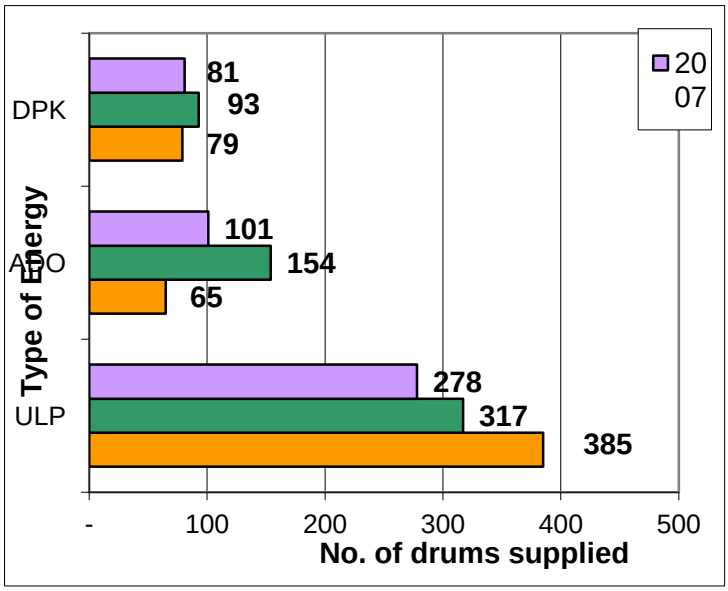
Water resources

The 2005 census stated that 48% (325) households main source of water are open wells, 46% (315) households use closed wells as their main source of water while a mere 3% are using rainwater as their main source of water and the remaining 3% were using piped and shop water as their main source of water. Water supply is abundant throughout the year but is prone to brackishness in times of drought.

Energy

Firewood is never an issue on the island due to its limited population and woodland that is abundant with drought-affected trees, dying and drying up. Together with firewood, people still use kerosene stoves especially during rainy days or functions. Kerosene, together with other fossil fuels are imported and distributed to all the outer islands by the Kiribati Oil Company (KOIL).

Fig 14: Fuel supply 2004-2007



Beru fuel energy needs since 2005 as provided from KOIL totaled 1553 drums comprising 980 un-leaded petrol (ULP) drums, 320 automotive diesel oil (ADO) drums and 253 drums of dual purpose kerosene (DPK). At 200 liters per drum, Beru has received a total of 196,000 litres of ULP, 64,000 litres ADO and 50,600 litres of kerosene (DPK) The ULP is used solely to run vehicles such as trucks and motorbikes as well as an energy source for generators and outboard motor engines. Kerosene is used mainly as fuel for kerosene stoves and also as fuel for 'bottled' night lights, lanterns and pressure lamps.

Marine resources

Size of Reef/Lagoon Size

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Beru	33.98	21	2.31	17.65

The villages of Tabukiniberu, Eriko and Taboiaki are conveniently located at the southern portion of the island where the ocean is very much accessible from the villages. The lagoon is also abundant in fish and shellfish such as the 'kouamwara', 'nikabibi' and 'katura' amongst others making it easy for women to gather them for home use. There are also signs of declining fish numbers as indicated by bonefishfish fries are sold like sprats or *tarabuti*. There are also indications of crab abd shellfish declining due to closure of inland lagoons at both ends of the island with causeways. Mangroves and iron wood trees are dying and disappearing so as bonthic marine resources and fish which frequent those habitats. The negative and adverse impact of causeways on coastlines and marine resources will increae over time, some coastlines may disappear sooner or later and numerous finfish and shellfish will eventually disappear for ever. Negative and irreversible impact of causeways outweigh benefits derived from them, are short term lived.

Issues facing fishing and development of marine resources include the following:

i. Lack of fishing equipment
ii. Remoteness of the island makes it hard for them to access fish markets in South Tarawa
iii. Absence of an ice-plant has made salting, their only way of preserving fish
iv. Depleting ocean resources in the nearby ocean area (sea cucumbers)

ENVIRONMENT

The most threatening environmental issue on the island is soil erosion, and flooding of land during high sea surges. Other issues also exist in the form of safe dumping of rubbish and lack of proper sanitation facilities that will not affect the water lens.

Drought is an ever-present threat to the Southern islands of Kiribati including Beru. Drought kills off land vegetation and where it does not, the fruits are affected in size and thus production. Wells providing the main source of water for the islanders turn brackish.

For the most part, coastal erosion appears to be mostly linked with aggregate mining for construction purposes such as housing, road, causeways, and land reclamation activities. To some extent seawalls appear to contribute to coastal erosion as well.

EDUCATION

Beru has all four types of school, primary school, a junior secondary school, a combined junior/senior high school and including preschools. The three primary schools are strategically located at the most convenient locations for several villages

as each village does not have primary school of its own. Namon Primary School is located in Tabiang and accommodates children from the villages of Autukia, Tabiang and Aoniman. Tebubutei Primary School is located in the village of Nuka and accommodates children from Rongorongo, Teteirio and Tabukiniberu while Tebono Primary School is located in Taboiaki for the Eriko/Taboiaki children. Beru JSS is located in Nuka for equal access by students from all over the island.

In 2005, a total of 367 children enrolled in the three primary schools on Beru – Namon Primary School in Tabiang, Tebubutei Primary School in Nuka and Tebono Primary School in Taboiaki. This number comprised 166 (45%) boys and 201 (55%) girls. JSS students totaled 171 comprising 85 (50%) boys and 86 (50%) females while HBHS students totaled 190 made up of 102 (54%) young men and 88 (46%) young women

There are five schools in Beru namely:

1. Hiram Bingham High School (a KPC high school)
2. Beru JSS
3. Namon Primary School (accommodates pupils from Autukia, Tabiang and Aoniman)
4. Tebubutei Primary School (Rongorongo, Nuka, Teteirio and Tabukiniberu)
5. Tebono Primary School (Temaraa, Eriko and Taboiaki)

HBHS is located in Rongorongo, Beru JSS is located at Tabukiniberu, Namon primary is located in Tabiang, Tebubutei primary is located in Nuka and Tebono primary is located in Taboiaki village.

Primary school enrolment 2006

2006	**Females**	**Males**	**Total**
Namon Primary School	66	63	129
Tebono Primary School	54	57	111
Tebubutei Primary School	62	42	104
Total	**182**	**162**	**344**

JSS student figures remained constant for 2006 at 171 students comprised of 79 (46%) females and 102 (54%) males distributed through Forms 1-3 as elaborately displayed in the following table:

JSS school enrolment at different levels 2006

	Form 1		**Form 2**		**Form 3**		**Total**
	M	**F**	**M**	**F**	**M**	**F**	
Beru	36	30	29	23	27	26	171

JSS							

2006	Total No. Pupils	Total No. Teachers	Pupil Teacher Ratio
Namon Primary School	129	6	22:1
Tebono Primary School	111	5	22:1
Tebubutei Primary School	104	5	21:1
Beru JSS	171	11	16:1
	515	27	**19:1**

HEALTH

There are three health centers on the island namely, Temaraa, Namon and Aonnati. The Medical Assistant is the most Senior Medical Officer on the island and he is stationed at the main health center on the island located at Temara. Nursing aides are recruited by the Beru Island Council whose responsibility is to assist in the nurses community health activities and medical services as necessary. Namon center is provided with one trained nursing officer and three nursing aides. Aonnati is also provided with one trained nursing officer and two nursing sides.

The health facilities and equipment on Beru include the following:

- Clinics – two impermanent materials at Temara and Aonnati, and one in local materials at Namon.
- 1 Maternity Ward in permanent materials at Temara.
- 2 Motorcycles.
- 2 Motorcycles,
- 2 Bicycles,
- 1CB Radio Set at Temara, and
- 1 Solar Refrigerator also at Temara

ISLAND ECONOMY

Like the other outer islands of Kiribati, other than fishing, copra cutting is the mainstay of the people on Beru. Being an island vulnerable to droughts, the people over the years learned to harvest and cut copra according to their needs and their copra production fluctuating over the years with the times of drought and good seasons.

Copra

The best year of production for Beru was in 2004 when their production reached a tonnage of 821 bringing in an income of $410,500.00. On the other hand, its worst year of copra production was in the year 2000 when its annual production was 258 tonnes that brought an income of $116,100.00. Copra prices by the year 2000 had all risen to $0.60/lb.

Agriculture

Agricultural activities are greatly hindered by drought at times restricting activities to teaching home gardens, provision of pigs and chickens, animal health schemes, provision of seedlings (coconuts) and breadfruit cuttings, and coconut replanting schemes.

TRANSPORTATION

Land and sea transportation on the island is not an issue as the Beru Island Council has a truck and people have their own pushbikes and motorbikes. The council and individuals also have their own canoes and boats which are used for fishing and for transportation between the villages. The issues lean more toward transportation to and from the island for the islanders, visitors as well as for cargoes and foodstuff and the high cost of pushbikes and motorbikes.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Water	-drought	-kills vegetation -fruits are affected in size -decrease in production thus decrease in income -major fruit trees are affected i.e coconut trees, breadfruit and pandanus	-future plans for concrete cisterns -water tanks -water systems to be in place -refer to KIRBATI WATER AND SANITATION PLAN for Onotoa island	-costly but sustainable
Coastal Erosion	-aggregate mining	-reduction in land masses, but minimal - a threat to properties and welfare of the people -threatens settlements, arable land, Water lens and coastal ecosystems	-control and limit aggregate mining by residents -implementation of a Revised Environment Act of 2007	-takes time and questionable
Reduction in Marine resources	-overfished -existing causeways -excessive fishing	-marine food insecurity in the following marine species:- • Bonefish • Mangrove crabs,koikoi,nikatona – no	-a need for a bylaw to regulate catches, commercial species -island council to report illegal ships fishing	-takes time -not effective

	-Illegal commercial tuna boat fishing	longer exist • Te kima and te were depleted • Lobsters and octopus decline in numbers • Commercialisation of some fish species which results in taking inferior imported canned fish which causes diseases relating to eating habits • Depletion of sea cucumber causing reduction in revenue		
Less Agricultural Activity	-superficial commitment to AA -shortage of feed for pigs/piglets due to delay in receiving orders from abroad -limited funding -mismanagement of livestock -pigs slaughtered before they are bred	-no balance diet -no supply of land protein	-increase awareness and importance of livestock and agricultural activity through Agricultural Division and Taiwan Technical Mission -provide funding - use of local plants, marine seaweed mixed with breadfruit to supplement imported feed	-it can be sustained -Can be done, cheap and sustainable, needs creativity

Capacity Building on CC andSLR	-no consultation previously conducted -no funding for training at island council level	-islanders are unaware of Climate Change and Sea Level Rise -island council employees not familiar with training of village people	-intensifying training and consultation -media training -contributions from respective govt. Ministries towards CC and SLR	-sustainable through funding sources -must continue at paced intervals

NIKUNAU

PHYSICAL FEATURES

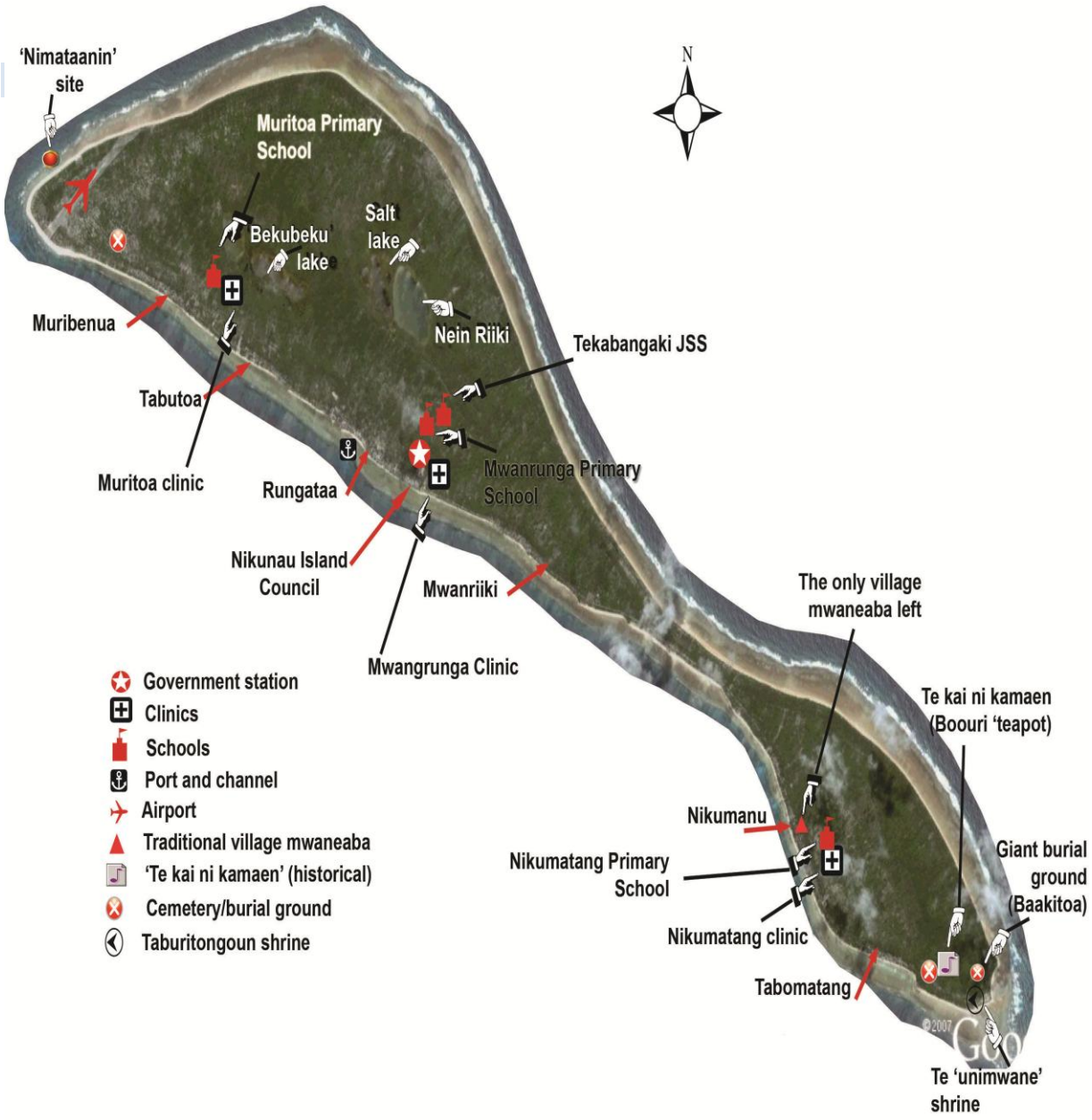
Nikunau is one of the southern islands in the Gilbert group. It has an area of 17.63 sq.km, 2.6 km at its widest point, and 0,26 km at its narrowest. It is about 14.12 km from one end to the other. The island is split into two parts connected by a narrow strip of land in the middle. The northern part accommodates the main service infrastructures such as the Council offices, airstrip, seaport and the villages of Muribenua, Tabutoa, Rungataa and Mwanriiki. The southern part accommodates the rest two villages of Nikumanu and Tabomatang. The Nikunau Island Council is located at Bukerua in the village of Rungataa.

Nikunau has several (3) landlocked, hyper-saline lagoons located within the island, measuring about 0.3 km² in area. The largest of these is called 'Riikis lake', north of Riiki's lake are 'Kabangaki' also known as the 'Salt lake', 'Bekubeku' and 'Tabakea' lakes. The island is surrounded by a narrow fringing reef while the tip of Nikunau, located near the airstrip, has the largest waves on the island and is the point where two tides meet, clashing one wave with another, thus creating amazing tides, waves, and currents.

Nikunau, like most of the outer islands has one main road that run along the island and sidetracks into the bush and other areas of the island. Due to its width, the road runs along and around the two parts of the island.

The Island Council (Government station) is located at Rungataa along with the medical centre, Mwanrunga Primary School, Tekabangaki JJS next to it and most of the Government and Council infrastructures such as Police headquarters, mechanical workshops, and rest-house etc. Medical and teaching facilities are shared between two villages thus Muribenua and Tabutoa (Muritoa), Rungataa and Mwanriiki (Mwanrunga) and Nikumanu and Tabomatang (Nikumatang) share a primary school, a medical facility and a preschool. The airstrip is located north of the northern village of Muribenua.

A geographical map of Nikunau



POPULATION

The 2005 census recorded a total population of 1912 people on the island, an increase of 179 people since the 2000 census when the population was 1733. Of this 1912, there are 980 males and 932 females scattered throughout the island's six (6) villages of Muribenua, Tabutoa, Rungataa, Mwanriiki, Nikumanu and Tabomatang.

Population Density by village (2000 & 2005)

Village	Village Land Area	Pop 2000	Density 2000 (%)	Pop 2005	Density 2005 (%)
Muribenua	0.17	228	1341	204	1412
Tabutoa	0.13	157	1208	416	1069
Rungataa	0.15	813	5420	101	6220
Mwanriiki	0.14	186	1329	315	1407
Nikumanu	0.26	281	1081	348	1215
Tabomatang	0.13	68	523	74	669
Total Village	**0.98**	**1733**	1768	**1912**	1951
Total Land	19.08	91		100	

Source: PopGis 2005 SPC Noumea

The majority of the island population in the statistical year was between the ages 0-14 numbering 846 out of the population 1912 with the highest number residing in the village of Rungataa. Those aged between 15-49 numbered 809 with the most residing again in the village of Rungataa. There are 100 elderlies over 70 years of age who are receiving the Government's elderly pension.

LAND AND MARINE RESOURCES

Land resource

The island's main resources like the rest of the islands are its limited tree resources predominantly coconut trees, pandanus and its limited marine resources.

Land is owned by individual landowners and inheritance is as willed by the parents. However, land can also be conveyed as gifts especially when one has done the landowner a big assistance such as in looking after an elderly till death because he was neglected by his own next of kin. Some can be given away to adopted ones who also can inherit lands from their own biological parents.

Water resources

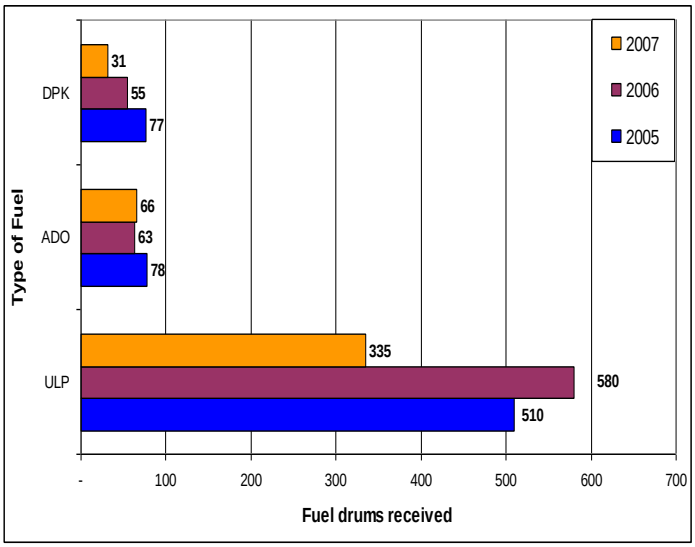
The only water source for drinking and sanitary purposes on the island are groundwater and to a small extent, rain. The 2005 census stated that 48% (325) households main source of water are open wells, 46% (315) households use closed

wells as their main source of water while a mere 3% are using rainwater as their main source of water and the remaining 3% were using piped and shop water as their main source of water.

Energy

The traditional form of fuel is firewood, mainly in the form of coconut husks, dry coconut leaves and dead wood of existing vegetation and trees. Firewood is never an issue on the island due to its limited population, vast coconut land and daily copra cutting.

Nikunau fuel supply



However, people also use kerosene stoves especially during rainy days or functions.

Nikunau fuel energy needs since 2005 as provided from KOIL 2007, totaled 1,795 drums comprising 1,425 (79%) un-leaded petrol (ULP) drums, 207 (12%) automotive diesel oil (ADO) drums and 163 (9%) drums of dual purpose kerosene (DPK). At 200 liters per drum, Nikunau has received a total of 285,000 liters of ULP, 41,400 ADO and 32,600 of kerosene (DPK).

Marine resources

Size of reef and Lagoon area

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Tamana	7.06	18	Nil	19.08

Issues facing fishing and development of marine resources include the following:

j. Lack of fishing equipment
k. Remoteness of the island makes it hard for them to access fish markets in South Tarawa
l. Absence of an ice-plant has made salting, their only way of preserving fish
m. Depleting ocean resources in the nearby ocean area (sea cucumbers)

ENVIRONMENT

The most threatening environmental issue on the island is soil erosion, and flooding of land during high sea surges. Other issues also exist in the form of safe dumping of rubbish and lack of proper sanitation facilities that will not affect the water lens.

Flooding during high tides is not common on the island as it is higher than other islands considering that it is a reef island, without a lagoon and therefore tends to be higher than islands with lagoons. The whole capital village of Rungataa seems to have had seawalls erected over the years and some of these seawalls were built generations ago, which can only mean that the island has suffered coastal erosion for generations or the islanders picked up on land reclamation long ago.

Brackish wells are also a common occurrence during long periods of drought on the island. The people however have freshwater sites further inland. As a broad island, there is always an abundance of potable water further away from the eroding coastline.

Nikunau Climate Change & Profile GPS Coordinates

No.	Village	Description	Position
1	Tabomatang	Taburitongoun's Shrine	S1 24.122 E176 29.606
2	Tabomatang	Urin Nei Tekakauba shrine, Taburitongoun's wife	S1 24.093 E176 29.577
3	Tabomatang	Urin Nei Tengare's shrine, Taburitongoun's wife	S1 24.212 E176 29.470
4	Tabomatang	Giant Burial Ground	S1 24.143 E176 29.383
5	Tabomatang	Te Kai ni Kamaen (Boouri's teapot) shrine	S1 23.943 E176 29.552
6	Tabomatang	Tabomatang Burial Ground	S1 24.091 E176 29.230
7	Tabomatang	Kaitu ma Uakeia shrine & pond	S1 24.024 E176 29.151
8	Tabomatang	Migration Beach	S1 24.258 E176 29.518
9	Tabomatang	Accretion	S1 24.075 E176 29.119
10	Tabomatang	Eroded area	S1 23.983 E176 29.079
11	Tabomatang	Fresh Water	S1 23.939 E176 29.072
12	Tabomatang	Eroded area KPC Tabomatang	S1 23.850 E176 28.879
13	Tabomatang	Fresh water where the solar pump was	S1 23.773 E176 28.935
14	Tabomatang	Eroded area	S1 23.765 E176 28.757
15	Nikumanu	Last Village Mwaneaba	S1 23.331 E176 28.524
16	Nikumanu	Eroded area	S1 23.334 E176 28.487
17	Nikumanu	Eroded area KPC Nikumanu	S1 23.253 E176 28.475
18	Nikumanu	RC Nikumanu	S1 23.056 E176 28.442
19	Nikumanu	Migration Beach	S1 22.859 E176 28.424
20	Mwanriki	Eroded areaRC Mwanriki	S1 21.200 E176 26.896
21	Mwanriki	Eroded area from South	S1 21.453 E176 27.133

22	Mwanriki	Fresh water where the solar pump was	S1 21.316 E176 27.176
23	Mwanriki	Eroded area KPC Mwanriki	S1 21.365 E176 27.056
24	Mwanriki	Erosion at Mwanriki	S1 21.125 E176 26.809
25	Rungata	Eroded area	S1 20.963 E176 26.560
26	Rungata	Migration Beach KPC Rungata	S1 20.545 E176 26.100
27	Rungata	Eroded area RC Rungata	S1 20.401 E176 25.949
28	Rungata	Eroded area	S1 20.261 E176 25.804
29	Tabutoa	Eroded area	S1 20.160 E176 25.678
30	Tabutoa	Eroded area	S1 20.074 E176 25.615
31	Tabutoa	Migration Beach	S1 19.758 E176 25.241
32	Tabutoa	Fresh Water	S1 19.592 E176 25.265
33	Tabutoa	Eroded area/KPC Tabutoa	S1 19.977 E176 25.492
34	Muribenua	Migration Beach/RC Muribenua	S1 19.618 E176 25.105
35	Muribenua	Migration Beach/KPC Muribenua	S1 19.505 E176 24.998
36	Muribenua	Eroded area	S1 19.335 E176 24.770
37	Muribenua	Eroded area	S1 18.781 E176 24.257
38	Rungata	Council area	S1 20.828 E176 26.388
39	Rungata	Muribenua Burial Ground	S1 19.025 E176 24.430
40	Muribenua	Erosion at end of runway	S1 18 45.89 E 176 25 08.15

Note: Refer to Nikunau Island Profile 2008 for problem areas and sites of significance.

EDUCATION

Nikunau has two types of school not counting the pre-school and these are primary schools and a junior secondary school. The three primary schools are strategically located at the most convenient locations for villages to each share a primary school. Muritoa Primary School accommodates primary school children for the villages of Muribenua and Tabutoa, Mwanrunga Primary School accommodates those from the villages of Mwanriiki and Rungataa while Nikumatang Primary School accommodate those from the villages of Nikumanu and Tabomatang.

In 2006, a total of 367 children enrolled in the three primary schools on Nikunau – Muritoa, Mwanrunga and Nikumatang Primary Schools. This number comprised 185 (50.4%) boys and 182 (49.6%) girls. JSS students totaled 171 comprising 87 (51%) boys and 84 (49%) girls. 54 (15%) children from the 367 enrolments for the year 2005 were enrolled in Muritoa Primary School, 239 (65%) at Mwanrunga Primary School and the rest 74 (20%) were enrolled at Nikumatang Primary School.

There are four schools in Nikunau namely:

1. Tekabangaki JSS (pictured above)
2. Muritoa Primary School (accommodates pupils from Muribenua and Tabutoa)

3. Mwanrunga Primary School (Mwanriiki and Rungata children – school pictured below)
4. Nikumatang Primary School (Nikumanu and Tabomatang children)

Nikunau School enrolment 2006

2006	Females	Males	Total
Muritoa Primary School	23	31	54
Mwanrunga Primary School	119	122	241
Nikumatang Primary School	40	36	76
Tekabangaki JSS	71	71	142
Total number of School Children			**513**

Source: Education Digest 2006

Teacher/Pupil ratio

2006	Total No. Pupils	Total No. Teachers	Pupil Teacher Ratio
Muritoa Primary School	54	3	18:1
Mwanrunga Primary School	241	8	30:1
Nikumatang Primary School	76	3	25:1
Tekabangaki JSS	142	11	13:1
	513	25	**21:1**

Generally throughout the country, the JSS schools, which were all established in the late 1990s are in better/good conditions and adequately furnished while primary schools are generally lacking in status and furniture. Most classrooms are however, equipped with blackboards, the main teaching instrument for schools on the outer islands.

HEALTH

There are three health centers on the island namely, Muritoa, Mwanrunga and Nikumatang Health Clinics. Fortunately for the island, the EU health clinic construction project has already visited their island consequently resulting in three newly erected health clinics (pictured above) for the islanders. These new clinics accommodate the clerical and clinical office, the dispensary and the obstetric theatre in one building while the toilet is placed outside and separately from this main clinical building. The three clinics are all equipped with solar lighting and a motorcycle for out-patient visits.

Conjunctivitis in the southern islands is common and is somehow connected with long periods of drought, most probably due to the high amount of dust resulting from the dry conditions of the islands. Diarrhea is also quite a common ailment throughout the islands in which all age groups are affected. Reasons for incidences of diarrhea are numerous but one of them includes the way and life of the people in their existing conditions.

ISLAND ECONOMY

Typical subsistent activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai, weaving mats, making thatches, rolling string, fetching water, collecting firewood, making fish traps and hooks, cleaning and washing, cooking and house construction amongst others. Where most of the fishing was done for subsistence, it is now sold where there is a surplus or given freely to relatives, preserved for later consumption or sale.

Like the other outer islands of Kiribati, other than fishing, copra cutting is the mainstay of the people on Nikunau. Vulnerable to droughts, Nikunau's wide land feature has made it necessary for coconuts to grow well throughout these dry periods and thus continuous though decreased copra harvest.

The best year of production for Nikunau was in 1998 when their production reached a tonnage of 955 bringing in an income of $429,750.00. On the other hand, its worst year of copra production was in the year 2000 when its annual production was 258 tonnes that brought in an income of $116,100.00. Copra prices by the year 2000 had all risen to $0.60/lb. If droughts were the only reason for the decline in copra production, the copra charts would have provided good indicators for times of drought.

Copra prices have also been slowly increasing from AU$0.30/lb in 1990 to AU$0.60/lb in 2005. The most recent copra production for Nikunau on record was 556 tonnes in 2005 that brought in an income of $333,600.00 which would give the households an income per day of $3.00, roughly a dollar over the international poverty line of US$1.00 per day.

Agriculture

Agricultural activities are greatly hindered by drought at times restricting activities to teaching home gardens, provision of pigs and chickens, animal health schemes, provision of seeds, seedlings (coconuts) and breadfruit cuttings, and coconut replanting schemes.

TRANSPORTATION

Island Council trucks provide the main transport for Primary and JSS students to and from their schools and general use by the Council. The most common form of land transport is the pushbike followed by motorbikes and trucks.

The issues of transportation include the following:

a. Insufficient transport services to and from the island
b. High cost of pushbikes, motorbikes and boats
c. Lack of properly equipped mechanical workshops

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Water	drought	-well water turn brackish -availability of potable water at the centre of the island -kills vegetation and fruits are affected	-future plans for concrete cisterns -increase water catchment such as water tanks -water systems, overhead tanks and solar pumps -encourage ironed roofing or aluminium roofing for dwelling -refer to KIRIBATI WATER AND SANITATION PLAN	-costly but sustainable
Coastal erosion	-surge storms -high tides -numerous seawalls	-threat to properties and welfare of the people -disturbance to settlements, arable land, coastal ecosystems and water lenses	-relocation of infrastructures (roads, buildings -construction of seawalls	Costly and effective Costly and may have side effects
Marine issues ❖ Lack of fishing gear ❖ Remoteness to fish markets at	-low income	-unable to catch enough fish	-increase income generating projects	-viable projects and can sustain

South Tarawa ❖ Absence of ice-plants ❖ Depletion of sea cucumber at nearby ocean areas	-geographical set up -no funding availability -overfished	-unable to market commercial marine products -salting only way to preserve fish -decrease in income	-find solutions at village and council level -devise project thru island council -breeding of sea cucumbers	-once solved it can sustain -can sustain when approved -takes time
Agricultural Activity	-superficial commitment to AA -shortage of feed for pigs/piglets due to delay in receiving orders from abroad -limited funding -mismanagement of livestock -pigs slaughtered before they are bred	-no balance diet -no supply of land protein	-increase awareness and importance of livestock and agricultural activity through Agricultural Division and Taiwan Technical Mission -provide funding - use of local plants, marine seaweed mixed with breadfruit to supplement imported feed	-it can be sustained -Can be done, cheap and sustainable, needs creativity

TAMANA

PHYSICAL FEATURES

Tamana is second southern-most island in the Gilbert group and the smallest island in the country**.** The island is approximately 6 km in length, 1 km at its widest point, and land area of 4.73 sq.km..

Tamana has only one minor road and a network of tracks running into the bush from this main road that runs all the way around the island. These network tracks are used for accessing lands and transporting coconuts, pandanus and to get from one end of the island to the other.

The Island Council is located at Bakaakaa, the central village of the island and is also where the rest of the Government facilities are located such as the CB radio for inter-island communication, the hardware, and the fuel depot. The schools (Primary and JSS) and the Medical facilities are also located in the same village but can be found further inland towards the uninhabited side of the island.

A geographical map of Tamana

POPULATION

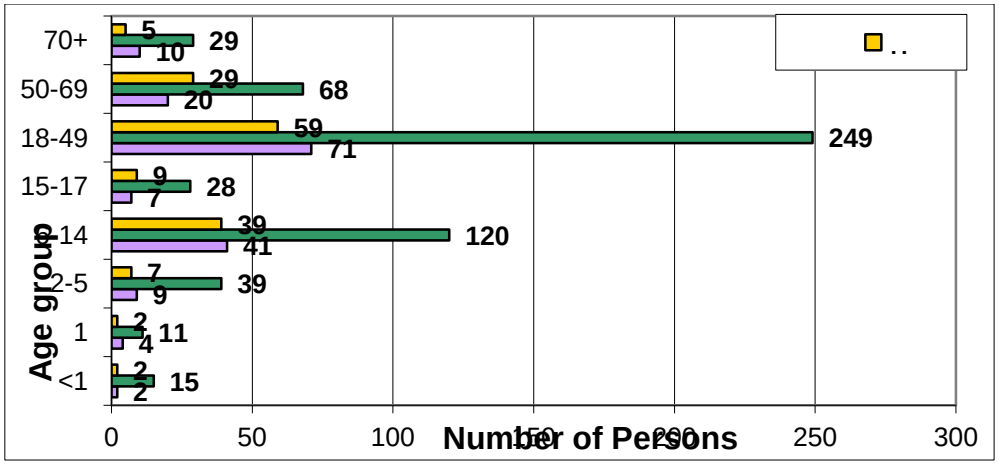
The 2005 census recorded a total population of 875 people on the island, a decrease of 87 people since the 2000 census when the population was 962. Of this 875, there are 408 males and 467 females scattered throughout the island's three (3) villages of Barebuka, Bakaakaa and Bakarawa.

Population Density by village (2000 & 2005)

Island	Land Area	1995 Density	2000 Density	2005 Density
Tamana	4.73	250	203	185

Source: 2005 Analytical report

Tamana Population distribution by age group in villages



Source: 2005 Census of Population, NSO/MFED, 2007

Most of the mature population aged 18 to 49 numbering 249 can be found in the village of Bakaakaa, the central village where most of the population is residing. 29 of the oldest 44 people aged 70 years and over live Bakakaa, 10 in Barebuka and the rest 5 in Bakarawa. Of the 875 total population, there are 352 (40.3%) of people in the age dependency group (age dependency group defined as those below 15 years and those over 64 years of age). From this figure of 352, the age dependent population, there are 291 younger than 15 and 61 elderlies older than 64 years old (PopGis 2005).

Tamana age group population distribution in villages

Tamana	Total	<1	1	2-5	6-14	15-17	18-49	50-69	70+
Barebuka	164	2	4	9	41	7	71	20	10
Bakaka	559	15	11	39	120	28	249	68	29
Bakarawa	152	2	2	7	39	9	59	29	5
	875	19	17	55	200	44	379	117	44

Source: NSO 2005 census

Tamana has got a young population with the majority aged between 0 years and 49 years old at 714 (81.6%) of the total 875 population.

LAND AND MARINE RESOURCES

The island's main resources like the rest of the islands are its limited tree resources predominantly coconut trees, pandanus and a variety of shrubs and grass.

Water

From the 2005 census, 127 (59%) households main source of water were open wells, 81 (37%) households were using closed as their main source of water, 6 (3%) households were using rainwater as their main source of water, 2 (1%) were using piped water as their main source of water while there was not anyone using bottled water.

Energy

Firewood is never an issue on the island due to its limited population and woodland that is abundant with drought-affected trees, dying and drying up. However, people still use kerosene stoves especially during rainy days or functions. In the year 2007, Tamana has received a total of 49,400 liters of benzene, 12,400 liters diesel and 18,200 liters of kerosene.

Marine resources

Size of Reef Size

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Tamana	1.68	5.2	No lagoon	4.73

The most common forms of fishing other than net fishing and 'te urakaraka' are:-

- Deep bottom fishing ('katokitoki')
- Hand lining ('katiki')
- 'Tabo n Ao'
- Trolling ('kauaaki')
- Spearing ('katebe')
- Octopus catching

There is only one boat channel on the island located at the capital village of Bakaakaa. This channel provides safe passage for transportation of cargo and passengers from visiting ships as well as for local fishermen alike.

Issues facing fishing and development of marine resources include the following:

- Lack of fishing equipment

- Remoteness of the island makes it hard for them to access fish markets in South Tarawa
- Absence of an ice-plant has made salting, their only way of preserving fish
- Depleting ocean resources in the nearby ocean area
- The continuous drifting away of buoys

THE ENVIRONMENT

The most threatening environmental issue on the island is soil erosion, which fortunately for Tamana is not that much of an issue. Other issues though exist in the form of safe dumping of rubbish and droughts. Drought is an ever-present threat to the Southern islands of Kiribati including Tamana.

EDUCATION

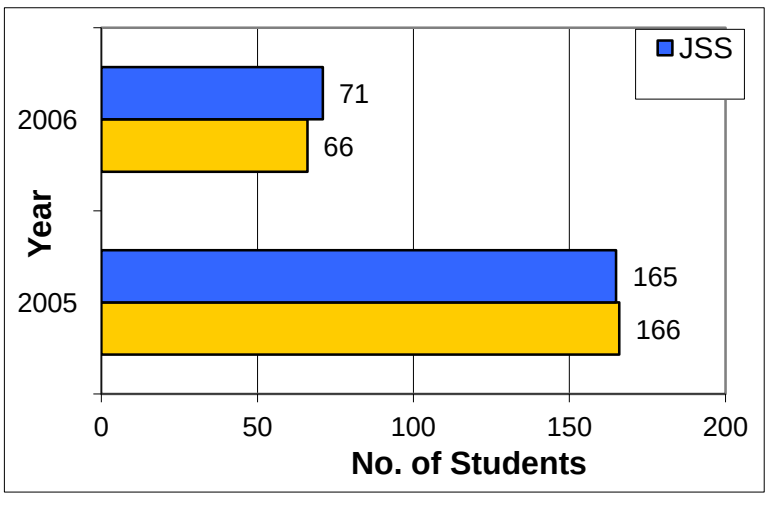
Tamana has three types of school, pre-schools, primary school and a junior secondary school. All these schools are located in the middle of the island and are all easily accessed by the children on the island. The JSS truck has also made access to the schools very easy.

Margaret Field School has been there longer when compared to the JSS school which were all established in the late 1990s and are therefore new and in pretty much good condition. School desks and chairs are however lacking in Margaret Field Primary School as in most of the outer island schools thus children sit on the floor on mats woven from coconut fronds or pandanus leaves. Fortunately all classrooms are equipped with blackboards, the main teaching instrument as whiteboards are a recent development and the schools do not have a generator to use media as an alternative teaching instrument.

The Nawai JSS on the other hand is better equipped with toilets and furniture i.e. desks and chairs however there are some school facilities still lacking at Nawai JSS such as a library, science laboratory, toilets and also rainwater tanks.

There is only one Primary and JSS on Tamana, the Margaret Field Primary School and Nawai JSS. Both are located at the centre of the island in between the Island Council and Medical centre (see geographical map of Tamana P.5) for location of primary and JSS schools on the island.

Primary and JSS school enrolment, 2006



Teacher:Pupil ratio

School	No. of Students	No. of Teachers	Teacher: Pupil Ratio
Margaret Field Primary School	191	7	1:27
Nawai JSS	47	3	1:16

HEALTH

There is one medical facility on the island that caters for the medical needs of the people on Tamana. The clinic is staffed with a medical assistant and assisted by nursing aides; the latter are employed by the Island Council. *Source: 2005 Census of population, NSO/MFED*

ISLAND ECONOMY

Typical subsistent activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai, weaving mats, making thatches, rolling string, fetching water, collecting firewood, making fish traps and hooks, cleaning and washing, cooking and house construction amongst others.

Fisheries

Like the other outer islands of Kiribati, other than fishing, copra cutting is the mainstay of the people on Tamana. Being an island vulnerable to droughts, the people over the years learned to harvest and cut copra according to their needs, their copra production over the years has been fluctuating with the times of drought and good seasons.

Agricultural activities

Agricultural activities are greatly hindered by drought at times restricting activities to teaching home gardens, provision of pigs and chickens, animal health schemes, provision of seeds, seedlings (coconuts) and breadfruit cuttings, and coconut replanting schemes.

TRANSPORT

Island Council trucks provide the main transport for Primary and JSS students to and from their schools and general use by the Council. The most common form of land transport is the pushbike followed by motorbikes and trucks.

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Water	-prolonged droughts -high temperatures	-major fruit trees for people to eat are affected i.e coconut trees, breadfruits and pandanus -decrease in production so decrease in income -wells affected, some no longer used for drinking purposes	-concrete water cisterns have to be maintained -increase water catchments for residents -overhead tanks and solar pumps with piping systems -refer to KIRBATI WATER AND SANITATIPON PLAN for Onotoa island	-costly but sustainable in the long run
Coastal erosion	- intensive aggregate mining before year 2000,mined boulders for seawall construction and repairs, reef flat void of boulders	-reduction in landmasses -loss of arable land and agricultural land leaving little land space to live	-plausible solution for Tamana community to sit down with island council and plan what is best to protect the island fragile ecosystems	-it is rather a must but it will take time
Reduction in Marine Resources	-overfished of marine resources -excessive fishing by fishermen and humans	-shortage of marine food for islanders in the following species:- • Shark meat • Flying fish • Shell fish like te kaomara,te koikoi, te katura, te bun, te	-a need for a regulatory mechanism on the number of catch	-takes time and its sustainability is questionable

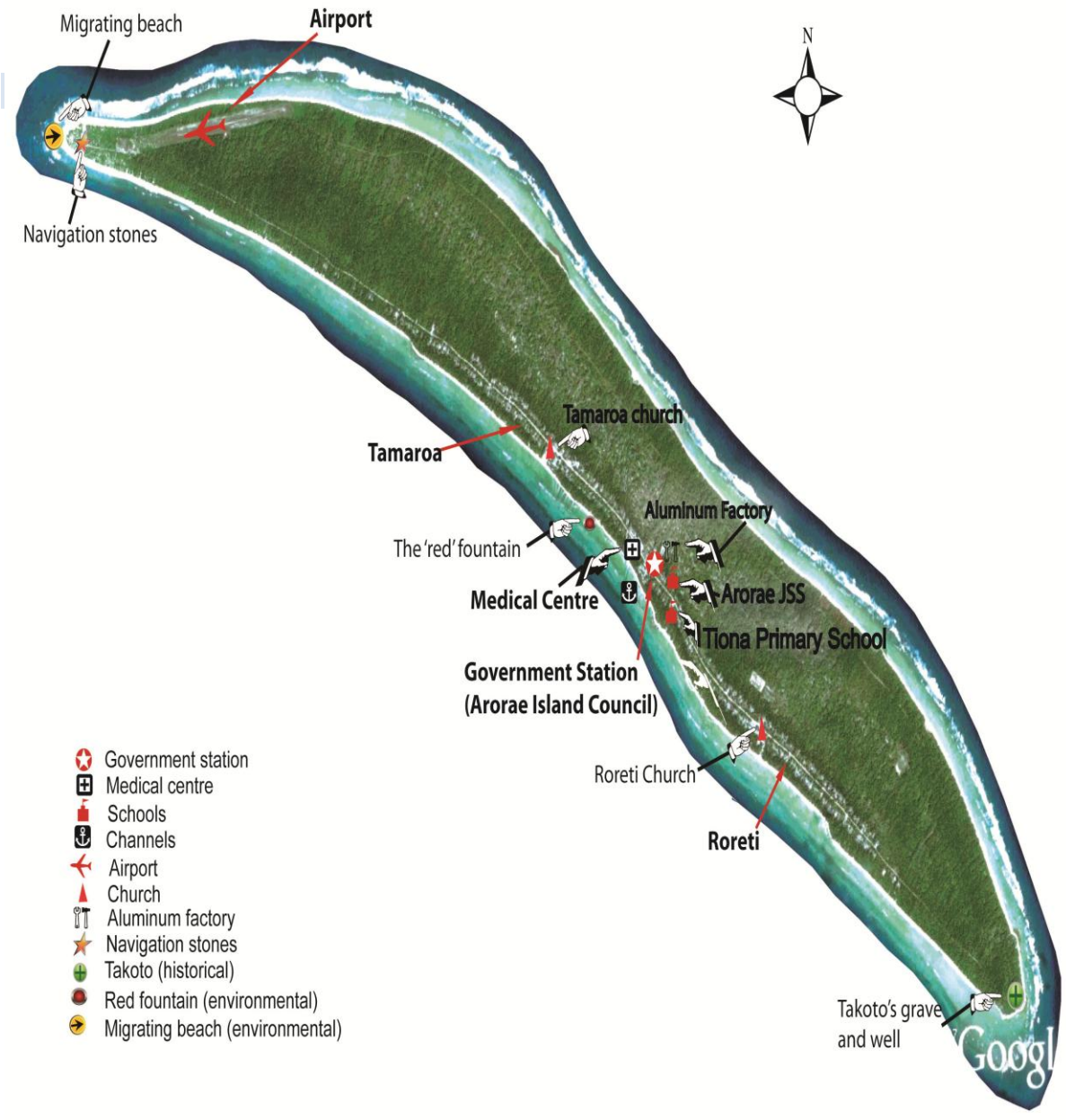
	-relative requirements by relatives from South Tarawa such as “te uakun”	nouo - Lobsters and octopus decline - Te kima and te were depleted - Shark fins for export to Asian markets causing repayments for loans unpaid due to scarcity of sharks		
Agricultural Activity	-superficial commitment to AA -shortage of feed for pigs/piglets due to delay in receiving orders from abroad -limited funding -mismanagement of livestock -pigs slaughtered before they are bred	-no balance diet -no supply of land protein	-increase awareness and importance of livestock and agricultural activity through Agricultural Division and Taiwan Technical Mission -provide funding - use of local plants, marine seaweed mixed with breadfruit to supplement imported feed	-it can be sustained -Can be done, cheap and sustainable, needs creativity

ARORAE

PHYSICAL FEATURES

Arorae is the southern-most island in the Gilbert group. It has a total land area of 9.48 sq.km, 1.01 km at its widest point, and 0.22 metres at its narrowest, with a total length of 9.01 km. There are only two villages on the island, Roreti (local translation of Royalist) the northern village and Tamaroa, the southern village. The most notable infrastructural features on the island are the churches that are built from pure limestone rock hacked from the island base itself during initial establishment of Christianity (LMS now called KPC) on the island in the early 1870s.

A geographical map of Arorae



POPULATION

The 2005 census recorded a total population of 1256 people on the island, an increase of 16 people for island. Arorae's growth rate in 2005 was 0.5%. The 2005 census density of Arorae is at 132 people per square kilometer of the island.

Population Density by village 2005

Village	Land Area	2005 Pop	Density Change %	2005 Density Per Sq. Km
Tamaroa	0.88	492	-4.09	559.09
Roreti	0.55	764	7.3	1389.09
ARORAE	9.48	1256	-3	132

Source: PopGis 2005 SPC Noumea

The majority of the population in 2005 were of the mature age 18-49 numbering 508 with 310 residing in Roreti and 198 in Tamaroa. In actual fact, 61% (1,528) of the population live in Roreti while the rest 39% (984) live in Tamaroa. There is a small number of children aged <1 when compared to the elderlies who totaled 67 (5%) while there were only 30 (2%) young ones.

The age dependency group is defined as those unable to live on their own and generally those below 15 years and those over 64 years of age. There are 559 (45%) of people in the age dependency group. 82% of these are those aged 14 or younger while 18% are the older folk. The age dependency trend is similar throughout the islands of Kiribati as well. Arorae has got a young population with the majority aged between 0 years and 49 years old summed up to 1020 (81%) of the total 1256 population.

LAND AND MARINE RESOURCES

The island's main resources like the rest of the islands are its limited tree resources predominantly coconut trees, pandanus and its vast marine resources. Typical subsistent activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai, weaving mats, making thatches, rolling string, fetching water, collecting firewood, making fish traps and hooks, cleaning and washing, cooking and house construction amongst others.

Fisheries

Like the other outer islands of Kiribati, other than fishing, copra cutting is the mainstay of the people on Tamana. Being an island vulnerable to droughts, the people over the years learned to harvest and cut copra according to their needs, their copra production over the years has been fluctuating with the times of drought and good seasons.

Agricultural activities

Agricultural activities are greatly hindered by drought at times restricting activities to teaching home gardens, provision of pigs and chickens, animal health schemes, provision of seeds, seedlings (coconuts) and breadfruit cuttings, and coconut replanting schemes.

Water

Water is an issue with extended droughts – water turns brackish.

Energy

Firewood is never an issue on the island due to its limited population and woodland that is abundant with drought-affected trees, dying and drying up. However, people still use kerosene stoves especially during rainy days or functions.

Arorae fuel energy needs since 2005 as provided from KOIL totaled 1399 drums comprising 446 (32%) un-leaded petrol (ULP) drums, 594 (42%) automotive diesel oil (ADO) drums and 395 (26%) drums of dual purpose kerosene (DPK). At 200 liters per drum, Arorae has received a total of 89,200 liters of ULP, 118,800 ADO and 71,800 of kerosene (DPK). Fuel shortages on the islands is a common occurrence that could be attributed to the dramatic drop in fuel drums being sent to the island.

ENVIRONMENT

Arorae has relatively not been affected by coastal erosion and in fact are actually experiencing accretion on a couple of sites on the island. The most threatening issues however relating to climate change and sea level rise is change in breeding sites of the marine fish as well as dying land vegetation and increased brackishness of the wells. Other issues also exist in the form of safe dumping of rubbish and lack of proper sanitation facilities that will not affect the water lens. Drought is an ever-present threat to the Southern islands of Kiribati including Arorae.

EDUCATION

There are only two schools on Arorae namely:

Arorae JSS
Tiona Primary School

Both schools are enough for the size and population of Arorae and are located near the Arorae Island Council, placed in the centre of the island for easy access to council, education and medical services provided by the Government. (There are 2 pre-schools also on the island)

In 2006, a total of 193 children enrolled in the Tiona Primary School on Arorae – the only primary school on the island strategically located at the centre of the island for convenient access by the children from the two villages of the island and including

council staff children. 100 students enrolled and attended the Arorae JSS comprising an even number of 50 girls and 50 boys.

HEALTH

There is only one clinic on Arorae staffed by a medical assistant, a nurse and two nursing aides recruited by the Council.

The most common illness on Arorae include general ailments such as sores, wounds, stomach aches, headaches, worms, and flu. Other health problems such as Acute Respiratory Infections (ARI), acute fever syndrome, conjunctivitis, dysentery and fish poisoning are relatively low. Fish poisoning seems to have been a common issue on the island. A most common fish poisoning case on the island is related to the high shark. Shark liver is a local delicacy; however, it requires expert processing for it to be edible which did not stop people from eating it nevertheless.

ISLAND ECONOMY

Apart from fishing, copra cutting is the mainstay of the people on Arorae. Being an island vulnerable to droughts, the people over the years have learned to harvest and cut copra according to their needs. Seasons of drought and rain are greatly reflected the copra production for the island that has been fluctuating over the years.

TRANSPORTATION

The most common form of land transport is the pushbike followed by motorbikes and trucks. Motorcycles ranks second in popularity, as they are generally more expensive than pushbikes.

Arorae households and land vehicles owned.

Village	Total HH	Own Car	Own Motorcycle	Own Bicycle
Tamaroa	97	1	15	83
Roreti	144	0	15	121
ARORAE	**241**	**1**	**30**	**204**
Percent		**0.4**	**12.4**	**84.6**

Source: SPC PopGis 2006

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
Water/Drought	Extended periods of no rain	-kills vegetation -fruit trees affected/small fruit sizes -dry vegetation makes bush vulnerable to bushfires -decrease income -increased brackishness of wells	-future plans for concrete cisterns -increase water catchments for residents -refer to KIRIBATI WATER AND SANITATION PLAN	-costly but sustainable in the long run
Marine resources and issues:- • Lack of or no fishing gear • Remoteness of South Tarawa markets • Little catch	-low income of residents -geographical set up - overfished sharks ; Many people engaged in Shark fishing	-unable to catch enough fish or can`t fish -unable to receive more income no shark meat, a marine protein for islanders -shark depletion thus decrease income re: the sale of shark fins	-devise income generating projects thru island council -consult island council for ways to find a solution -regulatory mechanism for the protection of sharks	-can be sustainable if project has a high viability -once accomplished it will likely be sustainable -takes time and questionable as when sharks will multiply

Strong winds	-whirlwinds	-destroying dwellings and uprooting trees and blew roof houses off	-Disaster Fund and program at Office of te Beretitenti	-costly but in times of contingency

TABUAERAN

PHYSICAL FEATURES

Tabuaeran, also known as Fanning Island is one of the Line Islands located at 3°51′36″N, 159°21′52″W. The maximum elevation is about 3 m (10 ft) above sea level**.** The island is a roughly oval coral atoll, 9.5 nautical miles northwest and southeast, by 6 miles wide. The land area is variously given at 13, 15, 17, and 26 square miles, and 8,500 acres. The enclosed lagoon has an area of 426 square miles. The deepest water in the lagoon is about 50 feet, only three-quarters of a square mile exceeds 30 feet in depth, and most of it is very shallow.

Sufficient depth of water through the passage for any merchant ship to pass in, and on the inner or bay side is smooth and convenient anchoring, which, together with the abundance of wood and water, the tropical fruits, best of fresh, and excellent turtle, here to be obtained, make this a very desirable spot, for the refitting of a ship, and refreshing a crew.

It is a low-lying atoll with a narrow fringing reef and three principal islets almost encircling a marine lagoon. The lagoon is tidal, and the surrounding brackish marshes and extensive intertidal mudflats create estuarine-like conditions. There are several small islets in the lagoon and some areas of salt pans.

Annual Rainfall by Month 2001 (inches)

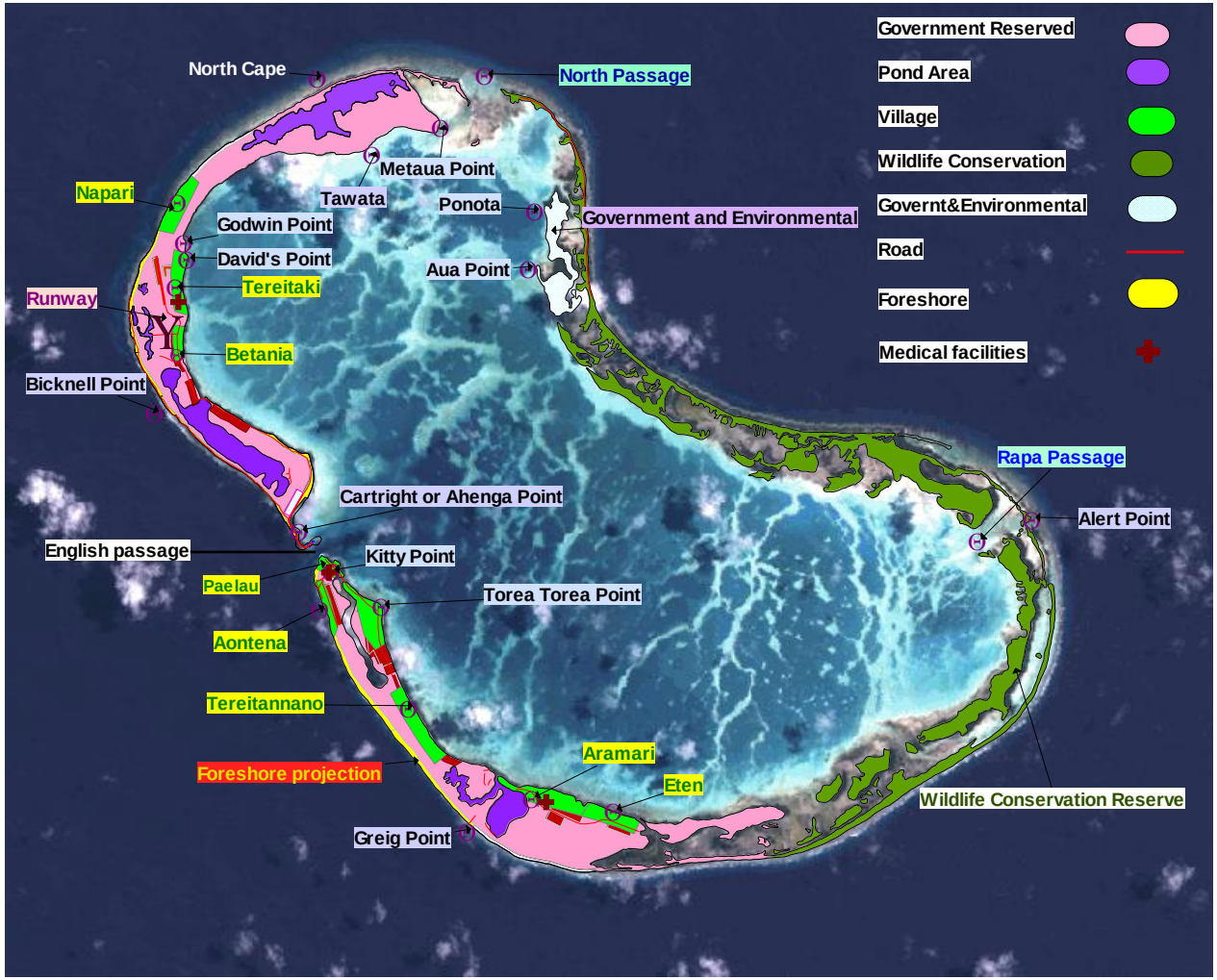
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2000	8.3	25.1	61.9	195.6	216.1	143.3	180.2	35.9	116.1	39.5		
1999	56.3	51.2	155.8	112	187	90.4	63.5	14.4	14.3	73.2	5.7	10.9
1998	234.9	260.1	34.3	7.8	202.7	172.8	56.7	2.1	6.7	2.1	7	70.8

POPULATION

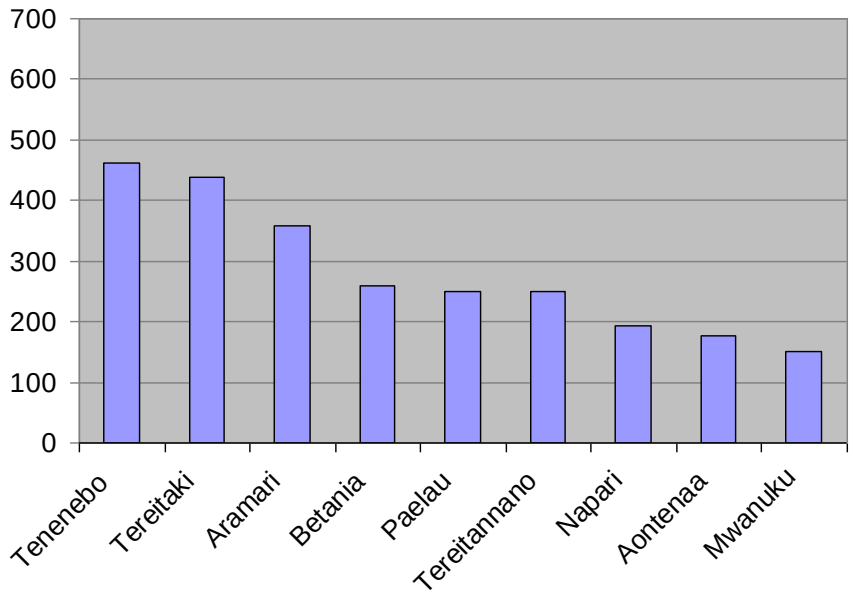
The 2005 census recorded a total population of Tabuaeran of 2,539. Betania and Paelau are two times overcrowded compared to other villages of Fanning Island.

Tabuaeran has a total land area of 33.75 square kilometers, giving average population density of 75 people per square kilometer.

Geographic view of Tabuaeran



Population by age group and village



Source: 2005 Census of Population, NSO/MFED, 2007

Out of Fanning's total population of 2539, males constituted 50.6% (1285) and females 49.4% (1254). In other words there are 97.6 females for every 100 males,

A large proportion of dependency age-group(age 0-15 and 50+) of both gender constituted most of Tabuaeran's population. Quite small proportion of the functional age group (20 – 50) most are to be retired upon reaching 50 years of age.

LAND AND MARINE RESOURCES

Land resources

The land has 9 villages altogether as mentioned earlier on. It is quite covered with shrubs, coconut trees, plantations of each individual in certain area that obtain under their lease. There are other sorts of plantations in which the island has uniquely due to the climate it has and that of historical relations. Banana, bwabwai, breadfruit, pandanus plantation and other sorts of plants that are able to be cultivated with the land soil, are sorts of vegetation that made the island outlook greenish, warm and cool through the thick vegetation that grow around the island. Mango tree is only seen on one area of Tabuaeran which is the NCL (Norwegian Cruise Line) compound. Other plants that are not indigenous to island also can be seen around the island such as sunflower.

Tabuaeran was formerly an important seabird rookery with 12 breeding species, but populations are now much reduced and only about six species still breed regularly: White-tailed Tropicbird known as "te Gnutu" in local language(Phaethon lepturus),

Red-footed Booby (Sula sula) also known as “te Koota” in Kiribati, Great Frigatebird (Fregata minor) “te itei”in local terms, Brown Noddy(Anous stolidus) popularly known as“te lo”in Kiribati language, Black Noddy (A. minutus) in Kiribati is known as“te mangkiri” and White Tern (Gygis alba) where as “te matawa” as the local name. There is small population of the Scarlet-breasted or Kuhl's Lorikeet (Vini kuhlii) on the northwestern islet. This species is believed to have been introduced by early Polynesian colonists. Tabuaeran is one of only four islands on which the Christmas Island Warbler or Bokikokiko (Acrocephalus aequinoctialis) is known to have occurred, but according to Perry (1980), the species has disappeared from this island since 1924. In fact, with increasing number of inhabitants the bird species declines.

Water resources

The 438 households on Tabuaeran have access to one or more sources of water, for drinking and other domestic uses. The 2005 census recorded that 144 households have access to rainwater, 2 to piped water, 418 to open wells, 29 to protected wells and 5 bought shop water. Water shortage is not a problem for Tabuaeran, for it has an immense water lense. However, this groundwater reserve on Tabuaeran is threatened by saltwater pollution through surface intrusion. Thorough care needs to be considered about sustaining underground water, pollution and population have to be consistently managed.

(Already the freshwater pond which serves as an important food-producing area for the largest village on Tabuaeran has been overflowed with seawater several times, causing destruction to *bwabwai*, banana, coconut and other food crops. Surface intrusion of seawater leaves the groundwater reservoir completely vulnerable to pollution, which slowly spreads out to affect the entire island water supply.)

Marine resources

Tabuaeran has 51 square kilometers of reef. This is a quite a big reef area compared to other larger islands in Kiribati. The island is of big coral formation and also of lagoon; however one reef size of the larger ocean passages which cuts through the island had become shallow at one end, creating a small mud flat which is still linked to the ocean by a narrow passage. Shell fish could be found on the mudflat at low tide, and abundant schools of small fish live among the roots of the mangrove during high tide. These resources provide an important source of food to the people of Tabuaeran people however the mudflat is located on the northeast of the island or opposite where the villages are located.

Size of Reef/Lagoon Size

Islands	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Tabuaeran	51	unknown	110	33.7

Despite the large area of lagoon, most of the people also prefer ocean fishing rather than lagoon fishing. There a quite number of village people who also prefer ocean fishing than lagoon fishing.

THE ENVIRONMENT

Coastal erosion is a major environment issue for the people of Tabuaeran. Apparently, the people of Tabuaeran do strongly believe that the construction of causeways in linking the islet of Tabuaeran is the main cause of serious coastal erosion on Tabuaeran.

EDUCATION

There are 3 primary schools, 1 JSS and 1 Senior Secondary, Meleangi Tabai High School, on the island.

In 2006 a total of 490 pupils were enrolled in three primary schools, namely Ara Eden, Norwegian Cruise Line and Tebonnano. Of this number 222 were girls and 268 were boys. The total number of teachers in all three primary schools is 17, out of which 3 were based at Ara Eden, 5 at Tebonnano and 9 at NCL.

For the whole island there is only one Junior Secondary School, Keina Tiito Junior Secondary School. As of 2006 the number of pupils enrolled in all forms totals to 207. Of this figure 67 were in Form 1, 63 were in Form 2, and 77 were in Form 3. With a teaching staff of 11, the Teacher to Pupil ratio at JSS was 1 teacher to every 14 pupils.

Enrolment in Primary and Junior Secondary Schools, Tabuaeran 2005 and 2006

Primary School								**Junior Secondary School**			Senior Secondary		
Year	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**TOTAL**	**Frm 1**	**Frm 2**	**Frm 3**	**Frm4**	**Frm 5**	**TOTAl**
2005	89	83	86	80	86	77	**501**	67	63	77	84	46	**337**
2006	72	81	91	65	82	99	**490**	67	63	77	84	46	**337**

Source: Compiled from the Digest of Education Statistics, MOE, 2005 and 2006.

HEALTH

There are two clinics and one health center on Makin. The clinics are located each in the villages of north side of the island (Napari), the other at the southern side of the island (Aramari) , while the health center is located in the island's administrative center, Paelau. There is one Medical Assistant (MA) who is the highest ranking medical staff on the island.

The health center and clinics have facilities to accommodate patients who are admitted for medical supervision. These health facilities are as follows;

- *Paelau Health Center*: 1 health center, 3 wards, 3 cooking houses and 3 toilets
- *Aramari Dispensary/clinic*: 1 clinic, 3 wards, 3 cooking houses, and 3 toilets
- *Napari Dispensary/clinic:* 1 clinic, 2 wards, 2 cooking houses, 2 toilets and 1 maneaba.

The health center and clinics are built from permanent construction materials, while the wards, cooking houses and toilets are of local material. Various surveys on the condition of medical facilities undertaken over the course of the past few years show that maintenance of medical facilities on Tabuaeran have been neglected, resulting in the deteriorating condition of both local and permanent buildings. The main cause of this problem is the lack of maintenance funds.

The most common diseases on Tabuaeran are fever, cough, headache, stomach-ache and diarrhea. As Figure 12 shows, these diseases were the most prevalent among the patients who visited or were admitted to the clinics and health center on Tabuaeran in 2006.

ENERGY

Firewood is abundant, mainly in the form of coconut husk, dry coconut leaves and common wood, but people are now relying also on fossil fuel for lighting, cooking, travelling and to run their machines.The 2005 census recorded that out of 438 households 3 owned power generators and 321 have pressure lamps. There were also 15 trucks, 92 motorcycles and 28 outboard motor engines. Electrical appliances include 73 radios, 1 computer and 50 CB radios. All these equipment and machinery require fuel or energy for their operation.

In terms of volume, unleaded petroleum has been the most commonly used fuel on the island, followed by kerosene and diesel. Fossil fuel consumption is rising on the island.

ISLAND ECONOMY

Copra Cutting

Copra production remains the most important commercial activity on Tabuaeran, which provides a reliable and sustainable source of income for many of the islanders

Out of 438 households on Tabuaeran (2005 census), 0% have rights to family-owned lands except on the issues on bought lease as already mentioned in the Land ownership section the land is entirely government owned. There are part of the island at which requires harvest license, purchasing that particular license is obvious

to have the rights in cutting copra any necessary means of harvesting provided that it goes with specified regulations or condition.

Copra production and revenue 2003-2005

Year	Tons	Total income	Income Per H/hold
2003	131	$65,500	$232.27
2004	174	$104,400	$370.21
2005	622	$373,200	$582.05

Source: National Statistics Office, 2007

The lowest production figure for Tabuaeran was 64 tons in 2002, and the most productive year was 2005 when it soared to 622 tons. The jump in production was caused by a rise in copra price introduced in 2003.

Agriculture

By Kiribati standard Tabuaeran is one of a small number of islands that have the greatest potential for agricultural development. This is due to the island's high annual rainfall and good soil. Beside coconut, a good variety of fruit and vegetable crops such as breadfruit, banana, pawpaw and bwabwai also grow well on the island.

LAND AND SEA TRANSPORTATION

The main transport infrastructure on Tabuaeran is made up of 10.80 miles of road. The road is normally 3 to 4 meters in width, enough for the use of small to medium size vehicles. The most common form of land transport is the bicycle, of which there were 370 in 2005. Motorcycles ranks second in popularity, with a total of 92 motorcycles recorded in 2005.

Inter-village travel between Napari village (north end of the passage) and the rest of the village (located on the south end of the passage) is done through the use of canoes and small boats and a ferry, since the villages are separated by a passage. The separation of the villages affects children the most, in particular those who are old enough to attend junior secondary school and even senior secondary school. Whereas there is a primary school on the other side of the village but there is only one junior secondary school for the whole island which is located on the south side of the passage, where children must travel every day to attend school. Those who do not have access to transport either miss a lot of classes or just simply drop out of school.

Tabuaeran has its own airstrip which is located on the north end of the island (Napari), has a length of approximately 0.72 miles and is built from compacted coral mud. In fact it has not been used for many years. The airstrip was initially built during the establishment of Tide monitoring and recording stations by the US Government; however, the University of Hawaii had to close the station in 1981.

Inter-village travel on Tabuaeran is hindered by the physical nature of the island, which is divided by open sea passages. The main mode of transport between 7 villages of the southern end of the island and the other two villages located on Napari is by small ferries or boats that are powered by outboard engines. It is difficult to walk since the passage cutting through the island is never shallow therefore one needs to wait for the ferry or other necessary crossing boats in order to cross the passages.

TEERAINA

PHYSICAL FEATURES

Washington Island now known locally as Teeraina is the northern most island in the Line group of islands. It lies 75 miles northwest of Fanning and 238 miles northwest of Christmas. It has also been known as New York Island and Prospectus Island.
It is a sandy coral atoll of about 5.5 kilometers long, 2.1 kilometers at its greatest width with a circumference of about 15 kilometers and an area of 14.2 square kilometers. Like other low lying atolls, it t**ypically averages 2 meters above sea-level, with sandy and porous soil.** However, due to its high rainfall, peat soil is found throughout where it is densely covered with coconut palms and forest trees (23 to 28 meters), shrubs and vegetation. It is surrounded by a fringing reef not over 183 meters wide, except at three places: 915 meters at the east point, 732 meters at the northwest point, and 549 meters wide at the southwest point. It is at these wide points of the island that the reef flats are seen during low tide otherwise, the rest of the reef flats surrounding the island are always submerged in water during high and low tide.

Teeraina has nine villages on the island located along the coast that can be accessed by a local gravel road mostly by pushbikes, motorbikes and trucks. Access of the villages by traveling the inner freshwater lake is impossible due to the thick dense coconut forest and marshland surrounding the lake. Instead the lake is used mainly to access other parts of the coconut forest for copra cutting and, or for fishing.

Teeraina has a high annual rainfall reportedly 2900-4000mm per annum, and a unique fresh water lake/lagoon, a lush tropical coconut forest where three different kinds of ferns and some other trees not found in Kiribati grow. Its main geographical feature is the presence of a fresh water lake/lagoon surrounded by swampy land and coconut woodland. Bulrushes (‘titania’) and giant swamp taros (‘bwabwai’) grow in abundance in these swamp or wetlands and can be observed when traveling throughout the lake. Coconuts, giant swamp taro, pandanus and breadfruit grow well without much need of cultivation in the coconut forest surrounding the lake. Sometimes during the wet season, the lake overflows, flooding the villages and causing discomfort to the villagers however, the islanders have learned to live with and prepared for such floodings.

The soil under the coconut forest is rich in humus, coconut peat and cushiony to tread on. The peat consists of a dense, interlaced mass of partly decayed plant fibres, dark brown or black in colour, a major feature of this forest. The surface of the lake is about 1 meter above sea level. It measures nearly 3 kilometers long by 11 kilometers wide, and averages about 2 meters deep during rainy seasons. (*www.janeresture.com*) Heavy rainfalls experienced throughout the year maintain

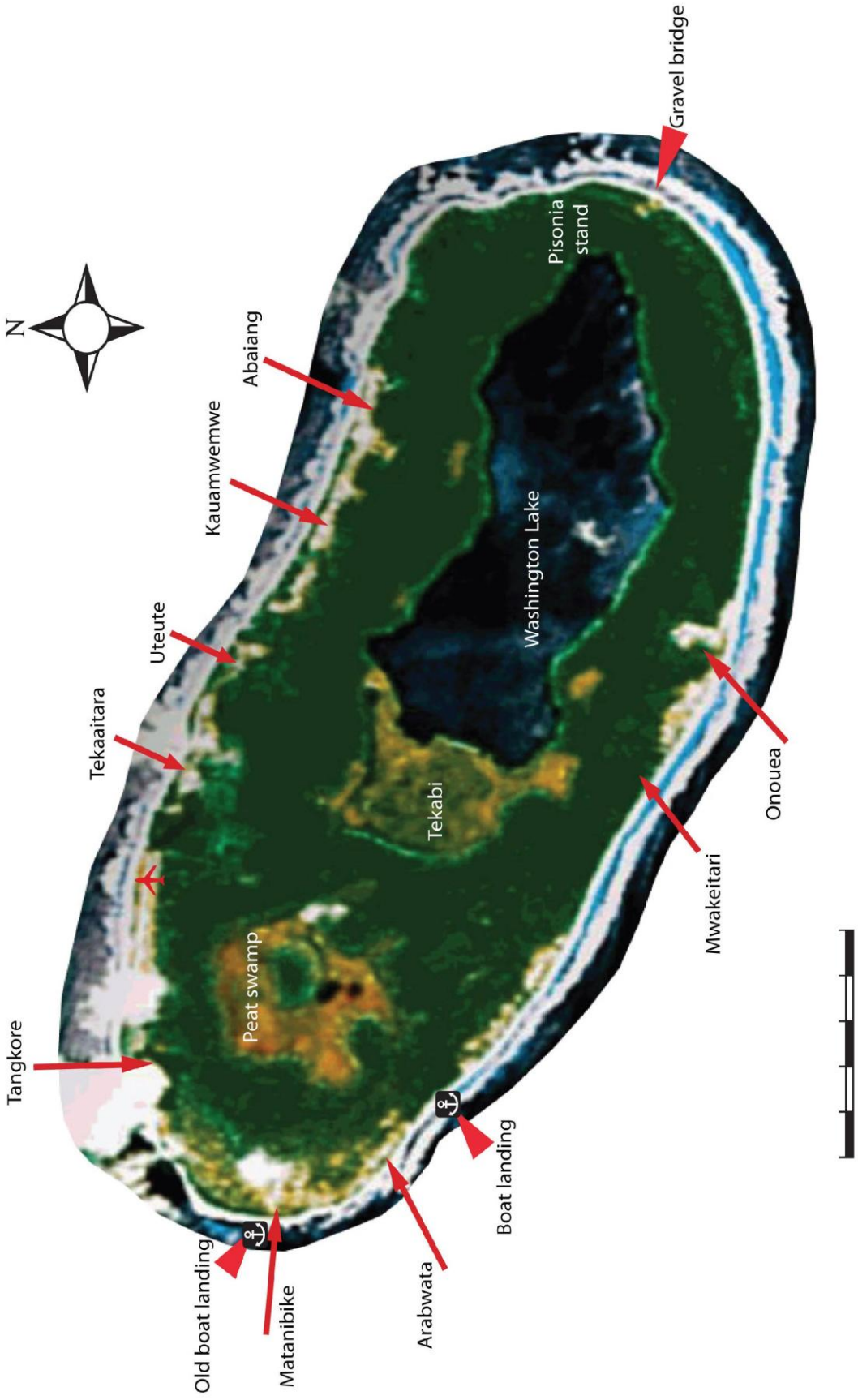
the fresh water quality and resources in the lake most notably the ‘tuna’, an eel like fish, the dusky jack, tilapia and milkfish.

The only inlet of ocean water into the island is through a small opening at the end of the *Te buka* (*Pisonia grandis*) forest locally called the *‘tunga’* marked by a reef spout that can be seen during the onset of incoming tide. A rocky and bumpy road provides access to its nine (9) villages, Matanibike (Government station), Tangkore and Arabwata (where most of the initial settlers of Teeraina during the BP Company Scheme have settled), Mwakeitari, Abaiang, Kauamwemwe, Uteute and Tekaitara where the recent settlers of the re-settlement schemes of 1989 and 1995 have settled. This rocky and bumpy road provides the main access not only to the villages but to the different parts of the island to harvest coconuts for copra or to find other means of livelihood.

On the outskirts of the forest towards the ocean, the normal gravely, rocky and sandy soil types can be seen.. Unique also to this island is the lack of reef flats around most of the island resulting in deep water around the island all year round. On two parts of the island (northwest and southwest) the reef flats are wide enough to be exposed during low tides otherwise the rest of the reef flats are never exposed but submerged by the sea all year round.

Access to the island is by ship/vessels only as there is no airport on the island. The Southwest point landing site is not used anymore due to its risky location (unprotected). The present used landing site was later developed on the south side of the island, half a mile from the southwest point that is better but still risky during rough weather. Landing is therefore often a tolerated and dangerous experience especially when it is rough. Ships have been known to leave the island without off loading or loading cargo and passengers.

The source of drinking water is the groundwater reservoir, tapped by digging wells 1 or so metres into the ground. The quality of groundwater is fresh throughout the year and not easily affected by droughts. There are over 196 open wells on Teeraina that the locals use for their livelihood, 3 of them are closed and there are 15 rainwater catchments in the form of cement tanks and polytanks.



Map of Teeraina

POPULATION

The 2005 census recorded a total population of 1,155 people on the island, an increase of 68 people since the 2000 census of 1087. Of this 1,155, there are 625 males and 530 females scattered throughout the island's nine villages.

Population by village

No.	Village	Population (Census 2000)	Population (Census 2005)
1	Abaiang	59	91
2	Kauamwemwe	109	106
3	Uteute	68	72
4	Kaaitara	27	34
5	Tangkore	120	203
6	Matanibike	316	191
7	Arabata	177	190
8	Mwakeitari	93	92
9	Onouea	118	176
	TEERAINA	**1087**	**1155**

Source: SPC PopGis

Population Density by village

Village	Village Land Area (sq.km)	Density 2000	Density 2005	Density Change %
Abaiang	0.15	393	607	54
Kauamwemwe	0.11	991	964	-3
Uteute	0.1	680	720	6
Kaaitara	0.12	225	283	26
Tangkore	0.36	333	564	69
Matanibike	0.23	1374	830	-40
Arabata	0.34	521	559	7
Mwakeitari	0.18	517	511	-1
Onouea	0.16	738	1100	49

Source: NSO 2005 census; PopGis

Teeraina is approximately 14.2 sq. km. and of this, a mere 1.75 sq. km is being lived on or is where the population resides, generally around the coastline. Consequently as a whole, the population for Teeraina in the 2005 census is at an average density of 81 (Total population divided/Total land area) people per square kilometer.

In the villages of Arabwata and Tangkore, the highest proportion of the population over 70 years old can be found which is mostly due to both villages being the

villages where the initial copra plantation workers settled during the copra plantation years. In recent years during the re-settlement years, owing to lack of transport and a very bad road, people preferred to live close to the government station. There are 5 elderlies, more than 70 years old in Arabwata and 4 in Tangkore.

The dominating age group of 473 is that of 18-49 years old followed by 296 six to fourteen (6-14) year olds, 2-5 year olds (143), 50-69 year olds (82) ,), 15-17 year olds (75), those less than or one year old (71) and lastly the elderlies numbering 15. From the 2005 census, it portrays Teeraina as an island with a young population aged.

LAND AND MARINE RESOURCES

The island's main resources can be found in its vast untamed forest, vast freshwater lake and swamp areas in the forms of:

Coconut trees grow untamed and so high in the forest, they form a canopy, preventing sunlight from reaching the ground thus the ground and soil are always moist. Concealed in this forest's vastness is a forest of breadfruit (*Artocarpus altilis*) trees that compete with the surrounding coconut trees for sunlight. The freshwater lake is surrounded by swampy areas where the 'bwabwai' grow, some wildly and others cultivated and bulrushes as far as can meet the eye.

An interesting feature of the island is the tendency for different stands of trees to be found in one location. Some of these trees can be found on other parts of the island but the majority was observed to be found in one location only. The tropical almond, *Terminalia catappa* (kunikun) and 'tekaitua', *Leucaena leucocephalus* are plentiful in the village of Matanibike. Stands of 'aronga' (still to find its English and scientific name) and 'te kanawa' (*Cordia subcordata*) can be observed in the villages of Kauamwemwe as one drives towards Abaiang after which a large stand of 'buka' trees (*Pisonia grandis*), probably the second largest of its kind in Kiribati after the pisonia forest of Millennium Island (Caroline Island).

Water resources

Water supply on Teeraina is not an issue and is abundant all over the island all year round even during periods of drought. This abundance of water could contribute to Teeraina not having many rainwater tanks and rare need for rainwater tanks in projects (*see Teeraina Island Council projects*).

The only water issue relating to health is the abundance of worms and thus a high incidence of epigastric (nurse pers. Comm.) health problems encountered by the medical staff all year round. A notably well known worm prevalent on Teeraina is known locally as the 'naautoonga' and has been observed to be a prevalent issue on

the island affecting mostly the children. The water supply otherwise is fresh and abundant all year round.

Marine resources

Size of Reef/Lagoon

Island	REF(sq.km)	REEF Base (sq.km)	Lagoon (sq.km)	Land (sq.km)
Teeraina	NA	NA	3	11.2

Owing to its natural feature, ocean fishing can be greatly constrained by rough weather whence fish from the lake, land crabs or tinned food are then used to supplement the absence of fish. Unfortunately, a fish or marine profile for the island of Teeraina has not been carried out yet. However skipjack tuna, sharks and other ocean fish are also common catches on the island including the following freshwater lake fish:

- Dusty Jack (*Caranx sp*.) – a trevally that seems to have made it's home in the lakes of Teeraina
- Tilapia (*Oreochromis sp.)* – this was introduced to the Gilbert group by the Agricultural Department as a biological control of mosquitoes that was later considered by Gilbert islanders as a pest believing it to predate on milkfish
- Milkfish (*Chano chanos*) – a popular bony fish
- 'Tuna' (*Anguilla marmorata*) – freshwater eel

EDUCATION

Teeraina has two types of school, a primary school called 'Sunlight Primary School' and a Junior Secondary School called the Teeraina JSS. Both schools are located on the boundaries between the villages of Matanibike and Tangkore. Sunlight primary school boasts three class rooms (divided into two each) that are in better condition compared to the recently established JSS that is already deteriorating mostly due to vandalism.

Like most schools in general in the Kiribati islands, there is a great lack of furniture for the schools and pupils especially in primary schools have to sit on the floor. Sunlight Primary School pupils are no exception to sitting on the floor while JSS students on the other hand, have desks and chairs, some needing maintenance and upgrading

In 2006 there was a total of 333 students in Teeraina of which 200 (60%) of them were in primary school while the rest 133 (40%) were at junior secondary school. The 200 primary school pupils comprised 101 males and 99 females while for the JSS, there were 71 females and 62 males. 100% of primary school pupils completed primary school since they first entered as Class 1 pupils while in contrast 92% of secondary school students completed their junior secondary school.

Primary enrolment 2006

	No. of Pupils			No. of Teachers		
	2006			2006		
	F	M	Total	F	M	Total
Sunlight Primary School	99	101	200	5	3	8
Total	99	101	200	5	3	8

Enrolment in Primary and Junior Secondary Schools, Teeraina 2006

Primary School								Junior Secondary School			
Year	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**TOTAL**	**Form 1**	**Form 2**	**Form 3**	**TOTAL**
2005 2006	37	34	34	29	29	37	**200**	48	41	44	**133**

Source: Digest of Education Statistics, MOE, 2005 and 2006.

Number of Pupils, Teachers and Ratio

School	Pupils	Teachers	Ratio
Sunlight Primary School	200	8	25:1
JSS Teraina	133	5	27:1
	333	13	26:1

Source: Digest of Education Statistics 2006

HEALTH

There is only one active health centre on Teeraina comprising of a dispensary (below left), a quaint obstetrical facility and two wards. The medical centre is staffed by a Medical Assistant, a nurse and an aid assistant. There used to be two other clinics but these have broken down and are no longer operational.

The medical centre is located at the Government station, has a CB radio that it uses solely to put in orders to the health centre in Kiritimati who then forwards the requests to the main hospital in Tarawa and, for emergency calls to Kiritimati Island. There are only two wards at this centre (pictured right) that are without cooking and toilet facilities. In-patients rely on their families to bring in food from the homes.

Most Common Health Problems include the following:

- Epigastric pains due to worms and ulcers
- The common flu
- Headaches
- Sores
- Coughing
- High temperatures

ISLAND ECONOMY

Copra

Copra cutting provides the main source of income for households on Teeraina. At $0.60 cents a kilogram, the total revenue from copra production in 2005 was AU$744,600.00 (Total production*cost/kg) bringing in an estimated average income per household of $3,760.60 (Total copra income/total household) in the year 2005.

Copra production and revenue 2000-2005

Year	2000	2001	2002	2003	2004	2005
Production	1,181	717	811	757	699	1,241
Income	$496,020	$301,140	$340,620	$317,940	$349,500	$744,600
Av. Income/HH	$2,505.15	$1,520.91	$1,720.30	$1,605.76	$1,765.15	$3,760.61

Source: National Statistics Office, 2007

One only needs to get on Teeraina to see that the potential for agricultural development and land resources is high given that the island is not that populated as yet. Not only does it have high annual rainfall and very fertile soil, but it is also free from most major pests and predators that are found in Kiribati especially in the Gilbert Group. Beside coconut, a good variety of fruit and vegetable crops such as breadfruit, banana and pumpkin also grow well on the island without or with little cultivation. Imported vegetable crops such as English cabbages, corn, rock melons, eggplants etc are cultivated presently on the island. The 'bwabwai' beetle (taro beetle), scale insect, sooty moulds are but some of the pests and plant ailments that are still to reach Teeraina.

TRANSPRTATION

Land transport

Teeraina is one of the least favorite islands to travel to as the only way to get there is by ship/boat as there is no airfield on the island yet. The Council records show that in 2007, only 5 trucks are in operation on the island, two owned by the Council and one owned by each of the island Cooperative store,

Council trucks provide the main transport for Primary and JSS students to and from their schools and general use by the Council. The other trucks are used for the respective services by the owners such as in transportation of cargo and other products from docks and to other branches while the KPC Tetaobe is used to support the KPC members in their church activities and functions. They are also hired by the general public for transportation as and when required.

Sea transport

Inter-village travel between the nine villages of Teeraina is done through the use of canoes and small boats, since the villages are separated by sea.

Canoes, boats, and skiffs can be used both as transport and for fishing. According to the latest statistics, the proportion of household owning a canoe is apparently high compared to other types of sea vessels. Makin has 48% of the household owning a canoe, while Kiebu has 37%. In comparison, those owning a skiff are typically low in number with Kiebu having 3% while there are none on Makin.

Air service

This service unfortunately is lacking in Teeraina even though literature states that at one point in time, there was an airport built by Dr. Martin Vitousek in support of his research work on climate which required recording rainfall data from Teeraina amongst other islands in the Line and Phoenix group. Unfortunately, the airstrip has now been overgrown with weeds and shrubs.

Having one of the most risky landing places in Kiribati, bringing in big vehicles such as trucks, cars and buses to Teeraina remains a challenge to transport ships. Still, there are now 5 trucks on the island that provide transport services for inter-village travel and school. The only issue is lack of a good road throughout the island and especially through the coconut forest which still cannot be accessed using a truck.

Canoes and boats are used as such to transport copra from other parts of the forest that otherwise cannot be transported through the forest by pushbikes or manual carrying. At these times, the canals become the issue especially during dry spells when the lake and canal waters go down. The canal beds are full of coconut and pandanus leaves, logs, wood and mud obstructing the passages and blocking the engines system. The canals are full of soft mud/peat that one can sink into and thus is a danger to step into the canal unknowing or alone.

BANABA

PHYSICAL FEATURES

Banaba is the only raised limestone phosphate island in Kiribati. It rises 81 metres at its highest point above sea level, has a land area of 6.9 sq. km and a circumference of around 10 kilometers. With the discovery of phosphate on the island and the subsequent mining of it from the early 20th century, rock pinnacles are now observably the main physical feature of the island including desolate phosphate mining infrastructure. It is surrounded by a fringing reef and is without a lagoon.

Banaba has four villages of which 3 (Tabwewa, Antereen/Tabiang and Umwa) are located along the coast and can be accessed by a modern coal tar road on pushbikes, motorbikes, trucks or simply by walking. The fourth village of Buakonikai ('Te Aonoanne') has been totally mined out leaving a mere plot amidst the rising rock pinnacles. Its woodland is now limited to the coastal area and is made up mostly of mangoes, flame trees, guavas, tapioca and common Kiribati shrubs such as the saltbush and legumes amongst others. Having been mined for over 80 years, the centre of the island is uninhabitable and the villages of Tabiang (Antereen) and Tabwewa, which once were bustling with miners and their families from the Gilbert group including people from Tuvalu, Chinese and Aborigines, stand desolate and eerie..

The phosphate storage tanks are slowly rusting away while the cantilever has broken down. The boat harbor on the other hand is still as practical as ever and still provides a safe haven of anchorage for visiting ships and boats to the island. Devoid of wells due to its physical feature, water can and has been a problem in drought years. The caves that can be found in specific places below the island should have been an oasis of water for the islanders but the depth of the caves make the water inaccessible and somehow, once this water reaches the open air above, it undergoes surprising changes so rapidly making it foul and smelly rendering it useless for consumption.

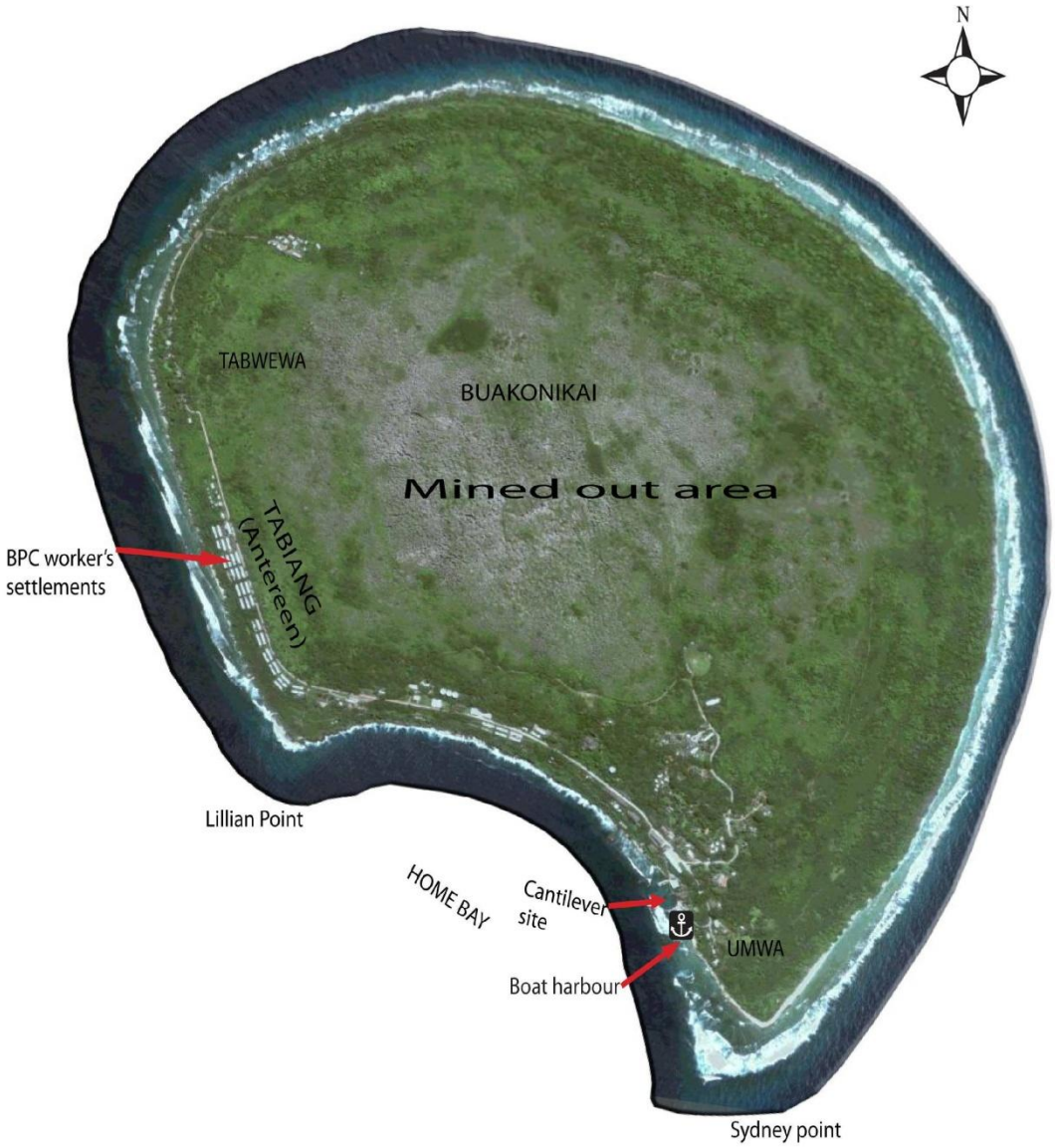
Access to the caves includes having to descend into holes well over 50 metres deep and carrying torches or as popularly used – a pressure lamp. The caves have ladders that were in-built during the phosphate mining years and maintained over the years by clan families who own the caves. In other caves, the steep descend requires ropes where there are no ladders. They provide popular sightseeing sites for visitors to the island of Banaba.

There is no airstrip on the island.

Drought spells in Banaba have been a common occurrence and times so bad that the Banabans on many occasions had to leave the island. The worst drought on

record for Banaba was in the 1870s; many died, and many also left the island on passing ships to escape the drought.

A geographical map of Banaba



POPULATION

The 2005 census recorded a total population of 301 people on the island, an increase of 25 people since the 2000 census of 276. Of this 301, there are 164 males and 137 females scattered throughout the island's three (3) villages of Tabwewa, Tabiang now documented in the 2005 census as Antereen and Umwa.

Most of the Banabans now live on Rabi in the Fiji Islands. Of the 301 counted in the 2005 census, 221 of them are Banabans while the rest 80 are from the other Kiribati

islands who either are working there as seconded officers to the Banaba Island Council or married to a Banaban.

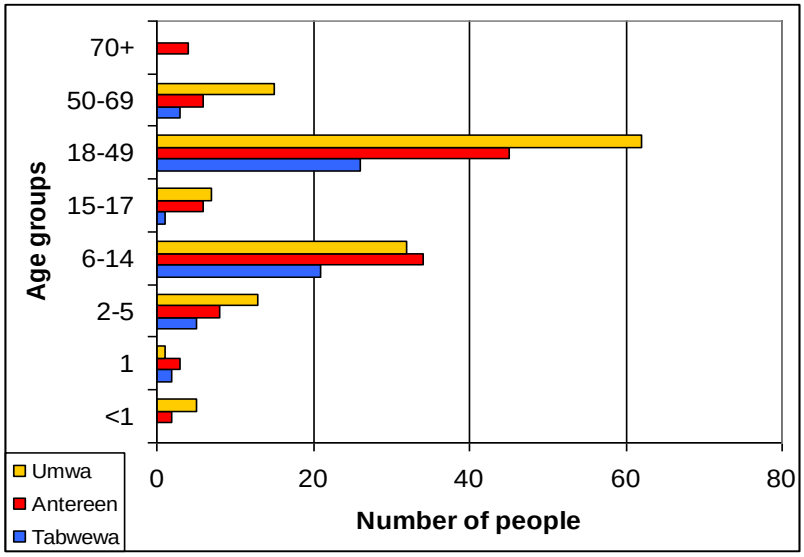
Population Density by village (2000 & 2005)

Island	Land Area	1995 Density	2000 Density	2005 Density
Banaba	6.29	54	44	48

Source: 2005 Analytical Report

In the 2005 census, the population density of the island was 48 people per sq. kilometer of Banaba; however, discounting the uninhabitable parts of the island, the majority of the people are living along the coast mainly in Umwa.

Banaba Population distribution by age group in villages



Source: 2005 Census of Population, NSO/MFED, 2007

Most of the mature population aged 18 to 49 can be found in the village of Umwa, the oldest four people aged over 70 years reside in Antereen (Tabiang) while the youngest under 1 year olds are in the villages of Umwa and Antereen. The number of people in the age dependency group is 134 (age dependency group defined as those below 15 years and those over 64 years of age) of which there are 126 younger than 15 and 8 elderlies older than 64.

Banaba population distribution in villages

Banaba	Total	<1	1	2-5	6-14	15-17	18-49	50-69	70+
Tabwewa	58	0	2	5	21	1	26	3	0
Antereen	108	2	3	8	34	6	45	6	4
Umwa	135	5	1	13	32	7	62	15	0
	301	**7**	**6**	**26**	**87**	**14**	**133**	**24**	**4**

LAND RESOURCES

The island's main resources can still be found in its phosphate, its surrounding ocean abundant with marine life, limited coastline woodland and its own people.

LAND AND MARINE RESOURCES

Land wnership and use

In Banaba, the females are landowners and when married, the husband goes to live with the wife's family instead of the traditional Kiribati custom of the wife going to live with the husband's family most probably due to the fact that water was a lot more precious than fish and since the water fetching is the woman's job, it was culturally accepted for men to go and live with the women as then the women would not have to leave their families and depriving them of the most precious item of all – water.

Water resources

The main water source for drinking and sanitary purposes on Banaba is rainwater. There are no wells on the island. The underground caves though could have provided an alternative source of water; they are inaccessible to the general public on Banaba. Most remain untouched and unusable.

A desalination plant was constructed in 2000 but this is prone to break-downs at which time the people have to use reserved rainwater. During the rainy seasons, the numerous BPC houses water cisterns are also filled with rain which is alternatively used to supplement the lack of water at individual homes.

Energy

Fuel - Firewood is never an issue in Banaba due to its limited population and woodland that is abundant with drought affected trees. But now that people are resorting to the use of modern technology to provide energy to meet their private and public needs, there is growing demand for kerosene, benzene and diesel.

.*Marine resources*

Size of Reef/Lagoon Size

Island	REF(sq/km)	REF base (sq/km)	LGN (sq/km)	LAND (sq/km)
Banaba			No Lagoon	6.29

ENVIRONMENT

The mining of Banaba resulted in land degradation of the central part of the island and an environmental issue since phosphate was initially mined. With the phosphate dug and exported, the sound base for vegetation to grow was also disrupted. Te remaining rock pinnacles stand isolated posing risks for those requiring to hike into

the centre of the island, plants cannot grow on the rocks but instead are growing at the rock bases. In the long run, were it overgrown with shrubs and other vegetation, this could be dangerous and stepping unknowingly into shrubs could mean a fall of 4-6 metres.

A recent discovery was the presence of poisonous roof slats that were used in a lot of the BPC company houses and buildings. A plea has been taken up to the Government of Kiribati to get rid of all those roof slats and in the meantime, the Banabans have been advised to stay away from such roofed houses.

EDUCATION

A total of 67 children enrolled in primary school in Banaba in 2005 (PopGis) of which there were 35 males and 32 females distributed in Classes 1 to 6. The JSS students numbered 30 with an equal number of girls and boys attending.

There is only one primary school on Banaba called 'Nei Kuana Primary School' situated at Antereen. From the 2005 census data, where a total of 67 pupils were recorded as having enrolled at primary school in 2005, 114 pupils were recorded as having enrolled at the same primary school in 2006, an extraordinary increase of 47 pupils. 2 female and 2 male primary teachers were teaching at Nei Kuana Primary school in 2005 giving a ratio of 29 pupils per primary teacher. 60 of the pupils were females and 54 males while there were 2 female and male teachers each. All of the 4 teachers are qualified teachers

Enrolment at Nei Kuana Primary School

	No. of Pupils			No. of Teachers		
	2006			2006		
	F	M	Total	F	M	Total
Nei Kuana Primary School	60	54	114	2	2	4
TOTAL	60	54	114	2	2	4

Source: Education Digest 2006

There is one Junior Secondary School. As of 2005 the number of pupils enrolled in primary and junior secondary totals 329 of which 237 were still at the primary level and the rest 92 attending the JSS. The national teacher pupil ratio was 26 pupils to 1 qualified/certified teacher in 2006 and where the primary pupil teacher ratio was at 29:1, JSS student teacher was at 6 students to 1 teacher as there were 5 recorded teachers on Banaba in 2005.

HEALTH

There is only one active health centre on Banaba comprising the old BPC hospital now housing the dispensary, clinic and wards. Note the roof slats, they are the poisonous types of roof slats that have to be removed from the BPC buildings. Just as the hospital is slowly rusting away, so are the clinical instruments and machines.

An EU project has started building medical clinics for all outer islands of Kiribati and Banaba will be having a new clinic constructed in 2008.

ISLAND ECONOMY

Typical subsistent activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, and breadfruit.

Copra cutting

\Unfortunately for the Banabans, copra cannot subsidise their way of living as they barely have any coconut trees left that can collectively give them a good enough harvest for income.

Agriculture

There are not that many coconuts and pandanus on the island. Vegetable gardens are maintained by the locals with the assistance of the nurseryman. The replanting of coconut trees on the island is not part of the Agricultural national coconut replanting scheme but the locals own initiative in their efforts to replant their lands with the islands 'trees of life' (coconut, pandanus and breadfruit).

With a history of droughts made more difficult by the absence of wells, agricultural activities on Banaba are limited and vary between the dry and wet seasons. Keen vegetable garden farmers, what the Banabans do is wait for the rainy season when vegetable gardens again can be replanted besides homes. One of the difficulties of farming in Banaba is the rockiness of the island that makes vegetable beds or plant holes the hardest part of the agricultural activities.

TRANSPORTATION

Banaba has a really modern boat harbor compared to the outer islands of Kiribati who have none at all and this infrastructure makes Banaba an easy place to transport in big vehicles such as trucks, cars and buses. As a high island, pushbikes are not that common on the island but instead motorbikes and cars are the most common means of transport. Banaba has a modern road made of coal tar and running all the way from Tabwewa to Umwa, basically the length of the island where all mining activities were carried.

The provision of the JSS truck from the Taiwanese Government has solved the issue of transport for the children of Banaba. With its limited population and limited activities, transport is not a problem on the island. The transport issue is more to do with the frequency of ships visiting the islands as ships do not seem to routinely go to Banaba.

……..

TE MAURI, TE RAOI, TE TABOMOA