



1. Makin



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PHYSICAL FEATURES

Makin is the second smallest inhabited island in the Gilbert Group, located at Latitude 3° 20' N and Longitude 172° 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.

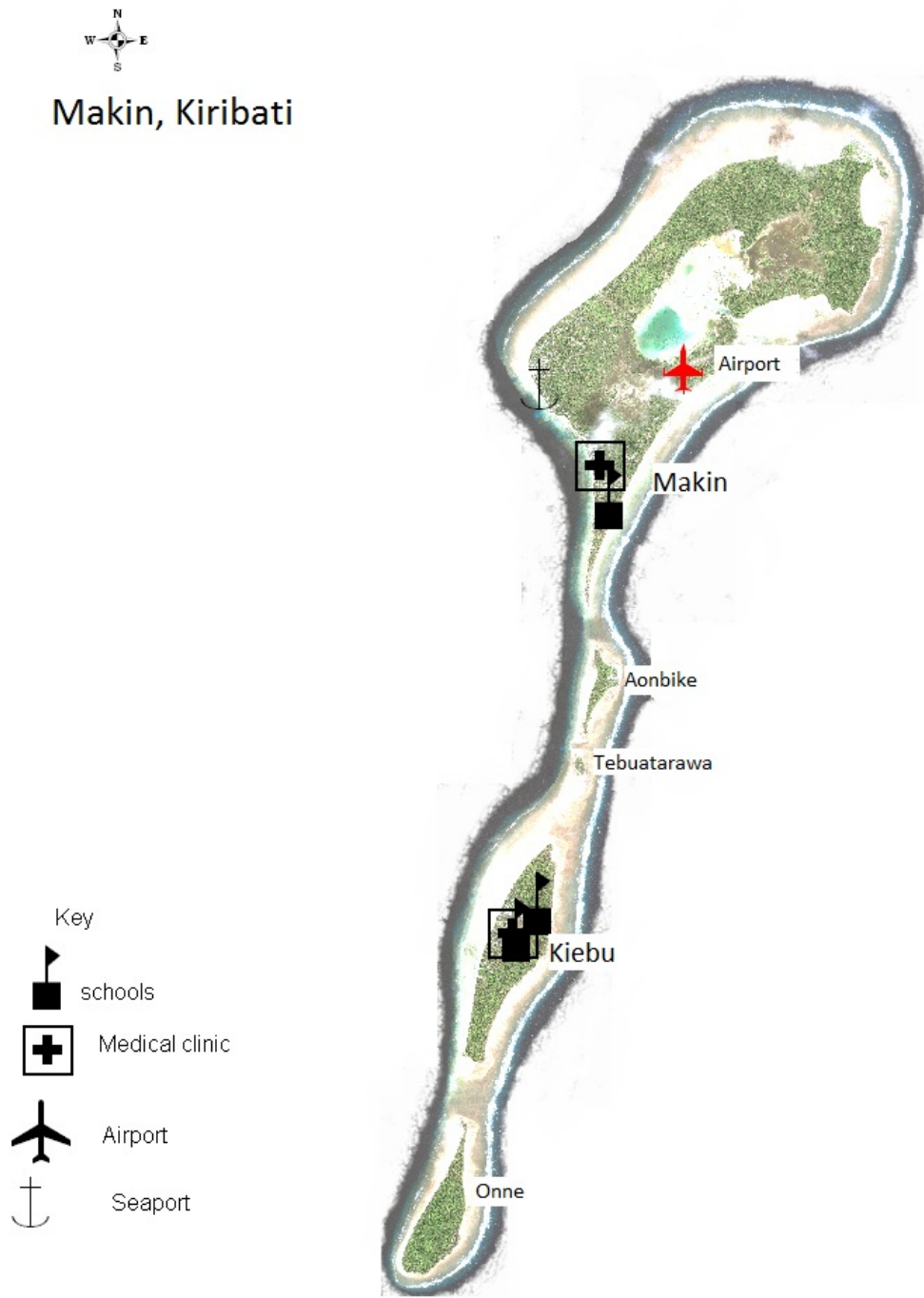
Makin is divided into five islets by shallow reef passages. The island resembles a large exclamation mark, with the largest islet, Makin, located in the northernmost tip of the island. The island is protected from the ocean by a narrow strip of fringing reef which encircles the land. Some parts of Makin 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.

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 conditions prevail in the Pacific.

Figure 1.1 Map of Makin

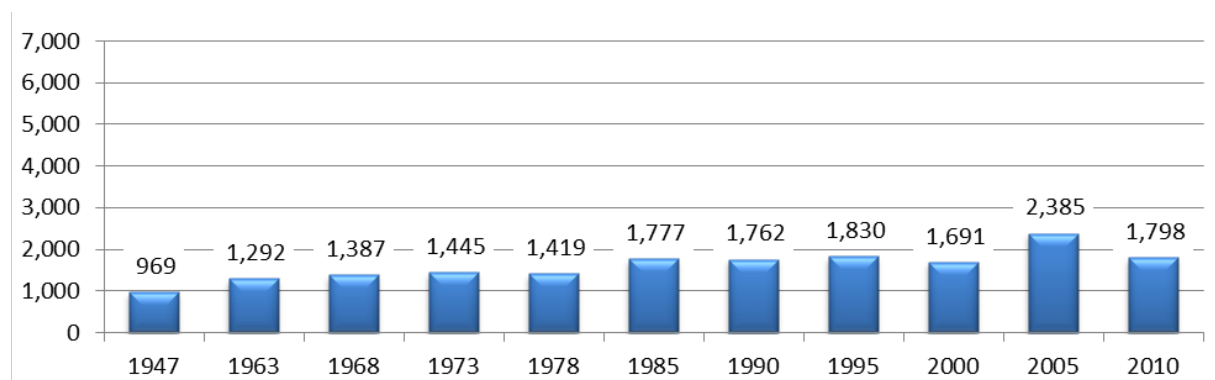


Note: Refer to Makin Profile 2008 for problem areas and sites of significance.

POPULATION

The population of Makin in the 2010 census was 1,798; this is 1.7% of Kiribati’s total population. 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. Apart from the 2005 anomaly, the population of Makin has been stable at around 1,800 people since 1985.

Figure 1-2 Makin population 1947-2010



Data Source: 2010 Census

Makin has a combined land area of 7.89 square kilometers and a population of 1,798, giving a population density of 228 people per square kilometer. Compared with other islands in Kiribati, Makin is the 5th most densely populated island.

More than two thirds of the population resides on Makin islet, the main administrative and commercial centre of the island. Makin islet has more land space for food crops, a large freshwater lens, and a large fishing area. The much smaller islet of Kiebu is home to about a quarter of Makin’s population.

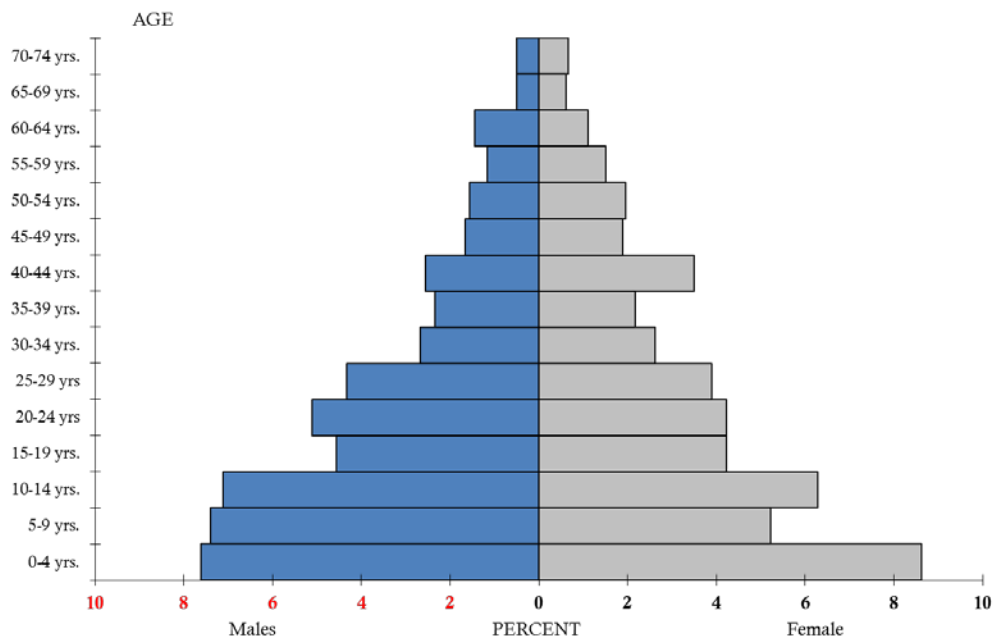
Table 1-1: Makin population by village

Makin	Village	Population
	Makin	1364
	Kiebu	434
Makin total population		1798

Data Source: 2010 Census

There are 347 households in Makin, and the average household size is just over 5 people (5.2). Makin has a very large youth population, with 42% of the population aged under 15, and in Makin as in the rest of Kiribati there appears to be a “baby boom” underway, with the population aged 0-5 outnumbering all other age groups as shown in Figure 1-3. There are relatively few young people aged 15-19, which is consistent with the fact that there is no secondary school on Makin and children who wish to complete their schooling must travel to another island.

Figure 1-3: Makin Island population by age and sex, 2010



Data Source: 2010 Census

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.

Table 1-2: Size of Reef/Lagoon Size, Makin

Islands	Reef(sq/km)	Reef base (sq/km)	Lagoon (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

Makin has a literacy rate of 86%. Of the adult population (those over 15), 14% have not attended school at all. 46% of the adult population have a Primary leaving certificate, 24% have a Form 3 certificate, and 15% have a Senior Secondary certificate. Only 2% hold a Post-Secondary qualification

In 2011 a total of 289 pupils were enrolled in two primary schools, namely Abaewewe and Nan Teikao. Of this number 131 were girls and 158 were boys. The total number of teachers in both primary schools was 12, out of which 3 were based at Abaewewe and 9 at Teikao.

Table 1-3 Primary school enrollments, Makin

Makin	No. of Pupils			No. of Teachers		
	2011		Total	2011		Total
	F	M		F	M	
Nan Teikao Primary School	97	110	207	5	4	9
Abaewewe Primary School	34	48	82	3	0	3
Total	131	158	289	8	4	12

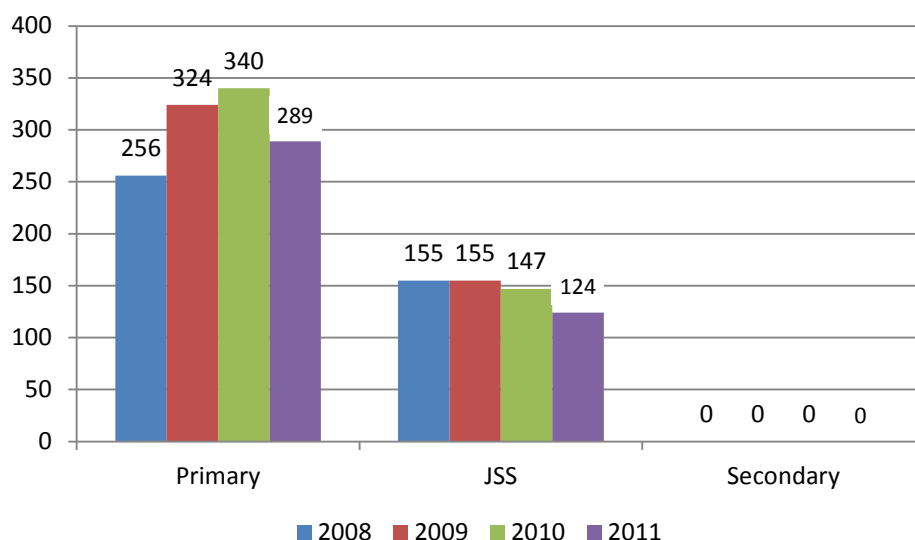
Source: 2011 Education Digest

In 2011 Teikao Primary school had 207 students with 9 teachers while Abaewewe Primary School had 82 students with 3 teachers. By individual school Teikao had a ratio of 1 teacher for every 23 pupils while Abaewewe had 1 teacher per 27 pupils. Combined the ratio for the two schools was 1 teacher per 24 pupils. This is roughly equal to the national ratio for all primary schools in Kiribati which was 1 to 24.6 in 2011.

There is only one Junior Secondary School on Makin, called Makin JSS but also known as Nakaa Junior Secondary School (named after the legendary guardian of the gateway to the place of the dead). As of 2011 the number of pupils enrolled in all forms totals to 124. Nakaa Junior Secondary School is located in Makin village.

Total enrolment in all schools in 2011 was 413. Enrollments each year vary slightly, as the number of children born each year varies and as families move to, or from, 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.

Figure 1-4: All school enrollments 2008-2010, Makin

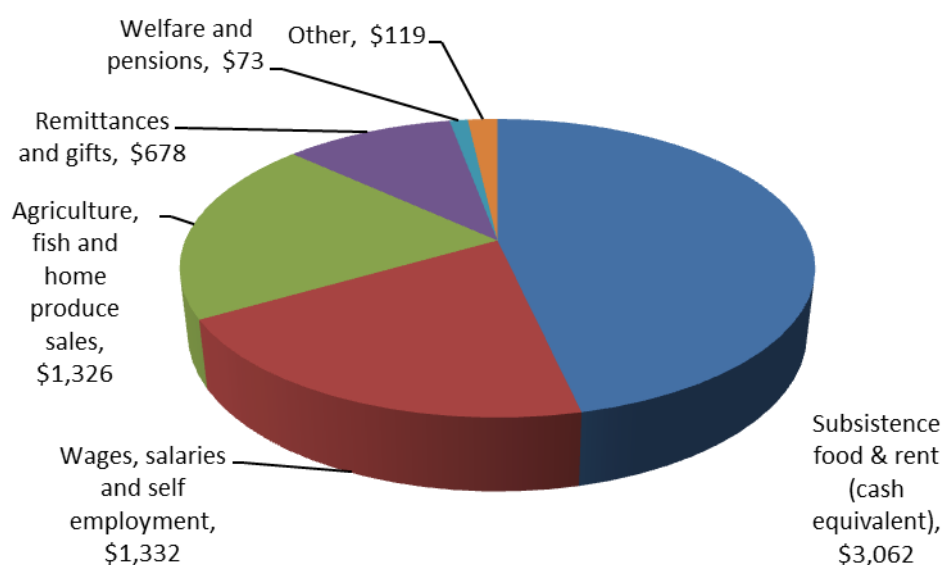


Data Source: 2011 Education Digest

ISLAND ECONOMY

The Household Expenditure and Income Survey 2006 showed that in the Northern islands, of which Makin is one, subsistence activity (living from the land without purchasing or selling) remains the most important economic activity. The equivalent cash value of subsistence food, materials and rent accounted for 46% of total household income. Other important sources of income were wages and salaries, agriculture fish and home produce sales, and remittances and gifts.

Figure 1-5: Sources of Household Income, Northern Islands



Data Source: 2006 Household Expenditure and Income Survey

SUBSISTENCE ECONOMY

Typical subsistence activities include fishing, toddy cutting, cultivation and harvesting of food crops mainly coconut, pandanus, breadfruit and bwabwai, and the construction and maintenance of buildings which are mostly built with local materials. 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 *kainga'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.

FORMAL EMPLOYMENT

In the 2010 census there were 115 people on Makin engaged in formal cash work. The Island Council is the biggest single 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 residents employed as village wardens, village nurses, drivers, hotel keepers, and 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.

MARKET ORIENTED EMPLOYMENT

In the 2010 census there were 507 people, or 49% of the potential workforce (people over 15) engaged in market oriented cash work on Makin – a much higher rate of employment than other outer islands.

Copra production is an important commercial activity on Makin. The regular rainfall and good growing conditions allow for a constant supply of coconuts which provides a reliable source of income for many of the islanders.

In addition to copra production, some families sell bananas, fresh coconuts or pumpkins 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 and vegetable production is still small with most of the operation overseen by small businesses. It is therefore difficult to obtain the amount of money generated, but the number of people engaged in “market oriented activity” on Makin is an indication that this is a significant and growing aspect of Makin life.

As a small island with undeveloped infrastructure, under-utilized resources, and a largely subsistence economy but with a high dependency on imported consumables, the size of trade and commerce on Makin is rather small but important. The most common imported items are food, tobacco and fuel, which are normally shipped to Makin by boat. 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 347 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.

Almost all households on Makin (over 90%) own coconut and breadfruit trees, two of the most important traditional fruit trees, and cultivate bwabwai, usually on family land away from the main villages. Many households (60-80%) also grow pandanus, banana, and pawpaw trees, and cut toddy. A wide range of other produce including *te bero*, kumara and cabbages are also grown by some families.

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. 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 2010 census records show that out of 328 households on Makin, 312 venture in small canoes and boats to fish in the deep ocean surrounding Makin to harvest tuna, flying fish, shark and other species. 244 households fish on the reef flat, although according to locals, the reef flat can be dangerous because of the presence of the Crown-of-thorns starfish (*Acanthaster planci*).

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. Almost all of Makin's households are harvesting the sea in one way or another, mainly to satisfy their subsistence needs, but also for domestic sale.

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.

ENVIRONMENT AND RESOURCES

WATER

The main water source for both drinking and washing is the freshwater lens. Only 9% of households use rainwater as their main source of drinking water, even though rainfall is high, because most households have roofs of local thatch which is not suitable for collecting rainwater.

Well water on Makin is often polluted due to the close proximity of some open wells to pit latrines, and people are advised to boil water before drinking.

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 except during severe droughts.

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, unleaded petrol (*bentiin*) and diesel provide energy for cooking, lighting and transport. In 2011, Makin received 84,000 litres of unleaded petrol, 8,400 litres of diesel and 14,400 litres of kerosene.

ENVIRONMENTAL ISSUES

Environmental issues affecting Makin include saltwater intrusion to *bwabwai* pits, coastal erosion, depletion of natural resources and lack of freshwater during droughts.

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 has caused the intrusion of saltwater into the communal pit, resulting in salt contamination and damage of food crops.

Table 1-4 below shows the environmental issues and impacts identified by representatives from Makin during the 2011 National Summit. In all cases, local causes have been identified which contribute to the problem, but there are also important global influences due to climate change which are expected to become worse over time.

HEALTH

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.

In common with all of Kiribati, the main health problems on Makin are respiratory infections, fevers and diarrhoea. Fish poisoning is more common in Makin than in most other islands, with 50 cases resulting in clinic visits during 2011. Diabetes and hypertension, serious diseases associated with poor diet and lack of exercise, are less commonly diagnosed on Makin than on many other islands.

Half of the adult population of Makin smokes, with 29% drinking alcohol and 29% drinking kava regularly or sometimes. Rates of smoking and kava drinking are about average for Kiribati, while reported rates of alcohol use are among the highest in Kiribati, which is surprising as alcohol consumption is strongly discouraged by village leaders.

TRANSPORTATION

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. As in all outer islands, roads 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.

Bicycles are the most common form of land transport, followed by motorbikes. Cars are uncommon and there is no bus service. However trucks are available for hire.

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.

Boat services between Makin and Tarawa are reasonably frequent but do not run to a published schedule. Air Kiribati has scheduled flights from Tarawa to Makin every Wednesday and Friday.

Table1-4: Environmental Issues and Impacts, Makin Island

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
<p>1. Sea water intrusion into <i>bwabwai</i> pits</p>	<p>Storm surges causing sea water intrusion to <i>bwabwai</i> pits;</p> <p>-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</p>	<p>-<i>bwabwai</i> plants died and therefore need replanting;</p> <p>-seawater comes into the channel at high tides filling <i>bwabwai</i> pits destroying their livelihood;</p>	<p>-replanting of <i>bwabwai</i> by a group known as karoronga or kawawa is popular practice</p> <p>-PWD has built a one way cage to allow fresh water to drain out and reduce seawater coming in</p>	<p>-the process is on going to maintain and sustain the livelihood of <i>bwabwai</i> plants for islanders;</p> <p>-the community tries to replenish the <i>bwabwai</i> plants;</p>

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
		<p>-namo-n-rua (communal <i>bwabwai</i> pit) is greatly affected, the main source of <i>bwabwai</i> for the people</p>	<p>-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</p>	<p>-the one way cage is not very effective</p>
<p>2. Coastal erosion</p>	<p>Aggregate mining and land reclamation</p>	<p>-decrease in land masses</p>	<p>-It is planned to have a separate regulation to oversee aggregate mining that complements the Revised Environment Act 2007</p>	<p>-this had not come to fruition</p>
		<p>-not enough land space for land owners to live</p>	<p>-replanting, demarcation and consultation re: mangroves took place in 2010</p>	<p>-Makin people including island council officials are willing to monitor, whilst ECD officers from Tarawa will come and monitor on planned schedule</p>

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
		<p>-line of coconut trees at coastal areas falling into the sea and lost productivity</p> <p>-high salinity at Makin north</p>		
3. Reduction in natural resources	-construction of an inland causeway in late 1980s.	less marine food for islanders;	-adaptive measures in terms of food security must be carefully planned at village/island level;	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
	-causeway recently turned into a bridge	-damages to marine life will continue, leading to a shortage of marine food for islanders	-families can be encouraged to cultivate and plant indigenous plants plus exotic plants (Taiwan Technical Mission to assist) which are adapted to Kiribati climate	

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
	<ul style="list-style-type: none"> -blasting of a boat channel giving rise to ciguatera poisoning - increasing human population results in increasing demand for resources 	<ul style="list-style-type: none"> -death of edible marine species for the islanders such as mud worm and shellfish -decrease in mangrove crab, sipunculids, shellfish and other marine resources 	<ul style="list-style-type: none"> -encourage domestic trade in land edible plants and marine species from respective islands 	
4. Unexpected prolonged droughts	<ul style="list-style-type: none"> -global warming 	<ul style="list-style-type: none"> -will affect vegetation, fruit trees and ground water 	<ul style="list-style-type: none"> -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; 	<ul style="list-style-type: none"> -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

ISSUES	PROBABLE CAUSE/S	IMPACT on SOCIETY	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
			<ul style="list-style-type: none"> - encourage effective family planning programs to sustain water consumption, awareness on looking after water 	
5. Kiebu village – scarcity of ground well water	-Kiebu is an islet quite distant from main island settlements	-scarcity of drinkable ground water for people living on the islet	-need immediate permanent rain water catchment, such as water tanks for each household and a concrete water cistern;	-rain water being stored will serve the community of Kiebu for a very long time
	- increasing number of people living on the islet	- huge impact on health of school children	<ul style="list-style-type: none"> - 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 	-concrete cisterns persists for years

