



# 6. South Tarawa



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## SUMMARY OF MAIN SOCIOECONOMIC INDICATORS – SOUTH TARAWA

	South Tarawa including Betio					All outer islands					All Kiribati				
	2005		2010			2005		2010			2005		2010		
Population (Census)	40,311		50,182			52,222		52,876			92,533		103,058		
Percent of national population	43.6%		48.7%			56.4%		51.3%			100%		100%		
Land area, km <sup>2</sup>	15.76		15.76			710.58		710.58			726.34		726.34		
Population density, people per km <sup>2</sup>	2,558		3,184			73		74							
			2005-10					2005-10					2005-10		
Population growth			9,871					654					10,525		
Annual rate of growth of population, %			4.45%					0.2%					2.2%		
	<15 years	15-29	30-44	45-59	over 60	<15 years	15-29	30-44	45-59	over 60	<15 years	15-29	30-44	45-59	over 60
Population by age group	17,119	15,784	8,959	5,813	2,507	20,065	13,924	9,503	6,240	3,144	37,184	29,708	18,462	12,053	5,651
Population by age group, %	34%	31%	18%	12%	5%	38%	26%	18%	12%	6%	36%	29%	18%	12%	5%
	2005		2010			2005		2010			2005		2010		
Number of private households	5,245		6,705			8,754		9,338			13,999		16,043		
Number of persons in private households	39,186		49,250			49,458		50,710			88,644		99,960		
Average household size	7.5		7.3			5.6		5.4			6.3		6.2		
	Labour market activity, people 15+					Labour market activity, people 15+					Labour market activity, people 15+				
	Cash work - formal	Cash work - market oriented	Voluntary or subsistence work	Unemployed	Not in labour force	Cash work - formal	Cash work - market oriented	Voluntary or subsistence work	Unemployed	Not in labour force	Cash work - formal	Cash work - market oriented	Voluntary or subsistence work	Unemployed	Not in labour force
Labour force status	8,594	2,487	0	6,826	13,545	4,846	3,666	0	4,626	12,130	13,440	6,153	0	11,452	25,675
Labour force status %	27%	8%	0%	22%	43%	19%	15%	0%	18%	48%	24%	11%	0%	20%	45%
	Education attainment, people 15+					Education attainment, people 15+					Education attainment, people 15+				
	No school completed	Primary leaving certificate	Form 3 certificate	Senior secondary certificate	Post secondary study or qualification	No school completed	Primary leaving certificate	Form 3 certificate	Senior secondary certificate	Post secondary study or qualification	No school completed	Primary leaving certificate	Form 3 certificate	Senior secondary certificate	Post secondary study or qualification
Education attainment	2,418	8,125	7,570	13,626	1,324	4,195	11,858	7,323	8,704	731	6613	19983	14893	22330	2055
Education attainment %	7%	25%	23%	41%	4%	13%	36%	22%	27%	2%	10%	30%	23%	34%	3%
			2010					2010					2010		
Literate in [te taetae ni] Kiribati %			93%					90%					91%		

## PHYSICAL FEATURES

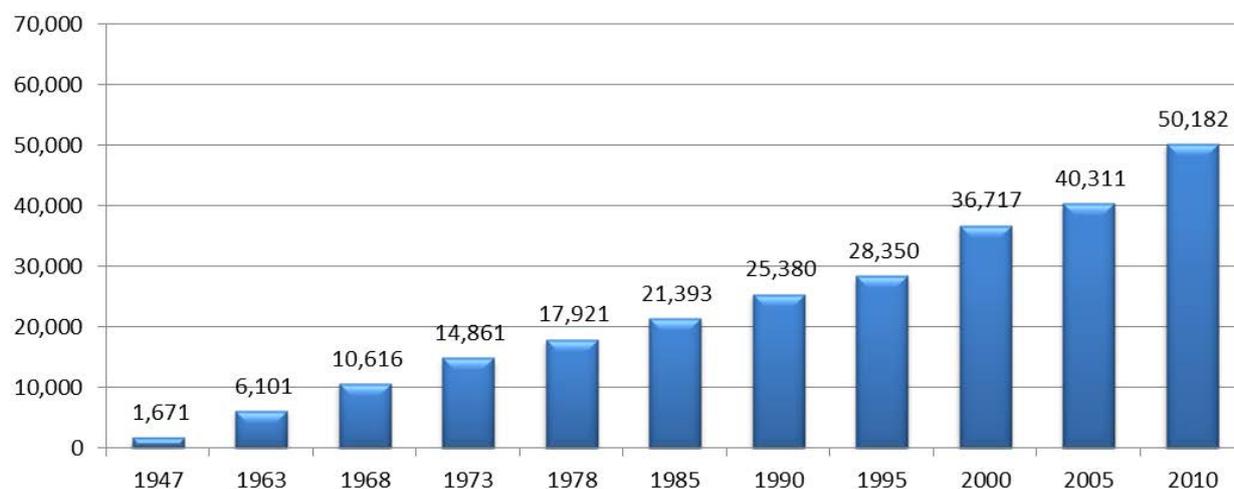
South Tarawa is the strip of land that stretches from Betio islet to Buota<sup>1</sup> village on Tarawa. It is the seat of the capital and hub of the Republic of Kiribati. Most of the island is less than 3 meters above sea level with an average width of only 450 meters. The main villages are Betio, Bairiki, and Bikenibeu. The whole of South Tarawa is linked by causeways, the longest being the Dai Nippon Causeway between Betio and Bairiki.

The seaport is located on Betio, the main hospital at Nawerewere, and the international airport at Bonriki village. The government senior secondary school, King George V and Elaine Bernachi School, is located at Bikenibeu village. Teoraereke village and Antebuka are the headquarters for the two major Christian Churches in Kiribati, the Roman Catholic Church and the Kiribati Protestant Church, respectively. The Church of the Latter Day Saints has its headquarters and secondary school at Eita village.

## POPULATION

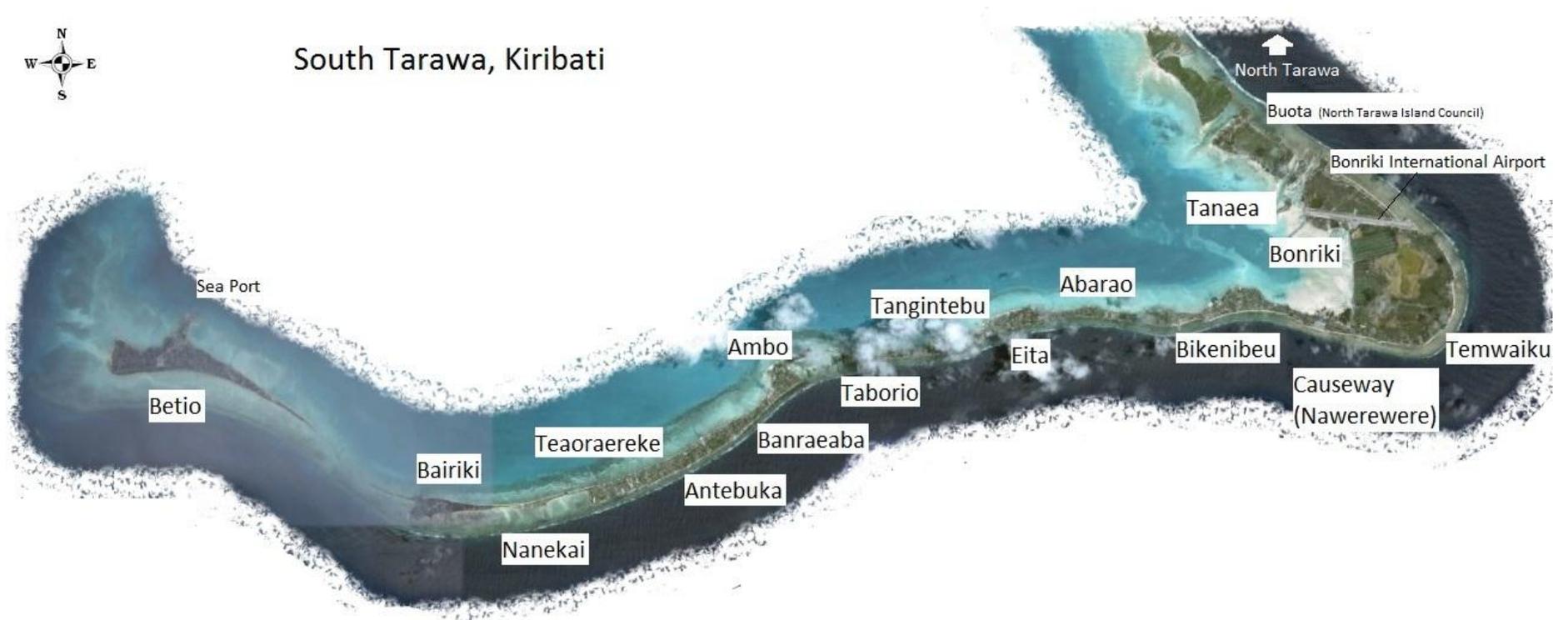
The population of South Tarawa according to the 2010 Census was 50,182. Compared to the 2005 population of 40,311 and the 2000 population of 36,717, the population is growing very rapidly. The population of South Tarawa grew by almost 10,000 people between 2005 and 2010, an annual population growth of 4.4%. South Tarawa ranks 3rd of the 23 islands of Kiribati in terms of annual growth as a percentage, but is by far the fastest growing island in terms of actual numbers.

Figure 5.1: South Tarawa population 1947-2010



<sup>1</sup>Buota islet officially falls under the North Tarawa Island Council (ETC) however it is connected by a road bridge to South Tarawa, and the issues affecting South Tarawa also affect Buota. Where possible this report includes Buota as part of South Tarawa, but some statistics are only for the Betio and Teinainano Island Council areas.

Figure 52: Map of South Tarawa



South Tarawa has an official land area of 15.76 square kilometers and a population (in 2010) of 50,182, giving a population density of 3,184 people per square kilometer. The actual population density is even higher, as the land area of 15.76 square kilometres includes unusable land such as roads and causeways, the airstrip and the offshore islets of Abairarang and Abaokoro; excluding these the land area of South Tarawa is only about 12 square kilometers. Compared with other islands in Kiribati, South Tarawa is by far the most densely populated island. Even compared with other cities internationally, South Tarawa is more densely populated than Auckland or Sydney<sup>2</sup>. All areas of South Tarawa are growing rapidly including areas such as Betio which are already very crowded.

Table 5-1: Population growth 2005-2010 for South Tarawa, by area

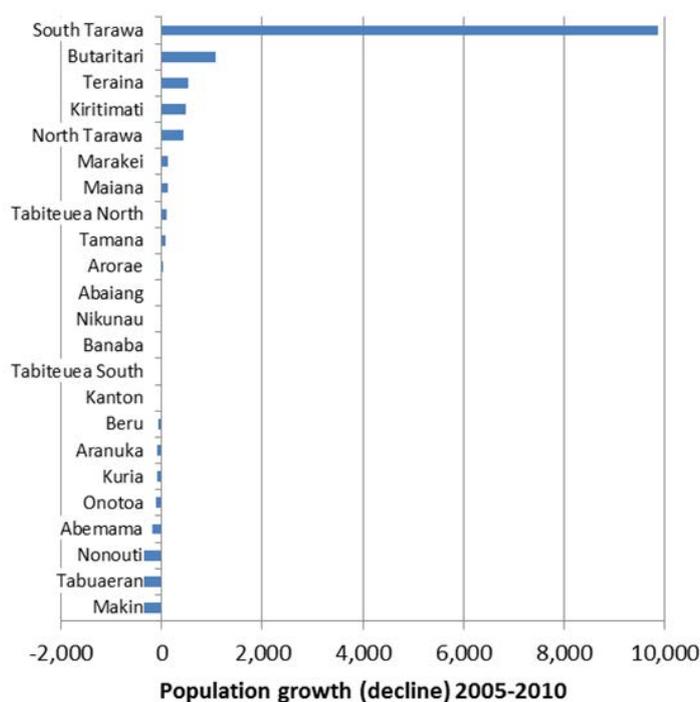
	Annual Average Growth 2005-2010
Eastern Area	2.99%
Central Area	5.69%
Western Area	4.42%
Bikenibeu Urban Area	3.2%
Bairiki Urban Area	5.0%
Betio Urban Area	4.7%
SOUTH TARAWA	4.4%

Source: National Statistical Office and Fraser Thomas Partners 2011

The population of Kiribati grew by 10,525 people between 2005 and 2010. Almost all of this growth is in South Tarawa, which grew by 9,871 people.

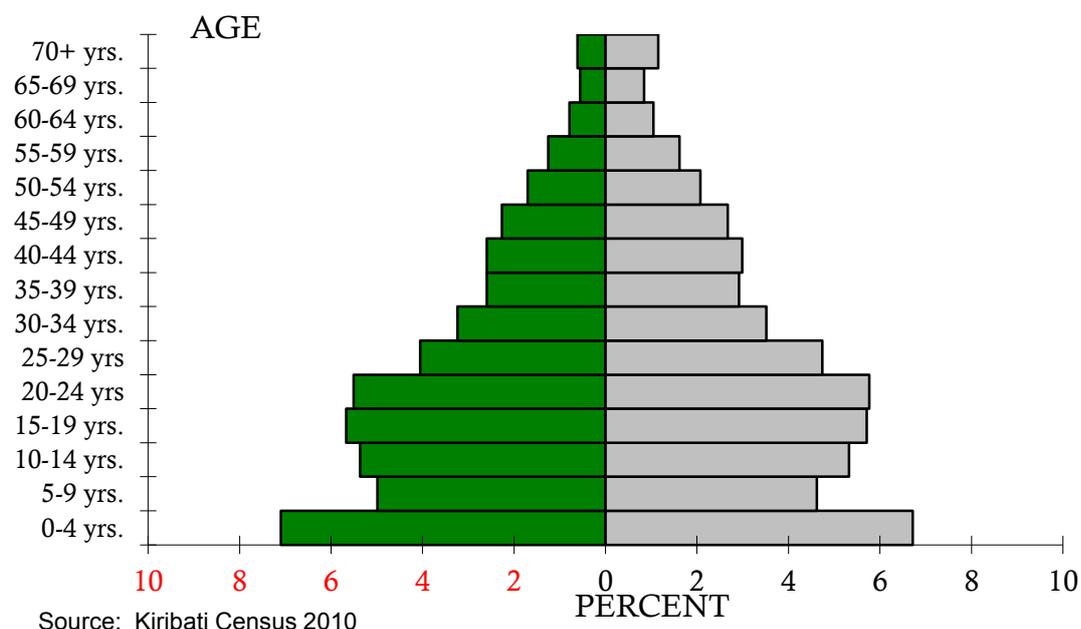
The practice of sending children for schooling and leaving them with relatives on South Tarawa, and relations visiting families on South Tarawa hoping to find jobs, or for health reasons and staying with them indefinitely are some of the main reasons for this overcrowding issue. But though these are the usual reasons given for the growing population of South Tarawa, the 2010 Census reveals that more babies are now being born on South Tarawa than on any other island, contributing to about 2.26% of the population annually to South Tarawa. In total there are 6,934 children aged 0-4 on South Tarawa, this is almost 14% of the total population.

Figure 5.3: Population growth 2005-2010 for South Tarawa, in comparison with other islands



<sup>2</sup>Auckland has 2,200 people per square km and Sydney 2,000 (Demographia World Urban Areas 8th Annual Edition April 2012)

Figure 5.4: Age and Sex distribution of South Tarawa population 2010

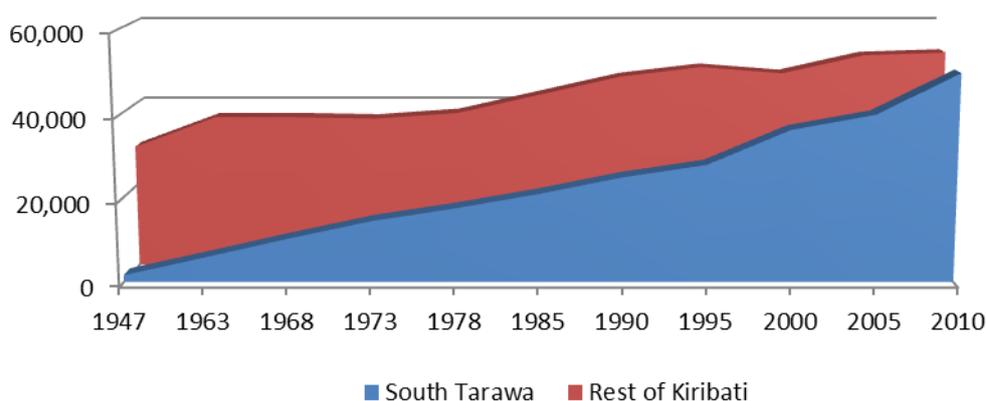


If the current population growth trend for South Tarawa continues, then by the end of 2012, the population on South Tarawa will surpass the population of the rest of Kiribati, and by 2030 South Tarawa's population will double to about 107,000 people. This will be about 70% of the total population of Kiribati living on South Tarawa.

Table 5-2: South Tarawa future population, high population growth projection

Area	Population 2010	Population 2015	Population 2020	Population 2025	Population 2030
Bonriki	2,607	3,153	3,811	4,609	6,297
Temwaiku	3,123	3,775	4,565	5,520	9,400
Hospital	2,324	2,810	3,398	4,109	5,724
<b>Bikenibeu Urban Area</b>	<b>5,940</b>	<b>7,181</b>	<b>8,684</b>	<b>10,514</b>	<b>14,286</b>
<b>Eastern Area</b>	<b>13,994</b>	<b>16,919</b>	<b>20,458</b>	<b>24,752</b>	<b>35,707</b>
Abarao	2,431	2,939	3,554	4,298	5,197
Eita	3,153	3,812	4,610	5,575	6,741
Taborio	1,357	1,641	1,984	2,399	2,901
Ambo	2,297	2,777	3,358	4,061	4,911
Antebuka	3,102	3,750	4,535	5,483	6,630
Teaoraereke	4,106	4,964	6,003	7,258	9,039
<b>Central Area</b>	<b>16,446</b>	<b>19,883</b>	<b>24,044</b>	<b>29,074</b>	<b>35,419</b>
Nanikaai	1,035	1,251	1,498	1,688	1,688
<b>Bairiki Urban Area</b>	<b>3,281</b>	<b>3,947</b>	<b>4,799</b>	<b>6,110</b>	<b>6,960</b>
<b>Betio Urban Area</b>	<b>15,646</b>	<b>18,916</b>	<b>22,837</b>	<b>27,419</b>	<b>27,942</b>
<b>Western Area</b>	<b>19,962</b>	<b>24,134</b>	<b>29,170</b>	<b>35,217</b>	<b>36,590</b>
<b>SOUTH TARAWA</b>	<b>50,402</b>	<b>60,936</b>	<b>73,672</b>	<b>89,043</b>	<b>107,716</b>

Figure 55: Comparison between South Tarawa population, and rest of Kiribati, 1947 to 2010



Average household size on South Tarawa in 2010 was 7 persons with a range between 12 and 4 persons. It is not uncommon however for significantly more people (15 to 20) to use a household's facilities although not reported as household members.

Table 5-3: South Tarawa population by village 2010

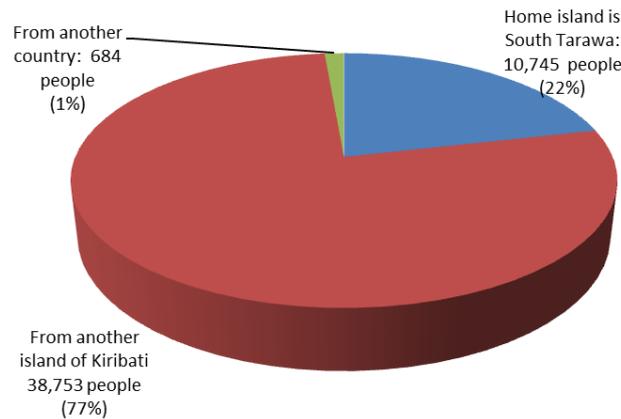
Village	Population	% of total
Bonriki	2,607	5%
Temwaiku	3,123	6%
Hospital	2,324	5%
Bikenibeu Urban Area	5,940	12%
<b>Eastern Area</b>	<b>13,994</b>	<b>27.76%</b>
Abarao	2,431	5%
Eita	3,153	6%
Taborio	1,357	3%
Ambo	2,297	5%
Antebuka	3,102	6%
Teaoraereke	4,106	8%
<b>Central Area</b>	<b>16,446</b>	<b>32.63%</b>
Nanikai	1,035	2%
Bairiki Urban Area	3,281	7%
Betio Urban Area	15,646	31%
<b>Western Area</b>	<b>19,962</b>	<b>39.61%</b>
<b>SOUTH TARAWA</b>	<b>50,402</b>	<b>100%</b>

As shown in the table above, 50% of the South Tarawa population is now concentrated in three Urban Areas: Bikenibeu (5,940 / 12%), Bairiki (3,281 / 7%) and Betio (15,646 / 31%). The balance of the current population is distributed: (i) Between the east of Bikenibeu and Tanaea (included in Bonriki area) at the causeway which separates South and North Tarawa. This is the Eastern Area, with 27.76% of the total population); (ii) Between Abarao and Taeoraereke (the Central Area), with 32.63% of the total population); and (iii) Nanikai, Bairiki and Betio (the Western Area) with 39.61% of the total population.

One striking feature of South Tarawa's population is that only about one in five people (22%) identify themselves as being "from South Tarawa", even though over three quarters of South Tarawa residents (76%) were born here. Most people living on South Tarawa say they are

from one of the other islands of Kiribati. Perhaps this loyalty to a distant home island is one of the reasons why the environment of South Tarawa is not being protected as it should.

Figure 5.6: Population of South Tarawa by home island



Source: 2010 Census

The high population density and on-going population growth of South Tarawa are exacerbating the already serious problems of waste disposal, sanitation, and environmental pollution unusual on South Tarawa. Overcrowding is a problem in households who have low income or have no access to land to build houses or to gather fruits. As South Tarawa is the hub of central government administration and of the commercial sector, it is rational that new migrants will continue to move to the urban areas in search of better employment opportunities and higher incomes for themselves and their families. Explicitly attempting to slow or reverse this trend is not likely to be successful and would not be rational in economic development terms, given the important contribution to national economic growth that urban areas are able to make.

The challenges the government ministries and the three Island Councils are facing are how best to ensure that their services reach the public and how best to improve the economic conditions in order to enhance the quality of life for people living in the urban areas. But having said that, it still needs to be emphasised: 'South Tarawa has a large and growing population and is placing an additional burden on the already fragile atoll environment. And Church leaders who command a lot of respect from the people can help curb this menace by allowing their church members to practice safe birth control measures.

## LAND AND MARINE RESOURCES

### LAND RESOURCES

The gross land area for South Tarawa (Fraser *Thomas Partners, 2011*) excluding the airport and causeways is 1,157 hectares, and the amount of land committed to non-residential use or which is not developable is 473 hectares. The balance available for residential use (including local roads and local land uses is 683 hectares. 30 % of this has been allocated for local roads and local land uses. This 30% totals 204 hectares. There are significant areas of land which are regularly inundated or at risk of inundation which would need to be filled before being available for development. These include the large area of undeveloped land at Temwaiku and smaller areas on Betio, Abarao and Ambo.

Land is owned by the families. The head of the family has the right to distribute land to its members. All members of the family have equal rights to family lands, to build or to collect fruits from. Large portions of land are leased to governments, businesses, to organizations and churches. A substantial portion of the island on South Tarawa is still occupied by villagers and migrant settlers from other islands,

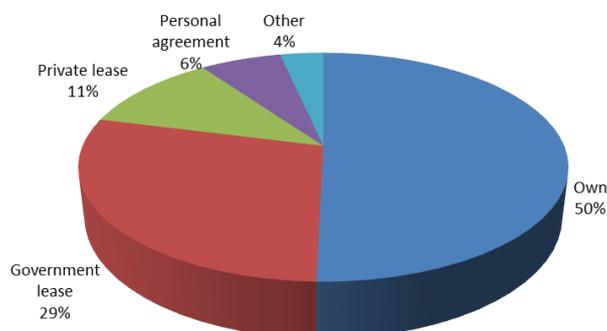
The rights of the landowner are paramount in existing land tenure and urban planning arrangements. The Native Lands Act for example, provides that the landowner 'controls the use of his property' while the Land Planning Act makes provision for land use planning in the 'public interest'. On lands leased from landowners by Government on South Tarawa, the landowner still retains the right of veto over applications for a sublease on his leased lands, by consenting or refusing his consent signature on the planning application form.

State lands are confined to Temwaiku Bight, a reclaimed area of land of approximately 200 hectares. Government leased land cover approximately 30% of land on South Tarawa. The leases were taken out in the name of 'orderly planning for public and private development'. Government buildings, sports field, small industries, ports, offices of local governments, and extensive public housing stock under the authority of Government's Kiribati Housing Corporation (KHC) are built on these leased lands. Areas not required for public purposes within these leased lands are subleased to applicants on a 25 year period for business, churches and to individuals. Land rent are paid to landowners every January, and reviewed every 5 years.

This current complex land supply / tenure situation, including the extensive use of Government head lease arrangements in the main village areas has left large segments of the urban population with no alternative but to either construct their houses illegally or to enter into some form of an agreement (informal or formal) with the owner of native lands. On Betio, Bairiki, Teaoraereke, and Bikenibeu where space has dwindled considerably because of developments and the influx of migrant settlers from outer islands, homes and squatter settlements are found amidst the shops and offices in these villages.

Overall, only half of South Tarawa households live on land that is owned by their families. One in ten households on South Tarawa live on land that is neither leased nor owned; their right to occupy the land is based on a personal agreement or other arrangement.

**Figure 5.7: Household rights over land, 2010**



Source: 2010 Census

Disputes over land occupation and land boundaries are increasingly a problem on South Tarawa. Many of these land disputes are the result of poor informal agreements which have no legal or contracted basis, including complaints by landowners and family members who challenge the names shown in the South Tarawa Land List in court.

The overriding consideration in both improving the existing, overcrowded housing conditions as well as providing land to accommodate future growth in South Tarawa, will be to ensure that to the extent possible, adequate amounts of native lands (a lot which are underutilized or used as rubbish sites for old cars and rusting containers) as well as the comparatively small area of State lands are brought onto the housing market and for development in an orderly and planned manner, especially as growth spreads into the peri-urban areas of lower North Tarawa. It is important also that certain occupiers of land, especially the Churches and the schools make best use of the lands they occupy, for example, by building double storey buildings to have extra space available for other uses, and allowing for community use of their land and open space, for example as sports fields – or relinquish the land for development. Churches through their groups, very often fundraising groups, are a growing occupier of land on South Tarawa – the Latter Day Saints Church, the Roman Catholic and the Kiribati Protestant Church in particular. It is now a common sight on South Tarawa to find church groups having their own *maneaba* and worship halls. This further reduces the amount of land available for housing.

Although a large portion of the land on South Tarawa is occupied by houses, office buildings and roads, a diminishing proportion remains occupied by coconut trees, pandanus, breadfruit, *bwabwai* (local taro variety) and wild bush. The dominant fruit trees in terms of numbers are coconut and breadfruit. Pandanus is still grown on family land while banana, pumpkin, tomato, cucumber, and Chinese cabbages are also cultivated by many households though the technical assistance of Taiwan Technical Mission and the Agricultural Department of MELAD. Most people on South Tarawa, however, do not live off the land; there are just not enough fruits in terms of bananas and pandanus but a variety of home grown vegetables are increasingly available at roadside stalls for those who can afford to purchase them.

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## MARINE RESOURCES

South Tarawa has a large reef area and mudflat, and its lagoon, which it shares with North Tarawa is one of the largest in Kiribati(533.91 sq.km). Its reef, mudflat, and lagoon were at one time abundant with fish and shellfish of many sorts; overfishing and pollution are the main causes for the scarcity of catches on the reef and in the lagoon.

Table 5-4: Reef and Lagoon Size, Tarawa (including North Tarawa)

Island	Reef (square km)	Reef base (square km)	Lagoon (square km)	Land (square km)
Tarawa	129.03	375	533.91	31.2

Source: Ministry of Fisheries & Marine Resource Development

Accessing lagoon and deep sea resources requires owning a canoe or a boat, fishing gears, and other necessities. The fishing catches are generally used for subsistence, but those who go fishing using motorized skiffs are usually fishing gangs employed by boat owners, and their catch is mainly for commercial purposes on South Tarawa.

*Anadara holoserica (te bun)* is scarce because of overharvesting; even *Strombus luahunus (tenouo)* is not as plentiful as it used to be in the last decades.

Some marine issues for South Tarawa include:

- a. Lack and cost of fishing equipment;
- b. Competing of local fish companies and vendors with fish from CCPL;
- c. Depleting lagoon resources in the nearby sea area and in the lagoon, *te bun and tenouo*;
- d. Continual contamination and pollution of the lagoon and beach as still being used for toileting and rubbish dumping;
- e. The use of newly developed destructive fishing methods such as 'water splashing for bonefish, gillnetting schooling fish over lagoon reefs.

## ENVIRONMENT

### CLIMATE CHANGE AND SEA LEVEL RISE

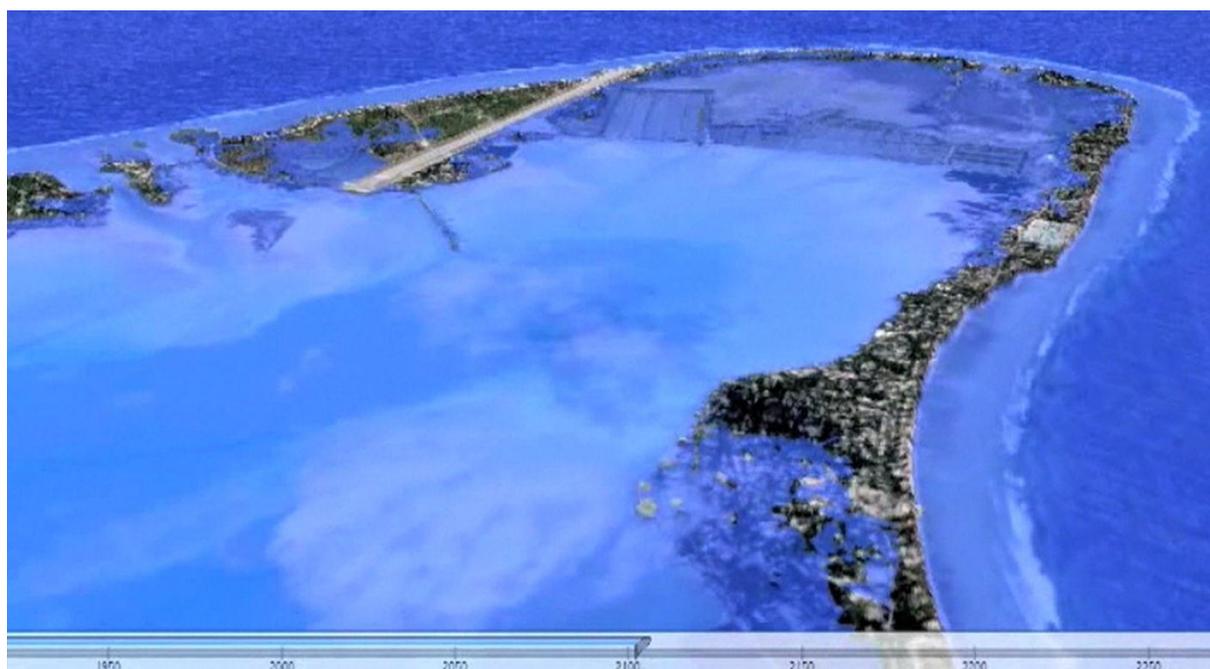
Climate change will make current development challenges worse throughout Kiribati, and this is especially true in South Tarawa. Climate change issues identified by the South Tarawa community are listed in Appendix 1, these include:

- Coastal erosion
- Depletion of marine resources
- Overcrowding
- Lack of water and poor water quality.

However, there is evidence that at present, climate change is not the main cause of coastal erosion, water shortages or overcrowding. Other issues, especially population growth and the move to Western lifestyles, are having a more immediate impact. But any future plans to tackle any of the above challenges need to provide for the growing contribution of climate change over time.

Estimates of the extent of sea level rise risk vary, and if the IPCC High Scenario 2070 risk levels are assumed it is suggested that Bikenibeu and the area immediately to the west of Biekenibeu, Eita and Antebuka and Antenon are most at risk (extreme risk) with Bangantebure and Temaiku having a high level of risk. Nowerewere, Tangintebu, Ambo and Teaoraereke and Betio are classified as being at a medium risk level and Abarao, Taborio, Banraeaba, Nanikai and Bairiki are all classified as being at (relatively) low risk. With limited land availability and an increasing population, settlement densities in South Tarawa are increasing especially in the already densely populated areas of Betio, Bairiki, Nanikai and Bikenibeu. However the long term outlook for the whole of Kiribati looks uncertain as more recent scientific evidence suggests faster sea level rise than the IPCC Scenarios.

Figure 5.8: GIS simulation of the effect of sea level rise - Bonriki/Temwaiku area in 2100 under IPCC "high" scenario



## ENVIRONMENTAL ISSUES AND CHALLENGES

Developments and the growing population have both put a lot of pressure on the environment in terms of destruction and pollution to many sites because of the over extraction of sand, gravel and rocks (aggregates), removal of trees from shoreline for firewood or building, and poor waste disposal habits. The practice of raising pigs and chickens around homes creates a lot of foul smell, and the waste from these animals, including wastes from stray dogs and cats is a growing concern for health and for the underground water lens.

One of the major concerns for fish and coral in the lagoon is the growing number of ship wrecks and the fear of oil spills from sunken vessels inside the lagoon. Disposal of wastes from mechanical shops and bus companies which directly dispose of waste oil into the ground or along the shoreline is a big threat to the freshness and cleanliness of water lens across the island.

Sanitation in South Tarawa is inadequate and the environment is not in a healthy state, especially in overcrowded places in the main centres, despite the waterborne sewerage system. The sewage collected is discharged to the sea at the three main centres of Betio, Bairiki and Bikenibeu. Leaking pipes in the reticulated saltwater system which provides saltwater to premises connected to the sewerage system for flushing is injecting a lot of seawater into the water lens, making groundwater repulsively brackish and contaminated.

The beach is still being used as toilet by many people, even by those that have flush toilets or pit latrines. Many of the flush toilets and pit latrines are poorly maintained in that they leak into the water lens and many are offensive.

The habit of disposing of rubbish anyhow, especially into the sea, is polluting the beaches, coastal waters and the lagoon. Solid waste is now collected by the two South Tarawa local

councils within their respective jurisdictions, but a lot of community education on proper disposing of rubbish is still required to ensure a healthy and clean environment.

The Ministry of Environment, Lands and Agriculture Development (MELAD) is involved in the replanting of mangroves in selected sites to help against coastal erosion; however, a lot more is required to protect many of the sites already eroded away on South Tarawa including islets that once were protected with mangrove and iron-wood (*tengea*) trees. Extraction of aggregate in quantities from the foreshores and inland is one of the main causes of erosion on the foreshores in many places and a danger to underground water lenses especially the Bonriki water reserve.

## EDUCATION

South Tarawa has a literacy rate of 93%. Education levels on South Tarawa are generally higher than for the outer islands. Of the adult population (those over 15 years old), 7% have not attended school at all. 24% of the adult population has a Primary leaving certificate, 22% have a Form 3 certificate, and 43% have a Senior Secondary certificate and 4% hold a Post-Secondary qualification.

Tertiary, Secondary, Junior Secondary, Primary and Pre-schools are all found on South Tarawa.

A total of 12,195 children were enrolled in the primary, JSS and secondary schools in South Tarawa in 2011. Overall there are fewer boys at school than girls, of the total enrollments males comprised 5,716 (47%) and females 6,479 (53%). In the senior secondary years, there are significantly more girls (1,469) than boys (1,141).

Table 5-5: South Tarawa school enrollments 2011

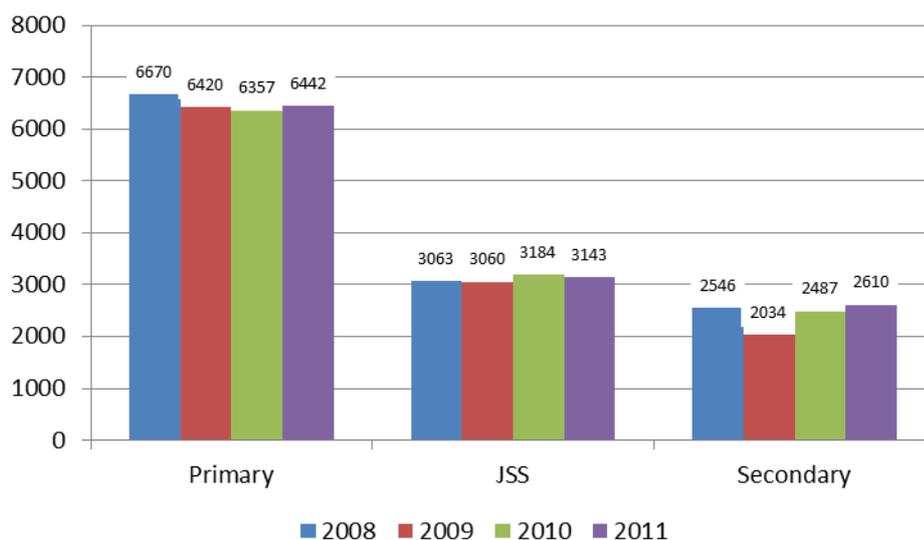
Year Level	PRIMARY						JSS			SECONDARY				Total		
	1	2	3	4	5	6	7	8	9	10	11	12	13			
Abaunamou Primary School	89	86	87	71	78	79								490		
Bareaumai Primary School	68	69	61	73	54	61								386		
Bikenibeu West Primary School	91	91	99	125	107	115								628		
Dai Nippon Primary School	108	86	96	82	123	94								589		
Rurubao	66	48	35	32	43	33								257		
St John Bosco Primary School	48	70	60	57	68	73								376		
Taakeni Bairiki Primary School	122	122	124	117	98	102								685		
Tabontemaneaba Primary School	110	98	120	92	115	103								638		
Tebwanimwaneaka Primary School	99	86	108	93	115	119								620		
Temaiku Satellite School	57	55	25											137		
Temwanoku Primary School	162	151	146	154	179	150								942		
War Memorial Primary School	115	125	102	115	119	118								694		
Betio JSS							317	312	315					944		
TUC1 JSS							391	370	360					1,121		
TUC2 JSS							205	213	174					592		
Moroni High School							56	70	67	114	109	81	44	541		
St.Louis High School							105	85	103	167	130	174	68	832		
King George V & Elaine Bernacchi										187	195	151	139	672		
Sacred Heart High School										27	51	36	49	163		
St. Patrick College										117	123	134	66	440		
William Goward Memorial School										141	153	134	20	448		
	1,135	1,087	1,063	1,011	1,099	1,047	1,074	1,050	1,019	753	761	710	386	12,195		
	Primary enrollments total						6,442	JSS enrollments total			3,143	Secondary enrollments total				2,610

In 2011 there were 6,442 students were enrolled in the primary years, 3,143 in the JSS years, and 2,610 at senior secondary level. In the primary and JSS years, most of these students will be Tarawa residents. It is a concern that, despite the growing population of

South Tarawa there seems to be little change over time in primary or JSS level school enrollments.

At secondary level many students travel from their home island to attend school in South Tarawa, usually staying with relatives. Secondary schooling is not compulsory in Kiribati and school fees are hard to afford for many families.

Figure 5.9: South Tarawa school enrollments 2008-2011



School children make their own way to school, and with most of them using the public transport which are usually full during the morning rush hours and sometimes is very scarce on raining days. Children getting to school late is not unusual, and some children miss whole days of school as they are unable to catch a bus.

At the tertiary level, the University of the South Pacific has a campus at Teoraereke. There are also several vocational schools including an institute of technology (KIT), maritime training centre (MTC), a fishing school (FTC), a Policy Academy, a nursing school, a teachers training college (KTC), a theological college (TTC) for Ministerial Formation in the Churches at Tangintebu, and a pastoral institute (KPI) at Teoraereke.

With a population growth rate of 4.45% - through in-migration from outside South Tarawa and especially from childbirth at 2.26% per year - by 2015 the population of South Tarawa is projected at around 61,000, and will reach 73,672 in 2020 (*Fraser Thomas Partners 2011*). This will mean an increase of another 10,000 people in 2015, or about 990 newborn babies every year from 2010. And if that is the case, some of the questions to consider are: Are there provisions for more classrooms to the existing ones to accommodate children of school-age by 2015 if they all went to school? Is there provision for more teachers in proportion to the growing number of students? Will there be enough public transport to get them to school on time? Will there be enough drinking water and good toilets in the schools?

Every year more than 2,000 school leavers, school dropouts, and returning students studying abroad seek employment mainly on South Tarawa. And every year about 500 jobs in the formal and private sector are available. What would the remaining 1,500 do and what

impact would they have on resources, family and social stability? Would they ever want to go back to their home islands and adapt to the rural lifestyles?

## WATER

Most households on South Tarawa use rain water and groundwater for drinking, cooking, and cleaning. However, groundwater fetched from wells on most of South Tarawa is not suitable for human consumption. All groundwater tested on South Tarawa tests positive for coliforms, faecal coliforms and E.Coli, that is, the lens water for South Tarawa is universally microbiologically contaminated and should not be used for drinking or cooking purposes without being boiled. Worse, in the main settlements of Betio, Bairiki, Teorareke and Bikenibeu, chemicals and heavy metal in the water lens have also been found, this means the water is unsuitable for drinking even after it has been boiled.

Clean and treated groundwater, therefore, is brought to homes by the Water Supply section of Public Utilities Board. The two main freshwater lenses that supply potable water to most households come from Buota and Bonriki. The PUB currently applies a standard charge for water consumed of A\$10 per month. The output from the Bonriki infiltration galleries which is of the order 1900-2000m<sup>3</sup>/day, is treated at Bonriki and then distributed through a 30km long transmission main and a series of low level and elevated reservoirs into a network that serves the communities. Unfortunately the Bonriki galleries are about 20% over-pumped so there is high risk of increased salinisation under circumstances such as on-going over-pumping, drought, climate change or excessive unauthorized extraction of water for private use. According to PUB, only about 705m<sup>3</sup>/day of the water treated at Bonriki reaches the customers. The remainder (1250m<sup>3</sup>/day) is unaccounted for water - leakage, waste and unlawful connections.

The Buota galleries have been off-line since 2008 because of pipeline damage that has since been repaired but the reconnection of the system was delayed because PUB made no provision for an essential \$37,000 transformer – this equipment has since been ordered and should be operational by mid 2012. To cope with this mis-match on water demand, PUB has set up 51 zones so customers in each zone receive water for 2 to 3 hours in 48hrs. The significance of this is that it is very difficult to maintain positive pressure in a piped system that has such highly variable flows. A normal consequence of highly variable flows is contamination of the mains through ingress of polluted ground water.

The Bonriki water reserves are also under threat from pollution. Numerous reports over the recent past have raised concerns about human habitation encroachment on the Bonriki water reserve. One report recorded that *E. coli* a microbiological indicator of the presence of human or animal waste was detected in the Bonriki freshwater lens.

The lack of a water reserve management plan linked to a lack of will for curbing unacceptable practices affecting lens water quality could eventually condemn the Bonriki lens water to a status that may be no better than the polluted shallow ground waters that prevail throughout South Tarawa. MHMS disease statistics and water sampling records highlight several important and relevant facts (i) diarrhoeal diseases are a significant causes of illness in the community; (ii) the mortality rate for under 5 year olds is 49:1000 - an unacceptably high rate that would have to be analysed before a direct association with water could be made; (iii) incomplete as the data base is, there is still evidence that PUB does not

consistently maintain a free chlorine residual throughout the distribution system as shown by the fact that MHMS regularly records nil chlorine residuals in PUB elevated reservoirs; and (iv) by PUB's own admission, it only reacts when advised by MHMS.

AusAID (1977-1983) and ADB (1999-2005) have been involved in water and sanitation in the past, and are the major donors contributing to current improvements in the water and sanitation networks. In 1999-2005, the ADB supported Sanitation, Public Health and Environmental Project (SAPHE) provided significant improvements to South Tarawa's water supply (as well as sewerage, saltwater flushing system and power supply system) and further improvements, supported by multiple donors, are planned under the South Tarawa Water and Sanitation Roadmap. The World Bank/GEF/other donor which support Kiribati Adaptation Project (KAP 1 and KAP 2), a 'climate change' focused project, supported the development of a National Water Policy initiative and a 'Water Master Plan' for South Tarawa.

Approximately 3,500 consumers of the total of approximately 5,250 establishments are now connected to the reticulated water supply system (this is estimated to be around 67% of households). The main area yet to be connected in South Tarawa is Temwaiku, but smaller settlements without safe water supplies are found throughout South Tarawa.

One of the serious concerns now for water in South Tarawa is the sustainable yield from the water lenses at Bonriki currently being tapped as they have already have been exceeded. This means increased salination of the Bonriki freshwater lens. Another serious concern is the risk of contamination by the *Giardia* and *Cryptosporidium* protozoans, contaminants outside the scope of the protection that chlorine can provide. And with households continuing to appear overnight, clean water will be a major issue for South Tarawa for the foreseeable future.

## ENERGY

Two separate generating stations serve South Tarawa including Betio. Each has diesel generators feeding an integrated underground transmission and distribution system. Electricity is generated at 11 kv and is stepped down to a 415 volt system and then to 240 volts for household supply. The station at Betio has one generator of 1.25 mw capacity. The new station at Bikenibeu provided with Japanese government support has 3 generators which deliver 4.2 mw giving a total capacity of 5.45 mw. Average consumption is approximately 5.1 mw.

There are a total of about 6,400 consumers of which about 5,260 are domestic (Betio 2,020, Bairiki 1,835, Bikenibeu 2,552), 287 industrial and 814 commercial. Most residences are connected to the electricity supply, and most households use electricity for lighting. Electricity tariff is AUD\$0.34c per unit for residential properties and AUD\$0.47c per unit for commercial properties. Billing is done monthly. Power generation is currently just able to meet current demand. Power used to run these generating stations is diesel imported from overseas and is costly.

Most households in the main centres, Betio, Bairiki, and Bikenibeu use kerosene stoves for cooking as firewood is becoming scarce in these villages. Coconut oil waste from the Copra Mill is now becoming a popular fuel for cooking by many families who find kerosene expense

to buy. Gas is used for cooking as well, but only by families who have gas stoves and oven and can afford to buy gas.

## ISLAND ECONOMY

### SUBSISTENCE ECONOMY

Fish are important as a food source and a source of income for many unemployed men and school drop-outs, fishing for owners of fishing boats around South Tarawa. Betio, Bairiki, Teoraereke and Bikenibeu are the main fishing centres selling mainly tuna, flying fish, and lagoon fish.

With very limited space for planting crops, home gardens are familiar sights around South Tarawa. With the support and help of the Taiwan Technical Mission, a growing number of people are growing vegetables and raising pigs. Because of the limited number of coconut trees, copra cutting is confined to villagers of Buota, although it is not uncommon to find copra being dried in Bikenibeu and Temwaiku to sell as well.

### ECONOMIC AND COMMERCIAL ACTIVITY

The economic development of South Tarawa as the centre for economic welfare of the country is fundamental to the economic development of Kiribati and the provision of government services and support to the Outer Islands.

Currently unemployment and under-employment are a serious problem in South Tarawa. In 2010 only 34% of urban people over 15 years of age were engaged in cash work. Of the remainder, 21% were unemployed, 5% were engaged in voluntary or subsistence work, and 41% were not in the labour force (that is they were studying, retired, raising children or otherwise not available for work). In total, two thirds (66%) of adults (over 15) in Tarawa are either out of the labour force, unemployed or engaged in subsistence activities.

However, there are indications that efforts to consolidate the economy of Kiribati (and especially efforts to create employment in South Tarawa) are bearing fruit. The proportion of people engaged in cash work in 2005 was only 30%, and there has been a lot of growth in market activity, with market oriented work providing a cash income for almost 2,500 people.

Economic investments are beginning to deliver benefits in terms of jobs and cash income. For example, Kiribati Fish Limited is a three-way partnership between the Kiribati Government's Central Pacific Processors, a Fiji-based fishing venture Golden Ocean and Shanghai Deep Sea Fisheries Limited. Kiribati Fish plans to begin operation in Betio in 2012 and it will be Kiribati's first onshore fish factory with a US\$12 million investment. Another example is a joint venture between the two governments of Kiribati and Fiji and a foreign investor for fishing and processing company. Fiji will host the cannery and Kiribati will supply the tuna. As the Pacific Island nation with the largest fishing waters, Kiribati is working on several similar joint ventures which, if all were implemented, would represent more than US\$86 million worth of investments. Five of these ventures concentrate on fishing in Kiribati's 200-mile Exclusive Economic Zone (EEZ) and government has given notice of its intention to include on-shore processing of catches in future fish access licences. Joint

ventures between the Kiribati Government and four Korean companies will see the construction of a fish market and ice plant in Betio.

Although there is growth in the number of jobs, the problem remains that this growth is outstripped by growth in population. Every year more than 2,000 school leavers, school dropouts, and returning students studying abroad seek employment mainly on South Tarawa. And every year about 500 jobs in the formal and private sector are available.

Planned urbanization is recognized as a prerequisite for economic growth, diversification and sustainable development. However, for the economic and social potential of towns to be realized, their development needs to be accompanied by appropriate capital investment in a variety of infrastructure sectors so as to respond to the different needs of the urban population, and in reality Kiribati is still faced with problems of funding capital for infrastructure and service delivery to urban communities. There is at present little interplay at the macro level policy between economic planning, physical land use and environmental planning.

It is striking that although current government policy would appear to be attracting investment to the Outer Islands to ensure equitable national development, South Tarawa will be hosting an array of investment implementation from 2012 for a number of years. These include the World Bank/ADB roads project, Asia Development Bank (ADB) Sanitation and Water Improvement Project for South Tarawa, Bonriki International airport runway rehabilitation, and the Betio Port rehabilitation and expansion project. The implementation of these infrastructure investments are much needed and will help to promote economic investment, but will also attract a large number of in-migrants in the early years of the plan period.

A number of successful local entrepreneurs and companies are found on South Tarawa, but there are also a growing number of companies owned by locals of Chinese origin (recently naturalised). Most of the companies are retailers and/or wholesalers of mainly imported goods and products. (With Kiribati importing more than it is exporting our trade balance is, as it has always been, a trade deficit.) The most common and depressing issue with shop owners is that of credit – *tetaarau* – and many shops have closed down because of *tetaarau*. This habit of purchasing goods on credit without being able to repay is one of the indicators of 'poverty'. The majority of people on Tarawa are jobless and those who have jobs cannot settle their '*taarau*' because their earnings do not match their level of need in terms of food and basic items. The Household Expenditure and Income survey showed that the average household on South Tarawa earns \$11,464 per year (including almost \$4,000 "cash equivalent" for subsistence activities and imputed rent) but spent \$13,149 each year with half of this spending being on food. Every year, households on South Tarawa slip further into debt.

In many cases, small retail shops purchase on credit from government's importing/wholesaler agencies; when little shops fail to pay up the wholesalers also lose money and unable to repay to overseas suppliers, and the cycle goes on.

Government has a number of Enterprises which are yet to perform and pay dividends to government. Because of their poor performances, the most likely path for many of them is to close down or sell them to local and overseas entrepreneurs. One classic example is the

recent sale of Government's Supply Company that has been functioning since colonial days until its demise at a stringent competition with local and overseas hardware entrepreneurs. Before the company was sold, it had received Government bailouts totaling millions of dollars to try to keep it afloat. Mismanagement of public enterprises is rife. If the private sector can provide services that public enterprises are insufficiently providing then it is more efficient for the Government to close or sell these enterprises.

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## EMPLOYMENT

There are more people engaged in cash work in South Tarawa than in the Outer Islands, but even in South Tarawa, there is little prospect of school leavers finding job in the formal sector. In 2005, young people between 15 and 24 years of age constitute 35% of the workforce in South Tarawa. They are the most affected by the lack of cash employment opportunities as they represent 50% of unemployed or inactive people (representing a total of 2,000 youth) and only 17% of those engaged in cash work.

In South Tarawa women make up 53% of the workforce and 40% of cash workers. However, women are still outnumbered by men in high level government positions. In the lower income groups, women are active in the informal sector, selling candy, bread, doughnuts, fish, clothing or handicraft products.

Unemployment is a growing concern for many people living in South Tarawa, yet people from the Outer Islands keep flooding in hoping to find jobs and a school for their children. Government, the private sector, island councils, and the Churches are the main employers in South Tarawa.

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## HANDICRAFTS

A number of handicraft and local produce stalls can be found on South Tarawa. Most of the handicrafts are made by women, and they include dancing costumes, mats, replicas of traditional swords, houses, and canoes.

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## HEALTH

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### HEALTH FACILITIES AND SERVICES

The main hospital is at Nowerewere in Bikenibeu area. Betio has its own hospital while the populated villages have their own clinics. From Buota to Bairiki, there are 13 clinics, and Betio alone has 7. Some of these clinics are special clinics for certain ailments or for counseling.

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### LIFESTYLE IMPACTS ON HEALTH

Sexually transmitted and non-communicable diseases including health problems linked to changes in diet and habits are on the rise in South Tarawa. Smoking, consumption of alcohol and especially kava drinking are not only becoming a public nuisance but are also quite costly not just for families, but to the local clinics and the health budget of the county as a whole. Twenty percent (20%) of the population of South Tarawa drink alcohol "regularly" or "sometimes", and the same proportion (20%) drink kava. Thirty five percent (35%) of people

over 15 years old are smokers. Women are around half as likely to smoke, and much less likely to drink kava or alcohol, compared with men.

People, mostly men, spend their evenings singing and drinking kava, and then spend the whole morning of the next day sleeping, or if employed would perform half awake and still feeling groggy at work the following day. In a lot of cases, civil servants who drink heavily over a weekend, either alcohol or kava, would get sick on the first and even second official working days. And of course, poor performances in workplaces, whether it is in government or in the private sector, will always have adverse effects on the economic activity of the country.

The impacts on the health and welfare of individual families of smoking and alcohol and kava consumption are now seen more and more as the real causes of or contributing factors to many family health issues and eventual family breakdowns. The Bonriki-based Alcohol Anonymous (AA) Rehabilitation Centre recently announced that its current programme will extend to include kava addicts as the impact on families is similar to that of alcohol.

Children and young women roaming around kava bars and night clubs during late hours at night is becoming a normal sight in Bikenibeu, Bairiki, but especially in Betio. Either parental control has loosened or the parents are not at home, and are most likely to be found in Church *maneabas* playing bingo or in kava gatherings.

Kiribati has an extremely high incidence of water-borne diseases with an infant mortality rate amongst the highest in the Pacific at 46 per 1,000 live births, which is attributed to infantile diarrhoea. The World Health Organization (WHO) and health officials report an average of three outbreaks of diarrhoea annually directly linked to poor water supplies, inadequate sanitation, unsafe practices and poor public hygiene.

In 2010, almost one person in four was affected by diarrhoea or dysentery to the degree that required a visit to a health clinic. For the crowded area of Betio the percentage increased to 54% visiting a clinic. Infants are particularly vulnerable. Anecdotal information indicates that the visit to a health clinic only occurs as a last resort after local natural remedies prove unsuitable, indicating that the incidence of dysentery and diarrhoea are significantly higher than the health clinic statistics suggest.

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## COMMON HEALTH PROBLEMS

The medical services in South Tarawa have been described as being overburdened with dysentery and diarrhoea with high incidences of non-pneumonia (21,686) and pneumonia (1,485) during 2010 (Betio 10,184 and 415); acute temperature without rash 7,260 (Betio 3,307) and increasing incidents of leprosy, all diseases symptomatic of overcrowded living conditions. In November 2010 the Ministry of Health and Medical Services (MHMS) confirmed an outbreak of fever and vomiting, particularly among children living in Betio and TUC area which WHO treated as a typhoid fever outbreak. These poor health statistics underscore the urgent need for water supply and sanitation improvements.

With about half the population of Kiribati living on South Tarawa, diseases spread very quickly and easily because of overcrowding, poor ventilation, and dirty surroundings. South Tarawa, Betio in particular, has the highest case of Tuberculosis, skin infections, and some cancers. Poor diet and lack of exercise contributes to high rates of non-communicable

diseases including diabetes, heart disease and stroke. South Tarawa bears a “double disease burden” in that rates of infectious diseases are still high, but rates of non-communicable diseases associated with modern lifestyles are also high.

## TRANSPORT AND COMMUNICATION

### LAND TRANSPORT

Buses, trucks, cars, motorbikes, and pushbikes are the main forms of transport on the roads on South Tarawa. The paved primary road system are usually in a very bad condition, especially so after a heavy downpour of rain for days. In some stretches the road is very poor and is in need of complete reconstruction. Government (through MPWU, Civil Engineering Division) is responsible for the maintenance and upgrade of the primary and secondary (feeder) roads, while the local councils (TUC and BTC) are responsible for the tertiary (access) road system. Because local councils have no construction and road maintenance capability, government (CED) maintains the access roads on payment by the local councils. The inventory of access roads totals on South Tarawa to about 40 kilometers.

Main roads in Betio and Bairiki are generally good, but outside these centres the main road from Teoraereke to Temwaiku in the TUC area and Buota in the ETC area that are quite problematic during rainy seasons.

### SEA TRANSPORT AND SHIPPING

Because all the islets of South Tarawa are connected by causeways and a bridge joining them to ETC Buota village, people would rather use the road to go to other villages than to travel by boat. The main port and jetty is at Betio, and boat transport leaves from Betio to all outer islands. Most of the cargo vessels are owned by government but there is an increasing number of interisland vessels run by private owners (individuals and island councils).

### TELECOMMUNICATIONS

Tarawa-based TSKL and TKL are the main providers of telecommunication services. There are 3 telephone exchanges at Betio, Bairiki, and Bikenibeu with a total capacity of approximately 5,000 lines. There are now about 1,800 active mobile phone customers. Internet service, which is still quite expensive, is provided also by TSKL. Mobile telephones are a new addition to TSKL’s services to the outer islands.

A common problem faced by TSKL is damage to underground cables through construction work and excavations. Many new electricity and water connections are not reported to the office thus causing a lot of problems in terms of damaged cables. In terms of water and sewerage piping, including electrical cables, PUB normally runs its systems alongside main roads, so as TSKL. Maintenance work on these plus the main road are potential risks to telephone cables, and vice versa. Better coordination between parties concerned needs to be strengthened.

APPENDIX 1, ISSUES RELATED TO CLIMATE CHANGE ON SOUTH TARAWA

ISSUES	PROBABLE CAUSE/S	SOCIETAL IMPACT	REMEDIAL ACTION	SUSTAINABILITY (EFFECTIVENESS)
<b>Coastal Erosion</b>	<ul style="list-style-type: none"> <li>-aggregate mining</li> <li>-seawall construction</li> <li>-causeway construction</li> <li>- land reclamation</li> </ul>	<ul style="list-style-type: none"> <li>-reduction of landmasses at some areas</li> <li>-loss of <i>bwabwaipits</i> and fruit trees</li> <li>-water sources affected</li> </ul>	<ul style="list-style-type: none"> <li>-mangrove planting</li> <li>-limit aggregate mining</li> <li>- properly designed seawalls</li> <li>-opening up of causeways</li> </ul>	<ul style="list-style-type: none"> <li>-sustainable</li> <li>-questionable</li> <li>-can be sustainable</li> <li>-expensive but sustainable</li> <li>-costly but sustainable</li> </ul>
<b>Unemployment</b>	<ul style="list-style-type: none"> <li>Inadequate employment opportunities;</li> <li>Too many job seekers</li> </ul>	<ul style="list-style-type: none"> <li>Growing poverty;</li> <li>People getting into debt;</li> <li>Buying on credit from shops (<i>taarau</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Enhance economic conditions and develop local industries;</li> <li>Develop private sector;</li> </ul>	<ul style="list-style-type: none"> <li>sustainable</li> </ul>
<b>Limited land space &amp; overcrowding</b>	<ul style="list-style-type: none"> <li>-Population growth – migration of people from outer islands to South Tarawa;</li> <li>Children born on South Tarawa;</li> <li>Space taken up by rubbish and rusting vehicles and containers</li> <li>Churches through</li> </ul>	<ul style="list-style-type: none"> <li>-lack of privacy;</li> <li>Rise in disputes over land boundaries;</li> <li>Not enough fruits and vegetables;</li> <li>Dirty and unhealthy lifestyles and environments;</li> <li>Rise in crime, unwanted pregnancies, (single teenagers) mothers,</li> <li>Not enough recreation centres,</li> </ul>	<ul style="list-style-type: none"> <li>Control of migration of people to South Tarawa;</li> <li>Developments to move to outer islands;</li> <li>Land management and sound urban development planning.</li> </ul>	<ul style="list-style-type: none"> <li>costly but can be sustained</li> </ul>

	<p>their groups occupy a lot of land with their group <i>maneabas</i>;</p> <p>Sea water filling up land spaces because of coastal erosion</p>	<p>playing courts and fields;</p> <p>Abuse of the custom of BUBUTI;</p> <p>Low income families struggle and many owe a lot to shops and to money lenders;</p> <p>Lack of funds for school fess and utilities</p> <p>Stress in families, depression, alcohol abuse, domestic violence;</p> <p>Risks of contamination of water resources (because of informal settlement);</p> <p>Poverty is on the rise</p>		
<b>Reduction in Marine and Resources</b>	<p>-overfished by TUC/BTC fishermen</p> <p>--variety of fishing gears by fishermen</p> <p>-unregulated harvest of resources</p> <p>-gang and family fishing for cash revenue;</p>	<p>-discrepancy of islanders' attitude toward conservation</p> <p>-limited marine resources for them to live and fish</p> <p>-lobsters and octopus decline in numbers</p> <p>--bone fish and finfish decline from heavy and non-stop fishing</p> <p>-shellfish – <i>te bun</i> depleted</p> <p>-cone shell – <i>tenouo</i> overharvested</p> <p>--red snapper decline</p>	<p>-by-law to protect fishing grounds</p> <p>-identification of identities</p> <p>-a well constructed management plan and regulatory measures</p> <p>-draft bill for protected species and areas</p> <p>-demarcation of fishing zones</p>	<p>-take time to effect</p> <p>-take time to effect</p> <p>-on the way, but questionable in terms of effectiveness</p> <p>-can work if all parties agree</p>

		<ul style="list-style-type: none"> <li>- -te mania, tekoikoi decline</li> <li>-all sea cucumber species depleted</li> </ul> <p>Not enough fruits and vegetables;</p> <p>People rely a lot on imported food from shops</p>		
<p>Growing population, Bonriki water lens has already exceeded its sustainable yield;</p> <p>drought;</p> <p>Poor water management and engineering;</p> <p>Toilet pits, flush toilets and septic tanks in poor condition;</p> <p>Bacteria, chemicals, and heavy metal in water lens</p> <p>Leaking seawater pipes</p>	<p>Not enough clean water for everyone</p> <ul style="list-style-type: none"> <li>-less ground water</li> <li>-vegetation and fruit trees affected</li> <li>-contamination of underground water</li> </ul> <p>Inadequate supply of water</p>	<p>Desalination</p> <ul style="list-style-type: none"> <li>-concrete cisterns to be built that can withstand long droughts</li> <li>-watering systems to be in place</li> <li>-aluminum or tinroofing for residents for tanks</li> </ul>		<p>-long term plan and costly but can be sustainable</p>

