

Disaster Risk Reduction in the Republic of Kiribati

Status Report 2019



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UNDRR

UN Office for Disaster Risk Reduction

Disaster Risk Reduction in the Republic of Kiribati

Status Report
(October 2019)



About this report

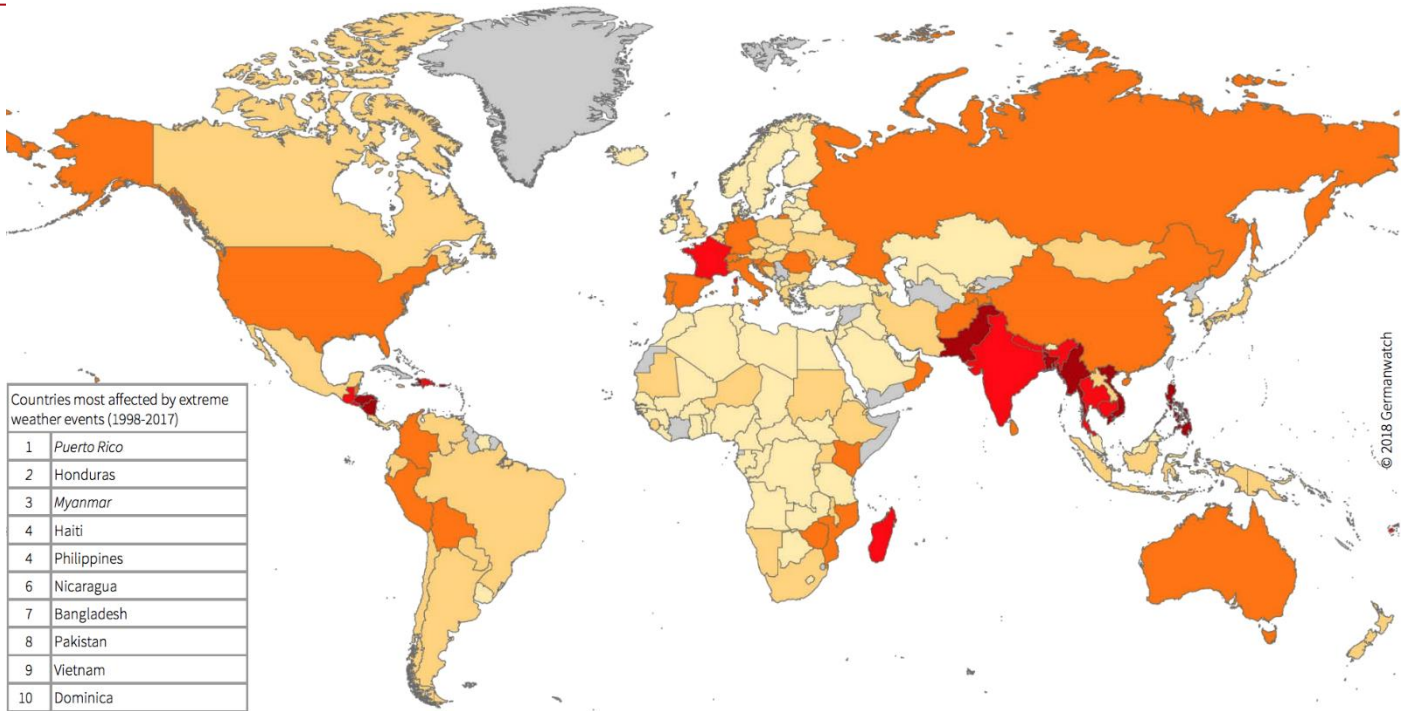
The Disaster Risk Reduction (DRR) report provides a latest snapshot of the DRR progress the Republic of Kiribati has achieved under the four priorities of the Sendai Framework for Disaster Risk Reduction. It also highlights some of the key challenges surrounding the issue of creating coherence among the key global frameworks at the country level; and makes recommendations for strengthening the overall Disaster Risk Management (DRM) governance by government institutions and other stakeholders at national, sub-national, and local levels.

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The findings, interpretations, and conclusions expressed in this document do not necessarily reflect the views of UNDRR or of the United Nations Secretariat, partners, and governments, and are based on the inputs received during consultative meetings, individual interviews, and the literature reviews conducted by the research team. While every effort has been made to ensure the accuracy of the information, the document remains open for any corrections in facts, figures and visuals.

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Climate Risk Index: Ranking 1998 - 2017 1 - 10 11 - 20 21 - 50 51 - 100 >100 No data
(GermanWatch, 2019)

POPULATION 2017	
Total Population	114 158
Urban Population	60 803 (53.2%)
Population Density Per Km ²	141
ECONOMIC INDICATORS	
Gross Domestic Product in Current \$US	185.57 million
GDP Per Capital (\$US)	1 626
GDP Growth (Annual %)	0.30%
HUMAN DEVELOPMENT	
Human Development Index	0.612
HDI Rank	134
Income Level Category	Lower-Middle income

(World Bank, 2019)

About this report

The Disaster Risk Management (DRM) report provides a latest snapshot of the DRM progress in the Republic of Kiribati has achieved under the four priorities of the Sendai Framework for Disaster Risk Reduction. It also highlights some of the key challenges surrounding the issue of creating coherence among the key global frameworks at the country level; and makes recommendations for strengthening the overall DRM governance by government institutions and other stakeholders at national, sub-national, and local levels in Kiribati.

Climate Risk Index

Rank 123, Score of 110.83*

INFORM Risk Index

Rank 86 / Low Risk**

* Climate Risk Index of 2019 analyses the extent to which countries have been affected by weather-related losses between 1998-2017 (GermanWatch, 2019).

** INFORM risk index is a global tool which measures the risk of humanitarian crises and disasters based on 50 indicators assessing hazards, vulnerability and capacity (resources available to mitigate the impact) (INFORM, 2018)

Table of Contents

Introduction.....	3
Disaster Risk Profile.....	5
Climate and Disaster Risk Reduction Interventions	7
Issues in Implementation of the DRR policy.....	10
Stakeholder Analysis.....	10
Challenges and Priority Issues.....	11

1. Introduction

The Republic of Kiribati is an atoll nation located in the central Pacific Ocean with three main islands groups: The Gilbert, Phoenix, and the Line Islands. Consisting of 33 scattered islands of mostly volcanic origin, of which 21 are inhabited, the country covers 800 km² of total land area. Nearly all the islands are low-lying atolls that rise no more than 2-3 meters above sea level except one, Banaba island, which is a raised coral island 81 meters above sea level. Nearly half of the population lives on the capital, South Tarawa, in the Gilbert Islands and has seen a population increase of 24% between 2005 and 2010 (ADB, 2011).

There are very limited natural resources and fertile soil, on the atoll island, constraining agricultural development. Kiribati relies on its ocean resources. Fisheries offer large employment opportunities for I-Kiribaiti and is a main contributor to the country's economy (Ministry of Fisheries and Marine Resources Development, 2013). However, there is still limited opportunities for employment and many nationals migrate abroad (PIFS & European Commission, 2008). Youth employment is very low at 46% for those aged between 15-24 years (Kiribati National Statistics Office & Pacific Community, 2012). The public sector is 34% of the labor force and makes up 31% of the gross domestic product (GDP) while agriculture and fishing accounts for 25% followed by real estate with 12% of the GDP (JNAP - MFED KNSO 2012 & KNSO & SPC 2012). Figure 1 shows the breakdown of the most prevalent industries. Men typically work in agriculture or fisheries while women work in manufacturing (Kiribati National Statistics Office & Pacific Community, 2012). Tourism only plays a moderate role in the Gilbert Islands and plays a much higher role in the Northern Line Islands (ADB, 2009; Hay, Climate Risk Profile for Kiribati, 2006).

Like other Pacific countries, Kiribati is located in the Pacific Ring of Fire and, making it more prone to disasters. However, it is in the Northern Pacific and therefore a natural hazard is less likely to happen. Kiribati is susceptible to disasters such as droughts, tsunamis, flooding, and cyclones. During the La Niña season, Kiribati can be effected by severe droughts where annual rainfall will be less than 750mm. Another common hazard are the high tides which can result in a threshold of greater than 2.8 meters. The capital, Tarawa, already sees large fluctuations of 0.5 meters in sea level which has caused a number of houses to be washed away when high tides come in. While incidence of drought is projected to decrease in the future, sea level is projected to rise by 5-15cm by 2030 and will further impact coastal infrastructure (GFDRR, 2017; Republic of Kiribati, 2014).

Kiribati does have a wide range of ecological diversity. With the land area of Kiribati only making up 0.023% of the country, it is home to over 567 different species of fish, 361 species of coral, and 20 marine mammal species. However, 90 of these species, most being coral and fish, are considered to be a threatened species by the International Union for Conservation of Nature (Ministry of Environment, Lands & Agricultural Development, 2013).

In 2016 Kiribati released its 20 year vision development plan for the period of 2016 – 2036 known as the KV20. While its main goal is for Kiribati to become a wealthy, healthy, and peaceful nation, it plans on doing this by concentrating on four pillars. These are wealth, peace and security, infrastructure, and governance. While the pillar of wealth looks to focus on economic growth, it also aims to reduce

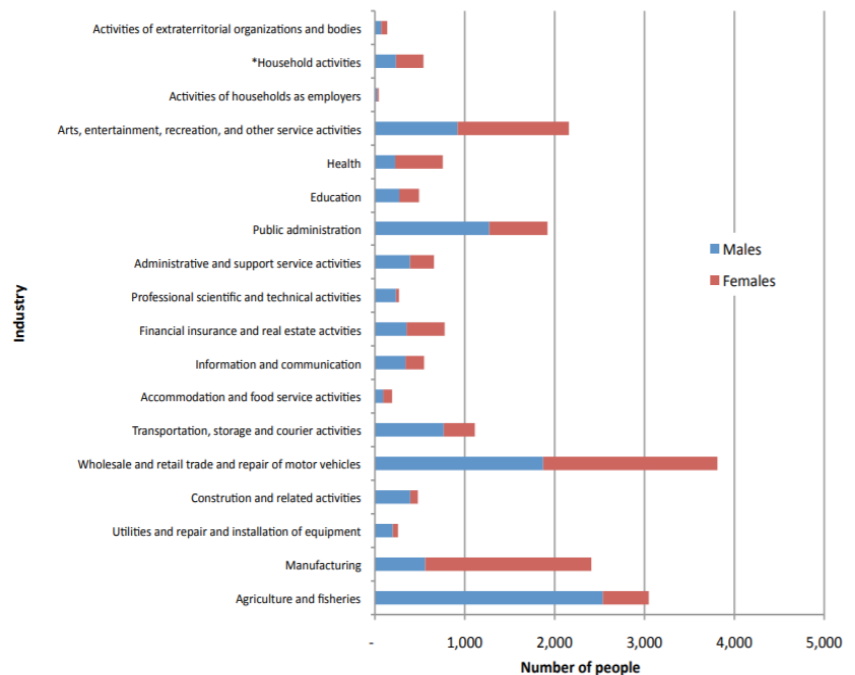


Figure 1. Employment by industry, Kiribati 2010 (Kiribati National Statistics Office & Pacific Community, 2012).

poverty, improve education, and create an affordable healthcare system. The peace and security pillar focuses on establishing the National Security governance policy frameworks and the infrastructure pillar aims to improve transport and information and communications technology infrastructure. Finally, the governance pillar looks to strengthen national and local governance policy and legislative frameworks. Outside of these main pillars, the KV20 will mainstream equity for women, youth, vulnerable populations, and the disabled (Republic of Kiribati, 2016).

1.1 Demographic Characteristics

The 2010 Kiribati census recorded a total population of 103,058 people which is an 11.4% increase since 2005. South Tarawa had the largest portion of the total population at 49%, the Gilbert group followed with 42% and the Line and Phoenix group at 9%. Kiribati has become more urban than rural in recent years as over 50% of the population live in this urban areas and have a growth of 4.1% annually with no signs of slowing down (Kiribati National Statistics Office & Pacific Community, 2012).

Much of the population of Kiribati, 90%, are I-Kiribati with a small percentage, 10%, considered themselves to be being part I-Kiribati and part 'other' ethnicity. Only 1% identified as being non-I-Kiribati. This group is mostly made up of people from Australia, New Zealand, or Fiji (Kiribati National Statistics Office & Pacific Community, 2012). Youth, below the age of 15, represent more than 36% of the current population with the numbers expected to continue to increase. This is due to high levels of fertility and low rates of contraceptive use. In rural outer islands, the people have limited access to employment opportunities, effective transport, communication, and community services such as education and health. They are also highly dependent on subsistence agriculture and coastal fisheries (Government of Kiribati, 2012).

Equality among the population faces challenges as well. Women have very little representation in not only government, as only 4% of the seats in parliament are held by women, but also in non-agriculture sector employment in which only 39% of those employed are women (UNFPA, 2012). Traditionally I-Kiribati society

was patrilineal, and while the status of women is changing, women are still often considered subordinate to men. There is a prevalence of intimate partner violence in which more than two in three women aged 15–49 (68%) had been in a relationship where physical and/or sexual violence took place. Another 47% of women have also reported experiencing emotional abuse from a partner (Ministry of Internal and Social Affairs & National Statistics Office, 2010).

1.2 Economic Impact of Disasters

Kiribati has few natural resources and relies mostly on subsistence agriculture, copra and fish. Other resources come from the ocean, such as fish, seaweed, manganese nodules and cobalt-rich crusts (Republic of Kiribati, 2014). Currently, a significant amount of the national income comes through remittances, as I-Kiribati are developing expertise as merchant seafarers abroad. However, Kiribati continues to be considered one of the most economically vulnerable countries in the world. This is due to the smallness in population, geographical remoteness, physical exposure to sea-related risks, and a high ratio of victims of disasters (UNCDP, 2018). While the likelihood of a disaster affecting the county is relatively low, in comparison to the rest of the Pacific Island Countries (PICs), at 10.8%, the percent of population affected is still high. Percent GDP affected has not been listed but would be expected to be high as well (Lee, Zhang, & Nguyen, 2018).

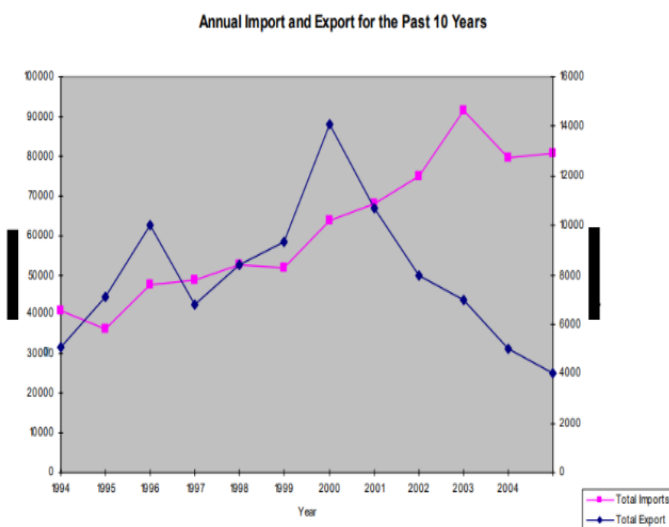


Figure 2. Annual Import and Export 1994-2005. Source: Planning Division, Ministry of Finance (Hay, Climate Risk Profile for Kiribati, 2006).

Kiribati had only 45% of the graduation threshold under the economic vulnerability criterion in 2015. Compared to other least developed countries (LDCs), Kiribati exports 80% more products such as coconut products, sea cucumbers, shark fins, and tuna products. Fish products have begun to exceed that of coconut product exports as of late. However, because the export base is very limited, this leads the country to be more economically vulnerable (UNCDP, 2018). From 2000 to 2004, exports have drastically reduced while imports have been steadily increasing as seen in Figure 2 (Hay, Climate Risk Profile for Kiribati, 2006).

In the last 80 years, there have been 13 major droughts with an average duration of 20 months (UNCDP, 2018). Long droughts have caused groundwater to become contaminated and turn blackish as well as turning the leaves of most plants yellow. For example, during the 1970-1971 drought, there was a complete loss of coconut palms at Kenna village on Abemama in central Kiribati (KMS, BoM & CSIRO, 2011). A recent study by the ADB estimated that the economic burden of poor sanitation, mostly caused by droughts, on the urban area of South Tarawa alone, costs between \$3.7 – 7.3 million USD annually (ADB, 2014).

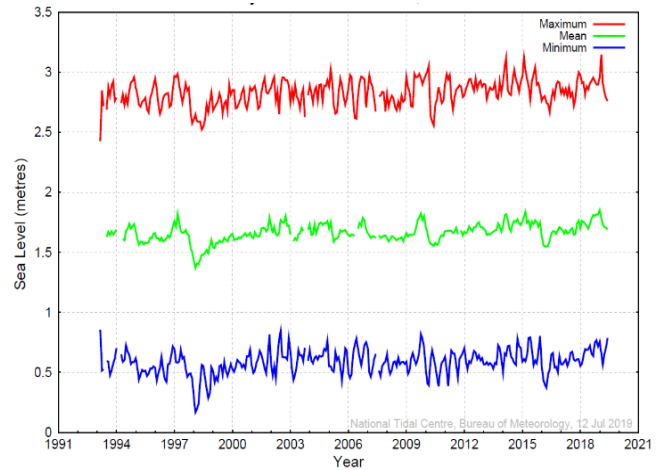


Figure 3. Monthly sea level at Betio, Kiribati over time (Australian Government, 2019).

Sea level rise is also having increasing impact on the economy by affecting coastal areas, access to fresh water, farming, and people’s health. For example, more than 80% of Kiribati’s population live in low-lying coast areas (UNCDP, 2018). Figure 3 shows that while the average sea level has been increasing a bit, the maximums have been growing (Australian Government, 2019). This flooding has led to many houses being destroyed and serious impacts on near shore infrastructure and crops. Due to the susceptibility of ocean resources to disasters and climate change, livelihoods of many, food security, and safety of the population may be reduced severely if the risks are not managed. Reduced livelihoods would have further implications by affecting the economy which needs a health society to properly function.

1.3 Social Impact of Disasters

As the sea level and tidal waves continue to grow in size, communities will suffer as houses will become flooded and underground well water becomes blocked. The Tebikenikora community, located near South Tarawa, has faced this problem on several occasions and in 2010 built a sea wall as a solution. However, the strong tidal waves damaged the sea walls. During this time houses became flooded and household belongings floated to neighbors and covered well water (FSPK, 2015). Disabled persons ran into problems of discrimination in that the public thought of them as a burden and were displaced from their traditional houses. Women were forced to live in overcrowded areas which led to stress and health issues. Men also faced problems in having limited knowledge and skills for adaptation undertakings. While the entire population was affected by the rising sea levels and the larger tidal waves, women, children, and those with disabilities suffered the most and felt more as a burden or were not allowed to voice their concerns that they had (FSPK, 2015). What the Tebikenikora community experienced gives good insight on the impacts of flooding.

In 2015, Kiribati had rough seas with large tidal movements created by Tropical Cyclone (TC) Pam. TC Pam resulted in widespread damage in the four outer atolls of Tmana, Arorae, Onotoa, and Nonouti. Damage to houses, inundation, water contamination, and 80% of wells being badly affected were just some of the reported issues from the disaster. It was estimated that over 1,500 people were affected along with 65 homes destroyed and another 42 homes damaged (IFRC, 2018). With many living in overcrowded areas and drinking from unsanitary drinking sources, the prevalence of vector-borne diseases, like dengue fever, increased. Dengue fever worsened the livelihoods of the population as many were not able to work or trade (World Bank, 2000).

Climate change will have a large impact on the agriculture. Copra, the cash crop for more than half of the population, is sensitive to changes in rainfall and groundwater. During times of drought, coconut production could severely decline. Sea level rise will also affect copra as saltwater intrusion will decrease production as well (World Bank, 2000). The impacts from climate change are expected to become more severe with more extreme sea level rise as well as an increase in extreme rainfall. These extremes have been documented from as early as 1926 as seen in Figure 4 which show drastic increases and decreases in rainfall year to year. Thus agriculture production will continue to be hampered. A hindered production of agriculture will endanger economic growth, human health, and wellbeing of the population. Furthermore, it will slow the government's development goals for a wealthy and healthy Kiribati.

2. Disaster Risk Profile

2.1 Hazards and Climate Change

Kiribati, like other countries in the South Pacific Convergence Zone (SPCZ), experiences various hazards that affects the country. It ranks 86th among 189 countries on the INFORM 2019 index with a score of 3.9 (INFORM, 2018). The most common hazards include drought and extreme heat, sea level rise, epidemics, tropical cyclones, and tsunamis.

Sea level rise and extreme heat is a significant concern for an atoll nation. As the number of extreme weather events increase, this will lead to inundation of the atoll islands. Furthermore, the warming of the oceans is likely to decrease the number of reefs acting as coastal defenses (Bell, et al., 2011). With the number of healthy reefs decreasing, infrastructure, fisheries, and agriculture sectors are likely to be affected as well as the natural biodiversity of the ecological systems. Impacts on human health are also expected to become more prevalent. For example, longer periods of drought will limit the availability of fresh water and lead to poor sanitation. Poor sanitation in Kiribati is a driver for increased rates of diarrhea. There have also been mosquito-borne disease outbreaks, such as dengue fever and lymphatic filariasis, in the last 50 years which are caused by the warmer and wetter conditions of the South Pacific (Ministry of Health and Medical Services & WHO, 2011).

Droughts are a frequent occurrence usually linked to the La Niña events which have the potential to reduce annual rainfall to less than 750mm. These droughts can cause severe shortages of fresh water, dramatic increases in salinity in domestic wells, and death of some trees (KMS, BoM & CSIRO, 2011). An analysis of the water supply and sanitation situation on South Tarawa confirmed that, during a drought, households resort to unsafe storage practices and alternative water sources, with up to 23% of the population relying on their neighbor for water (ADB, 2014). There is more than a 25% chance that at least one period of prolonged exposure to extreme heat, resulting in heat stress, will occur in the next five years. The temperature increase is still expected to be significant, but much lower than the worldwide average (GFDRR, 2019).

While earthquakes are considered to be a very low risk hazard for Kiribati, as it is a relatively quiet seismic area, there was a moderate 5.1 magnitude earthquake in January of 2018, in the Line Islands (VolcanoDiscovery, 2018). Reports show that there is a 40% chance that Kiribati will experience a least one weak level of ground shaking from an earthquake in the next 50 years. However, this level of shaking is not expected to cause any significant damage to buildings and infrastructure (PCRAFI, 2011). Further, an earthquake creating a tsunami has not been seen in the region since 1899.

The earthquake caused a tsunami which reached the shores of Kiribati and caused moderate losses (PCRAFI, 2011).

Similarly, Kiribati does not usually experience tropical cyclones. Tropical storms and depressions do occur, but they do not have strong enough wind speeds to be categorized as tropical cyclones. In one example in 1978, tropical cyclone Alice did start as a tropical depression over Kiribati and hit Tarawa which caused minor damage. It was only later, when it was over the Republic of Marshall Islands, that it turned into a full tropical cyclone. A risk analysis showed that a tropical cyclone, earthquake, and tsunami will cost 0.3% of Kiribati's GDP on average once every 50 years (PCRAFI, 2011).

Climate change is contributing to warmer temperatures of an El Niño weather event and causes more atmospheric water to converge in an area, this can lead to higher king tides in Kiribati. When a king tide pushes onto the land, causing coastal flooding, the porous land becomes saturated with high salinity ocean or lagoon waters. The water then begins to form large puddles or pools on land, effectively rendering the soil underneath these puddles useless for agricultural purposes. King tide events are happening in Kiribati with more intensity and frequency (Werner, 2017).

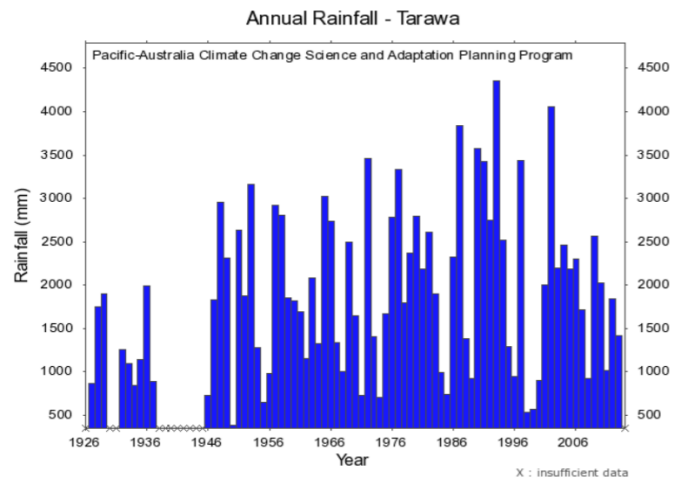


Figure 4. Annual rainfall captured at monitoring stations in Tarawa from 1926 – 2014 (Werner, 2017).

2.2 Exposure

Nearly the entire population of Kiribati is exposed to climate change impact, especially sea level rise. This exposure is because of the nature of Kiribati, being made of atoll islands, requires the majority of the population to live in low-lying coastal areas. With El Niño weather events becoming stronger, and more common, more powerful king tides and sea level rise threaten people's homes (Werner, 2017). Remoteness, lack of infrastructure, high levels of poverty, and a geographically dispersed country adds on to the exposure-related risks.

Like most of the population, infrastructure is also near low-lying coastal areas. There is a lack of protection from large storm events, during which king tides and heavy rain can erode the coast and damage or destroy infrastructure. In the capital of South Tarawa, for example, many families in urban areas tend to have pigs on their properties. With the addition of poor black- and greywater management, this can lead to contamination of the city's scarce groundwater resources. Rainwater, a large source of drinking water, is harvested from roofs and then poorly stored which leads to quality degradation (World Bank, 2019).

The INFORM Risk Index of 2019 identifies exposure to tsunami and drought as the highest contributors to hazard risks (INFORM, 2018). When droughts do occur, there is low access to drinking water. Combined with poor sanitation, Kiribati has one of the region's highest under-five child mortality rates, which is estimated at 47 deaths per 1,000 live births (Kim, Costello, & Campbell-Lendrum, 2015). Furthermore, the exposure to dengue fever and other diarrheal diseases see a sharp increase at the end of the driest period of the year (August – November). There were outbreaks of dengue in 2003, 2004 and 2008 (Ministry of Health and Medical Services & WHO, 2011).

2.3 Socio-economic Vulnerability

In the Outer Islands, most households make a living through fishing, agriculture, copra, and making and selling crafts. The Line Islands, for example, have a greater availability of land and, therefore, agricultural production (Thomas & Tonganibeia, 2006). In more urban areas, such as South Tarawa, many work in the public administration, enterprises, or the private sector. However, of the 40,000 available to work, only 30% have jobs with very few support programs available (ADB, 2009). A 2006 national household survey found a 22% poverty rate with most of these households being located in South Tarawa as well as the Southern Gilberts. The Southern Gilberts have such a high rate because they are considered some of the most remote and smallest islands with limited resources and vulnerable to drought (Abbott & Pollard, 2004). Lack of capacity to manage inundation and periods of drought are likely to amplify the impacts for the poor, disabled, women, and children. They are more likely to suffer disproportionately due to inequalities in distribution of aid, gender-based violence, and instability often arising in the aftermath of these events (AusAID, 2012).

Gender dimensions in Kiribati is reflective of the poverty burden. Women have less access to employment with only 38% of paid workers being women (Kiribati National Statistics Office & Pacific Community, 2012). Furthermore, from the 2006 national household survey, about 20% of households were headed by a single female and in more rural areas like South Tarawa and rural Gilbert Islands the number increased to 25% of households (Kiribati National Statistics Office & UNDP, 2010). In South Tarawa, physical or sexual violence towards women has been higher than the rest of the country due to the pressures relating to the higher cost of living, unemployment, overcrowding, and the higher rate of alcohol consumption (Government of Kiribati, 2005). In total, 68% of women, aged between 15 and 24 have said they have been in a partnership where they experienced physical or sexual violence (Ministry of Internal and Social Affairs & National Statistics Office, 2010).

Traditional way of living is also decreasing which is another factor in the increased vulnerability to disasters. Fewer young people are being taught skills, such as cutting toddy and traditional skills of cultivation and fishing, because many are leaving for other job opportunities in urban areas. A report by ADB showed that those who are poorer are the least able to contribute to social networks, therefore are less likely to receive support in times of need (Department of Foreign Affairs and Trade, 2014). With less able bodied individuals on the outer islands those populations are more susceptible to the aftermath of king tides and other disasters.

While medical services are provided free by the Government, there are only a limited amount of health centers throughout the country. In 2009, the number one illness treated in the health system was diarrhea followed by acute respiratory infection. With the population aging, more non-communicable diseases are

growing (AusAID, 2012). Due to the lack of healthcare facilities the aftermath of disasters, when the needs for care are high, is when there is the most concern. For example during a flood that occurred in 2015, one of the two hospitals in Tarawa was severely damaged. Patients had to be evacuated and all medical services at the hospital were suspended and the other hospital at the time was already at full capacity (Momoisea, Kiribati Hospital to Take Weeks to Recover, 2015). Vulnerable populations are always the worst off during disasters and with a hospital closing, they will have a challenging time receiving treatment.

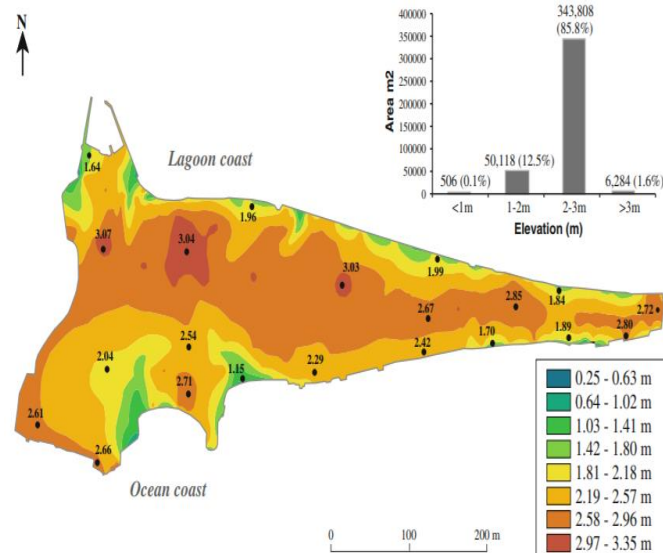


Figure 5. Digital terrain model (DTM) of Bairiki Island which shows the distribution of elevations on Bairiki Island. (Duvat, Magnan, & Pouget, 2013).

2.4 Physical Vulnerability

Other than the social-economic vulnerabilities described, Kiribati also faces physical vulnerabilities. A large proportion of the population, 80%, reside in the coastal regions of the country, which are prone to flooding, cyclones, and sea-level rise. For example, Bairiki Island only has 1.6% of its terrain which is three meters or higher above sea level as shown in Figure 5 (Duvat, Magnan, & Pouget, 2013). The housing and infrastructure in these areas are also not often climate-resilient or built in consideration of these risks (UNCDP, 2018).

The INFORM risk index makes a point that the poor physical infrastructure is a significant factor to lack of resilience in the country (INFORM, 2018). Currently, because of rapid urbanization, South Tarawa has 49% of the total population living there. Many are moving to the urban regions because they have a larger number of services and opportunities. Urban informal settlements are growing in number in South Tarawa and in the rest of the South Pacific as well. These informal settlements often lack resilient homes, typically made out of a variety of locally available materials and are overcrowded. Therefore, they are more prone to flooding, drought, and disease. For example, in Bairiki Village, an urban settlement in South Tarawa, of 51 households interviewed, only two had private toilet facilities while the rest defecate in the ocean or on the beach (ADB, 2013).

Many structures and designs have not taken into account climate change when being established. For example, main roads on the atolls run along the shorelines. When flooding does occur, the population will tend to their homes or move elsewhere. The roads will continue to be eroded and will require costly maintenance (Republic of Kiribati, 2007).

Kiribati's agriculture is not only affected by flooding, but droughts as well. During the La Niña season that lasted from April 2007 to 2009, plants bore yellowish leaves and small many trees bore only small fruits or no fruit at all. Coconut trees were also seen dying off (Pacific Community & GIZ, 2013).

2.5 Future of Disaster and Climate Risks

During the 21st century, climate projections show an increase in temperature in the area. By 2030 there is an expected 0.3 to 1.3°C increase for the Gilbert Islands and 0.4 to 1.4°C increase for the Phoenix and Line Islands under a high emissions scenario. Annual temperature could increase by greater than 3°C by 2090. This will lead to increase in very hot days as well as the intensity and frequency of days of extreme heat, and warm nights, increasing with days of cooler weather declining. Annual mean rainfall is also expected to increase by greater than 5% by 2030 and greater than 15% by 2090. The intensity and frequency of extreme rainfall will also continue to increase (KMS, BoM & CSIRO, 2011).

While droughts is expected to decrease in frequency from seven to eight times every 20 years by 2030 to six to seven times by 2090, the mean sea level is projected to continue to rise. Mean sea level could rise by approximately 5-15cm by 2030 and 20-60cm by 2090 under the higher emissions scenario. This will continue to increase the impact of future storm surges and coastal flooding on infrastructure, communities, and groundwater. Ocean biodiversity is also in trouble as acidification of the ocean is expected to rise as well (KMS, BoM & CSIRO, 2011). Coral reefs are projected to progressively degrade with losses of live coral of greater than 25% by 2030 and greater than 50% by 2050 due to the acidification and rising sea-surface temperatures (Bell, et al., 2011). Furthermore, the impact from ocean acidification on the health of the reef ecosystems is likely to be compounded when including coral bleaching, storm damage, and fishing pressure (KMS, BoM & CSIRO, 2011).

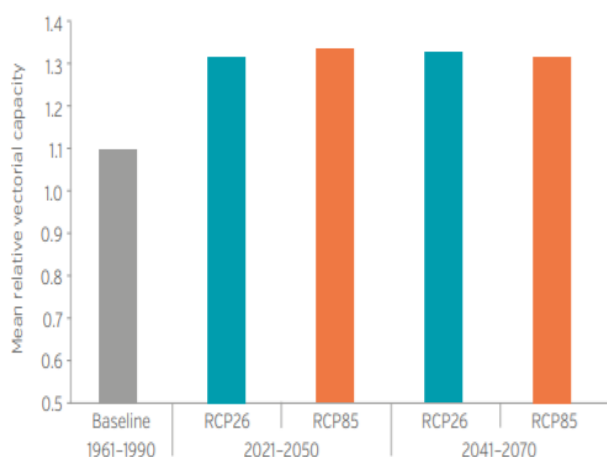


Figure 6. Mean relative vectorial capacity for dengue fever transmission in Kiribati (WHO, 2017).

Climate change is also expected to increase the risk of infectious and vector-borne diseases. Dengue fever, cholera, ciguatera poisoning, and diarrheal diseases prevalence will increase, especially in more populated areas such as the capital city of Tarawa (Ministry of Health and Medical Services & WHO, 2011). Under a low (RCP 2.6) or high greenhouse gases emission (RCP 8.5) projection, dengue vectorial capacity is seen increasing greatly (WHO, 2017). An example is ciguatera poisoning which comes from consuming reef fish that has been contaminated by ciguatoxins. With the increase in sea surface temperature is linked to increase incidence of ciguatera poisoning. Furthermore, just the overall concern from the population about ciguatera poisoning could

cause a change in eating patterns and therefore an increased household expenditure and loss of revenue from fishers (Kim, Costello, & Campbell-Lendrum, 2015).

3. Disaster Risk Reduction and Climate Action Interventions

To illustrate the government's will and commitment to protect the population and the country from future disasters, the following sections shed light on Kiribati's process in disaster risk reduction (DRR) and climate change adaptation (CCA), as mandated and guided by the global policy frameworks: Sendai Framework for Disaster Risk Reduction (SFDRR), Sustainable Development Goals (SDGs) and the Paris Climate agreement.

Priority 1. Understanding Disaster Risk.

Disaster risk management policies and practices should be based on an understanding of disaster risk based on its different factors such as vulnerability, capacity, exposure of persons and assets, hazard characteristics, and the environment. However, small island states, due to their wide range of hazards and remoteness, can have a hard time collecting and analyzing comprehensive risk information. Kiribati, especially, has limited resources and capacity to conduct such assessments at the subnational level.

With support from international NGOs, some data has been able to be collected, analyzed, and managed. For example, UNCDP in 2015 and again in 2018 commissioned a national vulnerability profile that looked at Kiribati's human assets criterion, economic vulnerability criterion, as well as a history of disaster events since 1938. Information such as the percentage of the population undernourished, children under 5 mortality rate, and economic vulnerability can all be used for risk assessment purposes (UNCDP, 2018).

There are also a number of quantitative and qualitative situation analyses that have been conducted that can be used for risk assessment purposes. Kiribati is part of the Pacific Regional Information System Management (PRISM), along with 22 other PICs, which focuses on accessibility and user-relevance of statistical information systems and databases across all sectors such as education reports and household income and expenditure survey (HIES) data (Pacific Community, 2018). The Disaster Resilience for Pacific Small Island Developing States (RESPAC) project, which Kiribati is covered by, aims to improve Pacific SIDS resilience to climate-related hazards by collecting and analyzing sex-disaggregated data for post-disaster recovery processes (UNDP, 2016). Another example is the Millennium Development Goals, now known as the SDGs, that looks at data regarding poverty, gender equality, environmental stability, and combating diseases (Republic of Kiribati, 2007). While there are some data collection tools, there are large hurdles in completing further risk assessments and monitoring and evaluation due to lack of human capacity and technical expertise in the area.

Priority 2. Strengthening Disaster Risk Governance to Manage Disaster Risk.

The Disaster Management Act of 1993, the Draft National Disaster Management Plan of 1995, and the Draft National Disaster Plan of 2010, are the foundational documents for the 2012 National Disaster Risk Management Plan which outlines the responsibilities of government agencies related to disaster management activities. The National Disaster Risk Management Plan discusses how the National Disaster Risk Management Council (NDRMC) is to be responsible for reviewing and auditing DRM strategy and plans as well as in times of disaster, be the peak decision making body that

provides advice on strategic decisions (Republic of Kiribati, 2012). While it is the NDRMC that is the principal executing body, it is the National Disaster Risk Management Office (NDRMO) that is responsible for advising the NDRMC on government DRM training requirements, developing an annual DRM training plan, and ensuring reviewing DRM arrangements at local and island levels (Republic of Kiribati, 2012).

Other key committees that the NDRMC overlooks is the Emergency Operations Committee, the Community Training and Awareness Committee, the Exercise Management Committee, and the Island Disaster Committees (IDC). The Emergency Operations Committee assists the NDRMC during emergency operations during a disaster event in allocating resources in the most effective way. The Community Training and Awareness Committee is responsible for developing, maintaining, and implementing a national training strategy for communities to reduce vulnerability and enhance resilience. The Exercise Management Committee is responsible for developing a strategy for testing elements of the Disaster Management Operational Plan. Finally, the IDC is responsible for local coordination of disaster preparedness, response, and recovery activities as well as public education programs (Republic of Kiribati, 2012).

The Kiribati Joint Implementation Plan on Climate Change and Disaster Risk Management (KJIP) 2014 – 2023 evolved from the National Disaster Risk Management Plan and National Framework for Climate Change and Climate Change Adaptation.

The framework looks to enhance resilience and sustainable development through 12 strategies and actions that will be fulfilled at the national level. While all the strategies are of high priority, promoting sound and reliable infrastructure development and land management is receiving 50% of the funds while promoting the use of sustainable renewable sources of energy and energy efficiency is the second highest funded priority and is receiving 11% (Republic of Kiribati, 2014). Other strategies of the framework is looking to improve crops by making them more resilient to extreme weather, decreasing water borne and vector borne diseases by educating the population on water safety, and increasing efficiency and effectiveness of early warning systems.

Priority 3. Investing in Disaster Risk Reduction for Resilience.

Like many other PICs, it is difficult to project the amount of resources that will be needed to support DRM strategies. This can be attributed to the lack of data for disaster preparedness and mitigation measures for analysis. Due to the low GDP of Kiribati, DRM and DRR programs often suffer. Therefore, these projects are often supported by development partners such as UNDP and the United Nations Development Assistance Framework (UNDAF) (UNPS, 2017). For example, Kiribati has received \$1.816 million USD from the UNDAF 2018 -2022 to support the strengthening of

Implementation	Legislation/Policy	Scope	Purpose
National Disaster Council	National Disaster Act (1993)	National, Local	Addresses mitigation of, preparedness for, response to and recover from disaster in Kiribati. To create the necessary institutions required, such as the National Disaster Council
Government of Kiribati, Relevant Stakeholders	National Adaptation Program of Action (2007)	National, Local	Identifying adaptation needs that are consistent with national development strategies and climate change adaptation policies and strategies
National Disaster Council	National Disaster Risk Management Plan (2012)	National, Local	Integrate disaster management planning into a Disaster Risk Management Framework. Define responsibilities of key committees in which the National Disaster Risk Management Council oversees
Government of Kiribati	National Framework for Climate Change and Climate Change Adaptation	National, Local	Developing a framework guided by mitigation, resettlement, and national planning and institutional capacity
Government of Kiribati	Kiribati Integrated Environment Policy (2013)	National, Local	Sets a policy for long term planning and action to respond to priority environmental issues such as the impacts of climate change
National Disaster Council, Relevant Stakeholders	Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (2014-2023)	National, Local	Identifying actions for resilience and measures that enable the Government to facilitate
Government of Kiribati	Kiribati Development Plan (2016-2019)	National, Local	The 10th Development Plan that continues to look at priority areas such as health, human resource development, infrastructure, and economic growth
Government of Kiribati	Kiribati Climate Change Policy (2018)	National, Local	Strategically guides and supports decision-making processes and scaling-up implementation of climate change adaptation, mitigation, and disaster risk reduction

Table 1. National disaster and climate risk reduction policies, plans and legislation in the Republic of Kiribati

the country’s water security and sanitation, supporting behavior change programs for gender equality, provide development for better collection of statistics to measure the progress of Kiribati National Development Plan, improve road safety and proper mass transportation, and capacity development (UNPS, 2017).

Kiribati has also received financial assistance from the Asian Development Bank (ADB), World Bank, and Governments of Australia and New Zealand. The Strengthening Economic Management Reform Program is well aligned with the Kiribati Development Plan to support the Kiribati Economic Reform Plan with \$7.40 million USD. The Kiribati Economic Reform Plan looks to improve fiscal sustainability by improved management of public finances and improved environment for the private sector (ADB, 2017).

To help identify Kiribati’s disaster risks, the Global Facility for Disaster Reduction and Recovery (GFDRR) helped develop a risk profile from the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI). GFDRR has been a strong ally of Kiribati and is currently funding \$455,000 USD for the ACP-EU Natural Disaster Risk Reduction Program. The funding is for Kiribati to collect and analyze data to help identify and plan for climate resilience, infrastructure servicing, and safe urban expansion (ACP-EU, 2017).

Priority 4. Enhancing disaster preparedness for effective response to “Build Back Better” in recovery, rehabilitation and reconstruction.

Kiribati is one of 15 PICs that receives funding from the EU Building Safety and Resilience in the Pacific (BSRP) Project implemented by the Pacific Community. This project works directly with the National Disaster Management Office (NDMO), also known as the National Disaster Risk Management Office (NDRMO), to strengthen policy and operational disaster management. An example is when the Kiribati Government received two fire trucks, fire emergency equipment, and proper training for the fire officers as part of the activities of the BSRP project (Pacific Community, 2018). It is the NDRMO that coordinates with the island-level committees and secretariat support for the NDRMC. The NDRMC is made of the National Disaster Controller, Commissioner of Police, Director of Meteorological Office, Secretary General of the Kiribati Red Cross Society, and the President of the Kiribati Association of Non-Governmental Organizations (KANGO). It is this council that, during times of disaster, is the main acting body and in charge of making strategic decisions (Republic of Kiribati, 2012).

From the 2012 National Disaster Plan, all island communities must have an Island Disaster Committee (IDC). However, there are currently only five throughout the country. The IDC’s role is to prepare their community for disasters, communicate with the NDRMO during a disaster and how disaster management plans are being implemented (Matanimeka, 2016). During Tropical Cyclone Pam, Kiribati’s NDRMO reported that three islands were being struck by very strong winds. Families whose houses were damaged were relocated to meeting halls of their IDC. In collaboration with the NDRMO, the Kiribati Red Cross Society coordinated with the IDC to meet the needs of those affected. It was quickly determined that there was not enough preparedness stock in-country and a dispatch of relief items was sent from the Fiji Red Cross Society to Kiribati (IFRC, 2018).

While tropical cyclones are rare, the need for early warning systems is still crucial. However, Kiribati does not have their own methods of tracking tsunamis or tropical cyclones. Therefore, they use the Pacific Tsunami Warning Center that tracks upcoming events (Kiribati Meteorological Service, 2019). For drought, the Kiribati Meteorological Service (KMS) adopted the Tarawa Drought Response Plan in 2011. This plan looks to raise awareness of the community on the current and projected rainfall as well as information on how to properly conserve water and sensible water use. Furthermore, the plan looks to increase awareness about risk to the National Water Reserves and to officially declare if a drought is in place. KMS also uses the tool Seasonal Climate Outlook Software (SCOPIC). This tool uses a statistical model to better predict rainfall by taking into account monthly rainfall and sea surface temperature data (SPREP, 2014).

The Pacific Sea Level and Geodetic Monitoring Project (PSLGM) has 14 PICs participating, including Kiribati, to collect sea-level rise data and predict on long-term sea level for the Pacific region. This data is to be more accessible to support management of coastal infrastructure and industries. Monitoring is a large component of the PSLGM project as well. This monitoring network works with Geoscience Australia to provide Global navigation Satellite System measurements that allow for more precise measurements of sea level (Australian Government - Bureau of Meteorology, 2019).

4. Coherence with Sustainable Development Goals & The Paris Climate Agreement

Kiribati’s newest policies and frameworks all include linkages between climate change and development, showing a confirmation of the commitment towards addressing climate risk and challenges. Being an atoll nation means the susceptibility to climate change is higher and, therefore, Kiribati has been working to adopt and promote the ideas of the SDGs and the Paris Agreement. However, in 2018, the self-assessed Kiribati Voluntary National Review and Kiribati Development Plan Mid-Term Review found that Kiribati continues to face limited funding to effectively monitor and implement the SDGs and were unable to report on many of the indicators. It is the Kiribati Development Plan 2016 – 2019 (KDP) and the Kiribati 20-Year Vision 2016 – 2036 (KV20) that shows the integration of the SDGs into national planning documents (Government of Kiribati, 2018).

In Kiribati’s recently finished tenth Kiribati Development Plan 2016 – 2019, there are six key priority areas that focus on human resource development, economic growth and poverty reduction, health, environment, governance, and infrastructure. SDG indicators have been assessed for relevance to Kiribati’s context and can be seen throughout these key priority areas such as ending poverty, inclusive quality education, making cities inclusive, safe, resilient and sustainable, achieving gender equality, and ensuring access to water and sanitation (Government of Kiribati, 2016). The KV20 is very similar by including SDG indicators, but with a focus on longer term strategies that looks at increasing the GDP, Infrastructure, Governance, and Security of Kiribati. A key aim of the KV20 is to have equity be in all sector programmes and projects which aligns strongly with the SDGs (Republic of Kiribati, 2016).

Kiribati has also signed onto the Paris Agreement which aims to strengthen the global response to Climate Change. While Kiribati is only a very small percentage of the total global carbon emissions, it is still contributing towards the goal of a carbon-neutral world. Ideas are already forming in using the copra industry to create biofuel as an alternate energy source. Kiribati is aiming for a reduction in its emissions by 12.8% by 2030. However, with further assistance from international organizations, it could potentially reduce its emissions by 49% by 2030. Kiribati is looking to increase its energy conservation and efficiency while promoting the transition towards renewable energy sources (Republic of Kiribati, 2019).

Although capacity and financing to implement these plans continue to be a challenge, a new project, with help from the Pacific Community (SPC) and the United Nations Population Fund (UNFPA) as well as funding from Department of Foreign Affairs and Trade (DFAT), looks to update data on households and institutions across the country. Three new data collections have either just started, Social Indicator Survey and Household Income and Expenditure Survey, or is upcoming, Population and Housing Census. This incoming data will be invaluable in planning and measuring progress against the SDG indicators (Pacific Community, 2018).

Sectoral Aim	Policies with Linkages to Sendai Framework for Disaster Risk Reduction	Policies with Linkages to Sustainable Development Goals	Policies with Linkages to the Paris Climate Agreement for Environment
National Development	Kiribati Development Plan 2016-2019	Kiribati Development Plan 2016-2019	Kiribati Development Plan 2016-2019
	Kiribati 20-Year Vision 2016 - 2036	Kiribati 20-Year Vision 2016 - 2036	
	Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (2014-2023)		
Environmental Protection	Kiribati Integrated Environment Policy (2013)	Kiribati Development Plan 2016-2019	Kiribati Development Plan 2016-2019
Disaster and Climate Risk Reduction	National Adaptation Program of Action (2007)	National Adaptation Program of Action (2007)	National Adaptation Program of Action (2007)
	Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management (2014-2023)	Kiribati Climate Change Policy	Kiribati Climate Change Policy
Vulnerability Reduction	National Disaster Risk Management Plan (2012)	National Adaptation Program of Action (2007)	National Adaptation Program of Action (2007)
		Kiribati National Disability Policy and Action Plan (2018 - 2021)	
		National Approach to Eliminating Sexual and Gender Based Violence in Kiribati. Policy and National Action Plan (2011 - 2021)	Kiribati Climate Change Policy
Land Use Planning	Kiribati Development Plan 2016-2019	National Adaptation Program of Action (2007)	Kiribati Integrated Environment Policy (2013)
	National Adaptation Program of Action (2007)	Kiribati 20-Year Vision 2016 - 2036	

Table 2. Synergies between the national policies, plans and frameworks by sector

5. Issues in Implementation of the DRR and Climate Policy

Implementation of DRR strategies and climate policy have always struggled due to lack of the necessary technical capacity, funding and tailoring institutional bodies at the national level. Furthermore because the population is so dispersed and a lack of communication, local level DRR and climate policies have suffered even more. This is a common theme throughout the Pacific (Government of Kiribati, 2018).

While there has been a fiscal surplus lately, it is not enough to cover all of the development for the Kiribati 20-Year Vision 2016 – 2036 or the Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management. Although there are plenty of goals and aims around implementing DRR, many do not have a funding source. Therefore, many DRR and climate policies are being funded with the help of development partners in an ad hoc fashion (Government of Kiribati, 2018). Disaster risk management is progressively being incorporated into policies and strategies when it comes to agriculture, youth, and education, but not when it comes to human resource development, private sector, communication, and tourism. Therefore, more work still has to be done in synergizing DRR and climate policy with other sectors (Republic of Kiribati, 2014).

6. Stakeholder Analysis

A large amount of funding for the Kiribati Development Plan 2016 – 2019 and the Kiribati 20 Year Vision comes from various stakeholders as there are limited resources and capacity in country. Therefore, Kiribati has received support from countries and development banks such as Australia, Japan, the Asian Development Bank (ADB), the World Bank, and many others. In the 2017-2018 fiscal year, 72.9% of the total Official Development Assistance (ODA) aid was provided by these donors. These contributions are to implement economic reforms and to improve education and health in the population (DFAT, 2018). More specifically, nearly 50% of the ODA is to go to education, 31% to governance, 10% to health, and the remaining to agriculture, infrastructure, and resilience (DFAT, 2019).

Recently, the Green Climate Fund (GCF) has decided to provide \$28 million USD, nearly 50% of the budget, to Kiribati's largest water project that looks to supply clean water 24 hours a day, seven days a week to the South Tarawa population (Green Climate Fund, 2018). Many projects are also funded through the Secretariat of the Pacific Regional Environment Programme (SPREP) who funds around climate change resilience and environmental governance. SPREP has teamed up with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and IUCN to fund the Marine and Coastal Biodiversity Management in the Pacific Island Countries (MACBIO)

Project which looks to collect and analyze data for Marine Spatial Planning (SPREP, 2018).

The Kiribati Red Cross Society is a key stakeholder that works with other organization like NGOs and the United Nations system when it comes to humanitarian response, such as first aid and food supply, in times of emergency. While the Red Cross works on getting the proper supplies, The United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) specializes in deployment of humanitarian personnel for on-the-ground support efforts (Republic of Kiribati, 2012).

With regards to the private sector, Kiribati has made it a high priority in focusing on creating job opportunities and revenue for the government in the form of taxes and fees. To this effect they have created the Private Sector Development Strategy (PSDS) to complete these goals and have welcomed funding from AusAID, New Zealand Official Development Assistance (NZODA), ADB, the World Bank, and other development partners (Ministry of Commerce, Industry and Cooperatives, 2013).

Funding of over \$139.5 million USD has been provided by the Government of Japan, the World Bank, ADB, New Zealand, Taiwan, and the European Union to improve the Infrastructure in Kiribati. This includes upgrades to the airport, reconstruction of main roads, upgrades to the Port at Betio, and the Solar Energy for the outer Islands Project (Government of Kiribati, 2016).

7. Future Challenges and Priorities

7.1 Challenges

While Kiribati has been seeing constant economic growth since 2011, it is still one of the lowest GDP per capita among the Pacific countries and poverty is widespread. Environmental factors continue to effect agriculture and food productivity as well people's daily lives. Remittances, from New Zealand and Australia, and fishing licenses have been a large contributor to the Kiribati GDP and labour force, but more work needs to be done to continue to create well-paying jobs for the population. Improved capacity building to determine the best strategy to increase the number of jobs and productivity is also greatly needed. For example how to gain more sustainable income with the changing sea level temperature from the El Nino season, which brings higher fishing catches, to La Niña season where, which brings drought and less catches (Government of Kiribati, 2016).

One of the reasons for the high poverty rate is the high unemployment rate, which according to the 2010 Census was 31%. However, this number is even higher when looking just at youth which is at 54% unemployment. This problem will continue as a major challenge as the population continues to grow steadily. A healthy educated youth is needed for capacity building and an increased skill set. While the Kiribati Institute of Technology has resulted in good employment opportunities, there is still poor access and reliability to internet connectivity which negatively impacts the program (Government of Kiribati, 2016).

Climate change has increased the frequency and harshness of the king tides and storms that continue to cause damage to the surrounding buildings. They are also causing economic loss to the communities and government as well. A main reason for this is the continued use of sandbags which cannot feasibly protect from the repeated onslaught of the tides. The greatest impact from this is

the safe water supply, especially on South Tarawa, where the quality and quantity is in a precarious condition. More infrastructure to improve the quality and quantity of water from the ground is greatly needed (Government of Kiribati, 2016).



(Republic of Kiribati, 2016)

7.2 Priority Areas of Work

Kiribati is looking to increase its GDP and help those in poverty by attempting to boost its economy through developing its tourism sector. The hope is to provide employment and income generation by promoting sustainable tourism. By improving its mobility, by increasing domestic and international air service capabilities as well as increasing demand for Technical and Vocational Education and Training (TVET), Kiribati is looking to improve its tourism numbers and therefore its economy (Republic of Kiribati, 2016).

Furthermore, education is a key component in increasing the number of skilled jobs and the economy of Kiribati. Programs such as the Positive Parenting and Young Couples, which helps teach children's caregivers properly on how to give positive parenting techniques, and the Kiribati Teachers College (KTC), which looks to train diploma teachers for Primary and Junior Secondary education levels, are important programs that should receive continued implementation and funding (Republic of Kiribati, 2016).

Finally, increasing the quality and accessibility of healthcare in Kiribati is a top priority. With climate change causing harsher king tides and higher sea-level rise, overcrowding and poor hygiene will continue to be a challenge to overcome. Furthermore, diseases associated, such as dengue and tuberculosis, will continue to be prevalent and be a burden on the population. Measures are needed to promote more doctors and nurses as well as strengthening the capacity of the hospitals and health centers in the area.

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