

Government of Kiribati



Ministry of Fisheries and Marine
Resources Development

Kiritimati Integrated fisheries master plan 2014–2017



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Ministry of Fisheries and Marine Resources Development

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List of acronyms

KIFMP	Kiritimati Integrated Fisheries Master Plan
CPPL	Central Pacific Producers Limited
MFMRD	Ministry of Fisheries and Marine Resources Developments
KNFP	Kiribati National Fisheries Policy
KDP	Kiribati Development Plan
NGOs	Non-governmental organisations
SCUBA	Self Contained Underwater Breathing Apparatus
BDM	Beche-de-mer
FADs	Fish aggregating device
EEZ	Exclusive economic zone
MISA	Ministry of Internal and Social Affairs
MELAD	Ministry of Environment, Lands and Agricultural Development
MPWU	Ministry of Public Works and Utilities
MPA	Marine Protected Area
SPC	Secretariat of the Pacific Community
FFA	Forum Fisheries Agency
GDP	Gross domestic product
KFL	Kiribati Fish Limited
EU	European Union
MCTTD	Ministry of Communication, Transport and Tourism Development
EIA	Environmental Impact Assessment
ADB	Asian Development Bank
KIT	Kiribati Institute of Technology
MTC	Marine Training Centre
MLPID	Ministry of Line and Phoenix Islands Development
MLHRD	Ministry of Labour and Human Resources Development
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean
EPO	Eastern Pacific Ocean
CA	Competent Authority
IUU	Illegal, unreported and unregulated
SPREP	Secretariat of the Pacific Regional Environmental Programme
PUB	Public and Utilities Board
KPA	Kiribati Ports Authority
PS	Purse Seine
LL	Long Line
MLPID	Ministry of Line and Phoenix Island Development
MFED	Ministry of Finance and Economic Development
DBK	Development Bank of Kiribati
ANZ	Australia and New Zealand
MCICD	Ministry of Commerce, Industry and Cooperative Development

1. Executive summary

This Kiritimati Integrated Fisheries Master Plan for the period 2014 to 2017 is designed as one of the Kiribati National Fisheries Policy (KNFP) strategic actions to improve both the management and the sustainable development of the fisheries and marine resources on Kiritimati Island to maximise economic growth, employment opportunities, and food security and to safeguard the marine environment.

The Plan is focused on oceanic and coastal fisheries and aquaculture, in the broader context of development including in tourism, environment, salt production and construction of a fisheries jetty/wharf. To achieve the level of performance that will be necessary for Kiritimati to receive the benefits from well managed marine resources will require assistance from regional and international agencies, and from our development partners. The outcomes described in this Plan cover activities that require commitments by the Kiribati Government and respective donors. Areas in which the Ministry of Fisheries and Marine Resources Development (MFMRD) believes that there needs to be more investment for the future are also set out. These include the challenges of addressing the lack of adequate infrastructure, lack of transportation (air/sea), poor communication, and high cost of services, which impinge on the economic benefits that can be derived from the fisheries sector as well as tourism.

Kiritimati Island is a potential economic growth centre for Kiribati in the future, due to its inherent advantages, which allow it to offer more development opportunities than Tarawa. It is thus an ideal location for a longline and purse-seine provisioning base for vessels operating in the eastern and western Pacific Ocean.

This Plan should therefore be seen as a guide to potential investors and our development partners, as well as the MFMRD and the Kiribati Government. The involvement of MFMRD staff and, through consultation, the wider community in developing the Plan has promoted for a clear sense of ownership and commitment to the objectives, outputs and actions.

MFMRD, line ministries, national, regional and international agencies and NGOs, are now ready for the future and prepared to play their parts in managing and developing Kiritimati's fisheries and marine resources, in particular for those that are clearly outlined in the complete framework provided in the Plan.

2. Introduction

The development of this Kiritimati Integrated Fisheries Master Plan (KIFMP) is one of the priority actions of the Ministry of Fisheries and Marine Resources Development (MFMRD) to achieve the 12-year vision and goals of the Kiribati National Fisheries Policy (KNFP) 2014–2025, to achieve effective management and development aspirations of the Kiribati Government through sustainable fisheries.

Kiritimati Island provides the largest land area in Kiribati and is well known as the largest coral atoll in the world. Due to its special natural characteristics and setting in the central Pacific, it possesses one of the most diverse and healthy marine and terrestrial environments. It also provides a strategic location of both economic and political advantage for the Government; therefore, a number of studies have been undertaken by respective government sectors to explore opportunities for Kiritimati as a future economic growth centre.

Given the development context of Kiribati and its fundamental dependence on coastal and oceanic fisheries, it is critical that Kiribati strengthen the governance of its fisheries management and development through a ‘whole of government’ approach to reinforce sustainability and to build climate resilience of the marine resources for the enhancement of food security for I-Kiribati and the maximisation of the economic growth and employment derived from these resources.

The development of the KIFMP is a demonstration of good governance and thus is a significant result of extensive consultations with Kiritimati Island communities and collaborative work between the Ministry of Fisheries and Marine Resources Development, the Forum Fisheries Agency (FFA) and the Secretariat of the Pacific Community (SPC).

The Plan provides a contextual analysis of development issues and constraints, and then offers possible resolutions, which are detailed as priority actions needing adequate resources and effective implementation in the next four years (2014–2017). Furthermore, it provides particular emphasis on the vital need for establishing the fisheries jetty and other necessary infrastructures and facilities that would trigger or attract lucrative investments on Kiritimati Island in the future. MFMRD, along with line ministries, the Kiritimati local communities, and donor partners will work closely in addressing the issues and strategies identified in this Plan, and will coordinate the monitoring and evaluation processes of the Plan on annual basis.

This Plan will be reviewed at the end of the second year (2015), which is consistent with the review cycle of the Kiribati Development Plan (KDP) and KNFP. This is critically important to improve the implementation processes and approaches in achieving the targeted outcomes, and to reframe priority actions for the next four-year period according to the KNFP medium- to long-term strategic actions. However, this is subject to the successful implementation and outcome of this Plan. Most importantly, the successful implementation of this Plan may not be possible without the commitments of development partners who have recognised this Plan as an imperative tool to ensure effective management and sustainable development of Kiribati’s coastal and oceanic fisheries in the future.

3. Background – development context and the fisheries planning processes

Kiritimati Island has a unique and delicate environment due to its isolation, size and atoll characteristics, which have resulted in a diverse ecosystem endowed with extensive biophysical resources. It is the largest island of Kiribati, and the largest coral atoll in the world. The bird life is of international significance, with the highest species diversity and largest number of breeding sea birds on any island in the world. Kiritimati Island has great potential for ecotourism and fisheries economic activities, which may offer opportunities for the island to become one of the economic growth centres for Kiribati in the future.

Tourism potential depends on retaining and enhancing the island’s unique biophysical environment which, amongst other matters, includes its world class reputation for sport fishing, and as a bird sanctuary. The Paris Flats is a major spawning area for bonefish and may be designated as a ‘marine park’ to reduce the excessive fishing using gill nets. Four protected areas have already been designated within the extensive Kiritimati Island lagoon system in which fishing activities are prohibited.

On the other hand, the marine and fish resources are abundant and are highly important both as a food source and for commercial activities such as sport fishing and post-harvest and export processing. However, the island may provide greater potential if the right enabling environment for development is created. In the area of offshore fisheries, there are challenges and opportunities that need to be addressed in order to realise the full potential. The challenges include the lack of infrastructure, lack of transportation (air/sea), poor communication, and high cost of services, and these

challenges impinge on the economic benefits that can be derived from the offshore fisheries sector. Despite these challenges, Kiritimati Island does have more advantages that present development opportunities than Tarawa. These advantages include its geographical location, which places it in close proximity to potential fisheries markets such as Hawaii and Fiji, and which makes it ideal for a longline and purse-seine provision base for vessels operating in the eastern and western Pacific Ocean.

The people of Kiritimati Island also rely heavily on exploitation of the resources for their economic and socio-cultural well-being. This includes copra production, water extraction from the underlying lens and exploitation of marine resources. Proper resource management through integrated sectoral approaches is indeed required, in advancing management tools and guidelines to safeguard the marine environment, and promoting the health of both marine ecosystems and coastal habitats.

Although Kiritimati Island is owned by the Government, the growing population on the island is becoming a concern due to the high influx of people observed into Kiritimati over the past 10 years, which resulted in a rise of squatter settlements and illegal fishing activities or poaching in marine protected areas. A rapid increase of population on the island will continue to increase tension between the need for exploitation of resources to satisfy the drive for both social and economic development and the need to protect the environment upon which this development depends. Therefore the Government needs to strengthen its regulation and policy to control the migration of people to Kiritimati Island, and provide effective land use planning to address the increasing demand for a range of land uses and the continuous illegal extraction of resources and trespassing on protected or closed areas.

According to the climate change book recently published by SPC, entitled *The Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change*, coastal fisheries may be adversely affected by climate change, with the possibility of a significant decline in coastal fisheries. However, tuna stocks may increase slightly in the future as a result of climate change.

The KNFP was approved by Cabinet in August 2013 and sets new strategic directions for MFMRD towards effective fisheries management and development, and the promotion of marine resource conservation in Kiribati for the next 12 years. It is also designed to ensure strategic planning and integrated fisheries management approaches at all levels to achieve sustainable development through a more coordinated and collaborative approach between all stakeholders and related government departments on a national level. Thus it provides 5 overarching goals and strategic objectives:

- i) contribute to economic growth and employment through sustainable fisheries, aquaculture and marine resources development;
- ii) protect and secure food security and sustainable livelihoods for I-Kiribati;
- iii) ensure long-term conservation of fisheries and marine ecosystems;
- iv) strengthen good governance with particular focus on building capacity of MFMRD and relevant sectors to implement and support fisheries management, development and monitoring, control and surveillance; and
- v) build climate change resilience for fisheries and marine resources in Kiribati.

4. Goal and priority areas

This KIFMP was specifically developed in accordance with Strategic Action 13 of the KNFP: to provide a comprehensive and detailed plan of actions for oceanic, coastal fisheries and aquaculture in the broader context of development in areas such as tourism, environmental protection, onshore facilities and infrastructure to support fisheries development, the necessary secondary supporting services and the enabling environment to attract lucrative investments on the island.

In addition, after a formal consultative process with key government sectors, the private sector and the fishermen association on Kiritimati Island, the following goal for this KIFMP was endorsed:

To improve both the management and sustainable development of the fisheries and marine resources on Kiritimati Island to maximise economic growth, employment opportunities and food security and to safeguard the marine environment

In order to achieve the goal of this Plan for the next four years (2014–2017), it is particularly focused on achieving the priority actions of the five main focal areas:

- i) Coastal fisheries sector
- ii) Offshore fisheries sector
- iii) Aquaculture sector

- iv) Tourism sector
- v) Environment sector

However, to kick-start sustainable economic growth, some basic or essential infrastructure must be in place to provide an enabling environment for foreign investment and private sector development or expansion to occur. Therefore a significant milestone of this Plan is to focus on necessary infrastructure such as a jetty and more reliable air services to support economic development of the marine sector in Kiritimati Island.

In addition to these sectors, cross-cutting issues are also identified to address common shortcomings and gaps in legislation and enforcement, institutional capacity, transportation, market access, community empowerment, climate change, monitoring and evaluation which may prevent obligations from being met in these important sectors and hinder the achievement of the goals of this Plan.

4.1 Essential infrastructural needs

The development of the infrastructure on Kiritimati Island has been an ongoing concern for the Government of Kiribati. In 2002 an initial assessment was undertaken by SPC and FFA on the development options and needs for Kiritimati Island (Chapman 2002). In this report, the need for both a jetty and air service availability were highlighted as major constraints to the development of fisheries, especially the offshore fishing industry.

In 2006 the Asian Development Bank undertook a study for the development of Kiritimati Island to address problems with the existing jetty currently operated by the Kiribati Port Authority (KPA) with fenders on its side. The study emphasises that during rough weather, it is dangerous for the ships to berth; they can not only get damaged by knocking or bouncing against the jetty, but also has caused concrete surface of the jetty to shear off the main steel supporting structure. The jetty's height is also a critical problem for ships offloading domestic passengers and cargo. Therefore, domestic ships cannot dock at the jetty, especially during bad weather, but have to moor offshore and offload by small lighters. Therefore the jetty is inefficient, continuously posing significant costs to both the public and private operators. An offshore water breaker has been considered as one of the solutions to shelter the port area from continuous strong waves and rough weather. But this was deemed not to be possible as it would be too expensive to construct.

These studies demonstrate that infrastructure is one of the major constraints to fisheries development on the island. Therefore in December 2012 MFMRD worked closely with FFA to undertake a preliminary assessment of the jetty and provide potential sites for developing a new fisheries wharf/jetty on Kiritimati Island. Erasito Consultancy Firm was engaged for this work and has provided a Kirimati Island Port Scoping Study offering four options that would potentially be suitable for the fisheries jetty.

After a close consultation with the environment and tourism sector, and other relevant sectors such as the Ministry of Line and Phoenix Islands Development (MLPID) and KPA, MFMRD has recommended Option 3 (see Figure 1) as the best option to cater for longline fishing boats and domestic cargo boats. The jetty may be easily upgraded in the future if significant interest resumes on the part of cruise ships in visiting Kiritimati. This option can be realised with an estimated budget of NZD 12.5 million, which is within the EDF 11 (European Development Fund – 11th round) programme for Kiribati for the period 2014–2020. Consultation between Kiribati Government and the EU Delegation Office in Fiji is underway to finalise mobilisation for this important priority for Kiribati.

In addition, the current airline schedules limit any development of export markets in the fisheries sector (oceanic, coastal and aquaculture). This may partly be addressed with tuna fishery development where shore-based operations would bring in charter aircraft to export products to Hawaii and possibly other destinations. Such charter operations would allow some export of coastal fisheries and aquaculture products and also provide a service for importing goods needed on the island.

Proposed solutions are:

- Development of a wharf that will allow safe berthing of both longline and domestic cargo vessels for offloading and re-provision;
- Ensuring that all the necessary support facilities – electricity, water, etc. – are available at the wharf; and
- Encouraging an expansion of current airline services in consultation with the private sector, especially tuna fisheries operations.

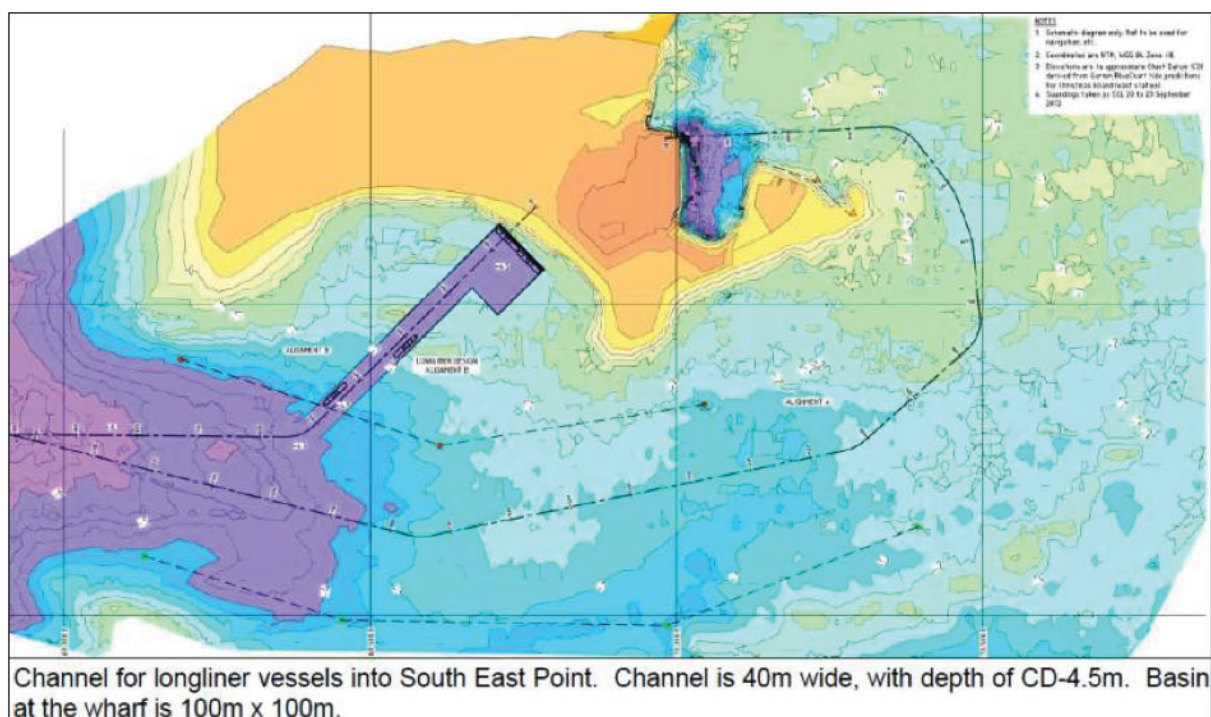


Figure 1. Map of Option 3 – Potential site for the proposed fisheries jetty on Kiritimati Island.

5. Offshore fisheries

The catch trend for 2012 for the entire Western and Central Pacific Commission Area (WCP-CA) was **2.6 million tonnes**, and this is valued at **USD 7.2 billion**. For FFA member countries, **1.6 million tonnes** was caught in their waters, valued at **USD 4 billion**. For the same year 35% or **568,000 tonnes** of the catch from FFA member waters was taken from Kiribati waters, worth **USD 1.3 billion**. However, the percentage of catch caught in Kiribati waters fluctuates from year to year due in part to El Nino and La Nina cycles; from 2003 to 2012 this amount ranged between 10% and 35%.

Looking at the catch trend on a national level, **24%** or **133,646 tonnes** of the total catch of the entire Kiribati exclusive economic zone (EEZ) was taken from the Line Group and the Phoenix Group in 2012, worth **USD 368 million**. From this total **USD 133 million** worth of fish is taken from the Line Group.

The revenue obtained through access arrangement has been contributing between 40% and 60% of the government's total annual recurrent budget, confirming the fact that the tuna fishery is the most valuable offshore natural resource in Kiribati. The abundance of tuna is projected to increase in the Kiribati EEZ due to changes in water temperature and prime feeding areas of these species caused by climate change.

The key species covered under this Plan include:

- South Pacific Albacore *Thunnus alalunga*
- Yellowfin tuna *Thunnus albacores*
- Bigeye tuna *Thunnus obesus*
- Skipjack tuna *Katsuwonus pelamis*

Other species captured as bycatch of pelagic fishing operations that target tuna include mahi mahi, marlin, rainbow runner, wahoo and several shark species. These can be added to the list of key species if their catch rates, value and commercial importance increase significantly in the future.

The fishing methods that will be covered under this plan are:

- Purse seine
- Pole and line
- Pelagic longline
- Handlining
- Trolling
- Sport fishing

5.1 The distribution of purse-seine and longline fishing effort

The distribution of fishing effort in the Kiribati EEZ (Figures 2 and 3) clearly demonstrates the unique features of the three parts of the EEZ and the types of fishing activities that can be developed and tailored according to the potential of each part of the EEZ.

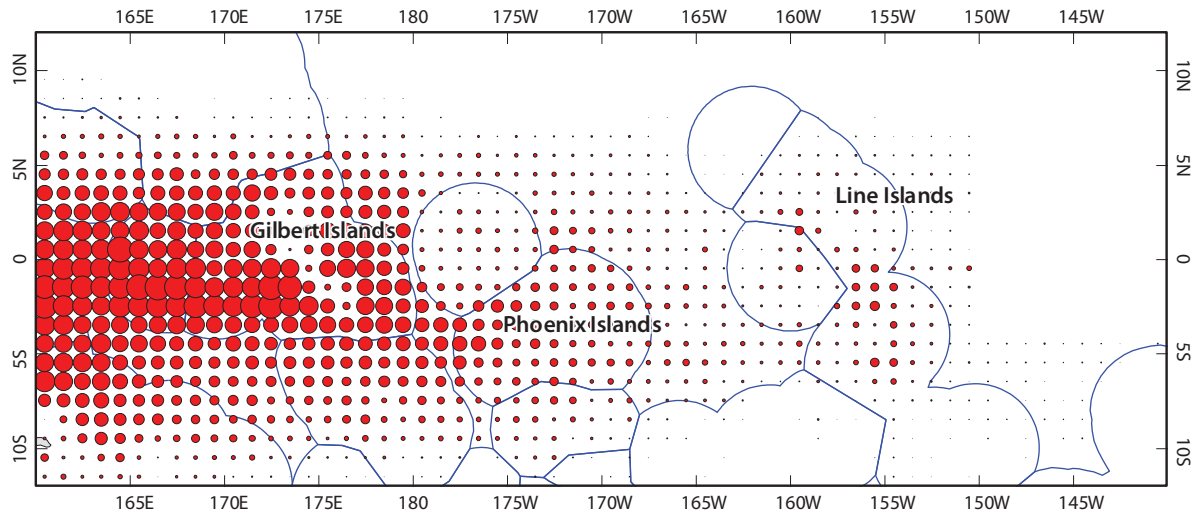


Figure 2. Distribution of purse-seine sets in the Kiribati EEZ and adjacent areas from 1997 to 2011 by degree of latitude and longitude (source: SPC logsheet data).

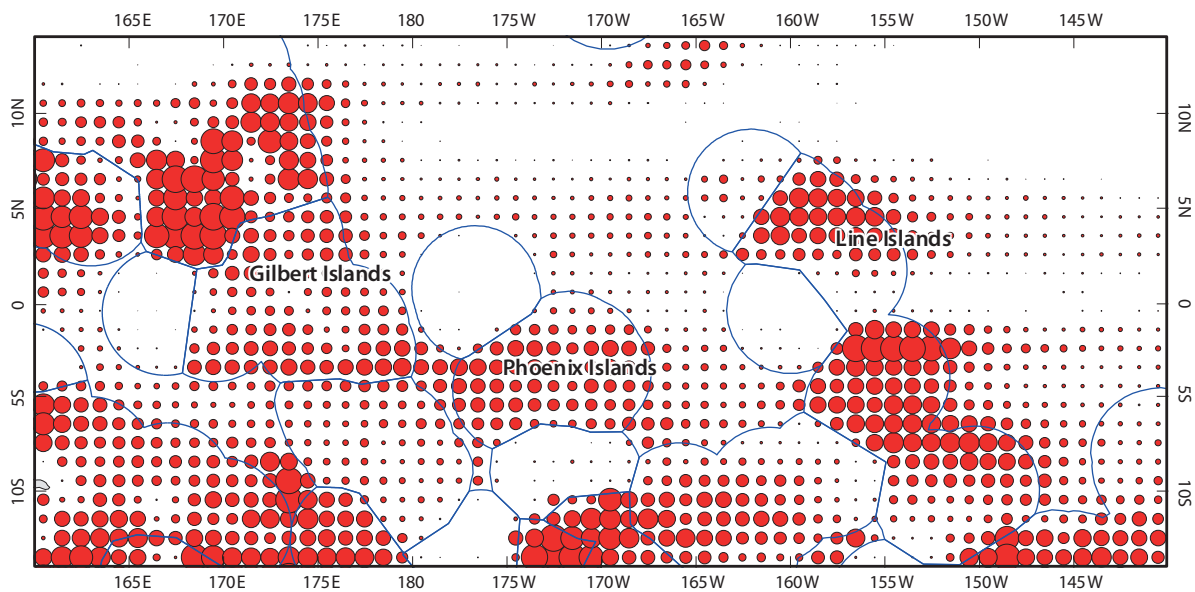


Figure 3. The distribution of longline fishing effort (number of sets) by degree of latitude and longitude for 1997–2011 (source: SPC logsheet data).

The two figures clearly demonstrate that the main fishing activity in the Gilbert Group is purse seining, while longline fishing is more concentrated in the Line Group, giving importance to Kiritimati Island as the potential hub for longline fishing for vessels operating in the entire Kiribati EEZ and those that are operating in the adjacent eastern Pacific Ocean (EPO) area.

5.2 Catch value by gear types in the three parts of the Kiribati EEZ

The value of catch taken out of the three groups' EEZs by purse-seine vessels for 2012 (Figure 4) is **USD 1.2 billion**. Only **6%** of the total value of tuna was caught in the Line Group.

For longlining (Figure 5) the total value of catch for the whole of the Kiribati EEZ in 2012 was **USD 123 million**, and 55% of the total value was caught in the Line Group.

Purse-seine fishery

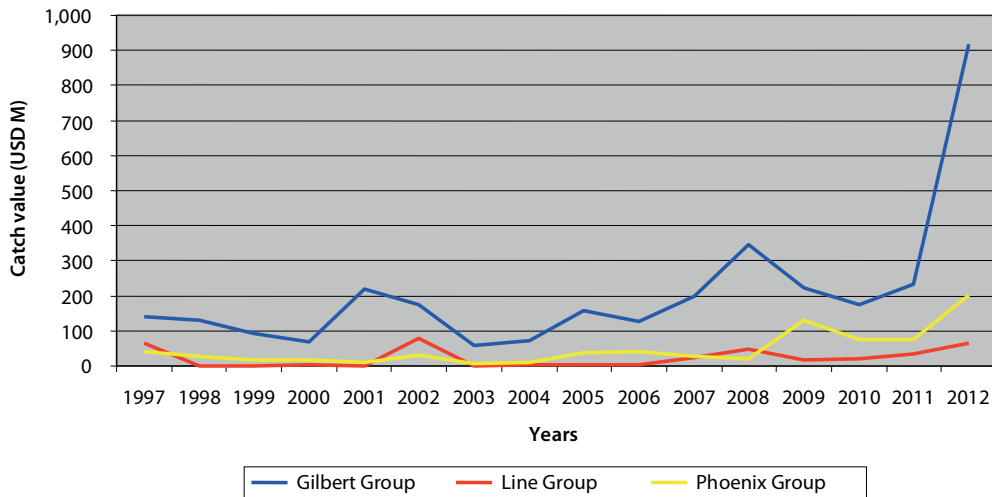


Figure 4. Value of catch for purse-seine fishing in the three groups.

Longline fishery

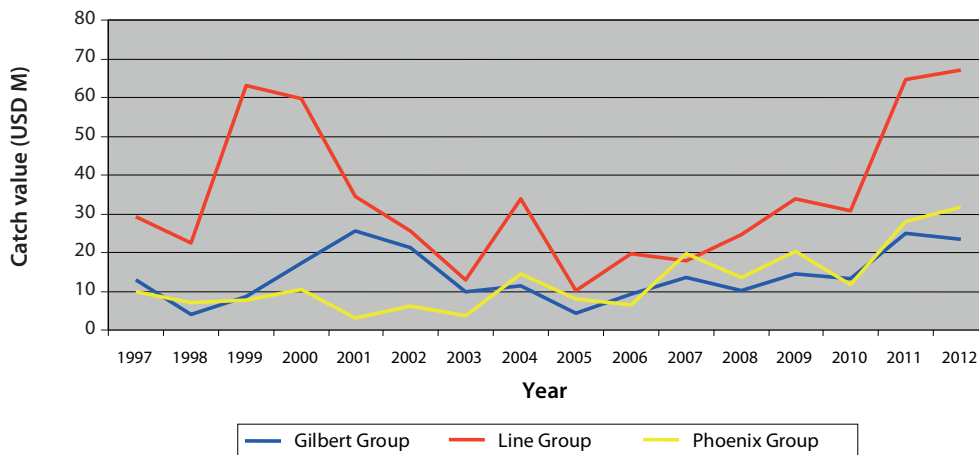


Figure 5. Value of catch for longlining in the three groups.

5.3 Shore-based facilities in support of offshore fisheries development

The location of Kiritimati Island in the Line Group along with the catch distribution favouring longline fishing in the Line Group does create opportunities and potential for Kiritimati Island to become a hub for longline fishing vessels operating in the Kiribati EEZ and the adjacent EPO area.

In the more distant future, skipjack are expected to move from west to east due to an increase in sea surface temperature caused by climate change. This possible shift in the migration pattern of skipjack tuna (the main target species for purse-seine vessels) will also see an increase in fishing activities by the purse-seine vessels in the Phoenix and Line Groups.

It is therefore timely that while development plans are being formulated, these changes are being factored into the planning process to ensure that maximum benefits are realised when these developments happen.

The development of the wharf/jetty infrastructure has been considered in Section 4 as the key driver for other onshore fisheries development such as:

1. Slipway – for the repair of longline vessels;
2. Tuna whole fresh and loining processing plants (loins can be processed as fresh, frozen or cooked);
3. Purse-seine net mending yard;
4. Refrigeration and other specialised fisheries maintenance services;
5. Machine shops – to supply spare parts for fishing vessels and other specialised spare parts, etc.

6. Coastal fisheries

There have been little direct coastal fisheries assessments and formal monitoring of resources in Kiritimati. Nevertheless, consultation with stakeholders and communities showed that there is a widely held perception that many of the lagoon/reef resources are generally in good shape. However, there are sustainability concerns for sea cucumber and pet fish export fisheries and some coastal resources used primarily for consumption.

6.1 Sea cucumber (kereboki)

Sea cucumbers are harvested by wading, snorkeling, free diving or SCUBA diving. The major issue concerning sea cucumber fisheries expressed by stakeholders is declining catches of all species and loss of economic revenue. This is evident in the dramatic decline in total catch. The number of exporters operating declined from five in 2011 to one in 2012. Sea cucumber export data demonstrate that 9.3 mt, 21 mt and 5.8 mt of dried sea cucumber (beche-de-mer) were exported from Kiritimati during the period 2006–2008. For the period 2010–2012, an average of 5.5 mt of beche-de-mer was exported per annum – mainly medium–low value species. The dominant species exported over this period were surf redfish (53%), greenfish (18%) and prickly redfish (9%). The remaining (19%) comprised lollyfish, brown sandfish, tiger fish, black teatfish, chalkfish, curry fish and black fish (refer to Table 1).

Proposed solutions are:

- Identify and establish effective sea cucumber management measures and harvesting strategies;
- Improve processing techniques to ensure long-term benefits for Kiritimati communities.
- Ban the use of underwater breathing apparatus and possibly other techniques in the fishery to protect stocks in deeper water.

Table 1. Exports of dried sea cucumber (beche-de-mer) from Kiritimati Island. Source MFMRD. (Note: no data available for 2009.)

Year	2006	2007	2008	2010	2011	2012
Surf redfish	6,848	14,130	3,826	1,295	166	0
Prickly redfish	1,626	1,739	239	183	308	499
Green fish	340	3,601	709	2,800	1,236	366
Black teatfish	50	388	528	83	220	0
Tiger fish	222	694	0	26	0	313
Brown sandfish	127	362	513	38	788	805
Chalk fish	0	24	0	0	0	0
Lolly fish	76	0	0	7	804	3,075
Curry fish	3	6	0	0	0	0
Black fish	0	17	0	36	394	0
Total	9,292	20,959	5,814	4,468	3,916	5,058

6.2 Pet fish

Kiritimati commercial pet fish fishers target around 30 species of ornamental finfish. However, more commonly up to 10 species form the bulk of the exports, with the flame angel fish (*Centropyge loriculus*) contributing up to 75% of total exports. The remainder is often dominated by up to five species (*Pseudanthias bartlettorum* – Bartlett’s anthias, *Centropyge flavissimus* – lemon peel, *Paracanthurus hepatus* – blue tang, *Centropyge bispinosa* – coral beauty and the *Chaetodon declivis* – declivis). Over the last decade the volumes of marine exports from Kiritimati Island have generally been increasing; this seems to have primarily been related to the increase in the number of licensed operators. The volume of export reached a peak in 2007, and in the years following that the volumes of exports have been decreasing, including the unit value of the resource (refer to Figure 6). The reported decline in exports is primarily due to limited airfreight.

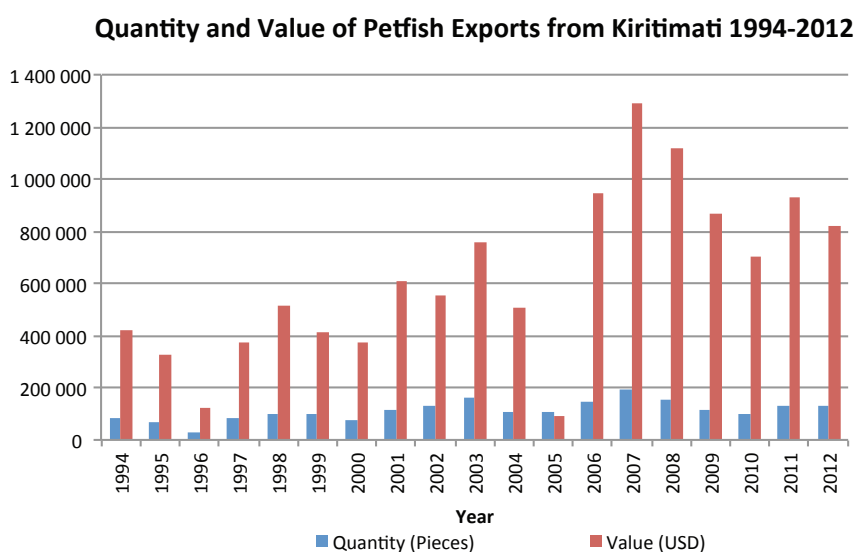


Figure 6. Volume and value of pet fish exports from Kiritimati Island (source: MFMRD).

Another issue of concern is the significant drop (by 90%) in the price of the flame angel fish. This drop in price has in part been attributed to poor handling and packing practices and competition amongst existing operators oversupplying the Honolulu market.

Many pet fish divers are not SCUBA certified. This has resulted in an increasing number of dive accidents which is a concern for the community and Kiribati Government.

A draft Kiritimati Island Pet Fish Management Plan is being developed in consultation with local authorities and industry to sustainably manage the trade and address highlighted concerns.

Proposed solutions are:

- Finalise, endorse and implement the management plan and regulation;
- Provide training in best practices in pet fish capture, handling, storage and transport; and
- Adequately train divers.

The capture and export of pet fish is an important cash generating venture on the island and the collapse of the industry would leave the operators in a vulnerable situation.

6.3 Artisanal and subsistence fisheries (food security)

Marine resources are the primary protein source for the Kiritimati community. In a 2007 socio-economic survey, Kiritimati had an average per capita consumption of fresh fish of 110 kg/person/year and 6–7 kg/person/year of invertebrates (meat only). This is triple the regional Pacific average of 35 kg/person/year. Kiritimati’s high average per capita consumption is probably related to factors such as the high cost associated with importation of alternative protein and food sources and having limited resources (arable land) and means.

Aside from export coastal resources (sea cucumber/pet fish), the community of Kiritimati believes that their coastal food resources are in good shape, although there have been steady declines in abundance of a selection of species such as giant trevally, reef sharks, puffer fish, parrotfish, mullet, mantis shrimp, lobsters and land crabs. The community is concerned for the future of their coastal resources, especially as some of these species are critical components of their livelihood. Coastal resources are fragile in the face of the impacts of fishing and the adverse impacts of climate change, yet they are the primary source of marine economic subsistence and nutrition for the community; therefore, sustainable approaches must be adopted and maintained.

To maintain current levels of harvesting and improve the situation for those species that have been shown to have declined would require adopting and implementing some acceptable management and harvest strategies. These strategies, where appropriate should take into account the ecosystem approach to management. This would lead to resource sustainability as well as ensuring that food security is sustained, leading to the continuous enhancement of the community.

Managing marine resources requires immense understanding and information, of not only the biological aspects of the resource itself but also their habitats and human impacts on resources and habitats. Kiribati people who inhabited Kiritimati Island for the past two decades or more have considerable understanding of the marine resources in terms of harvesting, but may have fallen short of adequately managing those resources. There has also been rapid growth in the Kiritimati population in the last decade due to migration from islands in the Gilbert Group. This has resulted in the increasing competition for the use of natural resources.

Possible solutions are:

- Ensure that each fishery has a management plan in place with regulations; and
- Close areas to gillnetting to protect nursery areas for bonefish and other species experiencing overfishing.

6.4 Monitoring and reporting

Regular monitoring of catch volumes (numbers and weights) is important to understand trends in export, artisanal and subsistence fisheries. The information is used to inform and improve resource management approaches. Monitoring systems are in place for sea cucumber and pet fish; however, these systems would benefit from some improvements. There is a need to develop cost effective systems to monitor artisanal and subsistence catch on Kiritimati.

Possible solutions are:

- Implement a logbook system to get an overall understanding of catch and effort;
- Implement a periodic creel survey to better understand catch effort and the species mix and size of fish being caught.

6.5 Enforcement of management measures

Compliance amongst the community with fisheries and resource management measures and regulations was seen as a major obstacle during the consultations.

Appropriate and sustainable management measures and regulations for specific fisheries (for example sea cucumber, pet fish, bonefish), and for the protection of the wider marine resources and environment from degradation need to be introduced, complied with and enforced to promote economic and resource sustainability for the benefit of the entire community. MFMRD, in collaboration and consultation with stakeholders, community and business, will develop resource management plans and regulations. Compliance amongst community members will be elevated when members are satisfied and comfortable with any fisheries management plans being communally adopted. It is therefore sensible to gain total community support prior to any adoption even though it might cost time. Providing the powers of Fisheries Enforcement/ Authorized Officers to registered guides/wildlife officers/tourism officers is considered a cost effective way of improving enforcement of fishery regulations.

Effective communication and raising awareness within the sector on rules and regulations, protected species, protected areas, etc., will require the development and distribution of awareness material. This can be achieved effectively by collaborating with line ministries and regional partners.

Possible solutions are:

- Introduce a community-based ecosystem approach to fisheries management through communities management plans;
- Develop awareness materials in local language so all community members know the rules and regulations for the different fisheries, protected species, protected areas, etc.; and
- Establish a joint enforcement and monitoring team composed of authorised/enforcement officers from line ministries to improve enforcement of fishery regulations.

6.6 Capacity building

Export marketing requires consistency in supply of products that meet specific quality and quarantine standards of export markets. Without meeting these standards, existing and prospective Kiritimati exporters will fail to establish meaningful long-term relationships of trust that will guarantee maximum benefits from their trade.

Capacity building at the various levels in the supply chain to ensure products that meet quality requirements is critical – including in application of appropriate fishing gear/technology and product-handling by fishermen during harvest; onboard storage; on-site processing, packaging, storage; and transportation to markets.

Provision of quality and timely administrative and technical support services by the MFMRD and line ministries is essential to the success of whole marketing process. Capacity building at the ministry level is therefore equally important – including on the important role in the marketing process, data collection/analysis, assessment of status of stock and development of management plans and timely liaison with community/producers/exporters.

Possible solutions are:

- Ensure MFMRD staff are provided with adequate training to be able to do their jobs effectively; and
- Run training programmes to improve private sectors businesses (sea safety, fish handling and processing, business management skills, etc.).

6.7 Income and employment

Community well-being is vitally important to a society such as Kiritimati which is isolated and has a population of 5,800. Kiritimati lacks some essential infrastructure, and this impacts economic opportunities and leaves the community in great need of income. Creating business opportunities through nearshore fisheries activities is seen as means of addressing employment and income. Some examples worth exploring include improving economics of small-scale tuna fisheries using nearshore anchored fish aggregating devices (FADs) and exploring deep-water snapper fishing and export opportunities.

International marketing opportunities exist for pelagic species (tuna and associated species) and deep-water snapper. To convert these opportunities into profitable reality there will need to be an assessment of the status of resources and technical production systems in areas such as capture and handling, and of barriers such as storage, market size, transport etc., all with the aim of determining the potential economic feasibility. Should feasibility studies demonstrate that business options are economically viable, assistance in the form of capacity enhancement, improving basic infrastructure and establishing a credit facility would promote the development of private businesses.

Possible solutions are:

- Develop and implement a FAD programme to ensure adequate material to maintain a minimum of 3 FADs around the island;
- Train local fishers in FAD fishing skills and proper handling of the catch; and
- Collaborate with the private sector to develop export markets for the different inshore fisheries.

6.8 Observed and projected impacts of climate change

The main habitat supporting coastal fisheries on Kiritimati, coral reefs, is projected to degrade progressively due to climate change, with losses of live coral of > 25% by 2035 and > 50% by 2050. Sea-level rise will also progressively convert the large areas of intertidal lagoonal habitat, such as the large shallow lagoon and com-

plex inner lagoon systems on Kiritimati, to sub-tidal areas, with uncertain effects on the associated shellfish and finfish which support subsistence (Bell, Johnson and Hobday 2011).

The productivity for coral reef fish and invertebrates on Kiritimati is projected to decline by 20% by 2050 due to both the direct effects (e.g. increased sea surface temperature) and indirect effects (changes to fish habitats) of climate change. Given the population growth trend on Kiritimati, further declines in the potential supply of reef fish per person are likely. On the other hand, the nearshore pelagic fishery component of fisheries based on skipjack and yellowfin tuna is projected to increase.

Given these projections it is essential to get management plans in place for all fisheries to ensure sustainability of harvests, thus ensuring that fish stocks are healthy and have the best chance of adapting to the effects of climate change in the marine environment.

7. Aquaculture

Farming of marine organisms to ensure food security and provide alternative income generating activities to the people on Kiritimati Island is a promising alternative for the local community. This form of activity could help restore some fisheries resources on the island as it would reduce the pressure on the wild capture fisheries. It is also an option to substitute for the projected decrease in coastal fisheries productivity as a result of projected climate change effects.

The impacts of climate change on aquaculture are most likely to occur in the following areas:

- Milkfish farming in ponds is expected to be favoured by higher air temperatures and increased rainfall but the effects of sea-level rise on this activity have yet to be determined.
- The projected higher water temperatures and rainfall, and increased ocean acidification are expected to progressively reduce the efficiency of culturing seaweed, giant clams, pearl oysters and sea cucumbers.

7.1 Milkfish farming

Milkfish farming is the only existing aquaculture activity on Kiritimati Island. It is undertaken in government controlled ponds and produces an average annual harvest of 15 tonnes worth around AUD 40,000. Kiritimati is blessed with abundant natural ponds. Many of these ponds are underutilised in terms of milkfish production; therefore investigation should be undertaken into how to fully capitalise on this opportunity. Several ponds have limited or no access to seawater, resulting in very highly saline ponds with lower productivity.

Opportunities exist for communities to utilise some ponds for nutrition and commercial gain. Subject to the development of a longline fishing port facility at Kiritimati Island for provisioning vessels, milkfish could be cultured by communities for sale to longline vessels as bait. Government could consider the opportunities and risks of medium- to long-term pond lease arrangements for any potential farm business on a pilot project basis prior to venturing it to the community.

The unique taste of Kiritimati pond cultured milkfish provides an opportunity for export to international niche markets. Compared milkfish produced in other major milkfish producing countries, the tissue fat and taste of Kiritimati milkfish is superior. Maximising returns for Kiritimati fishers/farmers will require identifying niche markets; developing processing, packing and marketing strategies; and addressing transportation barriers to allow niche marketing for local communities.

7.2 Brine shrimp farming

The existence of highly saline ponds offers excellent conditions for the culture of brine shrimp for aquaculture and pet fish feed. To maximise returns from brine shrimp culture, a feasibility study is needed and a pond lease arrangement similar to that for milkfish is worth considering. This could provide another potential international niche market opportunity for Kiritimati.

7.3 Giant clam farming

Introducing giant clam farming offers an excellent opportunity for the local communities on Kiritimati Island if appropriate low-cost technologies are used. Cultured giant clams would help diversify aquarium exports and reduce fishing pressure on wild finfish aquarium species. This activity would also help restore locally depleted reefs as the clams not suitable for the aquarium trade could be used for restocking.

7.4 Coral farming

Its proximity to Honolulu offers Kiritimati Island an opportunity for coral farming for the aquarium trade. The farming method for coral is relatively simple and can be transferred to local communities. This form of activity can also be used to enhance tourism snorkeling areas.

7.5 Seaweed farming

Kiritimati is no longer active in seaweed production; however, its close proximity to Hawaii and Fanning Island, the main seaweed producing island in Kiribati, makes it the ideal port for seaweed export. The current issue in exporting seaweed is the loss of quality due to the long storage period prior exporting, as all seaweed has to go through Tarawa port.

7.6 Enhancement programme

The enhancement of heavily depleted resources such as sea cucumber and other commercial species through artificial propagation would also be carried out with the help of hatchery technology. However, this would be a last resort if all other management efforts fail to allow recovery of species of concern. Cultured giant clams and coral can be used to restore or enhance depleted reef areas.

Possible solutions are:

- Investigate possible involvement of local community utilising unused ponds for baitfish production;
- Promote unique taste of Kiritimati milkfish targeting overseas niche markets and local communities abroad;
- Reinvestigate possible means of brine shrimp culture in highly saline ponds;
- Promote aquaculture income generating activity as an alternative source of livelihood in addition to wild aquarium fish (e.g. giant clams and coral farming); and
- Set up Kiritimati Island as the main exporting port for seaweed products to minimise storage time.

8. Tourism (fisheries/marine related)

Although Kiritimati Island tourism is still in its infancy, tourist numbers have steadily increased from 830 in 2009 to 1,840 in 2012. The bulk of the visitors (around 75%) come to Kiritimati for recreational fishing activities. Over the period 2009–2012, 40% of the visitors were from USA, 15% were from Australia, 6% were from New Zealand and the remainder were from Europe, Asia and other Pacific Island countries. There are nine guesthouses/motels on Kiritimati with approximately 150 beds.

The geographical location of Kiritimati Island is an advantage for tourist cruise ship visits. Over the period 1996–2010, between 8 and 15 cruise ships visited Kiritimati annually; however in 2012 only two cruise ships (with over 1,000 guests combined) visited Kiritimati. The decline in cruise ship visit is due to poor port infrastructure.

Opportunities exist to utilise available accommodation and services; however this will require undertaking some infrastructural improvements, developing tourism activities, promotion and addressing transportation. Developing marine-based tourism activities is a means of promoting growth in the sector.

8.1 Recreational fisheries

The tourist-based catch and release bone fish fishery is the only coastal fishery in Kiritimati that has formal management measures in place. No major issues were identified within the fishery; however, some guides in the fishery have interrupted bonefish spawning activities during fishing and non-participants in the recreational fishery are reported to be harvesting bonefish by the use of gillnets for subsistence consumption. Therefore conflicts still exist between beneficiaries and non-beneficiaries (those directly involved in and those not directly involved in the recreational fishery) of the bonefish resource. Solutions to these conflicts lie in improving compliance with management measures through awareness and joint enforcement of bonefish regulations. Providing the powers of Fisheries Enforcement/Authorized Officers to registered guides/wildlife officers/tourism officers is considered a cost effective way of improving enforcement of bonefish recreational fishery regulations. Alternative solutions are to review the management framework to address the protection of bonefish spawning aggregations and areas and broader community benefits from the fishery or develop lagoon-wide harvest strategies and measures for the management of a wider group of coastal resources.

Other recreational fisheries worth exploring are pelagic recreational/sports fishing targeting deep sea tuna and associated species, and expanding coastal recreational fishing (e.g. trevallies etc.).

8.2 Alternative incomes (non-extractive fishing/recreational activities)

Creating business opportunities through tourism-related marine activities is seen as an alternative to capture fisheries employment and income streams. Examples worth exploring are recreational snorkeling/diving, kite/wind surfing, and community-based tourism initiatives that make use of rich land and marine biodiversity to cater for both visitors staying on the island for short periods and those visiting by cruise ships.

9. Environment and the ecosystem

The coastal environments are impacted by fishing operations, non-fisheries activities such as land-based pollution or coastal development and climate change. Some concerns raised in the Fisheries Master Plan consultation were the discharge of ballast and brine water from large-scale commercial fishing and transshipping vessels and the potential for these vessels to transport marine and terrestrial species not naturally found on Kiritimati, such as rodents, various ants (crazy ants are beginning to infest the land around the port area) and other invertebrate species, and weed seeds. Some could be serious invasive threats; hence there is a need for stringent biosecurity measures. Large flood lights on these vessels could be changing the behavior of some species (e.g. nearshore baitfish and trevally), with potential impacts on seabirds (Kiribati hosts many migratory species at different times of the year, some of which are vulnerable) that are dependent on fishing to feed themselves and their juveniles.

Kiritimati is renowned as a destination for ecotourism in terms of sport fishing and bird-watching. The island is already a destinations for cruise ships for bird-watching and sport fishing, etc. With this economic potential also come concerns about the impacts on the local environment. Among other issues, these concerns relate to the increase in land-based trash (aluminum cans, plastics etc.) combined with the increase in population that may cause sewage disposal/discharge issues and negatively affect coastal ecosystems such as the lagoon and coral reefs. The use of small mesh gillnets and the lack of regulations prohibiting destructive fishing practices and effective enforcement capabilities was also highlighted. Some of these concerns are outside the responsibility of MFMRD. However these concerns can be addressed through a collaborative and ecosystems-based working approach between MFMRD; other ministries such as the Ministry of Environment, Lands and Agricultural Development (MELAD), the Ministry of Internal and Social Affairs (MISA) and the Ministry of Public Works and Utilities (MPWU); outer island councils and communities; local businesses and NGOs.

10. Cross-cutting issues

The plan identifies several cross-cutting issues that need to be taken into consideration during implementation. Amongst the cross-cutting issues highlighted below, transportation has been identified as a major barrier to further economic development in Kiritimati, and this need is partially covered under the essential infrastructure section as well as being covered here. MFMRD on its own is unable to address transportation issues; all parties (relevant government authorities, business etc.) will have to work together to remove this barrier and allow further development of Kiritimati.

During the implementation of the plan, every effort will be made to address gender issues and to promote the

involvement of all sectors of the community in decision-making, improving capacity, and employment. This will include the government looking at financing mechanisms to promote small-scale private sector development in fisheries or other marine-related areas such as tourism.

Possible solutions are:

- Better coordination of businesses and government to support charter flights;
- Ensuring gender issues are addressed when promoting community-based activities; and
- Ensuring that micro-financing is available to promote small-scale developments with equal access for both men and women.

Climate change is another cross-cutting issue that will have an effect on the marine environment over time. It essential to ensure that all fisheries are sustainable managed to ensure healthy fish stocks that are resilient to environmental change. Only healthy stocks will be able to adapt to the possible effects of climate change over time.

11. Monitoring and evaluation

MFMRD recognises the importance of developing monitoring and evaluation systems in providing for the successful implementation of the Plan on Kiritimati Island. The attached matrix provides the basis for monitoring and evaluation, with the baseline being set and the targets or outputs clearly identified. The monitoring and evaluation mechanism will also provide a clear direction for the ongoing implementation of this Plan for the next four years. Through a process of monitoring and evaluation annually against the matrix, the plan will be maintained as a living document. This focuses on the higher-level outcomes expected from the KNFP: the goals, objectives and results for the four year period 2014–2017 as well as providing indicators that can be used to measure progress. A comprehensive review and evaluation process will be undertaken in 2015.

12. The Integrated Master Plan 2014–2017

The following action plan matrix identifies the outcomes, outputs and priority actions for each concerned sectors on Kiritimati Island with a baseline of what exists at present. The master plan also relies on essential infrastructure to be in place for many activities, and this will be indicated in the assumptions column. It is also noted that the successful implementation of this action plan would be achieved through effective collaboration and coordination amongst key stakeholders including the full and timely support of development partners such as the Government line ministries, CROP agencies and donor agencies.

12.1 Essential infrastructure needs

Objective 1: Enabling environment established to encourage private sector development to occur in the fisheries sector on Kiritimati Island				
Outcome	Outputs	Activities	Baseline	Assumptions
1.1 New wharf constructed to provide the enabling environment for tuna fishery development	Funding identified for the construction of a new wharf and dredging of passage	Consult with donors to locate sufficient funding to cover the cost of wharf construction and the dredging of a passage.	Study undertaken and several sites located for a new fisheries wharf	Government is successful at attracting funding for the wharf's construction, and the wharf is constructed.
	New wharf suitable for tuna longline and purse seine vessels to utilize is constructed.	Undertake an environmental impact assessment for the selected site for the new wharf and passage dredging.	Approximate costings provided for each option	
	Amenities available on wharf (electricity, water, fuel, road access etc)	Have plans drawn up and costed for the wharf construction and dredging	Existing wharf in need of repair and channel and birthing area need dredging, but likely to silt up again and need annual dredging.	
		Tender let for the construction of the wharf within a specified timeframe based on the costed plans for construction.		
		Work with other sectors to ensure amenities are provided and available on the wharf.		
1.2 Airline services increased to allow expansion of tourism and the export of marine product	Increase in the number of flights per week to Hawaii and Fiji	Assessment of airfreight needs for both imports and exports	One flight per week to both Fiji and Hawaii	Airlines agree to more flights.
	Increased freight in and out of Kiritimati Island.	Promotion of Kiritimati Island as a tourist destination to boost the number of people visiting the island.	Limited freight space available, especially to Hawaii	Demand exists for flights, especially for freight in and out of Kiritimati Island.
		Encourage development of the tuna fishery so that dedicated charter flights for cargo can be encouraged.		

12.2 Offshore Fisheries Priority Actions:

Objective 1: Establish Christmas Island as the potential supplier of whole chilled tuna and fresh, frozen and cooked tuna value added products				
Outcome	Outputs	Activities	Baseline	Assumptions
1.1 Export markets established for tuna products	Market link for whole fresh tuna and other tuna value added products are established in Hawaii, USA and Japan	Expand current market for fresh tuna and other value added products in Hawaii with possible support from Pacific Islands Trade and Investment Commission (PT&I), FFA, and SPC	The current level of export is low and unreliable (get data from CPPL)	Ministry of Fisheries and Marine Resources Development (MFMRD) take the lead in establishing market links through tuna expo in target countries. Essential infrastructure in place to attract longline fleets to work out of Kiritimati.
	Increase in the export volume of fresh whole tuna and other value added products from tuna	Establish new markets for tuna from Christmas Island in mainland US and Japan with possible support from PT&I, FFA and SPC	The current tuna fisheries sector contribution to GDP from Christmas Island is none	
	The increase in the fisheries sector contribution to GDP	Establish cold storage facilities at Cassidy International Airport for the storage of export grade tuna (both whole fresh and value added)		
	Increase in the level of foreign exchange			
1.2 Artisanal fishers skilled to produce export quality tuna products	Increase in the production of good quality tuna product	Training on adaptive fishing technologies that will increase production of export grade tuna with support by KFL, FFA and SPC	Currently the skills on proper fish handling is lacking by the local fishermen	Government provides support for the extension of skills learnt to a wider population to increase production and the overall benefit.
	The artisanal and small scale commercial fishermen production capacity and fish handling skills are enhanced	Training on proper fish handling to improve the quality of export grade tuna with support provided by KFL, FFA and SPC	Production of export grade tuna from the local fishermen is none	
		Introduction of new and affordable fishing vessels that will increase the local artisanal fish production and allow for longer trips and proper onboard handling of tuna. The design has been developed by FFA.		
1.3 Tuna export product developed and sourced from other islands in the Lines Group	Increase in the supply of tuna through the involvement of other islands in the Lines Group	Explore and provide means of transportation to collect fish products from Tabuaeran and Teraina Fish Centres.	There is no regular transportation link between Kiritimati/ Tabuaeran and Teraina	The Government of Kiribati prioritise this as one of the key driver for enhancing economic development in the Lines Group and to immediately provide support
	Economic and social benefit extended to the local fishermen on nearby islands	Explore transportation options for export of fresh marine products to international markets Attract potential overseas and local investors to invest in fish handling and processing on Christmas Island for fresh whole chilled tuna, fresh, frozen and cooked tuna loins and steaks at the highest quality standard	There is no local and overseas investors in the tuna handling and processing business on the island	
1.4 Sustenance in the supply of good quality shashimi grade tuna to meet the international market demand	Regular supply to meet the demand from overseas buyers is maintained	Develop legislation to tie in foreign long lining vessels to offload a percentage of their catch in Kiritimati for processing and export. Develop a licensing formular, as an incentive for foreign fishing vessels that offload their catch in locally based processing plant	There is no legislation to tie in foreign fishing vessels to offload a % of their catch	Government develop legislation to tie in foreign fishing vessels and develop incentives to attract foreign fishing vessels to offload a percentage of their catch

Objective 2: Maximise employment opportunities from offshore fisheries				
Outcome	Outputs	Activities	Baseline	Assumptions
2.1 Kiritimati Island is established as a hub for a long line	<p>The establishment of support industries such as specialised engineering services in vessel repair, refrigeration, net repair for purse seine nets, stevedoring and the supply of consumables for long line fishing vessels and processing plants.</p> <p>Availability of specialised engineering services.</p> <p>Establishment of the machine shops for the supply of fishing vessel spare parts</p> <p>Increased in employment opportunities for both direct and indirect</p>	<p>Development of dry-docking facility that will cater for the both long line and sportfishing vessels, net mending yard for purse seine nets and a mariner for sportfishing vessels. Actions will include costing, securing funds, tendering for designs and constructions, EIA, etc</p> <p>Expansion of fuel storage capacities on the island or attracting additional potential fuel supplier to cater for an increase in the demand of fuel at a competitive price.</p> <p>Development of boat building skills on Kiritimati for affordable small scale fishing vessels (2-3 days trip) using the FFA design</p> <p>Encourage the private sector to develop servicing agencies for the provision of stevedoring and other services</p> <p>Collaborate with line ministries to support the provision of adequate electricity and water supply to fishing vessels and fish processing plant at a competitive price</p>	<p>Currently there is only two servicing agency on the island</p> <p>There is no specialized engineering support facilities on the island</p> <p>There are no machine shops on the island and in the country to supply spare parts for longline fishing vessels</p> <p>There are only agencies operating on the island</p>	MFMRD along with the line ministries provide undivided support in establishing Christmas Island as the long line hub
2.2 The pool of skilled people on Christmas Island important in fisheries development and in areas along the fish commodity chain is developed.	<p>The provision of expertise in the catching sector, development of quality standards, marketing and retail business of the seafood sector.</p> <p>Increased employment opportunities</p>	<p>Expand the Kiribati Institute of Technology (KIT) areas of training to cover fishing vessel repair, refrigeration engineering, seafood technology covering fish handling, processing and quality control.</p> <p>Introduce Master Fishermen and engineering level courses at the Marine Training Centre (MTC) to cater for qualified Master Fishermen and Chief Engineers for long line and purse seine fishing vessels</p> <p>Tie in all fishing partners to provide support training in these areas</p>	<p>The skills required in developing a fishing industry is currently non-existent.</p> <p>There are no qualified Master Fishermen with experience to operate any long line and purse seine fishing vessels at the commercial level.</p> <p>There are no internationally recognized tuna fish grader</p>	The Government establishes training institutions to support fisheries development on the island.
2.3. Secondary support industries on the island are developed	<p>Processing of milkfish for use as bait by long line fishing vessels</p> <p>Additional and private run solar salt producing ponds are developed to increase production of solar salt, high value grade for international export and low grade for sale to purse seine brine solution</p> <p>Increase in employment opportunities</p>	<p>Encourage potential investors from local and overseas to run and manage milkfish ponds for the processing of milkfish as food and bait for long line fishing vessels</p> <p>Encourage potential investors both local and from overseas to run solar salt production to supply both overseas, local (import substitute for imported salt), purse seine vessels for their brine solution and for local processing plants.</p> <p>Special lease arrangement of the existing ponds and lagoon area allocation for the development of salt concentration ponds to be developed and leased out to potential investors with preference to local investors.</p>	Involvement of the private sector in s milkfish processing for bait and solar salt production is non-existent.	Government establishes lease scheme for ponds to the private sector for the production of milkfish bait and solar salt

Objective 3: Encourage both local and overseas investment in the offshore fisheries sector				
Outcome	Outputs	Activities	Baseline	Assumptions
3.1 The development of an enabling environment that is conducive to fisheries development.	<p>More foreign investments to the fisheries sector.</p> <p>Credit facilities to support local investment in the fisheries sector is established</p> <p>Concessions on the service charges and duties to improve the competitiveness of marine based products produced in Kiribati</p> <p>More employment opportunities</p>	<p>MFMRD to work in collaboration with the Foreign Investment Commission (FIC) to review their approval and processing guidelines which has been a stumbling block for potential foreign investments in the fisheries sector.</p> <p>MFMRD to work with development and commercial banks to provide credit facilities for investment in the fisheries sector.</p> <p>MFMRD to work with potential donors in the provision of funding assistance for the establishment of a credit facility for any fisheries investment.</p> <p>MFMRD to work with line ministries to establish tax free zones on Christmas Island</p> <p>MFMRD to work with line ministries to establish concessional service charges provided by Port Authority, Public Utilities Board on their electricity charges, duty concessions, etc.</p>	<p>The current FIC guidelines and approval criteria is very stringent on foreign investment</p> <p>The current loan terms and conditions by the development and commercial banks are very high.</p> <p>Investment in the fisheries sector by both foreign and local investment is very low.</p> <p>There are no tax free zones on Christmas Island</p> <p>Service cost on port handling and electricity etc is very high</p>	<p>Government provide concessional charges, duty free exemptions, attractive loans terms and conditions, a more relax foreign investment criteria , a credit facility and create tax free zone on Christmas Island that will support fisheries development</p>
3.2. Reliable and efficient communication link is established on Christmas Island.	<p>Phone networks and internet service, the key tools in modern fishing and marketing operations is improved to world standards.</p>	<p>MFMRD to collaborate with the Ministry of Communications, Transport and Tourism Development (MCTTD) to utilize the Southern Cross broad band underwater cable running from Hawaii to Fiji, New Zealand and Australia or any other service provider to improve communication link.</p>	<p>Phone networks and internet service is poor by developed world standards</p>	<p>Government explores the possibility of connecting Christmas Island to the Southern Cross underwater cable for a faster and reliable communication link</p>
Objective 4: Enhance food security and livelihoods, minimise adverse social, cultural and gender impacts				
Outcome	Outputs	Activities	Baseline	Assumptions
4.1. Supplement the current coastal and reef fish production from the nearshore fisheries sector and through the trade link between Christmas Island and other islands in the Lines Group.	<p>Deployment of FADs around Christmas Island to enhance nearshore fisheries production.</p> <p>The development of the supply link of certain fish species banned on Christmas Island from Tabuaearan and Teraina</p> <p>Stock recovery of some important fish species such as sharks</p>	<p>Establish inter-trade link between Christmas Island and the outer islands from the Lines and the Gilbert Group to supply fish species that are banned on Christmas Island.</p> <p>Encourage fishing partners licensed to fish in Kiribati EEZ to contribute to the communities food security through installation and deployment of FADs</p> <p>Collaborate with SPC in the deployment of FADs around Kiritimati for easier access by the local and artisanal fishermen.</p>	<p>There is no inter-island trade link on fisheries products from the other islands to Christmas island</p> <p>There is no arrangement for fishing partners to contribute to FAD installation and deployment</p> <p>There are only 3 FADs around Christmas Island</p>	<p>Government provides trade link between Christmas and the other islands in the Lines Group and more FADs are financed for installation and deployment.</p>
4.2. Gender equality is provided at all levels of fisheries sector development	<p>More women working through out all levels of the commodity chain.</p> <p>More employment opportunities for women</p>	<p>Promote the employment of women in the fishing industry taking into account the needs of women and men in developing and implementing fisheries programme</p> <p>Ensure the approach taken to training, mentoring and stakeholders skills and understanding in relation to fisheries is consistent with the National Policy on Women.</p>	<p>The current number of people working in the fisheries sector favours men in the ratio of 10 to 2 (confirm this)</p>	<p>Government provide are more focused training arrangement for women in fisheries development on a national level.</p>

12.3 Coastal Fisheries Priority Actions: (commercial, artisanal, subsistence fisheries and income/employment)

Objective 1: Sea cucumber fishery sustainably managed with maximum economic return to the sector				
Outcome	Outputs	Activities	Baseline	Assumptions
1.1 Managed plan for the sea cucumber fishery developed and implemented to ensure sustainability of the fishery	Short-term: Immediate reduction in catches and income (-ve impact),	Identifying and establishing effective management measures and harvesting strategies that would suit the Kiritimati Island situation and take into consideration potential impacts of climate change. Actions could include:	No management plan in place	Government takes the lead and implements and enforces management arrangements
	Long-term: Sustained improvements in catch and income (+ve impact) By 2016, 1-2 buyers and 20 fishers are employed part-time annually to harvest sea cucumbers.	MPA or network of no catch zones (and re-stock these MPAs/network with sea cucumbers caught from wild, or cultured prohibit or introduce quota systems or restrictions for species with sustainability concerns prohibit sea cucumber fishing in Xmas till stocks recover, in the interim allow rotation short term fishing in the other islands in the Line-islands group investigate breeding/restocking possibilities of sea cucumber investigate potential impacts of climate change on sea cucumber growth and habitat introduce limitations on fishing gear (e.g. prohibit the use of SCUBA for collecting sea cucumber) introduce limits on the harvest and/or export size of sea cucumber (length) prohibit certain species from exports apply limitations on effort (eg the numbers of fishers and/or export operators)	Sporadic fishery with declining stocks and intermittent income generation for some fishers (4-5 mt dried weight annually from 2010 to 2012).	
1.2 Sea cucumbers processed to "A" grade to maximise return to the sector	80% of processed beche-de-mer is "A" grade.	Conduct training for sea cucumber collectors/operators in appropriate processing methods to improve quality. Ensure processors have access to materials to maintain a high quality product Ensure sea cucumbers are of the correct size for processing	Buyer purchases sea cucumbers and does processing himself. Prices range from AUD \$0.20 (lollyfish) to \$7.00 (prickly redfish) per animal wet weight.	Buyers promote best processing practices and reject poorly handled product.
Objective 2: Pet/aquarium fishery is sustainably managed with maximum economic return to the sector				
2.1 Management plan finalised and implemented for the Pet fish fishery, to ensure sustainability of the fishery	Management finalised and implemented	Finalize, endorse and implement Kiritimati Island pet fish fishery management plan.	Draft management plan prepared and awaiting endorsement	Fisheries implement plan and industry accepts this adheres to regulations
	Sustainable quota set for flame angels	Address supply and value of flame angel fish. Implement a quota on flame angel fish to ensure this species is harvested sustainably.	Concern at declining catches of flame angle fish Currently 12 exporting companies and divers move from company to company	

2.2 Reduction in pet fish mortality during capture, storage and export	Reduce mortality to less than 5% across the industry	Provide training in appropriate fish handling and storage techniques to maintain fish health Develop best practice materials and use these in training for collectors and exporters	Current mortality of fish received by buyers or importers is above 20%	Fishers and exporters follow best practices
2.3 Divers trained and certified	All current divers SCUBA certified by mid-2014 Divers entering the fishery after mid-2014 need to be SCUBA certified SCUBA certification a requirement under the plan for the fishery	Provide training for SCUBA Diver Certification Explore options for the acquisition of a decompression chamber Develop dive master/instructor capacity on Kiritimati	Only 2 divers from 35 are SCUBA certified No capacity on Kiritimati Islands to train divers	Divers will attend courses and pass course

Objective 3: All other fisheries sustainable managed to ensure food security and livelihoods for the people of Kiritimati Island

3.1 All remaining coastal fisheries (finfish and invertebrate) are sustainably managed under fishery management plans	At least 3 fisheries have sustainable management plans and regulations implemented by 2015. General management applied to protect fishing areas (MMAs) or restrict fishing methods (eg gillnets, use of SCUBA) to address declining stocks of specific species.	Develop a profile for Kiritimati island marine resources Collect biological data to support management of selected species of concern (may require training of local fisheries staff) Establish Management Plan or regulations for depleted species (or declining catches) and the protection of wider coastal resources taking into account ecosystem and climate change Maintaining current levels: would require adopting and implementing some harvest/management strategies that suit the Kiritimati situation. These could include: -Seasonal closures (for known species spawning periods) -Temporary or rotational closures of some fishing areas -Set up marine protected areas or several no-take areas -Establish resources use zoning -Limitation on the use of fishing gear e.g., net length, mesh size -prohibit set net fishing (e.g bonefishing, etc) -complete or temporary ban the capture or sale of giant trevally and sharks	No fisheries have management plans in place Lobster / crayfish fishery has a minimum size restriction of 8.5 cm and no taking of buried females No other regulations in place for coastal fisheries. Reports of declining catches of some reef species	Government takes the lead and develops (with stakeholder consultation), implements and enforces management arrangements and regulations
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Objective 4: Data collection and monitoring systems in place to ensure best available data on which to base management advice and decisions

4.1 Data is available that can be used to justify sound management of inshore resources	Functional data collection systems in place for all fisheries, (subsistence, artisanal, recreational and export) with supporting databases	Establish cost effective catch monitoring systems for subsistence and artisanal fisheries	No data collection on subsistence and recreational catches	Government provides resources (human and financial) to implement and maintain data collection systems and their supporting databases
	Functional databases with queries in support of data collected	Establish and strengthen consistency and mandatory monitoring/reporting of the export catch.	Do data collection on resources harvested for local sale on Kiritimati Island	
	At least 2 fisheries staff with skills to analyse and interpret data and produce reports.	Ensure databases are maintained for all catch collected	Export data available for all species including personal consignments leaving the island (air and sea)	
	Annual report for the fisheries department produced analysing all data collected	Conduct an annual assessment of all data collected and make this available in an annual report for the fisheries department	Most export data maintained in Excel files not databases.	
		Ensure regular feedback on monitoring and reporting results (CPUE, quantity etc.) provided to those that provide the data	No databases at all for subsistence, artisanal and recreational catches	
		Use the analysed data for management of the different fisheries as appropriate.		

Objective 5: Appropriate enforcement for all coastal fisheries management and conservation is implemented to ensure adherence to the plans and regulations

5.1 All coastal fisheries management plans and regulations fully enforced	At least 4 fisheries officers are dedicated to monitoring and enforcement of coastal fisheries management plans and regulations	Establish cost effective fisheries monitoring and enforcement capabilities, suitable for the Kiritimati situation (possible; authorized recreational fishing guides to be wardens, penalties should act as deterrent).	Two staff monitor milkfish ponds for poaching and enforce breaches.	Management plans and regulations are in place to enforce.
	A range of awareness materials on fishery rules and regulations are produced in local language and distributed to all communities and fishers	Enhance and up-skilled concerned staff for awareness material production and delivering of resource management messages to the public, etc	No awareness materials at all for coastal fisheries management, rules and regulations in Kiritimati Island	Government provided the resources (human and financial) to maintain enforcement capabilities
5.2 Fisheries conservation implemented and enforced through joint activities with wildlife and other relevant departments and stakeholders	Communication strategy developed to ensure collaboration on enforcement initiatives	Establish collaborative enforcement team of authorized officers between Fisheries, Police, Wildlife, etc and the sharing of resources and budgets for more effective enforcement.	Some joint surveillance activities undertaken with Wildlife staff around ponds.	Government provides the resources (human and financial) to maintain joint enforcement capabilities
	A range of awareness materials covering conservation of resources (fish, corals, sea birds, threatened species etc) produced in local language and widely distributed	Develop a communication strategies with line ministries such as Tourism, Environment etc to provide regular and continuous public awareness programs, and the sharing of resources and budgets to deliver public awareness	Limited awareness materials on conservation, mainly seabirds.	
		Develop and distribute public awareness programs covering resource management, environment, biosecurity etc		

Objective 6: Fisheries officers on Kiritimati Island have the necessary skills to fully fulfil the roles and responsibilities of their positions

<p>6.1 Fisheries officers on Kiritimati Island are fully skilled to undertake their duties</p>	<p>All fisheries officers trained with the skills to effectively undertake the duties prescribed to them.</p> <p>At least 50 fishers trained in fish handling and preservation methods</p> <p>At least 30 fishers or private sector companies receive training in fisheries business management</p>	<p>Secure training opportunities for MFMRD staff for improved project management, monitoring and evaluation and service delivery</p> <p>Run training programmes to improve private sector business and fish handling and preservation</p> <p>Collaborate with Ministry of Commerce Industry and cooperative Development (MCICD) to develop and deliver training courses in fisheries business management</p>	<p>Currently 6 people working in fisheries, with 4 of the staff unskilled</p> <p>No training provided by fisheries to fishers or private sector companies.</p>	<p>Government commits to training all fisheries officers with the skills needed to do their jobs effectively.</p>
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Objective 7: Increased income and employment opportunities for people in the coastal fisheries sector

<p>Sustainable export operations in place for selected coastal resources</p>	<p>Ongoing FAD programme including maintenance maintained</p> <p>At least 50 fishers trained in sea safety and different fishing techniques.</p> <p>Export strategy developed</p> <p>At least 2 private sector companies exporting coastal resources, fresh or value-added, that are sustainably harvested</p> <p>Increase self-employment</p>	<p>Maintain an active FAD programme for Kiritimati Island and ensure adequate materials are on hand to replace lost FADs.</p> <p>Train local fisheries officer and interested fishers in FAD installation and maintenance.</p> <p>Conduct training in fishing techniques, sea safety, fish handling for both coastal pelagics and snapper resources</p> <p>Assist the private sector to explore and develop a sustainable export market strategies for coastal pelagics, deep-water snapper and other coastal resources, such as lobster, mantis shrimp etc,</p> <p>Assist and encourage the private sector to develop and supply export markets with fresh coastal resources under a management plan to ensure sustainability.</p> <p>Assist and encourage the private sector to develop value-adding techniques to increase the value of exports</p> <p>Government to support private sector initiatives, financially and technically</p>	<p>FAD programme implemented in 2014 with support from GIZ/SPC</p> <p>Some exports of coastal resources (lobsters and tuna) by CPPL, but limited and sporadic.</p> <p>No private sector exporting of coastal resources (excluding sea cucumbers and pet fish)</p> <p>One local producer of tuna jerky for local sale.</p>	<p>Government supports and encourages private sector development</p> <p>Government maintains FAD programme.</p> <p>Air freight space is available to allow exports to happen and not compete with other export commodities (eg pet fish)</p>
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12.4 Aquaculture priority actions

Objective 1: Maximize income and employment opportunities from sustainable aquaculture developments				
Outcome	Outputs	Activities	Baseline	Assumptions
1.1 Sustainable and viable aquaculture projects established	10% of unused ponds utilized for community or private sector milkfish farming	Feasibility study on community milkfish farming making use of existing ponds for bait supply. Investigate leasing arrangement for communities to utilize potential unused ponds for milkfish production	Fisheries has control over around 35% of ponds No leasing of ponds to private sector or communities	Government will allow the leasing of ponds to private sector or communities
	Two alternative finfish aquaculture income generating activities identified and implemented	Investigate ways to improve water exchange in potential ponds to improve water quality Reviving of brine shrimp culture for the production of live aquaculture feed	No aquaculture on Fanning and Washington	Longline fleet working from Kiritimati needing milkfish for bait.
	Viable aquaculture projects established on Fanning and Washington	Feasibility study on the potential aquaculture commodities for Tabuaeran and Teraina		
1.2 Fishing pressure from wild capture fisheries reduced and redirected to focus on aquaculture	Two new commodities produced through aquaculture for the aquarium trade	Introduction of community farming for giant clam, corals etc for the aquarium trade. Introducing potential aquaculture species with commercial importance (eg sponge)	Aquarium trade only exports fish at present No hatchery on Kiritimati Island	Government supports the establishment of a hatchery
	Low tech hatchery established to support community farming	Establishment of low tech hatchery to support community farming activities	No local feed production for aquaculture	Government allows the introduction of species (eg sponges) for aquaculture purposes
	Feed produced locally for aquaculture development	Investigate the possibility of producing local aquaculture feed from PS and LL by- catches (discarded fish) by potential ventures		
1.3 Export of high value aquaculture commodities established	Semi processing plant established for seaweed	Investigate the possibility of establishment of seaweed semi processing plant for the packing and extraction of carrageenan to support Fanning island seaweed production	No processing of seaweed beyond drying at present	Results of studies and assessments are favourable for developing a facility for seaweed processing.
	Two markets identified and supplied with aquaculture commodities	Explore the possibility of direct export of aquaculture product (eg seaweed) from Kiritimati	No export markets identified or supplied for aquaculture products including value-added products	Air freight space is available to allow export of products.
	At least 30 fishers trained and employed on value adding activities	Proper training on handling, processing and packaging to fishermen on value adding product (eg deboning, smoked etc)	Some solar drying on open racks undertaken on milkfish for local and family consumption.	Health standards are achieved to allow the export of processed value-added products.
	Distributor in New Zealand identified and value-added product sent regularly.	Identify niche market for Kiritimati milkfish products Collaborate with potential private ventures to conduct feasibility study on the exports aquaculture products (seaweed, brine shrimp, milkfish, etc) from Kiritimati to external destinations		
		Upgrading of cold storage and processing facility for milkfish and other commodities for export. Establish market link and distributor in New Zealand to supply Kiribati community with smoke fish, solar dried fish, etc		
Objective 2: Restoration of declining resources and rehabilitation of affected reefs				
2.1 Restoration of declining species and affected reefs	Hatchery is producing commodities in sufficient numbers for restocking and farming (refer 1.2 above)	Establishment of low tech hatchery (refer 1.2 above) to support enhancement and restocking programs for giant clams, sea cucumber, flame angels, corals etc	No hatchery and no restocking activities at all at present	Government supports the hatchery and restocking activities
	Popular dive sites replenished	Restock popular dive sites with corals and giant clams to support eco-tourism		

12.5 Tourism (Fisheries and Marine Related) priority actions

Objective 1: Maximise economic returns and employment in the recreational bonefish fishery					
Outcome	Outputs	Activities	Baseline	Assumptions	
1.1 Sustainably managed recreational bonefish fishery, with a wide distribution of benefits across communities	Fishery expanded while remaining sustainable (resources and income generation)	Improve compliance of management measures through awareness and enforcement.	Management plan and regulations in place for bonefish fishery	Government supports management and strengthens enforcement	
	New Regulations developed and agreed for fishery.	Provide some powers to Fishing Guides to enforce management measures.	No sustainability issues although issues with enforcement		
	Restrictions put in place to control other fishing gears that interact with bonefish	Review bonefish regulations			
		Declare bonefish, trevally, as protected species for recreational fisheries only.			
		Place controls or restrictions on fishing gears that interact with bonefish, such as gillnets.			
Objective 2: Improving and creating more non-extractive marine tourism-related business opportunities on Kiritimati Island					
2.1 Increased employment through non-extractive marine-related tourism	Alternative income activities for local community	A study undertaken to determine the long term impacts (cost and benefits) of commercial tuna fishing and processing versus tourism fishing and recreational activities.	Approximately 1,900 tourists annually		
	Expanded professional private sector base	Explore tourism related business opportunities (eg coastal pelagic recreational sports fishing, diving/snorkeling, marine recreational activities).	Many tourists come specifically for fly fishing or sportsfishing for bonefish		
	Increase self-employment				
	Improved reputation as a world class recreational fishing and snorkeling/diving destination	Support the develop shore excursions (island overview, lagoon sightseeing, bird watching, traditional and cultural activities, village walking tour) implemented by the private sectors for tourism expansion			
	Increased utilization of available infrastructure (accommodation)	Conduct feasibility study to address barriers to the expansion of the tourism industry (eg transport, accommodation, services, equipment infrastructure)			
		Conduct training in tourism related activities for local communities (training could include areas such as fishing methods, gear maintenance, business management/hospitality etc)			
		Develop brochures/posters/online promotions etc, to promote and expand tourism.			
		Develop and strengthen a recreational and sport fishing association			
	Establish marine parks/reserves and supporting regulatory frameworks for tourism recreational actives.				
	Develop dive master/instructor capacity on Kiritimati to expand SCUBA diving operations				

12.6 Cross-cutting priority actions

Objective 1: Adequate transport to and from Kiritimati Island available to meet the needs of expanding population and businesses				
Outcome	Outputs	Activities	Baseline	Assumptions
1.1 Adequate transport (sea and air) available to meet the development needs of Kiritimati Island	Regular charter flights arranged	Kiritimati private sector to lead coordination efforts to secure additional charter flights with government assistance where needed	Private sector arranged a charter flight a couple of times per year	Essential infrastructure, especially a wharf, in place to encourage tuna vessels to work from Kiritimati.
	Regular shipping services including other islands in the Lines Group	Government (MFMRD, MCTTD, MIPID) to assist the private sector in developing a strategy for securing charter services	Coastal shipping service is sporadic.	
		Secure interisland shipping infrastructure and services		
		Expedite tourism, and development activities to increase export product volumes		
		Look at development options for marine products from other islands in the Lines Group		
Objective 2: Development funding available to promote small-businesses with equal access to men and women				
Micro-financing available to promote gender balanced small-scale business development	Micro-financing facility available through DBK	Government to establish a development grant fund facility to cater for fisheries related businesses	No micro-financing available on Kiritimati through DBK	Government supports the initiative and provides funding to DBK
	Gender-balanced criteria developed and implemented for loan applications and assessment	Government to inject funds to development banks for small business development targeting those with potential to succeed but with no security/guarantee means (equally to both men and women)		
		MFMRD to screen, review business project proposal prior to submission to DBK/ANZ		
		Project appraisal and development of criteria through MFED and MFMRD processes and requirement to support application of projects to DBK/ANZ.		
2.2 All barriers to the equal participation of women and other disadvantaged groups in development and management removed	Application forms for micro-financing are gender neutral.	Review and amend current policies on fisheries management, conservation and development to address any barriers that exist to the equal participation of both men and women.	Gender issues not fully addressed and some barriers exist for women and other disadvantaged groups	Government implements a policy to support the equal participation of men and women in the workplace
	Government policies on management and development have no barriers to equal participation of men and women	Government and the private sector to actively promote equal employment opportunities		
		Gender neutral application forms developed for micro-financing.		

12.7 Environment and Ecosystem Priority Actions:

Objective 1: Maintain a healthy environment and ecosystem on Kiritimati Island					
Outcome	Outputs	Activities	Baseline	Assumptions	
1.1 Environment and ecosystem protected from biosecurity risks	Regulations and guidelines strengthened to minimize the introduction of invasive species	Review conditions for commercial fishing and transshipment vessels using Kiritimati as an operational base to address biosecurity concerns	Some regulations in place but hard to enforce.	Government strengthens regulations and enforcement efforts to address potential biosecurity causes.	
	Enforcement capabilities strengthened (human and financial) to enforce regulations.	Review and strengthen regulations, guidelines and enforcement on foreign fishing and carrier vessels discharging ballast water and/or brine water that could harbour invasive species and create a biosecurity risk.	Some invasive species have been introduced (crazy ants around the port area)		
		Review and strengthen regulations, guidelines and enforcement for foreign fishing and carrier vessels in regard to the carrying of invasive species (eg rodents and reptiles), littering (dumping of waste materials and rubbish) and oil spills			
		Explore options for observers to collect information and report on the activities of foreign fishing and carrier vessels in regard to all activities where the introduction of invasive species as mentioned above may be an issue.			
		The above would also apply to cargo vessels, cruise ships and visiting yachts etc.			

1.2 Environment and ecosystem protected from development, tourism and fishing activities	<p>Regulations developed and strengthened to address illegal and destructive activities efficiently</p> <p>Wildlife, Fisheries and Tourism working together in a coordinated manner for all monitoring and enforcement activities</p> <p>Moorings installed at specific sites for larger vessels and tourism operators.</p> <p>Penalties increased to act as a deterrent with short prosecution times</p> <p>Specific species protected and MMAs established and enforced.</p>	<p>Review, develop, introduce and enforce regulations addressing illegal or destructive activities which contribute to the degradation of the environment for the protection of the wider coastal and marine resources.</p> <p>Develop and implement sound management systems taking into account ecosystem and climate change considerations in collaboration with all relevant government departments and other stakeholders.</p> <p>Develop a coordinated and cost effective enforcement mechanism amongst the key enforcement authorities mandated to protect resources, fisheries, parks and the environment.</p> <p>Streamline licensing and other requirements/ conditions so there is consistency between the MFMRA and Environment Acts</p> <p>Review penalties in existing regulations/ordinances with a view to speed up prosecutions and increase penalties so they act as a deterrent.</p> <p>Develop and promote environmentally friendly, sustainable fishing strategies.</p> <p>Identify and assess possible sites for the installation of moorings for larger vessels and tourist operators to use</p> <p>Establish Marine Managed Areas (MMAs) for better management and conservation of marine resources through collaboration between Wildlife, Fisheries and Tourism.</p> <p>Look at the protection of specific species, such as turtles, seabirds, sharks and the restriction on some fishing gears or activities on selected species, such as bonefish and trevallies.</p> <p>Need to identify seabirds seasonal migration routes to minimize interactions with fishing fleets working in the area.</p>	<p>Some protected areas for seabirds, but poaching is a big problem</p> <p>Fisheries and Environment Acts both cover conservation, so overlap and lack of coordination.</p> <p>Penalties too low and not acting as deterrents and few prosecutions</p>	<p>Government provides the support (human and financial)</p> <p>The different government departments do work together and coordinate activities.</p>
1.3 Public and visitors fully aware of, respect and participate in the protection of the Kiritimati environment and ecosystem.	<p>A range of appropriate educational and awareness raising materials in English and local language</p> <p>Training programmes established to raise awareness of conservation and sustainable management issues.</p>	<p>Develop and make available educational and awareness raising materials in English and local language covering sustainable resource use, conservation and climate change effects.</p> <p>Develop an awareness raising programme for Kiritimati Island schools and tourist operators so they make others aware.</p> <p>Develop and make available educational and awareness raising materials in English and local language and training covering waste and pollution management</p> <p>Use existing materials produced from regional organisations that are appropriate to Kiritimati Island.</p>	<p>Poster on seabirds of Kiritimati Island</p> <p>No other educational or awareness raising materials in local language</p>	<p>Government supports the initiative</p>

Objective 2: Develop and implement a sustainable and environmentally friendly solid waste and land use management system

2.1 All solid waste and land use issues fully addressed on Kiritimati Island	Solid waste management plan developed and implemented.	Develop a solid waste management plan for Kiritimati Island to cover both the land and marine environments.	No plan in place for the management of solid waste.	Government provides the resources (human and financial) and commitment to address solid waste disposal.
	Recycling of some waste undertaken	Review of existing toilet designs based on previous sanitation programmes towards identification of the most appropriate design or model for Kiritimati Island	Recycling of aluminium cans has been tried	
	Effective land use plans developed	Promote, encourage and support waste recycling initiatives and activities.	Some land use planning but needs strengthening	
	Strategy for hazardous and health care waste developed and implemented.	Identify and issue environmental license to existing sources of pollution (discharges, effluent etc) impacting the marine environment.		
Strategy or plan developed for waste disposal from the tourism sector.		Develop and implement hazardous and health care waste strategies for Kiritimati Island		
		Develop a strategy with tourist operators to ensure all solid waste produced from tourist operators is disposed of in an environmentally friendly way.		
		Strengthen enforcement for littering and waste disposal both on land and in the marine environment		
		Develop and strengthen land-use planning to identify zones and areas of concern to improve environment management and conservation.		
		Wildlife, Fisheries and Tourism work closely with the Kiritimati Lands Department to review and develop effective land use plans to strengthen environmental management and conservation.		

List of publications, literature used to develop the Plan

- Anon. 2005. Kiribati National Biodiversity Strategies and Actions Plan Government of Kiribati. (p. 9, 13, 15, 16, 19 and 41).
- Anon. 2012. Kiribati Development Plan 2012-2015. Government of Kiribati. 106 p.
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- Anon. 2013. National Framework on Climate Change and Climate Change Adaptation Government of Kiribati. (p. 5 and 18).
- Bell JD, Johnson JE and Hobday AJ. 2011. Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change. Secretariat of the Pacific Community, Noumea, New Caledonia. 925p.



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