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# Participatory diagnosis of coastal fisheries for North Tarawa and Butaritari island communities in the Republic of Kiribati



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## **Citation**

This publication should be cited as: Delisle A, Namakin B, Uriam T, Campbell B and Hanich Q. 2016. Participatory diagnosis of coastal fisheries for North Tarawa and Butaritari island communities in the Republic of Kiribati. Penang, Malaysia: WorldFish. Program Report: 2016-24.

## **Acknowledgments**

We would like to thank the financial contribution of the Australian Centre for International Agricultural Research through project FIS/2012/074. We would also like to thank the staff from the Secretariat of the Pacific Community and WorldFish for their support. A special thank you goes out to staff of the Kiribati's Ministry of Fisheries and Marine Resources Development, Ministry of Internal Affairs, Ministry of Environment, Land and Agricultural Development and to members of the five pilot Community-Based Fisheries Management (CBFM) communities in Kiribati.

# Contents

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Executive summary	4
Introduction	5
Methods	9
Diagnosis	12
Summary and entry points for CBFM	36
Notes	38
References	39
Appendices	42

## Executive summary

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In support of the Kiribati National Fisheries Policy 2013–2025, the ACIAR project FIS/2012/074 Improving Community-Based Fisheries Management in Pacific Island Countries aims to “develop and nurture the structures, processes and capacity to implement and sustain national programs in Kiribati, Solomon Islands and Vanuatu.” The Kiribati component of the project is being implemented through a partnership between the Government of Kiribati Ministry of Fisheries and Marine Resource Development (MFMRD), the Australian National Centre for Ocean Resources and Security (ANCORS) at the University of Wollongong and the Secretariat of the Pacific Community (SPC)—with support from the WorldFish Center.

In Kiribati, the two project target areas are North Tarawa and Butaritari in the Gilbert Islands. The pilot communities are Buariki and Tabonibara in North Tarawa and Kuma, Tanimaiaki and Bikati in Butaritari. The people of North Tarawa and Butaritari have a long-held, strong relationship with their marine environment and remain almost entirely dependent on coastal marine resources for their food and livelihood. Although sparsely populated, North Tarawa shares the Tarawa lagoon with urbanized and heavily populated South Tarawa, which is home to about half of Kiribati’s population. For this reason, the coastal fisheries of the Tarawa lagoon currently sustain the livelihoods and food security of more than 50,000 I-Kiribati. In contrast, the communities of Butaritari are far from Tarawa and do not directly share their marine resources with fishers from the capital. However, opportunities to sell their resources in South Tarawa markets can put pressure on the sustainable management of their coastal fisheries.

Between May 2014 and the end of December 2014, ANCORS led the diagnosis phase in Kiribati with assistance from project partners. In this phase, Kiribati’s CBFM team followed the participatory diagnosis and adaptive management (PDAM) framework (Andrew et al. 2007; Andrew and Evans 2009; Evans and Andrew 2009) to identify and evaluate the social, economic, environmental and governance context of the five pilot CBFM communities and the characteristics of their coastal fisheries. Participatory research techniques used to elicit diagnostic information included village profiles, community mapping, resource matrix exercises, gender-based focus group discussions and interviews with key informants. Secondary data was also collected if primary data could not be obtained. Additionally, the diagnosis included a situation analysis to identify CBFM entry points in Kiribati. This analysis built on earlier scoping work that provided a national stocktake analysis of offshore and coastal fisheries in Kiribati (Campbell and Hanich 2014). In early 2015, the CBFM team presented the preliminary results of the initial diagnosis to each community to validate the information. This report presents a synthesis of the collected, compiled and validated information obtained during the project’s diagnosis phase.

The diagnosis reveals the common threads and key differences among all CBFM pilot communities. In terms of similarities, all five share a strong dependence on marine resources and have similar village profiles and local leadership structures. Community members across both islands also share many of the same resource use issues and concerns, including overall declines in important marine resources, overharvesting and increases in fishing capacity, destructive fishing methods, destruction of marine habitats, pollution, lack of livelihood opportunities and pressure to get food and cash for families. Communities identified these as major factors contributing to the current status of their coastal fisheries. The major differences between the two islands include the number of fishers accessing common coastal resources and the willingness of community members to work with one another toward a common goal. Taking a generally holistic view of the use and management of their local coastal fisheries, diagnosis participants commonly noted that the acceptance and long-term enforcement of community-driven resource management decisions will require strengthened connections and support within and between villages, as well as across levels of government and regulation.

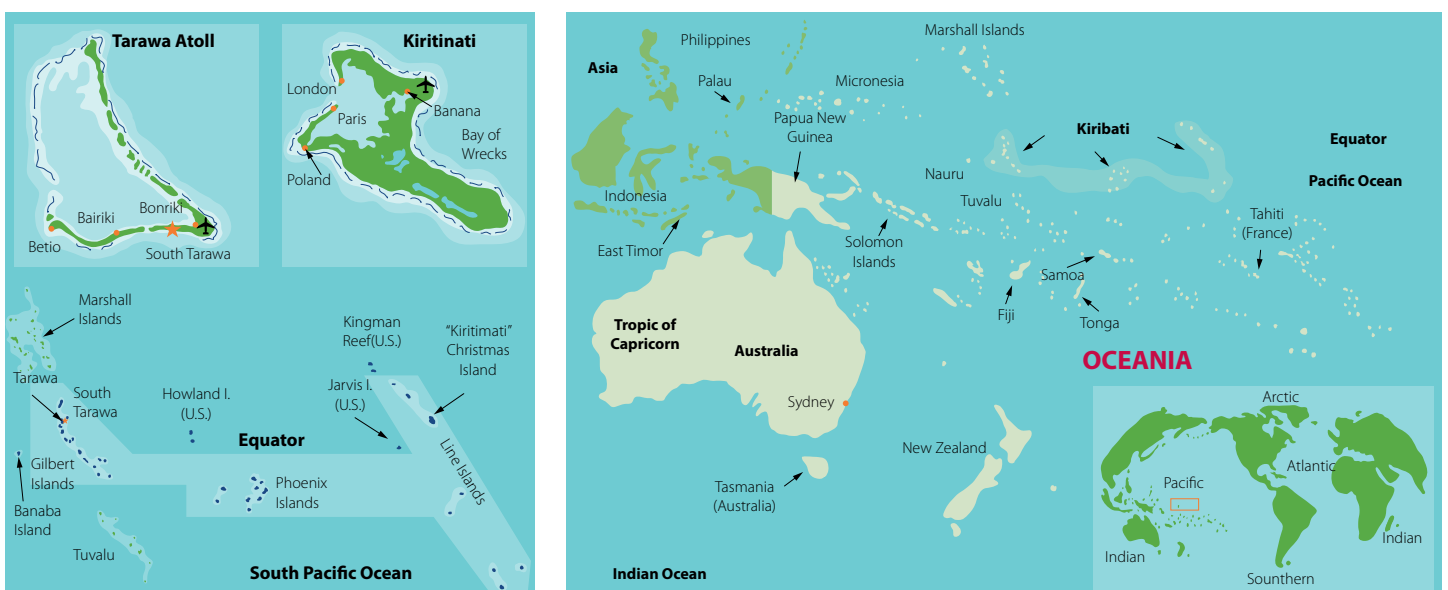
The strong support and participation of village members in the diagnosis phase suggests the five communities were ready to move on to developing their own management plans. At the time of writing, all communities had developed their CBFM plans, which include rules such as closed areas and a ban on destructive fishing gears, and created their respective CBFM committees.

# Introduction

The atolls of the Republic of Kiribati lie scattered over an oceanic exclusive economic zone (EEZ) of 3.5 million km<sup>2</sup>, with a land area of approximately 800 km<sup>2</sup> (MELAD 2013; Thomas 2002). The country lies close to the equator in the Central Pacific, from about 4°N to 11°S in latitude and between 170°E and 150°W in longitude (Figure 1). The Republic of Kiribati includes the formerly uninhabited Phoenix<sup>1</sup> and Line<sup>2</sup> island groups in the east, as well as the 16 inhabited atolls of the Gilbert group. The pre-European population of Kiribati (in the Gilbert<sup>3</sup> group), mainly of Micronesian origin, was 25,000–30,000 (Bedford et al. 1980). Traditional population densities averaged about 93 people per km<sup>2</sup>. In 2010, the population reached 103,058, with 49% concentrated in the urban center of Tarawa (GoK 2012). Although the average national population density is approximately 127 inhabitants per km<sup>2</sup>, it is the result of a large discrepancy between the distribution of Kiribati's urban and rural populations. For instance, the urban center of Betio in the capital of South Tarawa has reached a density of more than 3,000 people per km<sup>2</sup>.

The sea provides virtually all of the animal protein in an I-Kiribati's diet. Because terrestrial food protein and carbohydrate resources are limited, per capita fish consumption in Kiribati is among the highest in the world. Bell and colleagues (2009) estimate Kiribati's average annual consumption of whole fish to be 115 kg per capita. In Kiribati, fish provides more than just food protein benefits. As the Food and Agriculture Organization of the United Nations (FAO) estimates that about 300 g of whole fish per capita per day would provide the minimum protein requirements for good health in general, it is evident that fish also supply much of the daily energy requirements although carbohydrate intake is increasing in the diet. Fish resources are thus extremely important to the food security of the I-Kiribati people.

The limited availability of productive land and the harsh environment (limited land mass, poor soil and prolonged periods of drought) have compelled the I-Kiribati population to form an important relationship with the marine environment (Johannes and Yeeting 2001). Marine resources are invaluable to inhabitants of the archipelago. Oceanic resources, of which tuna is the most lucrative, bring in over 70% of government revenue in fishing access fees every year, reaching AUD 136 million in 2014 (MFED 2015). This financial importance partly explains why Kiribati authorities have invested a lot of the time and effort of MFMRD staff in the sustainable management of oceanic resources. Although the financial contributions and government revenue generated by the use of oceanic resources have an indirect influence on the lives of everyday I-Kiribati, they are more directly involved with coastal resources. In fact, only a small minority participates directly in the use of oceanic resources, while 80% of I-Kiribati state that they directly use coastal resources (Campbell and Hanich 2014; KNSO 2006). Kiribati's coastal marine resources are important from an economic perspective: They were valued at approximately AUD 22 million<sup>4</sup> in the mid-2000s (Gillett 2009). More importantly, however, they are responsible for most of the protein and micronutrient intake of



Source: Worldatlas.

Figure 1. Map of Kiribati.

(Gillett 2009). More importantly, however, they are responsible for most of the protein and micronutrient intake of the local population. Based on 2005–2006 data, Bell and colleagues (2009) estimated that fish accounted for over 80% of Kiribati's annual protein consumption. It is thus paramount to ensure the sustainable management of those coastal resources.

The Kiribati government recognizes the importance of the long-term protection of coastal resources in its newly developed National Fisheries Policy 2013–2025. In this policy, special mention is made of the importance of involving local communities in efforts directed toward the management of coastal resources. Currently, the system includes national legislation, policies and the authority by island councils (subnational level of government) to establish rules within their three nautical mile (n.m.) jurisdiction on an island-by-island basis. Although the sustainable management of coastal fisheries resources is listed as a national priority, the Government of Kiribati acknowledges that the current management regime is ineffective. For the most part, arrangements provide little or no protection for the resources they are intended to conserve.

Throughout the Pacific region, the management of coastal fishery resources is a priority and should include active participation by community members as emphasized in a new regional initiative endorsed by the Heads of Fisheries in March 2015, "A new song for coastal fisheries – pathways to change: The Noumea strategy" (SPC 2015). Co-management or community-based approaches to fisheries management have gained a lot of attention in many countries (Evans et al. 2011) and are seen to provide benefits such as increased compliance, social justice and equity through the direct involvement of resource users (Berkes 2009; Pomeroy 1995). In Kiribati, the management of coastal resources has traditionally been led by the government, which makes decisions at the national level and takes action through policies and legislations. These are then implemented at the subnational (i.e. island) level in Kiribati. In practice, government agencies inform communities of changes to policy and legislation through their island councils or through community information sessions. These information dissemination activities require financial resources and staff capacity, which cannot be maintained at a sufficient level. Furthermore, the geographic isolation and widespread location of the Kiribati islands make communication and enforcement difficult and costly. It is therefore imperative to improve the existing arrangements to make the operating system of coastal fisheries management more sustainable in the long term.

Community-based or co-management initiatives for coastal fisheries are not currently in place in Kiribati, though this form of management is becoming increasingly popular in the Pacific (Govan et al. 2009) to address small-scale fisheries problems (Jupiter et al. 2014). Although not specifically referring to community-based or co-management processes, previous studies of coastal fisheries in Kiribati have suggested a change in the current model, calling for greater inclusion of resource users in decision-making (Abbott and Garcia 1995; Thomas 2001, 2003a, 2003b). We only know of one previous initiative by the Secretariat of the Pacific Community (SPC) to implement a similar program, Community Ecosystem Approach to Fisheries Management (CEAFM) (Ropeti 2008). In 2008, this program started to work with communities in the rural outer island of Nonouti to deliver artisanal fish aggregating devices (FADs). The SPC's CEAFM program consulted with members of the island council in Nonouti to decide on the best location(s) for the deployment of FADs around the island and worked with a few fishers to deploy them. As part of the program, data was collected on fish catch around the deployed FADs. A fisheries extension officer did this monitoring with the approval of the island council.

In 2013, the Government of Kiribati formally made CBFM one of its short-term priority strategic actions in its National Fisheries Policy. Strategic action 4 recommends: "Implementing community-based fisheries management (CBFM) in three pilot communities/islands." Under this strategic action, the MFMRD recommended activities that address

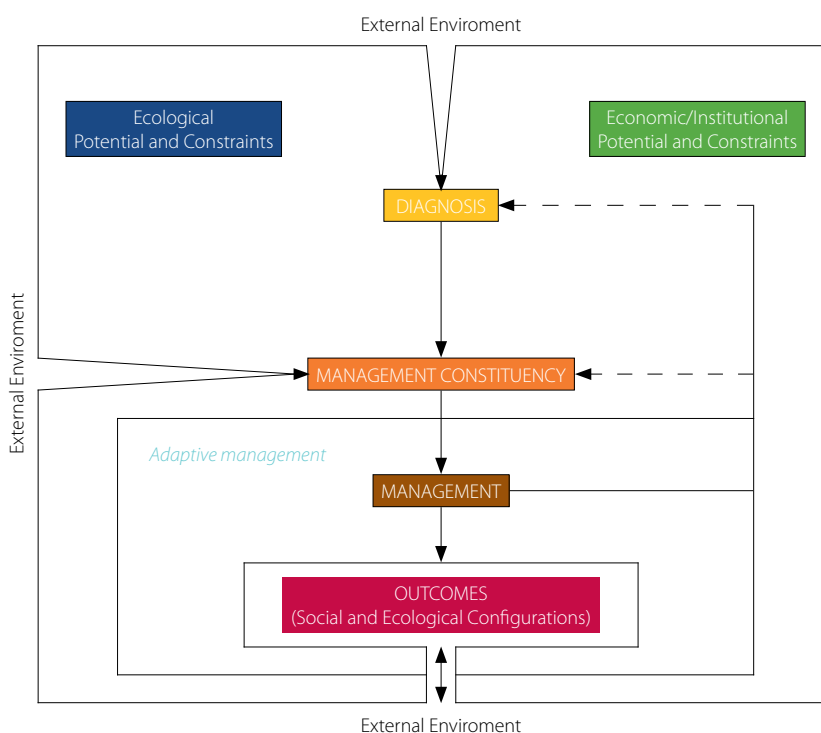
- the improvement of coastal fisheries resources management and strengthen climate resilience through increasing the contribution of oceanic fisheries' resources to domestic food supplies and employment, without unduly impacting on the livelihood of small-scale fishers;
- food security, marine managed areas and commercial development concerns to avoid conflict between subsistence fisheries and commercial fisheries.

The ACIAR project FIS/2012/074 Improving Community-Based Fisheries Management in Pacific Island Countries supports the goals of the Government of Kiribati's National Fisheries Policy 2013–2025. The project is being implemented by ANCORS, with the WorldFish Center, the SPC and the Government of Kiribati MFMRD as partners. It aims to improve the management and sustainable use of Kiribati's coastal fisheries by strengthening institutions across scales of governance. The approach followed in Kiribati is grounded in the participatory diagnosis adaptive management (PDAM) framework used by WorldFish (Figure 2; Andrew et al. 2007; Evans and Andrew 2009) for the diagnosis and management of small-scale fisheries in developing countries. The framework has its roots in social-ecological systems and resilience theory (Berkes and Folke 1998; Walker et al. 2004). It recognizes that natural resource management is influenced by external conditions that could be internal to a community or outside a community's sphere or power (Andrew et al. 2007). The model is divided into the following four phases:

1. scoping threats and opportunities for management (diagnosis);
2. clarifying the management constituency (fisheries beneficiaries and wider stakeholders) and how the constituents wish to manage their fishery through the design of a community-based management plan;
3. developing management indicators to enable reflection and learning (adaptive management phase 1);
4. monitoring and evaluation (adaptive management phase 2).

The PDAM framework is well designed for the purposes of analyzing and implementing governance transitions (Ericksson et al. 2015), which is why it is particularly applicable to analyze the transition of the management of Kiribati's coastal fisheries from a traditional, top-down approach to a community-based fisheries management approach.

Because of the novelty of CBFM to Kiribati, the diagnosis phase of the PDAM framework is an especially important step. There have been few attempts to install community-based management in any Kiribati fisheries, and the previous initiative by the SPC was not followed through. Therefore, the fact that the diagnosis phase marks a re-evaluation of a fishery system makes it particularly applicable to the evaluation of what will be novel fisheries systems in Kiribati (i.e. coastal fisheries managed in part by the communities that rely upon them). The diagnosis phase involves the synthesis of information relevant to a fishery system for the assessment of the relative importance of opportunities, strengths and threats (Evans and Andrew 2009). The diagnosis aims to (1) understand the fishery system under management; (2) clarify the threats and opportunities to improve



Source: Andrew et al. 2007.

Figure 2. Participatory Diagnosis and Adaptive Management (PDAM) framework.



governance of the fishery toward a path of sustainability; (3) identify what management actions should be prioritized to meet the sustainability goals of the fishery; and (4) identify the people who can manage the fishery (management constituency, step 2 of PDAM). Because the fishery system in this instance will rely heavily upon the community members and their capacities through the design of community-based fisheries management arrangements, it is necessary to collect as much information as possible about potential stakeholders (see section on Management constituency: Governance and institutions).

For the purpose of this participatory diagnosis, the project team decided to center data collection around four dimensions: “people of each community and their livelihoods”, “marine systems”, “institutions and governance” and “perceived external drivers” inspired by the 360° radar assessment tool (Garcia et al. 2008). An understanding of these four dimensions was deemed relevant to help design institutions that will match the specific biophysical and socio-economic conditions of Kiribati’s coastal fisheries (Young 2011).

In some instances, the necessary information was not available through government sources. In these instances, the engagement protocol detailed later in this report greatly facilitated the project team’s efforts to elicit relevant information (e.g. about the relationships between villages that share a coastal fishery resource).

In this document, we only report on the diagnosis and management constituency phases of the program (i.e. phases 1 and 2 of PDAM). The diagnosis phase took place from the time that two local I-Kiribati project officers were recruited in May 2014 until the end of 2014. In early 2015, community members presented and verified the information gathered during this phase, and it is included in this report.

The diagnosis phase followed a strict engagement protocol that national partner agencies helped define. Adherence to the engagement protocol described in more detail below was vital for the success of all activities associated with the CBFM project (including initiation and data collection phases).

Diagnosis activities targeted the project’s pilot communities. The project decided to work with a few targeted communities and applied a range of participatory data collection techniques that helped contextualize the fisheries of Kiribati’s CBFM pilot communities. The analysis considered the contribution of a range of assets available at the community level and helped communities discuss the status of their marine resources. The report also describes the management constituency (i.e. governance arrangements existing at the community level) that has been defined during this process in preparation for developing community-based management plans with each of Kiribati’s CBFM pilot sites.

The Kiribati CBFM project focuses on five pilot communities whose participation community leaders themselves helped identify. For the purposes of this project and for ease of identification and delineation, a community is defined as an individual village, as identified by a distinct island and village code in the national census. In Kiribati, the two target areas for the project are North Tarawa and Butaritari, which are both in the Gilbert island group. Pilot communities in both areas are Buariki and Tabonibara in North Tarawa, and Kuma, Tanimaiaki and Bikati in Butaritari.

We first present the methods used to conduct the participatory diagnosis in Kiribati and provide a general description on a range of assets available at the village level from which we can profile each village. We then describe the importance of marine resources and report on community governance and leadership structures before highlighting entry points to consider for the rollout of CBFM in Kiribati.



# Methods

In 2013, project team members from ANCORS conducted a scoping analysis with the assistance of staff from the MFMRD. This identified suitable sites for the pilot of a community-based fisheries management project in Kiribati (Campbell and Hanich 2014). After initial discussion, the MFMRD selected the outer islands of North Tarawa and Butaritari, which had previously expressed concerns toward the state of their coastal fisheries and/or wanted information about coastal fisheries management. The following subsections detail the activities carried out during the participatory diagnosis phase of this project. Every effort was made during each activity to foster an environment of open two-way information sharing.

## Engagement protocol

With the assistance of the Ministry of Internal Affairs (MIA), the project team designed a protocol for engaging with potential CBFM pilot communities in a manner that is both culturally appropriate and respectful of local institutions. This engagement protocol was followed during the initiation of the project, until the project was approved by a number of pilot communities (Figure 3) and subsequent visits to undertake the diagnosis activities (Figure 4). The initiation of the project took approximately three months to be finalized in Butaritari and North Tarawa. The diagnosis activities were spread over a few months, depending on the availability of the pilot

communities. In each village, the activities took a total of seven days (in one or two visits) followed by a visit of a few days to validate the information.

In mid-2014, following contact with the mayor and clerk of North Tarawa and Butaritari (steps 1 and 2, Figure 3), the rationale for the project was presented to members of the island council<sup>5</sup> and the Unimwane (male elders) association<sup>6</sup> of each island (step 3, Figure 3) before proceeding with the setup of the community-based fisheries management project in both communities. These two island-level institutions (the island council and the Unimwane association) are respectively comprised of elected councilors and Unimwane from each village. As part of its presentation, the CBFM team mentioned that the project could take place in two to three pilot sites per island and would let representatives of the island council and the Unimwane association decide how to proceed. Following the project presentation, these elected community leaders granted the project team permission to proceed and selected pilot sites (step 4, Figure 3). In North Tarawa, the island council there suggested that the councilors from each village discuss the selection of pilot sites during the next monthly meeting with the support of the the Unimwane association. In contrast, the island council and the chairman of the Unimwane association in Butaritari decided that interested villages should argue their

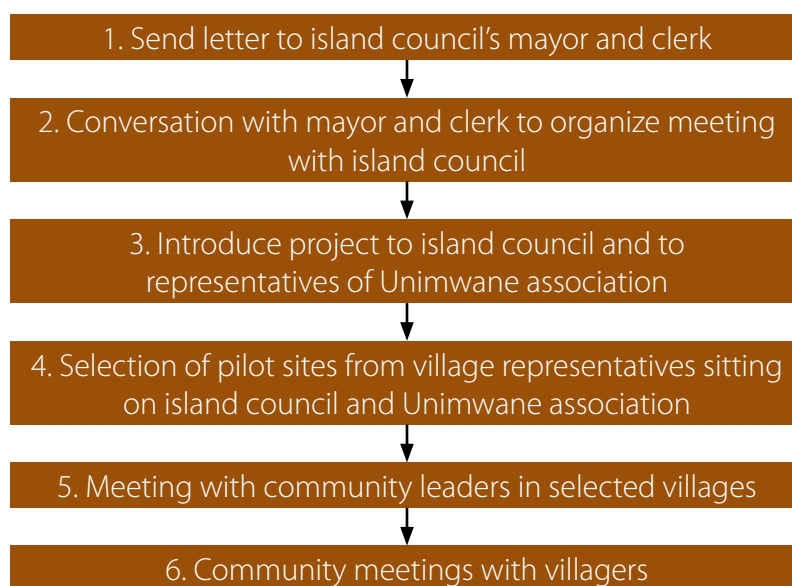


Figure 3. Community engagement protocol for the selection of CBFM pilot sites (initiation of the project).

case to become pilot sites straight after the project team's presentation. In each island, three pilot sites were selected: Buariki, Tabonibara and Buota in North Tarawa; and Kuma, Tanimaiaki and Bikati in Butaritari.

## **Introductory visits and confirmation of pilot sites**

A few weeks following the selection of the pilot sites, introductory visits were made to each community. This was done to ensure that all community members (not just their elected representatives) had the opportunity to (1) meet with the project team, (2) learn about the project, (3) ask questions about it, (4) discuss the project among themselves and (5) decide whether they wanted to work with the project team to establish community-based approaches for the management of their marine resources. Each prospective pilot site was visited to introduce the project and the team members. The CBFM team was comprised of locally hired staff from the SPC, ANCORS, MFMRD and MIA. The visits consisted of a small introduction of the team and project to village leaders (step 5, Figure 3) followed by a village-wide assembly meeting to describe the project design and the expected roles of each partner to the wider community (step 6, Figure 3). This larger meeting was followed by smaller consultations with certain groups, including leaders, Unimwane, women and youths to answer specific questions about the approach.

These initial visits provided an opportunity for communities and team members to establish relationships with one another, and they were successfully done in all communities except Buota. On several occasions, the CBFM team, assisted by representatives of the MIA, attempted to meet with the village leaders of Buota to discuss organizing a village meeting to present the proposed project. However, village leaders would only meet separately, and attempts to meet with all of them were unsuccessful. Through discussion with village members and MIA staff, the CBFM team became aware that disputes existed among village leaders and members. Due to its proximity to the urban center of South Tarawa and its land area, Buota is the most populated community in North Tarawa and is composed of a mixture of long-time residents and migrants from other islands in Kiribati. Although administratively located in North Tarawa, our key informants from North Tarawa and Buota mentioned that many residents from Buota feel they belong to South Tarawa. Because of the recurrent difficulty of organizing meetings with all residents of Buota and the existence of recurring conflicts, the CBFM team decided not to pursue Buota as a potential pilot site.

The decision was discussed with the mayor of North Tarawa, and it was agreed that the CBFM project would focus its efforts in two remaining communities in that island, Buariki and Tabonibara.

## **Focus group discussion**

Once communities expressed interest in the project and a willingness to engage in the activities, the project team organized secondary sets of visits in all five of them. The purpose was to gather information for the diagnosis phase of the PDAM and gain understanding. It was also to support a platform for open discussion about how each community understood and functioned within its marine environment, utilized its coastal resources and functioned as a community more generally. In-country CBFM project officers, ANCORS staff, and representatives from the MFMRD and MIA attended the visits, during which consultations focused on three separate focus group activities designed to elicit information and support discussion about

- the spatial and temporal trends and status of marine resources in and around each community;
- harvesting and resource use patterns and activities;
- community structure, governance and leadership.

The engagement protocol for these visits respected the one that was initially developed and is being used by the team to prepare each project visit in any of the pilot CBFM villages (Figure 4).

Focus group discussions were conducted separately with Unimwane, men and women. Young adults attended focus group discussions based on their gender. Only village leaders (members of a village executive committee as described in section on Governance at the village level), who were almost exclusively male, took part in discussions about community governance and leadership. Female CBFM team members facilitated the women's group discussions, while male team members facilitated the men's groups. Discussions were held primarily in I-Kiribati, the national language of Kiribati.

The first focus group activity, designed to enhance the understanding of the current status of marine resources, their use and perceived trends, was facilitated via village mapping and resource matrix exercises. Each group was asked to draw a representation of its village and spatially represent (1) important places in the village, (2) important marine habitats and the species found within these habitats and (3) methods of species collection. To gather information on perceived trends and allow community

members to reflect on potential changes in the availability of stocks or their resource use, we asked each group to discuss if their current map would have looked different in the year 2000. Creating these maps also provided an opportunity for the CBFM team to explore community members' vision for the future.

In a parallel activity, groups were also invited to fill out a tabular matrix with information about important marine species for their community. For each marine species, groups identified (1) the main purpose for collection, (2), who was responsible for collecting, (3) where the organism was collected, (4) the methods of collection, (5) the seasonality of collection and (6) species population trends.

These two exercises helped the different groups discuss perceived problems and issues with the current use of different marine resources and open up discussions about existing management initiatives. Once the groups had separately completed those exercises, each one was invited to present the results of its discussion to all community members engaged in the discussions. After this presentation to the group, members of each focus group were then asked to reflect on the important aspects of village life that they would like to see created or maintained in the future.

### Village profile

Finally, the project team gathered information about each community to establish a village profile, which is comprised of data about (1) household demographics, (2) village migration, (3) access to education, (4) health and sanitation facilities, (5) access to infrastructure and (6) communication. Whenever possible, this information was gathered during the same visits as

those described above. However, in the two villages of North Tarawa, time constraints made this impossible, so a shorter visit was conducted specifically to gather information about the profiles of both villages. The project team constructed the profiles based on data gathered during walks in each village and through interviewing key informants. Secondary data collection complemented data gaps in the village profiles in the form of a national-level desktop study.

The project team summarized the results of this primary and secondary data collection and presented them to villagers at the next visit to verify the information and foster an environment of open two-way information sharing. This verified information forms the basis of this report and concentrates on the diagnosis and management constituency of the PDAM framework.

### Stakeholder meeting

On 27–29 October 2014, the first high-level CBFM stakeholder meeting was organized in Tarawa. The purpose was to understand what CBFM could look like in Kiribati and to generate discussion on a general model for implementing community-based approaches to fisheries management there using a coordinated approach through collaboration of different stakeholder groups at various levels of governance. Representatives of the CBFM pilot communities, the mayors of North Tarawa and Butaritari, government staff from various ministries and nongovernmental organizations (NGOs) all attended the meeting, and together they decided it should take place annually.

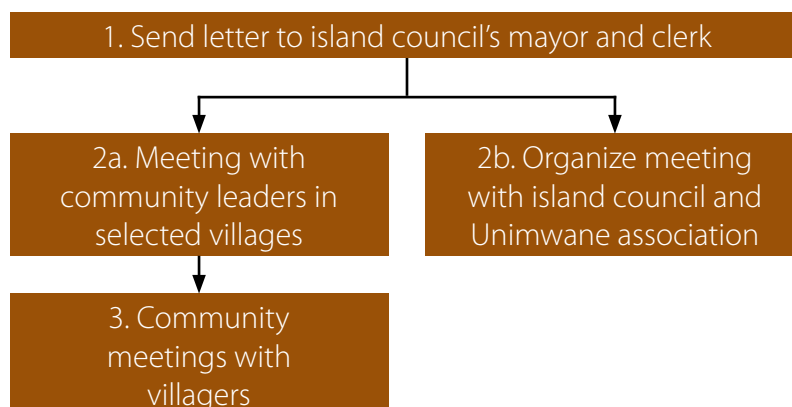


Figure 4. Engagement protocol for visiting pilot CBFM communities post-initiation of the project.

# Diagnosis

The diagnosis phase of the PDAM framework involves the synthesis of information relevant to a fishery system for the assessment of the relative importance of opportunities, strengths and threats (Evans and Andrew 2009). The first stage of the diagnosis phase must be gathering relevant information. Because this project is about evaluating the possibilities of installing CBFM arrangements in Kiribati, the first stage involved a stocktake of the availability and accessibility of resources, services and infrastructure in project communities, and in Kiribati more broadly. The information in this section was sourced from secondary data collection through a desktop study, and primary data collection was obtained for the village profile through key informants and village walks. Data was collected to provide information around four dimensions of the diagnostic approach: people

and livelihoods, marine systems, institutions and governance and external drivers (Garcia et al. 2008).

## General description

This section briefly introduces broad characteristics of the two study islands and the five CBFM pilot communities before going on to a more detailed inventory in subsequent sections.

## Location and physical geography

North Tarawa and Butaritari are two of 16 islands situated within the Republic of Kiribati's Gilbert Islands chain. They are both situated in the northern Gilbert Islands, with Butaritari located 186 km from the country's capital of South Tarawa. Table 1 gives an inventory of the key features of both islands'

	North Tarawa	Butaritari
Coordinates	1°26'N, 173°00'E	3°09'N, 172°50'E
<b>Land</b>		
Total land area (km <sup>2</sup> )	31.20	13.49
Total land length (km)	42.00	69.27
Max/Min land width (km)	Max: (Buariki) 2.00 Min: (Tearinibai) 0.50	Max: (Ukiangang) 2.60 Min: (Kuma) 0.26
Max elevation (m)	3.00	3.00
Freshwater	No natural water bodies; a few human-made ponds and depressions	No natural water bodies; a few human-made ponds and depressions
Water sources	Open/closed wells; rainwater tanks	Open/closed wells; rainwater tanks
Key market resources	Coconut tree-related items; pandanus; fish	Fruit and vegetables; coconut tree-related items; fish and shellfish
<b>Ocean</b>		
Total lagoon area (km <sup>2</sup> )	533.91	295.77
Total ocean reef area (km <sup>2</sup> )	129.03	82.61
Reef base (km <sup>2</sup> )	375.00	11.70
<b>Other</b>		
Natural disasters	Floods; droughts; cyclones (very infrequent)	Floods; cyclones (very infrequent)
Key environmental issues	Coastal erosion; salinization of agricultural areas; flooding; drought; reduction in marine resources; competition for resources from urban South Tarawa; human pollution	Coastal erosion; availability of potable water; salinization of agricultural areas; flooding; reduction in marine resources; human pollution

Source: GoK 2012, KNSO 2012 and OB 2012a,b village profiles constructed.

Table 1. Inventory of key geographical features in North Tarawa and Butaritari.

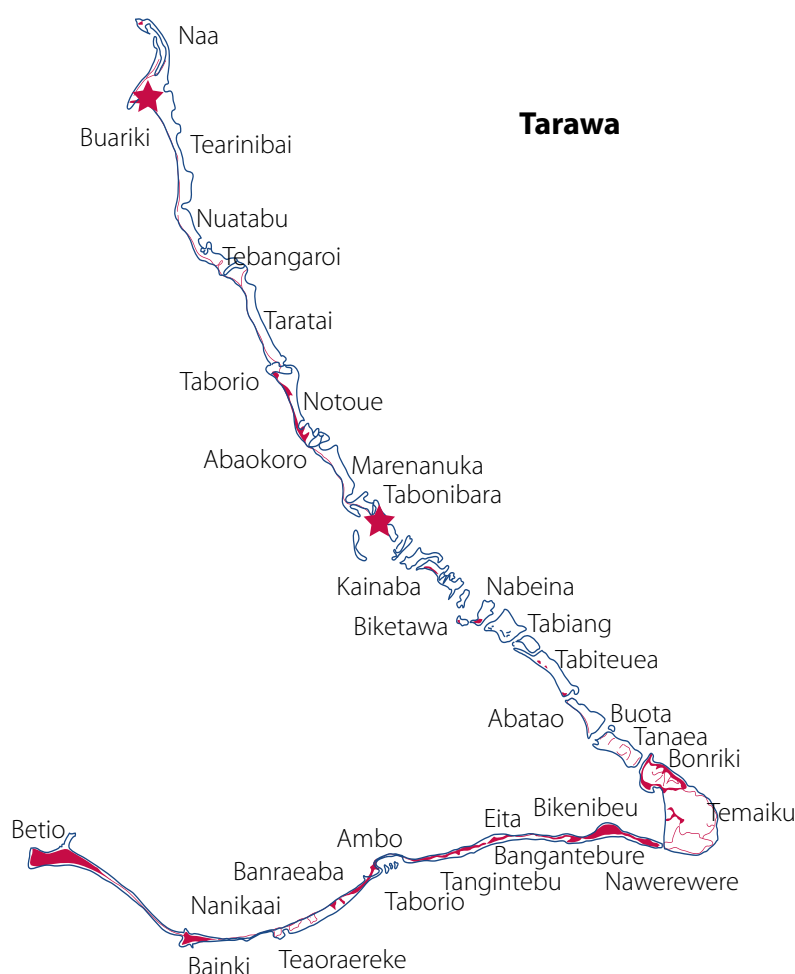
geography. These details provide some context for the availability of and access to different food and livelihood resources on both islands.

Both North Tarawa and Butaritari are considered rural outer islands with a strong historical dependence on coastal marine resources for food and livelihoods. The islands and their communities both have anecdotally experienced changes to the distribution, abundance and size of many of their most valued marine species. These changes are believed to be the result of a combination of internal and external fishing pressures, including population increases and pressure from urban South Tarawa, changes in gear use and the building of urban infrastructure, global market pressures and changes in oceanic conditions because of climate change. These challenges are not unique to either North Tarawa or Butaritari. However, as this report demonstrates, while some challenges are addressed similarly by the island communities, others are addressed differently. It is therefore likely that the same will be the case in other communities (i.e. that points of difference between the various communities will preclude the application of any one suite of management arrangements).

## North Tarawa

The Gilbert Islands are the most populated of Kiribati's three island chains and home to the country's capital atoll island of Tarawa. Tarawa is administratively subdivided into two smaller islands: North and South Tarawa. According to the latest domestic census, more than half of Kiribati's 103,058 I-Kiribati people lived on Tarawa in 2010, with the majority residing in urban South Tarawa (KNSO 2012). Of the total population, 6102 people (5.9%) live in more rural North Tarawa (OB 2012a), an island which distinguishes itself from South Tarawa by a district boundary and separate subnational (i.e. island council) representation. North Tarawa's two pilot communities, Buariki and Tabonibara villages, are located in the center of North Tarawa (Figure 5).

North Tarawa is a rural island made up of several islets. Not all of these are connected by roads, causeways or bridges. Not counting smaller islets, there are 15 villages in North Tarawa (OB 2012a). The central village is Abaokoro, and it is home to the local government station, the Eutan Tarawa Island Council, as well as most of the main service infrastructure.



Source: MFMRD 2015.

Figure 5. Map of Tarawa atoll, with two study communities marked in red. The district boundary dividing North and South Tarawa islands is located between Tanaea and Buota.



Buariki is in the northern tip of the island and includes Naa. It has the widest land width in North Tarawa and is connected to Abaokoro by an unpaved road. Occasionally, some ferries connect Buariki to Bairiki in South Tarawa; however, most people rely on the ferry service that runs three times a week between Abaokoro and Bairiki.

Tabonibara is characterized by large sand flats. The village is connected to the upper half of North Tarawa, including Abaokoro, by a causeway and an unpaved road. People traveling to South Tarawa will catch the ferry from Abaokoro.

While it is generally considered to be an outer island, North Tarawa's proximity to urban South Tarawa means that it has some distinct differences and specific challenges compared with other outer islands. The major distinction is that communities in the less-developed North Tarawa share their Tarawa lagoon marine resources with nearly half of the entire population of Kiribati residing in the urbanized communities of South Tarawa.

## Butaritari

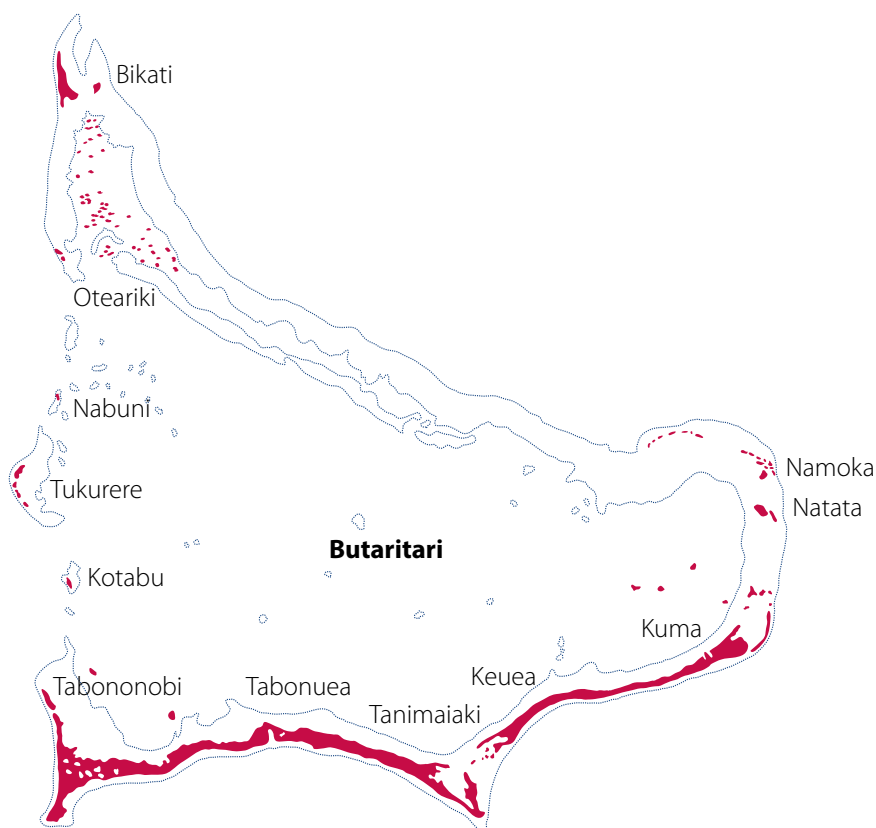
Butaritari is the third-most populated island in both the Gilbert Islands (behind South and North Tarawa) and in Kiribati. Butaritari's population of 4346 comprised 4.2% of Kiribati's population in 2010

(OB 2012b). The CBFM project's three participating communities are located at the extents and middle of this atoll island (Figure 6).

The 12 villages that make up the outer island of Butaritari are mostly linked by one unpaved main road that runs the length of the island as well as one causeway (OB 2012b). Most villages are located along the lagoon side of the road. The central village is Temanokunuea, which is home to the local government station, the Butaritari Island Council, as well as much of the main service infrastructure. Bikati is a remote islet and is only accessible by boat. There is currently no ferry service connecting Bikati and the mainland of Butaritari, though village leaders are exploring this as an option.

Tanimaiaiki is located outside the unpaved main road connecting most of the villages in Butaritari. The village is located close to the causeway built in the 1970s to connect this islet of Kuma with the rest of Butaritari.

Kuma is located in the narrowest part of the island and is connected to Temanokunuea through the unpaved road running over the causeway. For cultural reasons, Kuma is the first village to be visited by newcomers when they arrive in Butaritari (Butaritari Island Council 2014, pers. comm.).



Source: MFMRD 2015.

Figure 6. Map of Butaritari atoll.

Butaritari’s comparatively wet climate and greater agricultural capacity distinguish it from the other Gilbert Islands, especially from those in the southern Gilberts that are more exposed to droughts.

## Population and demography

Kiribati’s population is one of the fastest growing in the Pacific Islands, with an annual population percentage growth of 1.8 as measured by the World Bank in 2015 (World Bank 2014). It also has one of the most densely populated urban areas in the region, with 3184 people per km<sup>2</sup> in South Tarawa (OB 2012a). Table 2 provides some simple population data for the two project sites and Kiribati.

Rural North Tarawa is the second-most densely populated island after South Tarawa, at 400 people per km<sup>2</sup> in 2010 (OB 2012a). Its population has grown annually since the 1980s, with the villages closest to South Tarawa (Buota, Abatao and Tabiteuea) experiencing the greatest absolute population increases in the past 10 years (OB 2012a). Butaritari has a density of 322 people per km<sup>2</sup> in 2010 (OB 2012b). While its population appears to be growing rapidly, a long-term trend of inter-island migration between Butaritari and neighboring Makin makes it difficult to determine clear island-level population growth trends over time (OB 2012b).

According to the data collected by the MIA, Buariki is the largest community involved in the CBFM project, with approximately 145 households, while Bikati is the smallest with about 47.

## Households: Bukinibwai or non-bukinibwai

Across all pilot sites, the definition of “household” used by the census and by the MIA (see definition in Table 2) differs from the concept of a household as characterized by village members. In our discussions during the diagnosis activities described in the methods section, village leaders referred to a community household as either *bukinibwai* or *non-bukinibwai*. This indicates that an I-Kiribati household is not as homogenous an entity as the census describes. A *bukinibwai* is described as a household that is fully integrated into the life of the community. *Bukinibwai* members share responsibilities and resources based on broader community needs, such as for events and fundraising. *Non-bukinibwai* households have not yet committed to be fully integrated within the community. As a *non-bukinibwai* household, members still have to respect decisions made by the village assembly under the *maneaba* (meeting house in Kiribati), but they only have a passive or listening role when it comes to participating in decisions made by villagers. A *non-bukinibwai* household does not have to share its resources during community events or other functions organized by the whole village (e.g. provide food for guests). Moreover, members of *non-bukinibwai* households are neither eligible to take a leadership position in the community nor to be selected for work opportunities that sometimes arise at the island level (e.g. construction of a *maneaba*, painting of a building). In most cases, *non-bukinibwai* households are young households or households whose members have just migrated to the community. *Non-bukinibwai* households can choose to become *bukinibwai* households, though

	Population (#)	Households (#)	Average household size (#)	Annual rate of population growth (%)
<b>Total</b>	<b>103,058</b>	<b>16,043</b>	<b>5.2</b>	<b>2.2</b>
<b>North Tarawa</b>				
<b>Total</b>	<b>6,102</b>	<b>1,002</b>	<b>5.9</b>	<b>0.2</b>
Buariki	703	145		
Tabonibara	363	61		
<b>Butaritari</b>				
<b>Total</b>	<b>4,346</b>	<b>630</b>	<b>7.0</b>	<b>0.2</b>
Bikati	225	47		
Tanimaiaki	267	60		
Kuuma	323	62		

Source: KNSO 2012; OB 2012a, b.

Table 2. Population and household size in both study sites and Kiribati in 2010. For the purposes of this table, a “household” is defined as per Government of Kiribati Census enumeration protocols to mean people who usually eat together and share in the preparation and costs of providing food. KNSO 2012.



the exact process was not investigated for this project. Both *bukinibwai* and *non-bukinibwai* households have the same rights when it comes to accessing marine resources. When it comes to the CBFM project, however, the project team has to make sure the information is adequately disseminated to both *bukinibwai* and *non-bukinibwai* households, as they are not equal participants in the activities and decisions of a community but are potentially equal in their impact on marine resource use.

### Length of residence and migration

The availability of services and socio-economic opportunities in the urban centers of South Tarawa and Kiritimati make the two islands very attractive to rural households. As a result, rural-urban migration is a widespread phenomenon, with urban centers experiencing immigration and rural outer islands experiencing emigration (KNSO 2012). During the discussions with the village leaders carried out during the profiling activities at the CBFM pilot sites, all villages mentioned that the number of households is either stable or slightly increasing. Village leaders said that young people were more likely to move away from their home village to pursue further education or find wage employment. All village leaders also mentioned they have witnessed an increase in seasonal migration from their village to South Tarawa. This means a few members of one household might temporarily leave their home village to work in South Tarawa before

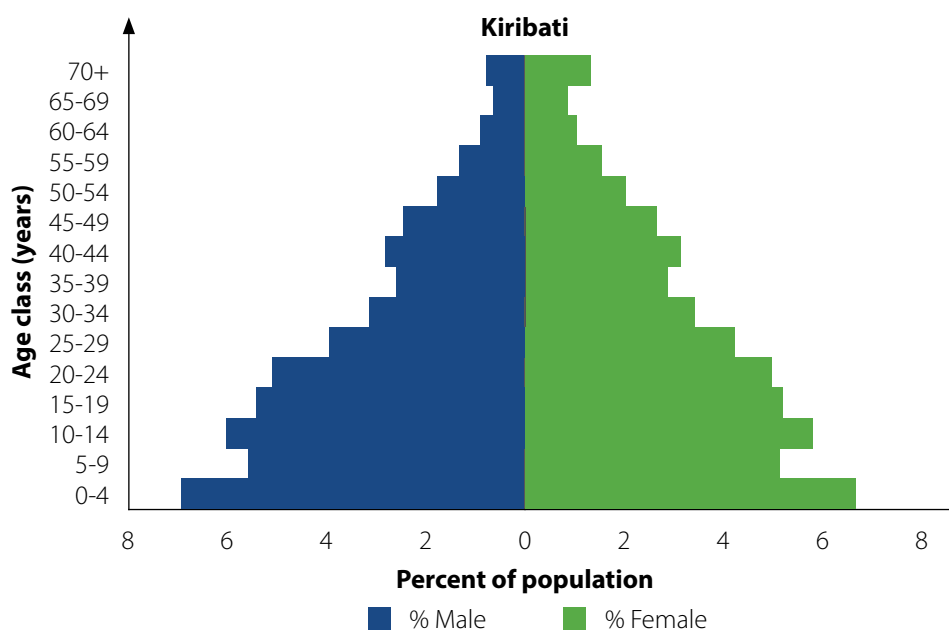
returning a few months later. Bikati was the only pilot village that mentioned an addition of three households with a total of 20 members in the previous year. All new households had relatives in Bikati.

### Age pyramid and gender ratio

Kiribati's population is divided almost evenly by gender, with 36% of the population under the age of 15 and only 5% over 60 (Figure 7). Kiribati's triangular-shaped age-sex pyramid highlights high birthrates and relatively low life expectancy.

These national population trends remain roughly the same in both North Tarawa and Butaritari, though the drop in 15- to 19-year-olds reported on Butaritari in the 2010 census may be linked to the absence of a secondary school there (OB 2012a,b).

The 2010 census does not provide the same scale of age-sex data at the village or island level as it does at the national level. However, rough analysis of census data indicates all five pilot site villages share a similar age pyramid structure at both island and national scales. At the village level, pilot site population trends also remain roughly equal by gender. The smallest and largest absolute percent differences between females and males in the population are 0.3% more females than males in Kuuma and 4.7% fewer females than males in Tabonibara.



Source: KNSO 2012.

Figure 7. Age pyramid structure for the population of Kiribati in 2010 by gender.

## Culture

Kiribati is part of Micronesia and has been inhabited since at least AD 1300. Interactions with other Oceanian and Asian cultures over time have created a modern-day mix of Micronesian, Polynesian, Melanesian, European and Asian cultures. However, Kiribati is far more ethnically, linguistically and culturally homogenous than most of its Pacific neighbors. Ninety-nine percent of the population identifies as either Kiribati or Kiribati/Mix (Table 3) (KNSO 2012), and there is no strong differentiation identified along ethnic subgroups.

I-Kiribati speak I-Kiribati, the national language, which, with the exception of minor differences in word use, spelling and idiomatic expression, is virtually identical across all islands. English is often spoken as a second language and is being taught in all schools across the country. Kiribati became independent from the United Kingdom in 1979.

Religion and religious observance are an important part of most I-Kiribati's lives. As a result, churches play a significant role in many areas of contemporary Kiribati society—including media, transport, family and town planning, youth education and politics. All formal gatherings, including government and family events, typically begin with a prayer, and holidays and festivals are predominantly religious in origin. The vast majority of I-Kiribati identifies as Christian, in particular Catholic

and Protestant (Table 3). Denominations are, however, diverse and include Baha'i, Seventh Day Adventist and Jehovah's Witness (*te Koaua*) to name a few. There is relatively little religious conflict in modern-day Kiribati. However, the spirit of competition is strong in I-Kiribati culture, and this competition has been observed to extend into religion, particularly between Catholics and Protestants.

Traditional beliefs and spiritualities, including the existence and power of spirits and ghosts, or *anti*, as well as the use of feasting, song and dance in religious services, are understood to co-exist in relative peace alongside more contemporary religious activities (Grimble 1972).

The presence and the role of the Catholic and the Protestant church in the different pilot sites are similar. Villagers consider events organized by both churches to be very important. In all pilot communities, villagers are expected to participate in church fundraising activities and to look after guests from their respective church when those visitors from other islands come to stay in their village. As a result of the importance placed on religious affairs in the community, the organization and scheduling of meetings to discuss the CBFM project at the village level need to take into account any church activities. Otherwise organizers run the risk of sparse attendance.

	Total population (#)	Religion (Top 3 by % total population)	Ethnicity			
			Kiribati	Kiribati/Mix	Tuvalu	Other
<b>Total</b>	<b>103,058</b>	Catholic: 55.80 Protestant: 33.50 Mormon: 4.60 None: 0.05	<b>92,206</b>	<b>9,960</b>	<b>116</b>	<b>776</b>
<b>North Tarawa</b>						
<b>Total</b>	<b>6,102</b>	Catholic: 71.20 Protestant: 20 Mormon: 4.80	5,850	233	3	16
<b>Butaritari</b>						
<b>Total</b>	<b>4,346</b>	Catholic: 79.00 Protestant: 15.30 Mormon: 2.90	4,170	163	4	9

Sources: OB 2012a, b and KNSO 2012.

Table 3. Population by religion and ethnicity in 2010. "Other" includes Australia, New Zealand, China, Fiji and Nauru.

Protestant pastors and Catholic priests are important figures in villages around Kiribati, and our pilot sites are no exception. In all our pilot sites, discussion about community governance and leadership highlighted that pastors and priests are mainly in charge of church matters in their communities. They are highly regarded and can sit in village committees, though they mainly act as the head of any church committees, which oversee activities of both women and youth groups in our pilot sites. Because of this, no women or youth groups are independent from a faith-based organization. For any other matters not church-related in the community, the opinion of pastors and priests is welcome, but final decisions are made in partnership between village leaders and Unimwane.

## Education

National literacy rates are high in Kiribati. Ninety-one percent of the enumerated population is literate in the Kiribati language (KNSO 2012) and almost 73% in English (KNSO Census 2012). Seven percent of Kiribati's enumerated population aged 3 years and over has never been to school, while the rates are slightly higher in North Tarawa and Butaritari, at 8.8% and 8.4% (KNSO 2012). There is no major difference recorded in school nonattendance by gender; only 100 fewer females than males have never been to school out of the sampled population of 94,312 (KNSO 2012). Table 4 provides a basic overview of census statistics on education for both project sites, and for Kiribati more broadly.

There are two levels of schooling in Kiribati's education system: primary and secondary. Primary school lasts 6 years, and students can start at age 6. After completing primary school, students can go to a junior secondary school for 3 years. Junior secondary schools finish in Form 3, and students can then sit an exam to access the higher forms taught in senior secondary school

(most schools offer Form 4 to 6, and a limited number offer Form 7).

North Tarawa has 10 primary schools, one junior secondary school and one senior high school (mayor of North Tarawa, pers. comm.). Schools include both government-run and church-based institutions. In Butaritari, children have access to seven primary schools and one junior secondary school (mayor of Butaritari, pers. comm.). Most students who wish to pursue further studies beyond Form 3 then leave the island. In 2015, St Leo's College, a Catholic-based senior secondary school, began in Tanimaiaki with about 20 pupils attending Form 4.

In North Tarawa and Butaritari, primary schools are strategically located to facilitate access by villages (OB 2012a,b). For example, in North Tarawa, islets isolated by a lack of connecting transport infrastructure will have their own primary school, whereas in Butaritari, schools will be located within or between villages.

## Health

The health status of rural and urban coastal communities in Kiribati will influence their capacity for and commitment to activities that preserve natural resources. On the one hand, healthy fishers with easy access to health facilities for their families will be able to carry out livelihood activities, including fishing, in the best possible way. Easy access to health facilities and the confidence that the existing health system will effectively treat any injury or illness reduces the time needed to receive treatment for family members and thus the time spent away from income-generating activities. On the other hand, environmentally responsible behaviors may be ignored if the immediate health of family members is compromised. Individual fishers may choose to forego

	<b>Kiribati literacy rate (%)</b>	<b>Early childhood and primary (%)</b>	<b>Junior (Form 3) and Sr. Secondary (%)</b>	<b>Tertiary (%)</b>
<b>Total</b>	91	30	23 34	3
<b>North Tarawa</b>				
<b>Total</b>	89	31	21 35	2
<b>Butaritari</b>				
<b>Total</b>	91	37	22 28	1

Source: KNSO 2012

Table 4. National and island-level literacy rate and level of education as of 2010.

environmentally friendly behaviors (e.g. not fishing during spawning season) if it means providing food for their family.

Many subsistence fishers and their families in tropical coastal communities present high rates of maternal, infant and child mortality, vitamin deficiency, child malnutrition and diet-related illnesses as adults (Hatcher and Hatcher 2004). In this section, we summarize information about the health status of the I-Kiribati population at the national level, as primary data was unavailable at the community level.

According to data collected through the 2010 Census and the Ministry of Health and Medical Services' 2011 health report (MHMS 2011), there has been a steady improvement in national health indicators over the past decade. However, I-Kiribati still have a shorter life span than people in most of the Pacific Islands. In 2013, average life expectancy at birth was estimated to be 66 for males, 76 for females and 71 for both.

Kiribati faces a double burden of disease, with high mortality and morbidity from communicable and noncommunicable diseases. In 2013, the leading causes of mortality in children under 5 were diarrheal diseases and lower respiratory infections, which respectively contributed to almost 24% and 13% of all deaths. The leading causes for adult mortality were "ill-defined" diseases (14%) and cardiovascular diseases (9%).

Several risk factors contribute to these leading causes of mortality. Men and women between 25 and 64 years old show high blood cholesterol (27.7%), high blood pressure (17.3%), high rates of diabetes (28.1%) and obesity (50.6%). Tobacco and alcohol use are also on the rise. Around 70% of males between the ages of 30 and 54 are regular smokers, compared with less than 50% of the adult female population, while 32% of young males aged 15–19 years old smoke. Twenty-five percent of the adult population declares it consumes alcohol (WHO 2009).

Kiribati also faces a double burden of health problems related to diet and nutrition: Over-nutrition in adults and undernutrition in children. Economic development and modernization has increased reliance on imported, processed food, which, combined with reduced levels of activity in adults, increases the risk of noncommunicable diseases. Results from the WHO STEPwise approach to Surveillance of Noncommunicable Diseases (STEPS) survey undertaken in 2004–2006 showed that 50% of the population is categorized as having low levels of physical activity

each week (WHO 2009). About 99% consumes fewer than five servings of fruit and vegetables per day. Infant mortality and routine health facility data suggest undernutrition and vitamin and mineral deficiencies are major factors contributing to mortality in children under 5 (WHO 2009). The STEPs survey showed a prevalence of vitamin A deficiency in children, which remains a public health problem—deficiency in vitamin A has also been linked to morbidity due to diarrheal disease and pneumonia, the two leading causes of mortality in 2013 (WHO 2009). Risk factors contributing to the prevalence of diarrheal or respiratory cases include inadequate water supplies, unsafe drinking water, poor food handling and storage, and poor sanitation (WHO 2009). In 2011, 66% of the population had access to an improved water source, defined as households having access to piped water, rainwater or a protected well (World Bank (n.d.)<sup>b</sup> "Improved water access"). South Tarawa has public water supply infrastructure, while the remaining population in the outer islands relies on rainwater supplies and well water. In 2011, almost 40% of the population had access to improved sanitation, defined as households having access to flush toilets or water seal latrines (World Bank (n.d.)<sup>a</sup> "Improved sanitation facilities"). Most of the population in the outer islands report using the beach, sea or bush for toileting facilities. However, the EU-funded Kiriwatsan project is encouraging communities in Kiribati to go open defecation-free.

The CBFM team collected information about the availability and access of health facilities at the island and community levels, as well as some information about the incidence of diarrheal disease in children in 2014 following an outbreak in South Tarawa.

In North Tarawa, there is a health center in Abaokoro staffed with nurses and one medical aide. An additional five smaller clinics, usually staffed with one nursing aide, are located in Buariki, Tearinibai, Taratai, Tabiteuea and Nabeina. Staff from the Ministry of Health and Medical Services routinely visit the communities to perform yearly health checks. Communities such as Abatao and Buota, which are located in the vicinity of South Tarawa, benefit from the health facilities located there. In 2014, Tabonibara and Buariki reported a few diarrheal cases among children with no incidence of mortality.

In Butaritari, there is a health center in Temanokunuea staffed with nurses and one doctor. Seven smaller clinics are located along the island in Kuuma, Nakiroro, Tekananuea, Tanimaiaki, Ukiangang, Bikati and Keuea. The smaller clinics are usually staffed with nurses or

nursing aides. Each village on Butaritari has a village welfare group that helps medical staff on the island. Each village welfare group is made up of community members and medical personnel, and it is coordinated by an overarching working group. As in North Tarawa, the communities of Kuma, Tanimaiaki and Bikati reported a few diarrheal cases among children without mortality in 2014. Village members in Bikati were the only ones to report health-related problems due to ciguatera (e.g. food poisoning from eating certain reef fish contaminated with the ciguatera toxin). Serious injuries or illnesses are referred to Nowerewere Central Hospital in South Tarawa, which requires medical transport by plane.

## Jobs, livelihoods and assets

### Jobs

Kiribati has a “dual economy,” where subsistence and informal or unpaid work make up a large portion of the domestic economy. This means the age classes conventionally considered by Western standards to be supporting the older and younger portions of society (i.e., ages 15 to 60) may not be doing so in a formal, cash-oriented labor force. Only 20% of Kiribati’s sampled adult population (i.e. 15 and older) engages in “formal work” in the labor force, with an additional 9% engaged in “market oriented” employment (KNSO 2012). Over 40% of the adult population is “not in the labor force,” a categorization that differs from “unemployed” (18%). Reasons given for not actively looking for work vary and include being a full-time homemaker, being a student, being retired or disabled, believing no work is available and “didn’t want to work” (KNSO 2012). Fifty-three percent of those employed are in public administration, while the remainder is employed as subsistence farmers or fishers.

The data presented above shows that jobs and income are not the only assets that contribute to sustained livelihoods in Kiribati and that important factors to consider also include access to and availability of land and fishing areas and resources, infrastructure and services, community and personal capital, and markets.

### Income-generating activities

In our five pilot communities, key informants provided information about income-generating activities and the island’s main employer. In North Tarawa and Butaritari, the biggest wage employers were the two councils. However, it is unclear which proportion of the council positions benefited actual residents of the islands versus staff from the Ministry of Internal Affairs who are sent to support island-level activities.

At the island level, the main income-generating activities listed by pilot communities in North Tarawa include producing building materials like thatch and mats, selling fish to markets in South Tarawa, producing and selling local foods, and selling firewood, coconut-based products and handicrafts. Village members in Tabonibara mentioned that the village’s location in proximity to Abookoro, from which the tri-weekly ferry to South Tarawa departs, allowed easier access to urban markets. Women from Tabonibara take advantage of this ferry service to travel to South Tarawa to sell handicrafts.

In Butaritari, the main income-generating activities are agriculture-based. Due to its higher level of rainfall, Butaritari is known for its constant production of coconuts, pandanus fruit, breadfruit, giant taros (*bwaibwai*) and bananas. Villages in Butaritari also produce mats and thatch, fish traps and hooks, *toddy* (a drink made of coconut sap) and seafood for export. The Unimwane association of Butaritari owns a boat, called the “Tekinati,” which makes a weekly voyage between Butaritari and South Tarawa. The service allows people in Butaritari to send their products to the markets of South Tarawa by sea freight. Village members noted that the remoteness of some villages and the lack of regular truck transport meant that those villages missed out on opportunities to use the sea freight service. The village members also noted that communities located in Bikati and close to Temanokunuea were at an advantage to send their products by freight. Although Bikati is a remote islet (Figure 4), the Tekinati makes a stop to the islet, which allows village members to send their goods. Moreover, many village members in Bikati also have access to dinghies with outboard motors and travel to Temanokunuea to unload their goods for transport.

Fishing activities were listed as an important daily occupation for men and women in each of the five pilot communities. However, village members expressed that revenues from fishing were not as consistent and as high as those from agriculture. Out of the five villages, only members from Bikati declared that fishing is a good source of income. This particularity is most likely due to the ability of fishers from Bikati to sell clams in South Tarawa (AUD 70 for an approximately 5 kg bucket). The limiting factors cited to explain the low contribution of fishing toward income included market distance, lack of transport to market, lack of storage facilities, limited preservation techniques and limited knowledge of how to add value to fish products.



## Community and household assets

During their first visit to each village, members of the CBFM team walked with community members to develop a village profile, summarizing key community and household assets. On average, household and community assets were almost identical in all five pilot communities. These are described in the following sections.

## Household facilities

Most living quarters, called *buya*, in the five pilot communities are made of traditional materials from coconut and pandanus trees (Figure 8).

A limited number of buildings are made of permanent materials such as concrete. Those include churches, storage facilities for fishing equipment, clinics and schools.

Neither outer island has access to an electrical grid. Village members get electricity by using fuel-powered generators or individual solar cells. The five pilot communities owned one to three generators, which were either communal or belonged to a church. Each household owned at least one solar cell. These are used to power small lights and small appliances such as laptops and portable DVD players. In Butaritari, a Taiwan-funded project through Kiribati's Ministry of Public Works and Utilities delivered solar lighting kits, with three solar lights, to each household on the island. Those solar lights are easily recognizable thanks to their logo, "Love from Taiwan." Households in North Tarawa will soon receive identical solar lights.



Figure 8. Traditional I-Kiribati houses, or *buya*, made of coconut and pandanus materials.

As described in the health section above, access to improved drinking water and improved sanitation is still in progress in Kiribati. According to the 2010 census, 96% of households in North Tarawa use (primarily open) wells as their main water source, and 1% rely on rainwater (OB 2012a, census). The remaining 3% of households can access the public urban water system (those households are located in Abatoa and Buota, the two closest villages to the urban center of South Tarawa). The rainwater tanks are usually located close to a school or church *maneaba*. In North Tarawa, village members reported that some churches only allowed the use of the rainwater tanks for church-related activities.

In all five pilot communities, households primarily used firewood from coconut husks to cook, and only a few households were found to use kerosene stoves.

In Butaritari, households declare relying on multiple sources of drinking water. According to the census, 86% of households report well water as their primary source of drinking water, while 14% mentioned being primarily dependent on rainwater. As in North Tarawa, rainwater tanks are located close to schools and church *maneabas*. Contrary to North Tarawa, village members in Butaritari did not mention that churches only allowed the use of their rainwater tanks for church-related activities.

In terms of access to sanitation, North Tarawa was declared an “open defecation free-island.” Village members of Abaokoro have instituted a AUD 5 fine for people using the beach as a toilet, though such a system does not exist in Buariki and Tabonibara. The Kiribati Adaptation Project (KAP) is currently working in North Tarawa to install septic tanks, including in Tabonibara. The Kiriwatsan project continues work in North Tarawa to improve toilet facilities through the construction of pit latrines and compost toilets. In Butaritari, people in the three villages mention that they primarily use the beach, bush or lagoon as a latrine. Kiriwatsan is also working in Butaritari to improve access to sanitation.

Access to agricultural resources was identical in the five CBFM sites. Land ownership may affect access to agricultural resources on privately owned land, though two systems that seem to be widely used are rotation between different plots and access fees (usually a percentage of a sale).

In many cases, villagers stated that they harvest crops on community land to avoid sensitivities around land ownership.

The most notable contrast between the CBFM pilot sites was their access to fishing gear and equipment, most notably boats. In all of our pilot sites except Bikati, the rate of boat ownership averaged 30% of households (primarily in the form of canoes), while ownership of outboard motors was restricted to a very limited number of households. In contrast, almost 70% of households in Bikati owned a boat, of which 30% owned an outboard motor. The high proportion of outboard motor ownership in Bikati is speculated to come from (1) the remoteness of the islet and the necessity to travel to the mainland of Butaritari for supplies, and (2) income generated through the sale of clams.

### Island transport

All the CBFM communities are accessible by trucks, motorbikes and bicycles via an unpaved road. Butaritari is reached through an Air Kiribati plane service to and from South Tarawa operating two times per week (increased to three times per week in 2016). On arrival in Butaritari, the council truck offers a transport service to passengers charged at AUD 1.50 per km. People can travel to Butaritari on the weekly Tekinati boat (owned by the Butaritari Unimwane association). The boat service does not keep to a tight schedule, and it takes approximately a day to travel between Butaritari and South Tarawa.

Villagers get around their respective islands on bicycles or motorbikes. A truck service operated by each island council is provided to residents for a small fee. In North Tarawa, the mayor owns trucks that can be hired out. Land transport there is often difficult because of the limited number of bridges and causeways linking the numerous islets. Only one causeway exists in Butaritari, which links the village of Kuma to Butaritari.

### Information Services

An important endeavor for the CBFM team during the diagnosis phase of the project was to assess the existence of communication outlets at the island and village level to help with future dissemination of information. Key informants were also interviewed about the most common method used by villagers to find out what is going on in their community and surroundings.

Internet access is not available in North Tarawa<sup>7</sup>, and it is only available at the office of the Butaritari Island Council in Temanokunuea on weekdays. Villagers are charged AUD 0.50 to use internet for 30 minutes.



There is no mobile phone coverage currently in any of the pilot sites. Landlines are available at the council offices in North Tarawa and Butaritari. Village members can purchase phone credits and use it to make calls to outer islands. In North Tarawa, some villages have been given one public phone to service the community. Buariki was such a village, but the phone line has not been operating since the start of the CBFM project. In Butaritari, both Tanimaiaki and Bikati have a public phone to receive and make calls to the outer islands. The public phone in Tanimaiaki is also used to pass on messages to residents living in villages on the eastern side of the island, including Kuma. The functionality of those public phones is variable.

The most commonly used media by villagers in the outer islands is the radio. Approximately 90% of households in CBFM pilot sites own a radio. It is a popular way to find out news around Kiribati and pass on messages. Individuals and even ministries use radio to pass messages to specific individuals or communities. A national newspaper is published weekly in Kiribati but appears to be only available in South Tarawa. Newspapers in pilot communities were brought there by family members visiting from South Tarawa.

Beyond the use of radio announcements to disseminate information to villagers in the outer islands, a protocol exists in both North Tarawa and Butaritari. As observed by the CBFM team, information about visits to specific villages should firstly be addressed to staff of the appropriate council (usually the mayor and clerk) by phone and hard copy letter. Information received in writing is then passed on to relevant village leaders who are then in charge of distributing the information to their constituents. In most cases, information pertinent to what goes on in the village or about local rules is circulated and discussed during a monthly village assembly. This system was found to be identical for each of the five CBFM communities.

## **Management constituency: Governance and institutions**

The CBFM team gathered information about the leadership structure of each pilot community through secondary data collection and focus group interviews. The information was then validated with key informants in each village. The team collected as much information as possible on the different stakeholders who may have to be involved in the management constituency of the pilot CBFM villages.

To start with, it is important to consider two scales of governance. Although most of the field activities of the CBFM project occur at the village level, governance at the island level is also key to the project. In the following sections, the different institutions operating at the island and village levels are described and their links to the CBFM project defined.

### **Governance at the island level**

Two institutions operate at the island level: the Unimwane association and the island council.

#### **Unimwane association**

The Unimwane association represents the circle of traditional leaders on the island. Under current administrative processes, it is not recognized as an official decision-making institution. In reality, however, members still wield much power on most islands, though the extent is not uniform across Kiribati. As in all islands, Butaritari and North Tarawa have an established Unimwane association. The membership is open to one to two Unimwane from each village of an island. The village's council of elders choose the representative. A chairman, selected from the pool of members, presides over the association and sits in the island council, serving as a link between the two institutions.

The Unimwane association, called *Tekinati*, is still powerful in Butaritari. However, it lacks power in North Tarawa as members there have to share in decision-making with Unimwane from South Tarawa, who are represented in larger numbers.

#### **Island council**

The island council represents the local government on each island. It is a legally formed body under the Local Government Ordinance 1966 followed by the Local Government Act 1984 (amended 2006). Members of the island council are called councilors, and members of their village elect them by popular vote. Among the councilors, mayoral candidates are selected and a subsequent election by popular vote takes place across the island. As with the Unimwane association, each village elects one or two representatives based on the size of the population of a village. Through the Local Government Act 2006, island councils have been given power to administer the affairs of an island and granted responsibilities in the 12 following areas: (1) Agriculture, livestock and fisheries; (2) buildings and town or village planning; (3) education; (4) forestry and trees; (5) land; (6) relief and famine and drought; (7) market; (8) public health; (9) public order, peace and safety; (10) communications and public utilities; (11) trade and industry; and (12) miscellaneous.

Both institutions meet on a monthly basis. On North Tarawa and Butaritari, the meeting of the Unimwane association currently takes place one day prior to the island council meeting.

### Links to the CBFM project

The island council needs to be consulted in its capacity as the agency responsible for island development (including fisheries projects), while the Unimwane association ensures that projects are culturally appropriate. Both institutions should be consulted to gain the appropriate formal authorization for a project to take place on a specific island. Once approval has been obtained either directly from or on behalf of both institutions, project teams are permitted to establish direct contact with specific villages.

In the case of the CBFM project, members of the team worked closely with both institutions to establish rigorous community engagement protocols from the outset. The time used to work in collaboration with both institutions helped legitimize the CBFM project and team members in the collective eyes of the community. To create a participatory and collaborative environment for the project within communities, both institutions are regularly updated on project progress and activities. Additionally, CBFM pilot site leaders that are members of each institution have used their position to disseminate information about their experiences with the CBFM project to non-CBFM communities, which has implications for future scaling-out capacity.

### Governance at the village level

At the village level, community leadership structure follows a similar pattern in all five pilot sites. The only differences were in the mode and frequency of selection of leaders and size of the village institution.

Each village is governed by an executive committee, which includes a village chair, vice-chair, secretary, treasurer and community warden. It oversees the affairs of the village and works closely with the Unimwane and councilors of the village. The village executive committee is responsible for overseeing the activities of its subcommittees. These usually include a school committee, a health and welfare committee and an agriculture committee. Members of the executive committee are selected during a village assembly under the *maneaba* by popular vote through either a public or secret ballot system. Potential committee members need to belong to a *bukinibwai* household, and the length of the mandate seems to vary between villages. However, the functions of the

main committee members appear to be identical in each village (e.g. village members charged with the role of treasurer perform the same function in each village).

### Role of Unimwane

The Unimwane (usually men over 50 years of age) act as mediators for a village and are responsible for resolving any issues or conflicts within it. In complex situations involving other villages, the representative sitting in the Unimwane association is expected to bring up the issue during the association's monthly meeting. The association has the power to raise issues during village assembly meetings. These meetings in the pilot villages seem to happen on a monthly basis to discuss relevant issues such as fundraising, visits of guests and community decisions about issues of importance to the entire village. However, any decision on such issues cannot be made individually or through the village executive committee. Instead, it requires the whole village to share opinions and decide through a secret ballot. The Unimwane hold a strong traditional position in the CBFM pilot villages, and any decisions affecting the life of the village will ultimately need their support.

### Role of chairmen

The chairman (the chair of the village executive committee is usually a man) oversees matters concerning the village in close collaboration with the Unimwane. He is in charge of organizing meetings of the village assembly and the executive committee, as well as organizing community members to cater for guests. If village matters require the support of the island council, the village chairman liaises with the village councilor.

### Role of councilors

The councilor is responsible for informing the island council of matters decided during village assemblies and vice versa. Since proper community engagement protocols usually dictate that island council members must be notified of any prospective project seeking approval to operate on an island, councilors are usually the first to be aware of a potential project of interest for their village. As such, they need to inform both the village chairman and Unimwane of any local visit or community awareness session from projects and government bodies. During island council meetings, councilors may speak on behalf of the village they represent, but they cannot make final decisions without first informing and seeking final say from members during their assembly.

## Role of church leaders

Church leaders are required to deal with church matters and can make decisions on them without the need to consult with the village assembly, village committee or Unimwane. They may sit in the executive committee or any subcommittee but cannot make unilateral decisions on village matters. Catholic and Protestant leaders seem to hold a higher standing in the community, which is perhaps due to the size of their church in all CBFM sites. Church leaders can help disseminate information during church services.

## Role of community wardens

The community warden is in charge of enforcing community rules decided by the village assembly. The major activity of the community warden is that of the village messenger. Any meeting announcement requiring villagers to gather is the responsibility of the community warden. In Buariki, the position was restricted to members of one family who had traditionally held it for generations.

## Existence and role of women and youth groups

All pilot sites mentioned the existence of women's and youth groups. In all cases, all such groups are affiliated with a church, since no independent ones currently exist. Women's and youth groups usually fundraise for the church by selling food and handicrafts, organize Bible studies and take part in welfare groups.

At the village level, women and youths are represented in subcommittees. Through our diagnosis, women and youths in the five pilot CBFM communities currently belong to school committees exclusively. Only in Tanimaiaki can a woman be selected as a member of the village executive committee; however, a woman cannot take the position of village chairman.

Butaritari currently has one female councilor among 14, while no women hold the role of councilor in North Tarawa.

On both islands and among all pilot villages, decision-making is for the most part the prerogative of men. During village assembly meetings, women participate in discussions, though they are usually less vocal than men. During a formal village consultation with the presence of all community members, women will usually discuss ideas among themselves before having one of the older women or a woman married to one of the village leaders report to the whole assembly. It is a personal observation that some pilot communities seem to be more inclusive of women's participation than others.

## Governance: Collaboration and conflicts

The level of existing conflicts, collaboration within a community and respect and trust toward leaders by community members are all important criteria that influence the rate of success of community-led approaches to natural resource management (Evans et al. 2011). During the diagnosis phase, the CBFM team enquired about the perceived social capital<sup>8</sup> in each village and noted any situations that highlighted the existence of conflicts, collaboration and respect toward leaders.

The five pilot communities seem to fit along a spectrum in terms of their individual level of social capital as evidenced by information collected through open-ended interviews during the diagnosis phase of the CBFM project. Interestingly, the level of perceived conflict at the island-scale influenced the level of organization, collaboration and trust at the village level. Specifically, external influences operating at the island level in Tarawa (including South Tarawa) appear to have a negative impact on the level of cooperation within and between the two island-level institutions (the Unimwane association and island council) in North Tarawa. In fact, tensions are reported to exist between representatives of communities located close to the urban South and representatives of communities farthest to the North. Villages such as Buota and Abatao, which are located closest to the boundary with South Tarawa, have experienced a high level of migration from residents originally living in South Tarawa. As such, a large proportion of residents feel their communities have more in common with South Tarawa than with those in North Tarawa—a feeling sometimes shared by their representatives sitting in North Tarawa's institutions.

The unique administrative case of Tarawa may also exacerbate conflicts rather than encourage cooperation because of an incident described below that has had a long-lasting impact on the perceptions of North Tarawa fishers in their ability to work together with fishers from South Tarawa. Tarawa is administratively divided into three island councils and two Unimwane associations, and all institutions respectively meet to discuss affairs pertinent to Tarawa in its entirety. One particular event highlights how authorities in North Tarawa have slowly lost confidence in the ability of the administrative system to sufficiently support cooperation between North and South. This event is particularly relevant to the CBFM project as it deals with fisheries. For years, tensions have been building between communities in North Tarawa and fishers' associations operating in South Tarawa. The island council in North Tarawa, with the

support of its Unimwane association, sought to resolve the situation by invoking its administrative jurisdiction over the council's waters. The council went on to pass a bylaw that outlined permitted rules for fishing activities in the vicinity of North Tarawa's coastline. While we were not able to locate this particular bylaw during the participatory diagnosis phase, we were informed of its existence by numerous key informants from the MIA, the North Tarawa Island Council, North Tarawa Unimwane Association and village leaders of our two North Tarawa CBFM pilot villages. Fishers from South Tarawa committed multiple infractions, so communities in North Tarawa decided to apply the penalties listed in their bylaw and confiscate fishing gears from a number of fishers. The island council in North Tarawa was then taken to court by a fishers' association in South Tarawa. The verdict ruled in favor of the plaintiff and ordered the island council in North Tarawa to return the confiscated fishing gear and pay a fine. This court case is repeatedly mentioned by inhabitants in North Tarawa and explains at least in part the current tension and frustrations of villages in North Tarawa at implementing any kind of fisheries management initiative. More importantly, village members interviewed during CBFM activities said that they do not trust the ability of current authorities to support them. They expressed a sense of helplessness toward the situation with fishers from South Tarawa and perceive that the authorities would favor the interests of the population in South Tarawa. Such perceptions gathered during the participatory diagnosis are very important to know prior to the implementation of the project's management phase as they directly inform the management constituency. In North Tarawa, the management constituency will need to ensure issues of mistrust are appropriately dealt with and that the membership of any committee in charge of coastal fisheries management in Tarawa does not favor members from the South over the North.

At the village level, conflicts could destabilize a community's leadership structure and the ability to take on a project such as the CBFM project. The most appropriate example is the case of Buota, which the island council in North Tarawa had originally chosen as one of the three CBFM pilot sites on the island. The CBFM team soon realized that the decision to be included as a pilot site had been made by one of the village councilors without liaising appropriately with the other representatives of the community because of existing conflicts. As a very large village, members of Buota are organized around different wards. A very high number of conflicts exist between members of different wards, and collaboration between wards is relatively rare.

In Buariki, the CBFM team observed a political conflict between the village chairman and the two local councilors. The conflict had a direct impact on the effective dissemination of information to all interested community members. Upon realizing that the personal conflicts affected the community's ability to fully participate in the CBFM project, the Unimwane of the village decided to dissolve the village executive committee and act as the overarching institution for the foreseeable future. Buariki's village members declared that apart from political disputes between leaders, the village only experienced a low number of conflicts between inhabitants even though the community is quite large. Villagers perceive that people in their community work closely with one another and have a strong sense of collaboration. Moreover, villagers appear to have strong respect for their council of elders.

In Tabonibara, the issues noted during team visits, which mainly related to a lack of organization, did not stem from existing conflicts. Rather, they originated from the low level of respect and trust by villagers toward community leaders in the context of their ability to take action and act on behalf of villagers. Young people especially mentioned that high levels of kava consumption among adults had negatively affected the capacity of leaders to be proactive. Kava is not a traditional drink in Kiribati as in other Pacific counties where it is used as a ceremonial drink. However, kava consumption has substantially increased in Kiribati over the past decade (WHO 2009). Kava is available in a brown powder form and then soaked in cold water to produce a drink which is shared among community members (mainly men). This kava drink is often used as a sedative and acts as a muscle relaxant. In Tabonibara, youths mentioned that adults tended to consume too much kava in the evening and were too tired in the morning to undertake their duties or act as leaders for their community<sup>9</sup>. Few conflicts are said to exist in Tabonibara, and these mainly pertain to land disputes. General collaboration appears to be high across the community, although some tensions may occur between the two wards making up the village.

In contrast, the level of social capital in Butaritari at both scales of governance appears to be currently higher than in North Tarawa. Both the island council and Unimwane association are well regarded, and a high degree of confidence exists among all pilot site villagers in the ability of the Unimwane association to resolve conflicts between villages and to help them collaborate with one another. At the village level, all pilot sites mentioned that minor conflicts do happen



in each village but are commonly resolved because the village executive committee and Unimwane encourage the open and quick resolution of conflicts.

In Kuma, the two wards traditionally compete with one another. The CBFM team experienced this latent competition firsthand during the initial community visits, when representatives of the two wards stated their desire to work separately within the project. Currently, the two wards have come to the decision that collaborating with one another on the CBFM project would lead to better collective outcomes.

In Bikati, the team witnessed issues between the councilor and the village chairman during one of the CBFM visits. These arose from improper communication protocol between the two leaders and were later resolved during a village assembly specifically called to solve them. Tanimaiaki currently appears to be the most organized CBFM pilot site, as there have not been any observed conflicts obstructing the implementation of the project.

Finally, it is important to note that all three pilot sites in Butaritari have so far established a CBFM committee under the village executive committee. The creation of all three CBFM committees came directly from village leaders without any suggestion or prompts from the CBFM team. Neither village in North Tarawa has established or spoken about creating a CBFM committee.

### **Importance of marine resources**

Most of the CBFM project activities during the participatory diagnosis phase aimed to understand the characteristics of the fisheries of each pilot site. This information allowed the CBFM team and each community to understand the marine system, one of the pillars of the PDAM framework. The team conducted participatory research activities during gender-based focus groups to collect information on:

- community resource use patterns;
- status of fishery stocks;
- perceived changes observed in the fisheries over the past 15 years;
- perceived threats and opportunities contributing to observed changes in the fisheries;
- current and past fisheries management actions.

Based on the information collected, the CBFM team then held discussions among community members to generate a list of activities to help contribute to the sustainable management of their inshore fisheries.

### **Community patterns of resource use**

The CBFM team first gathered secondary data information on the level of fisheries resource use. The MFMRD collects catch data in the outer islands through a socio-economic monitoring survey, which provides a snapshot of the annual catch at the island level. The catch data for finfish collected in 2012 by MFMRD in Butaritari was summarized across fish families (Table 5). Such data was unavailable for North Tarawa.

In Butaritari, the data shows that emperors, snappers and flying fish are the most important targets in terms of quantity. Secondary data could generate general assumptions, but it would not be village-specific or include invertebrates, and data would be missing for North Tarawa.

As such, the CBFM team conducted two main activities to understand how each pilot site perceives its use of its fisheries resources. A mapping exercise combined with a resource matrix activity provided ample information. Both activities were very successful in getting groups to start talking about their fisheries. Although all gender-based groups took part in both activities, women provided more information during the resource matrix activity than during the mapping exercise, while men did the opposite.

Resource matrices were collected for each group in each community, with a total of 15 being collected across the five pilot sites. An example of a resource matrix developed by the women in Bikati, Butaritari, is shown in Table 6. The names of the marine species (in both I-Kiribati and English) presented in Table 6 were copied directly from the matrix created by the women. The women of Kuma almost exclusively know the I-Kiribati names of the species they collect, not the common English names. In the appendix, a list of species targeted by villagers in Kiribati is provided and includes both I-Kiribati and English common names. This list is however nonexhaustive and currently focuses on finfish and demersal fish. Only four entries are not about fish and include lobster, sea cucumber, seaworm and turtle. A list specifically targeting invertebrates harvested by villagers in Kiribati is currently being developed by the MFMRD and the CBFM team as the information was highlighted as lacking during community consultations. An example of the 15 community maps collected, drawn by men living in Kuma, Butaritari, is provided in Figure 9.

Family name	English common name	Kiribati common name	No. of species	Annual catch (metric tonnes)
Lethrinidae	Emperors	Okaoka, Rou	2	208.8
Lutjanidae	Snappers	Awaii, Bawe, Bwao, Ikanibong, Ingo, Takabe, Tinaemia	7	182.0
Exocoetidae	Flying fish	Onauti	1	141.9
Scombroidei	Barracuda, wahoo, tuna, mackerel, swordfish	Ati/Atiwaro, Baara, Baitaba/Baiura/Ingimea, Ikabauea, Raku	5	109.9
Carangidae	Jacks, pompanos, scads, runners	Aong, Bariii, Ikanrereba, Kama, Kimokimo, Nari, Rereba, Tauman	8	93.8
Mullidae	Goatfishes	Maebo, Tewe	2	70.0
Other	Misc. finfishes and other vertebrates	Bukibuki, Karon, Kunkun, On, Manai, Mon, Nimwanang, Ntabwabwa, Rabono, Reiati, Uaanati	11	55.8
Mugilidae	Mulletts	Aua, Baua,	3	50.3
Epinephelinae	Groupers, sea basses	Bakati, Kuau, Kuau te bero,	6	31.2
Albulidae	Bonefishes	Ikari	1	22.2
Gerreidae	Mojarras and silver-biddies	Amori, Kobe, Ninimwai, Nibongbong	4	17.7
Belonidae	Needlefishes	Mwake/Make	1	13.2
Scaridae	Parrotfishes	Ikamawa, Inai,	3	11.1
Acanthuridae	Surgeonfishes, Tangs, Unicornfishes	Koinawa, Mako, Riba	3	10.7
Siganidae	Rabbitfishes	Imnai	1	7.8
Balistidae	Triggerfishes	Binaing, Bubu	2	6.0
Hemiramphidae	Garfishes	Ana	1	5.6
Chanidae	Milkfish	Baneawa	1	0.9
Kyphosidae	Sea Chubs	Inonikai	1	0.7
Tetraodontidae	Pufferfish	Buni, Tauti	2	0.1
Elasmobranchii	Sharks, skates, rays	Bakoa	1	0
<b>Total</b>				<b>1,039.4</b>

Table 5. Catch from Butaritari in 2012.

Marine Species	Use	Who	Habitat	Fishing gear	Seasonality	Trend over 15 yrs
Flying fish	food/cash	men	reef	fishing net 2"	4 p.m. onwards, both tides	increased
Giant clam	all	men	reef	knife	all year, both tides	decreased since 2004
Hippopus clam (strawberry clam)	food/barter	all	reef flat	hand	all year, low tide	increased
Ikabuneti	food/cash	all	reef flat	collected	few days after storm, tide in	2 or 3 times a year
Ikakirati	food/cash	all	reef flat	collected	few days after storm	unsure
Ikamawa	food/cash	all	reef flat	collected	few days after storm	unsure
Inai	food/cash	all	reef flat	collected	few days after storm	unsure
Katura	food	all	mudflats	hands	all year, both tides	increased intensively
Koikoi	food	women and children	among mangroves/ stones	spoon/shell	all year, low tide	decreased since 2009
Lobster	food/cash	men	lagoon/ ocean	dive (torch)	night time, both tides	increased
Manoku	food/cash	men	ocean side	fishing line	Oct/Nov-Dec/Feb, low tide	plenty
Nimatanin	food	all	between large rocks	hands	full moon, low tide	increased
Nouo	food	men	ocean side	hand	all year, high tide	increased since 2007
Peanut worm	food/cash	women	mudflats	stick/ pandanus root	full moon, low tide	increased
Rabono Mai	food	men/ women	reef flat	knife	all year, low tide	increased
Rabono n un	food/cash	men	ocean side	eel trap	all year, both tides	increased
Riba	food/cash	all	reef flat	collected	few days after storm	(range from 1" to 1 ft)
Te ang/ te rotu	food	women/ men	on the reef	hands	all year, low tide	increased
Yellowfin	food/cash	men	ocean side	fishing line (katiki)	stormy weather, high tide	increased

Table 6. Example of a resource matrix developed by the women group in Bikati, Butaritari.



Although the information collected through community mapping and resource matrix exercises does not provide quantitative measures of catch and effort or pressure on the environment, it strongly suggests all groups in the five pilot sites have a detailed knowledge of their marine environment and their marine resources. For instance, it was common for male groups to provide a list of I-Kiribati names for the main fishing spots around their community. All gender-based groups provided information on a range of marine species, supporting habitats, methods of collection and time for collection using either the map or resource matrix format. Through discussion during the activities, the CBFM team observed that gender-based groups provided detailed information on resources they primarily harvest as well as on those harvested primarily by another resource user group. However, discussion was more detailed when talking about marine species directly harvested by the resource user group. Although women appear to have little responsibility in harvesting finfish resources, they could describe a large number of species, habitats, timing and methods of collection based on the knowledge acquired during postharvest activities. Men could also provide information on invertebrates, even species primarily harvested by women or children. In each village, all gender-based groups admitted knowing less about the lifecycle of marine invertebrates than of finfish species. Women tended to know less than men about the lifecycle of finfish species.

## Perceived changes in marine resources at the village level

Once each group completed both mapping and resource matrix activities, the CBFM team encouraged group members to think and discuss changes they had observed in the past 15 years. The groups used maps and matrices as a starting point in their conversation. Across the five pilot communities, all groups mentioned noticeable changes based on the following factors:

- change in trip duration to harvest marine resources;
- change in productivity of a number of habitats;
- change in size of marine resources being harvested;
- change in quality or size of marine habitats;
- change in fishing methods.

The consequences of these changes on the current status of the stocks of marine resources were discussed and a column was specifically added to the previously drawn resource matrices (last column of Table 6). In many cases, changes have resulted in a decline or even observed local extinction of marine species. Contrary to CBFM communities in Butaritari, communities in North Tarawa rarely mentioned an increase in a stock of a marine species. However, no data was collected on whether a perceived increase in a stock was the result of biological conditions or a shift of target species.

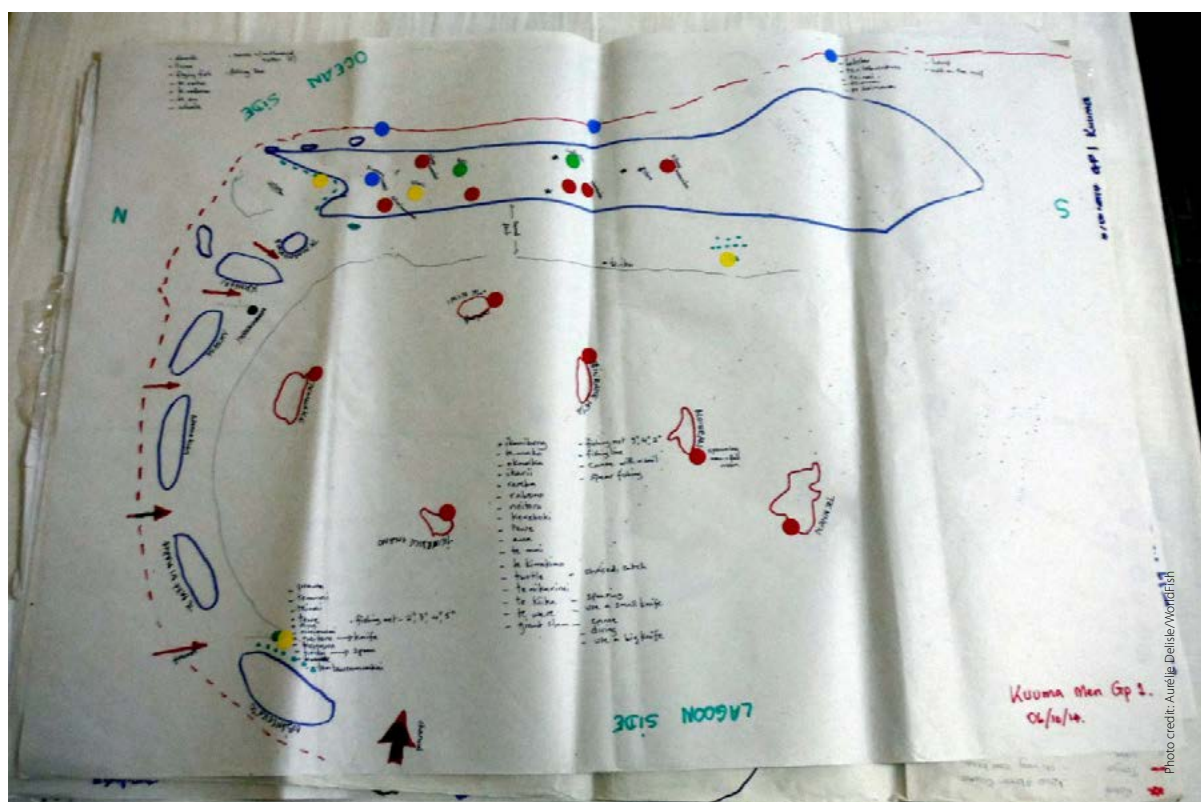


Figure 9. Community map drawn by one male group in Kuma, Butaritari.

The highlighted changes prompted gender-based groups to discuss their concerns for

- the long-term status of their inshore fisheries;
- highlight existing external and internal threats;
- list priority activities groups believed should take place to sustainably manage their fisheries.

As mentioned in section on Importance of marine resources, the discussion on the perceived changes in their marine resources provided each community and the CBFM team with information on the marine systems pillar of the PDAM. The awareness around the perceived changes allowed the CBFM team to target discussion around possible causes explaining the perceived changes. Community members were encouraged to discuss the potential internal and external drivers, which would have caused the perceived changes. Discussion surrounding changes perceived by community members prompted participants to make linkages between the marine systems pillar and the other three pillars (i.e. people and livelihoods, institutions and governance, and external drivers). The linkages identified were used to inform later exercises where community members were asked to list activities that they felt might help them manage their coastal fisheries more sustainably (Table 7).

### **Community-based fisheries management stakeholder meeting**

On 27–29 October 2014, the first CBFM stakeholder meeting was held in Kiribati. Participants included representatives from all five pilot sites, mayors of both North Tarawa and Butaritari, local NGOs and staff from government departments. The aim of the meeting was to introduce the CBFM project to a wide audience at the national level, allow community members to talk about their involvement in it and define priorities for a model of CBFM in Kiribati. Guests included community-based resource management officers from the Ministry of Fisheries in Vanuatu and the Solomon Islands and the Secretariat of the Pacific Community. Participants gained a lot by listening to presentations from international guests that gave concrete examples of how CBFM is implemented across the Pacific. Discussion provided food for thought to I-Kiribati participants to work on a model that would allow CBFM to be successfully implemented in Kiribati and become a tool to manage coastal fisheries.

The main outcome of the stakeholder meeting was for participants to understand that villagers and the government can better work together when it comes

to sustainable long-term management of coastal fisheries. Both communities and government staff realized their role through being involved in a CBFM process and admitted they held misconceptions about the support they could get from one another. The discussion resulted in an important outcome for the design of the management constituency. It highlighted that the management of small-scale coastal fisheries in North Tarawa and Butaritari needs to involve stakeholders across levels of governance— i.e. resource users at the community level and fisheries managers at the national level. Due to the importance of the island councils and the Unimwane associations at the island level, members of these institutions would also need to be part of the management constituency.

The list of priority activities developed by each pilot community was presented to participants of the meeting. All actions regarding the ban of destructive fishing methods, destruction of marine habitats and setting up of MPAs were positively received across government departments and generated proposals from ministries outside the MFMRD to be involved (Ministry of Environment, Land and Agricultural Development, Ministry of Education, Ministry of Internal Affairs). All participants consider that community members were the best stakeholders to take care of on-the-ground management activities but highlighted that communities could only be successful if appropriately supported by island- and national-level institutions. Stakeholders mentioned that the foremost priority was to support the establishment of strong bylaws followed by assistance to island councils to gain knowledge on fisheries management (not just fisheries development as currently observed).

Participants encouraged the CBFM team to act as a link between villages, Unimwane associations, island councils and government departments. At the conclusion of the meeting, participants also requested that it should become an annual event for sharing lessons across all levels of governance.

CBFM community	Important marine species	Observed changes and concerns	Identified threats	Activities
<b>Buariki, North Tarawa</b>	Peanut worm Goatfish <i>Strombus</i> shells and ark shells Bonefish Silver biddy	<ul style="list-style-type: none"> <li>Increased population and more fishing</li> <li>The use of destructive fishing methods, including <i>te ororo</i> (splashing water to scare fish into a net)</li> <li>Villagers not complying with management rules over marine resources</li> <li>Destruction of seagrass beds</li> <li>Change in current availability and access to main marine resources</li> <li>Do not know how to deal with observed changes and how to implement necessary management measures</li> <li>Villagers feel powerless against fishers from South Tarawa</li> <li>Major decline in most finfish and invertebrates</li> <li>Making little money from declining marine resources</li> <li>Fish do not come regularly especially during spawning aggregation</li> <li>Some ciguatera sites</li> </ul>	<ul style="list-style-type: none"> <li>Disappearance of the ark shell for a few years</li> <li>Decline in <i>Strombus</i> shells</li> <li>The use of the destructive fishing method <i>te ororo</i> (splashing water) by villagers and South Tarawa fishers</li> <li>Loss of traditional management rules</li> <li>Overfishing</li> <li>Causeway between Bairiki and Betio changes the current and impacts the biological life of many marine species found in the lagoon</li> <li>Lack of village capacity to set up own management plans</li> <li>Lack of legal support for North Tarawa bylaws</li> <li>Lack of enforcement capacity</li> <li>No transport to chase fishers</li> </ul>	<ul style="list-style-type: none"> <li>Bring back traditional management rules (no fishing during spawning aggregation, no noise)</li> <li>Make village and island council bylaws strong and respected by people in whole of Tarawa</li> <li>Need legal support from ministries to strengthen bylaws</li> <li>Want ministries to recognize community efforts and provide support accordingly</li> <li>Want to learn about postharvest activities</li> <li>Want to know about alternative livelihoods</li> <li>Want to reopen fish center</li> <li>Want to know where Fish Aggregating Devices (FAD) are and get support from the MFMRD to access them</li> </ul>
<b>Tabonibara, North Tarawa</b>	Peanut worm Ark shell Goatfish Bonefish Silver biddy	<ul style="list-style-type: none"> <li>Sedimentation increasing, perceived to be the result of the causeway</li> <li>Sharp decline in the availability of bivalves</li> <li>Local extinction of bivalves</li> <li>Harder to fish for the family</li> <li>Decline in sea cucumbers</li> </ul>	<ul style="list-style-type: none"> <li>Causeway</li> <li>Destruction of mangroves</li> <li>Destruction of coral reef</li> <li>Competition with neighboring villages for bivalve collection</li> <li>Fishers from South Tarawa fishing more and more</li> <li>Increased population in Tarawa</li> <li>Kava consumption</li> <li>Lack of leadership</li> <li>Do not feel supported by national government</li> <li>Cleaning of sea cucumber guts in the lagoon</li> </ul>	<ul style="list-style-type: none"> <li>Ministries to lessen impact of causeway</li> <li>Set up a marine protected area (MPA) to protect bivalves</li> <li>Mangrove planting</li> <li>Stop collection of corals</li> <li>Understand how to set up bylaws</li> <li>Work with Buariki and other villages in North Tarawa to set up strong bylaws for North Tarawa</li> <li>Learn about species life cycles and get advice on management practices</li> <li>Ban destructive fishing methods</li> <li>Get assistance on how to set up small businesses</li> <li>Resolve leadership problems</li> </ul>
<b>Kuma, Butaritari</b>	Striped emperor Mullet Bonefish Goatfish Red snapper Eel Coconut crabs Bivalves	<ul style="list-style-type: none"> <li>Decline in marine species in all habitats</li> <li>Longer time needed to fish to collect same amount of fish as in the past</li> <li>No longer see dolphins come to shore</li> <li>Use improved fishing gear</li> <li>Fish farther away</li> <li>Some species no longer aggregate around Kuma</li> <li>Decline in octopus and in coconut crab</li> <li>Erosion</li> </ul>	<ul style="list-style-type: none"> <li>Overfishing</li> <li>Use of small-size fishing nets and mosquito nets</li> <li>Use of solar lights to go fishing at night and collect coconut crabs</li> <li>Increased fishing pressure from Makin fishers (neighboring island)</li> <li>Competition between North and South village executive committees</li> <li>Pollution</li> <li>Cutting of mangrove</li> <li>Loss of traditional management rules</li> <li>Population increase</li> <li>Collection of aggregates for road construction</li> </ul>	<ul style="list-style-type: none"> <li>Create a CBFM committee with members from both North and South Kuma that includes women</li> <li>Ban the use of destructive fishing methods (small mesh size nets, gillnets, use of torch to hunt for coconut crabs)</li> <li>Mangrove planting</li> <li>Protect seagrass beds</li> <li>Work with fishers from Makin Island to set up common rules</li> <li>Get support from island councils and the MIA to set up a CBFM bylaw</li> <li>Get assistance from ministries on how to manage wastes</li> <li>Learn about management practices for important marine species</li> </ul>

CBFM community	Important marine species	Observed changes and concerns	Identified threats	Activities
<b>Tanimaiaki, Butaritari</b>	Striped emperor Red snapper Goat fish Silver biddy Bivalves Coconut crabs Bonefish	<ul style="list-style-type: none"> <li>Decline in availability of finfish species</li> <li>Longer time needed to catch fish</li> <li>Smaller size fish</li> <li>Causeways interrupting natural flows between lagoon and ocean causing fish decline</li> <li>Blocking of traditional milkfish ponds</li> <li>Households leaving to South Tarawa</li> <li>Increased pollution</li> <li>More crown-of-thorns starfish (COTS) outbreaks</li> </ul>	<ul style="list-style-type: none"> <li>Small mesh size (1 inch)</li> <li>Use of long gill nets</li> <li>Enclosing reef with a single gill net</li> <li>Destruction of corals</li> <li>Taking fish in great amounts</li> <li>Fishing during spawning aggregation</li> <li>Pollution from garbage thrown into the sea</li> <li>Climate change</li> <li>Change of current due to causeway</li> <li>Lack of management actions</li> <li>Lack of support from ministries and island councils</li> <li>Limited income-generating activities</li> <li>Decline in revenue from copra</li> </ul>	<ul style="list-style-type: none"> <li>Set up a CBFM committee inclusive of youths to promote sustainable use of marine resources in Butaritari</li> <li>Get support from ministries to lessen the impacts of causeway</li> <li>Make management decisions that take care of destructive fishing methods</li> <li>Learn about reducing pollution</li> <li>Learn about alternative livelihood options</li> <li>Work with island councils, Unimwane associations and neighboring villages to set up bylaws</li> <li>Repair milkfish ponds</li> <li>Get support from ministries to learn about sustainable fisheries management</li> <li>Learn methods to deal with COTS outbreaks</li> </ul>
<b>Bikati, Butaritari</b>	Giant clams Peanut worms Flying fish Reef fish Bivalves Turtle	<ul style="list-style-type: none"> <li>Overall decline in marine resources</li> <li>Longer time to go fishing</li> <li>Declined availability of peanut worm</li> <li>Increased fishing pressure on clams</li> <li>Clams unhealthy, mantle bleaching</li> <li>Declined number and size of bivalves in general</li> <li>Seagrass beds and mangroves unhealthy</li> <li>Change in fishing gear</li> <li>Shift from agricultural-based activities to fishing for income</li> <li>Ciguatera-sites increasing</li> <li>COTS outbreaks increasing</li> </ul>	<ul style="list-style-type: none"> <li>Fishing pressure increases with rising population</li> <li>Overharvesting of most marine resources</li> <li>Destructive fishing methods such as gill nets</li> <li>No management rules</li> <li>Degradation of seagrass beds and cutting of mangroves</li> <li>Pollution on land and at sea (mainly diapers and plastics)</li> <li>Decreased rainfall</li> <li>Increased temperature</li> <li>Rapid increase of outboard motors (OBM) and canoes</li> <li>Rapid increase in wealth</li> <li>Kava consumption creating social problems</li> <li>Lack of bylaws</li> </ul>	<ul style="list-style-type: none"> <li>Set up an MPA or allocate a no take area to protect clams</li> <li>Reduce pollution at sea and on land to create a healthy environment for marine organisms and to eliminate algal bloom</li> <li>Community support for managing and conserving marine resources to ensure sustainability</li> <li>Planting more pandanus trees for building materials, mats and income generation</li> <li>Support bylaws to safeguard marine resources</li> <li>Family planning to be exercised by all families for the welfare of Bikati's inhabitants</li> <li>The need to continue CBFM after 3 years for the continuous support of the management and conservation of marine resources and for communities and to realize their important roles in looking after their own marine resources</li> </ul>

Table 7. Summary information collected for each community.



## Summary and entry points for CBFM

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The participatory diagnosis undertaken during the first year of implementation of the CBFM project in Kiribati identified that the five pilot communities are largely dependent on marine resources for food and income. Although most participants, apart from members of Bikati, identified the difficulty of getting a suitable income through fishing activities, it was apparent that fishing was the most important subsistence activity to provide food to households in the outer islands. Although all communities acknowledge a certain degree of agricultural activities, expansion for cultivation is currently limited by the availability of land and existing land disputes. Climate and soil quality also limit opportunities in North Tarawa to grow food crops. All communities have noticed declining fishery resources over the past 15 years, with a decrease in catch per unit effort (CPUE) and in fish size. Some local extinction of invertebrates has occurred in North Tarawa.

The tools and activities used during the participatory diagnosis phase of the CBFM project enabled both communities and CBFM team members to gain a better understanding of the status of each community's coastal fisheries. The activities also allowed the links between the current status of the marine system to be linked to the three other pillars identified by the PDAM framework, namely people and livelihoods, institutions and governance and external drivers. As a result, community participants identified many internal and external causes to explain the overall decline in fishery resources (Table 7). Population pressure, destructive fishing methods, destruction of habitats, outsiders, change in fishing gear, pollution, lack of alternative livelihood opportunities, lack of supportive institutions, lack of coordination across scales of governance and across ministries were the main identified threats. Village members also identified potential activities, including selecting areas to protect, banning destructive fishing practices and rehabilitating marine habitats, especially through mangrove planting and waste management. Communities felt they could take on most activities but needed support from external institutions to resolve potential conflicts with neighboring villages and manage legal issues when dealing with outsiders, as well as enforcement. Village members thought that better coordination between government departments and a commitment from national political representatives to the sustainable management of coastal fisheries could help create a supportive environment for villagers across all levels of governance.

The following six points summarize the main aspects of the CBFM project in Kiribati to date:

1. The Kiribati component of this project (ACIAR project FIS/2012/074 "Improving community-based fisheries management in Pacific Island countries") was developed in support of the Kiribati National Fisheries Policy 2013-2025, which lists implementing community-based fisheries management (CBFM) in three pilot communities/islands under Strategic action 4. The project is being carried out in partnership with the Government of Kiribati Ministry of Fisheries and Marine Resource Development (MFMRD), the Australian National Centre for Ocean Resources and Security (ANCORS) at the University of Wollongong, and the Secretariat of the Pacific Community (SPC), and is being supported from the Worldfish Center.
2. This part of the project focuses on five pilot communities, which were identified by community leaders: Buariki and Tabonibara on the island of North Tarawa; and Kuma, Tanimaiaki and Bikati on the island of Butaritari. The communities on these two islands differ substantially, providing the opportunity to evaluate and test the efficacy of CBFM in different contexts. North Tarawa is the second-most densely populated island after South Tarawa and shares the Tarawa lagoon with South Tarawa, which is heavily urbanized and the most populated island in Kiribati. More than 50,000 I-Kiribati therefore rely upon the coastal fisheries of the Tarawa lagoon for their livelihoods and food security. Butaritari is the third-most populated island in Kiribati, but because it is geographically far away from Tarawa, the communities living there do not share their marine resources with fishers from the capital. Because of their proximity to South Tarawa, communities in North Tarawa also face different challenges when managing their fisheries than those living on Butaritari, which will be discussed later.

3. The participatory diagnosis and adaptive management (PDAM) framework was used to analyze the transition of the management of Kiribati's coastal fisheries from a traditional, top-down approach to a community-based fisheries management approach. The PDAM framework was chosen because it is well designed for the purposes of analyzing and implementing governance transitions. The diagnosis phase of the PDAM is particularly applicable to the evaluation of the introduction of CBFM in Kiribati because it requires the re-evaluation of a fishery system.
4. The project identified entry points at the national, island and community levels. At the national level, the project team found collaboration with the Ministry of Internal Affairs (MIA), to be beneficial. Involving the MIA during engagements with the pilot communities gave the project legitimacy, built a greater awareness among MIA employees whose roles are to support community activities, and also gave community members a greater sense of involvement and support.

At the village level, the island councils and Unimwane associations hold much of the decision-making power and have great influence over the actions of the community. The island councils represent the local government on each island. Members are elected by popular vote, with one or two representatives coming from each village. The island councils have been given power through the Local Government Act 2006 to administer the affairs of an island and have responsibilities in agriculture; livestock and fisheries; buildings and town or village planning; education, forestry and trees; land; relief and famine and drought; market; public health; public order, peace and safety; communications and public utilities; trade and industry; and miscellaneous. The island council must be consulted in its capacity as the agency responsible for island development.

The Unimwane association usually consists of men over 50 years of age. These men act as mediators for a village and are responsible for resolving any issues or conflicts within it. This association has the power to raise issues during village assembly meetings and at monthly association meetings involving Unimwane from other villages. The Unimwane hold a strong traditional position in the CBFM pilot villages and must be engaged to ensure project activities are culturally appropriate and gain their support. Any decisions affecting the life of the village will ultimately need the support of the Unimwane.

5. Although traditional village decision-making lies with the Unimwane and men of the village, the project team was able to work with the traditional institutions to ensure widespread engagement with different groups within one community, including women and youths. The village executive committee and Unimwane were consulted on the best approach for consultation. It was decided that meetings should be held on separate days with different groups to run the same activities; for instance day 1 with Unimwane, day 2 with men, day 3 with women and day 4 with youths. Then, an assembly meeting under the *maneaba* allows all consulted groups to present to one another and discuss between one another.
6. While the project team has been successful in identifying entry points on multiple levels, it is necessary to be aware that mitigating circumstances can effect the way the availability of those entry points and how they behave. Conflicts and power-plays between different island councils and Unimwane associations can cause tension between villages and communities on neighboring islands (see pages 25-26). At least one of these tensions seem to have arisen from a lack of government support for local bylaws (pages 25-26), leading to an atmosphere of frustration and powerlessness. It is recommended that greater support needs to be given to local governments to ensure the legitimacy and enforceability of their bylaws.

All five of our pilot communities were well positioned to develop their own community management plans based on the information gathered during the participatory diagnosis phase. At the time of writing, all communities had developed their CBFM plans, which include rules such as closed areas and a ban of destructive fishing gears, and created their respective CBFM committees. All plans were presented by community representatives from each of the five CBFM communities to government partners during the second CBFM stakeholder meeting. Community members, staff from the MFMRD and CBFM project team are now working together on the implementation of each plan.

# Notes

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- <sup>1</sup> The Phoenix Islands include Kanton, Enderbury, Birnie, McKean, Rawaki, Manra, Orona and Nikumaroro.
- <sup>2</sup> The Line Islands include Caroline, Flint, Kiritimati (Christmas Island), Malden, Starbuck, Tabuaeran (Fanning Island), Teraina (Washington Island) and Vostok.
- <sup>3</sup> The 16 islands and atolls of the Gilbert group are Abaiang, Abemama, Aranuka, Arorae, Beru, Butaritari, Kuria, Maiana, Makin, Marakei, Nikunau, Nonouti, Onotoa, Tabiteuea, Tamana and Tarawa. The island of Tarawa is divided into North Tarawa and South Tarawa.
- <sup>4</sup> Estimate only as the fluid nature of coastal fisheries makes it difficult to accurately estimate the financial contribution.
- <sup>5</sup> Each island council is composed of one or two elected representatives or councilors from each community across an island. Among those elected councilors, a mayor will be selected. Island councils usually meet on a monthly basis. Additional council staff are employed by the MIA and positioned on each island to assist the island council in its duties.
- <sup>6</sup> The Unimwane association is comprised of representative male elders in positions of leadership in each village.
- <sup>7</sup> As of early 2016, mobile coverage including 3G was available in North Tarawa.
- <sup>8</sup> Looking at the existence of networks, formal and informal groups, collective action, collaboration and respect of rules, customs and leaders.
- <sup>9</sup> In 2016, visits by the CBFM team highlighted a higher level of organization at the village level in Tabonibara and increased capacity of leaders to mobilize and take actions.



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# Appendices

## List of marine species caught by villagers in Kiribati

This list was organized per habitat and in alphabetical order as a collaboration between the CBFM team and MFMRD. This list is nonexhaustive and currently focuses on finfish and demersal fish and is lacking in invertebrates. Only four entries relate to species other than fish and include lobster, sea cucumber, sea worm and turtle.

Local names	English names	Scientific names	Habitat
<b>Amori</b>	Silver biddy	<i>Gerres oyena</i>	Lagoon
<b>Anaa</b>	Long-billed garfish	<i>Rynchorhamphus georgi</i>	Lagoon
<b>Atunnaomata</b>	Spotted eagle-ray	<i>Aetobates narinari</i>	Lagoon
<b>Aua</b>	Mullet	<i>Mugilidae (adult)</i>	Lagoon
<b>Auan</b>	Blue-backed sprat	<i>Spratelloides delicatus</i>	Lagoon
<b>Awatai</b>	Milkfish	<i>Chanos chanos</i>	Lagoon
<b>Baibai</b>	Leopard flounder	<i>Bothus pantherrinus</i>	Lagoon
<b>Baneawa</b>	Milkfish	<i>Chanos chanos (Juveniles)</i>	Lagoon
<b>Barebu</b>	Dusky jack	<i>Caranx sexfaciatus</i>	Lagoon
<b>Barii</b>	Big-eye scad	<i>Selar crumenophthalmus</i>	Lagoon
<b>Barii</b>	Mackerel scad	<i>Decapterus pinnulatus</i>	Lagoon
<b>Bwaua</b>	Blue-spot mullet	<i>Valamugil seheli</i>	Lagoon
<b>Bwauamaran</b>	Diamond-scaled grey mullet	<i>Liza vaigenises</i>	Lagoon
<b>Bwauamaran</b>	Trochel's mullet	<i>Liza macrolepis</i>	Lagoon
<b>Ikari</b>	Bonefish	<i>Albula vulpes</i>	Lagoon
<b>Imoone</b>	Spotted snake-eel	<i>Myricthus maculosus</i>	Lagoon
<b>Kaabubu</b>	Garfish	<i>Hyporhamphus laticeps</i>	Lagoon
<b>Kimokimo</b>	Salmon mackerel	<i>Grammatoroynus bicarinatus</i>	Lagoon
<b>Kona</b>	Blue trevally	<i>Carangoides laticaudis</i>	Lagoon
<b>Kuianrereba</b>	Papuan trevally	<i>Caranx sansun</i>	Lagoon
<b>Maebo</b>	Bar-tailed goatfish	<i>Upeneus taenopterus</i>	Lagoon
<b>Matabareka</b>	Malabar trevally	<i>Carangoides malabaricus</i>	Lagoon
<b>Nari</b>	Queenfish	<i>Scombroides lysan</i>	Lagoon
<b>Ninimai</b>	Common mojarra	<i>Gerres oyena</i>	Lagoon

Local names	English names	Scientific names	Habitat
<b>Raubara</b>	Choram long-tom	<i>Tylosaurus crocodilus</i>	Lagoon
<b>Ree</b>	Golden toothless trevally	<i>Gnathanodon speciosus</i>	Lagoon
<b>Rereba</b>	Bluefin trevally	<i>Caranx malampygus</i>	Lagoon
<b>Rerekoti</b>	Broad-banded hardy-head	<i>Pranesus pinguis</i>	Lagoon
<b>Rerekoti</b>	Hardy head	<i>Alletta ovalaua</i>	Lagoon
<b>Tarabuti</b>	Goldspot herring	<i>Dussumicria acuta</i>	Lagoon
<b>Tarabuti</b>	Goldspot herring	<i>Herklotsichthys punctatus</i>	Lagoon
<b>Tau</b>	Long-tom	<i>Strongylura incisa</i>	Lagoon
<b>Tawaa</b>	Milkfish	<i>Chanos chanos (larvae)</i>	Lagoon
<b>Urua</b>	Giant trevally	<i>Caranx ignobilis</i>	Lagoon
<b>Kereboki</b>	Sea cucumber	<i>Actinopyrga miliaris</i>	Lagoon/Outer Reef
<b>Bakoa</b>	Shark, large general	<i>Ginglymostoma ferrugineum</i>	Lagoon/Reef/Ocean
<b>Bakoa</b>	White-tipped dog shark	<i>Triaenodon obesus</i>	Lagoon/Reef/Ocean
<b>Bwabu</b>	White-cheeked whaler shark	<i>Carcharhinus dussumieri</i>	Lagoon/Reef/Ocean
<b>Bwabutababa</b>	Whaler shark	<i>Aprionodon brevipinna</i>	Lagoon/Reef/Ocean
<b>Bwaninua</b>	Barracuda	<i>Sphyraena barracuda</i>	Lagoon/Reef/Ocean
<b>On</b>	Turtle	<i>Chelonia mydas</i>	Lagoon/Reef/Ocean
<b>Rokea</b>	Tigerfish	<i>Galeocerda cuvieri</i>	Lagoon/Reef/Ocean
<b>Ibo</b>	Seaworm	<i>Sipunculus indicus</i>	Mudflat
<b>Anaororo</b>	Long-finned garfish	<i>Euleptorhanphys viridis</i>	Ocean
<b>Ati</b>	Skipjack tuna	<i>Katsuwonus pelamis</i>	Ocean
<b>Baiura (Ingimea)</b>	Yellowfin tuna	<i>Thunnus albacores</i>	Ocean
<b>Buari (Nnatiati)</b>	Dogtooth tuna	<i>Gymnosarda nuda</i>	Ocean
<b>Bwaara</b>	Wahoo (kingfish)	<i>Acanthocybium solandri</i>	Ocean
<b>Ingimea</b>	Large tuna	<i>Thunnus albacores</i>	Ocean
<b>Kamaa</b>	Rainbow runner	<i>Elegatis bipinnulatus</i>	Ocean
<b>Onauti</b>	Flying fish	<i>Cypselurus spp.</i>	Ocean
<b>Rakuika</b>	Swordfish	<i>Xyphias gladius (linnaeus)</i>	Ocean
<b>Rakuriri</b>	Pacific sailfish	<i>Istiophorus platypterus</i>	Ocean



Local names	English names	Scientific names	Habitat
<b>Takua</b>	Dolphin fish	<i>Coryphaena hippurus</i>	Ocean
<b>Tawatawa</b>	Mackerel tuna	<i>Euthynnus affinis</i>	Ocean
<b>Aonga</b>	Black trevally	<i>Caranx lugubris</i>	Outer Reef
<b>Arataba</b>	Short-tailed red snapper	<i>Etelis carbunculus</i>	Outer Reef
<b>Awai</b>	Green jobfish	<i>Aprion virescens</i>	Outer Reef
<b>Awaiuea</b>	Grey jobfish	<i>Aphareus furcatus</i>	Outer Reef
<b>Baamaii</b>	Large-eyed bream	<i>Gnathodentex mossambicus</i>	Outer Reef
<b>Buki-iaro</b>	Gold-tailed jobfish	<i>Pristipomoides auricilla</i>	Outer Reef
<b>Buki-mouta</b>	Purple-cheeked jobfish	<i>Pristipomoides multidens</i>	Outer Reef
<b>Buki-niti</b>	Yellow jobfish	<i>Pristipomoides flavipinnis</i>	Outer Reef
<b>Bukinrin</b>	Small-tooth jobfish	<i>Aphareus rutilans</i>	Outer Reef
<b>Buki-touti</b>	Rosy jobfish	<i>Pristipomoides filamentosus</i>	Outer Reef
<b>Buki-uaaki</b>	Long-tailed red snapper	<i>Etelis coruscans</i>	Outer Reef
<b>Ikabaun</b>	Banded flower snapper	<i>Pristipomoides zomatus</i>	Outer Reef
<b>Ikabwauea</b>	Forster's sea-pike	<i>Callossphyraena toxema</i>	Outer Reef
<b>Kauoto</b>	Seven banded grouper	<i>Epinephelus septemfasciatus</i>	Outer Reef
<b>Kontiba</b>	Iodine bream	<i>Gymnocranius japonicus</i>	Outer Reef
<b>Kuau-morua</b>	Curve banded grouper	<i>Epinephelus morrhua</i>	Outer Reef
<b>Tauri</b>	Snake mackerel	<i>Promethichthys prometheus</i>	Outer Reef
<b>Tieriora</b>	Amberjack	<i>Seriola rivoliana</i>	Outer Reef
<b>Utin-naano</b>	Brown spotted grouper	<i>Epinephelus chlorostigma</i>	Outer Reef
<b>Anoi</b>	Hammerhead shark	<i>Sphyrna lewine</i>	Reef
<b>Awai</b>	Green jobfish	<i>Aprion virescens</i>	Reef
<b>Baiburoburo</b>	Black-tipped shark	<i>Carcharinus spallanzanni</i>	Reef
<b>Barere</b>	Sweeper	<i>Pempheris qualensis cuvier</i>	Reef
<b>Beru</b>	Bridled beauty	<i>Labroides dimidiatus</i>	Reef
<b>Bibi</b>	Blackside hawkfish	<i>Paracirrikites forstevi</i>	Reef
<b>Boingo</b>	Two spot red snapper	<i>Lutjanus bohar (juvenile)</i>	Reef
<b>Bokaboka</b>	Brown unicornfish	<i>Naso Unicornis</i>	Reef

Local names	English names	Scientific names	Habitat
<b>Bubu</b>	White-barred triggerfish	<i>Balistes aculeatus</i>	Reef
<b>Bubutakataka</b>	Red-lined triggerfish	<i>Balistes undulatus</i>	Reef
<b>Bubutakataka</b>	Vermiculated triggerfish	<i>Aprionodon brevipinna</i>	Reef
<b>Bukibuki</b>	Sergeant major	<i>Abudefduf septemfasciatus</i>	Reef
<b>Bukitaakeiau</b>	Blue-spotted sea perch	<i>Plectropomus leopardus</i>	Reef
<b>Bunii</b>	Diagonal-banded toadfish	<i>Arathron aerostaticus</i>	Reef
<b>Bunii</b>	Narrow-lined toadfish	<i>Arothron immaculatus</i>	Reef
<b>Bureinawa</b>	Violet squirrel fish	<i>Holocentrus violaceus</i>	Reef
<b>Bwaru</b>	Purple rock-cod	<i>Epinephelus flavocaeruleus</i>	Reef
<b>Bwawe</b>	Red margined sea perch	<i>Lutjanus fulvus</i>	Reef
<b>Bwaweina</b>	One-spot sea perch	<i>Lutjanus monstigma</i>	Reef
<b>Bwaweina</b>	Rufous sea perch	<i>Lutjanus rufollneatus</i>	Reef
<b>Bwaweina</b>	Russell's snapper	<i>Lutjanus russelli</i>	Reef
<b>Ibwabwa</b>	Long-nosed bait fish	<i>Platax orbiculatus</i>	Reef
<b>Ibwabwa</b>	Threadfin coralfish	<i>Anisochaetodon auringa</i>	Reef
<b>Ibwabwanrotuma</b>	Pennant coralfish	<i>Henilochus acuminatus</i>	Reef
<b>Ikamatoa</b>	Long-faced emperor	<i>Lethrinus miniatus</i>	Reef
<b>Ikanarina</b>	Black-spotted swallowtail	<i>Trachinotus bailloni</i>	Reef
<b>Ikanenea</b>	Castoroil fish	<i>Ruvettus pretiosus</i>	Reef
<b>Ikanibong</b>	Humpback red snapper	<i>Lutjanus gibbus</i>	Reef
<b>Imnai</b>	Rabbit faced spinefoot	<i>Siganus rostratus</i>	Reef
<b>Inai</b>	Blue-barred orange parrot-fish	<i>Callyodon ghobban</i>	Reef
<b>Ingo</b>	Mangrove red snapper	<i>Lutjanus argentimaculatus</i>	Reef
<b>Inonikai</b>	Rudderfish	<i>Kyphosus cinearescens</i>	Reef
<b>Kairoroo</b>	Leopard moray	<i>Cymnothorax flavimarginatus</i>	Reef
<b>Kekerikaki</b>	Smooth flutemouth	<i>Fistularia petimba</i>	Reef
<b>Kiari</b>	Brown-lined wrasse	<i>Cymolutes lecluse</i>	Reef
<b>Koinawa</b>	Convict surgeon fish	<i>Acanthulus triostegus</i>	Reef
<b>Kuau</b>	Honeycomb rock-cod	<i>Epinephelus merra</i>	Reef

Local names	English names	Scientific names	Habitat
<b>Kungskung (mon)</b>	Black-tip soldierfish	<i>Myripristis kuntee</i>	Reef
<b>Maii</b>	Stingray	<i>Himantura sp.</i>	Reef
<b>Mako</b>	Ring-tail surgeonfish	<i>Acanthurus xanthopterus</i>	Reef
<b>Maoko</b>	Reticulated emperor	<i>Lethrinus reticulatus</i>	Reef
<b>Matakore</b>	Humpnose large-eyed bream	<i>Monotaxis grandoculis</i>	Reef
<b>Mawa</b>	Gold-saddle goatfish	<i>Parupeneus barberinus</i>	Reef
<b>Mawa</b>	Salmonet	<i>Parupeneus cyclotomus</i>	Reef
<b>Montaibakoa</b>	Lunar-tailed bullseye	<i>Priacanthus cruentatus</i>	Reef
<b>Morikoi</b>	Spangled emperor	<i>Lethrinus nebulosus</i>	Reef
<b>Mwake</b>	Needlefish	<i>Platybelone argalus</i>	Reef
<b>Neeia</b>	Striped large-eye bream	<i>Gnathodentex aurolinatus</i>	Reef
<b>Nimako</b>	Flag-tailed rock-cod	<i>Cephalopholis urodelus</i>	Reef
<b>Nimanang</b>	Peacock rock-cod	<i>Cephalopholis argus</i>	Reef
<b>Nimaninaba</b>	Arabian pike-eel	<i>Muraenesox cinereus</i>	Reef
<b>Nnewe</b>	Lobster	<i>Panulirus lobster</i>	Reef
<b>Nou</b>	Reef stonefish	<i>Synanceia verrucosus</i>	Reef
<b>Nrekereke</b>	Blue-spotted rock-cod	<i>Cephalopholis cyanostigma</i>	Reef
<b>Ntarema</b>	Gobies	<i>Gobiidae spp.</i>	Reef
<b>Nuonuo</b>	Brown triggerfish	<i>Balistes fuscus</i>	Reef
<b>Okaoka</b>	Orange-striped emperor	<i>Lethrinus obsoletus</i>	Reef
<b>Ouru</b>	Blue-barred orange parrot-fish	<i>Callyodon ghobban</i>	Reef
<b>Riba</b>	White tail surgeonfish	<i>Acanthurus gahhm</i>	Reef
<b>Rou (Taabou)</b>	Long-nose emperor	<i>Lethrinus miniatus</i>	Reef
<b>Roubaneawa</b>	Variiegated emperor	<i>Lethrinus variegatus</i>	Reef
<b>Taa</b>	Scarlet squirrelfish	<i>Holocentrus spinifer</i>	Reef
<b>Takabe</b>	Big-eye snapper	<i>Lutjanus lincolatus</i>	Reef
<b>Takabe</b>	Blue-lined sea perch	<i>Lutjanus kasmira</i>	Reef
<b>Takabe</b>	Yellow-streaked sea perch	<i>Lutjanus janthinopterus</i>	Reef
<b>Taritari</b>	Remora	<i>Echeneis naucrates</i>	Reef

Local names	English names	Scientific names	Habitat
<b>Tebakati</b>	Brown-marbled grouper	<i>Epinephelus fuscoguttatus</i>	Reef
<b>Tibetibe</b>	Long-nose trevally	<i>Carrangoides chrysophrys</i>	Reef
<b>Toaaua</b>	Cowfish	<i>Lactoria cornuta</i>	Reef
<b>Uningaabo</b>	Variiegated lizardfish	<i>Synodus variegatus</i>	Reef



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This publication should be cited as: Delisle A, Namakin B, Uriam T, Campbell B and Hanich Q. 2016. Participatory diagnosis of coastal fisheries for North Tarawa and Butaritari island communities in the Republic of Kiribati. Penang, Malaysia: WorldFish. Program Report: 2016-24.

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