

# Piloting a community-driven catch monitoring approach in Kiribati

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## Introduction

The people of Kiribati depend heavily on marine resources for nutrition and livelihoods. Due to the scarce availability of land, fish is the main source of animal protein, and coastal fisheries are the main provider of fish for local consumption. Because the society is now driven by a cash economy, over-fishing is increasing along with the use of destructive fishing gear and methods. Such practices are causing a rapid decline of fisheries resources and, therefore, management is needed to sustain these resources. The Community-Based Fisheries Management (CBFM) Project of Kiribati's Ministry of Fisheries and Marine Resources Development (MFMRD) works collaboratively with communities to sustainably manage their coastal fisheries. Many of the communities interested in the CBFM approach have developed their own village management plan, which requires implementation, monitoring and evaluation to assist with reviewing and adapting rules, if necessary.

In 2019, a new tool for collecting catch data was introduced to five CBFM communities: Kuuma and Tanimaiaki in Butaritari, Ribono in Abaiang, Tabonibara in North Tarawa and Autukia in Nonouti. This community-based catch monitoring approach was developed in partnership with MFMRD as part of the Pathways Project (Andrew et al. 2020; Sami et al. 2020). This catch monitoring approach differs from more traditional methods because it is optimised for supporting CBFM. Instead of collecting catch data to inform stock assessment models, or to inform government decisions, the community-based catch monitoring approach collects data specifically to inform community management plans. Sampling methods were also designed to facilitate local participation, and allow closer engagement between the communities and the CBFM team, building those relationships that strengthen CBFM.

This article details the piloting of the community-driven catch monitoring approach in Kiribati, how this tool was used, where in Kiribati this tool has been used, and some of the data collected from the target villages during our first trip using this approach. We will also share our experiences, lessons learned, and challenges encountered while using this approach, and discuss any limitations as well as ways forward in improving its usefulness for CBFM.

## Methodology

### Training

Before any field work was conducted, catch monitors were trained in how to collect data using the catch and fishing context survey forms, and how to take useable catch photos using a camera or tablet and custom-printed catch mats (a vinyl mat with 10 x 10-cm squares printed on it). A map of one community's coastal fishing area was also used to teach catch monitors how to plot each fisher's fishing grounds. The training was delivered by CBFM officers and the project assistant coordinator from the University of Wollongong in Australia, and was conducted over two sessions: one session dedicated to theory, and one dedicated to practical skills. Refreshers were also conducted by the catch monitoring coordinator in Kiribati before each data collection round.

### *In the community: Briefing sessions*

Upon arriving at the village for the first time, the CBFM team raises awareness about the catch monitoring programme and focuses on clarifying the methodology, the collection of information from villagers, and the return of results. During our initial round of catch monitoring, we explained the concept and background of the catch monitoring programme and the links of the catch monitoring activity with the village management plan, and gave villagers an understanding of how the data would be collected, the types of data to be collected, and the schedule of the catch monitoring programme. The content of the village briefings changed in subsequent rounds, and briefing sessions were used to clarify results and discuss the evidence behind the findings from previous rounds of catch monitoring. Awareness briefings are always delivered to a different audience of women, men and youth in order to encourage questions and participation of all target groups during the data collection period.

### *Data collection*

Data collection occurs over a two-week period, during which the catch monitors stay in the village being surveyed. Within that period, catch monitors walk around the village looking for any village members who are fishing, or returning from fishing (Fig. 1). Catch monitors also ask household

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Figure 1. Returning fishers who could be interviewed. (image: © Toaiti Vanguna, MFMRD)

members if anyone in their family is planning to go fishing or have gone fishing that day to ensure the catch monitoring team would be present and ready when fishers returned.

Catch monitors interview fishers using the fishing context and catch survey forms. The quantitative catch survey is similar to a creel survey, where the catch (fish or invertebrate) is photographed but measured later when processing the photos. This survey was conducted each time a fisher or gleaner returned from fishing. The catch survey principally collects information about: 1) how the community's fisheries resources are used over the two-week sampling period; 2) the kinds of fishing gear used; 3) which of those gear types are used most often; 4) which habitats fishers and gleaners favour; 5) which habitats experience the most fishing pressure; and 6) which fish and invertebrate species are most heavily targeted.

The fishing context survey, on the other hand, was conducted only once for each interviewee during the two-week sampling period. This survey collects longer range data, and is conducted with as many fishers and gleaners as possible, even those who did not fish or glean over the two-week sampling period. This survey collects information that helps gauge: 1) the seasonality of catches; 2) whether there are habitats that need to be protected; 3) whether fishing and/or gleaning has become harder or easier over time; and 4) levels of knowledge of, and compliance with, each community's management plan.

If the first time a fisher or gleaner was encountered during the two-week sampling period when he or she was returning from fishing or gleaning, the two surveys were usually conducted at the same time. However, in instances where the fisher or gleaner was too tired, an appointment was made to conduct the fishing context survey either later that day or the next day (Fig. 2).

Photos of fishers' and gleaners' catches were photographed each time a catch survey was conducted. Taking a catch photo involved laying the catch out on the catch mat with a 10 x 10-cm grid printed on it, and taking a photo from directly overhead. Care was taken to ensure individual animals did not overlap, and the entirety of each animal was visible in the photograph. This is to allow for the accurate estimation of length of individual specimens after data collection.

Each fisher was also asked to mark their fishing location on a map of their local fishing area, over which a grid was superimposed. The x and y coordinates were recorded, and the mark removed to preserve the anonymity of the fishing location before the next fisher or gleaner was interviewed.

The data gathered using these methods were used to characterise the fishing patterns within each community, and give communities an indication of whether their fisheries management plan needed adjusting, and what the levels of



Figure 2. Conducting a context survey interview. (image: © Toaiti Vanguna, MFMRD)



compliance are with the management plan.

### Data analysis

Among others, the data collected was used to answer the following questions:

- Who are the fishers/collectors in the community?
- Where are people fishing/gleaning?
- Are certain demographics within the community more likely to be affected by certain management interventions?
- What kinds of animals are people catching?
- How big are those animals (length and weight)?
- Which animals make up the largest proportion of a community's catch?
- Are the populations of those animals in a healthy state, or are some management interventions required?
- Is there any suggestion that existing management interventions are having an effect on the sustainability of the fisheries?
- What are some trends that community members have noticed that might require management interventions?

Responses to these questions allowed us to characterise each community's fishery and help community members decide how their coastal fisheries should best be managed. The data collected during the first round of monitoring have begun to paint a picture of diversity between the fisheries of the five communities visited (Table 1). We see differences in the diversity of the catch compositions, the number of fish harvested during the survey period, and the species that comprise the greatest weight of the catch. However, there are also similarities – in all communities, the greatest proportion of the catch was caught either from the lagoon, or from the reef flat adjacent to it.

Our data also revealed the importance of invertebrates to communities. Among the catch photos collected from Autukia in Nonouti, 75 photos consisted entirely of invertebrates (some catches numbered in the hundreds of individuals), and only 29 photos contained fish.

## Community engagement

Involving community members in the catch monitoring programme proved advantageous in several ways. Asking community members to help catch monitors arrange the catch on the mat (Fig. 3), helped our catch monitors photograph the catch more quickly, and each fisher was allowed to move on sooner. This improved efficiency meant that catch monitors did not miss as many fishers when multiple fishers were unloading their catch at the landing point at the same time. The



Figure 3. Community members help to lay out the catch of their family members before preparing the meal. (image: © Toaiti Vanguna, MFMRD)

recruited community members also helped catch monitors schedule survey appointments with fishers later on.

As fishers were surveyed more frequently, they also became increasingly aware of local regulations (e.g. bans on gill nets with small mesh sizes, and size limits for certain fish species).

In subsequent visits, the team presented the results of each catch monitoring trip to the communities of Kuuma and Tanimaiaki in Butaritari, Ribono in Abaiang, Tabonibara in North Tarawa and Autukia in Nonouti (Table 1) to give a bit of understanding to what sort of data were collected, and how the information can help the village make collective decisions to secure their resources and adapt the rules of their community management plan if needed. Presentations were prepared to address major findings, including common fish species, fish size length and weight, and village awareness of and perceived compliance with the management plan. These results were presented in graphs and tables to ensure the message was easily understood by the community. This is considered to be one of the important parts of the monitoring programme in which villagers engage with the data and start considering how the information could be used to adapt rules.

Community members found that the information returned to them was useful for informing discussions about how their management plans could be improved. For instance, when the presentations were first given, most villagers became interested in introducing size limits to their fisheries, and began discussing the importance of continuing to raise awareness about local rules so that people can effectively comply. One of the elders from Kuuma mentioned that the sharing of the catch monitoring programme's results

Table 1. A breakdown of catch diversity and abundance across the five sites visited during the pilot phase. NB: instances where habitat type was not recorded are not presented in this table.

	Islands of community sites				
	Autukia	Kuuma	Ribono	Tabonibara	Tanimaiki
No. fish	415	1700	913	838	530
No. families	15	22	22	16	16
No. species	39	95	77	45	47
Three most prevalent families	Mojarras (Gerreidae)	Trevallies (Carangidae)	Tropical emperors (Lethrinidae)	Tropical snappers (Lutjanidae)	Tropical snappers (Lutjanidae)
	Mulletts (Mugilidae)	Tropical emperors (Lethrinidae)	Parrotfish (Scaridae)	Mojarras (Gerreidae)	Goatfish (Mullidae)
	Milkfish (Chanidae)	Tropical snappers (Lutjanidae)	Tropical snappers (Lutjanidae)	Mulletts (Mugilidae)	Tropical emperors (Lethrinidae)
Three most important species by weight	Silver biddy ( <i>Gerres</i> sp.)	Bluefin trevally ( <i>Caranx melampyngus</i> )	Hump-headed Maori wrasse ( <i>Cheilinus undulatus</i> )	Silver biddy ( <i>Gerres</i> sp.)	Roundjaw bonefish ( <i>Albula glossodonta</i> )
	Yellowmargin triggerfish ( <i>Pseudobalistes flavimarginatus</i> )	Orange-striped emperor ( <i>Lethrinus obsoletus</i> )	Pacific longnose parrotfish ( <i>Hipposcarus longiceps</i> )	Mullet ( <i>Mugil</i> sp.)	Rusty jobfish ( <i>Aphareus rutilans</i> )
	Pufferfish ( <i>Arothron</i> sp.)	Pacific longnose parrotfish ( <i>Hipposcarus longiceps</i> )	Orange-striped emperor ( <i>Lethrinus obsoletus</i> )	Orange-striped emperor ( <i>Lethrinus obsoletus</i> )	Yellowfin tuna ( <i>Thunnus albacares</i> )
Most commonly harvested habitats	Lagoon (311 fish)	Lagoon (673 fish)	Reef flat – lagoon side (471 fish)	Lagoon (723 fish)	Lagoon (398 fish)
	Milkfish pond (54 fish)	Reef flat – lagoon side (447 fish)	Lagoon (196 fish)	Reef edge (20 fish)	Reef edge (72 fish)
	Mangroves (21 fish)	Reef flat – ocean side (71 fish)		Reef flat – ocean side (10 fish)	Reef flat – lagoon side (45 fish)
Most common fishing gear used	Gill net, spoon and knives, fishing line and hook	Spear, gill net, fishing line and hook	Gill net, spear, fishing line and hook, spoon and knives	Gill net, spoon and knives, spear, fishing line and hook	Gill net, spoon and knives, spear, fishing line and hook
	Canoe	Canoe	Canoe	Canoe	Canoe and boat

is crucial, because it warned everyone about community rules and regulations:

*“...without this sharing, it would be very difficult for our people to understand their fishing behaviour and whether or not they comply with the regulation.”*

Also, many village members appreciated the feedback because it showed how their fishing behaviours aligned with their village’s management plan. Because most of the monitoring information is related to villages’ management plans,

villagers will use this tool to check and monitor the rules in their management plan. The former chairman of Kuuma Village, stated that “the feedback also encourages and strengthens the relationship of the village with their management plan”.

## Challenges

As with any catch monitoring programme, our initial trip revealed some issues, which will be addressed in subsequent rounds of work.

There were instances where there were too few catch monitors allocated to a village. At times, five or six fishers returned from fishing at the same time, and only two catch monitors were present, and so the catch monitors could only survey two fishers each, and were forced to let the other fishers leave. Asking fishers to wait would not have met with favourable responses because fishers are often tired, and the catch can spoil in the heat as they wait.

Related to the above issue, some fishers chose a specific landing site for all monitoring activities, although most fishers were unable to use that landing site because it was difficult for people living in more remote areas (whether alongside the lagoon or in the bush) to access. The existence of multiple landing sites means more catch monitors will be needed to ensure coverage, even in more remote areas.

Occasionally, fishers feared being approached by catch monitors. These fishers thought that they would be reported if they had caught undersized fish, and sometimes, fishers would lie to the catch monitors, declaring that they had not been fishing or would hide part of their catch. The catch monitors would then need to reassure those fishers that the data collected would not be used against them, but was important for ensuring the success of the community's management plan.

There were also instances where women avoided catch monitors because they did not realise their gleaning activities were relevant to the catch monitoring programme. This situation was mitigated through more intensive engagement with the communities, thus ensuring that women realised that capturing the data from their catches was also extremely important for informing the community's management plans and fisheries management approaches.

Quantifying invertebrate catches is also proving challenging. Invertebrates are often harvested in the hundreds in Kiribati (Fig. 4), making the data management techniques used for fish inappropriate. And, many invertebrates are soft-bodied and removed from their shells upon harvest, making length measurements impractical. Every CBFM plan finalised thus far in Kiribati mentions concerns about the harvesting of invertebrates, and the control of invertebrate harvests features heavily in the management interventions listed within every management plan. In recognition of this, we are working with the Pacific Community (SPC) towards a solution for quantifying invertebrate catches. The gleaning of invertebrates is an extremely important livelihood for women in Kiribati, who can be affected disproportionately when marine protected areas are employed as part of CBFM plans.



Figure 4. Young community members often helped to lay out the catch collected with their mothers. (image: © Toaiti Vanguna, MFMRD)

## Cultural complexity

When conducting a community-driven catch monitoring programme, it is imperative to understand the local culture and the context of the fisheries and fishing activities relative to the community's traditions, norms, beliefs and cultural festivities.

Bivalves in some communities are valued differently than in others. In Ribono on Abaiang Island, where fish is the main source of protein for villagers, those who feed their families bivalves are considered poor fishers, or lazy. Our team experienced instances where fishers refused to be surveyed or have their catch photographed because they were ashamed of their bivalve catches. Conversely, in Autukia on Nonouti Island, our team witnessed a huge preference for bivalves seasonally – catch photos containing invertebrates outnumbered those of fish by more than two-fold. This preference was mainly observed during data collection in December 2019. The team became interested in understanding the large proportion of bivalves being harvested by men, women and youth. Community members explained that in December, villagers prepare for the dance festival and dance competitions during the Christmas season, and it is believed that eating a large quantity of bivalves help with energy during the dance competition.

Our team also encountered instances where an I-Kiribati tradition limited their ability to collect spatial data. In Kiribati, every fisherman secretly has their own *atiibu* or *kabwate* (fishing ground) for different fish species, and these locations can only be shared with family members. In Ribono, this tradition was still strong, and some fishers felt insecure about showing these fishing locations that had been passed down by their forefathers with the catch monitoring team.

Several times, our team also encountered fishers who were uncomfortable about having catch monitors waiting for them to return.



In some communities, there is a belief that a fisher who has someone looking for them or expecting them to return while they are out at sea will experience poor fishing, and could end up with no catch.

## Conclusion

The presented method of community-driven catch monitoring has proven to be more efficient and less time-consuming than traditional methods. The surveys were designed to collect information using tick boxes, simple numerical scales, and short comments from fishers. Fish were measured in-office using catch photos, and weights could be calculated using length-weight relationships supplied by SPC. This measurement tactic is considerably less time-consuming than taking manual measurements in the field using rulers and spring scales, especially for fishers who return with many fish.

The community-driven catch monitoring programme is a very useful tool for characterising the fishing activities of each village. The data give a better insight into what fish are being caught, by count and species, length and size, fishing gear used, and habitats where the fish are harvested from. The programme not only looks at finfish but also captures information on invertebrates, and covers a broad range of information around fishing that are useful for village decision-making, the island council and the MFMRD.

Given the rich information that this catch monitoring programme provides, it should be adopted as one of MFMRD's monitoring tools. The scope of the catch monitoring is different from the creel survey that is currently used because it is village-based and is done over a 14-day period although the content is quite similar. This tool complements existing creel surveys by filling in gaps where existing creel sur-

veys fall short by gathering information about invertebrate catches and gathering data over a two-week period.

Expanding the use of this catch monitoring approach to more than five villages will be quite overwhelming for the CBFM team as it exists. However, some possible avenues to explore for the expansion of this programme could be the training of Fisheries Extension Officers to carry out catch monitoring on their respective islands, and working closely with the Research and Monitoring Unit under the Coastal Fisheries Division, and integrating the community-driven catch monitoring with existing monitoring activities.

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### Acknowledgement for Rutiana Teibaba Kinonou (MFMRD officer)

The CBFM team in Kiribati and the whole Pathways team sincerely acknowledge the contribution of Fisheries Assistant trainee Mrs Rutiana Teibaba Kinonou, who passed away on the 14th of August 2020 of pneumonia. She was 29 years old.

Rutiana was first attached to the CBFM project in late 2015, and later formally recruited as Fisheries Assistant in 2017. As a newly recruited Fisheries Assistant, she spent three years in the office as a trainee before being posted to her island duty station. During her time as a trainee, she accompanied CBFM staff on many community consultations to develop and follow up on management plans. She was also appointed as one of the data enumerators for the catch monitoring. Rutiana was passionate about her work with communities, and was known to be very proactive and committed to all the tasks assigned to her. Her great sense of humour made an impact on everyone around her, especially community members who came to know her during community visits.

Thank you very much our dearest colleague, Mrs Rutiana Teibaba Kinonou and may your soul rest in eternal peace... Gone from our sight but never from our hearts...