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# Not just a passing FAD: Insights from the use of artisanal fish aggregating devices for food security in Kiribati

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# Not just a passing FAD: Insights from the use of artisanal fish aggregating devices for food security in Kiribati

## **Abstract**

Fish are the most important renewable resource in Pacific Island Countries and Territories (PICTs) for food protein, livelihoods, and economic growth (Bell et al., 2009 and Gillett and Cartwright, 2010). Considering food protein benefits alone, subsistence and small-scale commercial (i.e., artisanal) catches of fish account for over half of the total animal protein consumed annually in most PICTs (Bell et al., 2009; Gillett, 2009). The sustainable use and development of coastal Pacific fisheries resources plays an accordingly key role in strategic policy developments around the region (see e.g., Vava'u Declaration, 2007; Apia Policy 2008; Cairns Compact, 2009 and FSPWG., 2010). These same policies often emphasise the protection of domestic food security among their core goals and objectives. While these policies seldom define 'food security' outright, here it is understood to mean the physical, social, and economic access to sufficient and safe food fish for all people, at all times, so that they can lead healthy and active lives (FAO, 1996).

## **Keywords**

aggregating, food, artisanal, devices, insights, kiribati, fad, passing, just, not, fish, security

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# Not just a passing FAD: Insights from the use of artisanal fish aggregating devices for food security in Kiribati



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## 1. Introduction

Fish<sup>1</sup> are the most important renewable resource in Pacific Island Countries and Territories (PICTs) for food protein, livelihoods, and economic growth (Bell et al., 2009; Gillett and Cartwright, 2010). Considering food protein benefits alone, subsistence and small-scale commercial (i.e., artisanal) catches of fish account for over half of the total animal protein consumed annually in most PICTs (Bell et al., 2009; Gillett, 2009). The sustainable use and development of coastal Pacific fisheries resources plays an increasingly key role in strategic policy developments around the region (see e.g., Vava'u Declaration, 2007; Apia Policy 2008; Cairns Compact 2009; FSPWG, 2010). These same policies often emphasise the protection of domestic food security among their core goals and objectives. While these policies seldom define 'food security' outright, here it is understood to mean the physical, social, and economic access to sufficient and safe food fish for all people, at all times, so that they can lead healthy and active lives (FAO, 1996).<sup>2</sup>

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<sup>1</sup> Includes finfish, crustaceans, and molluscs.

<sup>2</sup> Definition adapted from FAO World Food Summit (1996).

Despite the importance of fish to this region, many PICTs are projected to experience food fish insecurity by 2030, meaning that these countries will not have access to sufficient fish supplies to meet their population's per capita requirements for 'good nutrition'<sup>3</sup> (Bell et al., 2009). This projected insecurity is largely driven by domestic trends in population growth, urbanization, and migration combined with current trends in coastal fisheries exploitation and productivity (Newton et al., 2007; Bell et al., 2009; Hoegh-Guldberg et al., 2011; World Bank, 2014).

Even if these projections fall short of predicted outcomes, they highlight a food security risk that heavily food fish-dependant PICTs cannot afford to ignore. The need to proactively diversify food protein sources is clear; however, it is also clear that most PICTs are limited in their practical options for doing so. Constraints to food protein and livelihood<sup>4</sup> diversification in what are primarily Small Island Developing States (SIDS) include limitations to: disposable income; physical geography and natural resources; human and financial resources; physical and institutional infrastructure; and viable markets. However, most PICTs do have abundant oceanic tuna and associated pelagic resources. Making oceanic fish more available and accessible to artisanal fishermen through the use of Fish Aggregating Devices (FADs) has therefore been identified as one of the more immediate and practical means of improving food fish security throughout the region (Bell et al., 2009; Sharp, 2011; Bell et al. 2015a).

Both industrial and artisanal FADs alike have enjoyed a lengthy popularity across the Pacific. Their capacity to increase the quantity and consistency of pelagic fish catches and to decrease vessel search time and some operating costs when compared to open-ocean conditions has been empirically verified over time (Matsumoto et al., 1981; Désurmont and Chapman, 2000; Dempster and Taquet, 2004; Sharp, 2011; SPC, 2012; Sharp 2014). FAD-associated food security and livelihood improvement efforts

<sup>3</sup> The World Health Organization defines 'good nutrition' as 0.7 g of protein/kg body weight/day (WHO, 2015). Using this ratio, Bell et al. (2009) calculate that an average of 35 kg of fish/person/year is needed to provide 50% of PICTs' recommended protein intake.

<sup>4</sup> Defined as the means of securing the necessities of life, the details of which are context-dependant and may vary by individual.

typically focus on the use of artisanal FADs. These offshore, near-shore, and lagoon FADs are sited closer to shore than their industrial counterparts, i.e., within 1500 m from shore (SPC, 2012). Theoretically, this means that artisanal FADs, and the presumably under-utilised fish that they aggregate, are more physically accessible to the artisanal fishermen who supply local households and markets with food fish (Beverly et al., 2012).

Artisanal FADs deployed for over one year have also been shown to increase total catch value and positive returns on investment in some SIDS (Sims, 1988; Detolle et al., 1998; Sharp, 2011, 2014). Additional but empirically-unverified FAD use benefits include a capacity to transfer artisanal fishing effort away from often heavily exploited coastal reef habitats, to provide options for rural economic development and livelihood diversification, and to increase artisanal fisher safety (Beverly et al., 2012; SPC, 2012; Bell et al., 2015b). All of these described benefits have evident implications for the long-term health and well-being of Pacific Islanders. It is therefore not surprising that the deployment of artisanal FADs continues to be so widely and keenly considered by governments and development assistance donors alike. Even so, the enthusiasm for using FADs as a tool to strengthen food security is currently based on little empirical evidence.

In the Pacific, the lack of evidence-based FAD-associated food security benefits may be partly attributable to the data-intensive complexity of determining what it is to be 'food secure' in often data-poor developing countries. Nevertheless, a confirmed ability to aggregate fish and earn fishing income in the short term is an incomplete measure of a FAD's 'success' at helping a country or people be more 'food secure' in the medium-to-long term (Désurmont and Chapman, 2000; Albert et al., 2014). As the prospect grows of more widespread increases to the number of near-shore FADs around the Pacific, ensuring that PICTs are on the path to achieving food security success will rely on more than just improvements to the quantity and quality of quantitative monitoring and evaluation data. To date, few studies have examined the enabling governance conditions that support successful nearshore FAD use for food security purposes in the Pacific (see e.g., some of the analysis in Bell et al., 2015b). Fewer studies investigate the linkages between successful FAD use and awareness, understanding, and appropriate responses to the barriers to FAD benefit delivery. These barriers may have one or more social, economic, environmental, or governance contexts and they may exist at the level of individual deployment, across the whole domestic programme, across the government more broadly, and even regionally.

Having awareness and understanding of these barriers can assist food security decision-makers and practitioners in determining context-relevant, timely, and adaptive responses to food security policy, planning, and management challenges in their country. The aim of this study is therefore to expand the understanding of what some of these barriers to artisanal FAD benefit delivery mean in practice when it comes to meeting policy-based food security objectives. Using a qualitative mixed-methods approach, this study identifies and discusses the governance barriers to nearshore FAD benefit delivery in the Republic of Kiribati, a Pacific island SIDS with approximately 30 years' experience in FAD deployment and a strong reliance on fish for domestic food security and livelihoods (MFMRD, 2014). Governance is described here as the formal and informal structures and processes that influence how power is exercised, responsibilities are allocated, and decisions are made in a multi-level and multi-actor system.

Using this approach, this study assesses Kiribati's current nearshore artisanal FAD information, policy, and practice and asks the following research questions: 1) Is the realization of FAD-associated food security benefits supported to reach its full potential in Kiribati?; 2) What barriers to food security benefit

optimization exist?; and 3) What are some potential responses to addressing these barriers? To answer these questions, we analyse the available information, identify some barriers, and discuss their implications for FAD benefit delivery. Building on these insights, we then propose some precautionary policy responses that can better inform PICT decision-makers and practitioners of the challenges and potential ways forward for using artisanal FADs to more effectively meet food security goals.

## 2. The status of nearshore artisanal FAD use in Kiribati

### 2.1. Study site and context

Kiribati's population of 103,000 continues to grow at an average annual rate of 1.5% per year (KNSO, 2012; World Bank, 2014). Around half of the population is concentrated into the urban centre of South Tarawa at a density of more than 3000 people per square kilometre (KNSO, 2012). This has placed significant exploitation pressure on Tarawa Island's immediate coastal marine environment (MFMRD, 2013). This pressure is expected to increase in the face of static coastal reef fisheries production and projected future climate-driven declines in reef productivity (Newton et al., 2007; Bell et al., 2009; Hoegh-Guldberg et al., 2011; Pratchett et al., 2011).

Kiribati is a remote and dispersed group of predominantly rural islands with a largely subsistence-based and cash-limited economy. Combined with a limited land area for agricultural development and a limited practical scope for increasing food imports, the solution to Kiribati's looming food security problem lies in its oceans. Kiribati as a whole is expected to meet total domestic food fish consumption demands to 2030 and beyond (Bell et al., 2009). However, as Tarawa Island's coastal fisheries resource base becomes less reliable and its human population grows, supplying sufficient quantities of fish to its population centre may become a significant challenge (Bell et al., 2009).

As the leading agency responsible for fisheries management in Kiribati, the Ministry of Fisheries and Marine Resource Development (MFMRD) is acutely aware of these challenges. The MFMRD, and the Government of Kiribati more broadly, have identified artisanal FAD deployments as a short-term priority strategic action for addressing Kiribati's food security and livelihood objectives in the National Fisheries Policy (MFMRD, 2013).

The next section builds on the social and environmental context provided above and gives an overview of the current status, policy, and practice of Kiribati's artisanal FAD programme. Kiribati's near-absence of quantitative coastal fisheries data and the considerable time, cost, and logistical challenges of robustly remedying this issue lend a practical dimension to the analysis methodology, which combines information gathered from semi-structured interviews of MFMRD members and regional scientists engaged in local projects with an analysis of Kiribati's limited policy and practice literature. In the absence of more detailed data from which to inform action, such an approach can provide government decision-makers with a rapid appraisal of how FAD policy and practice may be performing against desired outcomes. This 'best available information' can also highlight areas of concern for which adaptive responses may be discussed and implemented in order to strengthen the likelihood of achieving policy goals. Interviews covered a range of topics, including programme history, current management practices, operational capacity and support, available statistics, and deployment details.

### 2.2. Artisanal FAD programme status

The history of artisanal anchored nearshore FADs (hereafter 'FADs') in Kiribati goes back to at least the 1980s (MFMRD, 2014).

Most populated islands in the Gilbert and Line Island chains deployed FADs in the 1980s and '90s; however, a lack of documentation, information archiving, and knowledge transfer prevents a more in-depth analysis of past deployments (MFMRD, 2014). As of early 2015, 21 FADs are reported as 'active' across 13 Gilbert Islands (MFMRD, 2014). This is out of 58 recorded deployments since mid-2010. However, deployment record-keeping is not always complete, timely, or consistently housed in a central data repository.

The current FAD programme is overseen from Tarawa by the Fishing Development Unit in the Coastal Fisheries Division of the MFMRD. The "FAD team" is used for physical deployment and repairs and has 3 non-dedicated members including a supervising Master Fisherman who is also responsible for training (MFMRD, 2014). Due to recent cost cuts this is fewer people than in previous years (MFMRD, 2014). The team routinely tours for a month or more throughout rural and remote 'outer' islands to deploy and repair FADs and consult with community representatives. Due to the time, cost, and logistics of dispatching staff, MFMRD tries to get assurances of manpower support from communities. Visit plans are heavily dependent on the inter-island ferry schedule.

The Indian Ocean-style design of Kiribati's FADs (see e.g., Beverly et al., 2012) has changed little over time; however, FAD materials are now more often locally-sourced to reduce cost and transport challenges (MFMRD, 2014). MFMRD continues to work towards reducing the material costs of deployment, which are currently around AUD\$2000 per FAD (MFMRD, 2014). FADs may also be submerged to address problems with vandalism (MFMRD, 2014). FADs are deployed following a consistent process and with regular support from the Secretariat of the Pacific Community (SPC). However, there are no operational manuals, written procedural guidelines, or broader management plans from which the team directly operates (MFMRD, 2014). MFMRD plans to partly address this by developing an Inshore FAD Management Plan.

Financial support for FAD deployments comes from a mix of recurrent and discretionary funding from a range of external aid donors (MFMRD, 2014). MFMRD deploy FADs in communities at the direction of Parliament, who are informed by local Island Councils and local Members of Parliament at the request of village communities. MFMRD generally try to apply a 'two FADs per island' policy for budgetary and "fairness" reason, except in highly-populated urban South Tarawa where five FADs have been deployed (MFMRD, 2014).

MFMRD undertakes community consultations prior to deployment; however, the extent of consultation across a given village or group of villages is not documented and it is acknowledged that consultations could be wider (MFMRD, 2014). As part of the consultation, deployment information is disseminated indirectly through radio announcements as well as directly to key community members and fishing co-operatives (MFMRD, 2014). At least some consultation occurs with Island Councils and local fishermen to select FAD deployment locations; however, deployment sites are often later changed through "trial-and-error" to find more productive locations (MFMRD, 2014). Workshops are also sometimes held to teach community members how to deploy and make basic repairs to FADs, and MFMRD is taking steps to increase community self-sufficiency in this regard (MFMRD, 2014).

Despite consultation efforts and a growing community awareness of FADs and their potential benefits, FAD vandalism and related community conflicts are not uncommon (MFMRD, 2014). The length of deployment (i.e., from a few months up to 5 years) is understood to be strongly influenced by these issues (MFMRD, 2014). Some of this conflict is attributed to either perceived or real FAD access inequities both within and between communities (MFMRD, 2014). MFMRD does not currently conduct community consultations to address FAD-related conflicts.

Resolving FAD-related conflicts through current centralised and top-down compliance and enforcement mechanisms is difficult due to the absence of guidelines, regulations, bylaws or legislation governing artisanal FAD use in Kiribati (MFMRD, 2014). When it comes to coastal fisheries management issues, the current structure and level of communication and coordination between Ministries, as well as between Ministries and sub-national Island Councils, do not readily support more co-managed conflict resolution approaches.

Despite the relatively lengthy history of FAD use in Kiribati, few data on FAD deployment and performance (i.e., biological, economic, social) exist. No monitoring and evaluation data are currently consistently collected by MFMRD other than physical deployment characteristics (e.g., location, type, depth), procedural trip reports, and occasional anecdotes of biological productivity from extension staff and community members. Data loss is common when collection does occur (MFMRD, 2014). As such, the government's current metrics of FAD 'success' are limited to anecdotal reports of individual FAD fishing productivity and unverified increases in community deployment requests (MFMRD, 2014). As part of its recent strengthened focus on coastal fisheries, MFMRD are working to address this lack of data and have begun to enter deployment locations and associated data into a central database with the support of the SPC (MFMRD, 2014; D Brogan, personal communication).

### 3. Barriers to benefit optimisation and implications for food security

The need to be proactive on critical issues like domestic food security in the absence of key data and supporting resources is not unique to Kiribati or even Pacific SIDS. Nevertheless, these limitations do not preclude the benefits of planning for the future with the best available information. As Kiribati considers expanding its artisanal FAD programme to meet projected food security shortfalls, is current policy and practice allowing for existing FADs to reach their full potential or are strategic changes required?

Analysis of available quantitative information yields few insights into the realization of nearshore FAD benefits in Kiribati. From a policy and practice perspective, however, even without this supporting information two identified issues indicate that strategic policy changes are likely necessary in order for FADs to more effectively support Kiribati's food security objectives. A reported FAD loss of greater than 60% in less than five years provides one indication that FAD-associated food security benefits are likely under-realized using current approaches. Another issue is the evidence of a number of barriers to FAD benefit delivery in current policy and practice. The five thematic barriers identified in the following section are: strategic information; communication and coordination; programme capacity; funding and other external support; and development frameworks. These barriers are presented here in an integrated governance context rather than as individual social, economic and other components. Some of these same barriers and their constituent elements are identified as challenges at a broader Pacific level (Désurmont and Chapman, 2000; Madden, 2014; Bell et al., 2015b).

#### 3.1. Strategic information barriers

Not enough data and information currently exist, or are being documented, archived, and shared to be able to conclusively tell whether any nearshore FADs are delivering the benefits that support national food security goals in Kiribati. This lack of critical assessment information means that it is also very difficult for MFMRD and regional scientists to determine whether FAD benefits

are outweighing their costs at either an individual or broader programme scale. For example, it is currently unclear whether:

- More food fish are being caught with FADs than under open-water conditions, on a more consistent basis;
- More fish and/or money from fish sales are consistently and equitably accessible to previously access-limited communities, families, and individuals;
- More food fish is being consumed by the people most in need, and these people are healthier as a result;
- Additional household income is being freed up by the operational savings of fishing on FADs (e.g., fuel) and is being used to purchase food;
- Fishing pressure on vulnerable reef habitats is being reduced; and,
- Deployment activities are not spending more human and financial resources than the next best food security alternative.

This lack of key information for decision-making makes it difficult to strategically plan and adapt the FAD programme to continue to meet medium-to-long term food fish security commitments and to avoid potential negative impacts. Insufficient FAD monitoring and evaluation information can also undermine proposals for more sustained external funding support. In a world where ‘what you can’t count, doesn’t count’, Kiribati’s inability to empirically demonstrate that their artisanal FADs work in practice, and are an accordingly valuable tool in their food security toolbox, means that requests for external financial support may not be seen as a top priority by development assistance donors.

### 3.2. Communication and coordination barriers

Tied into information-driven barriers are barriers that arise from insufficient or ineffective communication, cooperation, and sharing of responsibility across national, sub-national, and community levels of decision-making. The success of FAD deployments and of the artisanal FAD programme on the whole has nation-wide and inter-generational food security ramifications for Kiribati. Despite this, FAD deployments are currently treated as isolated coastal fisheries management interventions rather than as part of a more integrated national food security strategy. The additional lack of national regulatory and legislative support for artisanal FAD use in Kiribati has created a situation where there are no overarching policies to clarify the roles, responsibility, and ownership of FADs in the broader national food security context.

The absence of such higher-level guidance and coordination may be contributing to the community-level conflicts that are currently affecting the physical performance and accessibility of some nearshore FADs in Kiribati. MFMRD clearly recognises the importance of community engagement for successful deployments and dedicates significant resources and energy to consultations. However, the remaining conflicts and lack of clarity over their root cause indicate that further work is likely required to sufficiently engage with Island Councils and communities.

### 3.3. Programme capacity

As a developing country with limited financial, human, institutional and infrastructure resources, Kiribati is poised to invest considerably more into its proposed FAD programme expansion. Even supported by external organisations such as the SPC this proposed expansion, with its ‘deployment-centric’ focus, has the potential to spread the already busy MFMRD even thinner. Supportive alternative management models like decentralized community-based resource management (CBRM) are still relatively

new concepts in Kiribati; government/community co-management relationships are not at a point where communities can take on more of the responsibility of deploying and maintaining FADs themselves.

Without securing additional resources, an increase in FAD deployments risks becoming a situation of ‘quantity over quality’. This approach could negatively affect medium to long-term food security benefit delivery in a few ways. First, a focus on deploying new FADs in new locations rather than on maximising the benefits of existing FADs could detract from ‘getting it right’ in priority areas. These areas include the urban centre of Tarawa, a food security ‘hotspot’ where existing FAD benefits remain unclear, and islands with limited lagoon and reef areas (e.g., Arorae), where FADs are relied upon to increase the local availability of coastal fish for communities.

Second, the planned FAD programme expansion risks taking attention and resources away from other coastal fisheries activities that might also be able to provide livelihood benefits to some rural communities, e.g., aquaculture. Third, as the number of deployment locations increases, so will the strain on MFMRD’s capacity to devote sufficient resources to effort-intensive but critical community engagement activities. Under current staffing levels and with the current consultation approach it is plausible to conclude that a decline in community consultation capacity could lead to an increase in FAD-related community conflict. Although the national context may differ, Albert et al. (2014) note that community engagement is a key factor in sustaining the positive contribution of artisanal FADs to rural livelihoods in the Solomon Islands. This focus on programme expansion, combined with a limited programme and co-management capacity, runs the real risk of creating a FAD programme that is not sustainable enough to meet its food security objectives.

### 3.4. Funding and other external support

Another barrier to FAD benefit delivery is the way in which some FAD funding and external support is delivered. As previously noted, the success of FADs, particularly in regard to food security, is about more than just deployment. Nevertheless, much of the external and internal focus on developing Kiribati’s artisanal FAD programme remains focused on just that. There is minimal consideration given to critical support systems, e.g.,: functional statistical systems; sufficient trained personnel; strategic planning and community consultation processes; regulatory systems; and clarifications of rights and tenure. This implicitly encourages a quantity over quality mindset and frames FADs as an ‘end to’ rather than a ‘means of’ addressing food security within a broader context.

The inconsistent nature of current funding models also has the potential to encourage a mentality whereby countries and/or communities are compelled to grab at a development opportunity without giving time to consider the merits or practicality of the opportunity in context. Supporting external agencies may find it difficult to justify a funding increase to a development project for which the benefits are unclear; however, by not treating FAD deployments as one aspect of a programme within a broader integrated food security delivery system, these organizations are contributing to many of the same barriers to strategic information delivery discussed in Section 3.1.

### 3.5. Development frameworks

The last barrier to FAD benefit delivery discussed here addresses the broader treatment of development assistance initiatives like FADs, not just in Kiribati but in the Pacific more broadly. In international development, the perhaps noble ambition to make

'everything better' as quickly, easily, and for as many people as possible has often led to scope over-selling and a scaling-out of insufficiently field-tested and context-relevant assistance plans (Hobbes, 2014). In treating complex social, economic, and environmental problems as though they have a short-term, discrete, and 'silver bullet' solution, development assistance initiatives do themselves, and the broader development framework, a disservice by not being more forthcoming about the trade-offs, risks, and unknowns of trying to deliver a certain suite of benefits using a specific tool and within a certain time-frame.

As a fisheries management tool, FADs have been shown to have much to offer some countries in some contexts. However, their benefits are far from guaranteed. In the apparent rush to deliver visible and positive results within relatively short funding time-frames, the allocation of project resources in Kiribati appears to be front-loaded to deployment activities. This leaves too few resources for the longer-term monitoring, evaluation, and adaptation processes that are essential to determining whether development objectives are actually being met, or whether or not there might be better ways of meeting them. This also does little to integrate FADs within a broader national 'toolbox' to address development, livelihoods, and food security in context. Albert et al. (2014) note that this integration is critical for a more equitable and effective delivery of FAD benefits in context.

#### 4. Precautionary responses to FAD use opportunities and challenges in Kiribati

In discussing the barriers and implications above, this paper does not suggest that nearshore FADs 'do not work' in Kiribati. It also does not claim that FADs should not be used to help make Kiribati more food secure. What it emphasizes, however, is that barriers to food security benefit delivery and maximization exist and that much more can be done to support the successful use of FADs in this regard. It also indicates that it may be prudent to scale back expectations on what artisanal FADs can realistically deliver in Kiribati's context, and that concrete steps can be taken to address the identified issues.

The following section proposes four policy responses that government decision-makers and implementing agencies in SIDS like Kiribati might consider when addressing the kinds of barriers identified above. To the credit of MFMRD, fisheries officials in Kiribati are already beginning to discuss or implement some of the policy responses proposed below.

##### 4.1. Strengthen communication, cooperation, and coordination across all levels of fisheries governance - particularly between government and communities

While hardly revealing, this statement nevertheless bears repeating as these '3 C's' (i.e., communication, cooperation, and coordination) continue to under-perform across Kiribati's top-down coastal fisheries governance framework. Performance could be improved by focussing on three key areas:

- Improving the flow of 'basic' information (e.g., who, what, where, when, why, how) through the various layers of decision-making – i.e., from Parliament through to, and between, Ministries and on to community leaders and individuals.
- Committing more FAD protocols, plans, regulations, and legislation to paper, passing these, and then implementing under more co-managed arrangements with communities.
- Strengthening cross-government support for compliance and enforcement activities related to artisanal FAD use, including at the sub-national Island Council level.

At the government level, efforts to promote greater Ministerial integration and capacity for cross-cutting natural resource use and planning issues need to be supported and furthered if the benefits of FADs and other natural resource management tools are to be better understood and optimised going forward. This includes improving the availability and accessibility of reference documents and standard operating procedures that clarify the roles and responsibilities of all stakeholders when it comes to deploying, maintaining, and sustaining FADs.

At the community level, efforts to engage effective compliance over the proper use and maintenance of FADs must go beyond the prescriptive. MFMRD and coordinating ministries need to engage communities in a way that promotes inclusive ownership and understanding about artisanal FADs and the community and nationwide benefits they can bring. Madden (2014) also finds that FAD-associated community conflict in the Pacific is 'limiting' to near-shore FAD programmes and suggests that this must be overcome with stronger communication and community engagement.

The remaining community-level conflicts indicate that more remains to be done to improve community engagement and ownership over FAD-related activities. However, Kiribati has its own examples of where the community co-management of FADs has positively contributed to the operational success of deployed FADs: the Southern Gilbert Island of Arorae routinely has lengthy FAD deployments of up to 5 years. MFMRD attributes this achievement to an island-wide mindset of cooperative, responsible and self-policing community stewardship (MFMRD, 2014). This also provides a good example of where greater communication would be of benefit to the broader success of FADs: MFMRD's analysis of the reasons for FAD success on Arorae, and therefore perhaps on other islands, has the potential to be greatly enriched by engaging in two-way consultations with the island's communities.

##### 4.2. Support and strengthen data collection, analysis, monitoring, and information sharing and management capacity through targeted training and education

Reliable assessments of food 'security' need to include not only FAD and non-FAD catch and effort sampling, but also a host of socioeconomic household survey and associated habitat sampling data (Albert et al., 2014; Bell et al., 2015b). Addressing these gaps in information will require additional time and resources, and is something on which donor and technical support could consider putting greater emphasis. Some suggestions for additional support are listed here:

- i) Create and sustain additional human resources support for artisanal FAD/non-FAD fisheries data collection, archiving, information transfer and maintenance.
  - a. This needs to occur in centralized databases with reliable backups and responsible handover protocols.
- ii) Increase monitoring and evaluation capacity. This may include:
  - a. Continued support for FAD-disaggregated artisanal catch sampling data collection like the SPC TUFMAN database;
  - b. Support for data analysis skills development for MFMRD staff;
  - c. Support for community-based data collection trials; and
  - d. Support for market and household surveys to better understand food fish supply and demand trends, 'supply chain' flows and delivery of food fish benefits into households;

- iii) Strengthen two-way government-community information and education activities. Supporting activities could:
  - a. Develop more effective ways to inform communities about FADs and their maintenance.
  - b. Foster more co-management-style relationships that increase the sense of community ownership, skill, and participation in FAD use decision making.
  - c. Evaluate the spread and effectiveness of messaging and information transfer through community follow-up interviews or surveys.
- iv) Hold workshops that help develop targeted solutions to coastal fisheries data collection challenges specific to Kiribati, which include dispersed communities, few dedicated fisheries landing sites, and limited staff (MFMRD, 2014).
  - a. For example: is it possible to create a gear rebate scheme in exchange for completed artisanal fishing log-books? Is it feasible to set up community-based data collection hubs that could support the MFMRD's data collection activities?

By committing to the recent Cairns Compact on Strengthening Development Coordination, Pacific leaders have recognized that monitoring and evaluation activities need to play a stronger role in the more effective utilization of development resources (Cairns Compact, 2009). FADs are no exception; PICTs like Niue, Cook Islands, and Federated States of Micronesia are now capable of quantitatively demonstrating that nearshore FAD use can yield some positive livelihood benefits (Sharp, 2011, 2014). While their national resource use contexts are sufficiently different to Kiribati's that it would not be wise to draw strong comparisons, these developing PICTs have shown that placing a higher priority on establishing and maintaining more robust data systems is feasible and that it can lead to more robust decision-making capacity.

#### 4.3. Consider how to make operational cost models for FAD activities more self-sustaining

Madden (2014) note that financial challenges are a key theme in their review of nearshore FAD literature in the Pacific. Individual FADs and the broader FAD programme need to last long enough into the future to meet food security objectives, which means that their funding needs to as well. Current funding models need to better reflect these longer-term planning horizons. They also need to better absorb the financial uncertainty of external funding streams. One way in which some of this financial uncertainty might be addressed is to explore the viability of FAD cost-recovery initiatives. Full cost recoveries are not practical for Kiribati, where incomes are low and additional or alternative budget allocations are limited. However, finding partial cost recoveries could not only help sustain the project in leaner times, correctly designed they could also create financial incentives for communities to take better care of the FADs deployed near them. In the Caribbean islands where artisanal FAD use is also common, some countries have implemented a FAD use fee to encourage compliance and responsible use or are considering small fuel levies to help recover some FAD maintenance costs (CRFM, 2013). However, compliance and enforcement efforts in these islands remain mixed.

In Kiribati, some cost savings could be found by constructing FADs with local materials that communities can more easily build and repair themselves. MFMRD is currently exploring cost-saving and revenue-generating options for FADs and other coastal fisheries activities, including using more local materials and exploring the possibility of licencing coastal fisheries exports (MFMRD, 2014). These efforts could be assisted by seeking out positive lessons

learnt through similar activities in neighbouring Pacific islands, such as Vanuatu (Amos et al., 2014). Other partial cost-recovery options could consider a community cost-share through a FAD use licence or through a small 'rental' levy in fisheries cooperative fees in communities that are expected to benefit from the use of FADs deployed near them. However, this would require a compliance and enforcement commitment at both the MFMRD and community level.

#### 4.4. Donors and technical support providers need to reconsider their current metrics of success for FAD deployments, and for domestic FAD programmes on the whole

If improving domestic food security and alleviating coastal marine environmental pressures are key objectives of domestic FAD deployments in general, then the act of deployment alone cannot be viewed as a sufficient single metric of 'success'. Deploying a FAD does not automatically equate to more food fish on the table and fewer vulnerable habitats with unsustainable fishing pressure. Both qualitative and quantitative indicators can contribute to a more holistic valuation of FAD 'success'. Examples of additional metrics of success could include: community perceptions of FAD use, catch-based measures of FAD/non-FAD productivity, socio-economic measures of FAD benefit distribution at the household and community level, and pre and post-deployment reef habitat assessments.

## 5. Conclusion

Artisanal FADs have been deployed around the Pacific for decades to address a range of fisheries management interests. Their practical and tangible appeal ensures their longevity as a management tool in the region for years to come. The more recent focus on using FADs as a solution to growing food security concerns means that some PICTs, like Kiribati, are considering expanding their existing programme without a clear understanding of the benefits and costs accrued under current efforts. In Kiribati, the absence of critical assessment information means that there are no clear and measurable indicators of nearshore FAD use leading to improved food security. Moreover, supporting policy and practice point to the existence of governance barriers to FAD benefit delivery – an indication that current FAD-associated domestic food security benefits are likely under-realized. This uncertainty means that a potentially food insecure developing country is expending valuable and limited resources on an outcome that may not be increasing resilience for the future as planned.

Tackling an issue as complex as food security is a long-term commitment that needs consistent and dedicated champions in donor agencies, in government, and in communities to see efforts through over time. Kiribati has indicated that artisanal FADs are to be part of their national food security solution; more needs to be done to integrate FADs into a broader regional and national food security strategy and to dispel the impression that FADs are a fisheries management panacea. Kiribati's artisanal FAD management challenges and this analysis' proposed adaptive responses provide a relatable platform for other PICT decision-makers to consider their own situation and context-appropriate way forward.

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