Coastal fisheries data collection in the Pacific Islands region, and the need for a fresh approach to management

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Data-less and data-poor management are, under the circumstances, not just valid alternatives. They are an imperative. (Johannes 1998:145)

Background

In the Pacific Islands region, marine fish and invertebrates are critically important for food security and livelihoods, providing 50–90% of animal protein for Pacific Islanders (FAO 2015. Per capita marine resource consumption rates in the region significantly exceed the global average by as much as three to five times in some Pacific Islands countries and territories (PICTs) (FAO 2015). While the recent Benefish study[2] cannot identify an actual monetary value for the social, health and cultural values that coastal fisheries support, it does demonstrate that coastal fishing is a significant contributor to the GDP of PICTs (Gillett and Fong 2023). Despite this importance, and the recent development of notable regional, subregional and national policies for coastal fisheries management (e.g. SPC 2015; MSG 2015; Vanuatu Fisheries Department 2019), implementation has been hampered by resourcing not yet matching what is required (Gillett 2016). While there are examples of positive progress continuing to emerge in recent times, particularly in support of community-based fisheries management (CBFM) approaches, management of coastal fisheries in PICTs is considered to be lacking or largely ineffective (e.g. Gillett et al. 2014; Govan et al. 2013; CFWG 2019; Welch 2021). From the latest Benefish study, Gillett and Fong (2023:19) stated the following as one of only two key recommendations:

> *The remarkable drop of per capita production from coastal fisheries over the period 2007–2021 alone (a decrease of 14% over 21 years) should be a "wake-up call" for countries that do not focus much attention on effective coastal fisheries management. Because it is coastal fisheries that provide most of the fisheries-related employment and food in the region, implementing the difficult task of improving coastal fisheries management should be pursued with greater vigour.*

Current situation in the Pacific

In 2021, with support from the Subregional Office for the Pacific Islands of the Food and Agriculture Organization of the United Nations (FAO), C_2O Fisheries reviewed available literature, and conducted consultations with all 22 PICT national fisheries department staff and the Pacific Community (SPC), to identify and document:

- What coastal fish and invertebrate data collections and activities exist?
- How have these data have been used to assess stock status?
- Have the outcomes of stock assessments informed effective management action?

After reviewing more than 100 historical Pacific coastal fisheries reports and data collections, it was found that even basic reliable data was generally absent, and data collected lacked replicability in time and space. Also, data collection activities were infrequent, often *ad hoc* and limited in scope, and most were associated with short-term external projects. In addition, data were rarely linked explicitly to assessment outcomes; the reliability of collected data was questionable; and, critically, strategic approaches to data collection were limited (Welch 2021). Further, there was limited use of data collections to assess the status of specific targeted species, due partly to the nature of the available data, but also an apparent lack of knowledge and/or technical capacity in data-limited stock assessment methods. Where assessments were available, the vast majority used only simple methods. While the use of simple stock assessment methods is completely valid, these assessments were reliant on external expertise, and explicit links to management responses were rare. It is, therefore, not surprising that the management of coastal marine resources in the Pacific Islands region is regarded as limited and that available data suggests that in many localities, a high proportion of marine resources are considered fully exploited or overfished (Gillett and Fong 2023).

The underlying challenges that have impeded effective coastal fisheries data collection and assessment for data-poor fisheries globally are well documented (see Johannes 1998; Orensanz et al. 2005; Pilling et al. 2008; Dowling et al. 2015a). Similar to these studies, the recent FAO data collection review and consultation with individuals from the majority of PICTs of Welch (2021) summarised the key challenges for the Pacific Islands region as:

- a lack of sustained and relevant funding;
- lack of personnel;

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[2] The Benefish study provides information on the benefits to Pacific Island countries and territories from the fisheries in the region: https://fame.spc.int/resources/documents/fisheries-economies-pacific-island-countries-and-territories

- limited relevant expertise;
- lack of equipment;
- large distances and remote areas to monitor; and
- technology and database issues, particularly the failure to leverage databases for quick access to information for management.

Compounding these challenges has been a long history of external projects and "experts" promoting and introducing Western approaches to "data-limited" monitoring and assessments that have all too often been disproportionately time-consuming, data-intensive and complex. Western practitioners regularly promote data-limited fisheries approaches that require the collection of many years of accurate catch and/or effort data. While perhaps well intended, the tendency is that such approaches do not benefit Pacific communities in the long term.

One of the key issues with past efforts by external projects and experts has been the failure to acknowledge the local socioeconomic, cultural and governance context (e.g. Cinner and McClanahan 2006; Barclay and Kinch 2013). Often, these challenges are accompanied by other factors, including: a lack of political will, ineffective policies, poor governance and low motivation among key staff (e.g. CFWG 2019). Collectively, these factors result in the lack of a strategic and achievable approach to coastal fisheries management for the entire region. Therefore, there is a need to rethink approaches for nationally led data collection, assessment and management of coastal fisheries historically used in the Pacific Islands region.

A fresh approach for the Pacific

The key overarching recommendation from Welch (2021) was for the development and adoption of an appropriate management framework designed to the "normal operating conditions" of the region, and that if implemented appropriately, has the potential to transform Pacific coastal fisheries management, thereby securing future food security and livelihoods for the people of the Pacific Islands. This recommendation was endorsed by an FAO-led roundtable meeting of several Pacific coastal fishery experts and scientists held in August 2021 (Welch and Halford, unpublished report). This recommendation also aligns with multiple regional papers, reports and policies, including the findings of Gillett and Fong (2023). Furthermore, the application of the framework proposed has the potential to significantly help meet the recommendation in the Benefish4 Report.

What is a management framework?

There are three main components to a fisheries management framework, all of which are linked to each other, and well-managed and sustainable fisheries apply these components (Sloan et al. 2013; Cochrane and Garcia 2009). These three components are:

1) data collection; 2) stock assessment; and 3) management actions (Fig. 1) (Dowling et al. 2015b).

The key to successful implementation of such a framework is recognising that each component has a clear purpose. That is, fisheries data are collected for the purpose of under-

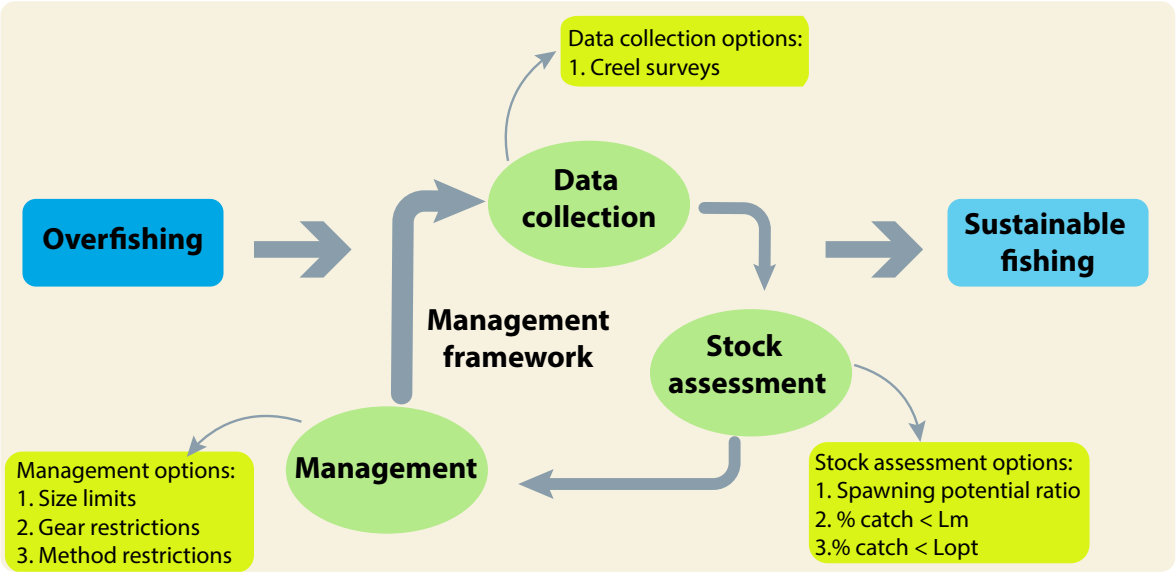

Figure 1. Conceptual diagram illustrating the three components of a management framework and their linkages: 1) data collection, 2) stock assessment, and 3) management actions. Examples of some options are given for each of these three elements. The key to a successful Pacific management framework would be to include options appropriate to the local context (e.g. capacity to conduct creel surveys given spatial extent of fishing, time and staff; and the technical capacity of staff to conduct different assessment types. Adapted from Dowling et al. (2015b).

standing how fishing is impacting the health of fish stocks. Generally, this is achieved using stock assessments, and the data collected must be commensurate with the intended assessment methods. The purpose of understanding the health of fish stocks, or their status, is to inform whether management intervention is required. It is also important to recognise that a management framework is a continuous cycle to ensure that existing management actions are effective and to identify emerging threats to stock health. Therefore, the application of a management framework as part of a national fisheries agency's routine (e.g. annual) is also an important aspect of success.

A management framework needs to match the local context

Because of the routine nature of a successful management framework, the scope of each component – and the approaches adopted – must align with the capabilities and capacity of the implementing entity. In many parts of the world, management frameworks are implemented although they are unable to be applied sustainably due to a reliance on data- and resource-heavy monitoring and assessment methods. A key concept to a successful Pacific fisheries management system is "less is more" (see Johannes 1998). Successfully adopting a regional management framework in the Pacific Islands region means developing each of the components to match the overall capacity characteristics for the entire region. This in turn means that a regional framework should incorporate the full range of characteristics of all PICTs (e.g. development status, fishery types, governance structures). Doing so ensures that the regional framework becomes a common and relevant template for all PICT to individually develop their local management system.

For example, creel and market surveys have been increasingly used by PICTs in recent years because they are recognised as being relatively cost-effective and able to collect large amounts of simple, but useful, fisheries data (e.g. species and size) (Kaly et al. 2016). Furthermore, some PICTs have begun to assess stock status using methods such as the length based-spawning potential ratio (LB-SPR) and the percentage of the catch that is below their size at maturity (Froese 2004; Hordyk et al. 2015; Prince et al. 2019). Such methods are often overlooked as they are considered too simple to reliably base management decisions on, when in fact, such methods are highly informative where data and information that informs management are limited. The uptake of the LB-SPR method is largely due to the recent development of resources and tools that have greatly assisted PICTs in using this method (see https://biospherics.com.au/barefoot-ecologists-toolbox/).

Developing a Pacific management framework

For the Pacific Islands region, there are many benefits of adopting a common, overarching regional framework. While there are obvious differences in coastal fisheries settings among PICTs, there exists many common characteristics and challenges that a regional framework can accommodate. Developed appropriately, a regional framework would provide an appropriate system for an individual PICT to independently adapt and develop their own national management system; one that is customised so that implementation requirements are well within local capabilities and local coastal fisheries management does not rely on external interventions or support (Fig. 2). For example, while the regional framework can provide data collection, and stock assessment and management options that may be suited to any PICT, a local national-level management framework should choose and only include options that are deemed appropriate to the local capacity to implement routinely (Fig. 2).

Furthermore, the framework would provide the flexibility for a PICT to modify its management system through time to include increasing or decreasing complexity in data types,

Local ni-Vanuatu fishing in the lagoon of North Efate, Vanuatu. Image: ©David Welch

monitoring methods and assessment approaches as, and if, capacity changes. Effectively, a regional management framework would provide all PICTs with a choice of options for data collection and stock assessment methods that match the data required and technical capacity available, and then to inform relevant management choices (Fig. 2). Furthermore, a common approach enables PICTs to share experiences readily through existing forums and processes hosted by SPC, non-governmental organisations and FAO.

The application of such a framework has the potential to vastly improve the management of coastal marine resources in the Pacific Islands region, if it is locally driven. However, for a regional framework to be successful in supporting local action, regional and local political will continues to be needed. Political will needs to be sufficient to counter the risk of commercial incentives over-riding the mechanisms of good management (e.g. Govan 2023). Successful implementation of any management framework will be dependent on genuine "buy-in" at all management levels and is possibly the single biggest challenge to be overcome. Therefore, consideration of meaningful strategies for achieving a collective higher sense of purpose at all levels of government will be key.

While the development and initial implementation of this regional framework approach would likely require external donor funding, longer-term and sustainable adoption should be possible under existing PICT national fisheries agencies budgets; and, if successful, may even reduce costs in the longer term. The Pacific region has a history of external aid for development projects, often aimed at addressing conservation and sustainability issues. In the past, the typical project cycle has meant that funding and effort has progressed to the stage of data collection and storage, but rarely to the point that the data are incorporated in an iterative and routine system of management. This is too often a consequence of ill-conceived projects that do not focus on local capacity development or sustainable outcomes from the outset. Ideally regional project donors would be more accountable to outcomes that genuinely match local priority needs (e.g. Enrici et al. 2023). Despite this, with local political will and a fully adopted regional or national coastal fisheries management system, relevant donor-funded activities can more readily be leveraged to provide meaningful and sustainable benefits.

For the development of a coastal fisheries management framework that is appropriate to the Pacific Islands regional context, there are several key elements that would need to be considered and incorporated into the process.

1 Consultation and ownership

The development of a regional framework must have significant involvement and leadership from PICTs, with local recognition and genuine "buy-in" to the system at all levels. While expert guidance and facilitation may be necessary and desirable during initial development and start-up, meaningful involvement of national fisheries agencies and other appropriate government agencies is needed to ensure the outcomes are locally appropriate. Ultimately, there should also be support by all relevant local research institutions, non-governmental organisations and civil society organisations.

2 Regional and cultural diversity

While a single regional framework could provide a consistent overarching framework across the Pacific Islands region, acknowledging diversity amongst PICTs is necessary to ensure the overall scope and framework specificity is appropriate to the local context. For example, the range in local capacity, artisanal and commercial fisheries, and current management and governance systems in place also need to be considered in a regional framework. This will ensure that available choices for each PICT are appropriate to the local context when developing its own management framework.

3 Informing regional policy

The development and implementation of a successful regional framework can help to meet many of the objectives of the relevant regional and national policies (e.g. the Noumea Strategy). Explicit and clear linkages of the regional frame-

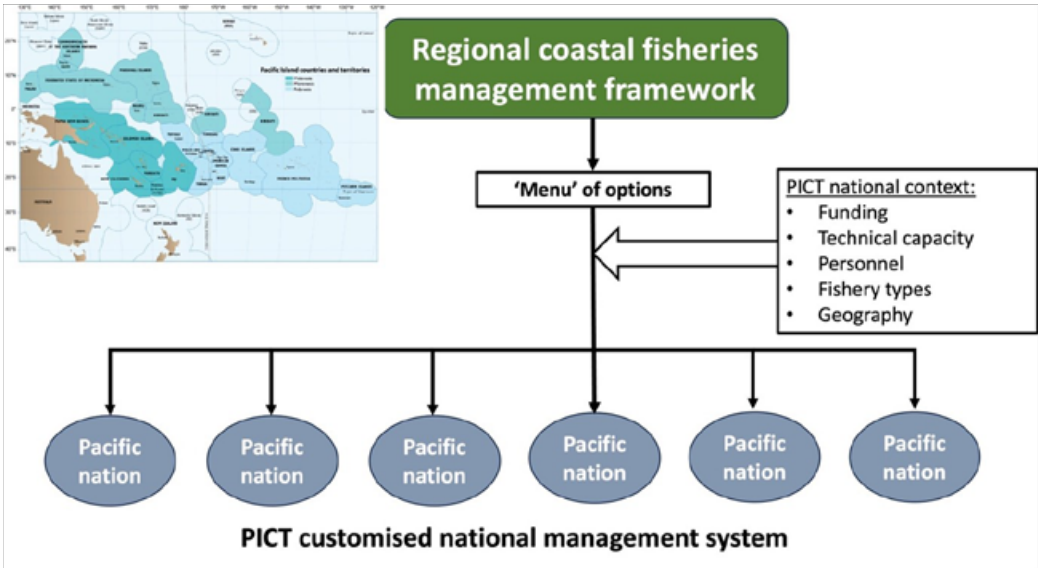

Figure 2. Conceptual diagram illustrating the process for each Pacific Island country or territory in developing its own coastal fisheries management framework to suit the local context and guided by the regional management framework.

work to these policies will be key for obtaining the necessary regional and individual PICT support.

4 Integrating CBFM

While the development of a regional framework is inherently a top-down management approach (i.e. implemented through government or other entities), in the Pacific Islands regional context, it is essential that any regional framework accommodates and integrates locally relevant CBFM approaches and activities (e.g. through co-management). In this regard, the management framework proposed here aligns with and provides the means for an overarching national system to support the *Pacific Framework for Action on Scaling up Community-based Fisheries Management: 2021–2025* (Pacific Community 2021). The Framework for Action provides implementation guidance that has significantly enhanced the implementation and "scaling up" of CBFM in the Pacific region in recent years (Govan and Lalavanua 2022; see https://cbfm.spc.int). Therefore, the management approach outlined here provides the appropriate national level support and guidance, and system template, for governance of coastal fisheries in the region while also providing an overarching national framework for successful strategies such as the Framework for Action.

5 Pilot phase and scaling up

Several PICTs have acknowledged the need for a strategic national framework to guide management of coastal fisheries in their PICT. Development and testing of a regional framework will need to occur with the involvement of several PICTs willing to act in a pilot phase. Successful practical application would provide the motivation and means for developing the full regional management framework package, thereby facilitating scaling up across the Pacific Islands region.

6 Integrating current resources

Several resources, tools and systems exist that are currently developed or under development and are relevant to a regional framework, and exploring and integrating these resources where possible is important. An obvious example is SPC's range of data management services that includes advanced tools that support data collection, data quality, data curation and analysis (e.g. the Ikasavea data tool; see https://fame.spc.int/resources/tools/ikasavea). Development of a regional and national management framework should carefully review and incorporate applicable tools and resources where they support successful implementation. For example, incorporating the Ikasavea data tool and associated resources could support data collection guidance, sharing and storage, creating efficiencies that enables resources to be directed to other components of the management system, such as capacity building in assessments.

What it would mean for the Pacific

The need to ensure food security and sustained livelihoods for Pacific Islanders into the future underpins much of the current efforts for sustainable fisheries management, both nationally and regionally. This is a key overarching goal for the Pacific Islands region. While the continued support and partnership with regional agencies such as SPC is important, a history of predominantly site-based and short-lived projects across the region have done little to provide an overarching and consistent approach that is effective in meeting regional goals. The successful development and implementation of a regional framework approach as outlined here, has the potential to be transformational in meeting these goals.

With sufficient and genuine desire at the national level to achieve food security and livelihood goals for coastal fisheries, the benefits and outcomes for PICTs could include:

- A clear but simple and strategic approach to focus PICT national efforts to achieve sustainable coastal fisheries goals, by formalising linkages between data collections and management outcomes.
- An achievable system customised to national policy and adapted to more effectively utilise and maximise local capacity.
- A management system that facilitates local (national) ownership and sustainable implementation.

Typical reef fish selection (caught by local commercial fishers) at the Suva fish market. Image: ©David Welch

- Guidance and a clearly defined purpose for national fisheries agencies staff in their roles.
- A system of fisheries management that provides greater ownership and empowerment for Pacific Islanders.
- A system of management that can more strategically direct recurrent national budgets.
- Providing an overarching national framework that puts into context all activities associated with the management of coastal fisheries, such as implementation of CBFM through the Framework for Action.
- Providing significant leverage and purpose for national fisheries agencies to align external actors and donor funded projects to invest in meaningful and positive outcomes that better align with local needs.
- Providing a common platform for inter-regional knowledge sharing and learning, across all aspects of the management system.
- Improved and regionally consistent linkages with regional agency support mechanisms, such as the SPC Ikasavea tool and resources.
- Apply relevant currently available technology, tools and resources that can be easily integrated, with potential for increased efficiencies as more tools and systems are developed. This will need to include easily accessible data products available for CBFM, through to national and regional actors and the use of artificial intelligence to improve data collections by supporting species identifications and measurements as the technology improves.
- Significantly improve the capacity for PICTs to readily meet international targets and indicators for key Sustainable Development Goals, specifically SDG2, SDG13 and SDG14, and for improved capacity to report on Indicator SDG14.4.1.

While the presentation of the above regional framework for the Pacific was well received at the 6th SPC Regional Technical Meeting on Coastal Fisheries and Aquaculture held last year at SPC in Noumea, this approach will only progress through further discussions among PICTs, and endorsement, if agreed to, be tabled at higher political forums such as the Fisheries Ministers Meeting. Calls for affirmative action on Pacific coastal fisheries such as the one in this article have become increasingly common in different forms. It is hoped that this article maintains the momentum and represents a "conversation starter" for a meaningful solution and ultimately helps to facilitate significant improvements in coastal fisheries management for the Pacific Islands region.

For further information or a copy of the full Pacific data mapping report, contact: d.welch@c2o.net.au

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