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Operationalising access to oceanic fisheries resources by small-scale fishers to improve food security in the Pacific Islands

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ABSTRACT

Maintaining the level of fish consumption in Pacific Island countries recommended for good nutrition as the populations of coastal communities grow, and as coral reefs are degraded by global warming and ocean acidification, will depend on small-scale fishers catching more tuna and other large pelagic fish. Concerted research and development by regional agencies shows that nearshore fish aggregating devices (FADs) provide one way for small-scale fishers to make this transition. Although the full potential of FADs remains to be assessed, several investments to optimise their use have been identified. These investments include pinpointing the locations where FADs are likely to make the greatest contributions to nutrition of coastal communities, integrating use of FADs with other livelihood activities, and improving the designs of FADs. Where Pacific Island countries have committed to developing nearshore FAD programmes, additional investments are needed to operationalise the use of FADs, particularly in cyclone-prone countries. These investments include: 1) training in safe and effective FAD-fishing methods; 2) developing reliable ways for forecasting when tuna, and other large pelagic fish (e.g., mahi mahi and wahoo), are likely to associate with FADs and delivering this information to fishers effectively; and 3) storing spare FAD materials, boats and fishing gear in cyclone-proof containers so that FADs lost during cyclones can be replaced quickly. When combined with measures to sustain catches of coastal demersal fish, operationalising the use of nearshore FADs is expected to help several Pacific Island countries attain the food security goals of regional policy frameworks.

1. Introduction

In 2015, Pacific Island leaders signed the *Regional Roadmap for Sustainable Pacific Fisheries* to maintain or improve the contributions of the region's rich tuna resources to their economies and societies [24]. An important goal of the *Roadmap* is to increase the availability of tuna

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for local consumption by 40,000 t per year by 2024 to help maintain the food security of rapidly growing populations. This important regional policy framework is supported by the *New Song for Coastal Fisheries: Pathways to Change* [58], which was approved by the 11th Ministerial Forum Fisheries Committee Meeting in 2015. The *New Song* also recognises the need to use the region's tuna resources to fill the gap between the fish needed for food security and sustainable harvests from coastal fisheries.

The main ways of increasing access to tuna for local consumption have been identified [10]. Making better use of the small tuna and bycatch offloaded in Pacific Island ports during transhipping operations by industrial purse-seine fishing fleets should provide more fish for rapidly-growing urban populations. Improving the distribution of tuna canned in the region should increase access to fish for communities in inland areas. And assisting small-scale fishers to catch more tuna and other large pelagic fish species should make fish more readily available for coastal communities.

Research and development by the Pacific Community (SPC)[1] over the past two decades indicates that an effective way to assist small-scale fishers to catch more tuna is to expand the use of nearshore fish aggregating devices (FADs) [3,16,57,59].

Building national networks of nearshore FADs should not only increase the availability of fish in the near term, it is also considered to be a key adaptation to climate change. In particular, increased use of FADs should enable communities to obtain the fish they need for good nutrition as the productivity of coastal demersal fisheries declines due to degradation of coral reefs caused by higher water temperatures and ocean acidification [7,8,12,46].

Several studies have demonstrated that catch rates of small-scale fishers can be improved when they fish around nearshore FADs [13,53–55]. Based on these encouraging results, considerable thought has already gone into identifying the actions needed to optimise the use of nearshore FADs for local food security [11]. These actions are necessary because not all FADs anchored in nearshore waters have had the full endorsement of local communities, or increased access to fish for food security when they were requested by communities [1,15] (Supplementary materials). The necessary actions include, for example, pinpointing locations where FADs are likely to make the greatest contributions to nutrition of coastal and island communities, integrating the use of FADs with other livelihood activities, and improving the designs and effectiveness of nearshore FADs [1,4,11]. As important as they are, however, these actions do not directly assist people to catch fish around FADs, or provide them with an effective way of replacing FADs lost during cyclones of for other reasons, such as wear and tear [4].

Three additional investments are needed to assist small-scale fishers to operationalise the use of FADs. The first involves training small-scale fishers in safe and effective FAD-fishing methods, especially where they have limited experience fishing offshore [4]. In particular, there is a need to raise awareness that more precautions are required when fishing around FADs, which are typically located 2–5 km beyond the fringing or lagoonal barrier reefs where most small-scale fishing operations have traditionally taken place. The lives lost at sea during the rapid development of the Alia longline fishery for South Pacific albacore in Samoa in the 1990s [27] is a sobering reminder of what can happen when small-scale fishers are not accustomed to operating further offshore.

The second investment is the development of tools for forecasting favourable conditions for catching yellowfin and skipjack tuna, and other large pelagic fish (e.g., wahoo and mahi mahi), around nearshore FADs and delivering this information effectively to small-scale fishers [21]. This is important because coastal and island communities have many competing demands on their time, e.g., production of subsistence food crops [9,62]. Forecasting when safe conditions for fishing around FADs coincide with times when target fish species are expected to occur in coastal waters will also assist communities to optimise their various livelihood activities.

The third investment centres around development of systems for storing spare FAD materials, boats and fishing gear in cyclone-proof containers so that FADs lost during natural disasters can be replaced quickly. In the aftermath of cyclones, the many demands for (often limited) national shipping can cause long delays in the replacement of FADs. Unless the materials needed to deploy FADs are stored locally by provincial fisheries officers or communities, it is unlikely that lost or damaged FADs will be replaced in time to yield fish catches when they are needed most – during the months required for newly planted crops to be harvested following natural disasters.

Here, we describe the specific activities that will be needed for each of these investments. We use Vanuatu as a case study because it has a rapidly growing population, a need to increase access to tuna for food security [6,56] (Supplementary materials), and is one of the Pacific Island countries affected most frequently by cyclones [43]. Vanuatu has also been an early adopter of FADs [2] and as an archipelagic nation with many remote island communities (Fig. 1) is well placed to benefit from the three proposed investments.

The ideas presented here should also apply to other Pacific Island countries where FADs are needed to help provide an important source of protein for coastal communities, especially those countries prone to cyclones.

2. Training in safe and effective FAD-fishing methods

In Vanuatu, small-scale fishers who use FADs fall into two categories: 1) subsistence fishers operating from paddling canoes catching fish relatively close to shore (1–3 km from the coast and in depths of 200–500 m), principally for their own households; and 2) commercial (artisanal) fishers using motor boats who typically catch fish around FADs further offshore (5–7 km from the coast, and in depths of 500–1000 m) for sale at local markets or in Port Vila and Luganville. It is estimated that there are ~16,000 small-scale fishers in Vanuatu (Supplementary Table 1) and that by the end of 2017 more than 50 nearshore FADs will be deployed at ~30 locations (Fig. 1, Supplementary Table 1).

To improve the safety and effectiveness of their fishing operations, both canoe and motor boat fishers need: 1) meteorological forecasts of wind speed, wind direction, atmospheric pressure, wave height and ocean current velocity to evaluate the risks associated with fishing offshore in small craft; 2) advice about safety procedures, which safety equipment to carry, and how and when to use it; and 3) training in the best ways to catch target fish species around FADs at different times of year.

2.1. Meteorological forecasts

The Vanuatu Meteorological Service (VMS) provides regular, short-term, forecasts of atmospheric conditions (e.g., wind speed, pressure) and related oceanic conditions (e.g., wave height)[2] essential for the marine weather bulletins needed to inform small-scale fishers about the safety of boating in coastal waters. VMS also issues bulletins and warnings for high winds, cyclones, and high seas. However, VMS needs support to 1) customise this information to the needs of canoe and motor boat fishers, 2) routinely transmit customised bulletins to each province on all types of mobile devices, and 3) ensure that communities know how to interpret the information correctly.

For customising the information to meet the needs of small-scale

[1] www.spc.int.

[2] These forecasts are delivered by VMS via its web site (http://www.meteo.gov.vu/) and by radio several times each day.