

Forty years of small-scale tuna fishery development in the Pacific Islands: Lessons learned

Robert Gillett,¹ Michel Blanc, Ian Cartwright, Mike Batty, Mike Savins, Joelle Albert, Noah Idechong, Mainui Tanetoa, Tricia Emberson and William Sokimi

1 Background

There has been a long heritage of attempts to promote tuna fishing from small boats in the Pacific Islands region. A fisheries specialist visited Fiji in the late 1930s and recommended a better type of small boat and new fishing methods to allow small-scale commercial fishing to expand into offshore areas (Hornell 1940). Following this, at the very first fisheries conference of the (then called) South Pacific Commission (SPC) in 1952, several possibilities for small craft tuna fishing were discussed (SPC 1952). In the early 1960s, SPC produced a manual on tuna trolling (Devambeze 1962). Since that early period, attempts to develop small-scale tuna fishing have proliferated. Box 1 lists the various interventions used to develop small-scale tuna fishing² in the last few decades.

Why has there been so much interest in promoting small-scale tuna fishing? The existence of large tuna resources in the region is certainly a factor but other issues are involved. This includes the thinking that indigenous Pacific Islanders have missed out on the benefits of industrial fishing operations, or that by using small boats and having low entry costs, there is an opportunity for a large number of people to reap benefits. In previous decades, the coastal fishery extension backgrounds of many fisheries officials in senior positions may have contributed to the preference for small-scale development when dealing with tuna. Overall, the governments of all Pacific Island countries feel an obligation to help small-scale fishers, and there has been much enthusiasm for linking this with the large tuna resources of the region.

Only a few of the attempts at small-scale tuna fishery development listed in in Box 1 have been successful and have led to the establishment of new fisheries or the sustained enhancement of existing ones. Reasons for this are complex and likely to vary across locations.

Considering the large number of initiatives to promote small-scale tuna fishing (and plans for more), there has been surprisingly little effort to consolidate what has been learned from past attempts. From a historical perspective, failed initiatives have often been repeated apparently without knowledge of the previous work. Conversely, some successes have

gone unrecognised. It is therefore opportune to review past efforts, determine what has been successful and unsuccessful, and provide guidance for the future to the individuals, organisations, and governments wishing to develop small-scale tuna fisheries in the region

2 Identifying the lessons

During 2017 the Food and Agriculture Organization (FAO) of the United Nations and the Pacific Community (SPC, formerly the South Pacific Commission) discussed ways that the two agencies could cooperate in the development of small-scale tuna fisheries in the region. One of the ideas that emerged was to bring together a small group of people highly experienced in small-scale tuna fisheries development to discuss what has occurred in the past, consolidate the experiences, and focus on common features that emerged, with a view of providing guidance for the future. Accordingly, the SPC/FAO Consultation on Small-Scale Tuna Fishery Development and Associated Value-Chains in the Pacific was convened 2–3 October 2018 in Noumea, New Caledonia.

The consultation was attended by the authors as well as by select SPC staff. During the consultation it was determined that the combined experience of the 10 participants in small-scale tuna fisheries development in the Pacific Islands region accounted for about 300 person years.

The consultation and the experience of the participants were the primary sources of information for this paper. Additional sources included documents assembled for the consultation, fieldwork on small-scale tuna fishery development in August 2018, and further reflection by participants on several issues after the consultation.

To structure the discussions in the consultation, key themes in the development of small-scale tuna fisheries were identified, and some of these were modified and/or consolidated. The resultant list consisted of 10 key themes: 1) FADs, 2) fisher associations, 3) safety, 4) subsidies, 5) interactions with large-scale tuna fisheries, 6) boats, engines and fuel use, 7) post-harvest aspects, 8) the role of women, 9) data, and

¹ Director, Gillett, Preston and Associates. gillett@connect.com.fj

² In this document 'small-scale tuna fishing' is defined as fishing for tuna from boats without decks or with partial decks.

Box 1: Past small-scale tuna fishery development efforts in the Pacific Islands

Work related to fish aggregation devices (FADs)

- Demonstration of FAD trolling techniques
- Design and construction of FAD buoys
- Improvement in FAD deployment techniques
- Conducting economic studies
- Provision of FAD fishing workshops
- Provision of FAD fishing safety training workshops
- Maintenance of FADs
- Facilitation of FAD materials ordering
- Determining optimum number of FADs in an area
- Encouragement of national FAD programmes

Gear and techniques

- Promotion of vertical longlining
- Promotion of tuna handlining
- Promotion of Maldivian-style tuna fishing
- Revival of traditional small-scale tuna fishing techniques
- Use of plastic pearl shell lures to facilitate the supply of gold-lip pearl shell for lures
- Replacement of Kiribati and Tuvalu tuna fishing in Nauru
- Promotion of pump boat fishing
- Trials involving small-scale pelagic gillnetting
- Promotion of Hawaiian techniques: palu ahi, ika shibi
- Testing capture of bait for tuna fishing: flyingfish, selar
- Trials of small-scale pole-and-line fishing from open boats in Samoa and Tuvalu
- Diversification of canoe tuna fishing

Vessel work

- Design of vessels for small-scale tuna fishing
- Promotion of sail power for offshore fishing
- Promotion of Oregon surf dory
- Testing of outboards: diesel outboards, standardization, fuel-use studies, 4-stroke engines
- Promotion of inboard diesels

Government interventions to protect small-scale tuna fisheries

- Banning the sale of industrially caught tuna and encouraging the sale of catch retention
- Establishing buffer zones
- Banning purse seining or all types of foreign industrial fishing
- Mitigation of range contraction*
- Enshrining in the basic documents of FFA and WCPFC the concept of avoiding adverse impacts on small-scale tuna fishers

Studies related to the Samoan alia vessel

- Study tours to Samoa, visits by Samoan fishers to other countries
- Purchase of an alia in Samoa for use in other countries: Tonga, Samoa, Fiji
- Enlargements of hulls
- Safety improvements
- Ice improvements
- Reviews of the Samoan alia by FFA, SPC, FAO and other organisations
- Study of fuel use
- Design and test of emergency sails

Post-harvest activities

- Piggybacking with larger-scale operations: air transport, wharves, cannery
- Improving onboard icing of fish
- Promoting the use of insulated fish bags
- Organising fish collection in outer islands
- Organising refrigeration in outer islands
- Setting up of fisheries centres
- Promoting alternative tuna products, such as jerky, fish balls, tataki
- Trialling tuna cake recipes
- Promoting fish recipes
- Providing fish handling training

Other

- Vessel construction and operation subsidies
- Supporting associations of small-scale fishers
- Upscaling to longline fishin
- Linking up with the tourism sector (e.g. restaurants and sport fishing)
- Harbour construction and management

* The historical geographic range of a stock of tuna can cover a large area. When that stock becomes overexploited, the geographical area can shrink. Some governments have intervened to reduce the amount of that contraction.

10) government interventions. It was recognised that, while these themes would be considered one-by-one, the reality is there is considerable overlap.

3 Discussion of key themes

In this section each key theme is considered with respect to background and observations, lessons learned, and recommendations.

There is a need to be cautious when trying to identify lessons learned and recommendations. Often, successes or failures are dependent on the local context: in other words, what works well in one village or community, may not work in the next province or even the next village. This comment is particularly relevant to small-scale tuna fishery development, which involves many different drivers (sociocultural, economic, logistical, environmental). Following from this concept, the 'lessons' below are generally applicable to most locations, whereas 'observations' are more limited in scope, much less analytical in nature, and tend to be statements of facts.

3.1 FADs

Background and observations

In reviewing the history of development of small-scale tuna fisheries, one of the most successful initiatives has been, and continues to be, the introduction of FADs. After decades of small-scale tuna development efforts throughout the Pacific Islands, FADs remain one of the few innovations that allow small-scale fishers to economically take advantage of the region's large tuna resources. Overall, nothing comes close

to producing ongoing benefits to small-scale tuna fishers as the FAD. Other important features of FAD use are:

- they can be successfully used at one location in a given country but not necessarily elsewhere in the same country;
- there is very limited information concerning the costs and benefits associated with FAD use (e.g. for each dollar spent on FADs, the amount of extra fish that could be caught);
- SPC assistance to national FAD programmes has been very effective in the past, but it should be recognised that the requirements of those programmes are evolving and there is now a need for assistance in more institutional aspects, such as providing advice on creating good national FAD programmes (SPC 2017); and
- FAD designs and technology will continue to evolve, and technical assistance and research continue to be needed in support of national FAD programmes.

Main lessons learned

- Governments that are serious about developing small-scale tuna fisheries need to be serious about having a well-funded, well-organised national FAD programme. Such a national FAD programme would need to not be reliant on volatile donor or regional organisation funding or expertise, and would need to have mechanisms in place to enhance the status and sustainability of the programme within the government fishery agency.
- Fisher associations can effectively catalyse and drive FAD programmes.



Fish aggregating devices moored close to shore have, in some places, facilitated canoe fishers' access to tuna resources – Nauru, 2007. (image: William Sokimi, SPC)

- Effective stakeholder engagement and local knowledge is required before and after deployment in order to validate deployment location, increase ownership, reduce conflicts and maximise the longevity of the FAD.
- Current FAD fishing is largely limited to surface trolling, but other types of fishing around FADs can be quite productive, suggesting the need for training in, and the promotion of, FAD fishing techniques other than trolling.

Recommendations

To achieve strong and sustainable FAD programmes, national fishery agencies and SPC should analyse existing FAD activities and identify and address gaps. Particular attention should be paid to aspects of staff capacity, management, stakeholder engagement, and ongoing funding mechanisms.

Improved data on FAD performance, including clear identification of social and economic costs and benefits, should be obtained by national fishery agencies and SPC. This should be used to promote national investment in FAD programmes.

3.2 Fisher associations

Background and observations

There are a number of good examples in the region of small-scale fishers associations that facilitate the development of small-scale tuna fisheries. This seems to have occurred by lobbying governments to discourage certain practices (e.g. dumping of fish by industrial fishing vessels) while encouraging other practices (e.g. promoting FAD programmes). In general, fisher associations can improve the relevance of government fishery interventions, although reaching an appropriate relationship between the government and the association can be challenging. In some countries, there seems to be generally a lack of government fishery agency support for fisher associations. This is not surprising in situations where the inclination is to criticise an agency's non-performance. The tendency is to want to exclude government influence from association operations, although the reality is that fisher associations need a pipeline to the fishery agency and other governmental departments to exert their influence. Other features of fisher associations that are relevant to small-scale tuna fishery development are:

- unlike regional agencies and consultants, effective fisher associations can have a constant presence and apply pressure for positive performance;
- many associations for large-scale tuna fishers have received substantial assistance from the regional agencies (e.g. SPC and the Pacific Islands Forum Fisheries Agency), but small-scale associations have not enjoyed such assistance; and

- fisheries specialists know little about the internal machinations of successful small-scale fisher associations, and there is much to be learned from successful (and unsuccessful) associations and from producer associations in the agriculture sector.

Main lessons learned

- In the absence of effective external criticism, government fishery agencies tend to become inward looking and focus on activities that staff feel are important. Associations of small-scale fishers have been effective in getting more attention focused on small-scale tuna fishing, and are often successful in getting improved outcomes.
- Successful fisher associations are very dependent on active individuals who have the support of their peers and fellow fishers, and have pathways to decision-makers in government.
- A fisher association seems to be most effective when governments: a) formally recognise the association, b) have a process for real engagement with the association, and c) include the association in advisory committees.
- Where government fishery agency representatives act as chair and/or drive the agenda for agency outcomes, fisher associations are not usually successful from the fisher's perspective, and it is important that associations are formed around fishers' needs and wants, in order to secure their support.
- In addition to providing constructive criticism to fisheries departments, associations can also be effective in a range of other activities (e.g. promoting safety at sea, organising training activities, and attracting government and non-governmental funding), resulting in significant benefits to members.

Recommendations

Because fisher associations can be effective tools, including for improving the governance of small-scale fisheries, national and international development partners should provide support for establishing and enhancing associations of small-scale fishers. The challenges, however, in organising a collection of competitive, diverse and individualistic fishers should not be underestimated.

Government fishery agencies should recognise that small-scale fisher associations can obtain substantial benefits for fishery stakeholders, and should therefore formulate mechanisms for interacting with these associations, as many fishery agencies have done for large-scale tuna associations.

3.3 Safety

Background and observations

In the Pacific Islands region, most loss of life in small fishing boats is associated with tuna fishing. Both SPC and

FAO have had numerous initiatives during the past several decades aimed at improving the safety of small-scale fishing. Those efforts have involved safety awareness, vessel design, legislation, safety equipment, and other aspects. The cost of small boat safety equipment is falling, but there are still problems of availability and affordability, especially in outer islands. Lately, SPC has been promoting the use of ‘grab bags’, which are waterproof sacks containing essential gear (e.g. flares, beacon, radio) to be used in emergencies at sea, and there are cases in which the bags have obviated the need for expensive search-and-rescue operations. Constraints to improving the safety of small-scale fishing include: a) a scarcity of region-wide data on safety incidents, including those on vessel loss and search and rescue costs; (b) a lack of appropriate small boat regulations in many countries; c) the lack of concern among many small-scale tuna fishers about sea safety; d) inappropriate boat designs and poor construction standards; and e) poor maintenance of outboard motors.

Main lessons learned

- FADs have both positive and negative implications for sea safety. They tend to concentrate fishing effort into discrete locations but the promise of easy access to fish can lure boats into unsafe offshore situations.
- After many decades of interventions by SPC, FAO and other organisations to improve small-scale fishing safety, there remains among many fishers a relaxed attitude towards the risks of fishing offshore in small boats and associated sea safety precautions.
- There has been a remarkable improvement in sea safety in countries where appropriate safety regulations have been introduced and reinforced by ‘big stick’ (very strict) enforcement.

Recommendations

Government fishery agencies should recognise that achieving significant improvements in small boat safety is a long-term endeavour. Measures to increase safety should include the areas of legislation, enforcement, awareness, and promotion of safety equipment and safe boats. The most effective ways of getting the message across should be identified and adopted.

Government fishery agencies, SPC and donors should take steps to ensure that national FAD programmes have sea safety as a major component.

3.4 Subsidies

Background and observations

Governments in the region often use subsidies in their attempts to develop small-scale tuna fishing. Many of these subsidies involve ice making and the provision of boats and engines. These subsidies have variously been successful (resulting in a long-term increase in tuna landings), ineffective (no

noticeable effect on landings), or even disastrous (no increase in tuna but a large increase in inshore fish landings in over-exploited fisheries). In general, those subsidies that involved simply dropping off items for free to individuals or communities appear to be the least successful, while those associated with a long-term development programme seem to be the most successful. Subsidies for ice are a special case: a government role in supplying ice to locations away from urban areas could be justified as a service, but many of the ice facilities were established with the expectation – on the part of governments and recipient communities – that the facilities would be profitable, or at least not be a financial burden, but this was often not the case.

Lessons learned

- In the development of small-scale tuna fisheries, there have been both good and bad subsidies used. Evidence suggests that a good subsidy in small-scale tuna fishing has clear objectives, is transparent (if intended to be catalytic), and has a realistic exit strategy.
- In some cases, the costs of subsidies have far outweighed the benefits, such as the donation of boats to individuals and communities outside of well-planned programmes.
- There is considerable justification for *not* considering certain types of support to fisheries sectors as being subsidies. Examples include: a) support to FAD programmes as being a provision of an essential infrastructure, as roads are on land; and b) free or un-taxed safety gear as being humanitarian assistance, which avoids further costs in search and rescue.
- It is inherently expensive to produce ice and maintain and replace ice making facilities, particularly in remote locations. An operational subsidy is often required, even if the facility has been received through an aid programme. The entities receiving ice making facilities (e.g. communities, island councils) need to be made aware of the extent of ongoing expenses *prior to* agreeing to take on such facilities, which has often not been the case.

Recommendations

Subsidies to encourage small-scale tuna fisheries can be justified in some cases, particularly where they align with the achievement of clearly defined government objectives. Subsidies should be supported by a clear economic rationale, including the expected costs and benefits, and their performance should be periodically reviewed.

3.5 Interactions with large-scale tuna fisheries

Background and observations

Interactions between small-scale and large-scale tuna fisheries take place at the resource and market levels, and at fishing grounds, and these interactions can be either positive or negative. There is less biomass of most tuna stocks in the

region than there was several decades ago because of large-scale fishing (fewer tuna and often lower catch rates for small-scale tuna fisheries). Dumping and the sales of tuna from large-scale fishing in ports of Pacific Island countries can negatively affect the markets for tuna caught by small-scale fishers. On the positive side, small-scale fishing operations often use the facilities, processing establishments and transport owned and operated by large-scale businesses (i.e. 'piggybacking'). Licence fees from large-scale tuna fishers have been used in some countries for small-scale tuna fishery development purposes.

Lessons learned

- There are considerable potential benefits from small-scale operations piggybacking on larger operations, including processing and marketing, transport and refrigeration. In fact, many of the existing small-scale tuna fisheries in the region would not exist without this piggybacking (e.g. the alia fishery in Samoa).
- The reality is that the large-scale tuna fisheries of the region are not going away. The most sensible strategy for dealing with their interaction with small-scale fisheries seems to be taking advantage of the positive interactions, and mitigating the negative ones.

Recommendations

Government fisheries agencies and donors should facilitate piggybacking whenever possible, including in the areas of marketing and processing, ice supply, wharf space, mechanics and technicians, and transport. As to mitigating the negative interactions, the advice given by SPC in 2013 is consistent with historical experience and remains valid today:

- establish industrial fishing exclusion zones to reduce direct competition between industrial and small-scale fisheries;
- install nearshore anchored FADs to increase the accessibility of tuna to compensate for catch declines;
- improve knowledge about the national catch and catch rates from small-scale fisheries;
- strengthen small-scale fisher associations and increase their participation in national tuna management planning forums; and
- promote management measures that address the special needs of artisanal fisheries through the Western and Central Pacific Fisheries Commission.

3.6 Boats, engines and fuel use

Background and observations

Some of the most expensive efforts to develop small-scale tuna fisheries were the long-term FAO projects that designed

vessels, trained people to build them, and taught offshore fishing techniques in Fiji, Tonga, Samoa, Kiribati and Vanuatu. In most of these locations, when the vessel construction subsidies ceased, the building of those boat designs also ceased. But, in Samoa and Kiribati, the building of FAO-designed vessels has continued. In Vanuatu and Tuvalu some locally built designs adopted in development projects also remain popular. The alia catamaran was designed in the early 1980s and has been very popular in Samoa. Despite many study tours by fisheries officers of other Pacific Island countries to Samoa to study the alia, and despite the many positive reviews of the alia, the adoption of that design outside Samoa has not occurred. Another feature of small boats in the region is that some designs are inherently unsafe for tuna fishing.

Within the region's small-scale tuna fisheries, boat propulsion is highly dominated by two-stroke petrol outboard engines. Although the use of outboards is, to some degree, ingrained in the culture of small-scale commercial fishing in the Pacific Islands, the engines are highly fuel consumptive. A World Bank study (Wilson and McCoy 2009) found that, in general, a small-scale tuna fishing boat uses about twice as much fuel per kilogram of fish than a purse seine vessel. Inboard diesel engines use less fuel and are prolific in Southeast Asia and elsewhere, but small-scale fishers in the Pacific currently have a strong preference for outboards, which typically use gasoline, due to their portability and lower capital cost. Opinion is divided on four-stroke outboards: they reduce fuel and oil consumption, and savings can justify the higher capital cost if they are used regularly, but maintenance is more difficult. FADs reduce fuel consumption in small-scale tuna fisheries because tuna and other pelagic fish species concentrate around FADs, thus reducing the need to fish over a wide area.

Lessons learned

- The introduction of new boat designs for small-scale tuna fishing is characteristically successful only when accompanied by long-term technical assistance and subsidies. The preferences and prejudices of fishers can be very strong, and the effective introduction of new vessel designs is usually a long-term process.
- The viability of small-scale tuna fishing operations is strongly affected by the relatively high fuel use of outboard-powered boats. When high national costs for fuel are combined with fuel-intensive fishing, the result can be little small-scale tuna fishing or expensive tuna in local markets.
- There are considerable challenges in introducing inboard diesel engines into the Pacific Islands for small-scale tuna fishing, despite potential advantages, including low fuel consumption.
- Apart from fuel subsidies, one of the few ways in which the high cost of fuel for small-scale tuna fishery can currently be mitigated is through the use of FADs.

Recommendations

When contemplating the introduction of new boat and/or engine designs, government fishery agencies, donors and other development partners should recognise that there is little chance of success unless there is a long-term, well-planned programme of assistance to accompany the introduction, and unless there is support from fishers.

Government fisheries agencies, donors and other development partners should also recognise that yet another positive attribute of the FAD for promoting small-scale tuna fishing is lower fuel consumption.

3.7 Post-harvest

Background and observations

Small-scale tuna fisheries face many difficulties with regard to post-harvest. The cost of skipjack caught by purse-seined vessels (recently USD 1,450–2,300 per tonne delivered in Bangkok) is very low compared with tuna from small-scale fisheries, and small-scale tuna fishers cannot compete in the same markets with commercial fishers. The offloading of fish from large-scale tuna vessels in Pacific Island ports can have negative effects on the marketing of fish from small-scale fisheries. Much of the tuna from small-scale fishing is caught away from urban centres but government fish collection and transport to those centres is often erratic and expensive. The availability of tuna from small-scale tuna fisheries often oscillates between abundance and scarcity. On the positive side, the production of novel fish products in Kiribati, Fiji, and elsewhere suggest there is considerable potential in situations where innovative entrepreneurs work with the production from small-scale tuna fisheries. In several countries there are large tuna catches in the outer islands that sell for very low prices. Other opportunities include:

- piggybacking on the transport, processing and export facilities of larger-scale operations, both inside and outside the fisheries sector;
- producing non-perishable tuna products (e.g. dried or smoked, tuna jerky), especially in remote areas; and
- partnering with tourism and relatively price-insensitive tourists.

Lessons learned

- The low price of purse-seine-caught skipjack, and the complexity and costs associated with the export process, generally constrains the small-scale tuna catch to the domestic market.
- The domestic market for small-scale-caught tuna can be adversely influenced by landings of high-quality, large-scale longline bycatch. The landing of poor-quality skipjack has fewer negative effects on small-scale tuna fishers

and can be an important source of food for impoverished households.

- Piggy-backing on large-scale commercial operations provides a range of opportunities, especially with regards to transport, processing and marketing. However, in situations where the operator of the piggyback facility is also the only buyer of small-scale tuna, prospects can be diminished.
- Government fish collection in the outer islands is mostly erratic, expensive and inefficient. When the transport of products is a major constraint, there are considerable advantages to relying on existing inter-island shipping services (many of which are subsidized) rather than relying on government-organised fish collection operations, which rarely last long.
- The many tuna jerky initiatives in the region have mostly failed except where there has been exceptional managerial talent and determination. High-value domestic markets are limited, export initiatives suffer from daunting logistics, and in many markets there is competition with overseas jerky producers and their associated economies of scale.

Recommendations

Government fishery agencies and development partners should refrain from becoming involved in outer island fish collection schemes unless they are willing to make a very long-term commitment to substantial subsidies.

Those agencies and/or partners should recognise that improved transport, handling and processing (including development of non-perishable products) has considerable potential to add to the viability of small-scale tuna fisheries. Government fisheries agencies and development partners should promote and facilitate the establishment or strengthening of small-scale tuna post-harvest activities.

3.8 Role of women

Background and observations

Small-scale tuna fishing has historically been 'men's business', even though women have a major role in post-harvest activities. Because decisions on actual fishing exert a large influence on post-harvest aspects, women are often excluded from involvement in major decisions associated with the very fishery that affect them. Another important aspect of women in tuna fisheries in the Pacific Islands is the semi-invisible nature of their contribution. As stated by Demmke (2006:42): 'An economic analysis of women in tuna marketing could be carried out to quantify their contribution. In the absence of such data, women's contribution remains invisible and as such, women do not acquire the support they need to improve their employment conditions in marketing.' Examples of women fishing for tuna from

small boats are extremely rare but do exist and there is the contention that no barriers to women tuna fishing should exist; but, it is uncertain how much priority should be given to this issue relative to improving post-harvest aspects where female participation is high.

Lessons learned

- In general, benefits from small-scale tuna fisheries flow mostly to men. While the contribution of women to small-scale tuna fisheries is substantial, the benefits to women have not been as great as those to men.
- In many of the small-scale tuna fisheries of the region, positive changes on the post-harvest side are often positive for women.

Recommendations

Mechanisms should be developed by government fisheries agencies and fisher associations to increase the engagement of women in the two levels of small-scale tuna fisheries: 1) the family or business level, and 2) the policy level, both locally and nationally.

3.9 Data

Background and observations

Collecting data on small-scale tuna fisheries is important for a number of reasons, including determining their national importance, and understanding the impacts of various development efforts and large-scale tuna fishing. Despite this importance, current data are poor or non-existent. Much of the data that does exist comes from relicts of former fisheries statistical systems. Another aspect of the data situation concerns the convention that established the Western and Central Pacific Fisheries Commission, in which Article 30 stipulates: 'the need to avoid adverse impacts on, and ensure access to fisheries by, subsistence, small-scale and artisanal fishers and fishworkers'. In order to 'avoid adverse impacts' there is an assumption that some form of system is in place to detect any impacts, which is typically not the case.

Lesson learned

- Despite the importance of collecting data on the catch of small-scale tuna fisheries, the reality is that most estimates of national small-scale tuna catches are poor, and recent efforts to improve the situation have not been very effective.

Recommendations

Agencies involved with fisheries statistics in the region should focus more attention on improving the methodology of collecting information on the production and associated trends in small-scale tuna fisheries in the region.

3.10 Government interventions to develop small-scale tuna fisheries

Background and observations

Many of the large number of development efforts listed in Box 1 above are government interventions, and some observations can be made about those interventions. In the quest by governments to develop small-scale tuna fisheries over the years, there has been much 're-invention of the wheel' and repetition of past mistakes. The interventions have been both components of well-planned development programmes and short-term ploys to obtain political support.

Lesson learned

- Government initiatives that generally seem to work in the development of small-scale tuna fisheries include: well-funded and well-organised national FAD programmes, safety programmes, provision of critical infrastructure (e.g. wharves, markets), efforts to shield small-scale fishers from the negative effects of large-scale tuna fishing, and maritime school training.
- Government initiatives that generally seem *not* to work: Government fish collection schemes and 'giveaways', especially a) in the absence of a well-designed programme (e.g. the dropping off of a few boats), and b) setting up activities that undermine or conflict with the commercial sector.

Recommendations

Government fishery agencies in their support of small-scale tuna fisheries development should only be involved with, or accept project interventions that, have been subjected to a thorough practical and economic analysis.

Because there is considerable historical experience in small-scale tuna fishery development in regional organisations (especially at SPC), countries should take advantage of that knowledge and seek advice on small-scale tuna fishery development plans to increase the chances of success and lessen the possibilities of repetition of past mistakes.

4 Locations and development potential

Noting the relative success of FADs in small-scale tuna fishery development, an internally funded and well-organised national FAD programme that is effectively institutionalised into the government fisheries agency is of great importance in the development of small-scale tuna fisheries in the Pacific Islands region. Having stated this, FADs are not the complete or total solution to developing small-scale tuna fisheries. Experience shows that there are locations in the region where FADs exist but do not result in significant landings by small-scale tuna fishing (e.g. Ra Province in Fiji), and other areas where there is a substantial small-scale tuna fishery without FADs (e.g. April 2017 to May 2018 at Kadavu Island).

From this example and other experiences, it appears that several features must be present at a location for the development of a small-scale tuna fishery, some of which can be engineered (e.g. a FAD, the teaching of fishing techniques) but some are inherent characteristics of the site itself, such as the availability and/or abundance of fish, favourable geography, a local tuna fishing heritage, and features of the local economy. Because site characteristics cannot be easily addressed by fisheries development efforts, it follows that not all coastal locations have equal potential for the development of small-scale tuna fisheries. Appropriate site selection (i.e. the presence of favourable non-engineerable factors) is, therefore, crucial for the success of a small-scale tuna fishery.

There is also an urban–rural dimension to development potential. Experience shows that small-scale tuna fisheries that are based in urban areas usually have lower prices for fuel, higher fish prices, larger markets, and easier access to repairs and spare parts. But, urban locations do not necessarily have favourable geography or fishers with a strong tuna-fishing heritage.

Following from the above sentiment, in their quest to develop small-scale tuna fisheries, government fishery officials must reconcile two very different concepts: 1) all coastal communities deserve support to develop their small-scale tuna fishery, and 2) some sites have much more potential than others.

5 Concluding remarks

In the development of small-scale tuna fisheries, what have been the most important lessons learned and the strongest recommendations? The most prominent appears to be that developing small-scale tuna fisheries is not an easy process, and that government fishery agencies should not repeat the many mistakes that have been made in the past. Other important key lessons and recommendations that have emerged from this study are described below.

- The FAD is undoubtedly the most important tool for the development of small-scale tuna fisheries; however, sporadically deploying FADs when external resources allow is not a good strategy. Government fishery agencies that are serious about small-scale tuna fishery development should also be serious about a well-funded, well-organised national FAD programme.
- Small-scale fisher associations have the potential to catalyse and drive FAD programmes, identify training

needs, assist in data collection, and contribute to better coastal fisheries governance. Government fishery agencies should recognise that small-scale fisher associations can obtain substantial benefits for fishery stakeholders, and should therefore formulate mechanisms for interacting with these associations. National and international development partners should provide support for establishing and enhancing fisher associations.

- Encouraging small boat owners to venture offshore in search of tuna has significant sea safety implications. Government fishery agencies should ensure that their national FAD programmes have a sea safety component.

The development of small-scale tuna fisheries could result in significant benefits to Pacific Island countries in terms of contributions to both food supplies and cash income. The chances of success of that development would be much greater if attention is paid to the lessons learned from past initiatives in small-scale tuna fisheries development.

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Pacific Community, Fisheries Information Section, BP D5, 98848 Noumea Cedex, New Caledonia
Telephone: +687 262000; Fax: +687 263818; spc@spc.int; <http://www.spc.int>