

# From control to community: A personal perspective on 30 years of change in Pacific Island artisanal fisheries and aquaculture

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## Introduction

Thirty years ago, I joined the Coastal Fisheries Programme of the Pacific Community (SPC). I had just spent seven years with the Fisheries Division of the Fiji Ministry of Primary Industries – the last two of these years as caretaker Director. Much of my work in Fiji had been on coastal fisheries and aquaculture because these produced the most difficult and frequent problems and created the biggest workload for the Division. Tuna fisheries were certainly important to Fiji, with a local pole-and-line fleet feeding skipjack to the PAF-CO cannery and rapidly growing interest in longlining to fish for export-grade yellowfin and bigeye (albacore was not a primary target for the local longliners at that point). But tuna involved relatively few actors, while artisanal fisheries and aquaculture involved thousands. And they also involved major constitutional questions like resource rights and ownership, with disputes between neighbouring communities, overfishing of artisanally-caught export invertebrates, the need to monitor hundreds of landing points and/or dozens of markets, and an apparently limitless need for science – not just for assessment of the limits to fishing on thousands of individual reef and lagoon fish stocks, but also to develop basic biological and ecological knowledge on fish species that were not being studied much (at the time) by research scientists in developed countries. And in artisanal aquaculture there was the constant struggle to develop farming systems to the point where they could be cost-effective for rural communities to invest their time.

I worked as Senior Inshore Fisheries Scientist at SPC for five years before moving upstairs in 1997 to become the first<sup>2</sup> Director of SPC's Marine Resources Division (now FAME). As director I continued to work more with the Coastal Fisheries Programme than Oceanic because the CFP lacked a programme manager until 2005, while the Oceanic Fisheries Pro-

gramme (OFP) had Tony Lewis as manager and hardly needed me to interfere with their journey to excellence. A decade later I left what had become a middle-management job under an increasingly centralised structure and became immersed in tuna fisheries for the next 15 years, first helping the Nauru Fisheries and Marine Resources Authority in nationally implementing the PNA Purse-seine Vessel Day Scheme, then with the Forum Fisheries Agency as Director of its Fisheries Management Division, and latterly with the Kiribati Ministry of Fisheries Management and Resource Development as part-time Offshore Fisheries Management Adviser.

So, in this International Year of Artisanal Fisheries and Aquaculture it was very interesting to be asked by SPC to return to the non-tuna side of the fence for a few days to see just how many of our plans and hopes of 30 years ago had come to pass. For example, has a new paradigm for coastal fisheries management been achieved, as proposed by Bob Johannes in 1994 and 1998? Johannes suggested that another approach is required where less emphasis is placed on “hard” data and more on gathering information from the people who fish. He noted that “conventional fisheries research requires data collection over long time periods before it can generate significant answers, whereas management decisions are usually required immediately, and a trial-and-error approach, where errors are part of the learning process, would be more suitable in the Pacific islands context”. Has the management of coastal fisheries in the Pacific Islands developed into an “amalgam of conventional approaches, including those where data are gathered according to sampling criteria to test hypotheses, and the less data-intensive approach advocated by Johannes” as predicted by Dalzell et al. (1996)?

This will be a personal perspective.<sup>3</sup> An immense amount of literature and knowledge has accumulated in the last few years and there has not been enough time to carry out the kind of comprehensive “Status of Coastal Fisheries and Aquaculture” reviews that we did in 1995–96 (Dalzell et al. 1996, Adams 1996)) and 2008 (Adams et al. 2008), and which was followed up by SPC in 2013 (Anon 2013), so I'm afraid that this article will be full of generalisations and opinions. This is not a formal review, nor a programme planning aid. However, these informal comparisons between past and present will hopefully provide food for thought.

The term “artisanal” is difficult to define in a way that satisfies everyone. Throughout this article, the artisanal fisheries that I refer to will be small-scale family or community fisheries whether purely for subsistence or also for income, and will not include fishing and fishery related or aquaculture activities by commercial companies.

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<sup>2</sup> Note that the title of the Fisheries Coordinator post was changed to create this “first” Director post.

<sup>3</sup> An email sent to most Heads of Fisheries asking about the main coastal fisheries and aquaculture issues crossing their desks recently, and inviting any other comment, received very little response. Questionnaire overload appears to be growing problem in its own right.



Tahiti, French Polynesia 1970. © Val Hinds, SPC

## The Pacific Islands coastal fisheries subsector, then and now

### *Then: 1992 context*

- The total population of the South Pacific (as the Pacific Islands region was known at the time) was around 6.5 million people, 62% of those living in Papua New Guinea (PNG). Of the 4 million people in PNG, only one-quarter of them lived on the coast. The total coastal population of the region was therefore estimated at approximately 3.25 million people, equivalent to the population of a medium-sized continental city, but spread over an area of 29 million km<sup>2</sup> of ocean (Dalzell et al. 1996)
- Many Pacific Island nations had become notably “macrocephalic”, with large proportions of their population congregating into one capital city or island, often with erosion of their marine custodial traditions and knowledge along the way.
- Experimental aquaculture had been underway for 50 years or more, and the export of relatively non-perishable coastal fishery products such as beche-de-mer and mother-of-pearl shell had been established for over a century. Coastal food fisheries had been in place for up to 40 millennia. Despite the vast area of nearby ocean, Pacific Island fishers<sup>4</sup> had no great, shallow continental shelves to exploit, while coastal reef and lagoons areas were fragile and relatively limited in size, and easy to overexploit. Pacific Island coastal fisheries could thus be considered mature well before the 1990s, with little room for sustainable increases in exploitation around most islands and considerable worries emerging about excessive exploitation exacerbated by the breakdown of traditional governance structures.
- In many places there was felt to be too-hasty commercial development without adequate safeguards, due to severe misconceptions about potential coastal fisheries productivity<sup>5</sup> by some government economic planners. And there was very little awareness by many governments about the scale and importance of subsistence (non-commercial family or village-bounded) fisheries. Average fish consumption per head in most Pacific islands was much higher than for continental populations – and still is, although per-capita fish consumption appears to have increased in the rest of the world over the past 30 years as aquaculture has expanded.
- There were fears at the time that the upsurge in market demand for exotic marine products in China could place Pacific Island coastal fisheries in further jeopardy. For example, Crocombe (1994) suggested that one of the major challenges to fisheries management and marine tenure would be the increasing influence of Northeast and Southeast Asia. And if the pressure from Asia to share in the exploitation of the region’s coastal resources increased, this would be bound to cause conflict with traditional tenure.
- There was no regular regional update on the status of coastal fisheries and aquaculture production analogous to the SPC Tuna Fisheries Assessment Reports (eg Kearney 1981, Hampton et al. 1999, Hare et al. 2021), and there was certainly no possibility of the assessment of coastal capture fisheries status relative to targets and limits.

These and other issues informed a 1996 discussion paper on the institutional future of the SPC Coastal Fisheries Programme that was discussed by the 26th SPC Regional Technical Meeting on Fisheries.<sup>6</sup>

<sup>4</sup> (apart from those in southern PNG)

<sup>5</sup> Often expressed in glowing terms such as the “teeming bounty of the reef”

<sup>6</sup> <https://purl.org/spc/digilib/doc/34ff2>



### *Then: 1992 sectoral production*

In the early 1990s, Dalzell and Adams (1994) estimated annual SPC island member coastal fisheries total production, averaged over the four years 1989–92 as follows:

These numbers were extremely approximate, but at the time they were eye-opening because nobody had tried to put together this kind of region-wide estimate before. And they indicated that the nominal value of coastal fisheries (if subsistence fisheries had been given a market value) might be

similar to the nominal value of tuna fisheries to the Pacific Islands at the time (in terms of landed value by Pacific Island-owned tuna vessels plus licence revenue). It should be noted that most of this coastal fishery value was produced by subsistence, and commercially marketed, village-level, non-company fisheries i.e. artisanal fisheries.

Much more sophisticated analyses have been carried out since then, particularly by Bob Gillett and his various collaborators and we will look at these later.

Table 1: Mean annual coastal fisheries production in the South Pacific 1989-92

Catch	Weight (t)	Nominal Value (USD)
Commercial reef and deep slope fish	10,476	26,034,723
Commercial coastal pelagics	4,419	14,708,216
Commercial estuarine fish	1,586	4,280,170
Commercial crustaceans	1,903	15,343,502
Commercial beche-de-mer (processed to 10% fresh weight)	1,717	12,371,240
Commercial trochus-, green snail-, pearl-shell (whole weight)	2,147	8,688,686
<b>Total commercial catch</b>	<b>24,609</b>	<b>83,353,790</b>
<b>Total subsistence catch</b>	<b>80,049</b>	<b>160,323,747</b>
<b>Total coastal fisheries catch</b>	<b>104,658</b>	<b>243,677,346</b>

Nauru Island, 2018. © Ariella D'Andrea, SPC



### *Then: 1992 national institutional capacity*

It has always been difficult for SPC to quantify national institutional capacity because it requires regular requests for information from national fisheries administrations, unless countries produce regular annual reports including descriptions of their staff structure and work programmes. SPC did make an attempt to bring this information together in 1995 for the monumental two-week Forum Fisheries Agency/

SPC Workshop on the Management of South Pacific Inshore Fisheries (Adams et al. 1995), but it was recognised that this was not definitive due to the patchiness of questionnaire responses. Even though all but two of SPC's island members provided some response to the questionnaire (covering staff, budget, levels of training and areas of focus, etc.) few members answered, or had the data on hand to answer, all the questions.

Table 2: SPC island member fisheries institutional capacity

SPC island member	Staff	Budget
American Samoa	15	USD 450,000
Cook Islands	78	USD 4,026,020
Federated States of Micronesia	ND	ND
Fiji	112	ND
French Polynesia	79	USD 5,500,000
Guam	ND	USD 750,000
Kiribati	ND	ND
Marshall Islands	ND except for mariculture – 8	ND except for mariculture- USD 448,000
Nauru	3	ND
New Caledonia (National Marine Marchande)	5	USD 75,000
Niue	2	ND
Northern Marianas	ND	USD 500,000
Palau	ND	USD 227,000
Papua New Guinea (DFMR)	164	USD 6,830,000
Pitcairn Islands	0	0
Samoa	ND	ND
Solomon Islands	24	ND
Tokelau	3	USD 23,000
Tonga	ND	ND
Tuvalu	ND	ND
Vanuatu	ND	USD 240,000
Wallis and Futuna	ND	ND

(Most estimates are from 1993 data)

## Now: 2022 coastal fisheries context

- ◆ The total population of SPC island members is estimated to now be around 12,400,000 – approximately double what it was in 1992.
- ◆ Unlike 1992, there is now a set of regional frameworks that include national coastal fisheries and aquaculture including:
  - ⌘ the Forum Secretariat's *2050 Strategy for the Blue Pacific Continent* (<https://www.forumsec.org/2050strategy/>);
  - ⌘ the Pacific Island Leaders' *Future of Fisheries Roadmap* (<https://www.ffa.int/node/1569> and <https://fame1.spc.int/en/publications/roadmap-a-report-cards>);
  - ⌘ the *New song for coastal fisheries – Pathways to change: The Noumea strategy* (<https://purl.org/spc/digilib/doc/b8hvs>);
  - ⌘ the forthcoming *Regional Aquaculture Strategy* ([https://www.spc.int/DigitalLibrary/Doc/FAME/Meetings/HOF/14/HoF14\\_WP6\\_EN.pdf](https://www.spc.int/DigitalLibrary/Doc/FAME/Meetings/HOF/14/HoF14_WP6_EN.pdf));
  - ⌘ the *Pacific framework for action on scaling up community-based fisheries management: 2021–2025* (<https://purl.org/spc/digilib/doc/yr5yv>); and
  - ⌘ the *Regional framework on aquatic biosecurity* (<https://purl.org/spc/digilib/doc/23nkb>).

## Now: 2022 sectoral production

Bob Gillett's compilations of nation-specific information about the contribution of fisheries to Pacific Island economies (Gillett 2016) and the latest iteration of the FAO Pacific Island national fisheries profiles (Gillett and Tauati 2018) are far more specific and comprehensive than our first attempts to quantify this diversity in the early 1990s. But there are no more recent overviews of Pacific Island coastal fisheries production or usage data published, as far as I'm aware.

On the face of it, despite the doubling in size of the human population there has only been an approximate 50% increase in coastal fisheries production. However, it could be unwise to directly compare these two estimates (i.e., Gillett 2016 and Dalzell et al. 1996) because it is quite possible that the margins of error, particularly for the less sophisticated earlier estimate, are wider than the apparent difference between the two, and the methodologies used in the two studies are quite different, particularly through the incorporation of national Household Income and Expenditure Surveys (HIES) by Gillett.

It is beyond the scope of this brief opinion piece to analyse this more deeply. However, at the least, both these estimates make it clear that the coastal fisheries subsistence catch was, and still is, considerably larger than the commercial, across the region as a whole.

Table 2: Mean annual coastal fisheries production in the South Pacific, then & now

Catch	Weight (t)	Nominal value (USD)	Unit value (USD per kg)
1989–92 Regional annual commercial catch	24,610	83,353,800	by category
2014 Regional annual commercial catch	53,753	215,012,000	4.00
1989–92 Regional annual subsistence catch	80,050	160,323,700	2.00
2014 Regional annual subsistence catch	110,183	231,383,300	2.10
<b>1989–92 Total annual coastal fisheries catch</b>	<b>104,660</b>	<b>243,677,500</b>	
<b>2014 Total annual coastal fisheries catch</b>	<b>163,936</b>	<b>446,396,300</b>	
<b>1996 Total aquaculture product value</b>		<b>156,788,000</b>	

Note:

- 1989–92 fisheries estimates are from Table 1 in this article
- 2014 estimates from Gillett 2016
- 1996 aquaculture value estimate from Adams et al. (2000), based on Bell and Gervis (1999). This value is dominated (93%) by black pearl mariculture, mainly in French Polynesia. Does not include subsistence aquaculture production. Note that the value of French Polynesian black pearl production peaked around 2000 and has since declined significantly, mainly because of market price erosion.





Suva, Fiji, 2022. © Pauline Bosserelle (SPC)

### *Now: Current national institutional capacity*

Hugh Govan produced for SPC a relatively complete review of national policy, operational budget and staffing support for coastal fisheries (Govan 2015). The following extract has

been put together to provide a simple comparison with the previous national institutional capacity estimates by Adams et al. 1995, but the rest of Dr Govan's report provides additional analysis beyond that attempted in 1995.

Table 3: Recent SPC island member fisheries institutional capacity (from Govan 2015, Table 2 – most numbers are from 2012–2014)

SPC island member	Total staff	Coastal staff as % of total staff	Total fisheries budget (USD rounded estimate)	Coastal budget as % of total budget
American Samoa	31	100%	1,082,283	43%
Cook Islands	65	26%	1,300,000	27%
Federated States of Micronesia	66	56%	755,000	56%
Fiji	147	50%	3,200,000	60%
French Polynesia	51	14%	6,261,778	13%
Guam	7	100%	1,570,000	47%
Kiribati	103	70%	1,162,604	ND
Marshall Islands	90	67%	2,380,000	ND
Nauru	46	39%	1,278,865	15%
New Caledonia	35	69%	6,810,693	27%
Niue	4	50%	154,612	ND
Northern Marianas	17	65%	581,302	72%
Palau	32	34%	755,693	22%
Papua New Guinea	290	44%	39,000,000	44%
Pitcairn	0.125	50%	ND	ND
Samoa	57	33%	850,365	18%
Solomon Islands	79	59%	1,500,000	21%
Tokelau	7	43%	ND	ND
Tonga	50	24%	927,671	17%
Tuvalu	43	23%	463,835	13%
Vanuatu	54	39%	1,075,373	29%
Wallis and Futuna	3	100%	193,265	59%



Although there is not enough 1995 data to make an overall comparison of total staff numbers between 1995 and 2015, some comparisons can be made for individual countries, and if the same trend holds true for the total there has not been the same dramatic increase in government resources devoted to coastal fisheries in the last 30 years as had occurred in the previous 30 years, before which some SPC island members did not even have a dedicated fisheries administration.

What *has* increased significantly in the last 30 years appears to be the amount of government resources put into the day-to-day management of oceanic fisheries within SIDS EEZs. Thirty years ago, at the national level there was no clear distinction between oceanic and coastal fisheries in most jurisdictions – Fiji Fisheries for example was divided into Extension, Resource Assessment and Development, and Technical Services Sections and there were no separate oceanic and coastal units. With the development of the FFA Harmonised Minimum Terms and Conditions and the advent of Western and Central Pacific Fisheries Commission (WCPFC) and the need for compliance with an increasing body of regional obligations, together with the need to manage (or generate) the immense mass of data being generated by industrial tuna fisheries, the oceanic arms of national fisheries administrations have become more elaborate.

There is, however, no obvious, regionally-shared driver for the similar elaboration of national coastal fisheries services in most countries. Nor, perhaps, should one be expected, because each Pacific Island country has a different mixture of coastal fisheries to manage. Various integrative regional-level coastal fisheries initiatives have been launched over the years, and the “New song” (SPC, 2015) is particularly notable, not least for its capacity to bring coastal fisheries issues to the attention of fisheries ministers and Pacific Forum Leaders. However, coastal fisheries waters are muddled by a number of different actors, and there are no clear, legally-binding external fishery frameworks to respond to in the same way that countries have enthusiastically risen to the challenge of collaboratively managing regional tuna stocks and moving towards the full control of regional tuna fisheries in and around their own waters.

And of course, there is much less prospect in most coastal fisheries for recovering the institutional costs of research and management than there is from tuna fisheries – especially the equatorial EEZ tuna fisheries. Different models have had to be found, and the resurgence of community-based management and local marine management areas in many places has been particularly encouraging (SPC et al., 2021).

Kiribati, 2021 © Kinanoua Abaiang (MFMRD)



## SPC coastal fisheries institutional capacity then and now

In 1992, SPC didn't have a Fisheries, Aquaculture and Marine Ecosystems Division. In fact, it didn't have any divisions at all. It had a Coastal Fisheries Programme consisting of a Fisheries Coordinator, an Information Section, a Training Section, a Postharvest Section, a Development Section and an Inshore Fisheries Research Project, and it had a Tuna and Billfish Assessment Programme (TBAP). And "Coastal Fisheries" was not just confined to reef and lagoon work, but included all fisheries-related activities apart from those carried out by large-scale tuna vessels. That was the domain of the SPC TBAP (oceanic fisheries data, stock assessment and biology) and the Forum Fisheries Agency (everything else to do with industrial tuna fishery management apart from science).

At the time member countries kept SPC's coastal fisheries activities strongly focussed on "development", and the word "management" was only starting to be heard in 1992 – not so much as a result of the identification of problems through coastal stock assessment but more as a result of Pacific Island citizens increasingly complaining to their fisheries administrations about it becoming harder to catch certain important aquatic resources. These were usually more financial than food security complaints, concerning overfishing of commercially valuable resources rather than staple food fisheries. In the early 1990s, despite the publication of *Words of the Lagoon* a decade earlier (Johannes 1981), support for artisanal fisheries and recognition of community-based management were still only beginning to come onto government and regional radars in most SPC island member countries and territories.

In 2022, SPC supports artisanal fisheries and aquaculture through the Coastal Fisheries and Aquaculture Programme of the Fisheries, Aquaculture and Marine Ecosystems Division. Notable additions to the functionality of the division have been legal and economic<sup>7</sup> support, MCS (monitoring, control and surveillance – coastal fisher regulatory compliance) and of course aquaculture. On the other hand, training has been lost as a section in its own right, and the formerly substantial development section is now much smaller. The women's fisheries development section that existed for several years had morphed into the community-based fisheries management section, and the coastal fisheries research function has varied in size depending on donor interest since its establishment in 1987. The support for this latter work over the years had come mainly from the UK govern-

ment and the European Union, but financial support for coastal fisheries science now seems to be going through another downturn phase. CFAP now also has dedicated data management support and coastal fisheries data now being archived on behalf of member countries by CFAP. This represents a major step forward from 1992 when only tuna data was being compiled.

In terms of number of staff, the SPC Coastal Fisheries Programme has changed as follows:

- In 1992, there were 11 internationally-recruited and 4 locally-recruited staff working on coastal fisheries.
- In 2007 (15 years later), there were 25 internationally-recruited and 5 locally-recruited staff in the Coastal Fisheries Programme.
- In 2022, there are 26 internationally-recruited and 5 locally-recruited staff in the Coastal Fisheries and Aquaculture Programme, although some additional coastal fisheries functionality also rests in activities administered by the Director's office.

In terms of recruitment policy, the informal CFP priority in the late 1990s and 2000s was to increase the Pacific Island national staff ratio to at least 50%, which was largely achieved in 2008. Given the high proportion of women in

### *The view from 1962*

In the course of writing this 30-year comparison, I also looked at the state of regional fisheries support 30 years before that, through the lens of the first SPC Regional Technical Meeting on Fisheries in 1962, 60 years ago (Anon., 1962). The shift in focus is noticeable. In 1962 it was all about developing fisheries for food security to support "rapidly growing island populations"<sup>1</sup> and resource appraisal was for the purpose of assessing the abundance of new resources for development, not to inform management plans. One of the biggest coastal fishery problems at the time was controlling the use of left-over World War II explosives to catch fish. In 1992, it was still about development, but the need to prevent overexploitation and restore overfished areas (reinforced in the public eye by the 1992 Rio Earth Summit) was starting to turn the region towards sustainable development, and the calls on SPC CFP time were as much to help national administrations deal with problems as to develop opportunities. In 2022, it is increasingly about conservation and restoration of nearshore ecosystems and heavily-targeted reef fishes, and aquaculture is seen as the only aquatic food production systems with future growth potential.<sup>9</sup>

<sup>7</sup> By some measures this is long overdue. The Chair of the 1st SPC Regional Technical Meeting on Fisheries in 1962 said: "It seems to me that the economic aspects of the fisheries of the Commission's area are vital elements in plans and programmes and are elements which are not presently well enough known to provide a basis for such planning and programming."

<sup>8</sup> Although the limits to growth of fisheries were clearly recognised at the time, and priority put on the need to determine those limits

<sup>9</sup> There is of course considerable scope for providing future Pacific Island food from oceanic pelagic tuna fisheries. However, this is no longer a matter of increasing total production, because WCPO tuna stocks are now more or less fully exploited. It is more about further "domesticating" or retaining more of the production of these primarily export-oriented fisheries, or of using the financial proceeds from these fisheries to finance other food sources. Different SPC members have different strategies in this regard.



university marine studies at the time, it was expected that the gender ratio of the coastal fisheries staff complement would inevitably rebalance and possibly even tip in the opposite direction by the 2020s, but that women would probably continue to need extra support and encouragement to enter fisheries science and programme leadership for some time after that.

## Aquaculture

It is difficult to fit aquaculture into a “then and now” format using SPC FAME work as a mirror on the sector because SPC did not have an aquaculture section in 1992. Regional-level support at the time came primarily from the FAO South Pacific Aquaculture Development Project (SPADP) based in Fiji, although it operated mainly through a relatively ad hoc set of activities based on national requests.

At the national level on the other hand, aquaculture has always been relatively strongly supported, and when I was working for Fiji, the national aquaculture budget was larger than the fisheries assessment and development budget. Aquaculture has also been the subject of a large number of regional reviews over the past few decades, with Lindsay et al. (2022) being the latest.

SPC had hosted a major aquaculture development activity in the early 1970s, as part of the UNDP South Pacific Islands Fisheries Development Agency (SPIFDA). According to governing council records in the SPC Library, SPIFDA had some serious management and communication problems with member countries, and UNDP did not renew the grant in 1973. However, during its three-year lifespan the

agency commissioned much significant research, including many aspects of aquaculture, such as culture and/or management of oysters, mussels, pearl shell, giant clam, trochus, mud crab, freshwater and marine prawns, mullet, milkfish and rabbitfish, and experiments aimed at enhancing natural populations of spiny lobster and turtles. Projects started by SPIFDA were the start of national aquaculture research facilities still operating in Fiji, New Caledonia and Palau (Adams and Dashwood, 1992).

Subsequently regional support for aquaculture took place through the FAO South Pacific Aquaculture Development Project managed by Hideyuki Tanaka through two FAO project cycles up to 1996. When SPADP closed, SPC was under considerable pressure from both FAO and member countries to take its place, although it was four years before funding could be found to do this because of the cynicism that had grown up around the prospects for Pacific Island aquaculture becoming sustainable, after several decades of donor and government investment (e.g. Uwate 1983). A new paradigm for SPC aquaculture support had to be found, and after discussion of potential modalities at the SPC 50th Anniversary Conference in Canberra (this was the Conference that changed the name of the South Pacific Commission to the Pacific Community<sup>10</sup>), AusAID provided initial funding for a new SPC aquaculture activity.

This new SPC aquaculture unit was to be concentrated not on providing countries with aquaculture development support, but in helping them to assess which of the many private sector aquaculture development proposals vying for their attention or seeking subsidies and concessions were likely to be economically, socially and environmentally feasible. It was felt that the most appropriate driver for aquaculture

<sup>10</sup> ... but kept the acronym “SPC” to refer to the Secretariat, as opposed to the collective membership.



development in the economy was the private sector, which could respond more nimbly to changes in costs and benefits than most governments. And it was felt that regional support was best concentrated in the area where most member countries' trade and foreign investment promoters seemed to have trouble making hard-headed decisions. So, the new SPC Aquaculture Section was set up in 2000 with the primary aim of providing economics-informed advice to member governments to help them judge if the (largely foreign) aquaculture investment projects that were being presented to them for approval would likely be more beneficial to the country than to the foreign investor, and that they would actually be economically and technically feasible.

In this initial aim we failed. Although there were some wild and woolly private-sector aquaculture proposals being floated around the region at the time, most SPC member governments were reluctant to seek external advice on such proposals, or perhaps they felt that SPC would not be able to respond quickly enough to satisfy other government agencies whose main aim was to reduce the difficulty of doing business by foreign investors, or in the fear that SPC advice would be negative and that investment opportunities would go elsewhere if sent for appraisal. And so, SPC's new aquaculture unit came to concentrate on its other aims – including helping countries to create a regulatory environment that would put aquaculture on a legally sound footing, to help establish better biosecurity for translocated aquatic species, and to generally support the development of best-practice national aquaculture development plans.

There was not a lot of *artisanal* aquaculture in the SPC region in 1992. Most of the aquaculture projects crossing the desks of Heads of Fisheries were commercial, and many of these were rather speculative. But some artisanal examples were the village-level (*Kappaphycus/Eucheuma*) seaweed farms being trialled in several countries based on initial growout studies in 1975 in Fiji (Singh et al. 1975) and 1977 in Kiribati (Russell 1982) and followed up for commercial development in the 1980s by Fiji, Solomon Islands, Kiribati and a few other SPC members.<sup>11</sup> In Fiji, there was considerable effort put into the development of artisanal tilapia farming with extension work supported by the USA Peace Corps using fry supplied by the Japan-funded government aquaculture research station at Nauruloulou. And International Center for Living Aquatic Resources Management (ICLARM) was helping establish village-based growout facilities for naturally produced aquarium fish fry, and hatchery-produced giant clams in the Solomons. Nauru had one of the few communities with a longstanding tradition of aquaculture, where milkfish fry was captured in the lagoon and transported to natural inland brackish lakes, particularly Buada, for growout (Spenneman 2002, R. Kun pers. comm.).

Each country has a different driver and a different story to tell about aquaculture. Again, most of these stories are not so much artisanal as commercial, from the black pearl farming in eastern Polynesia to the pond culture of live bait for the pole and line industry in Tarawa, and all seem to be affected by external factors more than the technical success of the culture process. When it came to fish farming for local food security, there was often no great competitive advantage to farming except in areas where wild fish are scarce – such as highland communities, and near overexploited reefs, or for domestic markets where fish prices were high.

But whatever the short-term or even medium-term difficulties, aquaculture is the way of the future if human populations keep expanding, because *wild* populations of currently fished species are definitely not expanding. At some point in the not-too-distant future Pacific Island EEZs will become valuable for more than just tuna.

## Conclusions:

### *Notable changes in the last 30 years*

The following by-no-means-exhaustive list of changes emerged from this quick personal review of coastal fisheries and aquaculture:

- *NGOs are now much more active, and not just in fisheries conservation but also in management* – particularly in the provision of support for community-based management. In 1992 the scarcity of NGOs with Pacific Island fisheries interests was remarked upon by global agencies and specialists visiting from other regions. This lack was usually put down to the fact that the Pacific Islands had organised much more support for themselves through regional institutions than other regions. But non-government services in support of coastal fisheries and ecosystem governance have expanded dramatically since then. Special mention must go to the Locally Managed Marine Area Network<sup>12</sup> as well as established international NGOs like the World Wide Fund for Nature and The Nature Conservancy.
- *Community-based artisanal fisheries management is now recognised as being normal, not exceptional nor a relic.* As mentioned earlier, Bob Johannes' 1981 book *Words of the Lagoon* played a big role in helping to establish the fact that community custodianship and traditional knowledge has a legitimate role to play in maintaining healthy artisanal fisheries. This carried an important message for governments, many of which were beginning to despair about the difficulty of ensuring their

<sup>11</sup> This however was hampered by a fluctuating world market price and major competition from lower-production and transport-cost countries like the Philippines, as well as the number of cyclones in Fiji.

<sup>12</sup> <https://lmmannetwork.org>



sustainability through direct action – through the kind of monitoring and management mechanisms being used in developed countries for commercial fisheries, and now in use in the Pacific Islands region for tuna fisheries. Devolved responsibility is really the only way forward for diffuse, non-commercial multispecies fisheries, especially in those areas where customary mechanisms are still in place.

- *Women's role in artisanal fishing is now quantified.* It may still not be quantified adequately, but in the early 1990s there was no quantitative information at all on the vast majority of women's fishing activity, as Dalzell et al. (1994, 1996) discovered when compiling their reviews of the status of coastal fisheries in the island region. The tide began to turn with the work of Patricia Tuara of the CFP Women's Fisheries Development Section, who began assessing the role of women in fisheries in several SPC member countries (eg Tuara, 1998). Later, in the 2000's Mecki Kronen and colleagues at the CFP Reef Fisheries Observatory carried out some intensive social participation studies at sites in almost every SPC island member country (see Kronen and Vunisea, 2009). The SPC *Women in Fisheries Information Bulletin*, which was first published in 1997, provides a very interesting chronicle of this emergence.<sup>13</sup>
- *Rapid assessment methodologies and indicators for identifying stocks needing action, and measuring the results of action, are becoming usable.* This was something high on the coastal fisheries wish-list in 1992 but seemed virtually unachievable at the time – at least for widescale application. Available methodologies required expenditure in

survey and monitoring that were beyond the capacity of most Pacific Island fisheries administrations.

- *Fundamental biological and ecological knowledge about reef fish and invertebrates has improved significantly.* We now know a lot more about longevity, recruitment, growth and the responses of populations and assemblages to exploitation. The rigorous management of fisheries involving dozens of species is still some way off, but progress has been significant.
- *The New Song is providing a long-sought regional framework for action in coastal, particularly community-based fisheries management, and progress is being measured.* The regional Coastal Fisheries Report Card now provides a mechanism that allows senior decision-makers to regularly review what is happening, at least at the regional aggregate level. And there is now an annual Regional Fisheries Ministers Meeting that allows national fisheries Ministers to discuss their coastal fisheries and aquaculture issues together – something that was rarely possible before 2020.
- *No-take MPAs and fishery management measures are no longer 'either/or' options.* The development of area-based management, the creation of demarcated areas that enable community-based management, the use of traditionally-founded *ra'ui/tabu/bul* temporary "fishery respite" closures and the rise of the Locally Managed Marine Area network have seen to that. There will always be disagreement between the ends of the belief spectrum ("is it better to put our scarce resources into completely protecting a few areas, or in trying to limit fishing impacts

<sup>13</sup> <https://coastfish.spc.int/en/publications/bulletins/women-in-fisheries>



across the entire area”?), but constructive compromise seems to be more frequently achieved now than in 1992. And sometimes it is very constructive, although the latest version of the FAME Results Dashboard (<https://fameresults.org/>) suggests there is still a long way to go in scaling up effective coastal fisheries management.

- *Sharing information and experiences about coastal fisheries and aquaculture experiences between community and professional practitioners in different areas was identified as something needing strengthening, but does not appear to be particularly more advanced than in 1992.* Although the SPC Fisheries Information Section is producing excellent material and CFAP is increasingly bringing people together and documenting experiences, they were *already* producing strong output in 1992. It is excellent to see SPC still addressing the needs of an ever-evolving sector, but for several years this work was starved of resources. For example, the Heads of Fisheries meeting had been reduced to a two-year cycle and most of the coastal fisheries technical issues on the agenda had to be dropped entirely. For a while in the 2000s the annual number of opportunities for national coastal fisheries managers to get together at the regional level had dropped to less than one, while the number of tuna fisheries science and management meetings was expanding so much that we had to propose a “two-session rule” for WCPFC. In the 1980s and 90s, the Coastal Fisheries Programme used to run occasional major two-week workshop/conferences to bring national scientists and managers together and to document their advice and experience in a way that could be shared more widely. In fact, it was one such conference – the 1988 Inshore Fisheries Research Workshop – that was my first introduction to SPC. Bringing people together and documenting the results is resource-hungry and time-consuming, but it is essential if Pacific Island practitioners are to assist one another to progress. It is a personal view, but I have always felt that documenting, collating, publishing and disseminating both practical information and science is one of FAME’s core strengths and is something that SPC does better than any other regional agency. Perhaps the COVID pandemic experience has opened the door to more frequent dialogue through more cost-efficient virtual mechanisms, or perhaps even more resources need to be channelled in this direction.
- *The importance of marine spaces to Pacific Islanders is now globally recognised* – certainly much more so than it was in 1992. There was a long campaign by the CROP Marine Sector Working Group and by the Pacific Islands Forum and Pacific SIDS major groups at the UN to raise awareness about “large ocean developing states” through instruments like the Pacific Islands Regional Ocean Policy, and this also appears to have focussed global attention more specifically on watery issues that are important to the Pacific Islands. It is helping avoid the previous one-size-fits-all tendency for global

institutions, donors and big NGOs to assume that the problems and solutions for other oceans are the same as the problems and solutions for the western and central insular Pacific.

- *The direct value of subsistence fishing, and the indirect value of marine spaces, to small-island economies is now much better recognised.* In 1992 this was a plea to not just consider the value of commercial fisheries to the economy, as was mainly the case up until then, but for it to become clear just how valuable subsistence and artisanal fisheries are in nation-building. And to also recognise the role that marine spaces had in other sectors, particularly tourism. In large part this improvement has been due to the quantification of economic contributions of fisheries through the work of Bob Gillett and colleagues’ “Benefish” series (see Gillett 2016<sup>14</sup>).

Adams (1996) suggested several potential responses to the coastal fisheries issues that had been identified by SPC in the early 1990s. Most of the above points were on this wish-list. Progress on some of the other issues identified on the 1996 wish list is not so readily assessed, and information on whether they are implemented is too diffuse or unavailable for a quick review like this. These are mainly “research” items, but they may be worth mentioning:

- *Investigate to what extent small-island reef-fisheries depend on distant sources of recruitment, and the significance of “spillover” from reef MPAs for different resources.* This is something where considerable research has more recently been done. It would be interesting to review whether there are now definitive indications available that will be useful in Pacific Island fisheries practical conservation and management planning.
- *Map and estimate the area of coastal fishery habitat for different assemblages in each small island.* This would have been extremely useful for the kinds of broad-brush assessments we were doing in the early 1990s, particularly for sedentary species, to scale-up point observations to the whole island level. Remote sensing was in its infancy, and imagery was expensive. But the biggest stumbling block at the time was the fight for donor attention between different regional agencies. It seemed to be assumed that only one CROP agency could become the remote sensing analysis provider for the others.
- *Compile existing and new information on catch rates and yields of different tropical species under different levels of fishing pressure, from different gear, in different areas, to improve indicative baseline information on the way that stocks respond to exploitation. Make it widely available.* I don’t yet know how much of this has been achieved, or even whether it would still be considered useful. The coastal component of the EU-funded SPC PROCFish project had been originally designed to start this ball rolling but was

<sup>14</sup> A new Benefish update is expected in 2023.



subsequently redefined to concentrate on (relatively) quick snapshots at a few areas in each country rather than attempting the monumental task of setting up time-series monitoring and wide-area assessments.

With the benefit of 2022 hindsight, there were also some gaps in the 1996 list of needs that have since become obvious and are now being better addressed:

- *Provide predictions of the effects of climate change on artisanal fisheries and aquaculture* to assist SPC member countries and territories and communities to make informed decisions about adaptation or mitigation (and in the case of groupings of countries, information to assist in influencing the international community to reduce or avoid the global causes of warming)
  - Since around 2005, SPC has applied significant resources around climate change effects on fisheries, including the first major overview of the vulnerability of tropical Pacific fisheries and aquaculture to climate change (Bell et al. 2011), modelling predictions of climate change effects on the western and central Pacific Ocean (e.g. Nicol et al. 2022) and baseline assessments in a number of countries (e.g. Moore et al. 2012)
- Develop national and regional plans and policies to guide progress in coastal fisheries and aquaculture and to direct resources to the most important problems rather than being driven by crisis responses.
  - We did not consider this to be a priority issue at the time, but rather a mechanism to help address priority issues. However, some considered this to be a major omission. At the SPC level, it began to be addressed with the elevation of the Regional Technical Meeting on Fisheries (RTMF) to a more policy-oriented Heads of Fisheries (HoF) Meeting in 1999; a proposal to set up a regional Agreement on Coastal Fisheries Management (although this was not endorsed by HoF) and the development of a Strategic Plan for the Coastal Fisheries Programme in 2003, shortly after the arrival of SPC's first Planning Officer. Regional fisheries programme planning has of course gone from strength to strength since then, and national fisheries development plans and policies have proliferated, although some of these seem to have been driven by the need to give short-term donor projects something to.
- *Continually take into account the vulnerability of Pacific Island fisheries and aquaculture to market price changes.*
  - Fishery and aquaculture project development planners and banks often seem to assume that prices are predictable and downplay the risks, including the risk of flooding the market. Various Pacific Island marine products have fallen foul of this, including several that are important to the artisanal fishing and aquaculture communities such as black pearl, trochus shell,

“Eucheuma” (Kappaphycus) seaweed, and the tuna fisheries sector is certainly not immune. We often take natural resource limits and the danger of overfishing into account, or the dangers to mariculture of extreme weather events, but price forecasts in investment proposals – or at least the investment proposals that have come across my desk over the years – are usually optimistic. This is one of the reasons that regional fisheries development agencies need economists, and I was pleased to see this capacity added to the Coastal Fisheries and Aquaculture Programme several years ago. For a long time before that, fisheries economic advice had been considered the role of the Forum Fisheries Agency but FFA is focussed on commercial tuna fisheries.

- *Poaching:* I was going to make a new issue out of “blue boats” here, but the number of small vessels that were venturing far out of one specific province in one country in southeast Asia across the Pacific Islands region to plunder remote reefs appears to have peaked before 2020 and the problem solved primarily through diplomatic means. The ravaging of remote reefs has happened before (for example there was a major spike in harvesting of giant clams by South Asian longliners in the 1980s – also solved primarily by international dialogue, although this time involving CITES<sup>15</sup> at the importing end), and it will probably happen again. The SPC members closest to insular and mainland Asia have *always* been more vulnerable to poaching, including being at the forefront of live reef fish poaching in the 2000s. Illegal, Unregulated and/or Unreported (IUU) fishing had been seen as an oceanic commercial fisheries issue because the terminology grew out of the problems caused by vessels flying flags of convenience. But illegal fishing occurs at all levels, and the process of assisting coastal fishers to comply with government regulations or community rules has usually been grossly under-resourced. SPC now has a coastal fisheries MCS (monitoring, control and surveillance) support unit to help member countries address local compliance issues.

I won't attempt to predict how the national fisheries administrations and the SPC Coastal Fisheries and Aquaculture Programme might respond to all the points raised in these conclusions. There are already comprehensive planning systems in place whose job is to do that. My job was to look at what has changed in the last 30 years.

But I have been impressed. The net change is definitely for the better, and while there has been slower progress in the region that I would have hoped on some issues, there has been better progress on many more, including some that I would never have thought possible.

Regarding SPC's role in all of this, I think my only real note of caution would be about what appears to be the extreme reduction in coastal fisheries “development” functions. Even if the limits to exploitation have already been reached or

surpassed in most coastal fisheries, and even if any significant future expansion of local food or marine product export supply lies in freshwater aquaculture and mariculture, I think SPC coastal fisheries still needs to be able to provide advice, support and training on improving efficiency in the artisanal fishery value chain, whether that be in reducing fishing costs, in processing and preservation, in reducing wastage of fish, in marketing etc. Assisting artisanal fishers to get the most out of what they already have is going to become more and more important as resource sustainability limits tighten.

I asked a fairly rhetorical question at the start of this article: Has the management of coastal fisheries in the Pacific Islands developed an “amalgam of conventional approaches, including those where data are gathered according to sampling criteria to test hypotheses, and the less data-intensive approach advocated by Johannes” as predicted by Dalzell et al. (1996)? Given the expansion of community-based and co-management approaches, coupled with the intensification of research and compilation of knowledge, I think the answer is “yes”. We still have the data-intensive approach exemplified by the recent presentation to the 14th SPC Heads of Fisheries Meeting on “Building a sustainable approach to collection and use of coastal fisheries data for effective management” (Magron and Halford 2022), but we also have the burgeoning of community-based management approaches described in SPC et al. (2021).

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