



## Original Article

# The Lawless Sea? Policy Options for Voluntary Compliance Regimes in Offshore Resource Zones in the Pacific

Paul D'Arcy\*

### Abstract

*Pacific open ocean fisheries are classic examples of the tragedy of the commons where a lack of defined ownership results in competitive overexploitation by multiple parties. Such circumstances exist over most Pacific seas beyond site of land due to scarce monitoring resources. Voluntary conservation regimes are not working, as fisheries decline substantially. The Pacific has diverse management regimes and approaches, gaps between recommended principles of management and certain practices, and a need for more comprehensive data on assumptions underlying management regimes, especially marine protected areas. Compliance regimes can be enhanced through greater consultation and incorporation of stakeholders in policy-making and enforcement, devoting more resources to monitoring and enforcement, and integrating sustainable management regimes with national economic development needs. The focus of ocean policy primarily on fisheries issues needs to be broadened to include consideration of the compatible use of seabed minerals and biota with medicinal benefit.*

**Key words:** Pacific Islands, offshore resource zones, voluntary compliance regimes

\* Pacific and Asian History, The Australian National University, Canberra, Australian Capital Territory 0200 Australia; email <paul.darcy@anu.edu.au>.

### 1. Introduction

The open ocean fisheries of Oceania are classic examples of the economic paradigm of the tragedy of the commons—the idea that there is a tendency towards unsustainable use of areas not owned by specific groups or individuals but for which there is common access, either legally or de facto (Hardin 1968). In such circumstances, no one group has a compelling interest to protect them if they are open to all comers, and so seek to maximise their return before the resource is exhausted. Such circumstances can be seen as existing in high seas beyond exclusive economic zones (EEZ) of nation states under the United Nations Convention on the Law of the Sea (UNCLOS), and indeed over most parts of EEZ's beyond site of land given the scarce monitoring resources of Pacific Island nations. Voluntary conservation regimes seeking to persuade fishers that it is in their best long-term interests to comply are the only mechanism able to be applied at present to Pacific pelagic fisheries. The last decade has revealed mounting scientific evidence that this regime is not working, as once prolific fisheries decline substantially.

### 2. International Legal Rights and Economic Realities in Pacific Island Maritime Economies

The 1982 UNCLOS III forms the basis of ocean governance in Oceania. The Convention substantially extended coastal nations' sovereignty over adjacent waters (United Nations 1992). This benefited most modern Pacific

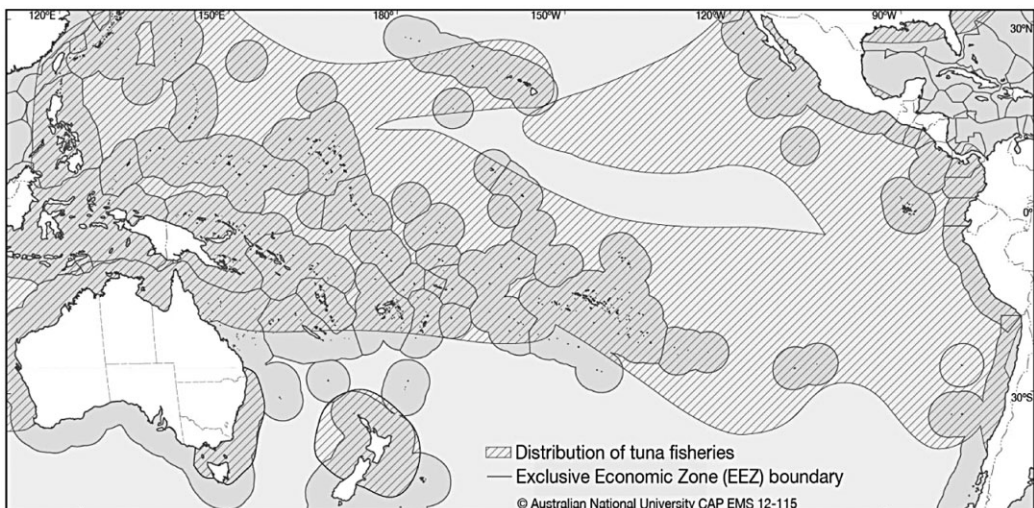
nations as island archipelagos surrounded by vast expanses of ocean. The outer limit of territorial seas was set at 12 nautical miles (22 km), but coastal states' sovereignty over living and non-living marine resources was extended to 200 nautical miles (370.4 km) from shore in the form of EEZs. Coastal states were also given the right to designate what constituted a sustainable catch within their EEZ, as well as who would get access to harvesting stock in excess of this sustainable catch, and the fee they would pay to the coastal state in return for this access (United Nations, Articles 55–75, especially 55–59). As Figure 1 demonstrates, the new 200 mi (370.4 km) EEZs dramatically increased the territory of Pacific Island nations, particularly archipelagic ones. For example, Fiji's 18,272 km<sup>2</sup> of land provided an EEZ of 1,290,000 km<sup>2</sup>, Kiribati's 690 km<sup>2</sup> of islands translated into an EEZ of 3,550,000 km<sup>2</sup>, while Federated States of Micronesia's 701 km<sup>2</sup> of land equated to an EEZ of 2,978,000 km<sup>2</sup>. Kiribati derives 45 per cent of its revenue from fishing and fishing licence fees, while Federated States of Micronesia derives around a quarter of its revenue from these sources (Crocombe 2001; Thomas 2003).

The potential maritime benefits of political independence have been eroded by economic realities. As small or fragmented political and

cultural entities that inherited limited modern infrastructure from their former colonial rulers, Pacific Island nations had limited ability to generate income domestically, and this meant that much income was absorbed in providing basic facilities and services taken for granted in more developed nations. Offshore fishing fleets from larger and wealthier Pacific Rim nations regularly violated Pacific Island EEZs in the absence of local monitoring. The same lack of resources to monitor offshore waters also meant that Island nations could not develop effective fishing fleets and were forced into fishing access agreements that returned a mere fraction of the value of the catch at market. The alternatives were forgoing this income and watching the offshore fishery erode through unmonitored fishing by non-citizens, or continued over-reliance on foreign aid from former colonisers (Crocombe 2001, pp. 368, 377–8; Jacobs 2002). The sea out of sight of land within and beyond Pacific Island nations' EEZs remains beyond the control of the state.

The big success story of Pacific Island fisheries has been sustainable fishery initiatives in neritic (near-shore) fisheries, including marine protected areas (MPA). Their most enduring and successful has been highly localised operations, where communities reliant on harvesting the sea also regulate its use (Anderson

**Figure 1 Geographical Extent of the Pacific Tuna Fishery**



1986; D'Arcy 2006; Bambridge & D'Arcy 2014). The *Pacific 2020 Background Paper: Fisheries* recommends improving coastal fisheries management through community involvement (Clark 2006). As well as monetary benefits, local participation in in-shore harvesting provides protein sources, import substitution for costly processed foods and local management of marine areas. Kiribati is developing a variety of initiatives to expand its near-shore resource base. These include tapping into the specialist aquarium fish market, and seaweed and pearl farming (Thomas 2003, pp. 9–14). Grafton et al. are more specific, pointing out that such schemes are particularly effective if local communities have the incentive to effectively manage the resource through uncontested ownership and receiving benefits from the harvest of the resource. Management is most effective when there are group rights that lead to collective community action (Hviding & Baines 1994; Grafton et al. 2006).

In an important, policy-orientated paper, economist Quentin Grafton (2000) compared the benefits, weaknesses and mechanisms used in the three main rights-based property frameworks advocated for management of resources in commons such as pelagic fisheries: private, community and state. Private rights-based management utilises market prices to regulate the catch, while direct returns to private rights holders spur innovation towards more efficient exploitation, but ultimately government enforcement is necessary to exclude non-rights holders from distorting and disrupting the system. Community rights-based management relies on social censure and reciprocal exchanges to ensure compliance for the good of the whole, but again needs government agency to exclude non-rights holders and relative internal consensus to work effectively, a consensus often tested when the ecosystem is under pressure and returns diminish. State-based rights provide the most resources for management, but this wealth of resources can be problematic in that different departments of state infrastructure may lack coordination, and compete with each other for control. State systems tend to be rules-based, which can lead

to potential lack of flexibility in the fluid or variable circumstances that characterise many contemporary Pacific pelagic ecosystems. Grafton argued that community management guaranteed and enforced by government was the most effective system to manage commons, although his supporting case studies only discussed community management of smaller, terrestrial commons, while his maritime cases study focused on private rights-based management of the largely neritic British Columbian halibut fishery. This article argues along similar lines to Grafton, but focuses in detail on existing and potential pelagic management regimes in the largely non-policed waters of the Pacific.

### 3. Current Pelagic Fishery Approaches

Community group rights have not figured in management regimes for pelagic waters. Rather national or international legal treaties and regulations signed by largely non-resident foreign signatories from Pacific Island and Pacific Rim governments and administered by government officials and regional fisheries' officials have prevailed. Such legal frameworks alone are insufficient to guarantee the survival and revival of Pacific fisheries. The Western and Central Pacific tuna fishery is particularly under stress from overfishing because of these circumstances, with the only current means of reversing this trend being voluntary conservation regimes seeking to persuade fishers that it is in their best long-term interests to comply.

The Western and Central Pacific tuna fishery is the largest and most intact tuna fishery in the world, supplying around half of the world's tuna supplies. Data from the Secretariat of the Pacific Community reveal that Oceanic nations' EEZs yield 78 per cent of the Western and Central Pacific Ocean tuna catch. The Oceanic artisanal catch represents less than 10 per cent of the total catch in this fishery (Chand et al. 2003, pp. 331–2; Cordonnery 2005; Williams & Reid 2006).

The wealth of the Western and Central Pacific tuna fishery relative to over-exploited and exhausted fisheries elsewhere has resulted

in increased pressure on this fishery. The main species targeted in the Western and Central Pacific tuna fishery are skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*) and bigeye tuna (*T. obesus*) (Williams & Reid 2006). In the last decade, the Secretariat of the Pacific Community has declared bluefin tuna critically endangered, and bigeye and yellowfin tuna to be in dramatic decline (Forum Fisheries Agency (FFA) 2008). The reason is not hard to determine. The total harvest has increased by an average of 5 per cent per year over the past 50 years. This average understates the escalating pressure that the fishery is under given that the number of boat-days has risen about 10 per cent per year over the period 1970–2000 (Kompas et al. 2010, pp. 1–2). In addition, illegal, unreported and unregulated (IUU) fishing within this fishery is estimated to take between 8 per cent and 16 per cent of the reported annual catch in the Asia-Pacific region (Food and Agriculture Organization of the United Nations (FAO) 2001; MRAG 2008). IUU fishing in Oceania takes the form of unlicensed vessels fishing within EEZs, fishing in closed areas, or misreporting or underreporting of catches (MRAG 2005). IUU fishing vessels have lower costs than licensed vessels as they pay less or no fees and are not bound by national or regional fisheries requirements.

The United Nations Fish Stocks Agreement of 2001 sought to develop a regime for voluntary action by stakeholder nations to preserve global fisheries. The agreement was based around the principle that coastal nations containing harvestable fisheries and distant water fishing nations (DWFN) required cooperation to effectively manage fish stocks on a sustainable basis, either bilaterally or multilaterally, or through setting up regional fisheries management organisations. The 2004 Tuna Convention flowed on from this, but its poorly funded Fisheries Commission limited its regulatory capacity, with enforcement of guidelines for sustainable harvests left to flag states—that is, states the fishing vessels are registered in, but not necessarily resident in. This created an obvious distance from, and tension with, territorial states in which

unsustainable harvests are made and were also impractical if the catch was sold in a port of a third state, especially one not party to a regional agreement. The Western and Central Pacific tuna fishery is collectively managed by member countries of the Western and Central Pacific Fisheries Commission. Members agree to adhere to a set of multilateral compliance measures, including compulsory registration of all fishing vessels, a vessel tracking system that plots the location of all registered fishing vessels, and a scheme to record and cap the total number of vessel days in the fishery by purse seine vessels. None of these measures address the problem of IUU fishing, however (FAO 2001; Kompas et al. 2010).

Ten DWFNs harvest 86 per cent of the catch sold at market from the Pacific, especially Japan, Taiwan, South Korea and the United States. All major stakeholders bar Japan signed a Multilateral High Level Convention (MHLC) on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean in Honolulu in 2000 (MHLC 2000). However, DWFN continue to prefer bilateral relations to multilateral ones when dealing with Pacific Island nations (Tarte 1999; MHLC 2000; Cordonnery 2005, p. 725). The exception has been the United States whose multilateral agreement with Pacific Forum nations produced terms more favourable to Island nations than most bilateral ones with DWFNs (Van Dyke & Nicol 1987). Bilateral agreements tend to be less restrictive on DWFN operations than the protocols that Pacific Island nations collectively agreed to in the FFA. The latter are perceived as also potentially compromising bilateral aid, which is seen by DWFN donors as potential tool for access to fishery rights on terms desired by them.

Economists Chand, Grafton and Peterson argue that only multilateral agreements can provide the basic requirements for sustainable governance of the Western and Central Pacific tuna fishery (2003). These requirements are that fishers were actively involved in co-management of resources; that total exploitation rates need to be accepted by most resource users and set at sustainable levels;

fishers need both long-term interests in preserving the fishery and individual incentives to do so; and last, that as with all international agreements, all parties must voluntarily cooperate in joint management, abide by the rules of exploitation and support mechanisms to restrict new entrants into the fishery. They see the need for a single policy-maker, such as a tuna commission, to set consistent and universally applied rules, to arbitrate disputes, and to support measures to restrict new entrants. Such an authority requires stakeholders to agree to give a percentage of their catch revenue to the authority to provide it with financial powers and capacity. In another paper on this fishery, Parris and Grafton note a tension between coastal nation national jurisdiction in EEZs and multilateral jurisdiction beyond EEZs in which coastal nations perceive little benefit to themselves from exploiting the high seas. They suggest that such tension can be reduced by sharing any rise in sale price with Pacific nations as the United States agreed to, setting up trust funds for them from tuna sales to partly rectify the small 3–4 per cent of catch sale price they receive as a resource rent (Chand et al. 2003; D'Arcy 2006; Parris & Grafton 2006).

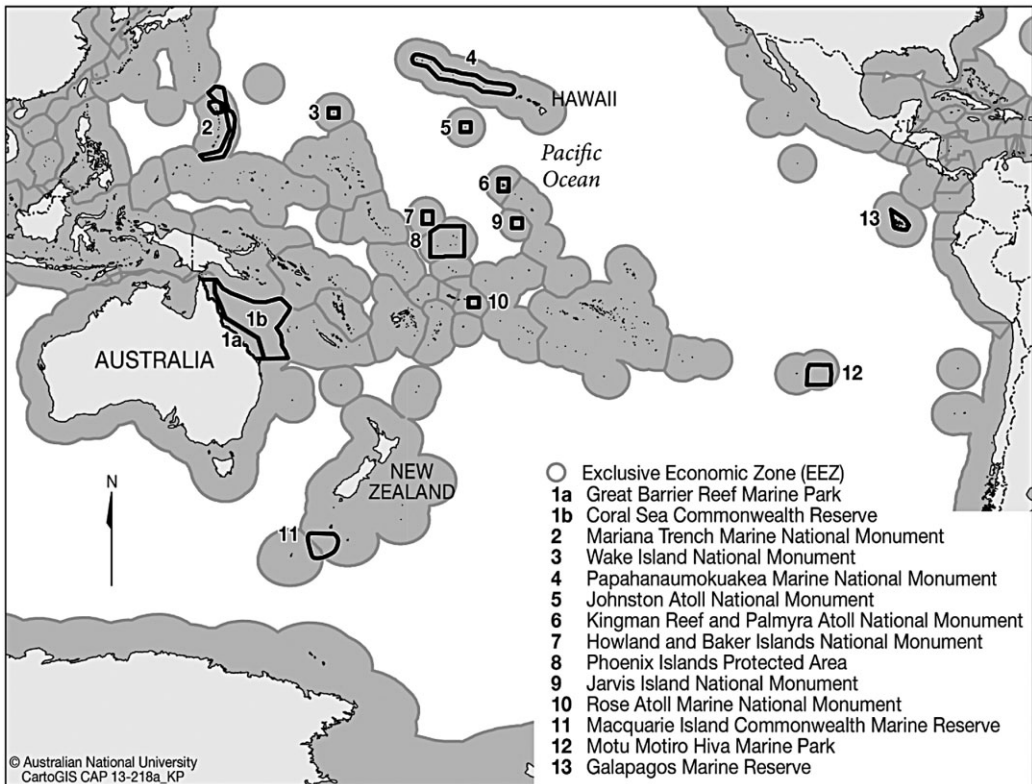
There are a variety of other options. Fleets of the European Union (EU) pay an average access rent equating to 18 per cent of the catch sale price to West African coastal nations (and up to 45 per cent of the catch sale price in some cases), which if applied to the 1998 figures for Oceania cited above would mean a leap from 60 million USD in access fees to 270 million USD. As the world's fisheries diminish, the bargaining position of Pacific Island nations should increase to enable the negotiation of similar rates to those occurring in the more exhausted Atlantic fishery. Setting aside a percentage of this increased revenue for monitoring and policing could raise income and protect the fishery by countering the huge trade in unreported and illegal fishing that floats unknown on top of the official sale price and catch figures. Kompas et al. argue that if the amount of tuna landed were to be reduced and if stocks were to rise due to reduced fishing, then profits (but not necessarily total

revenues) would increase because tuna would be easier and cheaper to catch. Carrying on with the same levels of exploitation will soon lead to massive financial losses as the cost of locating and landing increasingly scarce tuna outweighs increased sale price due to scarcity. In other words, at lower rates of exploitation, Pacific Island nations and DWFN would, overall, make more money (Bertignac et al. 2000; Kompas et al. 2010; FAO 2008). For Pacific aid donors, the implications are perhaps that more resources might be directed towards providing legal assistance in negotiating fisheries' agreements and viewing Pacific acceptance of relatively poor returns for fisheries licences as a key cause and effect of poor domestic income generation. Financial desperation forces poor returns, further enhancing the degree of desperation and pressure to undersell natural resources.

#### **4. The Rise of Large-Scale MPA in the Pacific**

Cultural affinity with the sea and its creatures, as well as a failure to control and significantly profit from marine resource, also means that Pacific Island nations have been amenable to calls from internal and international scientific and conservation lobbies for bans on fishing to allow protection and recovery of remaining stock. Large-scale marine protected areas (henceforth LSMPA) encompassing significant areas of pelagic ocean beyond sight of land have proliferated in the last decade (see Figure 2). While there is no standard accepted definition of LSMPA, most are defined as MPA covering areas of 100,000 km<sup>2</sup> or more (Leenhardt et al. 2013, p. 1). The median size of MPA is 1.6 km; LSMPA now make up over 50 per cent of the total area of MPAs globally. In recent years, there has been a trend in the Pacific Ocean especially towards even larger LSMPA, with the Cook Islands for example declaring a 1.1 million km<sup>2</sup> MPA covering half its EEZ in 2011 (Cook Islands Government). Pacific nations and international non-government organisations have been pushing for management of a 40 million km<sup>2</sup> Pacific Oceanscape that embraces multiple national

Figure 2 Pacific Large-Scale Marine Protected Areas 2013



EEZs that will contain 7 per cent of the earth's surface, while whale and shark sanctuaries already embrace and combine multiple EEZs (Conservation International n.d.). Three ecological and administrative rationales have underlain the rise of LSMPA: the realisation that most of the oceans were not protected and species were declining rapidly as a result of poorly regulated pelagic fisheries; that this decline had serious consequences for near-shore fisheries that provided sustenance and income for many coastal peoples in islands with limited alternatives on land; and finally that it was more efficient to manage one integrated large area than a lot of small, uncoordinated MPAs with unmonitored, but ecologically interlinked seas in between (MPA News 2011).

As new experiments in marine management, LSMPA planning has been based on an, at times, uncomfortable mix of management experiences and common assumptions of near-

shore MPA and marine scientific knowledge of the nature of pelagic fisheries. Planners have worked on the assumption of the increased efficiency of LSMPA over smaller, more fragmented administrative and regulatory MPA regimes, while yet also recognising the ineffectiveness of pelagic fisheries regimes requiring voluntary compliance because of the sheer size of the fishery and significant lack of monitoring capacity that this entails for small island states. This dichotomy between enhanced organisation efficiency of larger coordinated MPA regimes sits uncomfortably with the practical reality of a failing pelagic sustainable regime essentially based on voluntary compliance by DWFN. Highly variable rates of recovery and success in MPA mean that caution needs to be applied in assuming the success stories of intensively managed local near-shore MPA can be applied offshore solely through the use of more integrated and coordinated business models.

The applicability of neritic MPA management principles to LSMPA offshore remains untested and uncertain. These management principles are based on the assumption that MPAs revive biota. In 2003, Willis et al.'s published a paper that suggested that there was limited definitive evidence that MPAs revive biota. Their survey of scientific papers on MPA revealed that only 42 per cent of published papers used empirical data. They also noted that this data were often flawed due to the uneven spread and insufficient number of sample sites, limited time horizons to plot changes to biota, and limited control sites to test sampling sites against (2003).

This is not a reason to abandon MPAs, but rather a reason to increase partnerships between marine scientists and local fisherfolk to improve knowledge and data collection in a climate of limited research funding. It is also important to reiterate that MPA serve many functions other than purely protecting biota from exploitation to allow the revival of fish populations, each of which makes a strong case for the involvement of coastal communities that both benefit from, and are needed to implement, these processes. In the words of Aulani Wilhelm, Superintendent of the Papahānāumokuākea Marine National Monument,

MPAs are now viewed as tools to protect intrinsic ecosystem function; to establish refugia ecosystem function; to establish refugia for endemism or biodiversity (or both); to provide local communities with management tools appropriate for place; to increase protection for essential harvest species (e.g. food security); to enhance education and community engagement with coastal areas; to protect culture and heritage including access to areas and species; and the list goes on. To accomplish this variety of community and political aspirations, MPAs of all sizes are needed because the size should depend on the purpose for which the site is being designated (MPA News 2011).

Aulani Wilhelm and others argue strongly that Pacific MPAs should be seen as integrated parts of long-term community empowerment strategies in which fish bans are temporary means to ends rather than the ends themselves. This is in keeping with economic theory advo-

cated by Grafton and others above in which maximum sustainable efficiency is achieved through local community stakeholders profiting from and regulating fisheries. Four Pacific MPA practices are worth emulating in creating and maintaining pelagic MPAs. First, overriding coordinated policy avoids loopholes and contradictory instructions and practices. The principles upon which these policies are based need to be regularly revised, in ways that consult and incorporate all stakeholders as practised by Great Barrier Reef Marine Park Authority (GBRMPA), Papahānāumokuākea and the Cook Islands. Second, local communities should be used to monitor and enforce sustainability in partnership with marine scientists as is practised in Japan, GBRMPA, Torres Strait, Aotearoa/New Zealand, Samoa, Cook Islands, Fiji and French Polynesia. The third is education of young people and local communities on marine sustainable practices in culturally appropriate form, as is done by the Vanuatu Cultural Centre, Hawai'i, Moorea and Aotearoa/New Zealand. Finally, some form of improved surveillance and enforcement capacity is needed in pelagic areas of MPA to protect the offshore fishery from illegal distant water fishing fleets. The most commonly suggested are the use of satellite monitoring to pinpoint locations, more fisheries officers on vessels to monitor catch, and giving DWFN a stake in reviving the MPAs such as exclusive access rights to them until such time as the fishery has recovered to either resume commercial forestry or develop marine-centred ecotourism (Papahānāumokuākea Marine National Monument, Australian Government, Great Barrier Reef Marine Park Authority 2002; Kanwal 2013).

### **5. Integrating Non-Fishery Resources into Planning: Seabed Mining and Pharmaceutical Resources within EEZs**

The Pacific Ocean fishery is not the only maritime resource available to Pacific Island nations, and may not even be its most valuable resource in the long run as advances in technology and scientific processing allow the potential exploitation of other marine

resources on a commercial basis in the near future because of lowered costs of extraction and higher unit returns for these concentrated and high-demand resources. This is especially true for seabed minerals and pharmaceutical resources, where rapid advances in the technology of extraction and use have left planners unprepared. Pacific Island nations and international bodies working on Pacific marine resource plans need to prepare and integrate other resources into management plans sooner rather than later, as the three types of resource exploitation—fishing, seabed minerals and pharmaceuticals—ecologically overlap in places, potentially affecting the health of the others, and are governed by different international and domestic legal regimes, especially between the seabed and pelagic waters above them. If the potential economic return from pharmaceuticals and/or seabed minerals prove correct and adequate precautions are put in place to protect other marine resources, the potential economic return to Pacific Island nations will alleviate one of the driving economic forces pressuring Pacific Island nations to undersell and broaden Pacific Rim nation fleets' access to their EEZ fisheries.

Technological advances and increasing knowledge about the vast majority of the ocean's resources which remains uncertain call for a broadening of scope to Pacific maritime management regimes and their almost exclusive focus on fisheries. The oceans' benthic (seabed) environments remain some of the least known ecosystems on earth, despite the fact that most of the earth's geological surface is seabed. In July 2011, slowly accumulating evidence of the economic potential of the ocean floor was given a boost when Japanese scientists published evidence of large deposits of rare earth metals on the seabed in the eastern South Pacific and central North Pacific (Kato et al. 2011). Rare earth metals are among the most expensive minerals on earth because of the general lack of terrestrial sources concentrated enough to be commercially viable to mine. There have been significant advances in seabed technology in recent years for exploring and mining at great depths (Latimer n.d.). Other types of mineral deposits are also claimed to be

approaching viable levels for seabed mining, although these claims are by no means uncontested, as discussed below.

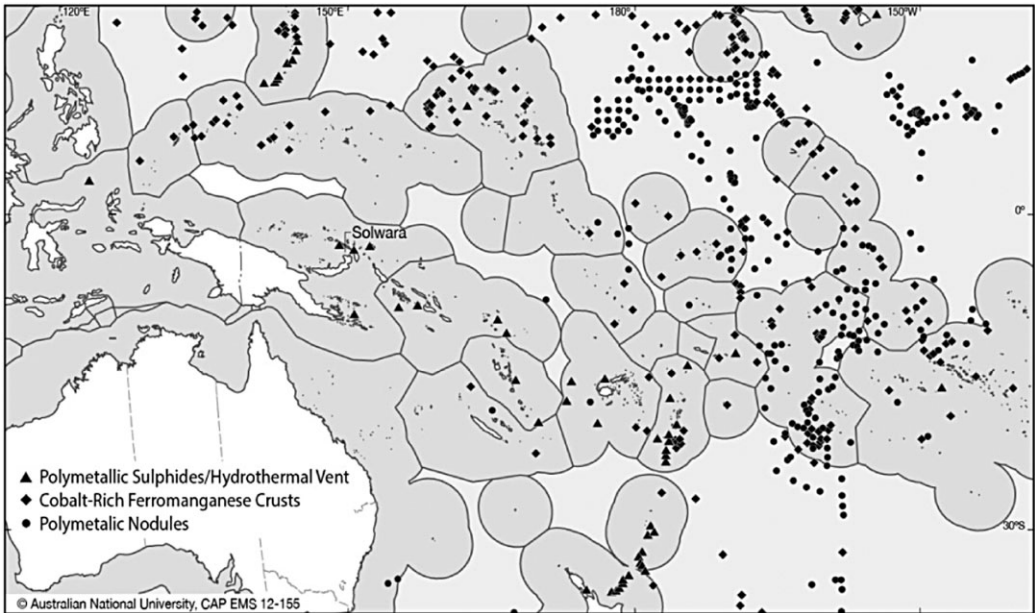
This new maritime frontier looks set to expand in the near future. The United Nations' designated regulator of seabed mining beyond EEZs, the International Seabed Authority (ISA), is processing a small, but rising number of applications for seabed mineral exploration in the Pacific. The rapidity of progress towards commercial seabed mining commencing has left national governments and international regulators scrambling to design and put in place policies, safeguards and laws pertaining to seabed minerals within and beyond EEZs. These new economic opportunities may also pose a potential threat of unknown magnitude to Pacific fisheries and may require greater coordination between fisheries and seabed mining regulators and industries in years to come.

There are three types of known seabed mineral deposits. The main Pacific locations of each type of deposit are illustrated in Figure 3. The first consists of manganese nodules, which are fist-sized polymetallic clumps containing valuable minerals, such as manganese, nickel, copper and cobalt, that lie on the seabed. Most known deposits lie in the deep ocean in international waters as deep as 5,000 m or 3 mi down (ISA n.d.: Polymetallic Nodules). Although their existence has been known for over 100 years, technical difficulties with extraction, legal uncertainty about access and ownership rights to seabed mine sites, and the cost of extraction relative to land-based deposits deterred seabed mining. Sustainability may also be an issue once more data on their abundance are known, as nodules take millennia to reach their modest size. Improvements in technology derived from offshore oil and gas operations have now made the extraction of this type of mineral technically feasible. The second type of potentially commercially viable seabed mineral deposit is cobalt-rich crusts on ridges and seamounts in all the world oceans (ISA n.d.: Cobalt-Rich Crusts).

The third type of seabed mineral deposit is polymetallic sulphides formed around hot



Figure 3 Pacific Seabed Mineral Locations



springs in volcanic areas where heated seawater in volcanic fissures dissolves minerals. The mineral-rich heated water rises like a geyser from the seabed to cool and condense the minerals. These deposits can be up to seven times the quality of the same mineral mined on land and can grow up to 6 m per year. These vents abound along the Western Pacific's Rim of Fire. Most of those discovered so far lie within EEZ, with many in water as shallow as 1–2 km, and they have already attracted bids for exploration licences off New Zealand, Japan, Fiji, Tonga, Solomon Islands and PNG. To date, around 200 vent fields have been located, although most appear too small to be viable to mine (ISA n.d.: Polymetallic Sulphides).

Seabed mineral deposits may have other significant economic value, as well as minerals. No hydrothermal vent communities have been comprehensively biologically mapped, and some may contain species with potentially significant energy or medical applications to human societies. For example, the biochemical properties of organisms that can tolerate temperature extremes found in and around deep sea vents and that find sustenance in toxic fluids of the vents have great potential benefit

for biotechnology industries. Enzymes from hydrothermal vent organisms are already being used in a variety of ways, such as skin lotion that counters damage from free radicals (Henne et al. 2004). Hydrothermal vent biota are specialised to adapt to their unique habitats, and are therefore highly vulnerable to disruption of these habitats, especially given that the surrounding seabed ecology is usually quite different (Drew n.d.). It, therefore, follows that seabed mining for minerals may destroy flora and fauna that also have economic and medicinal value for humanity, most of it as yet unknown. Vents targeted for mineral extraction should ideally be thoroughly biologically mapped before the commencement of mining. Balancing the delay in securing mineral revenue from mining, while seabed communities are mapped, and the possible loss of revenue and medical cures from biological extraction, present the designated regulators of the seabed within and beyond Pacific EEZs with yet another significant legal conundrum to deal with.

Despite these lengthy negotiations, the untested nature of seabed mining and the limited research on seabed biological communities means that the environmental impact of

seabed mining will only become apparent after mining commences. In such circumstances, the precautionary principle or precautionary approach should, and indeed must, prevail. This precautionary principle states that in the absence of scientific consensus on whether an action or policy will harm the public or the environment, the instigators must prove that it is not harmful before commencing. The precautionary approach offers more leeway for moving forward with caution than the precautionary principle, although both allow some leeway for new actions to be attempted with due consideration of safeguards as all the consequences of new actions cannot be known in advance (Kriebel et al. 2001). These concepts have gained increasingly wider support since articulated as Principle 15 of the Rio Earth Summit Declaration in 1992. Principle 15 states: 'In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation' (United Nations Conference on Environment and Development 1992).

In the case of seabed mining in unexplored or underexplored benthic biological communities, the precautionary approach might take the form of intensive biological surveys before the commencement of seabed mining, and also, beginning operations with a period of less intensive mining on a small section of a larger ecosystem to monitor the impact of mining and retain unmined sections of the zone in case of unanticipated devastation from mining. The appropriate length and form of such an experimental stage of mining would involve balancing marine science and commercial imperatives.

## 6. Conveying (Temporary?) Ownership to the High Seas: The ISA Approach

While community management has not been attempted for pelagic fisheries within EEZ to alleviate the tragedy of the commons syn-

drome, conveying *de facto*, but temporary 'ownership' and extraction rights has been attempted for seabed mining exploratory licenses. The determination of such rights is still being worked out within EEZs, and beyond national EEZs remains confined to the granting of rights to explore for minerals in geographical zones applied for by mining companies, increasingly with the support of one or more national governments. The precautionary principle will presumably require a great deal of self-regulation in such vast and remote locations. Such an arrangement potentially lacks the twin pillars of successful management of commons advocated by Grafton and others—community regulation and government enforcement.

The final UNCLOS set up the ISA in 1994 to regulate deep sea mining ventures outside nations' EEZs (ISA n.d.: Introduction). All 159 signatories to UNCLOS and the European Community are members of the ISA. The ISA's two representative bodies are the ISA Assembly on which all members sit and the 36-member council elected by the Assembly on the basis of criteria designed to ensure equitable representation for various groups, including those engaged in seabed mineral exploration (four members); land-based producers of minerals found on the seabed (four members); developing nation states with special interests, such as those with large populations, land-locked nations, Island states and states that are potential land-based producers of seabed minerals or major importers of minerals to come from the seabeds to be mined (six members); and geographical coverage of the globe, with at least one member from each of the following regions: Africa, Asia, Eastern Europe, Latin America and the Caribbean, Western Europe, and others. Membership is rotated by vote on a 4-year cycle and is held by representatives of nation states. At present, Fiji is the only Pacific Island member of the ISA Council (ISA n.d.: The Council).

The ISA devised regulations in 2000 for prospecting and exploration for polymetallic nodules. Provisions to minimise damage to the marine environments to be exploited were

a particular concern. In the following 2 years, the ISA signed 15-year contracts with seven private and public entities, granting these entities exclusive rights to explore for nodules in 75,000 km<sup>2</sup> tracts of seabed. (Each area is limited to 150,000 km<sup>2</sup> (58,000 mi<sup>2</sup>), of which half is to be relinquished to the authority after 8 years (ISA n.d.: Exploration Areas). Each contractor is required to report once a year on its activities in its assigned area.)

The EU is currently sponsoring a 4-year project to help Pacific Forum nations to develop their seabed mining policy frameworks—Samoa, Tonga, Fiji, Cook Islands, Solomon Islands and Vanuatu are also following Papua New Guinea's lead on this legislative frontier (Radio Australia 2011a, 2011b). In 2008, private companies in Tonga and Nauru aligned with the Canadian company, Nautilus Minerals, and supported by their governments became the first developing nation entities to apply for ISA authorisation to explore the seabed beyond EEZs for polymetallic nodules. The ISA granted an exploration contract to Nauru Ocean Resources Inc. in July 2011 and to Tonga Offshore Mining Limited in January 2012 (ISA n.d.: Contractors). The Fijian delegate to the ISA was the sole Pacific Island advocate for these applications within the ISA, and noted that in dramatic contrast to the applications from Russian and Chinese-based applicants, the Nauruan and Tongan applications faced extended opposition from a number of prominent members of the ISA Council before finally being approved (The Permanent Mission of Fiji to the United Nations, 'International Seabed Authority Approves Applications' n.d.). Pacific nations have a strong case for lobbying for greater representation in ISA decision-making bodies given that their maritime territory will form the overwhelming majority of early experimental seabed mining operations. Given the potential damage and financial rewards to Pacific Island nations, Pacific aid donors should also pay serious attention to this neglected dimension of potential maritime resource use.

## **7. The Need for a Comprehensive, Multinational Approach to Marine Resource Management in the Pelagic Pacific**

Pacific Island nations face major challenges in seeking multilateral solutions to oceanic issues confronting them. Their collective thinking is reflected in the Pacific Islands Regional Ocean Policy (PIROP) produced by a Marine Sector Working Group of the Council of Regional Organisations in the Pacific in response to a request from Pacific Island Forum leaders in 1999. The PIROP seeks to 'ensure the future sustainable use of our ocean and its resources by Pacific islands' communities and external partners' (Pacific Islands Forum Secretariat 1999). The PIROP outlined five guiding principles for ensuring this objective: improving understanding of the ocean, sustainable development and management of ocean resources, maintaining the health of the ocean, promoting the peaceful use of the ocean, and creating partnerships and promoting cooperation.

Laurence Cordonnery ends her insightful commentary on the practicality of implementing the PIROP by noting its two major challenges—one within Oceania and one concerning DWFN. 'Within the region, political leadership and the willingness to commit and raise adequate resources will be essential if the foreseeable implementation difficulties outlined in this article are to be overcome. This challenge will determine whether the Policy can be used as a model in ocean governance as it promises to be. For regional powers within the Pacific Rim who were not part of the inception and endorsement phases of the PIROP process, their commitment to PIROP will be determined by Pacific Rim nations' willingness to act as partners and to cooperate with PICs in the implementation process' (Cordonnery 2005, p. 731).

Eventual multilateral, international legal agreements on Pacific fisheries and seabed mining should not be seen as inevitable, if somewhat distant from realisation. Pacific nations may start seeing merit in emphasising bilateral relations if multilateral fishing agree-

ments continue to be violated or they have a limited say in decision-making processes concerning seabed mining. The Federated States of Micronesia is currently in discussion with the PRC (henceforth China) concerning exclusive rights to fish in its EEZ, which gives China a stake in also policing illegal fishing within a zone of exclusiveness that the host nation lacks the resources to police and monitor itself. Tonga's and Nauru's alliance with the commercial mining company, Nautilus, to secure a stake in the resource extraction and in the ISA organisational process has been noted (Papua New Guinea Mine Watch 2011). The legal ambiguity and immense economic potential and risk of the pelagic reaches of the Pacific Ocean offer perhaps the greatest potential for the effective combination of political-legal and development-economic regimes signalled in the recent mergers of foreign affairs and aid providers in major Pacific Rim aid donors to the Pacific, such as Australia, New Zealand and Canada. This potential will only be realised for the benefit of all parties through effective two-way dialogue and effective cooperation of all players.

## 8. Policy Implications and Recommendations

This survey suggests five strategies of relevance to policy-makers working on the sustainable use of pelagic resources in the Pacific Islands, and Pacific Rim nations such as Australia with substantial maritime interests and development agendas in the Pacific.

### 8.1 Focused Research

The first is that assumptions about the efficacy of MPA as means of protecting and reviving biota need to be investigated intensively given the diversity of results across MPA. As diversity occurs in MPA located broadly similar ecosystems, more attention needs to be focused on human factors, such as policy and local community participation, regulation, and compliance.

### 8.2 Greater Integration of Policy

Second, given the importance of the human factor noted in point 1, overriding coordinated policy to avoid loopholes and contradictory instructions and practices is vital. The principles upon which these policies are based need to be regularly revised, in ways that consult and incorporate all stakeholders.

### 8.3 Better Enforcement

Third, MPA success and policies should not be assumed to be totally applicable to pelagic environments, not so much because of ecological difference but rather the diminished enforceability of legal regimes in pelagic environments as opposed to neritic environments. Making current rules-based regimes work requires much greater attention towards some form of improved surveillance and enforcement capacity in pelagic areas to protect the offshore resources from illegal activities. The most commonly suggested are the use of satellite monitoring to pinpoint locations, more officials on vessels to monitor extraction activities, and giving external stakeholders a stake in reviving resources, such as exclusive access rights to them.

### 8.4 Economic Benefits for Pacific Nations

Fourth, pelagic policy options need to be viewed not only as a means of restoring marine ecosystems and biota, but also ones that generate viable and profitable economic returns to local communities and Pacific Island nations to reduce dependency on aid and especially poor returns from renting resource access to DWFN and multinationals because of limited alternative economic options. Conservation regimes are a means to an end, not the end in itself. The aim is a locally controlled, sustainable pelagic economy returning most profits to those with the largest stake in its ecosystems, Pacific Island communities.

### 8.5 Integrated Resource Management

The final conclusion is that the focus of ocean policy primarily on fisheries issues needs to increasingly be broadened to include consideration of the compatible use of seabed minerals and biota with medicinal benefit to humanity. These competing uses may at times be contradictory or mutually incompatible. Placing an effective and comprehensive policy regime in place is now a matter of global significance given the decimation of most fisheries beyond the Pacific, and the vast but uncertain medicinal, mineral and food resource potential of this huge surface of the planet and the vast volume of water beneath it.

April 2014.

#### References

- Anderson A (ed) (1986) *Traditional Fishing in the Pacific*. Bernice P. Bishop Museum, Honolulu, HI.
- Australian Government, Great Barrier Reef Marine Park Authority (2002) *Developing the Draft Zoning Plan*, viewed May 2014 <<http://www.gbrmpa.gov.au/zoning-permits-and-plans/rap/developing-the-draft-zoning-plan>>.
- Bambridge T, D'Arcy P (forthcoming) Large-Scale Marine Protected Areas in the Pacific: Cultural and Social Perspectives. In: Feral F (ed) *Large-Scale Marine Protected Areas*. GRAMP, Paris.
- Bertignac M, Campbell HF, Hampton J, Hand AJ (2000) Maximizing Resource Rent in the Western and Central Pacific Tuna Fisheries. *Marine Resource Economics* 15, 151–77.
- Chand S, Grafton RQ, Petersen E (2003) Multilateral Governance of Fisheries: Management and Cooperation in the Western and Central Pacific Tuna Fisheries. *Marine Resource Economics* 18, 329–48.
- Clark L (2006) *Pacific 2020 Background Paper: Fisheries*. Commonwealth of Australia, Canberra.
- Conservation International (n.d.) *Pacific Oceanscape*, viewed May 2014 <<http://www.conservation.org/global/marine/initiatives/Oceanscapes/pages/pacific.aspx>>.
- Cordonnery L (2005) Implementing the Pacific Islands Regional Ocean Policy: How Difficult Is it Going to be? *Victoria University of Wellington Law Review* 36(4), 723–31.
- Crocombe R (2001) *The South Pacific*, University of the South Pacific, Suva.
- D'Arcy P (2006) The Role of the Tuna Fishery in the Economy of Federated States of Micronesia. *Pacific Economic Bulletin* 21(3), 75–87.
- Drew LW (n.d.) *The Promise and Perils of Seafloor Mining*, viewed May 2013 <[https://www.whoi.edu/cms/files/PromiseAndPeril\\_68263.pdf](https://www.whoi.edu/cms/files/PromiseAndPeril_68263.pdf)>.
- Food and Agriculture Organization of the United Nations (FAO) (2001) *International Plan of Action, to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing*. FAO, Rome, viewed May 2014 <<http://www.fao.org/fi/website/FIRetrieveAction.do?dom=topic&fid-16007>>.
- Food and Agriculture Organization of the United Nations (FAO) (2008) *Capture Production 1950-2006*. FAO Fish Database, viewed May 2014 <<http://www.fao.org/fishery/statistics/programme/3.1.1/en>>.
- Forum Fisheries Agency (FFA) (2008) *Proposed Outline of Regional MCS Strategy Projects and Strategy: Development of an Integrated Regional MCS Strategy*. FFA, Honiara.
- Grafton RQ (2000) Governance of the Commons: A Role for the State? *Land Economics* 76(4), 504–17.
- Grafton RQ, Arnason R, Bjørndal T, et al. (2006) Incentive-Based Approaches to Sustainable Fisheries. *Canadian Journal of Fisheries and Aquatic Sciences* 63, 699–710.
- Hardin G (1968) The Tragedy of the Commons. *Science* 162, 1243–8.
- Henne A, Brüggemann H, Raasch C, et al. (2004) The Genome Sequence of the Extreme Thermophile *Thermus thermophilus*. *Nature Biotechnology* 22, 547–53,

- viewed May 2014 <[http://www.rdtunapng.com/docs/sullivan\\_report.htm](http://www.rdtunapng.com/docs/sullivan_report.htm)>.
- Hviding E, Baines GBK (1994) Community-based fisheries management: Tradition and the challenges of development in Marovo, Solomon Islands. *Development and Change* 25, 13–39.
- International Seabed Authority (n.d.) *Cobalt-Rich Crusts*, viewed May 2014 <<http://www.isa.org.jm/files/documents/EN/Brochures/ENG9.pdf>>.
- International Seabed Authority (n.d.) *Contractors*, viewed May 2014 <[http://www.isa.org.jm/files/images/CCZ\\_contractors-resize2.jpg](http://www.isa.org.jm/files/images/CCZ_contractors-resize2.jpg)>.
- International Seabed Authority (n.d.) *The Council*, viewed May 2014 <<http://www.isa.org.jm/en/about/members/council>>.
- International Seabed Authority (n.d.) *Introduction*, viewed May 2013 <<http://www.isa.org.jm/files/documents/EN/Brochures/ENG1.pdf>>.
- International Seabed Authority (n.d.) *Exploration Areas*, viewed May 2014 <<http://www.isa.org.jm/en/scientific/exploration>>.
- International Seabed Authority (n.d.) *Polymetallic Nodules*, viewed May 2013 <<http://www.isa.org.jm/files/documents/EN/Brochures/ENG7.pdf>>.
- International Seabed Authority (n.d.) *Polymetallic Sulphides*, viewed May 2013 <<http://www.isa.org.jm/files/documents/EN/Brochures/ENG8.pdf>>.
- Jacobs M (2002) Spoiled Tuna: A Fishing Industry Gone Bad. *Micronesian Counselor*, Vol. 40, 1–15.
- Kanwal S (2013) Speaking Out on the Marine Park. *Cook Island News*, viewed May 2014 <<http://www.cookislandsnews.com/2013/August/Wed14/environment.htm>>.
- Kato Y, Fujinaga K, Nakamura K, et al. (2011) Deep-Sea Mud in the Pacific Ocean as a Potential Resource for Rare-Earth Elements. *Nature Geoscience* 4(8), 535–9, viewed May 2014 <<http://www.nature.com/ngeo/journal/v4/n8/full/ngeo1185.html>>.
- Kompas T, Grafton QR, Che TN (2010) Bioeconomic Losses from Overharvesting Tuna. *Conservation Letters* 3, 1–7.
- Kriebel D, Tickner J, Epstein P, et al. (2001) The Precautionary Principle in Environmental Science. *Environmental Health Perspectives* 109, 871–6.
- Latimer C (n.d.) Seabed Mining: Plunging into the Depths of a New Frontier, viewed May 2013 <<http://www.miningaustralia.com.au/news/seabed-mining-plunging-into-the-depths-of-a-new-frontier>>.
- Leenhardt P, Cazalet B, Salvat B, Claudet J, Feral F (2013) The Rise of Large-Scale Marine Protected Areas: Conservation or Geopolitics? *Ocean & Coastal Management* 30, 1–7.
- MPA News (2011) The Surge in Very Large MPAs: What Is Driving It and What Does the Future Hold? *MPA News*, vol. 13 (2), viewed May 2014 <<http://depts.washington.edu/mpanews/MPA122.pdf>>.
- MRAG (2005) Marine Resources and Fisheries Consultants (MRAG), Review of Impacts of Illegal, Unreported and Unregulated Fishing on Developing Countries, Synthesis Report, viewed May 2014 <[http://www.imcsnet.org/imcs/imcs/docs/iuu\\_fishig\\_synthesis\\_report\\_mrag.pdf](http://www.imcsnet.org/imcs/imcs/docs/iuu_fishig_synthesis_report_mrag.pdf)>.
- MRAG (2008) Marine Resources and Fisheries Consultants (MRAG) and University of British Columbia (UBC), The Global Extent of Illegal Fishing, viewed May 2014 <<http://www.Illegal-fishing.info/uploads/MRAGExtentGlobalIllegalFishing.pdf>>.
- Multilateral High Level Convention (MHL) (2000) Report of the Eleventh and Final Session of the Multilateral High Level Conference on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific, Honolulu, Hawaii.
- Pacific Islands Forum Secretariat (1999) *Pacific Islands Regional Ocean Policy, Marine Sector Working Group, Council of Regional Organisations of the Pacific*. Pacific Islands Forum Secretariat, Suva, viewed May 2014 <<http://www.spc.int>>.
- Papahānaumokuākea Marine National Monument (n.d.), viewed May 2014 <<http://www.papahanaumokuakea.gov/>>.

- Papua New Guinea Mine Watch (2011) *International Seabed Authority Approves Seabed Exploration in Nauru and Tonga*, viewed May 2014 <<http://ramumine.wordpress.com/2011/08/04/>>.
- Parris H, Grafton RQ (2006) Can Tuna Promote Sustainable Development in the Pacific? *Journal of Environmental Development* 15, 269–96.
- Radio Australia (2011a) Help for Pacific Countries Seabed Mining Development. *Pacific Beat*, viewed May 2014 <<http://www.radioaustralia.net.au/pacbeat/stories/201102/s3148747.htm>>.
- Radio Australia (2011b) Samoa Moves on Seabed Mining. *Pacific Beat*, viewed May 2014 <<http://www.radioaustralia.net.au/pacbeat/stories/201106/s3257291.htm>>.
- Tarte S (1999) Negotiating a Tuna Management Regime for the Western and Central Pacific: The MHLC Process 1994-1999. *Journal of Pacific History* 34(3), 273–80.
- The Permanent Mission of Fiji to the United Nations (n.d.) International Seabed Authority Approves Applications, viewed May 2014 <[http://www.fjiiprun.org/index.php?option=com\\_content&view=article&id=70:international-seabed-authority-approves-applications&catid=11&Itemid=180](http://www.fjiiprun.org/index.php?option=com_content&view=article&id=70:international-seabed-authority-approves-applications&catid=11&Itemid=180)>.
- Thomas FR (2003) Fisheries Development in Kiribati: Sustainability Issues in a 'MIRAB' Economy. *Pacific Studies* 26(1–2), 1–36.
- United Nations (1992) *The Law of the Sea: Exclusive Economic Zone, Legislative History of Articles 56, 58 and 59 of the United Nations Convention on the Law of the Sea* New York: Division for Ocean Affairs and the Law of the Sea. United Nations, viewed May 2014 <[http://www.un.org/Depts/los/convention\\_agreements/texts/unclos/closindx.htm](http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm)>.
- United Nations Conference on Environment and Development (1992) *Rio Declaration on Environment and Development*, viewed May 2013 <<http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=78&ArticleID=1163>>.
- Van Dyke J, Nicol C (1987) U.S. Tuna Policy: A Reluctant Acceptance of the International Norm. In: Doulman DJ (ed) *Tuna Issues and Perspectives in the Pacific Islands Region*, pp. 105–32. East-West Center, Honolulu.
- Williams P, Reid C (2006) Overview of the Western and Central Pacific Ocean (WCPO) Tuna Fisheries, Including Economic Conditions – 2005. WCPFC-SC2-2006/GNWP-1. WCPFC – Scientific Committee Second Regular Session, Manila, Philippines, viewed May 2014 <<http://www.wcpfc.int/>>.
- Willis TJ, Millar RB, Babcock RC, Tolimieri N (2003) Burdens of Evidence and the Benefits of Marine Reserves: Putting Descartes before Des Horse? *Environmental Conservation* 30(2), 97–103.