



CRAWFORD SCHOOL  
OF ECONOMICS AND GOVERNMENT

## Fishing Futures

R. Quentin Grafton  
Tom Kompas  
Kate Barclay

[www.crawford.anu.edu.au](http://www.crawford.anu.edu.au)

ANU COLLEGE OF ASIA & THE PACIFIC

# POLICY BRIEFS

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## Fishing Futures

R Quentin Grafton, Tom Kompas & Kate Barclay

Policy Brief 1

Crawford School of Economics and Government

# Fishing Futures

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The Crawford School of Economics and Government, at the Australian National University has established a new and exciting series of policy briefs: opinion pieces pivoting on a particular theme. These briefs are designed to introduce key public policy areas that are of importance to Australia and its neighbours in the Asia and Pacific. The aim is to stimulate discussion and expand the perspectives of the policy community.

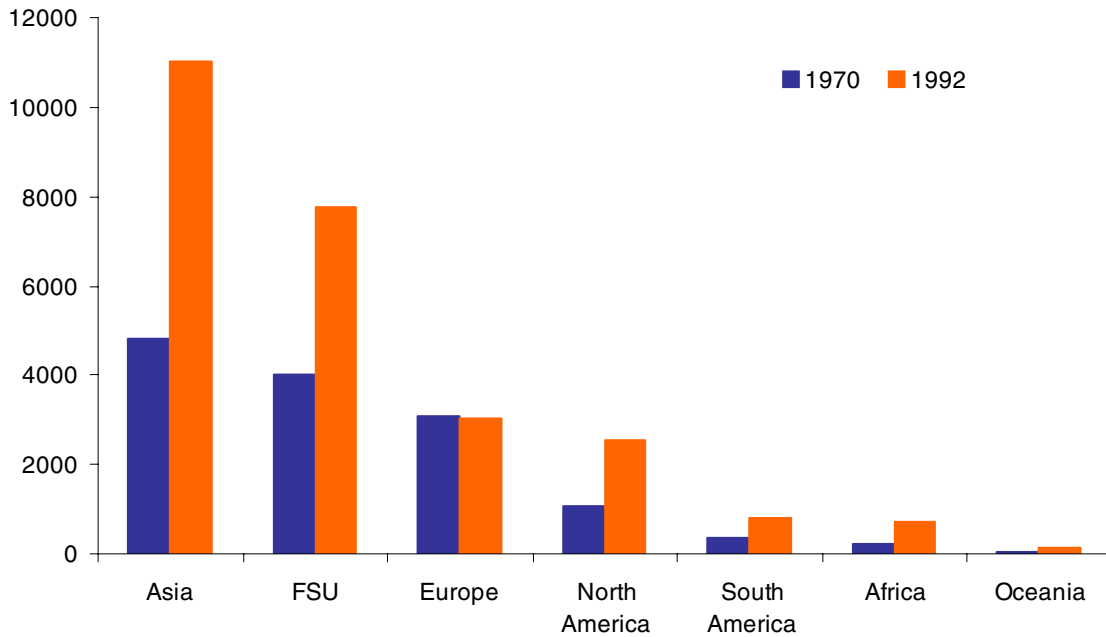
Our first *Policy Brief* focuses on fisheries and provides three perspectives: one, an overview of the underlying causes of overfishing; two, a discussion on the recent efforts of Australia to put its Commonwealth fisheries on a sustainable management path; and three, the challenges faced by our Pacific neighbours in managing valuable and migratory tuna fisheries. We hope you enjoy the discussion and we look forward to delivering another Policy Brief in the spring.

R. Quentin Grafton  
Research Director



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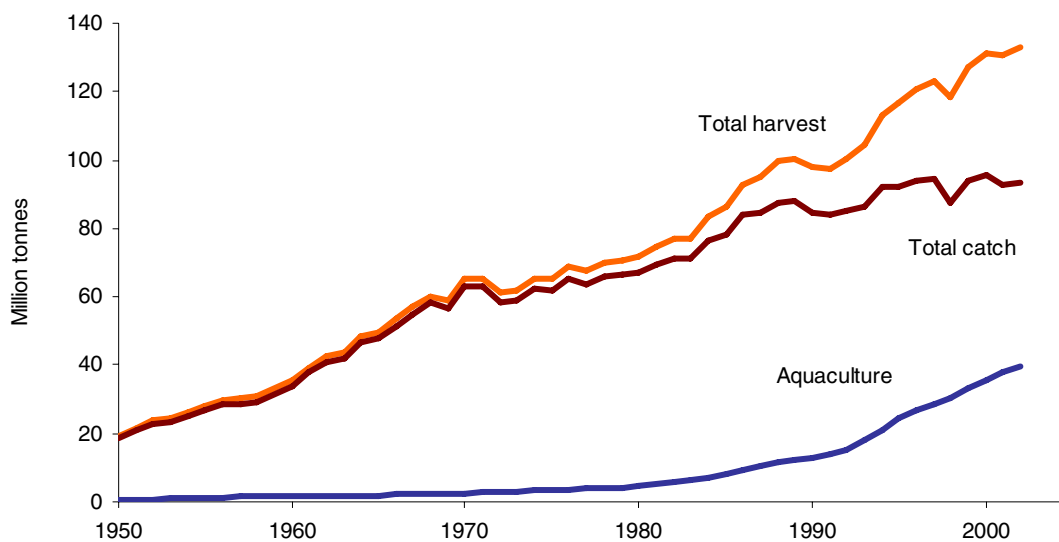
Figure 1 World fishing fleet, 1970 and 1992 (number of vessels)



what is FSU?

Full ref needed Source: Grafton et al. 2004.

Figure 2 World fish harvest, 1950–2002



full ref needed Source: FAO

## Too few fish and too many boats

R. Quentin Grafton

The world's fishery industries are facing the problem of too few fish and too many boats. To many casual observers the case of overfishing is simply another example of humankind's greed exceeding its needs. The reality is, however, that even if fishers wanted to conserve fish stocks, a reduced harvest by a conservation-minded fisher would simply allow someone else to catch more fish. Consequently, whatever their concerns about the future, many fishers have little or no incentive to conserve fish stocks and, over time, fishery levels decline.

### Of fish and fishers

Overfishing is an example of the 'tragedy of the commons': the overexploitation that arises whenever there are no property rights to a depletable natural resource. Many fisheries jurisdictions, including Australian fisheries, do have restrictions and barriers to entry; few jurisdictions have open access to all comers. These barriers and regulations have been designed to prevent overfishing as well as place restrictions on the number of vessels, the type of gear that can be used, the length of the fishing season and the size of vessels. This represents a 'command and control' approach to managing fishing inputs; it leaves the incentives for overharvesting unchanged, but makes it more difficult for fishers to catch fish. Sadly, these input controls have proved to be ineffective in regulating fishing effort and many fisheries are in decline despite their use.

Input controls provide an incentive for fishers to 'race to fish', catching a share of the limited compete harvest before the end of the fishing season. Further, when the regulated inputs constrain the ability to harvest fish, fishers are motivated to develop and use unregulated fishing inputs. For example, if regulations limit the length of vessel used when fishing—thus limiting their catch—fishers might build boats that are much wider so as to increase their hold size while still conforming to the 'letter of the law'. These

substitutions generate at least three undesirable effects: fishing effort creeps up, thereby increasing harvesting pressure on fish stocks; over time fisheries regulations become complicated and difficult to enforce as more rules are promulgated to prevent further increases in fishing effort; and input substitution often results in reduced efficiency and lower overall net returns as substitution to unregulated inputs is costly and cannot increase the amount of fish in the sea. Thus, in an attempt to redress one problem regulators have helped to create a slow moving, inexorable slide toward an unsustainable and unprofitable fishing industry.

### The ecosystem approach

To arrest the decline of fish stocks, scientists have argued for an ecosystem approach to fisheries management. This approach differs from traditional input controls, giving greater weight to integrated management and emphasising the importance of maintaining ecosystem health for future generations. Particular attention is given to the precautionary principle and the value of marine reserves as means of preserving critical areas of habitat and as refuges for key species. Australia has been one of the world leaders in adopting the ecosystem approach, establishing a National Representative System of Marine Protected Areas, and expanding the 'no take' areas in the Great Barrier Reef .

While the ecosystem approach highlights the importance of fishery–ecosystem interactions and knowledge gaps, its practitioners often overlook incentives for fishers as a means to improve fisheries management. Unfortunately, without a resolution for the 'race to fish' quandary the fundamental problems of overharvesting will remain, regardless of the quality advice offered by fisheries scientists. As a result, unless we are prepared to make all the world's oceans marine protected areas, fishers will continue to harvest where they are permitted to do so, and the problems of excess fishing effort will remain.

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## Incentive-based approaches

The key to resolving the dilemma of ‘too few fish and too many boats’ is to change the incentives for fishers. Ideally, fishers would be careful custodians of the sea, limiting their harvests to conserve fish stocks, and voluntarily choosing not to use harmful fishing practices. Such an idyll can only be realised if fishers have a long-term stake in the future of fisheries: if they choose to catch less fish today they will be rewarded by greater harvests and returns in the future.

One approach to changing incentives is to create durable and enforceable property rights. These rights could ensure a share of a sustainable total allowable catch, or protect the right to harvest in particular zones or areas of the ocean. Territorial user rights have existed in one form or another for thousands of years. For example, spatial management, whereby individuals, families or groups of individuals have a form of sea tenure, was widely practised by coastal Aboriginals in Australia. In many parts of Oceania, areas of lagoons and reefs were allocated to families and clans who could reap the gains of conservation and, conversely, the pains of overexploitation. Numerous examples also exist of communities that have successfully established their own fishing rules that are observed by members of the community and are also used to exclude outsiders. These community-based rights have worked successfully even in some modern fisheries (such as Japan’s coastal and inshore fisheries) for sedentary species, but frequently fail to provide adequate conservation incentives to those who fish for more mobile species.

## Individual fishing quotas

An alternative to both spatial management and input controls is to allocate fishers a share of a sustainable total allowable catch. These harvesting shares have been referred to as individual fishing quotas, but have also been called individual transferable quotas to emphasise that fishers are able to sell or lease their rights to others. Transferability confers an economic advantage as those fishers with higher net returns per unit of harvested fish are able to purchase rights from those with lower net returns, thereby increasing overall profitability. Such transfers provide an incentive for fishers to exit voluntarily from the industry, as well as promoting an autonomous adjustment process, helping to reduce excess vessels and gear employed in a fishery.

An important aspect of individual harvesting rights is that, provided that the total allowable catch is a binding constraint such that fishers would catch more fish if the total harvest were at a higher level, individual fishing quotas command a positive price. This price provides a conservation signal in the sense that holders of the rights can benefit from more sustainable fishing practices because higher future returns from fishing will be incorporated into the value of their asset holdings of individual fishing quotas. Harvesting rights that effectively control the overall catch of fishers also changes what fishers must do if they wish to catch more fish. Under input controls, a higher individual harvest requires greater fishing effort by an individual to out-compete other fishers. By contrast, with enforceable and binding individual fishing quotas, fishers are obliged to buy or lease quota to increase their harvest. This changes the dynamic from catching as many fish as possible in a limited period of time under input controls, to maximising the net returns from a valuable property right by landing higher valued fish in a more valuable form (fresh versus frozen fish), and/or minimising harvesting costs per unit of fish landed.

The extent to which individual fishers act with a greater conservation ethic with individual fishing quotas, however, depends on several factors, such as monitoring and enforcement issues and the level of productivity in the fishery. For instance, if fishers can ride on the back of others’ conservational actions of others then individual fishing quotas may be no better than input controls. Similarly, for long-lived species with a low growth rate some fishers may find it profitable to continue to overexploit a fishery as any gains from conservation would be too far into the future.

The overall experience of individual fishing quotas in different parts of the world, including Australia, has been positive, but not without problems. Successful individual fishing quotas management requires that total allowable catches be set at a sustainable level, disincentives be established for dumping of fish at sea and for catching species incidental to the fishery (such as sea turtles or sea birds), and ensure adequate monitoring and enforcement so that those without individual fishing quotas are prevented from fishing, and those with the rights respect the rules. Where this has been successfully accomplished, individual fishing quotas have resulted in more sustainable and profitable fisheries.

## The way forward

The history of fisheries management in many countries, including Australia, has not been a happy one. For example, in the past ten years there has been a three-fold increase in the number of Australian Federal fisheries classified as overfished. To stop this decline and help ensure sustainability of fish stocks, in November 2005, the Federal Minister of Fisheries announced a A\$220 million structural adjustment package to secure Australia's fishing future.

The structural adjustment package includes funds for fishers to tender voluntarily for the sale of their fishing concessions, so as to reduce fishing effort, and also to provide business exit assistance for fishers whose fishing effort will be displaced following the creation of proposed marine protected areas in the South-east Marine Region. This assistance is timely and will help remove fishing effort in some vulnerable fisheries. However, without management changes that effectively account for the incentives faced by fishers, coupled with ecosystem approaches and effective public oversight, Australia's fishing future will not be secured.

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## Getting things right: structural adjustment in Australia's Commonwealth fisheries

Tom Kompas

Given the problems with open access resources, as well as the effectiveness of modern fishing technology, there are few fisheries, if any, which will not be both overexploited and unprofitable unless they are managed effectively. For a fishery to be economically efficient, it is necessary that management targets be set correctly, enforced effectively and delivered in an inexpensive and incentive-compatible manner. An efficient outcome is important not only because it protects fish stocks and guarantees sustainability, but also because it ensures that resources will be allocated to the fishery correctly and in a way that maximises the returns from fishing. Inefficient fisheries are plagued by low profits and excessive boat capital or fishing capacity, with the all too familiar outcome of 'too many boats chasing too few fish'.

The traditional 'command and control' approaches to fisheries management—ones that focus on input restrictions and total catch limits—fail to provide the incentives for those who fish to do so efficiently and in a manner that gives industry a long term stake in the future of the fishery (Grafton et al. 2006a). These approaches often result in considerable effort creep (increases in fishing power) and excessive and wasteful competition, with both inappropriate levels and combinations of inputs used to catch fish (Kompas et al. 2004). The negative consequences of input and output controls are nicely illustrated by recent experience in Australia's Commonwealth fisheries. In the past 10 years the Australian federal government has committed A\$80–90 million per year to fisheries research and ecologically sustainable development, undertaken substantial buybacks of fishing effort, implemented detailed scientific fishery management plans that incorporate strong stakeholder involvement and expanded its National Representative System of Marine Protected Areas. Despite such strategies, substantial effort creep in input-controlled fisheries, and the inability to decrease total allowable catches when necessary in output controlled fisheries, has contributed to a threefold

increase in the number of Commonwealth fisheries classified as overfished in the past 10 years (Caton and McLoughlin 2004). The economics of these fisheries has also suffered. Surveys conducted by the Australian Bureau of Agricultural and Resource Economics have consistently shown close to zero net returns in most Commonwealth fisheries over the past several years (Kompas and Gooday 2005), and many fisheries are currently on the verge of economic collapse.

It is time to get things right. In November 2005 the Minister for Fisheries, Forestry and Conservation announced a A\$220 million package to secure Australia's fishing future. The package, 'Securing our fishing future', will provide a major one-off structural adjustment package and improved management measures to address concerns over the state of Australia's fish stocks, and the sustainability and profitability of the fishing industry. A sum of A\$150 million has been allocated to reduce fishing capacity in Commonwealth fisheries at risk, or currently subject to, overfishing. It will also provide assistance to fishers who may be displaced from fishing grounds following the creation of marine protected areas in the South East Marine Region.

The structural adjustment package will allow fishers to participate in a voluntary tender process that will encourage them to exit the industry and reduce excess fishing capacity. All licence holders in Commonwealth-only fisheries, with the exception of internationally and jointly managed fisheries, will be allowed to participate in the tender process but the main target fisheries are: the Southern and Eastern Scalefish and Shark Fishery (excluding the Great Australian Bight), the Eastern Tuna and Billfish Fishery and the Bass Strait Central Zone Scallop Fishery. In the Northern Prawn Fishery, funding is available for structural adjustment in conjunction with the transition to a management system based on output controls and individual transferable quotas. This policy action is timely since it has become

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abundantly clear that the Northern Prawn Fishery is currently experiencing severe economic hardship and rapidly falling profits, due in large part to the increasing price of fuel, but also to decades of 'effort creep' and considerable excess capacity in the current fishery, or 'too many boats chasing too few prawns' (Rose and Kompas 2004).

However, for the structural adjustment package to be a success the Australian Fisheries Management Authority needs to ensure that this planned reduction in fishing capacity goes hand-in-hand with targets and policies that guarantee economic efficiency. This normally means pursuing some form of 'maximum economic yield', or finding catch and effort levels, along with the right number of boats and vessel capital, that maximise returns from the fishery to the Australian community. The Australian Fisheries Management Authority is now fully committed to this sort of target, but failures in the past (total allowable catches that are far from binding in the South East fishery and considerable effort creep in the Northern Prawn Fishery and Eastern Tuna and Billfish Fishery) raise concerns. The A\$220 million could easily be wasted if poor management allows additional boat capacity to re-enter the fishery—something that has happened in past structural adjustment programs in Australia (Newby et al. 2004).

There are a number of important benefits of pursuing economic efficiency in a fishery (Grafton et al. 2006b). First, profits are maximised regardless of changes in the price of fish or the cost of fishing. Profits may be low when the price of fish is low and costs high (due, for example, to an appreciation of the exchange rate in Australia or the rising price of fuel), but they will still be maximised under and the maximum economic yield target. Pursuing economic efficiency will also ensure that the costs of harvesting are minimised, improving the international competitiveness of domestic fisheries and the resilience of the industry to economic and environmental shocks. Second, an efficient level of catch (at the maximum economic yield) is a sustainable harvest, and as such is preferable to a biological target like maximum sustainable yield. Depending on prices and costs, profits can be zero or even negative at the maximum sustainable yield. If sustainability is the goal, as it should be, it makes sense to select a sustainable yield that guarantees the largest return from the use of the community's fish resources regardless of circumstances. Third, at most biological growth rates, as well as practical discount rates and costs of harvesting, pursuing economic efficiency will imply an equilibrium stock of fish larger than that associated with the maximum sustainable yield. In

this sense the efficient level of harvest is more 'conservationist' than maximum sustainable yield, and provides additional environmental benefits and added resilience to unforeseen environmental shocks to the fishery. Finally, pursuing economic efficiency helps prevent overcapitalisation and ensures that resources are allocated to the fishery at correct levels, with surplus vessel and fishing capital allocated to their next best alternative uses in the economy. There is no better way to maximise the returns to the Australian community from Commonwealth fisheries, and 'Securing our fishing future' is a good part of achieving this outcome.

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## Ensuring sustainable tuna fisheries in the Pacific

Kate Barclay

Around half of the world's tuna catch comes from the Western and Central Pacific Ocean. This fishery has been considered to be healthy compared to other tuna fisheries around the world. The tropical tunas (such as Skipjack and Yellowfin) are on the whole more resilient to fishing than some of the larger temperate tunas (such as Northern and Southern Bluefin). As other tuna fisheries around the globe have dropped in productivity levels and have become more tightly regulated, fishing companies have been increasing fishing effort in the Western and Central Pacific. In recent years scientists have agreed that two of the four main species of tuna caught commercially in the Pacific, Bigeye and Yellowfin, are being overfished. A third species, Skipjack, is still biologically safe, but excessive and competitive fishing has caused prices to drop by as much as half in real terms since the 1980s.

On a global scale this is concerning, but for Pacific island countries it is potentially disastrous. Because of their geographies and small populations, most Pacific island countries have limited economic opportunities. For really small island countries like Nauru and Kiribati, tuna is one of the only economic resources available to them. Around 40 per cent of Kiribati government revenue comes from tuna fishing access fees paid by fishing companies.

Tuna is not only important for revenue and the national accounts of Pacific islands countries—it is important in terms of Pacific Islanders' food security. Many Pacific Islanders live largely from food they grow or catch, including fish. Although tuna is not as easy to catch from a canoe as reef fish, it is still a culturally important food source in many places. As growing coastal populations increase the pressure on many of the region's reef fisheries, tuna is a potentially important source of food and income generation for coastal communities.

As part of my research in 2005, I travelled to several Pacific island countries and asked local people what they wanted from the tuna resources in the Pacific. Interviewees were from the public and private sectors, and from non-government organisations concerned with the environment and community

welfare. Nearly all of them answered that they wanted Pacific Islanders to make more money from tuna, and for tuna industries to be both environmentally sustainable and socially equitable. Clearly, improved management of the region's tuna fisheries is crucial to achieve a balance of economic and environmental goals.

### Managing Pacific tuna fisheries

One of the basic challenges in managing tuna fisheries is that tuna species are highly migratory—they do not stay in the waters of specific countries but range across the waters of many countries as well as international waters (the high seas). This means no one country can manage tuna fisheries alone. Tuna fisheries management must, by definition, be carried out multilaterally by the governments of countries whose waters tuna pass through, and by the governments of companies that fish tuna, including in the high seas. For this reason multilateral government organisations have been created under international law to manage tuna fisheries, such as the Indian Ocean Tuna Commission, International Commission for the Conservation of Atlantic Tunas and the Commission for the Conservation of Southern Bluefin Tuna. Because these organisations operate like committees, with decisions reached by vote, they have often been unable to agree on sufficiently stringent fisheries management measures.

The potential negative impact of longlining on stocks of large tuna such as Bluefin, as well as on other species such as seabirds, turtles and sharks, has been well publicised by environmental organisations. Fisheries vary according to their environmental context, however, and thus far it seems that the tropical longline fisheries of the Pacific Ocean have minimal impact on turtle and seabird populations. Further research is needed to establish the impact of longline fisheries on shark populations. Most of the research on Western and Central Pacific tuna fisheries has been conducted by the Oceanic Fisheries Program

of the Secretariat of the Pacific Community. It is likely that some damage to the tuna species currently in trouble (bigeye and yellowfin) is the result of high levels of fishing going on around Philippines and Indonesia, about which there is insufficient research data. Around Pacific island countries, damage to bigeye and yellowfin stocks seems to come from purse seine operations accidentally catching large amounts of juvenile fishes that congregate under industrial-scale fish-aggregating devices, especially in the equatorial zone (including the waters of Papua New Guinea, Federated States of Micronesia, Marshall Islands and Kiribati). Since the 1990s, purse-seining has seen the greatest increase in growth in Pacific tuna fisheries: 2004 levels were the highest on record in 2005, and 2005 levels may exceed that. Therefore, the most pressing fisheries management issue seems to be the amount of purse-seine fishing, especially around fish aggregating devices.

## Western and Central Pacific Fisheries Commission

The Western and Central Pacific Fisheries Commission (WCPFC) is the organisation responsible for facilitating multilateral fisheries management in this region. The WCPFC first met in December 2004, with scientific and technical meetings scheduled throughout 2005, and the second general meeting taking place in December 2005. The Scientific Committee of the WCPFC, hosted by the SPC, concluded in 2005 that bigeye and yellowfin stocks were in worse shape than previously suspected. The Scientific Committee thus made a recommendation to the WCPFC that fishing mortality levels be cut to 2001 levels. This signalled unprecedented levels of alarm about the sustainability of Pacific tuna fisheries. Nevertheless, the 2005 meeting of the WCPFC decided only to limit purse-seining to 2004 levels (much higher than that recommended) and failed to make a strong commitment to limit the use of fish aggregating devices. In addition, thus far the WCPFC has not attempted to tackle the possible overfishing occurring around Philippines (a full member of WCPFC) or Indonesia (a 'cooperating non-member').

The reasons the WCPFC did not rise to the challenge of protecting the economic and environmental sustainability of Pacific tuna fisheries in 2005 are complex. In some senses the lack of action taken by the WCPFC could be seen as a victory for short-term commercial interests over the long-term interests of member countries. Another interpretation

is that the Pacific islands countries are acting counter to their stated goal of capturing more wealth from tuna industries in an environmentally sustainable and socially equitable manner. Pacific islands countries have the most to lose from failing to manage the region's tuna fisheries effectively, and since around two-thirds of purse-seine fishing is conducted within their collective maritime jurisdiction in their exclusive economic zones, they also have the potential to exert far greater control over regional tuna fisheries than they have thus far.

## Pacific island governments and tuna fisheries

Pacific island governments are the key to managing the region's tuna resources. Fishing companies and their respective governments, and international organisations have important roles to play. But the fact remains that only Pacific island governments can legislate for and implement fisheries measures in their exclusive economic zones. In addition, the WCPFC was established with a chambered voting system, wherein Pacific islands countries form one voting chamber and other members the other chamber. Structurally, the WCPFC recognises the primacy of Pacific island governments in driving fisheries management for the region. Apart from possibly Papua New Guinea (which has by far the largest fishery) no one Pacific island country exerts significant influence. However, as a group, the Pacific island countries, particularly the equatorial subgroup of countries where most fishing occurs, have the power to set the agenda in the WCPFC.

Unfortunately, many Pacific island governments have a range of governance problems that make managing fisheries difficult. A lack of government resources through very small revenue bases is one of the foundations of governance problems. Government departments are small so there may not be enough staff or staff with the relevant training. Creating an effective and comprehensive legislative framework is a large undertaking. It is expensive to run patrol boats and other kinds of surveillance to monitor fisheries. It takes resources to enforce fisheries regulations and prosecute offenders. Other problems are related to corruption. Unscrupulous fishing companies can evade fisheries management regulations if officials are willing to allow this in return for payment. Other kinds of problems relate to dysfunctional electoral systems and party politics, where governments and ministers change so often politicians cannot develop enough expertise in their portfolio to make coherent strategic

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policies. Donor organisations have attempted to address governance problems in their development programs in several Pacific island countries, but have not yet made much headway in assisting Pacific island governments to improve the situation.

Pacific island governments should take the lead in ensuring that the region's tuna fisheries are sustainable, both because they are most at risk from unsustainable fisheries, and because they have the most power over regional tuna fisheries. In order to be able to do this, however, Pacific island governments need to improve governance such that they can effectively exercise their sovereign powers. In addition, they also need to cooperate more closely with the other Pacific island governments to achieve effective fisheries management, and avoid being co-opted by wealthy fishing interests.

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