

## THEME 2

# Allocations across sectors



# Allocation of catches among fishing sectors: opportunities for policy development

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## 1. INTRODUCTION

The theme of this conference - the allocation of fish resources - refers to a pervasive challenge in fisheries management. Traditionally, it has also been a contentious subject, and for centuries it has preoccupied fishers and fisheries managers. I have been asked to comment on a narrow slice of the broad allocation problem; that is, the question of allocating catches among the distinct groups or sectors of fishers that often share access to a fishery.

In preparing this paper I found that although there is now a wealth of literature on fisheries allocation issues, there is not much on allocation among sectors. But I also found that some new problems associated with sectoral allocations are emerging, and there is growing interest in solutions. Devoting a session of the conference to this subject is timely.

To introduce this subject, I thought it would be most useful to begin with a brief outline of the issue of intersectoral allocation and the arrangements fishing nations have usually adopted to deal with it. I will suggest that the reason why this is so much more onerous an issue in fisheries than it is in the management of other resources is not because fish are common property but because of the way governments grant rights to the harvest. Then I will turn to recent innovations in fishing rights, notably individual quotas, some new pressures these are putting on sectoral allocation arrangements, and opportunities to improve them. Throughout, I want to emphasize the link between the form of fishing rights held by fishers and their ability to manage their fisheries, and draw attention to policies that will enable self governance.

## 2. FISHING SECTORS AND INTERSECTORAL ALLOCATION

I do not intend to focus my remarks on any particular country but, to begin, I want to illustrate how my discussion fits into the general issue of allocation with reference to a fishery I know quite well — Canada's Pacific salmon fishery. This fishery is based on five species of salmon and hundreds of separate stocks that sweep down from the northeast Pacific along the coast of British Columbia on their way to spawn in their natal rivers and streams.

Each year, with only meager advance information about the abundance of the stocks, fisheries managers plan fishing operations to achieve a number of allocation targets. First, they allocate the stock between the escapement needed to sustain the resource and the total allowable catch. The allowable catch is then allocated between Canada and the United States according to a formula prescribed in a treaty between

the two countries. Next, from Canada's allocation, the managers subtract the estimated requirements of the aboriginal 'food fishery'. The remainder is allocated between the recreational and commercial fisheries. The commercial allowable catch is then allocated among the three sectors of the commercial fishing fleet — the seine, gillnet and troll sectors — according to established policies.

Finally, these allocations are broken down among the several species of salmon and distributed among several fishing areas, to provide a 'target' allocation for each gear sector in each fishing area.

As the salmon approach, information accumulates about the size of the runs, and estimates are made of the potential catches for each sector in each area. The managers must regulate fishing to allocate the fish among all the competing demands on them promptly and progressively as the salmon pass through a succession of fishing areas.

To complicate matters further, the order of priority assigned to these demands is exactly opposite to the order in which the fish pass through the fisheries. First, the stocks pass through commercial and recreational fishers, mainly at sea; but these are the Department of Fisheries' lowest priority. A higher priority, a constitutional requirement, is to provide for aboriginal catches for food and cultural purposes, mostly in rivers and estuaries. And its top priority, prescribed by statute, is to ensure enough spawners of each stock escape through the fisheries and reach their spawning grounds in the headwaters of rivers and tributaries. So managers must plan in reverse, providing for each of the main fishing sectors in anticipation of higher priority demands on the fish further along their migration path.

This allocation procedure is admittedly an extreme example of the challenge faced by policy-makers and fisheries managers, but it illustrates a number of general issues that I refer to later. One is that the task of allocating stocks can arise at several levels, from allocations among individual fishers to allocations among nations, both of which are subjects of other sessions at this conference. Our session is concerned with allocation among sectors, which I define as separately identifiable, and usually separately managed, groups of fishers sharing the catch in a fishery.

A second observation is that sectors are identified in a variety of ways. Some are distinguished by the gear they use, such as a seine sector and a gillnet sector that share the catch. Sometimes sectors are identified by where they fish, such as an inshore sector and an offshore sector. Others are distinguished by their purpose in fishing, such as the commercial, recreational and aboriginal sectors. The task of allocating among commercial and non-commercial sectors raises particularly challenging legal, social and practical questions.

Third, sectors are often subdivided into sub-sectors. A commercial fleet may be divided into gear sectors. The recreational sector may consist of a commercial charter-boat sector and an independent fisher sector. Moreover, a sector is often split into areas or management units. And, as my salmon example illustrates, these various sub-sectors may call for separate allocations.

Fourth, allocation policies rest on a variety of policy instruments — constitutional rights, statute law, treaties and administrative policies and practices.

Fifth, allocations among sectors vary widely in terms of their specificity, from one extreme of no deliberate allocations at all between competing sectors, to a specific number or weight of fish at the other. Intermediate arrangements include a general priority assigned to one sector over another, the 'target' shares I referred to in the salmon fishery which are not binding on either the fishers or the managers, and percentage entitlements for each sector.

The important point for this discussion is that sectoral allocations are often loosely defined and lack a secure legal or institutional foundation, which makes the rights of fishers more uncertain. Later, I draw attention to commercial fishers' individual quotas,

which often give their holders a secure share of the commercial allocation. But where they share the catch with non-commercial fishers and the allocation between them is not defined, the security of their individual quotas is undermined.

The salmon example also illustrates certain difficulties governments face in allocating catches among sectors. A major constraint is the differing legal foundation for claims on the catch among sectors. Typically, aboriginal and treaty rights are accorded some priority. This, and pressure from all fishing groups to protect their historical patterns of use, constrain managers' scope for reallocating catches among sectors.

Another complexity, where individual fishers' entitlements are not quantified, is that managers cannot directly control the sector's catch. Under traditional open access or limited licensing regimes, fishers have the right to as many fish as they can catch. To implement allocations, governments must resort to manipulation of fishing effort through restrictions on fishing times, places and gear. This makes it difficult to precisely achieve allocations. It also aggravates the politicization and contentiousness of allocation decisions, and the likelihood that they will not reflect any consistent economic or other criteria.

Finally, fishing sectors benefit in different ways from the fish they harvest and so value them differently. Across the commercial, recreational and aboriginal sectors there is no common denominator for the value of fish and no way of comparing the values of fish caught in the various sectors. This makes allocation difficult if the objective is to allocate the fish among sectors in order to realize the highest possible value.

This is not to say that the objective of fisheries management should necessarily be to maximize the value of the catch; other social and legal considerations may call for priority in managers' decisions. But economic benefit is usually at least one of the objectives of fisheries policy. For the purposes of this discussion I will assume that the policy objective is to maximize the value realized from the resource, bearing in mind that the economic benefits generated, especially in non-commercial fisheries, are often difficult to measure.

### **3. ALLOCATION AND THE EVOLUTION OF FISHING RIGHTS**

The task of allocating catches in a fishery is inextricably linked to the form of fishing rights held by those who fish. To understand the opportunities for improving allocation arrangements it is helpful to bear in mind the way fishing rights have been changing and are likely to change further.

My colleague at the University of British Columbia, Anthony Scott, has traced the origin and development of fishing rights in England and other western countries (Scott 2004). A major turning point was the signing of the Magna Carta in 1215. At that time most fisheries were in rivers and estuaries, involving fixed gear such as weirs and traps attached to stream banks and beaches. Consistent with this link to the land, rights to fisheries were held by the owner of the bordering land. Landowners became upset when King John of England began overriding their property by granting fishing rights to outsiders. So the barons inserted a clause in the Magna Carta which committed the king to desist from granting exclusive fishing rights in the Thames and other rivers and, with drawn swords at Runnymede, persuaded him to agree.

Gradually, the courts expanded this to mean that neither the king nor anyone else could grant exclusive fishing rights to anyone in any tidal waters. Therefore no one could hold exclusive rights or exclude anyone else from fishing, which led to the doctrine of a general public right to fish in tidal waters.

Two other legal concepts contributed to the demise of proprietary interests in fisheries. One was the ancient 'rule of capture', which held that no one could own wild animals or fish until they were caught. The other was the doctrine of the freedom of the seas articulated by the Dutch jurist Hugo Grotius in 1609, which meant that no one, and no nation, could own the high sea or restrict anyone from fishing.

These three legal principles — the public right to fish, the law of capture, and the freedom of the sea — together left almost no scope for property rights in marine fisheries.

For centuries there appeared to be no need to ration access to ocean fisheries because they were believed to be inexhaustible. It was not until the 20th century, with convincing evidence of decline of heavily fished stocks, that the threat of overfishing was widely acknowledged.

However, although governments had lost the power to grant fisheries as property, they still had the power to regulate fishing, and the second half of the 20th century saw an explosion of regulatory activity, mostly directed toward protecting stocks from overfishing by burgeoning fishing fleets and free-for-all fishing pressure.

Some of the new regulations changed the allocation process, notably the limitation of fishing licenses which spread quickly through western fishing nations in the 1970s to help control the overexpansion of fishing fleets and excessive fishing pressure. Once licenses were limited, license holders, collectively, held an exclusive right to the catch. The licenses took on a market value, and the allocation of rights of access began to be influenced by market transfers of licenses. But governments still had no direct way of allocating catches among individual fishers, and their allocation among sectors in a fishery could be accomplished only indirectly, by manipulating gear and fishing effort.

Almost any regulation of fishing gear, seasons or locations affects commercial, recreational and aboriginal fishers differently. To achieve objectives of equity as well as conservation as they expanded their regulatory control, governments were forced to adopt different regulations for each sector. Doing so undoubtedly had the effect of defining, and in some degree creating, separate sectors and sub-sectors, each with its own permitted methods of fishing and regulatory regime.

These events, coupled with the common property character of fisheries and the difficulty of measuring the value of fish in alternative uses, left governments with the increasingly onerous task of allocating catches among sectors. Contention is inevitable because more to one sector means less to others. It has sometimes proven so difficult that governments have acceded to pressure to increase the allocation to one without offsetting reductions in others, leading to overfishing, stock depletion and ultimately losses for all. The dismal state of many of the world's ocean fisheries owes much to this difficulty.

The introduction of individual quotas in the late 1970s and 1980s was a new turning point. The economic effects of defining fishing rights quantitatively have been profound, because the specification of each fisher's entitlement to the catch eliminates the wasteful competitive race for the fish and the associated overexpansion of fishing capacity, high costs and dissipation of resource rents.

Moreover, individual quotas have increased the value of catches by enabling fishers to take the time and effort to clean and process fish for higher prices. And perhaps most important in the long run, they have created strong economic incentives for fishers to cooperate in conserving and enhancing stocks and in managing fishing, as these measures all increase the value of their fishing rights. Increased profitability has also facilitated cost recovery which, coupled with fishers' participation in managing their fisheries, has improved administration and management through increased transparency, outsourcing, and pressure for cost efficiency.

The individual quota management system, pioneered by New Zealand, Iceland, Australia and Canada is now an important element of fisheries organization in many western countries and in hundreds of fisheries, and is associated with widespread improvement in both the management of stocks and the economic performance of commercial fisheries (Arnason, 1996).

Through this evolution, rights to fish have gradually acquired the attributes of property, with increasing duration, security, exclusivity, transferability, divisibility and

flexibility. Back when anyone could fish, fishers held no property rights because their rights were no different from those of everyone else. When they were required to hold licenses, and licenses were restricted in availability, these fishing rights began to take on these characteristics of property, and they have been progressively strengthened in some of the more advanced fishing regimes through longer duration, even perpetual terms, greater transferability and divisibility (especially under individual quotas) and increased security against interference from outsiders.

Often, in the face of anxieties about “privatization” of the fisheries, governments have denied that they were creating property rights, and there has been a good deal of analysis of the law on this question (Department of Fisheries 2005). The legal issue varies among jurisdictions, but governments everywhere claim the right to regulate fishing and, as Anthony Scott has explained, it was their progressively restrictive regulation to protect stocks from overfishing that led to restrictive licensing, individual quotas and other forms of fishing rights that, incidentally, have the attributes of property needed for efficient organization of economic activity.

#### **4. INTERSECTORAL ALLOCATION AND TRANSFERABILITY**

In the multisectoral fisheries I know, the distribution of the catch among sectors, whether they employ individual quotas or not, is not highly systematic, precise or logical. Allocations among sectors are often based on vague criteria, influenced more by established positions than by analysis of the benefits of alternative ways of utilizing resources; and they offer little security to the fishers involved. Moreover the rights held by fishers are limited in important respects. Some are not transferable, or their transferability is restricted. Where individual quotas are employed, they typically deal only with allocation of the catch within the commercial sector. Transferability rarely extends to transfers from one sector to another, even between sectors of commercial fishers, and even when they all employ individual quotas.

Today, the arrangements for allocating catches among sectors are becoming strained in a number of countries, and there is growing interest in methods of redistributing allocations. Pressure to change catch shares is not a new phenomenon, of course; it is to be expected wherever there are two or more sectors in a fishery. But particularly notable today — and the issue worth noting — is the increasing difficulty in reconciling the individual quotas of commercial fishers with the demands of aboriginal and recreational fishers.

Thus, in New Zealand, expanding recreational catches in some fisheries, and the resulting erosion of commercial fishers’ quotas, has become an urgent issue (Edwards 2000). Similar concerns are developing in Australia, Canada and the United States. Both New Zealand and Western Australia have recently launched major reviews of their policies on allocation among sectors. Other jurisdictions are examining ways of transferring fishing rights among commercial sectors, and a number have been developing arrangements for transferring rights from commercial to aboriginal fishers.

The new pressures being felt in a number of countries arise from the conflicting interests of commercial fishers operating under individual quotas and non-commercial fishers which do not. The general problem is that the allowable catch available to the commercial sector, to be allocated among the individual quota-holders, is determined by subtracting from the total allowable catch, an allowance for the non-commercial sectors. These allowances are not fixed, and the criteria for determining them are more or less vague. Commonly, the demands of both the aboriginal and recreational fishers have been growing, and so have their catch allocations. As they grow, the residual catch available to the commercial fishers shrinks, undermining the security of their fishing rights.

The contribution of the individual quota system to this conflict is the increase in value it has generated for the commercial sector; the substantial value capitalized in

fishing rights has raised the stakes in this erosion of commercial access to resources. Otherwise secure individual quotas are rendered insecure by the uncertainty about sector shares. This problem is particularly acute: where the catch is shared and highly valued by both commercial and non-commercial fishers but the entitlements of each sector are not defined; where only the commercial sector employs individual quotas and; where the recreational catch is growing— such as snapper in New Zealand and Western Australia, and halibut in the United States and Canada.

This conflict between the sectors with individual quotas and those without has led some commentators to suggest that when quota systems are adopted all sectors should be included. This advice comes too late, of course, wherever individual quotas are already in place for commercial fishers. And, as a more general matter, if the quota system had to be acceptable to all sectors before being introduced, there would probably be few in place today.

Moreover, there might be some confusion about the root of the problem. It is not due to the lack of individual quotas in all sectors — it is due to the lack of a clear definition of each sector's share in the total catch. The difference is important; the solution requires only a clear specification of each sector's share of the catch.

## **5. IMPROVING INTERSECTORAL ALLOCATIONS**

There are two broad avenues for improving allocation methods: build on the governmental model and provide for market mechanisms. The governmental approach leaves the determination of sectoral shares to political or administrative decision-making. The advantage is that it builds on existing processes, has structural simplicity, and is responsive to values and interests other than economic ones. But it preserves all the shortcomings of governmental decision-making, especially insofar as it does nothing to encourage utilization of the resource to best economic advantage; it aggravates competitive lobbying among groups with the governmental authority at the centre of contention; and it maintains a competitive barrier to cooperation and collective action among those who share the rights to fish in a fishery.

An efficient intersectoral allocation system must meet two requirements: certainty about catch shares so fishers can organize their operations efficiently, and some means of redistributing the shares to ensure the most beneficial utilization as conditions change. Governmental decision-making does not lend itself well to reconciling these needs. To calculate the optimal sectoral allocations governments would need enormous amounts of information and they would inevitably have difficulty altering sectoral shares. But this is a role markets play often and effectively, as demonstrated in the allocation of individual quota rights among commercial fishers. With minimal information other than the price of fishing rights, fishers can bargain with other fishers to solve these problems, which governments cannot do.

The present obstacle to harnessing market forces is that the rights held by fishers in one sector are typically not transferable to other sectors and, even if they were, market trading among sectors would be frustrated wherever the catch share of any sector isn't clearly defined. To correct this; well-defined initial shares in the catch must be established for each sector in the fishery, and these shares must be divisible and transferable.

## **6. THE NEED FOR DEFINED SECTORAL SHARES**

For markets to function efficiently in allocating fishing rights among sectors to best advantage, the rights must be well-defined and secure in all sectors. This calls for an initial allocation for each sector. Establishing starting positions has often proven to be the most difficult step in introducing individual quotas, but for sectoral allocations there are usually established positions, priorities or targets of some sort already in place. The problem is that they are typically vague, often encumbered by policies giving



preferential treatment to one sector over another, and for other reasons unreliable and insecure. The need is for a clearly-defined share of the catch for each sector, secure enough to serve as a basis for bargaining and trading in fishing rights.

The benefits of well defined shares for each sector extend beyond their stimulus to trade. They also sharpen incentives to invest in stock rebuilding and enhancement, otherwise blunted by uncertainty about how much of the increased yield may be taken by others. They will facilitate treaty settlements with First Nations who, in treaty negotiations in Canada at least, have sometimes been reluctant to accept fishing rights to be transferred to them from commercial fishers because the commercial rights, being calculated net of growing recreational allowances, are seen as too uncertain. And defined shares focus the incentives and effort of fishers in all sectors of the fishery on opportunities to improve their resource base and management efficiency.

It should be emphasized that clear specification of each sector's share of the catch will be beneficial, whether the sectors employ individual quotas or not, though the financial implications will be greater for fishers holding individual quotas. Moreover, defined sectoral shares will be beneficial whether market trading is to be adopted or not, though their implications for long-term efficiency will be much reduced with subsequent trading.

## **7. THE NEED FOR INTERSECTORAL TRANSFERABILITY**

Defining each sector's share of the catch will alleviate the uncertainty and conflict where one sector could otherwise expand at the expense of another. But, to enable market processes to effectively provide for reallocations to rationalize fishing among sectors, the shares must be divisible and transferable between sectors.

There are varying constraints on meeting this need.

The communal ownership and non-transferability of aboriginal and treaty rights to fish inhibit redistribution, though such rights can often be transferred temporarily. Usually, customary and subsistence fisheries are accorded some priority over other fishing, and in countries such as New Zealand and Canada recreational fishers also claim they have, or should have, a general priority over the commercial sector. Not surprisingly, groups enjoying a priority resist any disturbance to their position.

Nevertheless, there is plenty of scope for markets in fishing rights to function in reallocating shares in the catch among sectors to best advantage. The provisions needed depend on whether individual transferable quotas are already in place. If they are in place for all sectors, the problem is relatively simple: government must ensure that there are no impediments to the divisibility and transferability of the quota rights among sectors, as well as within them. The allocation among sectors will then be determined by the purchases and sales of quota among individual quota-holders in different sectors.

Many fisheries involve only commercial sectors, distinguished by the gear they use or the areas fished. Here, market transfers between commercial sectors can be accommodated relatively easily, as illustrated by the legislative provisions to do so in Australia and Iceland (Kaufmann *et al.*, 1999; Runolfsson, 1999).

A couple of caveats to this simple facilitation of trade are needed. To ensure that transfers of fishing rights to vessels that use different gear, or fish in a different location, do not frustrate management of the stock, intersectoral transfers should, in general, be subject to regulatory approval, as provided for in Australia's legislation. In addition, all individual quotas must be denominated in terms of the same base — that is, as shares of the total allowable catch (and not shares of a sectoral allocation as is often the case at present).

In the more challenging case in which one or more sectors in a fishery does not employ individual quotas, fishers have no individual entitlement to any part of the catch, so they cannot trade in fishing rights. To adjust their allocation through trading the fishers in such sectors need an organization with authority to represent them, hold

their sector's total allocation, raise and hold money, and buy and sell fishing rights on their behalf.

These changes are currently underway in Canada's Pacific halibut fishery, which is dominated by a commercial sector organized under individual quotas. The expanding recreational sector has recently been assigned a percentage share of the allowable catch and the Minister of Fisheries has declared that he expects recreational fishers to turn to the market to acquire more quotas if they want to increase their share in future. Meanwhile, the recreational sector's initial allocation exceeds its catch, and the commercial sector has leased the recreational sector's uncaught surplus in return for cash.

Thus rights to fish can be made transferable between sectors in a fishery through market mechanisms even where fisheries are not organized around individual quotas. But individual quotas will undoubtedly facilitate intersectoral transfers. A prominent example is the way New Zealand's quota management system has facilitated the transfer of fishing rights to Maori to settle aboriginal claims. Soon after the system was introduced, it was found to be in breach of the treaty with New Zealand's aboriginal people and thus triggered a Maori claim. But the quota management system also provided the government with a mechanism for satisfying the claim, by purchasing quota from commercial fishers for redistribution to Maori — a direct transfer of rights to the catch which would not have been possible under the earlier open-access fishing regime. Through these governmental reallocations and further purchases of quotas by Maori themselves, the Maori have become major players in New Zealand's fishing industry and their fishing rights have been integrated with the commercial sector's quota management system (Nelson, 1995).

In Canada, recommendations a colleague and I recently made to the governments of Canada and British Columbia would introduce individual quota licenses in the salmon fishery and similarly accommodate treaty settlements with First Nations by enabling direct transfer of shares in the catch from commercial to aboriginal fishers (McRae and Pearse, 2004).

Individual quotas can be expected to facilitate intersectoral transfers in other ways as well. With individual quotas in all sectors, fishers do not have to depend on an organization to carry out their trading; individual fishers can transact directly themselves. Further, where individual quotas are employed in all sectors, they provide the sectoral shares with an underpinning of entitlements, making the quota rights more secure and marketable.

Recent developments in recreational and aboriginal fisheries suggest that the path of development in the non-commercial sectors is likely to be opposite to the one we have witnessed in the commercial fisheries. In commercial fisheries, adoption of defined allocations to individual fishers has provided the stimulus for them to organize themselves into sectoral organizations to advance their collective interests and enable them to participate in management. In the recreational and aboriginal sectors, the sectoral organization might have to come first, and when the organizations have become sufficiently developed they might take responsibility for determining how their share of the catch should be distributed among their members and how their fisheries should be managed.

Thus the Nisga'a people, a large tribal group in Canada, having recently reached a comprehensive treaty settlement including substantial provisions for fisheries, quickly organized their own fisheries management arrangements and introduced their own individual quota system, all well integrated within the wider governmental management arrangements. This example illustrates both the capability of an established organization to organize fishing among its members and the effect of a clear and secure share of the catch on incentives to participate in management.

Aboriginal groups, once equipped with a defined share of the catch, can relatively easily take the further step of participating in a fishery-wide individual quota scheme,

as the aboriginal organization holding the entitlement can, like a fishing corporation, be treated as one ‘individual’ quota holder and organize its fishing as it sees fit. Locally-based recreational groups might similarly seek an allocation of the recreational sector’s share and participate in an individual quota system.

This “bottom-up” organization implies a reduced role for government in initiating and administering allocations within recreational and aboriginal sectors, but it also suggests that governments wanting to encourage fisheries self-government should give high priority to helping these groups to organize themselves. Aboriginal people typically have organizations already, based on tribal or other traditional groupings, and in Canada, United States, New Zealand and Australia these organizations are taking increasing responsibility for managing ‘their’ fisheries. Recreational fishers also appear to be trying to organize themselves in many jurisdictions, often in reaction to the strengthening position of commercial fisheries.

Recreational fishers undoubtedly face the most daunting organizational task, because they are usually so numerous, disparate, dispersed and varying in their interests and commitment to fishing. Often, they have little enthusiasm for participation in management, preferring to rely on government.

Most urgent, where recreational fishers share the catch, is the resolution of their allocation. As noted earlier, recreational fishers often resist defined catch shares, viewing them as restrictive of their opportunities. Whether this is an accurate perception or not depends, of course, on their potential allocation relative to their present position. In the Canadian halibut example mentioned earlier, the recreational sector benefited from an allocation that exceeded its catch, the opportunity to sell their surplus and build an endowment fund, and the opportunity to acquire a larger allocation in the future. There are many other possible ways to make a sharing arrangement attractive, such as provisions for sharing the increase in catch resulting from investments in stock rebuilding and enhancement.

Defined shares will encourage organization, but organizations of recreational fishers, particularly, need support to get started, at least. Most importantly, they need to be empowered to take on management responsibilities, including the right to organize themselves and to require everyone they represent to become members to protect against free riders, to levy fees to finance their activities, and to make rules and enforce them. In addition, most need help with capacity development, finance and other resources.

## **8. PROPERTY RIGHTS AND SELF-GOVERNMENT**

The extent to which fishers, responding to economic incentives, can be relied upon to allocate catches and manage their fisheries for maximum value depends critically upon their ability to control their supply of fish, which in turn depends upon the scope of their fishing rights. In my opinion, this link between the rights of fishers and their ability to manage is key to the successful development of market-based fisheries management regimes. At the risk of oversimplification, I can summarize my comments in terms of this relationship.

For centuries, fishers had no rights and no control over other fishers or potential fishers. This was appropriate as long as the supply of fish exceeded demands and fish were (or were perceived to be) inexhaustible. In these circumstances, fishers had neither the means nor the incentive to organize themselves and participate in management.

Gradually, demands grew. To protect the stocks from overfishing, governments, lacking the power to grant exclusive property in fisheries, applied restrictions on fishing methods. They also prohibited everyone from fishing except those issued a license or other authorization, who thereby acquired collective exclusivity of access. Fishers now had rights, but the rights were too weak to assure them of a secure supply of fish in the face of increasing competition for the catch (Scott, 2000).

A solution was found in individual quotas, which have substantially strengthened the rights of fishers and restored their control over their catches. Their right to a defined harvest has eliminated the wasteful competition and interference from others. The right to transfer their rights has enabled them to rationalize their operations. And their proportionate interest in the catch has given them an incentive to cooperate with each other to manage their fishery and the resources they depend upon.

These rights, providing they are well crafted, are sufficient to enable fishers to manage their fisheries effectively in the simplest case where the fishery consists of only one sector and is not affected by other fisheries or external activities.

But the control afforded by individual quotas is not sufficient where two or more sectors are involved — unless the entitlement of each sector is clearly defined. If not, the rights of fishers in all sectors are at risk. In that case the solution parallels the prescription for individual transferable quotas: assign each sector an explicit, initial share of the catch to restore certainty and establish starting positions, and; make the shares divisible and transferable among sectors to enable fishers to realize the gains from rationalizing fishing among sectors. Defined shares can be expected to sharpen fishers' incentives to cooperate in management, and trade in catch shares will tend to reduce the barriers between sectors and broaden the ambit of management organization from sectors to whole fisheries.

Other circumstances call for developing fishers' rights in different ways. Where two or more fisheries are interdependent — that is, where one stock is linked to another by a predator-prey relationship, where two or more species compete for common food or where one is affected by the process of fishing for another — there will almost certainly be opportunities to increase the aggregate value of production from the fisheries combined by increasing production of higher-valued species at the expense of lower-valued species. Fishers will be able to affect such trade-offs and maximize the aggregate value of production only if their rights extend to negotiating the size and catch of their stock with the fishers in related fisheries.

Thus, in New Zealand, the Challenger scallop and the Nelson dredge oyster fisheries occupy overlapping areas and the harvesting and enhancement activities of each affects production in the other. In this case, many of the fishers hold quota in both fisheries, and they have joined in an effort to maximize the return on the two fisheries combined.

Such arrangements can be extended to respond to the growing pressure in advanced fishing nations to shift the focus of management from individual fisheries to whole aquatic ecosystems (McClurg, 2002). Where many interdependent species and fisheries are involved a management plan designed to maximize the economic return from the whole ecosystem may involve a large number of trade-offs, costly biological and economic information, and complicated compensatory payments among quota holders. In these circumstances fishers are likely to seek efficiency in a single enterprise or cooperative to hold the fishing rights for all the interactive species and internalize the benefits and costs of all the adjustments needed to maximize aggregate returns (Arnason, 1999). Such an organization could accommodate non-commercial interests, such as sport fishers wanting to purchase quota for certain species from the enterprise for their own recreation, or environmental organizations who wished to acquire but not exercise rights to the catch, to reduce exploitation of the species.

A step in this direction is being taken by fishers in a cluster of groundfish fisheries on the coast of British Columbia. Hitherto, the fisheries have been separately organized and managed, most under individual quotas, but the fishers in each fishery incidentally take significant quantities of the other species which they have been obliged to discard. They have recently formed an umbrella organization and negotiated amendments to their fishing rights to allow them to trade quota among fisheries - one species for

another - thus improving the efficiency of operations and eliminating waste (Diamond Management Consulting Inc., 2005).

These examples are intended to illustrate the strengthening of fishing rights needed to cope with progressively broader sources of interference with fishers' control over their fish supplies — from other fishers, other sectors, and other fisheries. Although this leads beyond the terms of reference for this discussion, I should add, for completeness, the challenge of allocating ocean space among fish production and other competing uses of the sea, such as navigation, mining, aquaculture, waste disposal and preservation of the natural environment as well as fisheries.

Where fish production competes with other uses of ocean space or marine environments, market mechanisms can determine the most beneficial use or combination of uses only if the rights held by each interest group include the right to make trade-offs in their demands on the ocean. This may call for a super- organization of fisheries groups capable of bargaining over fisheries production with parallel organizations of industrial, environmental and other interests with demands on the same ocean space (Scott 2006).

## 9. THE ESSENTIAL ROLE OF GOVERNMENT

Throughout this presentation I have emphasized the scope for harnessing market forces and the resources of those who hold the rights to fish to manage fisheries. I will conclude with a comment on the role of government.

Much has been written about the shortcomings of the traditional regulatory approach to fisheries management in terms of its inflexibility in the face of changing conditions, its unresponsiveness to differing circumstances, its demands for information, its conflict with the incentives of fishers and its costliness. And it has now been widely demonstrated that the development of new forms of fishing rights, notably individual quotas, by aligning fishers' incentives with the public interest, has enabled wholesale shifts in responsibilities for fisheries management from government to the fishers themselves, with generally beneficial effect.

However, while experience shows that the holders of fishing rights, under suitable institutional conditions, can safely be given wide responsibility for managing fishing, some responsibilities must remain governmental. As governments shed their traditional roles in regulating fishing and allocating catches the onus on government actually increases in respect of two responsibilities in particular.

One is establishing a clear and comprehensive framework of policy and administration within which those who depend on fish can conduct their affairs efficiently and with certainty. Fisheries jurisdictions vary widely in their response to this need. Australia's fisheries policy, introduced 15 years ago, is a model of clarity and rigor with its legislated statement of objectives for the fisheries, specification of management organization and of the responsibilities of the various parties and agencies, and clarification of the fishers' legal rights, and financial and other obligations.

At the other extreme are Canada's vague and inconsistent arrangements, based on antiquated legislation and developed piecemeal in response to more than a century of pressures and crises, and which lack the clarity and security needed to support modern fisheries management (Burke and Brander, 2000).

Significantly, the countries that have led the reorganization of fisheries and have benefited most from it - notably Australia, New Zealand and Iceland - have all adopted new legislation and administrative structures to accommodate their new regimes.

A carefully crafted, clear policy framework is especially important for a management regime that depends on efficient participation of fishers and non-governmental parties. Given the opportunities for self-government in fisheries, the most critical function of government might ultimately be in maintaining the legal and institutional framework to enable those with rights to fish to govern themselves.

The other increasingly important function is to protect the broad public interest in the face of harvesting and management of fish by those having a primary interest in the catch. This is largely an environmental responsibility, calling for basic rules to protect aquatic habitats and sea life which may be endangered by fishing activity, to control pollution and preserve aesthetic values. These are true public goods; the benefits accrue to society as a whole, not just to those who harvest or consume fish, so they must be provided for, if at all, by government. The governmental task is to articulate and enforce the public's long-term conservation objectives and standards of performance to be achieved. These basic requirements can be expected to leave wide scope for the holders of fishing rights to manage their fisheries for maximum economic benefit.

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# Extractive and non-extractive allocation issues – an environmental perspective

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There are three universal performance criteria for managers of extractive users of the marine living resources of the oceans: yield, sustainability and equity. Depending on how different managers with different mandates interpret, apply and perform against these three criteria, however, a wide range of different outcomes can be aimed at – and an even wider range actually achieved.

Taking the right approach to allocation of access to fish resources thus requires choosing an entire package of measures – that go considerably beyond the scope of what normally passes for fisheries management measures – if intent is to be achieved. I shall attempt to briefly identify and discuss each interlinked element of such packages.

Most importantly, however, is to recognize that, if fairer and more equitable allocation decisions are to be made that actually deliver on governments' stated environmental, social and economic goals and commitments, a fundamental reorganization of the way the maritime activity of fishing is legitimized, managed and controlled is necessary.

## **1. EBM > MSY**

The place to start is by doing away with the now outmoded concept of 'maximum sustainable yield' (MSY) to describe the strategic objective of fisheries managers. This rationale has been used to justify the singularly unhelpful practice of 'fishing down' the original biomass of an unexploited fish stock and then harvesting as much of the subsequent growth of recovering juveniles as can be got away with. This is exactly the same approach taken by foresters in clearing natural oldgrowth forest to replace it with managed regrowth and plantations.

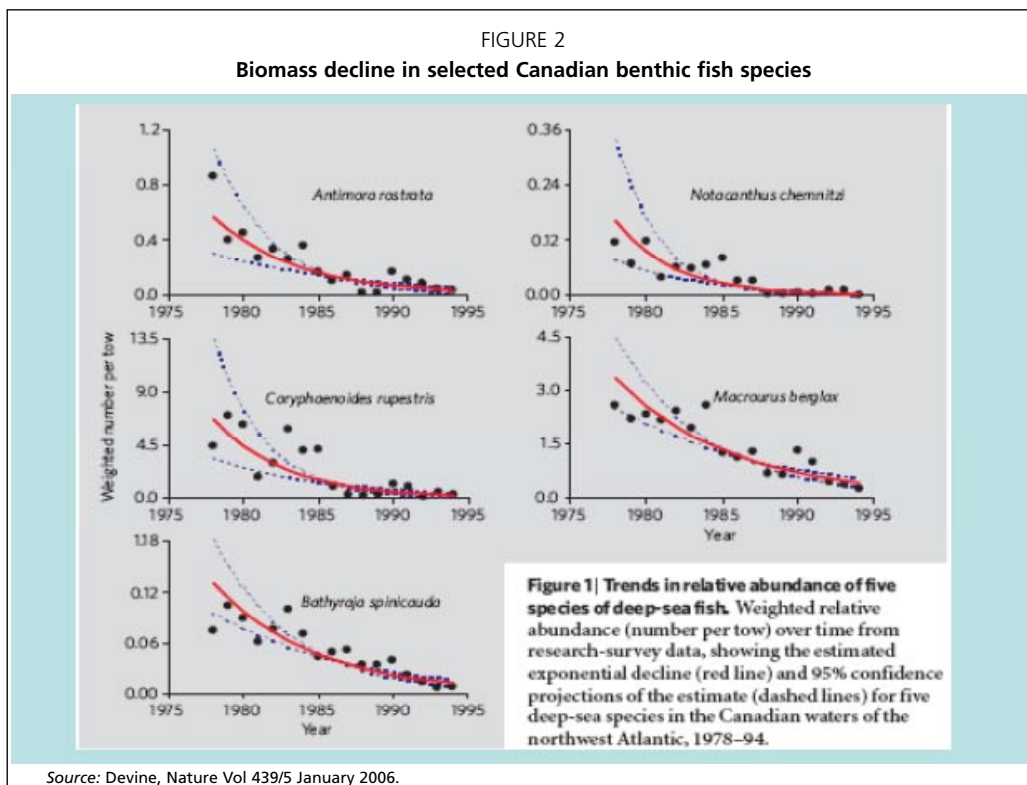
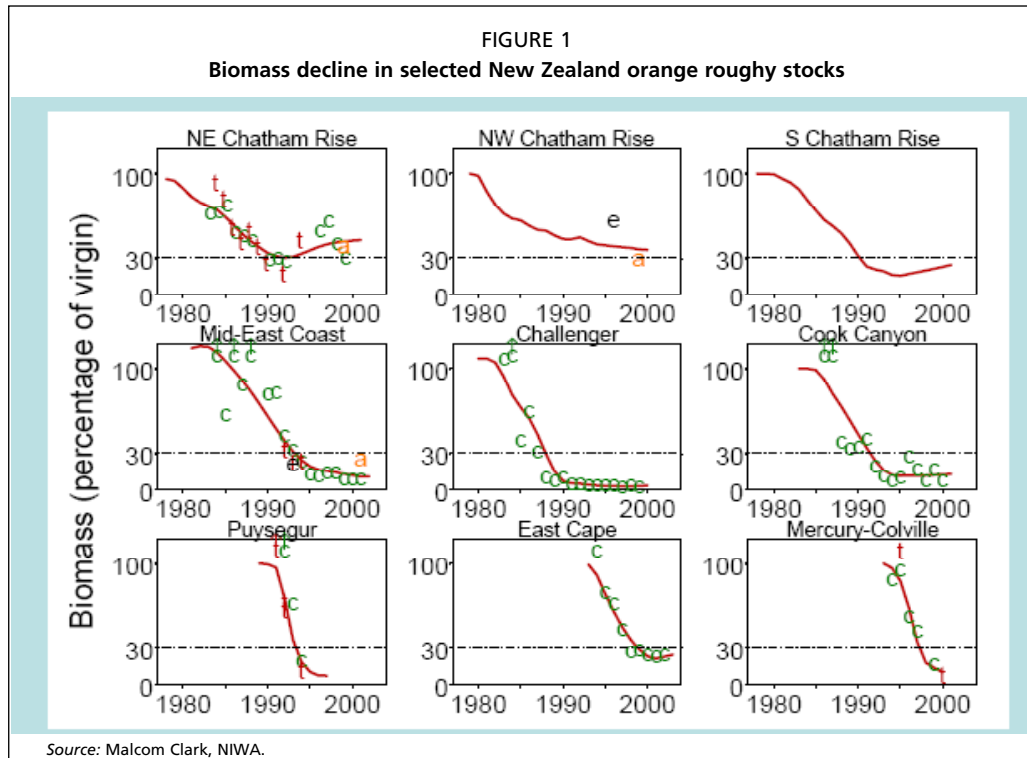
The MSY concept has embedded in it the ideological notion that manipulating a wild animal population to extract as much human benefit as possible, indifferent to impacts on the ecosystems and any related species involved, is an appropriate approach for resource managers, and for the fishers they manage, and an acceptable basis for government policies – it is not.

I am delighted to say that the concept of 'ecosystem-based management' – or EBM – is beginning to replace the concept of MSY as the basis for ocean and coastal resource management. It is important that this concept invades the minds, as well as the mouths, of fishers and fishery managers just as quickly as can be done.

The obstacles to making such a fundamental shift should not be under-estimated. When UNCLOS – the law of the sea convention – was negotiated in the 1970s and '80s, conservation considerations did not weigh on the minds of negotiators and MSY is actually enshrined therein as the objective of fisheries management – in the context of restricting a coastal state's ability to retain unexploited or under-exploited fish stocks in favour of the interests of foreign fishing fleets.



Even when ecosystem considerations are now more widely accepted in the international community, the World Sustainable Development goals adopted by governments in 2002 still identify MSY as an aspirational goal for fisheries management - albeit only in the context of recovering overexploited stocks. This is somewhat ironic in that it is hard to escape the conclusion that the concept of MSY has been little more than rhetorical veneer to cover for the serial depletion of those fish stocks (Figure 1 and 2).



### **1.1 Intergenerational equity**

Of all the allocational offences inherent in the MSY approach, perhaps the worst is the offence to intergenerational equity – the notion that each generation should leave its part of the planet in at least as good a state as we found it. The universal recounting of stories by older fishermen about bygone days when fish were more plentiful only compounds the offence.

Among other changes, genuine acceptance of EBM requires development and adoption of approaches to management that place the harvesting of a particular stock of fish in the much broader context of a commitment not only to maintaining the basic health of marine ecosystems as a whole but also to fostering the wellbeing of all marine species (including the target population) and their habitats.

In turn, adoption of an EBM approach requires fundamental institutional realignment whereby agencies with responsibility for sectoral management of fishing, as just one of a range of legitimate maritime activities, can be placed in a context set by broader institutional arrangements with the mandate and power to coordinate maritime activities and determine integrated outcomes – including allocation of access to marine areas in both space and time, and to set catch levels for commercial fisheries that reflect the interests of species other than ourselves and interests other than industrial fishers.

### **1.2 Sharing with other species**

The next worst allocational offence inherent in the MSY approach is the disregard for the interests of other species and the habitats that sustain them – whether incidentally destroyed by bottom trawling, as bycatch and incidental mortality, etc., or competitively starved by removal of critical food supplies – to say nothing of the destruction of the target stocks themselves.

It has taken the strident articulation of the wider community's concern over the fate of non-target species such as dolphins, turtles, seals and seabirds to impress upon fishers and their regulators the needs to reach beyond MSY as the ideological and policy framework for control of fishing activities. Only the most romantically deluded among us could conclude that such a broadening of responsibility and purpose was driven by any inherent maturation of purpose within the general fishing community itself.

The point is obvious and not worth dwelling on at length – except to emphasise its importance – and the institutional implications of taking such 'externalities' seriously. In particular, industrial fishers and their regulators should not be surprised if their ideas for allocation of tradable property rights to fish resources are met with some amazement, fear and derision by the wider community.

## **2. ADHERENCE TO INTERNATIONAL AGREEMENTS**

While the right to allocate and control access to terrestrial resources is mutually recognized by nation states as their inherent sovereign right, this is not the case for marine resources, where such rights are created – and constrained – by the provisions of UNCLOS - the law of the sea (and numerous other international and regional agreements). Even within coastal states' 200 mile EEZs, such international law limits the legal exercise of state power.

This is something that needs to be borne in mind by those championing the cause of creation and allocation of property rights to marine resources - it's not that simple! We have a long way to go in developing regional management arrangements and global oversight and accountability provisions before a clear mandate to create and allocate property rights to marine resources will be established - and that mandate will be heavily constrained by the obligation to share (unlike on land, where the opposite is customary).

The world is not short of such global and regional agreements where commitments to good oceans and fisheries management have been made - but we are falling well

short of formal acceptance of and effective implementation of such commitments by governments.

Coherent and comprehensive implementation of these commitments requires all eligible governments to sign, accede to and/or ratify all relevant international and regional agreements. Indeed, failure to do so represents an enormous obstacle to prompt and effective progress towards EBM.

While there is widespread ratification of the main two global agreements – UNCLOS and Convention on Biological Diversity (CBD) – there are some notable exceptions that must be addressed. Meanwhile, fisheries-specific agreements such as the Fish Stock Agreement and the High Seas Compliance Agreement are not widely ratified and even more poorly implemented, as is the case for the safe and proper operation of fishing vessels and treatment of fish workers on such vessels. At the regional level, many flag states allow their vessels to operate in areas and on stocks covered by agreements to which they are not party.

While ratification of such agreements is improving and numerous urgings have been adopted by governments, no sense of urgency is yet apparent – yet, if comprehensive acceptance of international commitments is not achieved, how are we to expect prompt and effective implementation? No state can claim to be committed to the ‘decade of action’ declared by the FAO’s Committee on Fisheries (COFI) last March until it has at least ratified all relevant international agreements.

The days when states could get away with ‘opting out’ of international agreements (or of specific measures adopted by management bodies) yet still expect access to marine resources provided for by those agreements must come to an end.

### **2.1 No commitments? No access!**

The next worst allocational offence is to allow states and the fishing vessels they flag to have access to fish resources if those states have not ratified or acceded to all relevant agreements and developed the national capacity to ensure compliance with relevant provisions. ‘No commitments – no fish’, and ‘no compliance – no fish’ should be the norm for all allocation regimes.

It is simply not fair – and an open invitation to abuse – to allow states that have not accepted international obligations to licence their fishers to operate in competition with states that have accepted such obligations.

## **3. AVOIDANCE OF DESTRUCTIVE FISHING PRACTICES**

At the 7th Conference of the Parties to the CBD last year, governments decided that there is an urgent need to take short, medium and long term measures to control destructive fishing practices, including interim prohibitions, where appropriate. Such interim prohibitions are an obvious, cost-effective starting point – stopping making things worse (which is quick and cheap) as a prelude to making things better (which is harder and slower) – “Freezing the Footprint” of damaging and unsustainable activities.

It is obviously wrong to fish in a manner that knowing reduces ecosystem health and viability of other species – and unfair to allow such fishing practices to continue.

Take bottom-trawling, for instance – immediate short-term measures to limit bottom trawling to areas previously bottom trawled and an interim prohibition on bottom trawling in high seas areas where there is inadequate knowledge or control to avoid significant harm is clearly justified. In response to a campaign by environmental NGOs against unmanaged bottom trawling on the high seas, this year’s United National General Assembly (UNGA) will consider adoption of an interim prohibition on bottom trawling – and maybe all unmanaged destructive fishing practices - outside EEZs and areas covered by management regimes capable of regulating such activities.

Again, what happens at the UNGA will clearly indicate real commitment to COFI's call to move from words to action. While some states have taken some steps towards such interim prohibitions both within their own EEZs and within regional management bodies in which they have a conservation and management interest, progress is limited and slow.

It is obviously most unfair that fishers that have been excluded from one fishery as effective controls have been introduced (or ineffective control allows stock depletion) can merely move on to a new fishery on the high seas and engage in licenced plunder.

With respect to the high seas, whatever happens in the short term at this year's UNGA, medium term actions are needed to ensure that existing management arrangements, including Regional Fisheries Management Organizations (RFMOs), are expanded with respect to both competency and geographic coverage to establish effective regional ecosystem management arrangements capable of delivering ecosystem-based, integrated oceans management.

In the longer term, these regional ecosystem management arrangements need the time and resources to allow appropriate conservation measures to be developed that ensure appropriate restriction of destructive fishing practices – thus obviating the need for interim measures – what Greenpeace has been calling Regional Ecosystem Management Bodies and WWF has been calling Regional Oceans Management Organisations.

The extent to which we need to see sectoral regulatory bodies amalgamated into single new regional bodies capable of delivering EBM through regulation of all relevant maritime activities or merely impose regional coordinating and control arrangements upon such sectoral managers is an open question. With industry good will, mere coordination should suffice, but I fear that, on past experience, strong regional institutions capable of over-ruling sectoral agencies articulating vested interests – or even replacing them – will be needed.

The next worst allocational offence is to allow industrial fishers to exploit high seas fish resources without any management framework having been established – let alone management measures developed and applied. Such offence is given by flag states by the simple expedient of licencing their vessels to fish on the high seas in the absence of any such arrangements – something supposedly responsible states, like Australia, are just as guilty of as those more customarily regarded as irresponsible.

#### **4. FAIR AND EQUITABLE ALLOCATION OF FISHERIES RESOURCES**

The concept of sharing in the oceans bounty has two key components – sharing between human needs and those of other elements of the oceans ecosystem; and sharing between human societies and economies. That such sharing should be fair and equitable is just the first principle to be accepted – and then elaborated and applied in practice.

The key reason why EBM must replace MSY as the basis for fisheries management is it includes an obligation to ensure that any resource extraction by humans does not cause serious or lasting harm to other species and the ecosystem relationships they rely upon – now or in the future.

##### **4.1 Precaution – ignorance is less**

The improvements in knowledge needed to make the successful transition from an MSY approach to EBM are considerable and should not be underestimated. The proper application of the precautionary principle can be used to discount harvest levels, or defer harvest decisions, in recognition of the higher risks inherent in lack of adequate information. That is to say, lack of scientific information need not prevent allowable catches being set – but fishers must accept that failure to allocate adequate resources towards both pure and applied scientific research to allow better understanding of ecosystem relationships, will result in precautionary discounting to lower catch rates.

The proper application of precaution also serves to ensure that the interests of future generations are respected – they have the right to expect to benefit from the oceans bounty in the same way that our generation does – and those that came before us.

#### **4.2 Industrial fishers v. coastal communities**

More important for human benefit, however, is the need to ensure that coastal communities, especially those in developing countries that are reliant on nearby ocean resources for subsistence and survival (including indigenous communities and artisanal fishers) are given appropriate preferential access to fish resources. Distant water and industrial fishers have the means and opportunity to choose where to fish – such coastal communities do not. Unfortunately, such foreign and industrial fishers habitually have the power and influence to get their way despite the adverse impacts on coastal communities.

From a social perspective, this is undoubtedly the most important aspect of allocation policy. In Australia this is played out in the often fractious disputes between commercial and recreational fishers – where recreational users do a pretty good job of looking after their interests. In many developing countries for instance, coastal communities generally fare very poorly when it comes to representing their interests against those of industrial fishers, especially foreign ones from developed countries – a very unequal conflict indeed.

As an aside, it has to be noted that this is the real tragedy of the commons – the failure of the state to protect weak communities against rich and powerful individuals – not the failure to allocate and exercise rights within such communities. Much as I am tempted to deliver a history lesson on the reasons for the enclosures of the commons of England, I shall resist – except to note the cruel irony in the frequent and inappropriate reference to the ‘tragedy of the commons’ by those who would alienate to themselves the community’s interest in the fair, equitable and sustainable allocation of rights to extract natural resources from the oceans.

#### **4.3 Catch history is ‘bunk’**

Closer to the present meanwhile, for deep sea fisheries, especially on the high seas, catch history should not be relied upon as the primary basis for allocating future catches. UNCLOS formally establishes the living marine resources of the high seas as being open to and belonging to all.

Open fisheries must be open to new entrants if the sustainable development aspirations of many developing countries are to be realized. This is a critically important allocation issue. Any attempt by those few countries and companies with the current means to exploit high seas fisheries to limit access to themselves is wrong – and any country seeking to encourage or entrench such limited access would be acting in breach of international law.

Reliance on catch history merely encourages excessive activity by those currently involved in unmanaged fisheries in anticipation of management being imposed and catch history being adopted as a basis for catch allocation.

#### **4.4 Efficiency and effort limitation**

Similarly, it should be regarded as desirable for governments to control fishing effort for social and economic reasons as much as for environmental ones. Restrictions on fishing gear type, vessel size and power, seasonal limitations, allocation controls will be relevant in many situations where restricting fishing effort is justified and minimizing social and economic impacts is an objective of government.

While use of market-based mechanisms, such as ITQs may have a place in appropriately institutionalized fisheries, the evidence from those countries that have relied heavily on ITQs clearly indicates the ongoing need to retain use of more interventionist measures as well if policy objectives are to be met.

Incorporation of such approaches into ocean resource allocation and management arrangements by governments that give priority to the needs of coastal communities would significantly contribute to the Millennium Development Goal relating to poverty alleviation and freedom from hunger. To rely merely on market instruments is to invite concentration of ownership in the hands of profit-maximising corporations – with no inherent expectation of responsible behaviour [viz. New Zealand orange roughy and hake, and Icelandic cod – the latter showing no signs of recovery even after twenty years of ITQ management].

#### **4.5 Respect for science**

One of the key differences between the MSY and EBM approaches to fisheries management is the substantially greater information requirements for full adoption of EBM.

More importantly, however, is the need to respect what scientists have to say about the management of target stocks as well as the implications for the rest of the ecosystem. I am struck by the number of scientists and managers who privately express horror and frustration at the lengths to which fishers will go to reinterpret scientific information and contest scientific advice in the interests of increased allocations today in the full knowledge of higher risks of collapse tomorrow.

It is hard to escape the conclusion that Australia's co-management model, for instance, may not quite be leaving the fox in charge of the henhouse but more like just giving the fox the key – the result is much the same. While I would be the last to suggest that scientists' advice should be immune from critique – by any stakeholder – vested interests in higher catch rates do seem to know how to get their way.

### **5. CONSERVATION AND PROTECTION OF BIODIVERSITY**

The effective conservation of biodiversity and protection of particular elements is the most important driver behind adoption of EBM in an integrated manner – all maritime activities must find their own ways of avoiding undue harm to, and adequately taking care of, the same species and ecosystems as they go about their business.

Internationally, the existence of sector-specific bodies to manage and control various maritime activities, especially on the high seas, is an inevitable part of the future in the medium term at least – hence the need for cooperation and coordination if EBM is to be achieved – and the need for institutional development to ensure such coordination and sectoral performance.

There are three areas where prompt action is needed (assuming short term measures to control destructive fishing practices have been taken):

- development of networks of MPAs;
- avoidance of bycatch and incidental mortality problems; and
- shared EIA standards and processes.

#### **5.1 MPAs to show the way on coordination and cooperation**

The WSSD commitment to establishing a network of representative Marine Protected Areas (MPAs) by 2012 is bold and exciting and some countries and regional bodies have made good starts. [Note CCAMR 2005 meeting decision to establish a network of representative MPAs throughout the Southern Ocean.] Generally, however, initial progress is disappointing and, at current rates of progress, we will need the next century – not the next decade – to reach our goal.

MPAs represent the clearest and most effective single measure that can be taken by states to demonstrate their commitment to EBM – recognition that species and ecosystems have a right to exist and prosper independent of their utility to humans and that restrictions on uses in particular areas is key part of the appropriate response.

Identification, declaration and effective management of a network of MPAs requires the close cooperation of all relevant bodies responsible not only for marshalling

scientific information but also for the management and control of each maritime activity. Development of an MPA network can thus be used to pioneer development of the cooperative arrangements, including institutional developments, needed not only to deliver MPAs but also to deliver oceans EBM – thus making it a top priority for action.

Obviously, the faster and easier MPA networks are established, the less institutional reform will be justified – or called for – within coastal states, regionally and internationally.

A really important step along this path of establishing MPA networks, especially on the high seas, needs to be taken at the 8th CBD Conference of the Parties – due in March this year: taking the lead in marshalling available scientific information to identify areas warranting MPA designation according to ecological criteria that the CBD adopts. Other bodies with the mandate to control particular maritime activities on the high seas can then act upon advice from the CBD to impose appropriate restrictions on activities.

While such institutional intricacies of establishing MPAs on the high seas might appear overly labyrinthine, actually mirrors the sectoral hurdles faced by proposals to establish MPAs in EEZs under coastal state control. – that other bodies with appropriate competency can apply in controlling various maritime activities.

## **5.2 Bycatch and incidental mortality mitigation and avoidance**

Protection of non-target species, especially by avoidance or mitigation of bycatch and incidental mortality, is a critical early step towards oceans EBM. Four main groups of species have been identified as being in particular and urgent need of better treatment – seabirds, marine turtles, marine mammals, and sharks, skates and rays.

Complementary lists of threatened species in need of similar special protection have been developed but the steady addition of more species to such lists is a strong indicator that trends in our actual performance as managers of the oceans are not good. Measures that are particularly effective for each particular maritime activity/species interaction, in each region need to be developed – and effectively implemented – backed by research to allow continual improvement in priority setting and impact reduction.

Again, progress by governments and regional bodies has been patchy and slow. It is important that political and technical investment in continual improvement is sufficient to drive rapid progress – or fishers will risk losing access to fisheries because the impact on other elements of the ecosystem are judged by the wider community to be too great.

In many cases, important policy decisions have to be made to decide which species are to be classed as ‘non-target’ and thence offered special protection in this way. EBM can provide a process for informed judgment – but not an answer to what are basically ethical questions for we humans. While some societies, communities and countries are comfortable with the idea that some taxa (like seabirds, seals and cetaceans) should not be subjected to targeted killing or indirect killing, others are not so concerned.

## **5.3 EIA for all**

Successful EBM requires a much greater understanding of marine ecosystems and interactions between their living and non-living components. The best way to develop – and apply – such knowledge is to require all potentially damaging maritime activities to be subject to the same requirements for Environmental Impact Assessment (EIA) and, in some cases, wider Integrated Impact Assessment (IIA) that includes social and economic effects.

An early step towards better international cooperation should be the adoption of common EIA and IIA standards and criteria by all governments, international bodies and regional bodies with management responsibility for one or more maritime

activities. Over time, this commitment to sectoral EIA/IIA can be developed into integrated, regional assessments that encompass all maritime activities- and so allow for truly Integrated Oceans Management (IOM).

Like MPAs, therefore, the introduction of common EIA principals, standards and procedures for all maritime activities can drive development of the collaboration and cooperation we need if integrated oceans management is to be achieved.

## **6. HIGH SEAS GOVERNANCE REFORM**

While UNCLOS made it clear that coastal states had the right to manage exploitation of living marine resources within their EEZs (with important limitations), control of maritime activities on the high seas remained the responsibility of flag states. Subsequent negotiation of the Fish Stock Agreement (FSA) and the High Seas Compliance Agreement under the auspices of FAO did much to establish a framework of government obligations capable of being applied to deliver EBM with respect to high seas fisheries activities, at least.

In practice, however, progress has been disappointing – government parties to pre-existing regional fisheries bodies have been slow to upgrade the mandates of such bodies and to adopt suitable management measures. RFMOs developed pursuant to the FSA have better mandates but still poor implementation. Additionally, there are regions of the world's oceans and exploited fish stocks that are not covered by any (or by adequate) regional management arrangements.

### **6.1 Global oversight of regional management – the way to go**

Regional management arrangements – that are genuinely committed to EBM implementation – primarily delineated according to ecological principles (and political realities) are to be encouraged to the greatest extent possible. Upgrading old and emerging regional bodies into comprehensive Regional Ecosystem Management Arrangements (REMA) that cover all regions and all fisheries activities and, further, by delegation and amalgamation of responsibilities held by various international and regional bodies, creation of Regional Oceans Management Organisations (ROMOs) must happen – and quickly.

Experience has shown, however, that states habitually take very limited agendas, driven by limited sectoral priorities, into meetings of RFMOs. There is no grounds for assuming that states will actually seek to meet their global responsibilities when participating in regional management of marine living resources. It is therefore prudent to establish new global oversight arrangements that make regional management accountable to global commitments – so that all states with an interest in the conservation and management of a region can satisfy themselves that those among them that assert a so-called 'real interest' in the region are doing the right thing.

It is encouraging that, at last year's COFI meeting, some states have expressed an interest in an external review of the capacity of existing regional fisheries bodies to meet the demands of EBM and elimination of IUU fishing (illegal, unreported and unregulated fishing). Such like-minded states should be urged to commission and complete such a review as quickly as possible and so set the agenda for requisite reform.

### **6.2 An UNCLOS Implementing Agreement for high seas EBM**

The extent to which such developments require a broader mandate than that already provided by existing agreements is an open question. Exploration of a new UNCLOS Implementing Agreement to provide a comprehensive regime for high seas biodiversity conservation is an encouraging development and deserves urgent attention – although, development of customary international law through responsible action should not be delayed in anticipation of such formalization.



Importantly, any such Implementing Agreement must be comprehensive in its potential for biodiversity conservation – not just allowing for MPA designation and extending FSA coverage to include discrete high seas fish stocks – and in its application to all maritime activities – no exemptions for fishers, miners or shippers.

Most importantly, the time has come to assert that fishing by fishing vessels flagged to states that are not parties to relevant international and regional agreements and by fishing vessels in areas or on stocks not covered by regional management arrangements be deemed to be engaged in IUU fishing and thence designated as stateless.

Furthermore, responsible states should ensure that such states and such fishing vessels are denied access to fish resources both within EEZs and on the high seas. Such action would make it much easier for responsible states to take effective action against them – and so end the scourge of IUU fishing – thus demonstrating a commitment to move from words to action.

Similarly, the time has come for real action to be taken against flag states that do not meet their UNCLOS obligation to maintain an ‘genuine link’ with any fishing vessels flying their flags – the so-called ‘flag-of-convenience’ states. In particular, it is important that the beneficial owners of fishing vessels must be transparently notified and steps take to ensure that they can be held liable for the activities of the fishing vessels and fishers that they control. In effect, flag states should only be flagging vessels that operate in their own waters or, if operating on the high seas, are beneficially owned by their own citizens with adequate assets within their jurisdiction, unless specific bilateral arrangements are in place with other states.

Use of flags of convenience by fishers is obviously unfair – as well as being a serious threat to effective management of resources – a calculated move to avoid and subvert rules enforced by responsible states and respected by responsible fishers. For all its legalistic interpretation, IUU is a term that neatly describes these bad actors – and its elimination must be a clear and pressing goal for all.

Importantly, the OECD-hosted and ministerially-led High Seas Task Force on IUU Fishing is due to hand down its final report in early March 2006 and should identify a suite of measures that should be taken by all responsible governments.

## **7. ADDRESSING OVERCAPACITY**

Unless firm action is taken, overcapacity (too many fishing vessels chasing too few fish) is to be expected as so many different factors contribute to it: technological advance means fewer vessels can catch more fish; both introduction of sustainable management and continued overexploitation result in lower catch rates needing fewer vessels; rising population and living standards but less fish means higher prices; and subsidies for the construction and operation of vessels encourages overexploitation.

Additionally, a bureaucratic culture of not caring what happens to vessels displaced from managed fisheries by such trends means that a large and growing fleet of fishing vessels is under growing economic pressure to break the rules or try their luck on those areas of the high seas where there are yet no rules – and to break the rules in those areas where they think they can get away with it. An industry culture of disdain for governments, and a broader failure to provide realistic regional development alternatives back home, makes such an outcast life more attractive than it should be – or need be.

### **7.1 Scrap to prosper**

Whatever else is done, we need more scrapping schemes – the permanent removal of fishing capacity not only from a particular fishery but from the stock of world fishing capacity. We have a few examples of such schemes to work from and much theoretical advice to work with – and, if ever there was an area where it is time to talk talking and start acting, this is it.

In particular, creation of new vessels – whether subsidized or not – must be matched by obligations to remove a greater amount of fishing capacity. Encouraging and monitoring scrapping of fishing vessels relieves a whole range of pressures not only on fish stocks themselves but also on managers of those resources.

At the same time, scrapping schemes must be matched with regional development packages that provide realistic, viable and honourable alternatives for fishers, their families and their communities – in recognition of the real social and economic costs of insisting on EBM.

## **8. MONITORING, CONTROL, SURVEILLANCE AND ENFORCEMENT (MCS&E)**

Improved management of responsible fishers as well as effective deterrence of irresponsible ones (IUU fishing), requires more and better MCS&E. This applies particularly to fishing vessels capable of deep sea fishing that can readily turn to distant water fishing, high seas fishing, and IUU fishing and so creating huge challenges for coastal states and regional management bodies.

It also requires better identification and control of those managers and beneficial owners of such vessels capable of making such decisions as a key part of effective deterrence strategies aimed at those engaged in or tempted by IUU fishing. Such improvements in MCS&E do not come cheaply or easily, thus requiring:

- Regional cooperation between coastal states and governments involved in regional fisheries arrangements;
- International cooperation where issues and problems extend beyond the region or action is needed at the global level; and, most importantly; and
- Specific assistance programmes are developed to help developing flag, port, coastal and market states improve participation and performance in MCS&E arrangements.

The OECD-hosted, ministerially-led Task Force on IUU Fishing on the High Seas (HSTF), established following WSSD, is due to report in March 2006 and is expected to make key recommendations in this area, including such matters as:

- Maintaining a global register of vessels capable of fishing on the high seas, including identification of the managers and beneficial owners of such fishing vessels, and operational histories of such vessels;
- Converting the current informal network of MCS agencies of likeminded governments into a new global institution to support, coordinate and encourage states and relevant international and regional bodies to improve MCS effectiveness;
- Coordinating lists of good and bad vessels and their beneficial owners and flag states as identified by both states and regional bodies;
- Improving transparency so that the enormous support of civil society for the efforts of governments to eliminate IUU fishing can be harnessed to support and complement the work of governments – so that IUU fishers will be left ‘nowhere to hide’; and
- Reviewing the competency and mandates of existing regional fisheries bodies with a view to expanding mandates and geographical coverage to ensure IUU elimination and EBM can be achieved throughout the oceans.

## **9. CONSUMER CHOICE SCHEMES**

As part of the efforts by the wider community to assist governments, it is encouraging to see the development of numerous consumer choice schemes around the world and the preparedness of FAO to develop technical guidelines for their operation. Such initiatives deserve the support and encouragement of all – especially through improved information sharing that can lead to better coordination, avoidance of conflicts between lists and, eventually, to greater harmonization of messages in particular markets.

It is important to recognize that the fair allocation of living marine resources is not just a matter for fishers, fishery regulators and governments. Ordinary citizens as consumers have a right to have an influence – and a duty to ensure that they know what the ecological footprint of their consumption habits is. Indeed, this is the key area where market forces can best help deliver better environmental performance – on the assumption that a properly informed consumer will make prudent and responsible choices.

Ideally, each major seafood market in the world should have its own coalition of consumer interests encouraging individual consumers to make informed choices to send market signals that support those fishers and fisheries that deliver on environmental and social outcomes – and penalize those that do not.

Similarly, it is hard to believe that the citizens of East Asia would be so keen to have shark-fin soup on the menu for customary celebrations if they knew how devastating an impact their choices were having on oceans health (although it must be noted that Hong Kong has just overtaken Tokyo as the biggest single fish market in the world – and that shark-fin is the single biggest item of trade by value)

Fortunately, however, there is a particularly good opportunity for such consumer schemes to help with discouraging unsustainable and IUU fishing of pelagic and deep sea species, especially on the high seas. There is a growing list of such species that have been so poorly managed and overexploited that they warrant listing on Appendix II of CITES let alone consumer choice red lists. [CITES is the Convention on International Trade in Endangered Species of Wild Flora and Fauna

Governments need to take note that the concerned communities of the world will not idly wait for governments to fix their governance gaps and unsustainable fishing by their vessels and citizens. Consumer choice lists and CITES listings both offer real opportunities to support governments trying to do the right thing and to discourage fishers that are not.

## **10. GREATER GOVERNMENT RESPONSIBILITY NEEDED**

Once governments have ratified relevant international and regional agreements, and thus legally obliged to implement their provisions and ensure compliance with their rules, governments are then obliged to adopt measures to meet those obligations. There is much more to be done by most governments in all areas of responsibility:

### **10.1 FLAG STATE RESPONSIBILITY**

It is no longer acceptable that states can exercise their right under UNCLOS to operate a vessel register that includes fishing vessels while failing to meet their UNCLOS responsibility to establish and maintain a genuine link with such fishing vessels. Governments have not yet even defined what is meant by that ‘genuine link’ despite much liaising and talking by relevant agencies and international bodies.

While there may be good reasons for responsible operators of merchant shipping to use flags of convenience, this is not the case for fisheries activities. To allow owners and operators of fishing vessels licenced to exploit marine resources, especially on the high seas, to hide behind veils of corporate secrecy, anonymous societies and limited liability companies should no longer be acceptable government practice.

Exercise of flag state effective responsibility over fishing vessels is no easy task and states operating vessel registers should be invited to make the necessary investments in establishing the capacity required – or to cease registering fishing vessels other than those operating in their own waters and beneficially owned by their own citizens. Fishing vessels flagged to states that do not do this should be refused access to fisheries, port facilities and markets by responsible states.

### **10.2 Port state responsibility**

It is encouraging to hear that port states are generally moving to improve oversight of fishing vessels using their ports. FAO has produced an excellent model of the kind of

control measures port states should be implementing. Of particular importance is the need to insist on port-to-port VMS tracking so that port authorities can ensure that fishing vessels have only been where they are licenced to go. It is important that port states develop regional port access agreements to stop IUU fishers 'port-hopping' in the same way that they 'flag-hop' to evade responsibility. A key part of such an agreement should be the global reporting of port movements by deep sea fishing vessels to support MCS&E efforts by coastal states and regional bodies.

### **10.3 Market state responsibility**

As with all food products, consumers expect and demand more accountability and responsibility by producers, traders and processors of the food they eat – and fish is no exception. Market states must be able to ensure that their consumers receive credible and reliable information and that access to their markets can be controlled in support of any trade measures adopted in support of sustainable fisheries management. The extent to which appropriate chain of custody measures are put in place can be expected to become a significant measure of progress towards EBM and Integrated Oceans Management.

### **10.4 Control of nationals**

Most importantly, governments must be willing and able to ensure that their own citizens and companies do not get involved with or benefit from IUU fishing. That some countries are taking such steps is very encouraging and revealing an important reality – that, in most cases, those engaged in and benefiting from IUU fishing are based in developed countries and exploiting the poor institutional and governance arrangements in many developing countries to shirk their responsibilities and evade liability for the activities they control.

## **11. AQUACULTURE**

Finally, it is time to sound a warning about the continued growth of the marine aquaculture industry, especially the farming of carnivorous fish like salmon and trout. In last year's State of the World Fisheries Report, the FAO noted that already 30% of all wild capture fish are fed to fish farms. A number of concerns need to be raised:

At such high levels of diversion of fish resources from fully exploited fisheries, less fish meal, fish oil and frozen small pelagic fish products are available to meet traditional needs and markets, putting pressure on coastal communities;

Small pelagic fish are diverted from providing food and wealth for coastal communities in developing states to generating smaller volumes of fish for luxury markets in developed countries – risking perverse economic development outcomes;

The sustainable management of pelagic fish stocks are coming under increasing pressure – and, in most regions, exploitation of high seas stocks are not under effective control posing a dire risk of overexploitation; and

Wild populations of predatory fish, including tuna, if not already depleted by over-fishing, face reductions in their food distribution and abundance with potentially adverse impacts.

There is thus a risk that naïve encouragement of further rapid development of salmon farming in particular will undermine government efforts to meet social and environmental policy commitments.

Furthermore, almost every allocation problem identified so far stands to be exacerbated by further growth in salmon farming – growth that is planned by many companies and encouraged by many governments.

# Resource sharing – key to sustainability\*

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Good morning, ladies and gentleman. In terms of my speech today, I'm going to do two quick facets. One is: I'm going to cover some issues around, or principles around, resource allocation, and perhaps give you some direction on where you can go into the literature to pick some of that material up. But probably more importantly, I want to talk about a regional perspective in terms of the Shark Bay Region, and how resource sharing fits within a total framework.

## **1. BACKGROUND TO RESOURCE ALLOCATION**

Classic approaches to fisheries management include MSY, MSC, ESD, EBM, and whole other series of jargons. And, what we've tended to do over the years is move forward from individual fisheries, and move more into ecosystem risks and so on, particularly under the EPBC Act, where we're dealing with issues of protected species, as well as the impacts on fisheries on broader ecosystems. For those who want some background on that, have a look at our website – I encourage you to have a look at the website, which you've got on your, on your tag. There's a lot of literature there that you might find of some interest.

Clearly the Oceans Policy, as the previous speaker has said, is actually pushing towards a broader, if you like, view of the world; particularly in terms of not just the traditional fisheries sectors of indigenous, commercial, and recreational, but extending into the broader questions of mining, petroleum, shipping, conservation, protection of biodiversity, and so forth.

## **2. REALITIES OF TODAY'S FISHERIES MANAGEMENT**

Before talking about sharing the fish, I just want to talk about some background, which I think is relevant when I get to the Shark Bay discussion: namely, fish stocks are not stable, technology, population growth in coastal communities, competing demands for fish, economic pressures and fleet overcapacity, political importance of tourism and recreational fishing, customary/artisanal fishing needs, and illegal fishing.

Fish stocks themselves are not particularly stable, and I think it's useful to keep that in mind, because of environmental perturbations and independencies between fisheries. Technology is impacting on increasing efficiency of all user groups harvesting fish. Population growth and coastal development continues to impact on the numbers of people fishing and fish productivity of adjacent waters.

Competing demands for fisheries resources continue to outstrip the productive capacity of the majority of the world's fish stocks. Economic pressures, especially the

\* Presentation can be found at <http://www.fish.wa.gov.au/docs/events/ShareFish/papers/pdf/presentations/Present-PeterRodgers.pdf>

growing costs of energy and commodification of seafood in the world's markets, are leading to issues of fleet overcapacity, low financial returns, and cost price squeeze pressures for many of the world's commercial fishing fleets. This trend is being ably assisted by growth in aquaculture production.

The political importance of recreational fishing pursuits in tourism, relating to dependence with charter fishing, coastal inland businesses from fishing or passive use of fish stocks are increasing. Customary fishing needs of indigenous people and, increasingly, more numerous artisanal fishermen in terms of the requirement to address protein needs of all in many of the world's oceans have become a matter of greater policy priority. And of course, illegal fishing, especially between jurisdictions, has made the task of sustainable fisheries resource management even more difficult for many jurisdictions. This activity, in turn, can and does, destabilize existing fisheries management arrangements.

### **2.1 Key governments role in allocation**

It's against this background of sustainable resource management, that this question of government's role in addressing this question of allocation is becoming increasingly clear - and a number of speakers have said so - that until you get to explicit shares, then you run the risk of growth in one sector or the other leading to overexploitation, and -without adjustment - unsustainable fisheries, and in practice that's what we're seeing in a number of jurisdictions. The allocation decision, for most fisheries, can't be made explicitly, but clearly for the major fisheries, explicit allocation is the key.

And the other issue is management of multiple sectors over time. I think we tend to be a bit static in the way we look at this question. There are awful and considerable trends impacting on fisheries and you need to be able to deal with it in a continuous spectrum. The realities of fisheries management are that it is complex, and we are making it more complex as we try to deal with more and more of the anomalies. An appropriate framework, as many have said, is a rights-based framework, but that doesn't mean to say you can't do a lot without a rights-based framework, and perhaps you'll see that when I move further into my talk.

### **2.2 Guiding principles for allocation**

In terms of guiding principles for allocation - I'll spend a little time on this, because there's been a lot of work done in Australia by Justice Toohey and the Coolangatta Communiqué also provides a good insight, at least I want to take the time to look him upon the website and, at least, go through them. The guiding principles are fairly basic:

- Intergenerational benefits - fish resources are a common property resource managed by the government for the benefit of the present and future generations;
- Sustainability is paramount;
- Decisions must be made with the best available information, but you should not defer decisions, simply because you don't have that information;
- Harvest levels that incorporate total mortality are seen as important;
- Allocations to user groups should account for total mortality of the fishery resulting from the activities of each group, including by catch and mortality of released fish;
- Total harvest across all user groups should not exceed the prescribed harvest level; if this occurs, steps consistent with the impact of each user group should be taken to reduce that take to a level that does not compromise sustainability;
- Appropriate management structures and processes should be introduced to manage each user group within their prescribed allocation, and this should incorporate predetermined actions that are involved with that groups catch increases above their allocation; and

- Allocation decisions should aim to achieve the optimal benefit to the community from the use of fish stocks and take into account economic, social, cultural, environmental factors. (Now, this is a fairly simplistic view, but each society has its own values and objectives, and it's critical to understand those objectives and those values before you actually move down this path-line. Realistically, this takes time to achieve, and the implementation of these objectives is likely to be incremental over time.)

In addition, allocations for a group should generally be made on a proportional basis to account for natural variations in fish populations. This general principle should not preclude alternative arrangements in a fishery where priority access for a particular use, or groups, may be determined. There are a number of examples of that, and the classic in the Australian scene is the priority given to recreational fishers in Northern Territory in the take of barramundi. That's been a very clear policy decision by the government in achieving such an outcome.

In addition, management arrangements must provide users with the opportunities to access the allocation. There should be a limited capacity for transferring allocations unutilized by a sector for that sector's use in future years, provided that outcome does not affect resource sustainability, and this question of transferring allocations between sectors is raised by Peter Pearse.

These principles are quite broad, but they remain applicable in most of WA fisheries. The real challenge facing the department and the committee set up to deal with this work is to translate those principles into actuality. There will be a number of talks at this conference focused on the work being done on rock lobster and abalone and on the difficulties in getting the appropriate data to actually make decisions. The collection of data and the management of precise allocations is problematic in itself. It is expensive, and it requires fairly precise measurement.

### **2.3 How to define shares**

In terms of defining shares, there's a range of traditional management approaches. If you put aside this question of explicit allocation, implicit allocation has already occurred. In every fishery which is exploited, the sectors invariably are taking certain percentage shares of the catch.

What we're trying to do is move to an explicit allocation and give better precision to management and change over time. That doesn't mean to say you can't address allocation; you can actually address it implicitly by applying tools like spatial closures, temporal closures, using management measures such as size limits and so on that actually give effect to management outcomes - which include resource sharing shifts.

I think it's useful to understand that, because clearly that happens on a regular basis. I guess one of the real challenges, as a previous speaker raised, is the question of taking a broader ecosystem approach. That is a real challenge. Perhaps by going through this example in relation to Shark Bay, we could put that into context.

## **3. A WESTERN AUSTRALIAN REGIONAL EXAMPLE**

### **3.1 Characteristics**

The area is called the Gascoyne. The Gascoyne Region is off Western Australia's Shark Bay. Its characteristics are: low resident population, you got two centers – Carnarvon and Denham, it's dry hinterland, pastoral mining area, World Heritage listed, and other features. It is a bay with hyper-salinity; it's an icon area and there are dolphins and dugongs of significance in the region; there are at least 8 fisheries (managed fisheries); and there are low environmental impacts from industrial development and agriculture in this region. There's significant visitation and tourism; much of the recreational activity in the area is actually driven by people coming from the metropolitan region and elsewhere around Western Australia and Australia.

Just to give you some perspectives, there's a crab fishery up there of five to six hundred tonnes. The multi-snapper fishery is an important fishery, and it's a managed fishery. Prawning is a significant industry in the area, along with scallops. The pictures provide you with some quick scenes; it's a very pristine and pleasant place to go. In terms of fisheries, the snapshot is that there are about 8 fisheries, and they are all managed fisheries in the sense of a limited entry framework. You have prawn, scallop and snapper fisheries; you have a beach seine fishery in certain parts; there's a crab fishery, a mackerel fishery, and an open wet line fishery; a charter industry that focuses on it, and of course, there's aquaculture development.

For those who don't know where Shark Bay is, that's it in terms of Western Australia. It's an area of about 14,000 square kilometres, the area which I'm talking about.

The prawn and scallop fishery, most of the fishing occurs in that area in terms of prawn fishery, these are permanent closure areas. There're a whole series closures and openings and so on aimed to maximize the catch. The Shark Bay snapper fishery has three stocks and areas, and the salient feature is that two of these are largely harvested by the recreational sector, while there's a commercial quota managed sector in the third area. A particular feature about the two recreational fisheries is that, in order to achieve sustainability because the stocks collapsed, we've had to introduce a tagging system for the recreational catch. The mackerel fishery is just wide open.

There is also a marine park. Each one of those blue areas represents special protection zones for seagrasses and the like. You have sanctuary areas, general use areas, and so on.

There is also a crab fishery. Crab operations are outside the area that serves as the nursery area for a lot of the crab fishery. There are aquaculture sites and pearling sites within Shark Bay. And when you impose a whole lot, you get what you call a real mess – and that's the reality. Fisheries management is done in terms of individual fisheries, and you have different particular measures on top of each other, and if you impose marine park, it's a fairly composite set of management arrangements aimed to ensure sustainability and which also has implications for resource sharing.

### **3.2 Key fishery management issues**

I just want to reflect on some of the issues which are going on. These include a marine park with multiple use areas in the lower half of Shark Bay, and there's separation between take and no take. There are significant intra-sectoral sharing issues in the commercial fisheries between scallop and prawns, snapper and other species, beach seine and crab, snapper and wet line. There are significant intersectoral sharing issues between commercial, charter, and recreational, snapper and wet line fishing operations, and to a lesser extent, crabs. There are stocks issues for tiger prawns and snapper. And you manage the whole lot as a composite set.

So what are some of the trends impacting on the fishery? Well there is the long term cost price squeeze that I mentioned before; there's growing tourism and, in particular, recreational fishing due to visitations to Carnarvon, Denham and Monkey Mia. There's expanding salt mining in the lower reaches of Shark Bay. There are resource management planning issues around protected species such as dolphins and dugongs. There is spatial separation of fishing. There's total protection of shark stocks in the area in terms of no netting, although that's really aimed at protecting the dugongs. And, of course, there is the World Heritage listing.

So you make a series of decisions in terms of who uses what area and what type of gear, all aimed at really optimizing, - not necessarily maximizing, but optimizing - the total take, and trying to minimize the interaction between and within groups. That's the normal process.



### 3.3 Within sector resource sharing issues

Briefly, there is the effort regulation between the prawn and scallop fleets. We have two fleets, I'm sorry we ever go to that point, but we have got to that point, and so you have this interaction which you have to manage. We'd be much better if there was just one fleet.

There's merging of management approaches for demersal finfish and snapper. Obviously, we put snapper management in place, but it has become terrifically, abundantly clear that we couldn't sustain the wet line fishery unless we moved that to quota management, or some form of management, along with snapper – and that's under way. There are spatial and time closures to protect snapper stocks from trawling, and we've had to put those in place so the two fisheries didn't interact from the point of view of sustainability.

We have gear controls – bycatch reduction devices (BRDs) to minimize interactions with turtles and bycatch. Also, there are gear controls (no shark netting, for example) and area closures to trawling to protect nursery areas, seagrass meadows, dugongs and dolphin interactions.

We have had quota reductions in snapper due to resource sustainability. We've had voluntary buyback schemes, in place to actually deal with improving profitability of the prawn and beach seine fisheries. We've had internal fleet size adjustments by unitizing gear in the Shark Bay prawn fleet, again, to improve the profitability of the industry.

### 3.4 Across sector resource sharing issues

We have clear limits on the recreational catches in the commercial quota and recreational line fisheries, particularly for the inner stocks of snapper in Shark Bay through tag issues, as I mentioned, in the Freycinet Inlet and Eastern Gulf.

We have spatial separation of crabs and snapper fishing activity between recreational and commercial fisheries and, to some extent, through closures and management zoning inshore. Also there are different sizes regulations for crabs: the commercial crab fishery in the top end of Shark Bay targets a size limit of about 135cm, compared with a recreational size limit of 127cm.

There's voluntary reduction and spatial separation of beach seine effort, and that's slowly progressing. (I can remember when there were 21 boats in the fishery, now we're less than 9 active vessels in the fishery, and they're voluntarily putting in spatial separation, because they don't want to have any interaction with recreational fisherman.)

There's a range of multiple use zones within marine parks impacting on management of boats, fishing, and non fishing or sanctuaries to meet Shark Bay marine planning outcomes and to ensure the biodiversity values of the Shark Bay region are met.

So, we have precise management of demersal finfish stocks progressing with the snapper fishery. Eventually, there will be an establishment of some resource allocation as the percentage take for oceanic demersal finfish fishery, and that's particularly likely to occur with increasing recreational tourism in the area.

There's potential market adjustment, as one of the other mechanisms we need to think about in terms of commercial and recreational catch, because the real key issue in terms of this is resource security. It's resource security from the point of view of the resource itself, the sustainability aspects – but it's resource security in terms of the players, particularly as an investment and business decision. And, I think we will see some further spatial separation of beach seine fishing as we go into the future.

## 4. LONGER TERM DIRECTIONS FOR THE MULTI-SECTOR, MULTI-FISHERY REGION

What it's leading to, I think, is that we can take a more sophisticated approach to resource management between sectors. Clearly, in the big sectors, and I'm talking

about the big fisheries – explicit allocation is possible. In the minor sectors, it's not cost-effective. The resources required to actually get down to fine-tuning a resource allocation in some of those minor fisheries is just not practical or possible.

But you can use tools such as making a fishery a single user fishery – that's possible. And it's realistic in terms of management options. And, even in making decisions about crabs, one has to take on board that most of the metropolitan take of crabs is by recreational fishing, whereas up in this region, most of the take is by the commercial industry. So, you may want to take a state-wide perspective in planning around future uses of fish and where it might lead you to.

In conclusion, I think fish use planning needs to become an explicit tool as a planning function. And if you look at a bioregion, you can certainly take a perspective which deals with explicit allocation for some fisheries, spatial separation for other fisheries, the single use of a fishery by one sector, clear marine planning requirements being met by closures and other things in terms of meeting biodiversity. And if you sit down and think about growth in population, think about changes in technology, think about trends in economic performance and so on, you can provide pretty good answers about where things might be in a decade's time.

If at the same time, you can actually define how you might facilitate adjustment between sectors, then I think you can give greater certainty to the commercial fishing industry, as well as others, in terms of how you might deal with the future.

A myriad of approaches are available in terms of resource sharing, and while I'm a great believer in explicit allocation for the larger fisheries, I am not convinced for many of the minor fisheries that it's a worthwhile task.

Thank you.

# Allocation issues in marine environment: managing conflicts between commercial, artisanal and tourism in tropical fisheries

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## ABSTRACT

Allocation of resource access and use rights is one of the most controversial issues in marine fisheries. Historically, various principles of allocation have evolved along with the objectives of public policies (such as concerns for sustainability and poverty alleviation), and recognition of different stakeholders in fishing industry. The recognition of exclusive economic zones (EEZ), development of technologies, and emergence of markets for different products, services and uses of fisheries and the marine environment provided an overall economic dimension to the allocation issues. Recognition of tourism, recreational fishing, conservation and bio-diversity values of fisheries have a recent and important influence on the allocation principles in fisheries. As a result, allocation issues in tropical fisheries have become elevated from concerns for improving and maintaining the welfare and living standards of small isolated fishing communities to a higher level cross-sectoral, national, and international development and conservation concerns.

This paper examines the conflicts and competition among artisanal, commercial, and tourism with regard to allocation of marine resources. The effectiveness and limitations of market-based allocation principles as well as common property and co-management arrangements to manage resource conflicts are discussed. The implications of replacing conventional hierarchical and command-and-control policies by moving towards greater decentralization, whether through markets, common property, or co-management, on existing resource allocation are also discussed. Both vertical and horizontal approaches to the management of the industry have been recommended to manage the allocation issues in socially, economically and environmentally sustainable ways.

## 1. INTRODUCTION

The allocation of resource access and use rights is one of the most controversial issues in marine fisheries ever since mankind began to fish in the seas, rivers and oceans, and even before public policies emerged to deal with the fisheries management. Although economists refer to allocation as an economic criterion for ensuring efficiency in the production and use of a resource, historically, various principles of allocation have evolved in response to the changing objectives of public policies (such as concerns for sustainability, improving economic efficiency, and poverty alleviation) and recognition

of different stakeholders in the fishing industry. The history of commercialization of tropical fisheries is a recent one since for decades fishing for food and local livelihoods were the main motivation behind coastal communities seeking allocation or rights over sea space and sea resources. On the other hand, commercial interest in tropical fisheries did not stay confined in intensive harvesting of fish alone. Recreational fisheries, tourism, and resort services are few of the modern forms of uses of fisheries, which have the dimension of allocation over space, time, and efficiency.

This paper examines the conflicts and competition among artisanal, commercial, and tourism with regard to allocation of marine resources. The effectiveness and limitations of market-based allocation principles as well as common property and co-management arrangements to manage resource conflicts are discussed. The implications of replacing conventional hierarchical and command-and-control policies by moving towards greater decentralization, whether through markets, common property, or co-management, on existing resource allocation are also discussed. Both vertical and horizontal approaches to the management of the industry have been recommended to manage the allocation issues in socially, economically and environmentally sustainable ways.

## **2. EVOLUTION OF FISHERIES ALLOCATION PRINCIPLES**

There were times when fishing was a way of life and part of traditional food and livelihood strategies in coastal communities. The issue of allocation at that time focused primarily on the communal use and access to the resources, which was mostly governed by traditional allocation principles, such as indigenous people's rights, and customary allocation of fishing rights over coastal and near-shore areas, coral reefs, islands and beaches. The creation of nation states that somewhat redefined many pre-existing traditional property rights, and state control over fisheries and coastal waters are relatively recent phenomena. However, their influence was instrumental in the development and design of formal principles of allocation in marine and coastal waters. While technological revolution hastened the growth of industrial fisheries, market demand and fishery characteristics contributed to further subdividing fisheries along species, gear use and fishing scale. The emergence of international policy regimes, such as the creation of EEZs, United Nations Convention on the Law of the Seas (UNCLOS) and several other international agreements and conventions that followed in the last two decades have also reshaped the fisheries and ocean management across developed and developing countries. This is also the period when a huge influence of value added and service oriented activities in coastal and marine waters, such as recreational fishing and tourism, were observed on the allocation of resources in fisheries, and many of the complex management conflicts ensued.

The early development of the fisheries industry during the 1950s through the 1960s was governed by the principle of "freedom of the seas," where unrestricted use of the sea's unlimited potential outside the territorial waters of a state's three-mile territorial limit was provided with minimal regulations on offenses (see Table 1). This reflects the allocation principle of open access, which is characteristic of this period where marine resources were perceived as inexhaustible. Table 2 summarizes the influence of major global policies and institutions on national and local allocation at different time periods.

The 1970s through the early 1980s saw coastal states declaring EEZs up to 200 nautical miles, which increased territories under national jurisdiction. Also at this time, the pursuit for economic growth and revenue generation from export trade, coupled with the expansion of fishing capacity from improvements in harvesting technology and methods led coastal nations to develop their national fishing industries, resulting in a phenomenal increase in the scale of fishing activities worldwide and the accompanying accrual of substantial short-term monetary gains to those who participated in the global fish trade (Bennett, 2000). Unfortunately, this development route resulted in the

dissipation of resource rent in the longer term, leading to problems of overfishing in a number of important fish stocks by the end of the 1970s, and consequently, escalating persistent conflicts between subsistence and commercial fishers as national policies continued to advocate for increased export receipts and started renting fishing areas to distant water fleets (Payoyo, 1994; Bennett, 2000, Kearney, 2001).

TABLE 1  
Evolution of fisheries allocation paradigm

	Time period			
	1950s to 1960s	1970s to early 1980s	Mid-1980s to early 1990s	Mid-1990s to present
Dominant Paradigm	Freedom of the seas	Rationalization	Sustainable development	Conservation and social welfare paradigm
Allocation Principles	Open access	Sustainable yield & efficiency (MSY, MEY)	Environmental sustainability	Ecosystem health and biodiversity conservation Multiple social and economic benefits
Management Regime	Development management	Territorial Use Rights of Fisheries (TURFs)  Centralized command and control	Monitoring Control & Surveillance (MCS) Integrated Coastal Management (ICM) Rights-based fisheries management	Multiple use and user approach Marine Protected Areas (MPAs) Community-based management Co-management

Source: Adapted from Ahmed *et al.*, 2005.

TABLE 2  
Influence of global policy and institutions on national and local allocation at different time periods<sup>144</sup>

	Time period			
	1950s to 1960s	1970s to early 1980s	Mid-1980s to early 1990s	Mid-1990s to present
Global Policies & Institutions	Freedom of the Seas	EEZs, UNCLOS, common heritage of mankind	· Brundtland Report · CITES	· Trade liberalization (e.g. WTO) · CCRF-FAO · MDG, WSSD, CBD
National Response	Open Access	· Expansion of coastal states jurisdiction · Joint venture license agreements · Fleet modernization · MCS systems · Aquaculture revolution · Introduction of Western stock assessment & management techniques	Coastal land use planning; Fishing zone; Gear regulations by fishing scale and use category  · Fisheries sector review (e.g., Philippines Fisheries Sector Program-World Bank)	· Updating of national fisheries development plan (e.g. 1997 Agriculture & Fisheries Modernization Act, 1998 Philippines Fisheries Code, Cambodia's National Fishery Law) · Tariff reduction
Local Response	Open access	· Increased fishing effort · Mangrove conversion to fishponds · Privatization	Fisheries infrastructure development (e.g. National Milkfish Breeding Program, Philippines)	· CBFM (Bangladesh) · Decentralization (Philippines, Indonesia) · Fishery management council (informal) · Community fisheries (Cambodia)

Source: adapted from Ahmed *et al.*, 2005.

<sup>144</sup> Note: CBD – Convention on Biological Diversity; CBFM-Bangladesh – Community-based fisheries management; CCRF-FAO – Code of Conduct for Responsible Fisheries; CITES - Convention on International Trade in Endangered Species of Wild Flora and Fauna; MDG – Millennium Development Goals; WSSD – World Summit on Sustainable Development.

The signing of the United Nations Convention on the Law of the Sea (UNCLOS) on December 10, 1982 in Montego Bay, Jamaica by 117 countries ushered a new paradigm on the world's oceans as "the common heritage of mankind." Thus, exploitation of mineral on the ocean floor beneath the high seas were now considered global jurisdiction rather than under national authority. In addition, full sovereignty of coastal states subject to the right of innocent passage for foreign ships was extended from three to twelve nautical miles. Moreover, the establishment of exclusive economic zones (EEZs) increased the ocean resources of those countries where they were granted exclusive rights to the fish and marine life in waters within 200 nautical miles from the baseline and gave them exclusive management and usufructory rights over these resources for economic development (Hinds 2003). The recognition of exclusive economic zones (EEZs), development of technologies, and emergence of markets for various marine products provided an overall economic dimension to the allocation issues based on conservation of the resource stocks.

In 1987, the guiding principles of sustainable development were laid down in the Brundtland Report by the World Commission on Environment and Development (WCED). With this, allocation issues took a new dimension to include the environmental consequences of aquatic-related activities as the intergenerational aspects of economic growth came into fore. In order to assure not only the short-term but also the long-term capacity of the future generation to meet their needs, sustainable development strategies called for a balance between the pursuit of economic growth and the protection of the natural resource stock.

By the 1990s, increased competition from non-fisheries users of the aquatic environment began to surface as other stakeholders of the ocean (e.g. tourism, recreational fishing, etc.), often with diverging socio-economic goals began to assert their rights. This implies that allocation issues were no longer exclusive to the fisheries sector and that any allocation decision will now have to account for the multi-uses of the ocean.

Among the poor, declining socio-economic opportunities brought about by poverty, lack of alternative employment in the non-fisheries sector, and landlessness made fishing the only remaining alternative for food, nourishment, and income, increasing fishing pressure and conflict among subsistence fishers (Salayo *et al.*, 2005b). This led governments around the world to commit to poverty reduction as one of their goals of the new millennium, which has equity implications in the allocation of resources.

On the global scene, while globalization opened new opportunities for increased production and trade, local coastal villages often found themselves unable to compete and in the losing end as they limit or lose control and access over fishery resources, which traditionally were accessible to everyone (Viswanathan *et al.*, 2003; Salayo *et al.*, 2005b). At the national level, the devolution of central government control provided local governments with a direct hand in managing resources. This has helped some of the states in Asia and Africa to revitalize participatory resource management strategies (e.g. co-management and community-based management) because the prevailing centralized, top-down management strategy for fishery resource failed to respond to the needs and issues faced by local coastal communities. Clearly, allocation issues in tropical fisheries have become elevated from concerns for improving and maintaining the welfare and living standards of small isolated fishing communities to a higher level cross-sectoral, national, and international development and conservation concerns.

### **3. FISHERIES ALLOCATION AND CONFLICTS UNDER DIFFERENT MANAGEMENT REGIMES**

#### **3.1 Types of management regimes and allocation principles**

##### **3.1.1 Traditional fishery management**

Customary or indigenous institutional fisheries management involves community ownership of coastal resources and collective fishing rights to allocate, use, manage,

TABLE 3  
**Fisheries management and allocation and their response to conflicts**

Management regime	Allocation principle	Response to conflict	
		Type of conflict created	Type of conflict resolved
Traditional	Open access; common property	Resource sustainability	Social tension between fishers (conflict on relations)
Centralized/Top-down	Conservation of resource stock	Social tension across scale of fisheries (e.g. small-scale vs. large-scale fishers)	Resource sustainability of selected fish stocks
Decentralized/Bottom-up	Ecological/ environmental considerations Intergenerational equity · Multiple use	Social tension between managers and users of the resource (e.g. marine users vs. government authorities/fisheries administrators)	Resource sustainability Social tension due to inclusion of local community/ resource users in the management process Intergenerational equity Multiple-use

and control fishery resources mainly for subsistence, based on cultural traditions and values that are generally marked by a sense of harmony with the ocean, and that is effected through kinship or similar arrangements within the respective indigenous group (Payoyo, 1994; Adams and Dalzell, 1995). Access to the near shore fishery resources is determined through several mechanisms, such as proximity of a coastal village to the fishery area, as in the case of the Micronesian islands. Beyond this exclusive zone, other fishers are allowed to harvest with the understanding that the privilege to fish in the area is a token of the island community's hospitality and generosity and that preferential rights to the fishing grounds belong to the adjacent village. Thus, any catch that is considered to be excessive is to be returned to the local chief, who will then determine their share in the catch (Nakayama and Ramp, 1974). Table 3 shows examples of conflicts that were resolved under different management/ allocation regimes, while creating new ones.

Because fishery resources were abundant and a sizeable proportion of the local village population has a direct stake in maintaining the health of the marine resource as a food source, overfishing was not a problem. Also, effective monitoring of fishing activities was easily carried out in indigenous fishing communities where everybody knows one another and where the village chief is always kept abreast with the latest developments in the community. As a result, conflicts were limited mostly to problems on boundaries of fishing grounds, which were settled through an established tradition of mediation and retribution (e.g. loss of face or standing) with nominal use of institutions (Adams and Dalzell, 1995).

For years, community access rules to manage common property was effectively handled by traditional systems. This is supported by a number of fairly recent studies on coastal communities (e.g. Hviding and Jul-Larsen, 1993; Ruddle, 1994; Dyer and McGoodwin, 1994) that show that given certain conditions (e.g. relatively small group with common needs and norms, clearly defined boundaries for resource management, strong leadership, relatively low cost of enforcement, etc.), informal management systems can effectively promote and enforce sustainable use of fishery resources (Pomeroy, 1995; Adger and Luttrell, 2000). This further implies that the social benefits of working together as a community towards a common goal of protecting the right to fishery resources outweighed any net gains in private utility from individual profit (Bennett, 2000). However, as markets began to permeate the economy, such that vertical integration of exchange replaced the prevalent horizontal structure of transactions, customary institutions of artisanal fishery management based on communal usufructory rights became inadequate in handling the pressures and the accompanying problems brought about by the growth of a market economy (Payoyo,

1994). Thus, governments began to intervene by limiting access to marine resources in an effort to protect the welfare of local fishing communities and accommodate the growing pressure from the commercial interests.

### 3.1.2 *Centralized fishery management*

Centralized fisheries management followed from the early phase of expansion of fishing in prevailing open access in the 1960s. As pressures from commercialization and industrialization began to impact on marine resources, governments around the industrialized world started to intervene in the management of fishery resources in an effort to control fish harvest (Kearney, 2001). This centralized approach to fisheries management drew largely from the biological models of maximum sustainable yield of selected fish species that has been proven to have limited use in multispecies tropical and subtropical fisheries (Pomeroy, 1996; Bennett, 2000). Nevertheless, the focus of this conventional science-based management framework is in controlling fishing effort in order to achieve a particular level of harvest and fish stock (SIFAR/FAO, 2003). Indirect controls were first imposed through regulations (e.g. shorter fishing period, restrictions on fishing areas, limits on allowable harvestable fish size, regulations and restrictions on the use of gear, boat length, and equipment, use of licenses, etc.), which proved ineffective as fishers devised creative ways to circumvent these regulations (Kearney, 2001; Jones and Bixby, 2003). For example, as the fishing season became shorter, the fishing crew became larger; as restrictions on boat length were imposed, boats with wider and deeper hulls were introduced (Jones and Bixby, 2003). In effect, these regulations were only effective during the transition period from its imposition until such time that resource users and/or technology have crafted ways to outwit the regulation (Jones and Bixby, 2003).

Because of the poor incentive structure of indirect controls to address resource use and allocation, a shift in fishery management based on the control of market forces and private ownership through the allocation of property rights gained increasing popularity in industrialized and sub-tropical fisheries (Bennett, 2000; Kearney, 2001; Jones and Bixby, 2003). Rights management or direct control on the number of fish caught was implemented mainly through individual, transferable quotas (ITQs), which confers property rights to the fish prior to harvest by providing license holders a share of the total allowable catch (TAC)<sup>145</sup> (Bennett, 2000; Jones and Bixby, 2003). ITQs have been identified as the dominant factor responsible for the success of commercial fisheries in New Zealand and Australia, primarily because by providing each license holder with a secure assurance of a portion of the fishery resource (TAC), competition in maximizing the catch is eliminated with an effective enforcement mechanism. This implies the following:

- a. ITQs reduce inefficient capitalization and increase profitability because fishers are able to concentrate solely on maximizing profits by improving the value of their catch and reducing costs instead of maximizing their catch;
- b. ITQs help fishers command a higher price for their product by allowing them to spend more time in marketing;
- c. ITQs is a more effective conservation method (as opposed to indirect controls) since it provides fishers a direct stake and the fishery and because ITQs are directly determined by the value of the fishery;
- d. ITQs can reduce subsidy to fisheries since the more efficient fishers can buy individual shares from the less efficient fishers; and
- e. ITQs provide a market mechanism to settle conflicts among various resource users through the exchange of quota shares.

<sup>145</sup> The quantity of fish that can be sustainably harvested in a season, as determined by biologists (Jones and Bixby, 2003).



In general, although fisheries management worldwide is predominantly run by government, experience to date shows the inability of centralized institutions in effectively addressing the fundamental internal and external pressures to the marine environment that affect fishing communities (e.g. competing uses, rising population, globalization, and environmental degradation) and in successfully achieving its conservation objectives, which have a narrow focus on the sustainability of the fish stock (Pomeroy, 1995; Viswanathan *et al.*, 2003; Nielsen *et al.*, 2004). Worldwide evidence show continued overfishing of several important fish species and the threat of extinction for some of these stocks even as modern fisheries management has been in place for decades (Viswanathan *et al.*, 2003; Nielsen *et al.*, 2004).

This has been traced largely to the exclusive use of biological models as basis for decision-making, the manner in which the objectives are defined, and more importantly, the lack or absence of input and participation of stakeholders from the local community in the management process, which in turn reduced its authority and usefulness as a governance structure (Pomeroy, 1995; Hara and Nielsen, 2002; Viswanathan *et al.*, 2003; Nielsen *et al.*, 2004). As a result, the recent decade has seen a revitalization of fishery management effort towards increased decentralization and active participation of coastal communities.

### 3.1.3 Decentralized fishery management

There is a growing trend towards decentralized bottom up or shared responsibility between government and local communities in the management of marine resources (e.g., co-management, community-based management) as evidenced by partnerships established by the national and local governments with industry, NGOs, fishing communities, and local resource users in carrying out programs and policies, and in the delegation of responsibilities between them (Nielsen *et al.*, 2004). Because local communities and resource users are provided a voice in the decision-making process and are actively involved in resource management, and because it provides a mechanism to strengthen the interaction between resource users and managers, bottom-up management broadens the information and knowledge base on which decisions are made, increases acceptability and compliance of regulations, reduces transactions costs of control, monitoring and enforcement, improves the efficacy of governance, and provides a more effective alternative to conflict resolution (Pomeroy and Williams, 1994; White *et al.*, 1994; Sandersen and Koester, 2000; Bennett *et al.*, 2004; Vedsmund and Raakjaer Nilsen, 1995; Nielsen, 2004; Nielsen, n.d). Moreover, supporters of this type arrangement have highlighted the fact that conflict can act as the catalyst for community groups and resource users to become actively involved in co-management/community-based management and thus, play an important role in conflict resolution (Nielsen, 2004). For example, co-management in Mozambique and the Philippines was prompted by conflicts over the type of fishing gear between small-scale fishers needing protection from industrial fishers; in the Laos, Malawi, Thailand, and Zambia, co-management was seen as a mechanism to exclude outsiders' access to fishery resources (Nielsen, 2004).

On the downside however, bottom-up approach to resource allocation involves various user groups and hence may be more time consuming compared to the centralized strategy (Vedsmund and Nilsen, 1995; Nielsen, n.d.). In addition, the bottom-up approach may not be suitable in a number of situations, such as when stakeholders do not have the capacity or willingness to manage the resource (Vedsmund and Raakjaer Nilsen, 1995; Nielsen, n.d.). Moreover, the relinquishment of authority from centralized control may be fraught with resistance by fishery administration who may be non-supportive of the transition towards decentralized management of fishery resources (Nielsen, n.d.).

TABLE 4  
Examples of prevailing fisheries conflicts: Philippines, Thailand and India

Typology of conflicts	Philippines	Thailand	India
<b>Type 1: Who controls the fishery (access issues)</b>	Small-scale fishers vs. commercial fishers and fishery regulatory bodies over zoning of fishing grounds to delineate access by category of fishers	Large vs. small-scale fishers over rights and access to designated zones by type of fishery and use of light luring and modern fishing gears by large scale fishers	Traditional vs. mechanized fishers who venture in 8 km inshore waters allocated for traditional fishers
<b>Type 2: How are the fisheries controlled</b>	Small-scale fishers vs. commercial fishers and sea patrols over variable levels of patrolling and enforcement of the latter that favour commercial fishers who can afford penalties	Commercial trawlers, push netters, vs. regulatory agencies over lack of enforcement to control the number of fishing vessels and limit entry and operation of destructive gears	Fishers vs. state government on mesh size regulation
<b>Type 3: Relations between the fishery users (linguistic, religion, ethnic, scale of fishing)</b>	Local artisanal vs. migrant commercial fishermen over access and competition on fishing zones	Rivalry between resident small-scale vs. migrant large-scale anchovy fishers over legitimacy of access and destruction of gears	Traditional fishers complain over use of ring seines by mechanized fishers
<b>Type 4: Relations between fishers and other users of the aquatic environment (fishing vs. tourism and similar water resource-based industries)</b>	Fishery and sectors such as tourism, navigation/ docking, sand quarrying and mariculture over varying use of aquatic resources	Rice farmers vs. prawn breeders over resource use	Traditional vs. mechanized fishers and hatchery operators over collection of prawn brooders Fishers vs. government and industries on discharge of effluents; also tourism
<b>Type 5: Relationship between fishers and non-fishery issues</b>	Fishers vs. government authorities over variable standards in management and enforcement arising from devolution of functions and overlapping institutional structures	Fishers vs. government authorities over lack of proper management and enforcement	Fishers vs. government on overlapping functions of agencies and weak structure at various government levels

Sources: <sup>1</sup> Bennett, *et al.*, 2001; <sup>2</sup> Siason, *et al.*, 2004; <sup>3</sup> Nissapa, *et al.*, 2004.

### 3.2 Typology of conflicts among resource user groups

Conflict among the multiple users of tropical fishery resources have never been more pronounced as today. This stems largely from strong and mounting pressure on a rapidly dwindling resource base from a rising population, changing consumer preference towards fish and fish products, globalization, competition from coastal zone development (e.g., tourism, housing, infrastructure, aquaculture, agriculture, etc.), increasing fishing effort and number of fishers. Below we discuss three cases of conflicts representing Philippines, Thailand and India. In the Philippines the conflicts relate to zoning regulations allocating access for small scale and commercial fishers in the Visayan Sea, which typifies the conflict of who controls the fishery (i.e., access issues) (Bennett *et al.*, 2001). In the case of Thailand the main conflict was over gear use between small-scale fishers and commercial anchovy fishers in southern Thailand, and characterizes conflict on relations between fishery users (e.g. linguistic, religion, ethnic, scale of fishing, etc.). In the case of India, conflicts originated from the state-government led implementation of Tamil Nadu Marine Fisheries Act 1983 that created separate zones for each of the dominant type of fishing (see Table 4).

#### 3.2.1 Philippines – small-scale municipal fisheries versus large-scale trawl fisheries

Republic Act (RA) 8550 is a zoning regulation that restricts fishing activities of commercial fishers to waters beyond 15 kilometres from the municipality's coastline. However, certain actions by the government authority, and perceptions among competing groups increased the level of conflicts rather than resolve them. Salayao

*et al.* (2005a) observed that commercial fishers are allowed to access to municipal waters within 10–15 kilometres from the shoreline in Concepcion, Iloilo, Philippines for a rental fee of P2,500 (approximately US\$50) per 2 weeks). The commercial fishers view that preferential treatment has been given to municipal fishers since the best fishing grounds are within the seven kilometres from the shoreline in Concepcion, Iloilo, whereas it is the commercial fishers who pay taxes and license fees. As a result, non-violent conflicts between the municipal and commercial fishers usually due to collision of smaller municipal fisher boats with the larger commercial vessels have increased since the promulgation of RA 8550 (Siason *et al.*, 2004).

### 3.2.2 Thailand – gear conflict versus weak enforcement of zoning regulations

The long-standing conflicts in Songkhla Province, Thailand, can be traced to the (a) difference in the type of gear used by local small-scale fishers and those used migrant large-scale anchovy fishers (i.e. light luring falling net vs. traditional fishing gear; small-scale light luring falling net vs. large-scale light luring fishing net; light luring falling net vs. light luring purse seine; and trawl vs. traditional fishing gear); (b) entry of non-local fishing boats in local waters; and (c) use of better fishing technology by migrant fishers. Although there were regulations on zoning and restrictions on use of fishing gears, poor enforcement by government authorities prompted both local and migrant fishers to break the law. In the end, local fishers and the local community lost out in the competition for access to fishery resources, which resulted in a reduction in fish stocks by 50 to 70 in the area (Nissapa *et al.*, 2004).

### 3.2.3 India – Tamil Nadu State Fisheries Act 1983 versus fishing practices

In the study sites in India Salayo *et al.* (2005) identified the key conflicts that arose from the resource sharing and indiscriminate fishing practices of the rival groups of fishers. Specifically, conflicts were due to use of smaller mesh-sized nets, trawling in breeding grounds, and weak marketing structure. The use of mechanized boats encroaching in areas allocated for traditional fishers was one of the most common conflicts not only in the study area, but also in adjoining fishing areas. The dispute was being linked to state government-led implementation of the Tamil Nadu Marine Fisheries Regulation Act 1983 aimed at curbing the excess capacity of mechanized fishing boats by creating separate fishing zones for the three sub-sectors. In the nearby Kerala State disputes arose from the imposition of closed fishing season which the fishers believe are ill-advised and lacking scientific basis.

The above examples show that while weak enforcement of regulations can be cause severe resource conflicts, attempts to enforce regulations targeting one user group or sector can also create an increased level of tensions and conflicts, especially when the desired results of such regulations remain at large. As a consequence regulations themselves are linked to the conflicts among fishery stakeholders, including conflicts between fishers and government officers who are perceived as not rightfully implementing the enacted regulations. Conflicts also arise from polluting effluent discharges and oil spills from various industries in the vicinity. Tourism and the gathering of shrimp brooders for the growing hatchery business in Tamil Nadu were also noted as cause of conflict between these industries and traditional fishers (Salayo *et al.*, 2005).

## 3.3 Conflict resolution instruments under alternative management regime

Instruments and reform measures to resolve conflicts vary across typology of conflicts and management regime (Table 5). For example conflicts arising from who controls the fishery can be resolved by traditional mediation in the case of traditional management. On the other hand, regulatory enforcement of access rights is a popular instrument for this type of conflict when fisheries are managed through central controls,

TABLE 5  
**Conflict resolution instruments and reforms under alternative management regime**

Typology of conflict	Management regime	Management instrument
1) Who controls the fishery	Traditional	Traditional claims/preferential rights
2) How are fisheries controlled		Conflict settlement through tradition of mediation and retribution
3) Relations between fishery users		Collective fishing rights based on cultural traditions/values
4) Relations between fishers and other users		Direct dialogue between various parties
5) Relations between fishery and non-fishery		Community policing–Chieftain tradition (Ghana, Africa)
1) Who controls the fishery	Centralized	Inter-village disputes settlement through negotiations among village chiefs
2) How are fisheries controlled		Inter-village disputes settlement through negotiations among village chiefs
3) Relations between fishery users		Council of Elders
4) Relations between fishers and other users		Zoning regulation (Republic Act 8850, Philippines) – municipal vs. commercial
5) Relations between fishery and non-fishery		Indirect controls/rights management on fishing effort
1) Who controls the fishery	Decentralized	Direct controls on catch limit (ITQs – New Zealand)
2) How are fisheries controlled		Indirect controls on fishing effort
3) Relations between fishery users		Recreational regulations – bag and size limits, method and gear restrictions, closed areas and closed seasons (Australia)
4) Relations between fishers and other users		Use of industry liaison for arbitration
5) Relations between fishery and non-fishery		Monitoring and enforcement of fisheries regulations, public strategic policy, and economic planning usually based in government agencies
1) Who controls the fishery	Decentralized	Zoning agreement based on sustainable use, integrated and co-management of the marine resource and multiple use (Caribbean)
2) How are fisheries controlled		Social inclusion and industrial organization
3) Relations between fishery users		Amicable settlement through payment of damages (Philippines)
4) Relations between fishers and other users		Rational harvesting between scallop and oyster (New Zealand)
5) Relations between fishery and non-fishery		Build non-fishery capacity and alternative livelihood
		Community-Based Fisheries Management Programme operating hand-in-hand with the traditional institution (Ghana, Africa)
		Establishment of MPAs (Sulawesi Sea) –small scale vs. tourists
		Information, education, and communication to create and enhance awareness
		Industrial organization (i.e., power sharing and balanced fisheries management)
		Empowering co-management (i.e., empowerment of fishing communities)

Source: Salayo *et al.*, 2005a.

although weakness in the surveillance and enforcement capacity couple with high management cost has made this instrument ineffective in resolving conflicts. The same can, however, be accomplished at a reduced transaction cost through decentralized and participatory managements such as co-management. Often, co-management and participatory management has to rely on integration of management with exit strategy and rehabilitation measures (Table 6).

In the case of Philippines, effective monitoring and enforcement of RA 8550 had expected to result in the exit of some municipal commercial fishers from some parts of the country (Table 6). Alternative livelihood options have been explored in order to reduce the pressure on the already overfished marine area. Moreover, the provision of educational opportunities primarily to the children of fishers may reduce the entry of new fishers into fisheries since fishing is often seen as an early employment outlet for those who couldn't afford to go to school (Siason *et al.*, 2004).

For Songkhla Province, Thailand, small scale fishers were willing to compromise with the larger scale anchovy fishers by working part-time in processing anchovies in order to augment their income and manage the conflict. At the same time, they sought the assistance and support of local government officials and worked with academics and non-government organization (NGOs) in obtaining information and advice about the situation (Nissapa *et al.*, 2004).

TABLE 6  
**Examples of Management Options to Fisheries Conflicts: Philippines and Thailand**

Country	Management options
Philippines	<ul style="list-style-type: none"> <li>·Limit new entrants</li> <li>·Review provisions on zoning</li> <li>·Alternative livelihood options</li> </ul>
Thailand	<ul style="list-style-type: none"> <li>·Fishing zones</li> <li>·Promote community-based management</li> <li>·Limit fishing effort (improved licensing system)</li> </ul>

Source: Salayo *et al.*, 2005b.

In terms of policy measures, majority of stakeholders in Thailand agreed that zoning of fishing grounds could be an effective measure in minimizing the conflict and rehabilitating the fishery stock in the area by protecting particular areas from encroachment and guaranteeing poorer stakeholders privilege rights on selected fishing grounds. In addition, government control on the use of destructive fishing gear should also be promoted through improved licensing. Moreover, while of local community rights in resource management has been recognized, regulations that explicitly include the role of fishing communities in the management process of the aquatic environment and its resources should be promulgated (Nissapa *et al.*, 2004).

#### 4. FISHING-TOURISM INTERACTIONS - ALLOCATION ISSUES AND EMERGING CONFLICTS

The coastal fisheries resources available to many countries no longer constitute just a source of food and income, but also an important tourist attraction, which in itself is a huge global industry. The concept of ecotourism in marine environment centers around the use of coastal resources for water sports, such as swimming and diving, and the recreational interest over fish, coral reefs, and other underwater resources. Sport fishing and diving are gaining increasing importance for tourism. Tourism uses can be beneficial, for instance, game fishing generates substantial revenues and is selective, while for many reef-dependent species, localized fishing sanctuaries can help reduce conflicts between user groups.

Coral reefs are an important part of the growing tourism industry. Corals are living organisms that contribute to fisheries in a number of ways: (a) reef fishing itself; (b) fishing in shallow coastal waters where the reef forms an essential part of the food web; and (c) offshore fisheries which depend in part on the reef's productivity. It has been estimated that one-third of the world's fish species live on coral reefs (WRI, 1986). Many artisanal fisheries also depend on coral reefs. Such fisheries represent 90 percent of fish production in Indonesia and 55 percent in the Philippines (Clark, 1992). Hence, there tends to be a high level of conflict over coral reef usage, especially between fishing, tourism, and coral mining. The issue of carrying capacity is a major management concern in all these usages. Clearly, coral mining leads directly to physical degradation as do some fishing methods, notably muro-ami. Recreational visits may also cause damage, e.g. anchoring. Reefs are also subject to a variety of natural disasters, including hurricanes, reef-destroying animals (crown-of-thorns starfish) and diseases.

While allocation principles in fisheries tended to become complex over time, and needed to deal with multiple industry sub-groups, the emergence of tourism around the marine and coastal resources has created both opportunities and new challenges for allocating the resources. With few exceptions, exploitation of sea and fisheries resources for tourism have been fraught with conflicts with more traditional fishing activities since fishers rarely reap the benefit from this alternative form of resource use, which directly restrict their livelihoods dependent on the same resources. Hence, increasing tourism and fishing has added to the already complex allocation problems in marine fisheries. Coordination of traditional fisheries, marine reserves, and various

forms of tourism appears to be the best way to avoid conflicts among different users of coastal areas. Short- and long-term resource allocation strategies have to be established in accordance with countries' economic and social needs.

In certain parts of the tropical world, such as the Caribbean, tourism has given to multiplicity of conflicts requiring newer principles of allocation. Even in some Central American countries, the Pacific and Indian Ocean fisheries management of tourism as an integral part of the allocation decision and resource management policies. However, many of the allocation principles have evolved through a trial and error process, and relied heavily on the participation and grass-roots democracies.

#### **4.1 Fishing and tourism interactions in the Caribbean**

##### **4.1.1. Soufriere, St Lucia**

In this case, a conflicting situation prevailed for over a decade before some principles and policies emerged. The range of conflicts include: (a) commercial dive operators vs. fishermen over the use of, and the perception of impact on, the coral reefs; (b) yachts vs. fishermen because of anchoring in fishing areas; (c) local community vs. hoteliers over the access to beaches; (d) fishermen vs. authorities at both the local and national levels over the location of a jetty in a fishing priority area; and (e) fishermen vs. hoteliers over the use of the beaches for commercial fishing or recreational, tourism oriented activities.

A conflict resolution process was initiated in 1992 by the Soufriere Regional Development Foundation, a community based non-governmental organization (NGO) involved in facilitating development activities in Soufriere. After two years of numerous negotiations between all the parties involved, an agreement on the Soufriere Marine Management Area (SMMA), to be managed by the Soufriere Foundation, was endorsed on February 1994 by the government. The agreement contained details of a proposed zoning agreement (marine reserves, fishing priority areas, multiple use areas, recreational areas, and yacht mooring sites), legal provisions needed to manage individual activities such as fishing, diving, yachting, marine transportation, demarcation requirements, materials for user information, and training needs.

A management plan was produced, defining the institutional arrangements and responsibilities, revenue sources (including specific fees to be charged for various categories of users, systems of fee payment and collection), job responsibilities and skills required for four area wardens and the SMMA manager, specifics of infrastructure needed (demarcation and mooring buoys, demarcation signs), systems for monitoring the resource base and levels of resource use, surveillance, maintenance, and public awareness needs.

In 1997 and 1998, after a period of relative instability, an institutional review with analysis of issues and problems was conducted with all the stakeholders. The SMMA mission states that: "The mission of the SMMA is to contribute to national and local development, particularly in the fisheries and tourism sectors through management of the Soufriere coastal zone based on the principles of sustainable use, cooperation among resource users, institutional collaboration, active and enlightened participation, and equitable sharing of benefits and responsibilities among stakeholders" (ICRI n.d.). As a result, new arrangements were put in place, such as the designation of the zone as a Local Fisheries Management Area, the creation of a new organization, the Soufriere Marine Management Association, comprising all the agencies with management functions in the Area, the establishment of a Stakeholders Committee, arrangements for a structure for law enforcement, development of a communication plan to address specific communication deficiencies.

The project has successfully addressed the main conflicts between users, mainly through zoning. Key to the SMMA's success in managing conflicts on an ongoing basis was the very close contact which exists among user groups, and between them and the

SMMA management. The SMMA played the role of a facilitating link between the user groups and not an enforcement agency.

The SMMA has shown that two essential conditions for conflict management are:

- a. Direct participation of resource users, because community institutions do not always provide adequate representation and because stakes/interests often vary from individual to individual; and
- a. Direct communication among stakeholder groups, for example, by allowing fishers to directly address conflicting interests to others, such as divers, or yachts people.

#### 4.1.2 *Barbados and Negril, Jamaica*

The major areas of conflict between fishers and tourism interests in coastal areas are the same throughout the region and include:

- a. Beach access: The uses of the two sectors are generally seen as incompatible, and the tourism sector often finds ways to move fishers from beaches used for boat landing or seine fishing;
- a. Trap fishing: Recreational divers dislike seeing trapped fish and many are concerned that traps contribute to fish stock declines by catching underage fish; fishers complain that divers cut lines or damage traps to release fish;
- b. Zoning: Both sectors fight for Marine Protected Area (MPA) zoning that supports their use and constrains that of the other sector, and both often feel that the other sector is getting the better deal; and
- c. Decreases in fish stocks: Fishers believe that pollution and sedimentation from tourism construction, beach resorts, and other tourism facilities are responsible for fish stock declines, while tourism interests are more likely to attribute declines to over-fishing.

Conflict resolution in Barbados consisted of an agreement between the tourism and fisheries sectors and the government on a legal fish trap mesh size adequate to protect young stocks. Since some dive tourists were damaging traps, the national fisheries association got support from the tourism sector and government for a visitor information program on how the mesh size law protects young fish.

In the case of Negril, Jamaica, until its transformation into a major tourism resort, the economy of Negril, revolved largely around fishing. While some residents have now found opportunities in tourism, many still rely on fishing for much or all of their income. The Negril Marine Park has worked hard to protect and enhance local livelihoods. The NGO that manages the Park relies on the help of community partners, including the fishing and tourism sectors. Representatives of both sectors are on the NGO's Board and so have regular input into management.

Many Negril fishers have supported the Park and become involved in management measures, such as protected nursery areas. These committed stakeholders have also been successful in getting other fishers to use good management practices, but they cannot deal with issues that involve other types of users (for example tourist boats that anchor in nursery areas) or "outside" fishers who do not respect local rules. For these matters fishers need help from government enforcement agencies, but they do not feel that these agencies take their problems seriously.

Coastal development has had serious impacts on the Park's natural resources, but planning decisions are generally based on narrow economic analyses and rarely take the existence of the Park or the needs of local fishers into account. For example, a hotel developer was permitted to dredge through a sea grass bed within a protected nursery area. The Park has no recourse when planning decisions are taken at the political level. Over the years tourism expansion has squeezed fishers out of traditional landing beaches and forced them to move to less suitable areas. Although beaches are supposed to be public, allocation of their use is based on the property rights of adjacent

landowners, not the traditional rights of local users. These are some of the challenges that the Park and the fishers are facing together (CANARI 2005).

#### **4.2 Fishing and tourism interactions in Central America: Galapagos, Ecuador**

The islands' fisheries and tourism resources are both under pressure from the domestic and international markets. The relative success of these industries in the Galapagos, combined with a high rate of unemployment and underemployment in mainland Ecuador, has turned the islands into a magnet for migration.

The establishment of the Galapagos National Park, especially the delimitation of its boundaries, provoked the first major conflict with the local populace. Declaration of the marine reserve in 1986 and approval of the management plan in 1992 (PDR-CPIG, 1992) produced a second conflict, essentially over the move from a system of free access to one of restricted access, without any effort to provide information, use persuasion, or negotiate with key users of the marine resources.

The zoning of the marine reserve by executive decree, without the support of law, highlighted at least five areas of conflict among the various interest groups (Coello, 1996):

- Conservation interests vs. small-scale and commercial fishers;
- Local fishers vs. mainland fishers;
- Small-scale fishers vs. tourism;
- Commercial fishing vs. small-scale fishers, the authorities, and tourism; and
- Conservation authorities vs. fishing authorities versus military and police authorities.

After 1990, progressively more severe restrictions were placed on free access to certain fishing resources, but no thought was given to providing compensation or finding alternative solutions. By mid-1994, fishing interests were complaining that they had been without work for 14 months, thanks to the various prohibitions or closed seasons that blocked them from their primary fishing sources and the fact that a freeze had been placed on permits for expanding the size and capacity of their fleets.

The sea cucumber fishery, in which high profit margins led to flagrant violations of national park rules, was the flashpoint for disputes between local fishers, especially those of Isabel Island, and the authorities for the protected area. This activity, which had arisen as a substitute for lobster trapping during the closed season, was legally open for only a few months in 1992 and between October and December of 1994.

The closing of this fishery provoked a series of violent reactions, and illegal fishing became the number-one problem in the region. In 1995, a popular uprising saw the active involvement of fishers, who went as far as to threaten to kidnap tourists and to burn areas of the national park. The national park authorities confiscated large volumes of sea cucumbers, and the fishers suffered losses amounting to thousands of dollars.

With respect to fishers, there was a general feeling of exclusion brought about by the systematic increase in restrictions on access to fishing resources without any process of consultation or direct or indirect measures of compensation. The underlying causes also included tensions arising from:

The perception of a tacit alliance between the conservationist forces and mainland tourism companies to displace fishers from coastal areas (the intertidal and lagoon zones) that had been their traditional fishing grounds but were now coveted by tourist interests as areas of great biological diversity and as favoured waters for recreational diving.

The growing crisis among local tourism operators, who had invested heavily in infrastructure that was now under-occupied; the lack of local government funds to meet the needs of rapidly growing human settlements; the inequitable distribution among the islands of the benefits of tourism, which had been concentrated primarily on one island; and the influx of new fishers from the mainland, the increase in illegal fishing in the marine reserve, and the fines and penalties exacted against violators.



In order to forge a resolution to the conflicts, the following three key points were made:

1. preparing a frame of reference for addressing the problem and defining strategies;
2. establishing a participatory process to revise the management plan of the marine reserve; and
3. preparing the special legislation, the Regime for the Province of Galapagos (Congreso Nacional, 1998).

The approval of this legislation clarified the legal regime governing the entire island territory. This put an end to jurisdictional disputes between the provincial and the conservation authorities, set limits on the scope of each entity's authority and action, and clearly establish the manner in which available economic resources are to be distributed. More significantly, it set a precedent for the sustainable management of natural resources by local communities by defining the principles that are to govern policies and activities in the national park, the marine reserve, and the various human settlements. These principles represent an unprecedented advance; they incorporate the concepts of conservation and sustainable development into Ecuadorian legislation, in line with the international instruments adopted during the Rio Summit and in keeping with regional decentralization schemes, respect for traditional user rights, and the recognition of local management capabilities.

The new law had important implications for the local fishers:

- It introduced the principles of conservation, adaptive management, and sustainable use, as well as a zoning structure for fishing activities;
- It created the category of marine reserve, with multiple uses and integrated administration, for protecting marine resources;
- It confined the extraction of marine resources to the local, small-scale fishery;
- It empowered the national park authorities to collect, administer, and distribute tax revenues to finance the marine reserve's management plan; and
- It created a participatory management body.

The case of Galapagos Islands, Ecuador, exemplifies an evolving allocation and management in protecting a valuable natural area, a prolonged conflict over the use of marine resources by various sectors, and recent efforts to manage the conflict through a participatory process (Oviedo, 1999).

#### **4.3 Fishing and tourism interactions in the Indian Ocean: the Maldives**

Establishment of marine protected areas in the tourism zone to protect marine biodiversity by supporting in-situ conservation and the aesthetic integrity of marine dive sites is a specific ecotourism project among a few which aims to solve problems that arise due to conflict of interests between divers and fishers using the same marine resources. Twenty-five important dive sites have been declared as marine protected areas in the main tourism zone where anchoring and fishing (except bait fishery that sustains the traditional pole and line fishing industry), is strictly prohibited (Maldives Ministry of Tourism, 2005).

### **5. CONCLUSION**

While fisheries management objective has shifted toward preserving the integrity of the ecosystem and biological diversities, a major element of fisheries management in the developing country is ensuring equity benefits and managing multistakeholder conflicts. The complexity of fisheries allocation issues calls for an integrated approach to dispute management. CBD and MPA management while restricts allocations (including imposition of no take zone), market based allocation such as quota and TURF-type of allocation can still promote the principle of economic efficiency (Gordon, 1954; Scott, 1955). Both vertical (in relatively specialized fishing) and horizontal (in cases where multiple uses are concerned) integration will have to be utilized in order to

maximize the benefits from the ocean and to assure that allocation issues are managed in a socially, economically and environmentally sustainable manner. Non-extractive use, such as diving and tourism (chartered boat; sea taxi) can be the basis of horizontal integration of resource allocation, and give equity benefits to fishing communities. This way, management can address the issue of losses to fishermen from reduced fishing ground due to MPA management. The WSSD goals require drastic actions of overcapacity in industrial fisheries—allocation of equitable use rights, effort reduction along with strengthening monitoring and control system through co-management type of arrangements (World Bank 2004). Likewise, in small-scale fisheries, MDGs and WSSD will warrant support for organization of fishers, allocation of use rights, alternative employment and income generating opportunities, and establishment of MPAs, where needed (World Bank 2004).

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