

1. From Values to Management: the Conceptual Elements of Fisheries Management

1.1 Introduction

This paper examines the functional activities that are involved in the overall process of fisheries management. It is intended to assist those working in fisheries management to obtain an overview of the process to help them identify where their efforts should be directed and what is needed to ensure that the different elements combine to produce an effective result. This presentation is not the result of the development of a particular discipline, rather it offers a personal interpretation: listeners should adopt and adapt ideas and views presented here as appropriate to their individual circumstances.

Consideration of issues involved in fisheries management can be approached from a *top-down* or *bottom-up* perspective. In the latter, one starts with one's ongoing activities at the operational level and considers how they contribute to the higher, more general overall objectives of the department (if at all!), that is, from a tactical perspective. A top-down approach starts with thinking about what it is that the department is supposed to achieve and why, that is it views its tasks from a strategic perspective. Then the actions that are necessary to achieve the department's strategy are deduced. In reality, planners use both perspectives in undertaking their task and both methods are useful and have their place. Because these concepts are hierarchical, even those working at lower levels in a department should be able to take a strategic perspective of their activities, as well as a tactical view of how their responsibilities will be best achieved.

Much of what is to be discussed here is general to all public administration, though in this development, the particular problems of fisheries management should make themselves evident.

1.2 What do I Mean by Values?

Even before considering this question, it is necessary to decide "whose values are we talking about"? Primarily, here I mean those of our political masters. These are the people we agree to collectively represent us and to those who gain political power, the electorate gives them the mandate to determine what values will be the basis of our government - constrained where they exist - by national constitutions. This is not to mean that public

servants as individuals do not, cannot, or should not have values. It does mean, at least traditionally, that personal values should not be allowed to interfere with the execution of ones' responsibilities to the government system within which one works, usually personified by the department's minister.

Values are what we care about. In a fisheries management context, they should be the driving force behind the decisions that determine how the fisheries will be managed, in terms of their biology, sociology and economy. As such, they are the fundamental basis for the operations of a fisheries (or any other public sector) department. Commonly, they may be encapsulated in the form of a "Mission Statement" (See, for example, the Appendix at the end of this chapter for two examples). A major characteristic of values is that often they are not amenable to technical analysis, though some would argue that the goodness of actions can be justified and measured in terms of self-interest.

Readers may have encountered the view that economists, as technical analysts, are poorly equipped to deal with the issues of equity, or what the allocation of benefits should be among different social groups, in policy analysis. That is, econometric analysis may show how to maximise total benefits, but value systems are needed to determine how such benefits should be distributed. The analogous situation in fisheries bio-economic analysis would be the determination of what level of fishing effort generates the maximum profits or economic surplus in a particular fishery. However, such an analysis may provide little insight into which fishermen should receive these benefits and how much of the surplus - if any - should accrue to society at large - the state.

Many values that commonly have come to be accepted may come to your mind. One is the pursuit of, or at least maintenance of bio-diversity purely for its intrinsic value is one (though the argument of future option-value and maintenance for potential, but undiscovered benefits also exists). Another is that of inter-generation equity, as expressed as some form of sustainability, though achieving a widely accepted and operationally practical definition of sustainability is proving a challenge. In the context of the environment, the UNCED Conference in 1992 provided a major impetus to the consideration of values in terms of environmental extractive commercial activities resulting in *Agenda 21*. This operational preoccupation extended to fisheries and is expressed in *Chapter 17* of the Conference document.

One common context in which fisheries managers will encounter expressions of (political) values is the view that parts of a fishery, or a share of the resource, should be reserved for a certain group of users. One expects that this will normally be the small-scale sector; but this is not always the case. Another common value-based situation is where a country is committed to allowing all of its citizenry to fish if they so wish - the infamous open-access, or perhaps in this case, more accurately termed common property, situation. Another common value is that regional communities should be sustained, even if it incurs costs to other sectors of society.

Just because one may be a technocrat does not mean one need have no values (what ever they may be). And at times a civil servant may feel he is in a situation where he is asked to do something he believes is morally wrong. Possible situations could be where a departmental officer is pressured to "cook the books" or more commonly, provide the most flattering interpretation of uncertain results that is possible. Such situations are more common in "grey" areas where analysts are asked to confirm that a particular outcome is possible, e.g. an unreasonable high choice for a MSY that translates into a dangerous TAC. As scientists know, certainty regarding the outcomes of decisions rarely exists, at least in fisheries, and while an honest answer will be "yes", such a MSY may in fact be sustainable, the rest of the answer is that it is highly unlikely and risk prone. But, by then the deputy minister, or his aide, has returned to his office. Industry may be no less guilty and the situation is common of their hiring consultants, often from prestigious universities, to assert particular risk-prone interpretations about the interpretation of a fisheries' data.

It is beyond this lecture to discuss possible responses in even a small part of these situations that are routinely encountered. But, when such situations are encountered, one can speak out (though not infrequently such comments are not received kindly), one can leave the situation (i.e. resign) or one can be 'disloyal', i.e. inform the Opposition. Note! No recommendations about possible actions are given here.

1.3 What is Fisheries Management?

When asked, few in the fisheries sector might hesitate in answering. But this presentation will ignore many of those functions, which are legitimately, part of this process, e.g. Monitoring, Control and Enforcement (MCS), research in product development, marketing, fishing vessel design, fishing harbour management, etc. Rather the focus will be

on the resource management aspect, but in its widest context. Further, the approach taken will be from a *strategic* perspective.

Thus, here I take Fisheries Management to be *those (structured) activities relating to the (public) administration of fisheries. Thus it covers all activities from setting of management objectives through monitoring, control and surveillance to legal enforcement.* It can be taken to comprise:

- *(Management) Objectives*
- *(Management) Policies*
- *(Management) Regulations*
- *MCS - Enforcement of regulations*

1.4 The Role of Objectives in Fisheries Management

1.4.1 An Introduction

The term *fisheries management* implies that the management has a purpose, that it is not simply an end or a goal itself. This should be self-evident but it is surprising how often people are unable to express what the objective of their fisheries management activities are. Rather, there is usually implicit agreement on what the person, or division, or department is trying to do, eg, as was the case when I took a fisheries management course. Alarmingly, (or should it be lamentably?) the common use of the term "sustainable fisheries management" in English may imply that it is the management, and not the fisheries, that should be sustainable.

Clarifying the purpose of fisheries management it extremely important if appropriate decisions are to be taken, though this is not always easy, for although what should be done may be self-evident, this is not always the case and at those times an expression of what are management's objectives is essential. Management *objectives* have an explicit relation to values in that they provide the first level of operationalization of societal values, in our case as expressed by the Minister. An explicit articulation of management objectives provides a means of accurately evaluating policy options. For example, a society's values might include that poverty, great disparities of wealth or regional economic disparities be avoided. A fisheries department may attempt to realise these values through management objectives of provision of equitable access to fishing resources, resource-use taxes that recover some/most

of the rent, or ensuring that national fishermen have preference in access rights over foreign companies.

Objectives may be expressed in various ways.

- i. *Explicit*, e.g. a department's stated objectives may be to (a) ensure sustainability of its fishery resources, or even better at a certain level of productivity, (b) ensure the social continuity of its fishing communities, or (c) to allow the manner in which resources are harvested and distributed be controlled by market forces or some combination of these. Preferably, the objectives should include exploiting the fisheries in a manner that provides maximum national benefits however these are measured.
- ii. *Implicit*, i.e. the objectives might be deduced from the various policies and regulations. For example, it may be apparent that the government does not wish to penalise a particular fisheries sector or foreign operator, but this wish is not openly expressed.
- iii. *Hidden*, in this case, decision-makers may wish to avoid admitting that they seek a particular objective, and the analyst must interpret management actions (i.e. policy choices) to deduce what it was that those in charge are trying to achieve.

In these last two cases, the decision-makers may not have explicitly articulated their objectives and they may even be unaware that they have not actually done so. This is not an unusual situation. It is my experience that managing to achieve implicit or hidden objectives is not necessarily a deliberate attempt to avoid transparency (though it may be). Rather, it can be the result of indifference or lack of appreciation of the benefits of explicitness in terms of management effectiveness and efficiency that come from explicit articulation of carefully considered management objectives.

In traditional *command and control* management, objectives are usually drafted by senior management for the minister to approve; though if there is a particularly contentious issue in a fishery, articulation of fisheries objectives may be done exclusively at the political level, perhaps even as the consequence of election promises. However, given the poor results this approach has shown, many management jurisdictions are moving to a *democratic* process

whereby all relevant stakeholders¹ “participate” in deciding what the management objectives should be.

Aspiring planners should realise that objectives exist in hierarchies. Thus, in a Fisheries Department, few will dispute that management should attempt to achieve maximum (national) benefits from its fisheries. But, attempting to do so will move the debate to how benefits are defined? At this point, those responsible for drafting management objectives will be confronted with the reality that rarely is only one objective sought - rather benefits from a fishery can arise in a number of way, many of which are simultaneously desired but cannot be either simultaneously achieved or maximized. For example, a fisheries minister may want to maximize employment in a fishery and also ensure that its fishermen earn a satisfactory income. And while there may be a national (or international) commitment to free trade, he may wish to maximise the *added-value* within his own political jurisdiction. It may be that the fishermen/producer can get a higher price by exporting their catch unprocessed than by selling it to a domestic processor (this particular issue now ends up at the World Trade Organization for arbitration).

When objectives do not conflict, i.e. achieving one does not affect success in achieving another, they may be considered to be independent and are not a further issue for the planner. But, when achieving one objective requires compromising in achieving another, they are dependent, and may be referred to as *incoherent*. Even individual stakeholders will have incoherent personal objectives, irrespective of the issue of disagreements among other members of the stakeholders' group and a fisherman may wish to limit entry into the fishery he prosecutes, but want a licence issues to his son. This is not helped by the reality that frequently stakeholders have not themselves clearly thought through what their various objectives are and how they would assign their own relative priorities to them.

1.4.2 Articulating Objectives

Articulating objectives may be a small or a large process depending on the number of stakeholders involved. From an operational perspective, every effort should be made to ensure that groups, whose interests are similar, at least in theory, negotiate as a single collective group. Some managers will be lucky in that their departments will have put

¹ While many individuals and groups may claim to be stakeholders in the in a fishery, it need not necessarily follow that all should participate in a co-management process.

considerable effort into deciding what should be the national objectives in relation to fisheries. This is often done in a wide context whereby commercial fishermen are seen as just one stakeholder among others with an interest in ocean use. At this level, conservation, maritime transport, tourism and other recreationalists, offshore oil and companies involved in extraction of minerals (e.g. aggregates) may be among the other stakeholders at the table during the objective setting process. However, attempts to formalize this process through comprehensive integrated coastal zone management have not been characterized by notable success.

It may be worthwhile to arrange specific sessions with stakeholders, individually and collectively, to elicit what it is they consider important. These stakeholders may even be fellow employees within a department, or more commonly, from other ministries who have some mandate for fisheries issues. In this process, a common challenge is to ensure that means are not confounded with ends. For example, a proposal to resolve a resource allocation issue might involve introducing some form of tradable rights into the fishery. But, another stakeholder who believes that tradable fishing rights are immoral, or socially undesirable for other reasons, may criticise it as being administratively unworkable and that it should not be adopted for this reason. The debate on the means of achieving an objective, or the feasibility of the means, should be separated from the debate on the desirability of the objective.

Once stakeholders have identified their objectives through, e.g. a technical panel, objectives can be grouped and formed into hierarchies. Some common categories for grouping objectives are:

Economic

Health and Safety

- for the public
- for the workers

Political

- political acceptability
- public confidence
- local / regional attitudes

Social

- affects on distribution of incomes

Scheduling Considerations – time preferences

- When will benefits arise or costs be incurred

Flexibility

- Ability to change tactics in the face of unexpected outcomes.

Different stakeholders will likely present different rankings of such elements and skilled facilitation will be needed to achieve a consensual outcome.

1.4.3 Some Countries Preferences for Fisheries Management Objectives

Even at the national level, not all countries agree on what their management objectives are. Table 1 shows the results of a 1995 survey of objectives among some important fishing countries. Not surprisingly, every country identified resource sustainability as a primary objective; four of six identified wealth creation; half of the countries identified community stability; two countries, stable employment, though this may be considered a subset of the former category. Only the United States explicitly identified fairness and equity as a management objective².

It is clear that these objectives, while important, apply at a strategic level. But do they influence policies at an operational context? In my evidence the answer is yes, at east sometimes in some cases. An interesting example was when the National Marine Fisheries Service introduced a system of transferable property rights in their Alaskan sablefish and Pacific halibut fishery. Those who were given quota were vessel owners during the qualifying period (). It was not necessary to have been a skipper or a crewmember. However, in the new system, the quota holder must at least own part of the vessel that is catching the fish. For a new entrant to be eligible to receive quota they must have worked on an American fishing boat for at least 150 days; 76% of Alaskan crewmembers held quota at the end of the

² These results were taken by from a report prepared by **Gardner Pinfold Consulting Economists** for the Department of Fisheries and Oceans, Canada, July 1995, titled "Operations Design for Fisheries Management: A Six Country Review.

1998! Further, the Alaskan Fisheries Management Council has taken explicit steps to ensure that quota ownership would not eventually be consolidated into a few hands and strict limits exist on how much of the quota can be owned by any individual. Typically this is either 0.5%, 1% or 1.5% of the units available in any one management area. In addition to this, quota that is held in small blocks (<20 000lb \approx 9 tonnes) can not be consolidated. In this way, small amounts of quota remain potentially available for new entrants to the fishery. And this in a country whose multi-billion dollar domestic multi-billion dollar automotive industry is (or at least was) dominated by only three companies!

Table 1
National Fisheries Management Objectives

<i>Objective</i>	Australia	Iceland	New Zealand	Norway	U.K.	USA
Conservation		✓				✓
Efficiency		✓				
Employment		✓		✓		
Community stability		✓		✓	✓	
Profitability/ economic efficiency	✓			✓		✓
Sustainability	✓		✓	✓	✓	
Optimum utilization						✓
Equity – fairness of allocations						✓

1.4.4 Conflicting Objectives

It is rare that a manager, or stakeholder, has only a single objective. And it is also rare if there is no conflict between them. When there are, such objectives are often referred to as *incoherent* - one cannot be maximized without reducing the degree to which another is achieved. There are a number of such examples that are infamous in fisheries.

One common set of conflicting objectives is (a) the desire of ministers (though not necessarily that for fisheries) that the population has access to cheap fish while (b) at the same time wanting to increase employment or incomes in the fisheries sector. Here the question is

to do with the allocation of benefits between producers and consumers. A similar incoherence arises between the desire to earn foreign exchange by exporting fish and at the same time supply domestic markets. These examples are self-evident and at the most, perhaps, amusing. However, incoherence can be extremely damaging if it is not explicitly recognized and dealt with through some form of compromise negotiating.

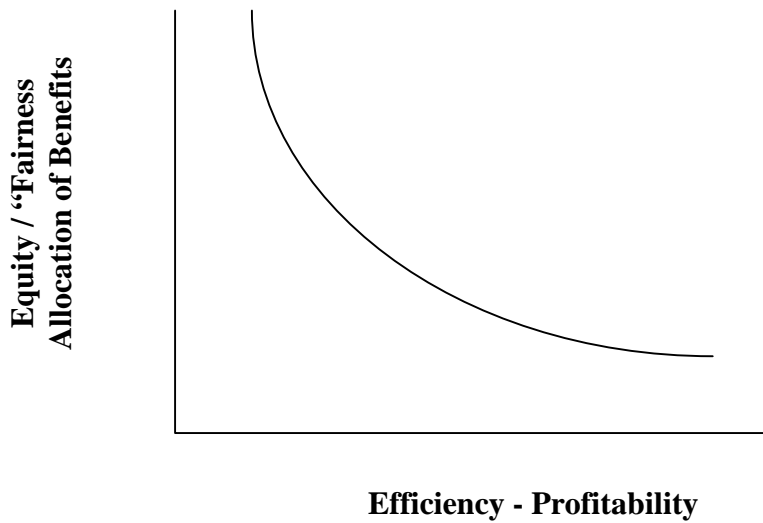
Of particular concern is the trade off between the objective of near-term employment and social benefits and sustainability of the resource. When allowable catches should decline because of, e.g. changes in oceanographic conditions and thus biological productivity, decision makers often have difficulty in accepting that the number of fishermen must be reduced if a viable fishery is to be maintained. Equally, this may require that at least some of the fishing companies go out of business, i.e. go bankrupt. This is often euphemistically termed "normal rate of business failures".

1.4.5 Equity and Efficiency

One of the most common situations a fisheries analyst encounters is when policy makers must choose between policies seeking greater economic efficiency (i.e. aggregate social surplus) and policies intended to provide for greater fairness, or equity (that is fairness in the way the benefits are distributed), in the fishery. This situation often arises when there are significant economies of scale, so that larger, more capital-intensive units with lower labour requirements are more profitable than small-scale units. A moment's reflection will show that the issues can become quite complex, and this discussion is necessarily simplistic.

Larger capital units may also offer many other advantages than simple profitability of assets or capital employed. In some fisheries, ability to process at sea enables a better quality product to be produced and thus permits a wider and more profitable range of markets to be targeted. Economic theory, predicts that fishing systems, at least those with strong property rights (fishing access conditions aside), left to find their own, should converge on the most profitable structure. But there is no *a priori* reason why this should be the most capital-intensive or vertically-integrated structure. Anecdotal evidence from, at least New Zealand, indicates the fishing companies that originally bought fish quota when property rights were introduced and entered the harvesting sector of the business to supply their own processing requirements, later sold their quota to smaller enterprises who were able to operate with lower costs.

Figure 1
Hypothetical Example of an Indifference Function

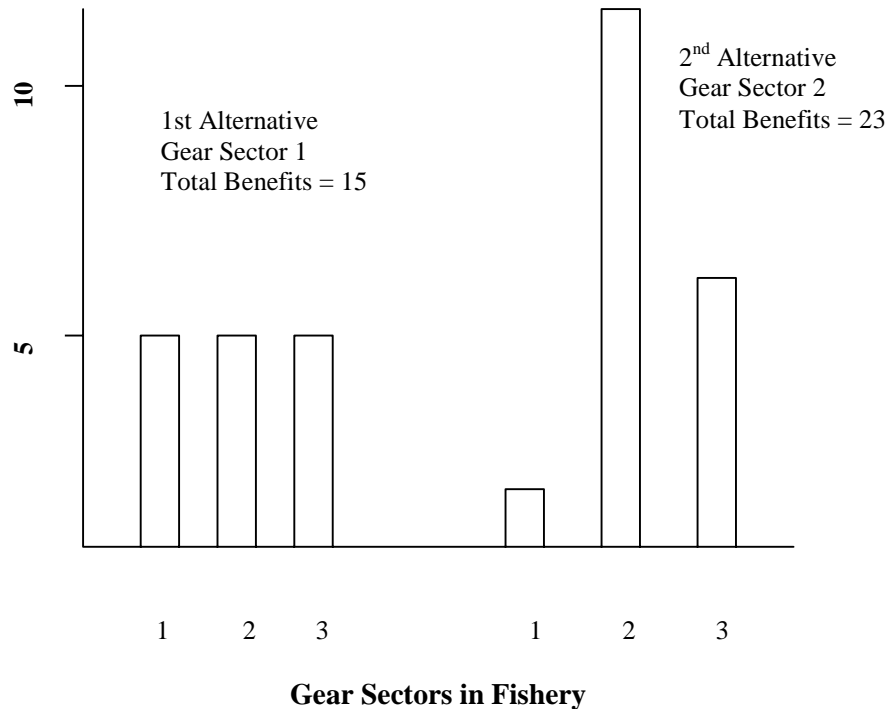


There is no prior reason why the indifference function should be monotonically concave as shown, or even continuous, but they usually are uniformly decreasing.

Further, even if a decision is made that policies that favour equity should be given preference, this may lead to the start of another round of indifference analysis. For example, it may be decided that factory trawlers are to be banned because of the social implications for the small-scale sector, which consists of small side trawlers using ice, small longliners and a gill net sector. For argument's sake two licensing options may be deemed feasible as shown in Figure 2.

Here the decision-maker with a preference for choosing equitable options may have to decide how he is to allocate the options between the different small-scale operators. Some would argue that the most equitable option is for every one to receive the same benefit. But such a choice would have a total cost of 8 units of forgone benefits. It is certain that gear sector "2" will argue strongly in favour of a solution based on efficiency, that is once they have secured their share away from the first gear sector.

Figure 2
Options for Allocation of Benefits



1.4.6 Management Policies

Some policies may be considered to be generic in the sense that they operate at a planning level above the department of fisheries. For example, it may be national policy across all primary industries to privatize all state-owned enterprises including those in the fisheries sector; to “coporatize” public service functions, or to stop, continue or increase all government subsidies to primary industries, including those in the fisheries sector. Or, the government may decide to privatize state research operations³. Implementation of such policies is usually beyond the direct influence of a Department of Fisheries - though the reverse is clearly not the case. The department will be directly influenced and will be required to implement policies imposed from senior levels.

³ **News Item:** WELLINGTON -- The Government's crown science institute in water and atmosphere has posted a record profit tax of \$7.0 million in the year to June 30, up 33% over last year (\$5.2m). National Institute of Water and Atmospheric Research revenues were \$65.1m, up 11.4% on last year's 58.5m. Chief executive Paul Hargreaves said in his annual a report that sharp lift in profits had followed an increase over six years of 41%. In the 1998-2000 bidding round, under awards funding on merit, NIWA gained an extra 3.8 million in 1998-99, and a further increase of \$1.35 in 1999-2000. Niwa received 35.1m in 1998-99 for funding not tied to specific contracts compared with \$24.9m in 1992-93. In addition, a reserve fund for replacement of vessels of \$3.880m existed. The record profit had arisen from increases in the public good and in commercial revenues, which had offset continuing declines in revenues from fisheries research.

There is a key characteristic of a policy that often gets lost in semantical confusion. Policies exist in the form of choices - they are not objectives in themselves, though frequently spokesmen will use such a syntactic construction. For example, a department may decide that its policy in relation to harvesting an offshore groundfish resource is to exclusively license longliners (because of, e.g. the higher quality fish such vessels land). In effect, there may have been a number of policy choices, e.g.

- i. allow a multi-gear fishery - trawls, longlines and gill nets of some combination of these or
- ii. allow a single gear fishery, which may have been only gill nets, only trawls or only longlines.

In this case the options are somewhat evident, but this is not always the case. Consider the choices involved in formulating a policy about who may be licensed to own a fishing boat or licensed to undertake fishing:

- i. only registered fishermen
- ii. only owner-operators, i.e. the licence holder must work on the boat
- iii. only nationals
- iv. only legal residents or
- v. some combination of these.

When the options are not clear, and even when they may seem to be, the challenge for the analyst is to be creative in his thinking. How many times has it happened that you have thought, "I never thought of that!" Even, when there may seem only one choice - for example close the fishery or not - options, or choices, may become apparent after further thought. Consider the issue, when to close a fishery? To all gear sectors? An all-area closures? Perhaps allow an exploratory fishery to enable data to be collected on the state of the fishery while the commercial fishery is closed?

Even if some choices are (to you) clearly impractical or unfeasible, there can be merit in identifying them so that at some subsequent point it is clear that the possibility has been raised, evaluated and subsequently discarded.

When one is satisfied with that all feasible options have been identified, the task then becomes that of evaluating which choice offers the most benefits in terms of the objectives of the department's minister, or other decision maker, who will be responsible for selecting the policy to be implemented. This stage moves the policy selection process into that of cost-benefit analysis – or benefit-cost analysis.

There are other terms that are commonly, though, differently used, in this context so it is important to understand the concepts being discussed and not get side-tracked by different terminological conventions. Many analysts use the term goal as a synonym for objective. As I note in more detail elsewhere, here goals refer to a quantitative level of achievement of an objective⁴. Policies exist in the context of the strategies and tactics that can be used to achieve them. Strategies usually apply to a general, higher level, tactics to a specific means of programme implementation. Strategies are implemented using tactics.

In well-established departments with stable management and facing no particular crises, it can be hard, if not impossible, to have serious consideration given to alternate policies for achieving departmental objectives, not least because of manager's natural desire to avoid inviting controversy for no apparent reason⁵. Even harder, in many departments, objectives will not even be clearly articulated making it even harder for the conscientious analyst. In these cases there may be little that can be done other than to identify the data that will be needed and wait for the institutional crises to arise when new options will be desperately sought and the opportunity will exist to influence the selection of new management policies.

1.5 Regulations

Regulations, through compliance by fishermen and enforcement by department officers are the means by which policies are given effect. There are three major strategic considerations in drafting regulations:

- i. those who will be governed by them should support them
- ii. they should be cost-effective and
- iii. they should have the potential for cost-recovery.

⁴ For example, an objective might be to restore minimum spawning biomass to acceptable levels; the goal might be to achieve a spawning biomass of 880 000t by the year 2003.

Support for Regulations: The first of these is the most obvious. The best way to achieve this is: (a) for those affected to believe that they are fair, (b) that they will not be penalized by them, at least unevenly; (c) that those affected by the regulations will be those who benefit from them if they have some conservation objective and (d), that those affected have been involved in consultations concerning the design and manner of implementation of the regulations.

Achieving such desiderata can be a real challenge. For example, if a well used and traditional means of fishing results in disproportionate amounts of discards, it will make sense to discourage or prohibit this type of fishing while encouraging a more resource-friendly gear. For example, trawlers in the groundfishery on the Scotian Shelf harvest much more unsaleable fish than do the longliners. However, trawlers are more profitable as they require a smaller crew and need less preparation to go fishing (no baiting of hooks, etc.) - even though the longliners land a catch of higher value (many with longline licences aspire to replace their longline licence with one to go trawling)⁶. In such a case, there is no option other than for the minister to clearly state the management objectives, why he supports such objectives and why the policies that have been chosen are believed to be the best to achieve them.

However, be prepared for the minister to refuse to implement the policies that will do this if he perceives that this will cost him too much political support. In this case, his close sub-ordinate advisors may even refuse to table the policy recommendations coming from your analysis knowing as they do that they will be politically unacceptable, despite their superior performance in achieving the minister's stated objectives. In this case, it becomes necessary to build support for your policies by identifying stakeholders whose interests are served by the policies your analyses support. This must be done carefully for as a civil servant; your legal responsibility will still be to the minister. Some ministers will be remarkably candid about such political realities and say, 'get the majority support of the industry and I will implement the policy through appropriate regulations. Such leaders who are followers can be remarkably effective fisheries ministers because of the underlying consensual nature of the decisions.

⁵ This is often expressed by the fishermen's aphorism, *if it ain't broken don't fix it!*.

⁶ Longline captains in one management regime I am familiar with refer to those in charge of 'draggers' as "slipper-skippers" from the absence of any need for them to leave the bridge.

Cost Effectiveness: The cost of implementing the regulation should not exceed the benefits it is designed to produce. Marine patrols using specialized, or indeed, any vessels, are extremely expensive and of unknown effectiveness. Fishery officers, sometime equipped with side arms and warrants to arrest recalcitrant fishermen, do not build the atmosphere of support that fisheries administrators seek. There have been two developments in this regard that administrators should be aware of. First, wherever possible, responsibility for enforcement of regulations should be transferred to the fishermen themselves. Second, book-keeping procedures that monitor the flow of fish products through marketing, processing and storage channels may be an effective substitute for direct monitoring of some fishing activities - but not all.

One successful programme has been the Dockside Monitoring Programme (DMP) instituted in the Maritime Region of Atlantic Canada. Previously the government had undertaken extensive and expensive fisheries data collection. Under the DMP, the industry was made responsible for the collection of the data through companies contracted to undertake the work under government supervision. The DMP was paid for by a landings-levy. Fishermen were restricted to landing at specific landing sites which they specified and the Weight Masters had to be notified in advance of a landing so as to be present when the vessel unloads.

Cost-Recovery: Another policy trend that is slowly spreading is the desire by governments to transfer management expenses from the public treasury directly to the commercial sectors that incur the costs - a policy commonly called *cost recovery*. In this case it is necessary that the costs involved can be clearly identified as attributable to the fishing sector. This may not always be easy and fierce debates may ensue as to what should be charged to the industry (e.g. clearly stock assessment and MCS activities) and what may not, e.g. oceanographic research.

1.6 Enforcement

Strategically, enforcement should be designed to ensure the minimum acceptable level of compliance with regulations at a minimum cost. Just what cost will be involved will depend on the characteristics of the fishery - an offshore fishery that must be monitored using patrol boats will have much higher enforcement costs than one that is undertaken in the inshore. An important concept is that of deterrence. If the maximum fine that a fishermen is

liable for is not commensurate with the fishermen's perception of his chances of being caught and the gains he makes from violating the regulations, then, ignoring the morality of the issue, it is rational behaviour on his part to continue breaking the law. At a minimum, fines should exceed the product of these two quantities - probability of detection and benefit to the fishermen from the infraction. But equally the reverse situation should be avoided where the penalty is excessive in relation to the infraction. In this case it is likely that the penalty will not be imposed. For example, many fishing permits are issued on the condition that the fisherman provide accurate and timely data on their catch success, fishing effort, area of activities, etc., for example, on a trip or monthly basis. The penalty for failure to comply can be cancellation or non-renewal of the licence. However, this consequence is so disproportionate for, e.g. submitting data two or three weeks late, that it will never be imposed. Here, a small fine of say \$200 that was automatically imposed would be more effective than a large fine that was never imposed.

In many management regimes, maximum fines have remained unchanged for decades so that they no longer provide disincentives to illegal activities. Getting these changed may require passage of new legislation, never a fast or trivial task. Further, in many management regimes, despite fisheries departments presenting compelling evidence in court of the guilt of the fishermen, judges who do not understand the consequences of irresponsible fishermen's actions have often been reluctant to impose severe fines. Not infrequently the defence's pleas for clemency are successful. This situation is exacerbated if there is a requirement for any technical interpretation of evidence to confirm the miscreant's guilt. For example, at one time, one Canadian scallop fishery had a requirement that the average size of scallops in the landings for each trip from an individual vessel should exceed a specified minimum. The objective here was to discourage boats fishing small scallops while recognizing that inevitably some small scallops would be caught. The check was done by taking a sample from the catch as it was landed using a standard 500ml peanut-butter jar! However, as anyone familiar with the concept of the central limit theorem knows, almost any sample has a finite probability of having an average below some limiting value. While this probability may be exceedingly small (eg, < 0.005), a defending lawyer can, if appropriately advised, argue that there was a finite statistical possibility that the fishermen was innocent. Only measuring the whole scallop catch would resolve the issue, and this is clearly impractical. In this case, the regulation though practical and easy to implement, is not defensible.

An approach taken in some countries has been to hold 'training' sessions for judges to explain the implications for conservation of fishermen breaking the law. Another approach has been to invoke automatic penalties whenever there has been a violation. Sometimes, the response has been tied, as a condition, to the licence. This means that the fisheries department, not the courts, has the power to force the pace of enforcement. For example, it may be made mandatory that no fisherman's licence can be renewed if all data required by the department have not been satisfactorily provided by the licence holder for the preceding season, though see the preceding text.

Another approach has been to place fisheries offences in the context of the civil law as opposed to the criminal law, for example such is the case in the US where the civil penalty is employed in federal fisheries legislation. In Canada, groups of fishermen have been able to come to mutual agreement as to how they will jointly prosecute a fishery and have it enforced through a civil agreement, outside of the context of the *Fisheries Act*. The principal advantage of this is that it enables enforcement to be dealt with more speedily outside the criminal law system (for example the standard of proof may be lower) and it allows cases to be settled the same as for other civil suits instead of plea bargaining, though penalties are often lower. In the fisheries context, it often means that matters can be settled quickly, and a vessel released quickly. In New Zealand, a major part of the enforcement process works by requiring companies in the possession of fish or fish products to be licensed and that all fish transactions be recorded with the records maintained for seven years. Mis-reporting transactions is treated in a similar manner to a bank cheating its customers - it is considered as commercial fraud.

1.7 Closing Note

Effective public administration of fisheries required that all of the elements involved in the process be understood. This is not to mean that all will require similar attention. Once strategy and objectives are set this task may only be re-visited once every decade, of following a fisheries crises. Likewise, policies do not usually change annually unless in the face of extreme circumstances such as a stock collapse. The main part of a department's activities will be routine, even humdrum - the collection and processing of data; its analysis and production of regular reports and annual management plans.

Appendix I

MISSION STATEMENT: Fisheries Department, FAO

Our mission

The mission of the Fisheries Department of FAO is to facilitate and secure the long-term sustainable development and utilization of the world's fisheries and aquaculture. FAO is acutely aware of the fundamental social and economic role played by the fisheries sector in:

- i. Meeting global and national sustainable food security.
- ii. Providing self and paid employment for fishing communities as a means of alleviating poverty in fishing communities and stemming rural/urban drift.
- iii. Contributing to national and international trade, and generating national income.

Underpinning these basic social and economic objectives is the requirement for fisheries and aquaculture to be responsibly managed. This implies preventing overfishing, co-ordination and delivery of effective research and extension and the empowerment of people, especially women tasks for which many FAO Members are not fully prepared. The Fisheries Department therefore provides, on the request of Members, technical assistance in all aspects of fisheries and aquaculture management and development.

Our principles

Within the mandate given by FAO's Governing Bodies, the Fisheries Department is committed to working with its Members, and to forging closer and more effective partnerships with national and international institutions, academia, the private sector and civil society to achieve long-term sustainable results in the fisheries sector.

Our values

The Fisheries Department has a commitment to team work in a spirit of cooperation and openness while building on past achievements; fostering a stable and community-orientated multi-cultural environment; respect for differences of opinion and minority views; gender-awareness; and personal trust.

Appendix II
MISSION STATEMENT: Ministry of Fisheries - New Zealand
Te Tautiaki I nga tini a Tangaroa

Values and Principles

The mission for the Ministry of Fisheries is reflected in its Maori name - *Te Tautiaki I nga tini a Tangaroa* - guardian of the multitudes of *Tangaroa*. The following statements outline the Ministry's values. Each is significant to the strategic direction of the key concepts that support them, which shape our professional behaviour. These values exist alongside the primary values of the Public Service and the behaviours governing us as a result of our as a Treaty partners.

Public Service

We will create an environment in which our people can be proud to be part of the New Zealand Public Service and can maintain the highest level of professional behaviour. This means:

- I. filling our lawful obligations to Government with professionalism and integrity
- II. performing our official duties honestly, faithfully and efficiently, respecting the rights of the public and colleagues and
- iii. not bringing our employer into disrepute through our private activities.

Treaty Partner

As a Ministry, we recognise the status of Maori as *tangata whenua* and will continue to develop and maintain processes and practices, which are consistent with:

- i. the responsibilities of the Crown in relation to the Treaty of Waitangi and
- ii. our specific legal obligations under the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 and the *Fisheries Act 1996*.

Such practices will become an accepted and integral part of all aspects of our activities supported through our organisational culture, and will underpin all of our values. Earning respect also means integrating specific behavioural values into our day to day work - both

internally with each other and externally in our relationships with our stakeholders and the general public.

Our behavioural values are:

- i. *Leadership*: we will develop effective and innovative means to allow staff to contribute to and support the Ministry's ability to deliver on its vision.
- ii. *Relationships and People*: we will develop, internally and externally, constructive and collaborative relationships built on trust.
- iii. *Working in Teams*: we will share information and knowledge, through superior teamwork and networking.

Achieving Results

We will create an organisation that encourages and recognises contribution and dedication to our mission and outputs.

Appendix III

MISSION STATEMENT: Fisheries Management Region Regional Advisory Process (RAP), Maritimes Region, Canada

The Department of Fisheries and Oceans (DFO) has the mandate for the management and conservation of Canadian marine and freshwater aquatic resources and their habitat. This mandate requires that technical knowledge and advice be provided to management and regulatory agencies within DFO and elsewhere on the conservation requirements for these resources. The Regional Advisory Process (RAP) was established in 1993 to provide peer reviewed information on the status of the fisheries and marine mammal resources in the Atlantic zone, and was expanded in 1997 to include the Central & Arctic and Pacific regions. In the Maritimes Region and the Gulf Fisheries Management Region, the RAP addresses issues in the southern Gulf of St. Lawrence, the Bay of Fundy, on the Scotian Shelf and on Georges Bank. The Maritimes RAP also undertakes the review of technical analysis relating to regional habitat and fisheries management issues.

The principles that guide RAP are:

- being timely, responsive and flexible to client needs,
- employing the most appropriate and credible scientific methods,
- providing technical review on the full range of regional resource management issues,
- involving industry, stakeholders, and outside scientific experts in the review process,
- providing a visible and public document trail, and
- fostering interaction with the other regional RAPs, as well as facilitating the advancement of resource science through zonal and national meetings and workshops.