Points of View - Theme 4

For Fishers or Fishes?: A Comment on the Development of an Inter-disciplinary Science of Fisheries and Fisheries Management

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Abstract

While fisheries-focused social research has experienced considerable development over the last thirty years, its concerns, methods, findings and analyses appear to have exercised little if, any influence, on the design and implementation of fisheries management regimes. Further, fisheries social research data and analyses, excepting the work of some resource economists, seems to have received little systematic attention and consideration by the fisheries natural science research community.

This essay explores various features of, and explanations for, this set of circumstances. In particular, differences in methodologies, theoretical/philosoph-ical pre-suppositions, institutional and social status and legitimacy are examined.

The essay concludes that the development of an interdisciplinary fisheries science and approach to fisheries management will require considerable shifts in the prevailing presumptions and paradigms currently featured in natural and social science fisheries research.

Discussion

J. Schnute.
The idea of Carl Walters is that in the future the world has to be viewed as closed to fishing with small windows that are opened occasionally. I regret that I am ignorant of social science and I want to know what can be done with a management policy like this, which results in lots of angry faces.

Tony Davis
Your question has the wrong fundamental premise. Social sciences have not been represented in consultative processes prior to demonstrations such as those that took place on Canada's east coast when the cod fishery was closed. In essence, the role of the social sciences should be in prevention not cure.

Rögnvaldur Hannesson
In what way does consultation with the social sciences help in situations such as the closure of the Atlantic Cod fishery.

Tony Davis
A social scientist would say that in such an issue representation of the disadvantaged sector in a consultative process is essential, as it is a matter of providing the dignity of appreciation of their views. They have been on the receiving end of decision processes which affect their livelihood but over which they have no control.

A Bridge over Troubling waters? Strategies for Integrating Natural and Social Science for Sustainable Fisheries

Lawrence Felt & Barbara Neis
Memorial University, St. John's, Canada.

A palpable lesson of recent fisheries crises is that, while understanding fish movements and population dynamics may be a necessary condition for sustainable fisheries management, it is certainly not a sufficient one. Equally critical is an understanding of those whose livelihood derives from the sea.

For policy makers, the objective is to develop management which reflects the work of natural scientists who study fish alongside the work of social scientists who emphasise those who pursue and harvest them. Integrating natural and social science research within the context of specific fisheries management plans has proven to be fairly elusive (with the exception of certain highly quantified economic decision-making models).

To a large extent, these difficulties reflect differences in methodologies, types of data

and interpretive frameworks. Using data from a three year interdisciplinary study of the ecological knowledge of fishers and fishery plant workers in Newfoundland, the paper suggests a number of ways in which natural and social science can be brought together for more effective management. The paper concludes with a discussion of potential new, cost-effective, participatory and interdisciplinary assessment methodologies emerging from this research.

Discussion

Laura Richards
How can we implement the information held in traditional knowledge.

Lawrence Felt
There are valuable sources of information other than the data collected by scientists, particularly in the case of the Atlantic cod. What is required is a way to be able to deal with such data that may not be in a nice neat quantitative form but none-the-less contains vital information. Somehow we have to learn not to operate under such "black box" constraints that are provided by the limited data that is collected officially in comparison to what other evidence is available and may be used.

Tony Pitcher
Social scientists and anthropologists often state that fisheries with fishers that have deep-rooted kinship and traditional knowledge and hence a strong stake in the viability of the resource are less likely to have impose a heavy harvest rate. We have heard tell for example of cod fishers avoiding catching the 'mother cod'. But how often do they do this and under what pressures do they not save them? What convincing evidence is there that you can present to scientists?

Lawrence Felt
Community conservation ethics are very complicated and indicate that there are no guarantees. But it is more than just a belief, there are bits and pieces of evidence to indicate so. Scientists have to open up what they are willing to be prepared to treat as data.

Enlarging the Shadow of the Future: Avoiding Conflict and Conserving fish in a Novel Management Regime off South Devon, UK.

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Abstract

Off the south coast of Devon in southwest Britain and within the UK territorial limit of six miles, many small vessels are employed in a pot fishery for crabs and in trawling for fish. In addition, there are a few boats that dredge for scallops. Each gear does not mix well with the others.

Trawlers, in particularly beam trawlers, disturb the benthic community and can cause costly damage to strings of pots if towed through them. This also damages the trawls and puts the gear out of action whilst pots are disentangled.

In the mid-1970's the interference between fixed and mobile gears was becoming so severe that a partitioning of the inshore area was brokered between the South Devon and Channel Shellfishermen, the Trawler Owners Association, the Devon Sea Fisheries Committee and the South West Fish Producers Association. As a result, certain areas are now closed to trawling so that crab fishermen can operate undisturbed. The system is voluntary and has no legal basis. Having remained in operation for nearly twenty years, the system must be strongly resistant to perturbations.

Two questions about the partitioning system are worth pursuing. Has the long term closure of areas to trawling acted to conserve benthic community structure and maintain a haven for populations of commercial stocks? Secondly, why do the fishers in the system continue to cooperate?

Data is provided in the paper to show that the crab fishery is very productive but there is no way at present to determine if the closures have maintained biodiversity.

In a first attempt to analyse why fishers

continue to cooperate, the social structure of the fishing fleet is examined. Amongst the crab crews about 40% belong to families who have been in the fishery for generations. Other fishermen, both in the crab and the trawler fleet are from communities that have long been involved in the fishery. There is anecdotal evidence to show that those skippers who do cheat on the agreement are social outsiders, although they live in local fishing towns such as Brixham or Plymouth. The hypothesis is proposed that the agreement works because the fishery is composed of people who repeatedly interact over an indefinite period so that cheaters are likely to be identified and punished readily.

Such a system could best be modelled using the Prisoner's Dilemma with long term interaction between the participants. This paradigm predicts that defectors will be outsiders, who are unlikely to interact socially with most of the members of the agreement.

Current research is aimed at obtaining more detailed data on the social structure of the fishery and on the variability in catch rates between fishers. Once the factors determining cooperation are properly understood, the Devon Management System could be used in other areas where a fishery is prosecuted by members of a closely knit community interacting with each other indefinitely and repeatedly.

Discussion

Nigel Haggan
Why not rotate fishing areas, perhaps making the distribution even more equitable.

Paul Hart
In the case of the Devon fishery, crabbers occupy "territories" within their closed area and rotation has indeed been exercised between the territories. But there was no rotation between the areas allocated to the beam trawlers, crabbers and scallop fishers. But clearly it is a feasible strategy for other instances.

Tony Pitcher
If you want to design a game theoretical model to represent such a fishery, how can attributes not measurable in direct economic terms be represented.

Paul Hart
Although not a great deal of time has been put into the design of the model so far, such attributes may be able to be converted into a common currency. For example, damage to a crabber fishing grounds by a beam trawler may be directly equated to the earnings lost if the grounds had otherwise remained in a productive state.

Fisheries management: A role for social science?

Svein Jentoft
Institute of Social Science
University of Tromso, Norway

Abstract

Today, social scientists are basically absent from the fisheries management decision-making process - perhaps with the exception of the economic profession. Rarely do sociologists, social anthropologists and political scientists serve in any advisory role vis-a-vis government agencies or fisheries organizations in the same way as biologists do. If social scientists were to become involved in responsible co-management, which they often claim that they would like to, they would have to become creative and constructive. What could possibly be their contribution?

I argue that there are at least two areas where social science is of relevance; a) in the design of management institutions; and b) as providers of critical feedback to the management process, particularly on social impacts. However, fisheries management could also benefit from the purely intellectual role of social science. To be applied requires commitment and imagination, but not necessarily involvement of the social scientist. There is also a role to play for the critical, skeptic, independent and unfettered mind - in society at large as well as in fisheries management. But can the social scientists have it both ways? Social scientists are generally outsiders. Is it better to be in the

tent pissing out or out of the tent pissing in?

Discussion

Jarl Giske
The speaker comes from Norway, and it may be important to remember that the political goals for fisheries in Norway do not include biodiversity or species conservation, but recently, the economics of fisheries been incorporated. Economic factors include rural development, jobs, well-being and goals, aspects that fisheries biologists are certainly not experts on. The type of conflicts that are apparent between Western and Northern Norway are those related to fleet structure and gear types within fisheries. Perhaps in such a case having social scientists as managers may be more legitimate than having natural scientists?

Svein Jentoft
I agree that the complexity of fishery problems in Norway is not as marked as in large fishing nations, due to the smaller numbers of stakeholders involved in decision making. The social sciences have been useful in creating some effective institutions, but it is a frightening thought that processes should be dominated by social sciences. I re-emphasise that the role was not to be in politics but rather, to ensure that such policies that are created that people can live with despite the fact they may disagree with them.

David Policansky
Perhaps the complexity is simply a function of the size of the country/fishing operations being dealt with. When it gets so big geographically it has to cross so many jurisdictions it therefore increases complexity.

Svein Jentoft
I agree with this point, but in Norway processes were probably easier to handle because the population is more homogenous and has less cultural diversity.

Observations of the Social Science of Fleet Dynamics and Local Knowledge

Thomas R. McGuire
Bureau of Applied Research in Anthropology
University of Arizona, USA

Abstract

One of the central lessons underscored, harshly, by the collapse of Northern Cod stocks is that the relation between catch per unit of effort and stock abundance is problematic. It is confounded by local knowledge.

But social scientists, with disciplinary training in the collection and interpretation of local knowledge, have made little contribution to this, and other, problems in fisheries management. This commentary briefly reviews several contested issues in maritime social science - the skipper effect and fleet dynamics, folk management, adaptation to chaotic systems - and suggests that the debates, and much of the fine-grained empirical work underlying them, evolved in the context of largely academic contests over paradigms such as cultural ecology, political economy, and recently, political ecology.

An emergent approach seeks to combine prior concerns with individual and household adaptations to ecosystems and environments and with local knowledge (the domain of cultural ecology) with the problematic of political economy. These are the inter-relations of production, class formation, the penetration of capital, the loss of local power and autonomy, all of which are essential antidotes to the limitations of cultural ecology.

As such, this developing paradigm offers the potential for a close interface with the natural sciences, both theoretical and applied. However, political ecology, as it is emerging, is truer to its political economy roots than to its cultural ecology ones: political ecologists know little about ecology. I suggest here that the program needs to be reinvented, to address the information requirements for effective fisheries.

General Discussion on Theme 4

Tony Pitcher
The general theme of the session appears to be the need to obtain users consent to policies. But the speakers have clearly advocated more than this - the need for strong involvement on behalf of the users in any part of planning processes for management. But speakers did not present much evidence or data that user involvement might actually be useful in avoiding situations such as fishery collapse.

Craig Harris
The type of data that social sciences could use to help prevent situations such as fishery collapse is available, but the social sciences are constrained by an institutional disability. Since they have not been present for the development of fisheries, then in the most cases they have been hindered by the fact that they simply have not had the long-term ongoing data gathering that may otherwise have been able to help prevent such cases.

Michael Sinclair
I want to make out a stronger case for the role of social sciences. The policy of ITQ's was supposed to change the stewardship of fisheries through increased ownership, but was I am unaware as to whether this prediction had actually been shown to be true. Similarly, changes in the legal framework were expected to reduce mis-reporting in fisheries, but whether these effects had also been shown to change the reaction of the participants was questionable. There is clearly a need for the social sciences involvement in order to elucidate whether such claims are valid.

Rögnvaldur Hannesson
The primary motive behind the implementation of ITQ's was to decrease overcapitalisation, rather than to change stewardship.

Tony Charles
The primary driving force behind the design of fisheries policy is often that of economists rather than fishery managers. But I agree that there is a clear need for social studies of policy implications before policy decisions are given the go ahead.

Jake Rice
Returning to the analogy of the policy makers "tent", I suggested that it is more like a large campground, with various parties each with their own tent (while the economists are in a hotel) not knowing where the other tents are located on the campground. Perhaps this is how it should be, each tent with its compliment of excellence. However, there is the need for a communal tent (the institution), from which comes the policy, that may be found by all.

John Schnute
Within the natural sciences there is a strong emphasis on rigorous methodology, but I have some reservations relating to the methodology of social sciences.

Tony Davis
The social sciences also contain ingrained rigorous methodologies. Its obvious that few natural scientists acquaint themselves with such methodologies. Many benefits may be gained from not-so-experimental but multifaceted, flexible, innovative methodologies used in the social sciences. Such methodologies can be used to extract maximum information out of data. I fully support earlier comments by Lawrence Felt that "everything is data for social scientists".

David Policansky
For all disciplines, one can only provide the literature and hope that other people read it.

unattributed
Is the minimum exploitation rate in fact negotiable, and if so who should be part of the negotiation?

consensus
The minimum exploitation rate to be set by policy should be based purely on biological grounds in order to maintain viable fish populations. But negotiation on exploitation above such a minimum should involve consideration of the various users groups. No universal prescription could be made.

THEME 5: THE ROLE OF ECONOMIC TOOLS IN REINVENTING FISHERIES MANAGEMENT

Session Rapporteurs
Richard Porter & Peter Tydemyers

Keynote Address

Fisheries Management, Politics and Markets

Rögnvaldur Hannesson
Norwegian School of Economics & Business Administration, Bergen, Norway

Abstract

The 200-mile limit was expected to lead to an improvement in the management of fish stocks. The paper looks at the experience of four states and provinces, Newfoundland, Norway, Iceland and the Faroe Islands since the 200-mile limit was established, particularly with respect to their cod fisheries.

Countries or areas particularly dependent on fisheries would be expected to show greater responsibility than others in conducting their fisheries but the evidence is mixed. All four have suffered greater or lesser stock depletions, apparently in part as a result of their own policies. The Norwegian experience is for the time being the most encouraging one in terms of resource conservation, while the Canadian example is at the opposite end of the spectrum. The Faroese have greatly overexploited their fish stocks despite being extremely dependent on fish for their export trade. Iceland, while having the most productive industry, has also overexploited its stocks.

The cause of this mismanagement is traced to the predominance of political considerations in fisheries management.

The remedy is seen as market-driven processes with built-in mechanisms to correct for the overexploitation that always will occur under unregulated competition.

Discussion

Carl Walters
Given the lessons of the Peruvian anchovy fishery, traditional management prescriptions have proven unworkable. How will a rights-based fishery (RBF) be more practicable?

Rögnvaldur Hannesson
It would be tragic if sustainable fisheries had no future. But, a rights-based fishery is a better/practicable solution. RBFs are not perfect, and may not always work; but, we know that they can overcome some problems. RBF provide an enhanced role for biology to inform the setting of TACs; there is less pressure to harvest in RBFs; and, they provide a means of managing overcapacity.

Ulrich Reinhardt
What is so bad about inefficiency? Why is overcapacity always portrayed as an economic bad?

Rögnvaldur Hannesson
Inefficiency is bad because we get less out of our resources. We contribute less with what we have to the economy as a whole.

Gert van Santen
The economic view is strikingly in contrast to that view expressed by biologists and anthropologists. Under ITQs an RBF would lead to quota concentration; should quota not be 'better' shared along size and capacity lines to protect community interests?

Rögnvaldur Hannesson
Is concentration a bad thing? In order to stay competetive and to satisfy income needs, it may require increasing scales of operation.

Randall Peterman
You said that the pig is not an endangered species. Is analogy of private property in agriculture not a weak analogy with which to defend similar rights in the fishery?

Rögnvaldur Hannesson
Its not a perfect world. What would be the result in agriculture if land were not owned? It may not be perfect, but what is better?

Daniel Pauly
Reiterating Randall Peterman's 'poor analogy' point, the genetic diversity of agricultural species such as pigs and rice, for example, are being lost due to

commercial concentration on a a few strains that are productive in todays environment. What can be used to protect genetic biodiversity?

Rögnvaldur Hannesson
Specific measures may be necessary to protect biodiversity. But, when you give people long term stakes in a resource they protect it.

Keith Sainsbury
ITQs have led to changes in fisher behaviour at a rate that previous government controls could not. Why? Is it sustainable in the long-term?

Rögnvaldur Hannesson
Whether it aids long-term sustainability is not known.

Keith Sainsbury
Quota markets are distorted. Other markets are often the subject of corrective controls. So how will quota markets help?

Rögnvaldur Hannesson
ITQ markets are imperfect/distorted. We need to see more of the stock control function in the ITQ market. Solutions have a habit of producing their own problems. But, ITQ markets can be corrected.

Cristina Soto
Is management by industry best? What about corporate responsibility? Who benefits, what are the costs, and who pays for habitat destruction? Is transferability without accountability desirable [e.g. fly-by-nighters, poaching, pulse fishing,]?

Rögnvaldur Hannesson
Corporations function for the long term. They have made major capital investments, and are not pleased to see that investment devalued as a result of overexploitation.

Since fish stocks fluctuate, capital should be flexible to fish them. ITQs can facilitate such a flexible response.

Yoshihiko Sada
ITQs exclude those who lack the resources to enter the fishery. Do ITQs merely justify the injustice of unequal access to natural resources?

Rögnvaldur Hannesson
Income distribution is not a fishery management problem. It is not a problem that can be solved by playing with access to fisheries.

Keith Sainsbury
We have a picture of where we want to take fisheries, but how do we get there?

Rögnvaldur Hannesson
How have we got here? Change has been borne by the fishers, not the governments. Because ITQs give fishers the hope of a capital gain, they will change.

Philip Neher
Government failure and management for non-economic objectives has led to the destruction of the asset. But, government is withdrawing from management, and fisheries are privatizing. But this may be happening because of fiscal constraints outside of the fishery, not for economic efficiency reasons.

Points of View - Theme 5

New Directions in Fishery Management: Lessons from the Collapse of Atlantic Canada's Groundfishery

Anthony T. Charles
Dept. of Finance & Management Science, Saint Mary's University, Halifax., Canada
Abstract

What caused the 1990s Atlantic Canadian groundfishery collapse? This paper argues that at the roots of the collapse lay a set of entrenched attitudes about the natural world, about fishery management and about how the fishery should function. These concern:

(1) the appropriate role of regulators and stakeholders;
(2) the burden of proof in balancing risks of lost benefits (through conservative management) and of stock collapse (through excessive resource use);
(3) a view that conservation can wait, postponing or minimizing cuts in harvesting to avoid disrupting fishing activity: and

(4) a sense that, despite the fishery's collapse, major changes in management approaches are unnecessary since fundamentally, the system works.

While there has been significant evolution in the first three of these attitudes (evidenced, for example, by a shift to more participatory management and more conservationist government policies), the fourth remains firmly entrenched. It is characterized by twin tendencies to deflect blame for the collapse and to avoid planning for the future, assuming that when the fishery recovers, past management and harvesting arrangements can continue much as before.

Perhaps the key conclusion from this analysis is the need to embrace major change in the philosophy of fishery management. In the absence of this, the next collapse will almost certainly gather momentum, and history may well repeat itself.

Discussion

John Caddy
Have you followed up the idea of a bankable or deferable ITQ?

Tony Charles
It would be a good refinement, but depends on the context. Tradability implies value to be captured today. Could involve classes of quota that allow in season distribution of effort. And there are other variations of quota which could be pursued: speculative quota and assured quota, come to mind.

Nigel Haggan
When a depleted fishery comes under ITQ management, where is the incentive to invest in the stock? What is the mechanism?

Tony Charles
Part of the Atlantic fishery is ITQ, part is competitive quota. Incentive is still there in the growth of a share in the TAC and the reduction of effort unit costs.

Natural Assets and National Wealth

Philip Neher
Dept. of Economics
UBC, Vancouver, Canada

Abstract

This paper puts the point of view that natural assets should be managed by sovereign and responsible nations as components of the portfolio of national wealth which yields real income to benefit real people.

It is not always the case that natural assets actually do this because institutions are not in place to minimize transactions costs, free-riding and rent-seeking behaviour. For this reason, it is, for example, arguably true that Canadians would be better off without wild fish, and that Mexicans and Nigerians would be better off without oil reserves.

For fisheries, the challenge for the next century is to craft fishery management regimes which have the paramount objective of maximizing wealth: the net present value of future cash flows.

This paper argues that wealth maximization is a necessary, primal, condition for achieving other legitimate objectives such as community development, acceptable working conditions for fishers, and notably, conservation. It follows that these other objectives will not be realized if they are pursued at the expense of the primal one.

Discussion

Keith Sainsbury
1. What role do national regulations play in Japanese Cooperative management?

2. How does cooperative management figure into their sustainability?

Philip Neher
1. Fisheries laws in Japan support the underlying institutions. They give them the security to sell, and territorial security to decide on use. This makes them sustainable.

2. There is a great deal of value-added in the near-shore fishery.

Carl Walters
Given that fish stocks cannot be accurately assessed, can you see any way where ITQs

figure into their sustainability?

Philip Neher
1. Fisheries laws in Japan support the underlying institutions. They give them the security to sell, and territorial security to decide on use. This makes them sustainable.

2. There is a great deal of value-added in the near-shore fishery.

Carl Walters
Given that fish stocks cannot be accurately assessed, can you see any way where ITQs are set up on something other than a (percentage) catch basis; perhaps, an area based system?

Philip Neher
Account for uncertainty, and do the best you can. If we cannot quantify the fish stock accurately, then the game is over, regardless of the regime.

Rognvaldur Hannesson
Managers should still set a quota despite the difficulties, and augment quotas with access rights (licenses). If need be, carve up areas with exclusive rights and let voluntary contracts prevail.

Cooperation and Quotas

Anthony Scott
Dept. of Economics
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Abstract

Fisheries cooperatives can manage their own fish stocks by self-regulation. They can also undertake data collection and research, enhance the habitat, and liaise with other fishing groups over the management of migratory stocks. However, government will not impose fisheries cooperation on fishermen. The drive has to come from the ground up, by voluntary action.

The paper lists the benefits to a fisherman from cooperation, and ask why he may nevertheless resist demanding it. There are many theories. Some fishermen like the racing fishery the way it is. Most economists' theory supports the view that members will defect and free-ride so that compulsory membership is probably needed. Economists and others also theorise that diversity among fishermen prevents the trust needed for cooperation.

The paper suggests that it is not diversity but the fear of loss that prevents cooperation. Even if a cooperative brings benefits, members fear some of them will be exploited by the rest. Homogeneity among members would not allay this fear.

What members need is the assurance that comes from fixed percentage shares in the catch and in other benefits and in costs. Government is needed to set up this sharing. ITQ's, when issued, automatically provide the fixed-share building blocks that are needed.

Discussion

Tony Pitcher
Are you advocating community based management for the off-shore fishery? Is it not impracticable?

Anthony Scott
Imagine a room full of fishers who are about to self-regulate. Failure to make joint decisions will arise because of the fear of private hostile actions. Successful joint-actions include no hostile private actions. When fishers have a common benchmark of interest, they develop a common structure to form collective actions around.

unidentified
What is necessary to encourage fishers to pick-up costs as government pulls away from financial responsibility for management? What is necessary to overcome the stultifying effect of fear of loss that change engenders, to achieve the positive benefits of cooperation?

Anthony Scott
Understanding joint problems is not enough. What is necessary is to encourage fishers to pick up costs as governments pull out. Existing community is insufficient. Common shares in the resource can help.

Linking Fish Price and Fishery Practice Through Eco-Certification, Labeling, and Crediting

John T. Sproul
UBC Fishery Centre & Sustainable Development Research Institute
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Abstract

A growing need exists in many world fisheries to initiate long-term market based changes to counter environmentally destructive economic forces that have historically motivated counter-productive fishing behaviour. Such circumstances have contributed to collapsing fisheries, producing local social and economic displacement and implications of biological loss to the global community. By and large, the market-place today fails to incorporate social and environmental practice information associated with the processes necessary to bring commodities from their points of extraction to consumption. The price mechanism does not directly address ecosystem impact costs relevant to method. Fishers harvesting in an ecosystem degrading manner can well expect to receive the same price as their counterparts pursuing the same resource but in more ecosystem sustaining ways. Worse yet, often unsustainable means of exploitation and production have historically been considered less expensive for industry to operate than more environmentally sensitive alternatives. Seafood consumers are unaware of the negative environmental and social consequences they may be endorsing when buying the cheapest fish. For seafood, as with nearly all goods and services, in-tandem presentation of defensible and concise socio-environmental product information does not yet exist for consumers.

The new paradigm suggested here is to transform environmental and social information into a primary value-added component of seafood and create heretofore non-existent market mechanisms that endorse fishery sustainability, socio-environmental education, and consumer responsibility.

Locally appropriate, and internationally recognized, criterion would be used by a third party eco-certification program to judge a fishery and its operators. Information, rating an activity's performance, would be conveyed by means of a fishery eco-label.

A result would be the ability of an increasingly environmentally conscious public to know, in a defensible and credible manner, the location, degree, and type of ecosystem practice they are endorsing with their purchases. In addition, government policy, such as an eco-credit system, could further encourage market demand of sanctioned sustainable fishery practices. This paper explores specific pathways for initiating such reforms for eco-information in the context of Pacific commercial fisheries and their markets.

Discussion

Ulrich Reinhardt
Is there not tremendous risk for corporations to corrupt the integrity of eco-labels?

John Sproul
Yes. And among some it has already started. But, institutions are taking shape to make labelling credible.

Anthony Scott
How does the labelling mechanism inform complex markets, such as the Tokyo fresh fish market?

John Sproul
The buyers in such markets are already informed of such things. An information system in the auction market itself informs the bidders.

Jake Rice
Do we have a sense of a first order cost estimate of setting up an eco-labelling system?

John Sproul
No - but we should use existing processes and structures, then build on them.

Uncertainty and the Role of Economics in Reinventing Fisheries Management

Ussif Rashid Sumaila
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Abstract

Most of the problems we see today in world fisheries emanate mainly from two broad sources, that is, the lack of adequate and correct information about how fisheries work, and the inadequacy of current institutional arrangements to deal with the problems at hand.

I trace how the former problem, in particular the problem of uncertainty, is being tackled, and speculate on how economics may help to bring some of the ideas being advanced to bear on the management of world fisheries in the not too distant future.

Discussion

Randall Peterman
Can formal quantitative techniques be used to incorporate true uncertainty?

Rashid Sumaila
One has to consider the shape of the PMR and movement of the stock. This model still has to be subjected to socio-economic tests.

Craig Harris
How do you protect refugia and obtain flexible management in the face of rapid technological change? What keeps the enterprising fisher/firm from attracting fish out of the refugia?

Rashid Sumaila
Flexible response in institutional design.

Kevin Cochrane
Would refugia reduce uncertainty?

Carl Walters
Historical records of the longevity of fisheries indicates that there are natural economic refugia. These are not PMRs, but exist in open fishing areas.

General Discussion - Theme 5

Paul Hart
Ecological behaviour models are based on competitive behaviour. Why does economics appear to employ an altruistic goal? People are motivated by self-interest not community interest, and that is what has to be modelled.

Cristina Soto
The economic doctrine is one of reducing the government role and increasing the market role in fisheries management, but is this not a road to unsustainable fisheries management?

THEME 6: ROLE OF INSTITUTIONS AND PARTNERSHIPS IN REINVENTING FISHERIES MANAGEMENT

Session Rapporteurs
Peter Tydemyers & Richard Porter

Keynote Address

Aquatic Resources Education for Developing World Needs

Meryl Williams
Director General, ICLARM, Philippines

Abstract

As we are talking of 'Reinventing Fisheries Management', the developing world and the development assistance agencies have been grappling with new concepts of development to replace the modernization /Eurocentric concepts which dominated the last several decades.

Although the changes in fisheries management and development concepts have not been closely linked in their causes, their combined effects on education for aquatic resource management and research in the developing world are interrelated. My presentation addresses how the target population for education, the structure and the institutional place of science and the demands for better management in the face of increasing resource scarcity and degradation are affected by the changes.

In particular, development and aquatic resources education will have to cope with user needs for greater participation in the processes (from research to management), a greater range of knowledge for decision-making, greater integration of knowledge, and greater attention to local conditions. All of these demands occur while developing countries are still in the process of building base expertise and have control of limited facilities for their tasks. Like any pioneer phase, time as well as resources are required to achieve a desired state. However, education could help speed the achievement provided it is targetted to future needs rather than to more traditional staging of development.

Discussion

Tony Pitcher
There is no question that here at UBC we have a long tradition of studying salmon biology and management issues which is not perhaps the best training for students from developing countries. As a result, there is need to continue to seek a balance between developed world research interests (ie salmon) and developing world research needs, especially with respect to the specific contexts of the students which are accepted.

Within the context of the apparent limits of the world's fisheries, what skills are needed to reduce the consumption of fish within the developing world?

Meryl Williams
While traditionally there has been a tendency to train students from developing countries in technical subjects (ie fisheries management), when they return home they often end up working on and leading projects which are largely socio-economic. With this in mind, we should probably provide more training in social and cultural skills which will support the specific needs of their home countries.

Craig Harris
Recognizing that there is an ongoing need for greater collaboration between scientists, social scientists, etc., what is ICLARM doing to meet this challenge?

Meryl Williams
The short answer is not enough right now. At some levels, however, we are attempting to have more cross-project planning and cross-discipline program review of our activities. We are hoping to move towards greater institutionalised cross-discipline integration.

Daniel Pauly
Dr Williams has argued that fisheries science has to maintain a broad vision. I support this call because I think that most of what traditional fisheries science has learned is utterly useless! The critical

element which is lacking is the mechanism to translate technical knowledge (say to reduce the catch) into meaningful implementation at the policy/political level.

Meryl Williams
Yes- students must also be taught how to operationalise their research.

Tony Pitcher
There is no shortage of good data out there. Aid agencies continue to train people, often graduate students, in conjuction with developed world universities, to collect data which pile up to be analysed at some point in the future by visiting developed world scientists.

How can we get our Ph.D. graduates, for example, to actually do research when they return home and not end up as administrators?

Meryl Williams
I don't know how we overcome this type of intra-country brain drain. It is a systemic problem which occurs in fields outside of fisheries science as well.

Pablo Arenas-Fuentes
What do you think about the idea of mandating developed world universities to maintain ongoing institutional links between themselves and their developing world graduates once they return home?

Meryl Williams
I am wholly in support of this sort of arrangement. Recently, the success of this type of ongoing relationship has been demonstrated in the world of agricultural science. Apparently, Cornell University is maintaining some sort of agricultural research link with one of its more prominent graduates, the current President of Taiwan.

Tony Pitcher
This style of ongoing commitment to graduates is also being attempted to a limited extent by both Britain and Norway, as part of their international aid programs.

Tony Davis
Given that the funding for fisheries-related research which is available to developing countries is in general decline, what has ICLARM's experience been with respect to collaboration or partnerships with private companies, both with respect to research and education?

Meryl Williams
To date there has been relatively little collaboration between ICLARM and the private sector. A notable exception to this, however, has been a joint selective breeding research project on *Tilapia*. One of the biggest obstacles which we face in increasing this type of collaboration is that ICLARM's purpose is to generate benefits for the public and as such, we must try to ensure that our research results remain public and are not captured as the private intellectual property of a company.

Points of View - Theme 6

A Fisheries Agreement with the Nisga'a people: The First Step Toward a Sustainable Fishery and Fishery Management System

Michael R. Link
Fisheries Analyst
LGL Ltd, Sidney, B.C., Canada

Abstract

Settlement of the land claim between the Nisga'a people of northwestern B.C. and the Federal and B.C. governments begins a process that will put in place the necessary institutions that will ensure sustainable management of all local fisheries. To achieve this goal, the Fisheries Agreement will consist of 4 key components.

1. A share of the fishery resource will be allocated to the Nisga'a and the fishery will be conducted to maximize resource rent and avoid the tragedy of the commons.
2. A funding system will be implemented whereby some portion of the resource rent pay for the management and assessment of the fish stocks.
3. The stock assessment, management and harvesting will be logistically and physically intertwined and mutually beneficial. This will lower the cost of each compared with separate operations and it will ensure the validity and

acceptability by all those involved.

4. A trust fund will be built up to ensure that funds are available to support annual stock assessment, monitoring and enforcement programs required for proper management of Nass area fish stocks. While the Nisga'a agreement takes advantage of unique features of their area, some elements of the Nisga'a solution would be applicable and could substantially improve fisheries management in other areas.

Discussion

Jim Kitchell
To what extent can the Fisheries Agreement and the more general agreement in principle with the Nisga'a people be seen as a model for future Treaties with other First Nations.

Michael Link
In some general respects, this agreement does contain elements which could be used as a model for future agreements or Treaties. For example the funding systems for fisheries management and stock assessment could be used more generally. However, there are aspects of this agreement which make it fairly unique. In particular, the Nisga'a were the only people with claims in the Nass valley. In most other watersheds in the province, there are often a number of claims which may be overlapping. In addition, the physical structure of the canyon on the lower Nass will facilitate the use of selective fishing gear types.

Carl Walters
I am encouraged by many of the provisions in the fisheries agreement with the Nisga'a especially with respect to the intention to use gear types which will allow the community to capture rents from the resource which can then in turn be used to finance management, assessment, etc..

Michael Link
The Nisga'a are very interested in seeing that the maximum value or benefit from the resource is returned to the community.

Reinventing Salmon Management: Changing the Burden and Nature of Proof in Salmon Conservation Programs to Support a New Management Paradigm

Phillip R. Mundy & Nancy M. Mundy
Fisheries & Aquatic Sciences,
Portland State University, USA

Abstract

The circumstances surrounding the inability of fisheries management institutions in the contiguous United States to prevent the widespread extirpation of salmon populations may be able to teach some lessons about how to design a more effective salmon management paradigm.

The burden for proving that any specific human activity risks the persistence of salmon populations has historically rested very heavily on scientists within management institutions with mandates for salmon conservation, and not on the proponents of the threatening activities. The nature of evidence available to management agencies has historically been limited to attributes of the target populations of salmon, such as numbers caught. Measures of attributes of the salmon's habitats and associated plant and animal species have only slowly become available, if at all.

As a consequence of owing the burden of proof, the scientist concerned with salmon conservation were constantly cast in the logically indefensible position of having to prove a negative proposition. Similarly, as a consequence of the single-species nature of the data, the scientists were prone to the circular proposition of describing the current abundance of the salmon populations in terms of only the prior abundances of the salmon populations, without resorting to extrinsic determinants of abundance. Hence the management institutions failed to exert control over the abundance of salmon through time because they could not prove that specific human actions would not put salmon populations at risk, and because the basic management data did not incorporate sufficient understanding of the ecological foundations for salmon production and the impact of human actions on those foundations.

If it is possible to create institutions which

are capable of effecting the indefinite persistence of salmon populations, two fundamental changes are required. First, actions within the salmon's environs which are physically capable of inflicting mortality, such as fishing and habitat degradation, must be presumed, *a priori*, to put the populations within those environs at risk. Second, management of a salmon population, or *deme*, needs to be based on spawning escapement goals which represent both the productive capacities of the habitats for the salmon population and all related salmon populations, and the contribution of the adult salmon carcasses to the production of other species of plants and animals in the salmon's environs.

Management processes in Alaska which seek to sustain salmon production in the face of newly-degraded habitat and burgeoning sources of human-induced mortality provide a laboratory in which to test designs for new salmon management paradigms.

Discussion

Unidentified
Is it possible that the economic value of salmon which could potentially return to the Columbia River is just too small to justify the efforts being expended in their recovery?

Nancy Mundy
There is the very real potential that on the basis of a strict economic analysis, the economic value of the fish, even at significantly increased abundance levels, might not enough to justify recovery efforts. However, our Treaty obligations with the native people of the Columbia Basin require that they continue to have access to a number of fish equivalent to 50% of 1859 return levels.

Richard Porter
What are your thoughts with respect to the utility and likelihood of success of some of the regional consultative fora.

Nancy Mundy
Some things are beginning to happen. Recently the US government approached the Northwest Power Planning Council. The problem, however, is that the Council only has the authority to plan. It has no enforcement power whatsoever.

Science and the Establishment of Marine Protected Areas

Richard Paisley
Westwater Research Centre
UBC, Vancouver, Canada

Abstract

The management of renewable natural resources is increasingly becoming a highly sophisticated activity. In many jurisdictions, including Canada, natural resource management policy is considered to have a strong science basis. Yet the precise role of science in decision making is often unclear.

This paper explores the role of science and scientists in the development of policy towards the establishment and maintenance of marine protected areas (MPAs) in Canada. This exploration suggests that science enters into decision making for MPAs in an episodic way. This episodic model of science in decision making is contrasted with a more adaptive approach in which policy initiatives would be treated as exercises in adaptive learning. Such an adaptive model is more likely to help close social and communications gaps between scientists and decision makers and lead to the establishment and maintenance of more and better MPAs in Canada

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Fostering Sustainable Development & Research by Encouraging the Right Kind of Institutions

Jake Rice
DFO, Nanaimo, Canada.

Abstract

At present we have lots of development and lots of research. We also have lots of institutions and even lots of partnerships. Implicit in devoting time to this Theme Session must be the belief that we have the wrong kinds of development, research, and institutions; the belief that current ones are

not devoted to sustainability.

Sustainability has been defined many ways, but fundamentally, it is a set of values for how we use ecosystems. If we believe our current institutions (and the research and development they support) are not devoted to sustainability, we must believe our institutions reflect the wrong values at present. How do institutions (and processes, for institutions and processes are inseparable) reflect values? More importantly, how do they change values? From the focus on partnerships, it seems that we believe that the values of those we allow to participate determine the values of the institutions and processes; that the values can be changed both by allowing new participants (and excluding some old ones?) and by broadening the backgrounds of the existing participants.

The current trend away from centralized control of both knowledge and decision-making to empowerment of many partners reflects these beliefs. We see representatives of fishers' organizations (and NGO's) on review and advisory bodies (sometimes even on Symposia Steering Committees). We see efforts to make fisheries scientists into fishers by sending them our on real fishing vessels; efforts to make fishers into fishery scientists by giving them notebooks and recording instruments. These experience are valuable, because they build communic-ations and respect between people from different traditions. However, these initiatives are not fundamental changes in roles and responsibilities. Nor do I expect they will fundamentally alter the values of the participants. We should no more expect fishers to defer to the opinion of academic or government experts on matters related to real fishing (regardless of how many trips the expert took on a commercial boat), than we would expect degree-laden experts to defer to the opinion of fishers on matters of science (however well fishers keep their logbooks).

It is not just an unrealistic goal to have a completely egalitarian makeup and role of all parties - industry, government, academia, NGO's etc - in all fisheries institutions and processes; it is the wrong goal. The right kinds of institutions and processes are ones that encourage different parties to do well the things for which each has special expertise, and then synthesize the diverse results at another level of process. Many of the institutions and processes for allowing different parties to hone their specialties to a keen edge already exist (although the push for egalitarianism places some in jeopardy). What is missing are the next level of processes and institutions, for synthesizing the products of the diverse specialities.

I will review some first steps towards developing the meta-institutions and meta-processes in a few fisheries jurisdictions, although I know of no initiative that is very far along. I will suggest that we look for the most instructive parallels in other areas of social progress (e.g. civil rights, women's rights). If we do believe that our institutions and processes must be changed to reflect a new set of sustainable values, our models perhaps should be found in those areas, where institutions and processes really have seen changes in values implemented over the past decades

Discussion

Christina Soto
To what extent are the perspectives which you presented in your talk reflected within or supported by your employer, the Department of Fisheries and Oceans?

Jake Rice
DFO is just another large institution and like most large institutions, reflects and embodies the values of those involved. I think that within DFO there is a sincere commitment to be more open, to cooperate and to share power.

Christina Soto
In your talk there was an emphasis on the need for trust and respect. Is this perspective enunciated in any DFO literature?

Jake Rice
Trust and respect are really only things that individuals can embody.

Yoshihiko Wada
What is your opinion with respect to the potential for demand side management for fisheries products within Canada and what is DFO doing, if anything, in this regard?

Jake Rice

DFO is a bit schizophrenic with respect to demand side management for fish. Different departments often act and talk at cross-purposes when it comes to limiting demand for aquatic resources. Currently, there is no holistic view on this issue.

The Need for Partnerships in Re-Inventing Fisheries Management

Indrani Lutchman
World Wildlife Fund, UK

Poster

The last decade has been marked by fisheries collapses and conflicts worldwide. Traditional fisheries management has been unsuccessful in ensuring the long-term sustainability of aquatic resources. Fisheries scientists and decision-makers have been unsuccessful at implementing practical management systems which take into account the nature of the resource and people who harvest it. It is generally accepted that current fisheries management methods need to be modified in order to achieve long-term sustainability. The aim of this poster is to highlight the benefits of partnerships in effecting better resource management.

As the largest international non-governmental organisation (NGO) advocating the protection of wildlife and all that sustains wildlife, the World Wide Fund for Nature (WWF) is in a unique position to influence public policy and initiate on-site projects which will benefit the aquatic environment worldwide. Through its regional programmes, WWF has funded three projects which have been based on the participation, collaboration and knowledge of local people towards promoting better conservation of aquatic resources.

Mafia Island Marine Park, Tanzania. This project's main aim was to develop Tanzania's first multi-user park. The area chosen has been shown to be high in marine habitat and species diversity with representatives of most of East Africa's marine ecosystems represented. It was recognized that the management of the park and its resources was dependent on participation and collaboration of local users and agencies. It is also hoped that the success of the stakeholder approach would become apparent through rational resource use and participation in development activities.

Les Arcadins Marine Park and Fisheries Project, Haiti. This project centered around three major objectives which include the promotion of sustainable development of the local fisheries and the establishment of a marine park to assist with the recovery of depleted species. The specific aims of the project were to assist the fishermen in making the changes in the way they operate, such as improving the organisational capability of a local fishing cooperative and enabling fishermen to take advantage of training in alternative fishing practices.

Mamiraua, Brazilian Amazon. A case of resource management involving local people. WWF has involved 2000 local residents in sustainable resource use planning to ensure that fish are not exploited and to improve the local standards of local communities. These residents participated in the formulation and implementation of management plans which included not only biological studies but socio-economic aspects related to local populations

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A Point of View from Mexico

Antonio Diaz de Leon Corral.
Instituto Nacional de la Pesca, Mexico

(No abstract received)

Discussion

Tom McGuire
During this conference, we have heard about the potential for using eco-certification programs in fisheries management (see presentation by John Sproul). What is Mexico's perspective on the use of eco-certification tools generally and, more specifically, with respect to their potential application to fisheries.

Antonio Diaz de Leon
Mexico's perspective on this issue must be viewed within the context of our current

trade relationships. For example, the United States is by far the major consumer of Mexican fisheries products. And despite the existence of specific written international agreements between Mexico and the United States, such as the North American Free Trade Agreement, which should address these issues, the problem still arises that many trade issues are masquerading as ecological issues.

In other words, how are true ecological issues, the potential subject of eco-certification, to be distinguished from trade problems? This raises the question of who or what is going to certify the eco-certifiers? Furthermore, what and whose standards are to be used. If eco-certification is to be accepted, there is a need for clear unequivocal standards within which trade issues cannot masquerade.

Meryl Williams
With respect to the apparent lack of highly experienced research expertise available in Mexico to address specific practical research problems, has Mexico considered inviting (and possibly having to pay for) recognized international experts from outside Mexico to come and work on specific problems?

Antonio Diaz de Leon
Mexico has invited foreign researchers to assist with specific pressing long-term problems (not just to do science) in the past and has found this to be quite useful. Typically, these have been arranged through linkages between government agencies, Mexican universities and foreign universities. In addition, we are also trying to build up a fund to finance our own scientists better and also to train our own future scientists.

General Discussion - Theme 6

Lisa Thompson
For those of you that have had experience within government, what is the internal decision-making process like? How much influence and pressure do specific interest groups bring to bear on the fisheries management decisions?

Vincent Gillett
Based on my experience in Belize, in developing countries it is very common that the Minister has the final say on all decisions of any consequence. As a result, they are very vulnerable to lobbying by various interest groups and may therefore be hard pressed to follow the advice of their scientists and managers.

Jake Rice
In Canada, the Fisheries Act mandates that the Minister is responsible for all fishing plans. Therefore, the decision-making process is also vulnerable to the influence of various groups. As a result, there are often highly variable outcomes or decisions across Canada and between regions given the same starting point.

Meryl Williams
The experiences mentioned previously in Canada and Belize can be contrasted with that of Australia. There, ministerial influence in decision-making has, in recent years, been greatly reduced because of a history of political and interest group interference in the process. Current legislation requires that decisions are taken by professional fisheries managers.

BIOGRAPHIES OF KEYNOTE SPEAKERS

John F. Caddy

Born in Ulverston, England, 1940; Bachelor and Doctorate in Marine Biology, 1966, University of London.

Landed immigrant and Canadian citizenship while working as research scientist on population assessment and fisheries management, (shellfish, crustaceans and marine fish) at the St Andrews Biological Station, N.B., 1966-75; Then, Associate Director, Resource Assessment Branch, DFO, Ottawa, 1976, and Chief, Invertebrates and Marine Plants Service, 1976-79.

Over this period I was mostly involved in cooperative efforts to establish the basis for invertebrate fishery assessments. Personal highlights were a first spatial model for an exploited fishery population, developed during sabbatical leave at the University of Washington, and a crustacean assessment model based on moult intervals. (This invertebrate work led to editing 'Marine invertebrate fisheries, their assessment and management', published by John Wiley in 1989). Some other scattered activities involved developing direct fishery assessment methods using cameras and submersibles, authorship of the first VPA for Atlantic bluefin tuna at ICCAT, and advisor on Canada-US boundary negotiations over Georges Bank.

Senior Resources Officer and Chief, Marine Resources Services, FAO, 1979 to present.

The first assignments given me by John Gulland, then service chief, were to cover fisheries resources issues in the Caribbean, Mediterranean and Persian Gulf. Following earlier work in the Bay of Fundy and Gulf of St Lawrence, this led to preoccupation with the state of semi-enclosed seas (Rev. Fish. Sci. 1993). Since finding that it does not always make sense to make 'routine' assumptions for shellfish populations, I have always questioned doing so in fisheries assessment methodology, and sought to incorporate marine ecology in fisheries (see 'An ecological framework for marine fishery investigations'; FAO 1986). Among my other research preoccupations has been the need of developing country scientists to find an appropriate context for assessing and managing tropical fisheries, which do not always follow North Atlantic and North Pacific models!

My service at FAO recently attracted widespread attention following publication of our 1993 'Review of the state of world marine fishery resources' (FAO Tech. Pap. 335), which has contributed, through the global media, to a broader global concern with the state of exploitation of marine resources. In association with our diagnosis, I have been occupied in recent years with providing input and background documents for international conferences: in 1992, on 'Living Marine Resources' for UNCED (FAO Tech. Pap. 353), more recently on 'Reference points for fisheries management' for the UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks (FAO Tech. Pap. 347), as well as input for the Articles on Fisheries Management in the FAO Code of Conduct for Responsible Fisheries Management, approved in 1995.

Kevern L. Cochrane

Kevern Cochrane was born in Cape Town, South Africa, but moved to Zimbabwe at an early age and completed much of his education there. He studied at the University of Zimbabwe, graduating with a B.Sc(Hons) in Zoology and Geology in 1973. After a brief spell teaching at a senior school in Harare, he joined the Department of National Parks and Wildlife Management in Zimbabwe. His research for this department centred on a study of the clupeoid Limnothrissa miodon in Lake Kariba to which it had recently been introduced from Lake Tanganyika. The species had rapidly become established and had become the basis of a lucrative fishery on Lake Kariba. His research, on factors driving strong seasonal trends in abundance of the species, led to the award of a M.Phil. degree from the University of Zimbabwe in 1978.

This was followed by nearly five years of teaching in Pretoria in South Africa after which Dr Cochrane joined the National Institute for Water Research of the Council for Scientific and Industrial Research in South Africa. Here he formed part of a multi-disciplinary team nutrient cycling within a hypertrophic impoundment, Hartbeespoort Dam. His responsibilities focused on the population dynamics of the three most abundant fish species in the lake

and their impact on nutrient cycling and water quality. As a result of this research, in 1985 he was awarded a Ph.D. for a thesis entitled The population dynamics and sustainable yield of the major fish species in Hartbeespoort Dam. While these fish species are not commercially harvested they do form the basis of a substantial recreational fishery, despite the poor water quality. As a member of this group, Dr Cochrane, also became involved in, and ultimately took responsibility for, development of a simulation model of the nutrient dynamics within the lacustrine ecosystem.

During the late 1980s, the political struggle in South Africa was reaching a climax and, having been involved in a number of activities attempting to expedite the establishment of a democracy in South Africa, Dr Cochrane left science for a period of 18 months during which time he was a full-time justice and reconciliation worker for the Church of the Province of Southern Africa (Episcopalian). His duties were concerned mainly with initiating and coordinating educational support to black scholars within the Pretoria region, working with families of political detainees and facilitating contact between black and white South Africans on a range of levels.

At the end of 1988, he returned to science and made his first professional contact with matters marine, joining the Sea Fisheries Research Institute (SFRI) in Cape Town. Initially he worked within the Whole Systems Group, undertaking research into environmental influences on the dynamics of small pelagic fish, particularly on recruitment. In 1990, he was made Head of the Stock Assessment Division of the SFRI and was therefore responsible for the provision of scientific advice for the management of the pelagic fishery. This fishery is the second most valuable in South Africa and is based largely on anchovy and sardine. Considerable progress has been made in developing acceptable management procedures for these two species based on rigorous assessments and intensive discussions with the fishing industry. In 1992, Dr Cochrane was made Head of the newly formed Stock Assessment Division and thereby became responsible for coordinating assessments of the species underlying all South Africa's major fisheries. He is due to join the Fisheries Department of the Food and Agricultural Organisation in October 1995.

He was chairman of the Benguela Ecology Programme from 1992 to 1994 and subsequently served on the Advisory Committee for this Programme. He was also one of the initiators of the South African Sea and the Coast Programme which has successfully brought together marine scientists, engineers and technologists, economists and sociologists, and representatives of the user communities and groups in order to investigate means of improving on the utilisation and management of marine resources. He served on the Policy and Advisory Committee for this Programme until his departure for the FAO. He is also a member of the Steering Committee of the Small Pelagics and Climate Change (SPACC) programme within International GLOBEC.

Rögnvaldur Hannesson

Rögnvaldur Hannesson was born in Iceland in 1943 and grew up in a fishing village. He received his university education at the University of Lund, Sweden. His dissertation dealt with the economics of fishing, a work that benefited greatly by spending a year at the UBC Department of Economics in 1972-73, where he came to know Tony Scott, Gordon Munro, Harry Campbell and Colin Clark.

Professor Hannesson has made his academic career in Norway, first at the University of Tromsø where he stayed one year, and later at the University of Bergen. Since 1983 he has been professor of fisheries economics at the Norwegian School of Economics and Business Administration in Bergen. He has published two books on the fundamentals of fisheries economics and numerous articles in the professional journals. He is a member of the Advisory Board of Marine Resource Economics. He was chairman of the Executive Committee of IIFET (The International Institute of Fisheries Economics and Trade) 1986-1990. He has hAd various short term assignments for the

FAO, the OECD and the World Bank.

Professor Hannesson's main interests are in fisheries management, bioeconomic models and the development of fish prices and markets. Some recent publications are How to set Catch Quotas: Constant Effort or Constant Catch? (together with S.I. Steinshamn), Journal of Environmental Economics, 20:71-9 (1991), Bioeconomic Analysis of Fisheries, Fishing News Books (1993), International Transfers of Excess Allowable Catches, Land Economics 70:330-344 (1994), and Fishing on the High Seas: Cooperation or Competition? forthcoming in Marine Policy.

James F. Kitchell

James F. Kitchell is the A. D. Hasler Professor of Zoology and Associate Director of the Center for Limnology at the Univ. of Wisconsin-Madison. His research interests emphasize trophic interactions. He has served on five panels for the US National Science Foundation and is Coordinator for the Living Resources Program, Univ. of Wisconsin Sea Grant.

He is currently appointed to advisory councils of the School of Fisheries and Marine Sciences, Univ. of Alaska, and the Multiscale Experimental Ecosystem Res-earch Center, Univ. of Maryland.

David Policansky

David Policansky is Associate Director, Board on Environmental Studies and Toxicology and Director, Program in Applied Ecology and Natural Resources at the National Research Council in Washington, D.C. He received his Ph.D. (Biology) and M.S. (Biology) from the University of Oregon, and his B.A. (Biology) from Stanford University. He was born in Cape Town, South Africa, and came to the United States more than 30 years ago after a 3-year stay in London.

Before coming to the National Research Council in 1983, Dr. Policansky taught courses in ecology, evolution, genetics, ichthyology, and introductory biology at the University of Oregon and the University of Massachusetts in Boston. His research interests include evolutionary ecology and life-history patterns and the evolution of exploited populations. His research experience includes marine and freshwater fishes, perennial herbs, and natural populations of Drosophila.

At the National Research Council, Dr. Policansky has directed projects dealing with natural-resource management, including recent reports on the Bering Sea ecosystem, the biological basis of the Endangered Species Act, wetlands delineation, the protection and management of anadromous salmon in the Pacific Northwest, and the Environmental Protection Agency's Environmental Monitoring and Assessment Program. He has also directed studies on the criteria federal agencies use to acquire land, the Environmental Studies Program of the Minerals Management Service (oil and gas leasing on the outer continental shelf), ecology and conservation of endangered sea turtles, the biology of the tuna-dolphin problem, and the Mono Basin ecosystem. He has published papers on resource management and the evolution of exploited fish populations.

In addition to his membership on the International Advisory Council of the Fisheries Centre, Dr. Policansky is or has been a member of the Advisory Council for the University of Alaska's School of Fisheries and Ocean Sciences, the Peer Review Panel on the Department of Energy's Academic Partner-ships Program, the BioScience Editorial Board, the American Fisheries Society, and the Ecological Society of America.

Keith Sainsbury

Dr Sainsbury is the leader of the Commonwealth Scientific and Industrial Research Organisation (CSIRO)'s Pelagic Fisheries Resources Program. This Program is responsible for all CSIRO's research on pelagic fisheries and manages the design and evaluation of strategies for fisheries

and environmental management of marine living resources.

Keith comes with a background that includes marine biology, population dynamics, fishery assessment and mathematical modelling. His primary responsibility over the past 10 years has been in providing the scientific input to management of the multi-species bottom-trawl fisheries in tropical north-west Australia. This includes conducting extensive trawl surveys of the resources present in this part of the Australian Fishing Zone (AFZ), stock assessment, and development of an adaptive management approach to dealing with the complex and highly uncertain dynamics of the resource.

Current responsibilities include scientific membership of the two Australian Management Advisory Committees responsible for pelagic fisheries covering southern bluefin, bigeye and skipjack tunas and billfish resources. He is advisor to the Commonwealth Environment Protection Agency on the management of ocean dumping and waste management under the London Convention and head of the Australian delegation to the international commission for the Conservation of Southern Bluefin Tuna.

Some of the projects Dr Sainsbury is currently involved with are: tuna population assessment and management; tuna tagging to measure abundance and dynamics; ecology of tunas; application of tracking methods to optimise use of Fish Aggregation Devices; detailed biological oceanography of eastern Australia and its relation to pelagic fisheries; analysis and interpretation of commercial catch data for fishery assessment.

Prior to Dr Sainsbury's current involvement he managed CSIRO's Australian Tropical Fisheries project involving survey of the demersal and pelagic fish resources of tropical Australia. He also developed a management plan for the demersal trap and trawl fisheries in this region and implemented the ongoing 10 year monitoring program for these fisheries.

Meryl Williams

Dr Meryl J Williams, appointed Director General of the International Center for Living Aquatic Resources Management (ICLARM) in April 1994, was educated in Australia (University of Queensland and James Cook University of North Queensland). She holds a Doctor of Philosophy degree, an MS in Literary Studies (Statistics), a Diploma of Education from the University of Queensland, and first class honours in Marine Biology from James Cook University.

ICLARM is an international research centre with headquarters in Manila, conducting fisheries, aquaculture and aquatic systems research and other activities relevant to the needs of those in the developing world. ICLARM is a center under the Consultative Group on International Agricultural Research (CGIAR), along with 15 other centers which cover agriculture and forestry research.

Prior to her ICLARM post, Dr. Williams was Director (1993) of the Australian Institute of Marine Science (AIMS). At the former Bureau of Rural Resources in the Department of Primary Industries and Energy, Canberra, she grew in her position from Fisheries Scientist to Assistant Director and finally as Executive Director, between 1986 and 1992. She also has had extensive experience as Fisheries Statistician and Consultant to the Tuna and Billfish Assessment Program at the South Pacific Commission, New Caledonia, from 1981 to 1984, and as Biometrician of Fisheries with the Queensland Government. From 1989 to 1994, she chaired the Australian Scientific Working Group on Ballast Water, was a member of the Steering Committee on Ballast Water, and sat on and chaired several fisheries research committees. She was also a member of the Australian Endangered Species Advisory Committee in 1993-94.

As a scientist, Dr. Williams has relevant experience in fisheries research at national and international levels. She also has extensive experience in Australian marine science research, with emphasis on the use of research applications and in environment management and policy decision making. She had been a Board member of the

Australian Maritime College and the Vice President of the Australian Marine Science Association and served on committees reviewing New Zealand and US fisheries research. At present she is an active member of the Council of AIMS.

Dr Williams has published extensively on a variety of marine and fisheries matters and continues to develop materials of relevance to fisheries research.

SYMPOSIUM PROGRAMME

SYMPOSIUM DAY 1

Wednesday February 21, 1996

8:00 - 8:30 **Registration**

8:30 - 12:15 **Session 1: The production base and ecosystem management** *(Chair: David Policansky; Rapporteurs: Kathy Heise & Steve Mackinson)*

8:30 - 8:45 **Welcome and opening thoughts**, Dr Tony Pitcher, Director, Fisheries Centre

8:45 - 9:45 **Keynote address**
James F. Kitchell, Univ. of Wisconsin
The trophic cascade and food web management

9:45 - 10:15 **Coffee Break**

10:15 - 11:15 **Points of view**
Pierre Magnan, Univ. du Quebec a Trois-Rivieres
The control of undesirable introduced species in small freshwater lakes: what we should learn from past experiments
Bill Neill, Fisheries Centre, UBC
Constraints on the intensity of trophic linkages in lake food webs
Daniel Pauly, Fisheries Centre, UBC
Ecosystem management: the next step
James Scandol, Fisheries Centre, UBC
The understanding and prediction of marine production: considerations for the future.

11:15 - 12:15 **Discussion** *(Chair: Tony Pitcher)*

12:15 - 14:15 **Lunch Break** (*Soup is provided at Ralf Yorque Room, Fisheries Centre*)
Poster Session, at Ralf Yorque Room, Fisheries Centre.
Alida Bundy and Tony Pitcher, Fisheries Centre, UBC
First world / foreign fishing and third world fisheries: impact on resources, economy and society
Indrani Lutchman, World Wildlife Fund, U.K.
The need for partnerships in reinventing fisheries management
Sam Wang, Elemental Research Inc., Canada
A new method to identify individual natal stream sources of salmonids and migration patterns of fish

- 18:00 **Session 2: Assessment, risk and adaptive management** *(Chair: Rögnvaldur Hannesson; Rapporteurs: Alida Bundy & Kathy Heise)*

- 15:15 **Keynote address**
Keith Sainsbury, CSIRO, Australia
Rediscovering adaptive management: a framework linking science and decision making in a reinvented fisheries management.

15:15 - 15:45 **Points of view** (Part I)
Alain Fonteneau, IATTC, USA
An overview of tuna assessment and management world wide
Jarl Giske, University of Bergen, Norway
Predictive models of growth, survival and reproduction.

15:45 - 16:15 **Coffee Break**

16:15 - 17:00 **Points of view** (Part II)
Randall Peterman, Simon Fraser Univ., Burnaby
Benefits of taking uncertainties into account when making decisions in fisheries management: example applications of Bayesian decision analysis.
Laura Richards, Fisheries and Oceans, Nanaimo
Intelligent fisheries assessment in an uncertain world
Carl Walters, Fisheries Centre, UBC
Fixed exploitation rate strategies for coping with effects of climate change

17:00 - 18:00 **Discussion** *(Chair: Tony Pitcher)*

20:30 **Informal discussion at Ralf Yorque Room, Fisheries Centre**
Chairs and rapporteurs to focus discussion issues from Sessions 1 and 2.

SYMPOSIUM DAY 2
Thursday February 22, 1996

8:30 - 12:15 **Session 3: Role of policy in responsible fishing** *(Chair: James Kitchell; Rapporteurs: Dave Preikshot & Alida Bundy)*

8:30 - 9:30 **Keynote address**
Kevern Cochrane, FAO, Rome
People, purses and power - some features of the debate surrounding a developing fisheries policy for South Africa.

9:30 - 10:00 **Points of view** (Part I)
Craig K. Harris, Michigan State University
Regime formation and community participation in fisheries management.
Tony Pitcher, Fisheries Centre, UBC
Measuring the unmeasurable: multivariate interdisciplinary method for determining the health of fisheries

10:00 - 10:30 **Coffee Break**

10:30 - 11:15 **Points of view** (Part II)
Gert van Santen, World Bank, Washington D.C.
Politics and fisheries
Michael Sinclair, Fisheries and Oceans, Dartmouth
Modifications of Scotian Fundy groundfish management for sustainable use.
Michael Sutton, World Wildlife Fund, UK
A new paradigm for managing marine fisheries in the next millennium.

11:15 - 12:15 **Discussion** *(Chair: Tony Pitcher)*

12:15 - 14:15 **Lunch Break** (*Soup is provided at Ralf Yorque Room, Fisheries Centre*)

14:15 - 18:00 **Session 4: Role of the interface between social sciences and natural sciences**
(*Chair: Meryl Williams; Rapporteurs: Steve Mackinson & Dave Preikshot)*

14:15 - 15:15 **Keynote address**
David Policansky, National Research Council
Fisheries management: science and decision making

15:15 - 15:45 **Points of view** (Part I)

Tony Davis, St. Francis Xavier Univ., Nova Scotia
For fishers or fishes?: a comment on the development of an interdisciplinary science of fisheries and fisheries management
Lawrence Felt, Memorial University, St.John', Nfld.
A bridge over troubling waters? Strategies for integrating natural and social science for sustainable fisheries

15:45 - 16:15 **Coffee Break**

16:15 - 17:00 **Points of view** (Part II)
Paul Hart, Univ. of Leicester, U.K.
Enlarging the shadow of the future - avoiding conflict and conserving fish
Svein Jentoft, University of Tromso, Norway
Fisheries management: a role for social science?
Thomas McGuire, University of Arizona, USA
Observations on the social science of fleet dynamics and local knowledge

17:00 - 18:00 **Discussion** *(Chair: Tony Pitcher)*

20:30 **Informal discussion at Ralf Yorque Room, Fisheries Centre**
Chairs and rapporteurs to focus discussion issues from Sessions 3 and 4.

SYMPOSIUM DAY 3
Friday February 23, 1996

12:15 **Session 5: Role of economic tools in reinventing fisheries management** *(Chair: Kevern Cochrane; Rapporteurs: Richard Porter & Peter Tyedmers)*

8:30 - 9:30 **Keynote address**
Rögnvaldur Hannesson,Norwegian School of Economics and Business Administration
Fisheries management, politics and markets.

9:30 - 10:00 **Points of view** (Part I)
Anthony Charles, Saint Mary's University, Halifax
New directions in fishery management: lessons from the collapse of Atlantic Canada's groundfishery.
Philip Neher, Department of Economics, UBC
Natural assets and national wealth

10:00 - 10:30 **Coffee Break**

10:30 - 11:15 **Points of view** (Part II)
Anthony Scott, Department of Economics, UBC
Cooperation and quotas
John Sproul, Fisheries Centre, UBC
Linking fish price and fishery practice through eco-certification, labeling and crediting
Ussif Rashid Sumaila, Univ. of Bergen, Norway.
Uncertainty and the role of economics in reinventing fisheries management

- 12:15 **Discussion** *(Chair: Tony Pitcher)*

- 14:15 **Lunch Break** (*Soup is provided at Ralf Yorque Room, Fisheries Centre*)

17:45 **Session 6: Role of institutions and partnerships in reinventing fisheries management** *(Chair: Keith Sainsbury; Rapporteurs: Peter Tyedmers & Richard*

Porter)

14:15 - 15:15 **Keynote address**
Meryl Williams, ICLARM, Philippines
Aquatic resources education for developing world needs.

15:15 - 15:45 **Points of view** (Part I)
Michael Link, LGL Limited (environmental research associates)
A fisheries agreement with the Nisga's people: the first step towards a sustainable fishery and fishery management system
Nancy M. Mundy,Portland State University, School of Urban & Public Affairs
Reinventing salmon management: changing the burden and nature of proof in salmon conservation programs to support a new management paradigm.

15:45 - 16:15 **Coffee Break**

16:15 - 16:45 **Points of view** (Part II)
Richard Paisley, Westwater Research Centre, UBC
Science and the establishment of marine protected areas
Jake Rice, Fisheries and Oceans, Canada
Fostering sustainable development & research by encouraging the right kind of institutions.

16:45 - 17:45 **Discussion** *(Chair: Tony Pitcher)*

SYMPOSIUM DAY 4
Saturday February 24 1996

9:00 - 11:00 Round table and rapporteurs' reports from session discussions, and planning the Chapman & Hall book. Ralf Yorque Room, Fisheries Centre *(Chair: Tony Pitcher)*

11:00 - 12:00 Travel to Richmond for lunch

12:00 - 14:30 Dim-Sum lunch at the Maple Garden Restaurant, Richmond
(Sponsor: Fisheries Centre)

15:00 - 16:00 Visit to Gulf of Georgia Cannery, National Historic Site, Steveson, B.C.

16:00 - 17:00 Travel back to UBC

17:00 Adjourn

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