

SETTING THE STAGE- REBUILDING SUSTAINABLE FISHERIES FOR THE FUTURE. CHALLENGES AND OPPORTUNITIES FOR FISHERIES MANAGERS AND DECISION-MAKERS.

Invited address- Organization For Economic Co-operation and Development (OECD), Paris, Workshop on the Economics of Rebuilding Fisheries, May 2009, Newport, Rhode Island.

John C. Davis

Institute for Coastal and Oceans Research, University of Victoria, Victoria, B.C., Canada

ABSTRACT

To set the stage for the Workshop, this paper provides an overview of the challenges and opportunities related to economic and policy issues for managing domestic and international fisheries, rebuilding depressed stocks, and achieving sustainability. The nature and characteristics of domestic and international fisheries are reviewed, with emphasis on the scientific, social, economic, and policy issues associated with managing and effecting needed management approaches and policy changes to achieve sustainability.

Specifically, factors related to why it is difficult to achieve change are examined with examples drawn from domestic and international situations. Conflicts between competing interest groups and organizations, economic factors related to vested interests, balancing short term interests with longer term opportunities and effecting policy change in such situations with political implications, form the basis of such difficulties in domestic fisheries management. In the international context, treaty arrangements, protocols, international agreements, conservation and sustainability on the high seas, and related laws and governance add complexity.

Examples of successful rebuilding approaches, factors leading to such outcomes, tools and strategies for achieving rebuilding, and potential opportunities are summarized with emphasis on the importance of managing the transition to rebuilding. Of particular importance in the future, and where fisheries economists can play a key role, will be making a successful case for the economic advantages of fisheries renewal, rebuilding approaches, and sustainability. Given the looming global food crisis related to world population trends, the importance of fisheries resources as a food source, and the need to address sustainability in the face of escalating demand and competition, will require a major effort in achieving success. Policy change, international governance, and achieving popular support for fisheries rebuilding and sustainability as a foundation for domestic and international fisheries management will be essential elements in addressing the social and political challenges associated with fisheries rebuilding.

Why Fisheries Stewardship and Fisheries Rebuilding are critical

We have often heard the phrase “too many fishermen chasing too few fish” which succinctly describes the situation in many domestic and international fisheries. Associated with this reality are concerns about overcapacity, wasteful practices, conservation, fishing down top trophic level species, environmental and ecosystem degradation and frustrations with respect to achieving management objectives and effective regulatory and governance regimes. Indeed, analysis of the main series of the Food and Agriculture Organization of the United Nations (FAO) world fisheries catch database over the last 50 years indicates that 366 fisheries collapses occurred- nearly one of every four fisheries examined. Moreover, no reduction in the rate of collapse took place over that 50 year span, indicating that management improvements were not evident over time (Mullon, et al., 2005).

United Nations estimates predict the global human population will increase from the current level of over 6 billion to around 9 billion by 2050. Associated with this huge increase are major concerns about the Earth’s ability to sustain humanity and about an expanding global food crisis with its social, political and economic implications. It is clear that the fisheries resources of the globe will increasingly be affected by this demand and while aquaculture will provide some relief, harvesting pressure and management and fisheries rebuilding challenges will intensify as an increasingly hungry world turns to the sea, rivers and lakes as a source of food (Engelman, 2004). Exacerbating the world food crisis, will be anticipated impacts of global climate change which will affect key food-producing areas, many with large populations. Dyer (2008) predicts major social, economic and political destabilization as nations seek to feed their people, disputes over water result, and migrations of affected individuals take place. Climate change will impact aquatic resources in diverse and not clearly understood ways, complicating the task of sustainable management and fisheries rebuilding.

Given this situation, the task of sustainably managing, conserving and rebuilding fisheries resources is a critical one of vital importance to the human race. As an introductory talk to this OECD workshop on rebuilding fisheries, while not purporting to be an exhaustive review of a huge subject, this paper aims to set the stage by broadly scoping the challenges, issues and potential approaches and opportunities and to suggest how fisheries managers, decision-makers and fishery economists can make a difference in addressing the important task of fisheries rebuilding.

The Challenge of Managing and Rebuilding Sustainable Fisheries

Fisheries management is a complex task usually involving two major elements- a human element and a biological element. Typically there are multiple human interests and stakeholder groups, many of which extract economic and social benefits from the fisheries resources and are thus dependant on them. In addition, there are groups and individuals concerned with conservation, environmental issues and non-consumptive uses. From the biological perspective, fish are dynamic resources that cannot be easily observed, studied and evaluated. Unlike terrestrial resources, we cannot see most of the resources we are tasked

with managing and must rely on sampling, survey methodology, estimates, models and data sets, usually catch and effort, in order to say something about the status of the stocks, their age structure and trends in abundance.

Scientific and technical information is thus used to make decisions, adopt management measures, impose conservation regimes and explain and justify those decisions to user groups. This often results in controversy, as those opposed to management measures may question the science or place alternate weight on certain indicators that support or contradict various perspectives. In addition, our oceans, rivers and lakes are not quiescent places where nothing changes. Aquatic systems are subject to natural and man-made variation and to fluctuations which alter physical and biological features of the ecosystem. This may result in changes in survival and abundance of the species or group of species being managed and require adjustment of management plans and conservation measures, with the need for resultant interactions with those harvesting the resource.

The concept of sustainable fisheries management implies managing the resource in such a way that it is available in abundance for the future and can sustain harvesting without damage to the long-term availability of the stock or its ability to withstand natural variations in the environment. Rebuilding fisheries resources involves creating the conditions to restore them to previous levels of abundance, usually as a result of reducing fishing pressure or restoring key habitat characteristics. Typically, we think of “rebuilding” as related to restoration of historic abundance or achieving the maximum productive fisheries capability of the system. This of course makes the assumption that conditions exist or can be created for such restoration to take place which may or may not be true. Typically restoration implies reducing or eliminating harvesting activities. Accordingly, such measures will likely cause harvesters and those related to the fishery to incur economic or social loss or change in order to permit the resource to recover for the future. Restoration of habitat and environmental improvement may require expenditures as well as restriction of use or impact on those activities that have resulted in environmental and habitat degradation. Thus, fisheries rebuilding and habitat restoration typically require changes in human activities and behaviours in order to achieve objectives. Social and economic impacts are associated with these changes. Accordingly, there is a tendency to oppose such changes, fear them, and support the maintenance of the *status quo* rather than the benefits of rebuilding the fishery.

Fisheries users and fisheries interests play a major role in the management and rebuilding challenge. In the North American context several major interest groups typically compete for fisheries resources- commercial, recreational and aboriginal fishers. In addition, conservation interests, supporters of non-consumptive use of natural resources, and environmental groups add complexity and often voice a different view from those engaged in resource harvesting. Frequently conservation groups press for a more precautionary and conservation-oriented approach than that being taken in the management regime. Managers and decision-makers conduct their activities in the presence of these often competing and frequently conflicting perspectives, which adds a social and political dimension to the task. Conflict and controversy typically centres around interpretation of science and information, status and trends related to fish stocks, access and allocation, management actions that restrict

or affect access or entitlement, perceptions of equity and fairness, traditional use, and differing perspectives between competing groups, organizations and interests. These conflicts can become intense as the livelihood and way of life of individuals and groups may be significantly affected by a management action or conservation measure. Similarly, debate often centers around the issue of maintaining immediate benefits as opposed to a longer term view of conservation and rebuilding and the benefits that might arise by foregoing catch now, to create more robust fisheries resources for the future.

Recognition of Native rights and entitlements, treaty settlements and legal precedents related to aboriginal people add another major element that must be addressed by managers and decision-makers. Many aboriginal people have a long-standing social and cultural relationship with fisheries. In Canada this has been recognized by the courts and indeed, this special relationship of aboriginal people to natural resources is recognized in the constitution and there are special fiduciary responsibilities that must be respected by fisheries managers in their relationship with aboriginal fishers. Accordingly, aboriginal fishing takes precedence in allocation decisions, subject only to conservation, and there is a special requirement for managers in Canada to consult in a meaningful way with aboriginal groups when taking decisions that may affect them.

This general pattern of competition and concern about protecting established entitlements and interests in the face of conservation and rebuilding requirements is a world-wide characteristic of the sustainable fisheries management challenge. The nature of the players may vary from location to location but the same underlying characteristics of human behaviour, economic and social benefits and established competitive entitlement apply. An interesting perspective, is that while fisheries managers describe their roles as “managing fish and fisheries” what they actually do is manage people by controlling their impact on the fish. Rules, regulations and management tools are all about controlling access, allocating resources to users through time, area, allowable catch, quotas, controlling gear and vessel requirements, protecting vulnerable stocks and areas, respecting reproductive sensitivities and life stages of stocks, etc., etc. Thus, what we really do is manage people in order to manage the fish.

How well we do at this varies with the fishery and location and the social and political situation at hand. Several gadoid stocks in the North Atlantic are currently considered severely overexploited (Cardinale and Svedang, 2008). They argue that managers and politicians have had the necessary science to manage stocks without collapse but that they failed to do so as they tried to minimize the impact of policy on those that are most affected- i.e.- the fishing industry. Similarly, Shimamura (2005) in examining fisheries policymaking in Japan, describes a triangular relationship between management agency bureaucrats, legislators and the fisheries industry that has been institutionalized. At issue in these and many other situations is whether the scientific advice in setting allowable catch, application of precautionary principles, and establishment of allowable catch limits is adhered to, or whether, because of the very nature of the interaction between the decision-makers and the established interest groups, there is a tendency which is counter-productive to preventing overfishing and ensuring conservation objectives are met.

In contrast, while there is a tendency to often attribute collapses and declines in fisheries to overfishing and mismanagement, environmental factors can also play a key role. In examining a long time series of Alaskan fishery catches, Litzow and Urban (2009) concluded that climate effects, particularly on high trophic level taxa, act as the major driver of variability in these species. This certainly applies to many British Columbia Pacific salmon stocks, where fluctuations in marine survival are thought to be the major factor in changes in abundance, rather than overfishing. In addition, Halliday and Pinhorn (in press), in examining the cause of the large decline in groundfish populations in the Northwest Atlantic about 1990, argue there are indications this was largely due to environmental variation, rather than the prevailing view that it was predominantly due to fishing. In this context, the story of the Northern cod demise in the North Atlantic is a sad one and you will hear a paper on the subject at this workshop. Rose (2007) provides a comprehensive review of the ecological history of the North Atlantic fisheries and the “perfect storm” of circumstances, many of which were fisheries-related, that led to the depletion of Northern cod.

International Fisheries- an Added Challenge

An interesting aspect of United Nations Third Law of the Sea outcomes is that fisheries management responsibility for a number of fisheries areas and resources moved from international waters to domestic waters and thus to domestic control. Munro (1981) pointed out that this resulted in extensive fisheries resources of the world being moved from international common property to the property of individual coastal states. In general, this was likely advantageous from a resource conservation and rebuilding perspective. However, fish stocks do not respect national boundaries and there are many challenges in managing and conserving highly migratory and straddling stocks as well as those that remain or pass through international waters. Arrangements on the high seas and governance of those waters is a complex matter, characterized by the presence of common property resources, law related to international waters, and impacts of “distant water” fishing fleets. From a governance perspective, there are many issues related to the effectiveness of monitoring, enforcement, fisheries policies, treaties and agreements, and the effectiveness of organizations and their stewardship of fisheries in international waters.

Like the competing domestic fishery interests described earlier, resource nationalism and a tendency towards a sovereignty-focused approach, tend to characterize international fisheries arrangements and relationships (Stephens, 2008). There is a significant literature on how countries relate to one another in the European Union (EU) arena and with respect to the EU’s Common Fisheries Policy (Penas, 2007), (Symes, 2007), (Payne, 2005). For example, McLean and Gray (2009) concluded that some nation’s perceptions tend to reflect euroscepticism where EU institutions are seen as obstacles to domestic fisheries interests whereas other nation’s perspectives relate to their national priority of environmentalism. Indeed, there is a view that countries have tended to focus more on bargaining over institutional rules than on conservation (Payne, 2005).

One key to this perhaps is separating out organizations and structures where vested interests compete with each other from those that generate neutral scientific advice needed

for conservation and fisheries rebuilding. International scientific organizations can provide a neutral forum where a broad group of marine scientists can work together to gain a common understanding of the marine environment and its processes. ICES, the International Council for the Exploration of the Sea, is an example of this (Tasker, *et al.*, 2000), as is the PICES organization in the Pacific (Tjossen, 2005). Again, as in the domestic fisheries situation, a key element in effective conservation and fisheries rebuilding in an international context is ensuring the scientific advice is followed and that national self-interest and short term objectives do not detract from the need to effectively conserve and manage fisheries resources sustainably and achieve rebuilding objectives where needed. Thus, the key to effective international arrangements for sustaining and rebuilding fisheries populations involves both good objective and mutually agreed science and the will to follow through to achieve sustainability and rebuilding objectives, with a common vision that overarches individual nationalistic self-interest.

Examples Point the Way to Effective Governance and Fisheries Rebuilding

While there are a number of examples of stock collapses and management difficulties, there are some examples of processes that work and characteristics that are important in managing sustainable fisheries and rebuilding them. Dr. Munro will describe some examples for sablefish and groundfish fisheries in British Columbia waters and others will be described in this workshop. One such example is the Pacific coho salmon stock rebuilding program in British Columbia Canada. In that case scientists and managers were very concerned about continued declines in both northern and southern British Columbia wild coho salmon populations and alerted senior management and the Minister of Fisheries and Oceans, the Hon. David Anderson. The Minister announced a comprehensive program of conservation and coho stock rebuilding that had unprecedented consequences on the coastal fishery. All users were affected, and major fisheries closures were enacted which substantively reduced the coast-wide catch of coho and other species. A vessel and licence buy-back was implemented which led to a significant reduction in commercial fishing capacity. Despite intense political pressure, the Minister was determined to implement the measures required and all user groups recognized he would follow through. The actions taken changed the nature of the salmon fishery in British Columbia in a lasting way.

Today, these measures have worked well for the northern coho in British Columbia and recovery is evident. For the southern coho, the outcome is less certain as poor marine survival of all five salmon species in southern British Columbia has affected abundance and trends will not be apparent until ocean conditions are more favourable. In this case however, it is clear that success for the northern coho rebuilding effort resulted from two things- strong and effective conservation and rebuilding measures coupled with political resolve to take lasting and effective action despite strong opposition.

A second example of effective fisheries management in an international context and of nations working together is the work of the Pacific Halibut Commission. In the 1920's as a result of concerns about halibut declines, fishermen on both sides of the Canada-USA border petitioned their governments to take action. The Pacific Halibut Convention, the first

international fisheries treaty signed by Canada, formed the Commission which was jointly funded by both governments. For many decades now, the Commission has managed the halibut fishery with benefits of a sustainable fishery going to both countries.

A fundamental key to the success of the Commission and its management of the resource, which is regarded as a model for effective management, is its process. Fishermen, processors, government scientists and Commission technical staff work closely together, share information, and decide on management measures. Recommendations on quotas and regulations are made by the Commission, and forwarded to the two governments where they usually are generally accepted, and are strengthened by domestic rules and regulations. For example, Canada applies 100% observer coverage/electronic monitoring to the Pacific groundfish fleet, and 100 % dockside catch verification, thus augmenting the stock assessment and research role of the Halibut Commission. A key feature of the process is that those involved are integral to developing advice and thus have a meaningful role in the decision-making process. While actions over the years have not been perfect, the Commission has managed to retain the support and respect of governments and the fishing industry. It serves as an example of an effective inclusive international process, based on good information, collaboration between interests and governments and provides an arms-length international stock assessment and scientific advice function which complements processes related to domestic fisheries management.

Tools and Approaches for Effective Conservation and Fisheries Rebuilding

With respect to the biological considerations and stock management, a critical factor we must all remember is prevention of stock collapse. Stock rebuilding implies that something has happened that has depressed stocks, usually overfishing, habitat loss or perhaps natural variation, or often a combination of these factors. What we really want to do is avoid having to rebuild stocks because we have managed them well. Our management plans need to anticipate the factors that may result in reduction in abundance and include measures to compensate for them. Good management plans should take into account natural and man-made influences and respond accordingly. When conditions are less favourable for a stock, we need to be more cautious in our management approach.

An additional consideration is deciding what stocks to rebuild or manage to, in complex multi-stock associations where fishing activities take several stocks or species at once. It may not be possible to rebuild very weak minor stock components of a mixed stock fishery without shutting down the fisheries on healthy stocks, hence there is an important socio-economic issue involved and some possibly difficult trade-offs. Managers and policy makers will need to decide on the best approach which considers the socio-economic considerations, the need to protect genetic diversity, and the impacts of measures taken. Managing to the weakest stock components in a mixed stock fishery will entail social and economic impacts due to immediate foregone catch, however there may be future benefits due to protection of genetic diversity and perhaps even greater future abundance of a number of the stocks involved. In such situations, the key stakeholders and interested parties who will be affected by the proposed approach should be involved in these kinds of decisions. In

engaging users, the choices and options available should be presented in an open and transparent way to assist with decision-making.

A key point for consideration at this workshop is recognition of the importance of managing the transition from depressed stocks to rebuilding and the process by which this transition is achieved. This is one of our most difficult challenges as it involves changing human behaviour and in making the case for the sacrifices that need to be made to achieve rebuilding. Transition therefore, is broader than just making fisheries management and policy decisions- it involves human behaviour, sociological, and economic considerations of both a short and long term nature. Incentives are an important key to success, whether they be in the form of ITQ's or other measures, and that a sense of ownership, stewardship, and having a say in the future well-being of the stocks and those that exploit them is very important. If people feel they are involved in the decisions, that they are being heard, and that they may benefit from future stock abundance or the availability of fisheries resources for the future, they may well be willing to make sacrifices to achieve rebuilding. Also, if people are going to sacrifice, the approach needs to be perceived as being fair to competing interests and values, transparent so people know what is going on, and credible, in terms of the measures being proposed.

Inherent in any stock rebuilding approach, may be considerations of timing. For example, for a salmon population we might propose to rebuild the stock within a sequence of reproductive cycles. We might aim to achieve rebuilding within several reproductive cycles, each of which spans the time from emergence of the young fish from the egg stage until the time the adults return to their place of origin to spawn. A fast pace of rebuilding might involve two or three such cycles and considerable reduction of fishing effort in order to achieve rebuilding. A slower pace of rebuilding might involve four or five cycles and less impact on the fishery. The faster paced approach would achieve rapid rebuilding with considerable short term social and economic impact on the users while the slower approach would entail less impact on those users but a slower, and perhaps uncertain outcome with respect to stock rebuilding. These considerations again involve people making difficult choices. In the case of a decision to move rapidly, there will also likely be strong opposition from those affected and the need for effective policy and political support for the measures being implemented.

We have seen that meaningful involvement of fishermen and beneficiaries of the resource in the management process and in decision-making appears to be a key element of success and in achieving policy agreement and support for management approaches. Penas (2007) has pointed out that more progress must be made in the EU context and in developing a fruitful dialogue among fishers, scientists and managers. Similarly, co-management and participative governance are regarded as important elements of effective governance and institutional reform (Symes, 2007). Symes (2006) also highlighted "three distinct but interconnected levels of governance: the first dealing with day to day issues of management; the second concerned with institutional arrangements; the third focusing on the construction of images, values, principles and criteria to guide fisheries policy making along a consistent path.

Indeed, progress is being made on these values, principles and criteria as illustrated by the United Nations Food and Agriculture Organization's Code of Conduct for Responsible Fisheries, 1995 and the Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks, 1995 (United Nations, 1995). Cole (2003) concluded that a process of fisheries governance is confirmed, emerging from a new environment of fisheries relations. Building on this view, Dobson and Regier (2007) emphasize the importance of the role of science and risk assessment, the precautionary principle, the public trust doctrine, an effective female work model, effective commons management as key elements of sustainable and equitably shared fisheries. Regier (2004) advocates interrelating efficient management of supply and demand into an "ethical context of equitable justice among humans and other species". Regier envisions a future where "places for humans and their friends, the fish, are secure". These concepts can form the basis of "aquatic stewardship" initiatives as a key to fisheries sustainability. Thus to guide fisheries rebuilding and conservation efforts, important social and ethical beliefs and values enter the equation, beyond simple user-oriented considerations related to self-interest and maintenance of the *status quo*.

To facilitate effective fisheries rebuilding and support an effective world vision and objectives related to global sustainability of healthy fisheries resources, a number of tools and approaches may be helpful. Much has been said about the need to move from our single species management approach to a multi-species ecosystem approach that recognizes the connections and interrelationships amongst species and their environment. In Canada, a major piece of oceans legislation, the Canada Oceans Act, is built upon the ecosystem approach, making it one of the first major legislative vehicles to incorporate this approach. In truth, we are only just at the beginning of incorporating the ecosystem approach into management practice, and it is a reality that we mostly still manage aquatic resources on a species by species basis and most of our scientific information used for management remains single species information.

Other useful tools likely involve the concept of marine protected areas which can act as places to rebuild depressed populations, as sources of offspring, special use zones, places to protect endangered species and their habitats and as conservation tools of a flexible nature depending on need. Protecting biodiversity, habitat protection and environmental quality, habitat restoration, and ensuring key elements of important ecosystems such as integrity of forage fish populations are also important considerations for effective fisheries rebuilding. In addition, while concerns exist with respect to aquaculture activities and their impacts, particularly with respect to salmonids, it is clear that in the face of global food supply issues, aquaculture will be an important component of feeding a hungry world population. Sustainable aquaculture, conscientiously practiced and regulated, will augment wild capture fishery production and provide some relief from overharvesting tendencies and conservation challenges.

Market-based incentives also offer an effective tool to both encourage responsible management and conservation as well as raise public awareness and support for conservation and rebuilding efforts. Eco-labelling and certification initiatives are powerful tools to achieve these ends if they are supported by the public and key players in global markets will only

endorse fish products that are certified as meeting objective standards of good management and sustainability.

The Transition to Rebuilding-Understanding How People Perceive Change is Key to Making Changes

In addition to the incentives and tools used to rebuild fisheries, we have discussed the fact that managing fisheries, in addition to understanding fisheries science as a basis for decision-making, is all about managing people. Thus the social sciences and psychology have a major role to play in bringing about change and awareness and in creating an environment where policy can be changed and new values and beliefs can guide a path to effective fisheries rebuilding. Psychologists tell us that people resist change for a number of reasons:

- The risk of the status quo is seen as less risky than the change;
- We fear loss of benefits, involvement, status;
- People fear hidden agendas or the unknown;
- We associate our beliefs with others of similar belief rather than a new idea;
- Doing nothing is much easier than accepting the uncertainty of change;
- We may not understand or believe in the proposed change.

Accordingly, developing and implementing effective fisheries rebuilding approaches, bringing people onside for new policy implementation, and gaining the support of affected users and groups will require sensitivity to how people perceive, support and accept change. Gaining the support for policy change from those who are affected by the change and achieving the necessary domestic and international conditions to implement changes will require addressing these human characteristics as an integral part of the approach taken.

Furthermore, when we work in complex governance situations with a wide array of interests, there may be social, cultural, or other perspectives beyond our own at play, particularly in an international context or where highly developed and developing countries are involved. Conservation and rebuilding efforts may be the last thing in the mind of individuals or groups desperate to feed their families, pay for their boats, or maintain their livelihood with little other opportunity apparent to them. Thus, understanding these realities and developing inclusive approaches that are sensitive to them and a broader context for rebuilding activities, including the involvement of an array of disciplines, incentives and support programs will be keys to effective fisheries rebuilding success. Indeed, at this workshop you will explore various incentives such as ITQ's and other measures that are effective tools for gaining the cooperation and support for rebuilding and sustainable management approaches from fishers. All this means that we must think beyond traditional fisheries management and fisheries economic perspectives and adopt a broader and more inclusive approach that incorporates both the social sciences and the natural sciences in an effective way.

The role of Fisheries Economists in Fisheries Rebuilding

At this workshop, participants will be involved in the consideration of fisheries rebuilding initiatives from the perspective of fisheries managers and decision-makers and as fisheries economics professionals. Participants can all play an important role in making a difference and in implementing sustainable fisheries management and rebuilding initiatives by acting through their own organizations and contacts to spread the outcomes of the workshop and share perspectives on what considerations will lead to effective fisheries rebuilding. The well known concept of “think global and act local” applies in this case and actions leading towards examples and processes that achieve rebuilding will serve to guide other groups and organizations to additional successes, thus promoting a broader application.

In my opinion, there is a special role that fisheries economists and decision-makers can play in making the important case for fisheries rebuilding. That role relates to developing and gaining support for fisheries rebuilding by contributing to the vision of exactly what benefits to individuals, nations and society will accrue through sustainable use of fisheries resources, effective conservation, and stewardship of healthy fisheries resources for the future. In considering the human perceptions that act to oppose change described earlier, it is clear that most people opt for what is known now rather than what might be achieved in the future. Economists and fisheries decision makers will have to paint the picture of the benefits associated with stewardship and rebuilding in the face of the global imperative of a world food crisis and the necessity for domestic and international action and cooperation. We will need to do that in a way that convinces the public, resource users, conservation and environmental factions and political leaders in order to bring about the necessary conditions for change. What is needed is a global vision, similar to that advocated by Regier (2004), where “places for humans and their friends, the fish, are secure”. Economists and decision-makers can play a key role in illustrating what that vision can be in terms of a sustainable supply of fish for the future, how aquatic systems can contribute to feeding an increasingly hungry world, and how there are future social and economic benefits for individuals and societies which are valuable and worthy of both domestic and international support..

In this context, we need to remember that taking effective action is urgent, given the growing global food crisis, the important role that fisheries will play in feeding an increasingly hungry world, and the unknown impacts of global warming on aquatic organisms and their environment. Finally, it is clear to me that fisheries economists and managers need to be involved early in any processes that involve rebuilding transitions and sustainability regime development in order to paint the picture of the benefits and advantages of the changes being proposed. This information will help people make intelligent choices in the face of the urgent need to take effective action.

Acknowledgments

The author would like to thank Senior Scientist, Canada Department of Fisheries and Oceans, Dr. Richard Beamish and Dr. Ralph Matthews, University of B.C., for insightful comments and stimulating discussion on several issues. Thanks also, to Dr. Gordon Miller,

Chief Librarian, Pacific Biological Station, Nanaimo, for helpful advice on literature search techniques.

References

Cardinale, M. and H. Svedang, (2008), "Mismanagement of Fisheries: Policy or Science?", *Fish. Res.* Vol. 93, No.1-2, pp. 244-247.

Cole, H. (2003), "Contemporary Challenges: Globalization, Global Interconnectedness and that 'There are Not Plenty of Fish in the Sea'. Fisheries Governance and Globalization: is there a Relationship?", *Ocean. Coast. Manage.* Vol. 46, No.1-2, pp. 77-102.

Dobson, T. and H. A. Regier (2007), "Contributing to Fisheries Sustainability Through the Adoption of a Broader Ethical Approach.", in Taylor, W.W., Schechter, M.G., Wolfson, L.G. (eds.), *Globalization: Effects on Fisheries Resources*, Cambridge Univ. Press.

Dyer, G. (2008), "Climate Wars", Random House, 267p.

Engelman, R. (2004), "Chasing too few fish: Addressing the Core Constraints of Human Population Expansion on Environmental Sustainability", *Sustainable Management of North American Fisheries*, *Amer. Fish. Soc. Symp.*, Vol. 43, pp. 31-43.

Halliday, R.G. and A.T. Pinhorn (In Press). The Roles of Fishing and Environmental Change in the Decline of Northwest Atlantic Groundfish Populations in the Early 1990's", *Fish. Res.* (2009), doi: 10.1016/j.fishres.2009.02.004.

Litzow, M.M. and D. Urban (2009), "Fishing Through (and up) Alaskan Food Webs. *Can. Jol. Fish. Aquatic Sci.*, Vol. 66, No. 2, pp. 201-211.

McLean, C. and T. Gray (2009), "Liberal Intergovernmentalism, Historical Institutionalism, and British and German Perceptions of the EU's Common Fisheries Policy. *Mar. Policy.* Vol. 33, No. 3, pp. 458-465.

Mullon, C., Freon, P., and Cury, P. (2005). "The Dynamics of Collapse in World Fisheries." *Fish and Fisheries*, Vol. 6, No. 2, pp. 111-120.

Munro, G.R. (1981), "Fisheries, Extended Jurisdiction and the Economics of Common Property Resources.", *Resources Paper*, University of British Columbia Dept. of Economics, Vol. 71, 32 p.

Oceans Act (1996). "An Act Respecting the Oceans of Canada". C. 31. Legislation of the Government of Canada.

Payne, D.C. (2005), "Overcoming Ineffective Institutions: Alternative Approaches to International Fisheries Conservation." *Diss. Abst. Int. Pt.A- Hum.and Soc. Sci.*, Vol. 66, No. 5, p. 1948.

- Penas, E. (2007), "The Fishery Conservation Policy of the European Union after 2002: Towards Long-term Sustainability." ICES, J. Mar. Sci., Vol. 64, No. 4, pp. 588-595.
- Regier, H.A. (2004), "Sustainable Development: What is it and What is Beyond it?" In Sustainable Management of North American Fisheries. Amer. Fish. Soc. Symp. No. 43, pp. 3-14.
- Rose, G.A. (2007). "An Ecological History of the North Atlantic Fishery." Breakwater Books, St. Johns, Newfoundland, 591 p.
- Stephens, T. (2008). "Fisheries-led Development in the South Pacific: Charting a "Pacific Way" to a Sustainable Future." Ocean Dev. Int. Law, Vol. 39, No. 3, pp. 257-286.
- Symes, D. (2006), "Fisheries Governance: A Coming of Age for Fisheries Social Science?" Fish. Res., Vol. 81, No. 2-3, pp.113-117.
- Symes, D. (2007), "Fisheries Management and Institutional Reform: a European Perspective." ICES J. Mar. Sci., Vol. 64, No. 4, pp. 779-785.
- Tasker, M.L., Knapman, P., Donnan, D., Eno, C., Haynes, B., Close, S. and B. Hastings, (2000), "How ICES can Help Integrate Biodiversity Considerations into Fisheries Advice. ICES Mini-Symposium on Defining the Role of ICES in Supporting Biodiversity Conservation. 2000/mini:08, 6 p.
- Tjossen, S. (2005). "The Journey to PICES: Scientific Cooperation in the North Pacific." Alaska Sea Grant College Program, Univ. of Fairbanks, 206 p.
- United Nations. (1995). "Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation of Straddling Fish Stocks and Highly Migratory Stocks." U.N., New York. 42p.