Dalhousie Law Journal

Volume 18
Issue 1 *18:1 (1995) Special Issue: Atlantic Canadian Fishery*

Article 12

4-1-1995

Stresses and Mind-sets in Fishery Management

Douglas M. Johnston
University of Victoria

Douglas M. Johnston*

Stresses and Mind-sets in Fishery Management

This paper reviews the evolution of fishery management as a field of cross-disciplinary inquiry and suggests that each participating discipline tends to be attracted to its own range of explanatory theories and to its own stock of relevant data. Impacts of fishery failure are experienced at different levels of society, each suggesting a different approach to remedial action. The fishery collapse in Atlantic Canada should be studied from a comparative perspective in order to gather ideas on how to cope more effectively with the socio-economic consequences. Above all, however, the disaster should be seen as an unprecedented challenge for the fishery management experts in Canada to integrate their mind-sets despite the intellectual stresses inherent in the field.

I. *Fishery Management as a Field*

Fishery policy is one of the most elusive sectors of public policy. Indeed, fishery "systems" may not be amenable to "control" over an extended period. When commercial fishing fails spectacularly, as in Atlantic Canada in the 1990s, it causes enormous social and economic distress. Understandably, victims of a systemic failure tend to blame the experts. What, they might ask, are the prospects of ever attaining the goal of control within such a volatile industry?[1]

Those responsible for the design and operation of fishery policy belong to the field of fishery management. More or less consciously, such designers and operators are influenced by the growing stock of knowledge and experience associated with the complex problems of fishery development and management. Fields such as fishery management, unlike disciplines, come into existence in response to real-world problems

* Professor Emeritus, University of Victoria, M.A., LL.B., MCL, LLM, JSD. Founding Director of MELP, co-founder of Dalhousie's Ocean Studies Programme (DOSP) and of the Southeast Asian Programme in Ocean Law, Policy and Management (SEAPOL). Author or editor of numerous works in the field of international law and policy, with special emphasis on fisheries, marine pollution, ocean boundary-making, and treaty-making. Currently Adjunct Professor at Dalhousie Law School.

1. On the boom-and-bust history of the Canadian fishing industry, see L.S. Parsons, *Management of Marine Fisheries in Canada in Canadian Bulletin of Fisheries and Aquatic Sciences*, vol. 225 (Ottawa: National Research Council of Canada and Dept. of Fisheries and Oceans, 1993) at 345–393. For a brief history of Canadian fishery management, see J. Gough, "A Historical Sketch of Fisheries Management in Canada" in L.S. Parsons and W.H. Lear, eds., *Perspectives on Canadian Marine Fisheries Management* (Ottawa: National Research Council of Canada and Dept. of Fisheries and Oceans, 1993) 5.

for which governments accept responsibility. Since complex problems have many aspects, research related to design and operation must be integrated into a cross-disciplinary frame of reference.

Fishery management originated in the 1880s as a subdiscipline: a subset of marine biology. Between then and the late 1940s the discourse on fishery management, pivoting on the concept of "conservation", was monopolized by biologists. Both at national and international levels, the objectives and methods of fishery management were the product of this new infant science, fishery biology.[2]

However, in the period between the late 1940s and the early 1970s the continuing dominance of biology was subjected to increasingly critical challenge from economists, who were interested in adapting what had been learned in the area of forest management to the needs of fishery management.[3] The biologically developed objective of maximum sustainable yield[4], the emphasis on biological research (e.g. population dynamics and stock assessment), and the statistical analysis of landings, which played a central role in the biologist's mind-set, had to contend with economically defined objectives such as economic yield, with the economic concepts of rent and efficiency, and with the techniques of access allocation, entry limitation, and individual quotas.[5]

At the time when the economists might have begun to displace the biologists as the chief influence on fishery management designers and operators, both the economists and the biologists had to yield to the new imperatives introduced at the global level of diplomacy at the Third U.N. Conference on the Law of the Sea (UNCLOS III).[6] The key delegates responsible for negotiating fishery management provisions at UNCLOS III were required, of course, to reflect the third world developmental ethic of

---

2. On modern biological theories of the effects of fishing, see Parsons, *ibid.* at 42–51. Many of the earlier fishery biologists were inclined to regard "depletion" as "little more than a bogie to frighten the credulous". Cited by Gough, *ibid.* at 32.

3. Canadian economists were preeminent among the pioneers in this new area of specialization, especially H. Scott Gordon and Anthony Scott. Other Canadians prominent today in this sub-discipline include Colin Clark, Parzival Copes, Gordon Munro, and Peter Pearse.

4. The clash between the two disciplines first took place in the 1950s and early 1960s over the *objectives* of fishery management. Biologists at that time were more or less united behind the concept of *maximum sustainable yield* (MSY), but the economists insisted on the primacy of *maximum economic yield* (MEY), and struggled for recognition of the need for bio-economic models. Since the 1970s both MSY and MEY have been replaced in Canada by the ambiguous, but politically and socially sensitive, goal of *optimum yield* (OY), which is designed to reflect and accommodate the diverse, legitimate but conflicting, objectives of fishery management. Parsons, *supra* note 1 at 57–76.

5. Canadian experience with these techniques applied to various fisheries is described in detail in Parsons, *supra* note 1 at 117–221.

6. *United Nations Convention on the Law of the Sea*, U.N. Doc. A/CONF. 62/122 (1982); 21 I.L.M. 1261.

the 1970s and to respond to demands for coastal state autonomy over fishery resources far distant from the shoreline.[7] To carry through bold initiatives for the extension of coastal state jurisdiction, deals had to be struck by diplomats mandated to restructure the law of the sea. Compromise diplomacy required lawyers to draft fishery management language that would give an extraordinarily high degree of discretionary authority, couched in eclectic terminology, to coastal states within these new extended limits of national jurisdiction.[8] At the same time, those wishing to exploit the living resources of the high seas areas beyond these limits were left free to do so without the burden of explicit environmental responsibility.[9]

The ethic of coastal entitlement applied to coastal states in the 1970s passed down quickly to the sub-national level of coastal communities. The concept of disadvantaged, peripheral fishing communities, in generally rich as well as generally poor countries, was articulated by sociologists. Concern for vulnerable, fish-dependent, coastal communities became a powerfully emotive factor in national fishery management, not least in "sympathetic" political systems such as Canada.[10]

Since the mid-1980s, the field of fishery management has been complicated further through the provision of environmental perspective and the insistence of ecologists on the need for a holistic orientation. Rationalized by the reference to the Brundtland concept of sustainability[11] and framed by the Rio prescriptions of Agenda 21,[12] a new anti-sectoral approach to fishery management is envisaged, which would require

---

7. On the relevance of these changes to Canada, see D.M. Johnston, *Canada and the New International Law of the Sea*, (Toronto: University of Toronto Press, 1985) at 5–9, 24–30.

8. D.M. Johnston, *The International Law of Fisheries: A Framework for Policy-Oriented Inquiries* (New Haven: New Haven Press and Martinus Nijhoff, 1987) at XLIV - LXXV.

9. For an early and trenchant environmental critique of the UNCLOS III fishery provisions, see C. de Klemm, "Living Resources of the Ocean" in D.M. Johnston, ed., *The Environmental Law of the Sea* (Gland: IUCN, 1981) at 71. See also D. VanderZwaag, "The Management of Straddling Stocks: Stilling the Troubled Waters of the Grand Banks" in D. VanderZwaag, ed., *Canadian Ocean Law and Policy* (Markham: Butterworths, 1992) at 115.

10. On the social dimension of Canadian fishery management, see Parsons, *supra* note 1 at 395–440. Curiously, the Department of Fisheries and Oceans does not employ a single sociologist — or at least did not as recently as 1992. A senior government official admits this is "puzzling given the high visibility of social issues, and the continual tug-of-war between economic and social factors in fisheries management". *Ibid.* at 621. On the "social/community" paradigm, in contrast with the "conservation" and "rationalization" paradigms, see A.T. Charles, "Canadian Fisheries: Paradigms and Policy" in D. VanderZwaag, ed., *supra* note 9 at 3.

11. On the relevance of "sustainable development" to habitat and fishery management in Canada, see Parsons, *supra* note 1 at 529–530.

12. United Nations Conference on Environment and Development (UNCED). *Agenda 21: Programme of Action for Sustainable Development.* UN Doc. A/CONF. 151/26, 13 June 1992 (New York: UN Dept. of Public Information, 1993).

fishery management decision-making to be incorporated into a system of "integrated coastal management".[13]

The recent tragic failure of the Canadian Atlantic ground fishery, and of other ocean food production systems elsewhere, gives urgency to the need for answers that would explain why crises occur so frequently in fishery management and what, if anything, can be done to establish a firmer foundation for fishing communities around the world. Unfortunately, the answers offered vary with the perspective provided by discipline and vocation.

II. *Explanatory Theories*

Biologists involved in fishery management can be expected to concede the existence of occasional scientific error or miscalculation, but no affordable level of research can remove the factor of scientific uncertainty. Moreover, all arguments for concentrating research effort in a particular area of investigation are a function of personal or institutional bias within the scientific community, derived from a particular hypothesis of choice such as recruitment level, change of temperature, toxicity tolerance level, fresh water run-off, bacteriological infection, or predator-prey relationship.[14] Within any research institution, choice of research focus is essentially a budgetary decision influenced by political considerations within the organization or profession. Research may ultimately produce a cure for most or all forms of cancer, but science unaided will never "solve" the problems of fishery management.[15]

---

13. B. Cicin-Sain, "Sustainable Development and Integrated Coastal Management" (1993) 21 Ocean and Coastal Management 11.

14. For evidence in support of some of these theories, see H.G. Gade, "When Ice Melts in Sea Water: A Review" (1993) 31 Atmosphere-Ocean 139; Y. de Lafontaine, "Zooplankton Biomass in the Southern Gulf of St. Lawrence: Spatial Patterns and the Influence of Freshwater Run Off" (1994) 51 *Can. J. Fish. Aquat. Sci.* 617; Y. Lambert *et al.*, "Effects of Intermediate and Low Salinity Conditions on Growth Rates and Food Conversion of Atlantic Code (*Gadus Mortva*)" (1994) 51 *Can. J. Fish. Aquat. Sci.* 1569; R.I. Perry and S.J. Smith, "Identifying Habitat Associations of Marine Fishes Using Survey Data: An Application to The Northwest Atlantic" (1994) 51 *Can. J. Fis. Aquat. Sci.* 589.

15. The "problems of fishery management" cannot be solved by science because they consist of an impenetrable complex of virtually unrelated social, economic and political issues as well as researchable, but not necessarily soluble, scientific problems. They have been said to include:

> "1. natural resource variability, often environmentally determined;
> 2. the common-property nature of fisheries resources and resultant overcapacity;
> 3. market fluctuations;
> 4. heavy dependence on the fisheries in isolated coastal communities;
> 5. recurrent conflict among competing users; and
> 6. conflicting objectives for fisheries management." Parsons & Lear, eds., *supra* note 1 at 1.

Economists unite in the recognition of industrial overcapacity as the cause of overfishing and in the call for entry limitation.[16] Some may go further than others as advocates for individual property rights through licensing or alternative arrangements.[17] But tough economic advice tends to be politically repugnant, and economists on their own cannot determine the precise role that over-exploitation plays in recurrent fishery crises. Moreover, fishery economists, like stock assessment biologists, are data dependent and therefore often at the mercy of inaccurate catch statistics distorted by deliberate misreporting.[18]

Lawyers are merchants in words rather than facts or figures. But lawyer's language tends to take on an administrative life of its own, adding inflexibility of obligation to the stability of purpose which is bound to be part of the bureaucratic process. Moreover, treaty language negotiated at the global level, such as the 1982 Convention on the Law of the Sea, tends to be given an elevated status as "binding" world community norm or decision, although it cannot possibly be sensitive to variation and complexity in local fishery situations. The existence of the Grand Banks type of "straddling stocks" anomaly was acknowledged at UNCLOS III, and this problem may soon be alleviated through further UN diplomacy,[19] but few, if any, fishery specialists believe that foreign overfishing beyond 200 miles was the primary cause of the "collapse" of the Canadian ground fishery closer to shore.

On behalf of the fishing communities, sociologists often provide the field of fishery management with the voice of popular resentment. Usually local community resentment is directed against a supposedly unfeeling central government, especially in a federal country as large as Canada or the United States. A low level of local compliance with government measures—or a low level of enforcement—is often attributed to insufficient delegation of fishery management roles, which

16. Parsons, *supra* note 1 at 159–192.

17. *Ibid.* at 193–221.

18. Many fishermen over the years have regarded scientists as their natural enemy. One, understandably anonymous, source has suggested that it is "a standard ploy the world over to try to discredit the scientific advice as a first defence against the implementation of rational fisheries management schemes". Quoted in *ibid.* at 568. On the misreporting problem, see J.J. Maguire et al., "What Are We Managing Anyway? The Need for An Interdisciplinary Approach to Managing Fisheries Ecosystems" (1995) 18 Dalhousie L.J. [see Table of Contents of this issue].

19. E. Meltzer, "Global Overview of Straddling and Highly Migratory Fish Stocks: The Nonsustainable Nature of High Seas Fisheries" (1994) 25 O.D.I.L. 255. For a Canadian governmental perspective, see also B. Applebaum, "Straddling Stocks: International Law and the Northwest Atlantic Problem" in L.S. Parsons & W.H. Lear, eds., *supra* note 1 at 193.

undermines the credibility of the management system as a whole.[20] Sociologists emphasize value conflict or cultural alienation as a root cause of fishery management failure. The special entitlements conceded to indigenous peoples in Canada and elsewhere[21] are seen to contribute to the mix of communal resentments, requiring faith to be placed in the possibility of balancing the protection of special legal rights with the mediation of conflicting interests.

Ecologists argue that management failure is due to underperception of the problems to be dealt with. Even a modest extension of fishery science encompasses "associated or dependent species",[22] including non-target species that exist at one stage above or below the food-chain level of the target species. The recent abundance of certain seals in the Northwest Atlantic may have contributed substantially to the demise of the ground fishery.[23] But ecological enthusiasm elsewhere has resulted in the exaggeration of by-catch concerns in the case of large-scale driftnetting in the Pacific Ocean.[24] Recourse to misrepresentation does not provide much comfort to those asked to accept the ecological approach to fishery management as an advance in rationality. On the other hand, ecological

---

20. Parsons, *supra* note 1 at 625–653; J.W. Lavers and I.S. Stewart, "Fisheries Surveillance and Enforcement" in D. VanderZwaag, ed., *supra* note 8 at 173. To describe the matter as an "enforcement problem" is to assume that the fault lies chiefly with those responsible for enforcement. To call it a "non-compliance problem" suggests that the fishermen are chiefly at fault. Neither phrase captures the *relational* nature of the problem.

21. Parsons, *supra* note 1 at 420–430. On the aboriginal right to fish in Canada, see B.H. Wildsmith, "The Mi'kmaq and the Fishery: Beyond Food Requirements" (1995) 18 Dalhousie L.J. [see Table of Contents this issue]. See also M.E. Turpel, "Aboriginal Peoples and Marine Resources: Understanding Rights, Directions for Management" in D. VanderZwaag, ed., *supra* note 8 at 393; M.J. Valencia and D. VanderZwaag, "Maritime Claims and Management Rights of Indigenous Peoples: Rising Tides in the Pacific and Northern Waters" (1989) 12 Ocean and Shoreline Management 125.

22. The need to protect not only target species but also associated and dependent species is acknowledged in various provisions of the 1982 UNCLOS III: namely, Articles 61, 63, and 119. Some degree of ecological awareness is also reflected in marine pollution provisions such as Articles 195 and 196, due mainly to the intervention of the nongovernmental IUCN (the International Union for Conservation of Nature and Natural Resources, now re-named the World Conservation Union).

23. At the time of writing (February, 1995) it appears that the Canadian government has decided to re-activate the Newfoundland seal fishery, whose population has mounted rapidly since the closure in 1991. This decision is apparently in response to the requests for re-opening by the Atlantic provinces, which allege that the expanding seal population has contributed to the crisis in the Atlantic fisheries. Federal-Provincial-Territorial Conference of Ministers Responsible for Fisheries, *Press Release*, (1 Nov. 1994).

24. W.T. Burke *et al.*, "United Nations Resolutions on Driftnet Fishing: An Unsustainable Precedent for High Seas and Coastal Fisheries Management" (1994) 25 O.D.I.L. 127. See also E.L. Miles, "Ocean Policy Development in the 1990's: The Uses and Limitations of the Diplomatic Arena" (Keynote Address presented to the First SEAPOL Tri-regional Conference on Current Issues in Ocean Law, Policy and Management, Bangkok, 13–16 Dec. 1994).

awareness may be critical to the development of policy-related (design and operation) research focussing on "vulnerable areas", which would seem to require regulation of more-than-usual stringency.[25] Moreover, ecologists who suspect that management failure can be attributed in part to the use of "inappropriate technology" also have a useful role to play in the broadening of research on the effects of gear selection beyond the target species.

Last, but clearly not least, fishery failure may be ascribed to mismanagement, in the sense of "inappropriate measures", such as the single species quota system, which has been accused of causing the present crisis in the Canadian Atlantic groundfishery.[26] Like all other explanations of failure, this kind of charge is difficult to substantiate. In the eye of administrators, fishery management may be closer to art than to science. Choice of overall regulatory strategy is a judgment call.[27] Experimentation along the lines of any particular strategy may require a decade at least to allow for short-term fluctuations to be discounted. Indeed, even after a 10-year period, the abundance of potentially relevant variables in fishery management may preclude the validation of any explanatory theory directed at administrative policy. Furthermore, "mismanagement" belongs to the vocabulary of politics, and explanations of this kind are always suspect to the extent they reflect the colour of political sentiment.

III. *Impacts of Fishery Failure*

In some degree, reaction to a severe case of fishery failure is governed by how one chooses to characterize the impact of such a crisis. In human terms, a major fishery failure may be perceived as having adverse effects at seven levels of society. First, the Canadian Atlantic collapse or disappearance has a *national* significance, at least in the view of politicians and economists, since it deprives the Canadian people as a whole both of food and wealth-creating opportunities. The national level of

---

25. It is argued elsewhere that "exceptionally dependent coastal communities", such as the fishing outports of Newfoundland, might be included under a broad concept of "environmental security zones" that deserve special protection under international law. D.M. Johnston, "Vulnerable Coastal and Marine Areas: A Framework for the Planning of Environmental Security Zones in the Ocean" (1993) 24 O.D.I.L. 63 at 71–72. See also R. Graham *et al.*, "The Protection of Special Marine and Coastal Areas" in D. VanderZwaag, ed., *supra* note 8 at 341.

26. P. Underwood, "To Manage Quotas or Manage Fisheries? The Root Cause of Mismanagement of Canada's Ground Fish Fishery" (1995) 18 Dalhousie L.J. [see Table of Contents of this issue].

27. On the techniques of fishery management applied in Canada, see Parsons, *supra* note 1 at 77–91.

perception is crucial, because normally only the national or central government can provide compensation or alternative relief to those most directly affected. Relief policy is directed at the second level of impact, the *regional* economy placed under severe stress as a result of the failure: especially the province of Newfoundland in the Canadian situation. In the *industrial* context, the consequences are felt at corporate and sectoral levels, which may vary with the structure of the industry as a whole and with the kind of industrial organization associated with the species landed in each port or section of the coastline. For sociologists, it may be more important to assess the impacts of fishery failure at the *communal* level, since a uniform reaction at a higher level of analysis may overlook the extent of differential effects. Some fishing communities have alternative sources of livelihood or a viable system of intra-communal support; others do not. At the *sub-communal* level, one can examine the consequences for particularly vulnerable sections of the community, such as women or children or elderly dependents.[28] Class theory might suggest that members of the "working class" or subclass of a fishing community, having less opportunity to accumulate savings, are the chief victims of a major fishery failure.[29] In the alternative, in communities with a "close family structure" it might be best to examine the effects of such a crisis at the sixth level, that of the *household*, where intra-familial support and dependency arrangements are worked out before or after the trauma.[30] Finally, of course, an effort can be made to measure the human cost of a fishery collapse at the level of the *individuals* most directly affected, but this approach may be the most likely of all to inject inequities into the policy of compensation and supplementary relief.

In non-anthropocentric terms, the impacts of major fishery failure can be studied at no less, and probably more, than six levels of significance. The normal commercial reaction may be framed around the *stock* or stocks that seem to have collapsed, disappeared, or migrated to an unknown locality. Some scientists, however, are more likely to concentrate on the *species*, or combinations of species, that contribute to the stock; or on the *area* which is designated as the unit of management; or on the entire *ecosystem* which seems to have been subjected to intolerable stress. For those associated with large-scale international fishery research or management commissions, it may be necessary to investigate the

---

28. (see comment/request on front cover).
29. During the Gulf of Maine fish feud between Canada and the United States in the 1970s, one U.S. opponent of the agreement negotiated between the two governments claimed that the "working class" component of the New England fishing industry would be the principal victim of such an arrangement, which was based on a model of cooperative fishery management.
30. J.J. Maguire, *supra* note 18.

disaster at the level of the *macro-region* encompassed by the members of the organization. At the highest level of the six, the *global community*, a world body such as Food and Agricultural Organization of the United Nations (FAO) or United Nations Environment Programme (UNEP), or even the UN General Assembly, might be pressed to begin a careful investigation of all current or recent fishery failures of crisis proportions because of their cumulative impact on the world's food production systems and the prospect of systemic catastrophe for the world's expanding population.[31]

IV. *Comparative Perspectives*

One of the weaker features of fishery management as a field of inquiry is the relative neglect of comparative studies. The comparative analysis of disastrous fishery failures of comparable magnitude might help to correct some misconceptions arising from studies that focus sharply on local factors or conditions in a particular crisis.[32] In the country most directly affected, scholarly detachment may not be as easily achieved as its scholars would like to believe. Even the most "objective" of scholarly observers may be affected emotionally by the need to empathize with the victims of the disaster or the desire to allocate blame. If Canadians were well-suited to analyze the collapse of the Peruvian anchoveta fishery in the early 1970s,[33] Chilean or other non-Canadian experts might be invited to contribute to a dispassionate analysis of the Canadian collapse of the 1990s.

Further benefits in the form of comparative insight are less likely to be gained from historical research that goes back much further in time than the 1960s. In the absence of data, we can only speculate on the disappear-

---

31. While the present UN conference on straddling stocks is an appropriate — and for Canada an important — initiative to correct an environmental deficiency of UNCLOS III, it has little to contribute directly to the problem of fishery collapse. If this problem is to be seriously addressed, drastic improvements in fishery management *within* national limits must be effected. Admittedly, the global conference arena has a role to play in the shaping of national fishery management, and the relevant principles of sustainability and precaution, which were adopted at UNCED, are being refined by FAO as well as at the straddling stocks conference. Preferably, the problem of fishery collapse should be on UNEP's list of top environmental priorities and a world-level effort should be mounted to deal comprehensively with this phenomenon of systemic failure.

32. For a good example of this kind, see R. Apostle and K.H. Mikalsen, "Lessons from the Abyss: Reflections on Recent Fisheries Crises in Atlantic Canada and North Norway" (1995) 18 Dalhousie L.J. [see Table of Contents of this issue].

33. Canadian biologist Lloyd Dickie led a team of Canadian scientists engaged by the Peruvian government in the early 1970s to assist Peruvian scientists to investigate the causes of the collapse of the anchoveta fishery off the coast of Peru, previously the world's largest single-species fishery.

ance of the famous herring fishery of the North Sea in the late 15th century, which some historians have blamed for the collapse of the Hanseatic League of Northern Europe.[34] Yet even this kind of remote reference may serve the purpose of warning sceptical contemporaries that the current disaster might also be transformational, and not merely disruptive, in its consequences. Historical insight may be needed to keep alive the awful possibility that none of the currently debated initiatives in "crisis management" may be sufficient to maintain the economic and social structures of Newfoundland beyond the turn of the century.

In order to gather ideas on how to cope more effectively with the consequences of a fishery disaster, specialists in fishery management might do well to consult with specialists in other fields where disasters have had long-term consequences for large numbers of people or for a large-scale sector of the environment. The disasters of Chernobyl and Bhopal come to mind as comparable in magnitude, though very different in origin and in their impacts on human health. Comparison with near-extinction of a non-fish species such as the blue whale may also be useful in illuminating certain aspects of current failures in fishery management and conservation.[35] Closer to home, a Canadian-American collaboration would be useful to compare the causes and effects of fishery failure in New England with those of the collapse in Atlantic Canada.

V. *Projections and Appraisals*

Specialists in the field of fishery management have a responsibility to be of practical utility to society at large in their discernment and projection of trends and development of policy recommendations. To outsiders it might seem reasonable that the credibility of the field should rise or fall according to the success or failure of the experts in projection and appraisal.

However, such expectations may not be as reasonable as they appear on the outside. All fields come into existence as a response to complexity. In the case of fishery management, the "problems" are not really "soluble" in any resolutive sense. Of the innumerable factors that bear upon

---

34. The Hanseatic League was a medieval association of North European (mostly German) towns and commercial groups abroad founded to protect their common trading interests. The herring and cod fisheries of the North Sea and the Baltic were the most valuable single component of the North European trade system. The decline of the League in the early 16th century began shortly after the disappearance of the major herring fisheries. This famous "collapse" is believed to be due to a 1° Celsius rise in surface water temperature that resulted in a northernward migration that could not be understood and monitored under existing conditions of ocean science and technology.

35. Johnston, *supra* note 8 at 396–411.

performance in fishery development and management, many (and probably most) are beyond the "control" of any institution at any level of society, above or below the national. In the sphere of economic affairs (economic development and management) we are now learning that some of the basic problems associated with control, especially those dependent on savings and investment, can only be influenced in some degree by government measures. A higher degree of influence, if not control, resides in an amorphous grouping of large-scale investors (a sector of the international investment community), which does not exist in any institutional form and therefore cannot be identified, approached, and persuaded or cajoled. In the sphere of fishery affairs it is even more difficult to identify the chief locus of influence, and the notion of effective control in a context as elusive as fishery management may be the product of self-deception.

Fortunately, prospects are not entirely bleak. It appears that most of the catastrophic fishery failures could have been kept to a non-catastrophic level, if some of the advice offered by the biologists and economists, who remain at the centre of fishery policy-making, had been acceptable at the political level. In recent years the useful, but admittedly still vague, concepts of sustainability and a "precautionary approach" to fishery management[36] have become part of the politically acceptable vocabulary in the diplomatic arena, and in some countries, including Canada, these concepts are now in the process of adaptation to serve national policy purposes. Each of the various mind-sets discussed in this essay, and represented by the contributors to this issue, has a role to play in the development of *sustainable and precautionary policies and practices* at global, regional, national, and subnational level of fishery management. If any cross-disciplinary field as diverse and difficult as fishery management needs unifying core concepts for the participating disciplinary mind-sets to rally around, then the politically acceptable concepts of sustainability and precaution should be welcomed.

Most cross-disciplinary fields are bound by their nature to reflect a potentially divisive degree of dissonance. Each discipline projects its own, highly developed, mind-set which strives to be autonomous and tends, therefore, to be incompatible with other disciplinary mind-sets. Within the field of fishery management, the tendency to dissonance is particularly apt to lead to incompatible modes of projection and appraisal. A policy favouring cross-disciplinary collaboration at the policy-setting level offers no guarantee of a fusion of minds.

---

36. For a review of the precautionary principle in Canada and other national legal systems. See *ibid.* at 36.

Fishery biologists, dependent on data that can never be sufficiently comprehensive or completely reliable, accept that fishery management can only be approximate;[37] and that management decisions can only be given a firmer, less uncertain, scientific foundation through continuous investments in expensive, mostly long-term, research projects. Fishery economists work with shorter, politically realistic, time-scales, and their considerations of efficiency, incentive, and profitability encourage the belief that fishery management objectives can be precisely defined; but their prescriptions tend to be too draconian, in normal times, to be politically or socially acceptable.[38] Sociologists inject sympathy into fishery policy-making by portraying fishing communities as victims not only of an industry made volatile by the fluctuations of nature, but also of governmental incompetence or insensitivity; but their advice is the least "scientific" and the most "political" in the sense of reflecting sectional interest.[39] Marine ecologists take the broadest view of all, but the research needed to validate their hypotheses would be the most expensive and their model of cooperation for a complex federal state like Canada may be unrealistic.[40]

Each of these disciplines, then, presents its own, internally reinforced, order of rationality and its own brand of faith. Five faiths seem to contend

---

37. It is difficult for fishery scientists to meet the expectations of fishery managers and administrators, and probably impossible to meet those of the general public. The expectations of the latter, and possibly of fishermen also are higher than are necessary for effective conservation. Scientific advice should be expected to be *consistent*, and this is perhaps at least as important as it to be accurate or precise. W.G. Doubleday, "Reliability of Scientific Advice on Fishery Management Measures" in L.S. Parsons and W.H. Lear, eds., *supra* note 1 at 369. On the credibility of scientific advice to fishery managers, see Parsons, *supra* note 1 at 568–575.

38. *Ibid.* at 621. Sometimes task force recommendations fail to be implemented not because of lack of merit but because of industrial hostility. L.S. Parsons, "Shaping Fisheries Policy: The Kirby and Pearse Inquiries—Process, Prescription and Impact" in L.S. Parsons & W.H. Lear, eds., *supra* note 1 at 408. Since its establishment in the late 1860s, the Canadian federal Department of Fisheries has received reports from over 100 task forces, royal commissions, and special inquiries. Not even one of these reports has been fully implemented. *Ibid.* at 386.

39. For example, sociologists almost always support the "underdog", which means inshore fishermen as opposed to offshore corporate interests.

40. In the 1970s the Atlantic provinces and Quebec argued in favour of a larger (concurrent or paramount) role in fishery management, and the same argument was heard during the Meech Lake negotiations in the early 1990s. This kind of proposal has consistently been rejected, or politely set aside, by the federal government on the ground that the "balkanization" of the Canadian fisheries would eliminate the possibility of fair and effective fishery management. Parsons, *supra* note 1 at 19–34. Now, in the post-Meech era, the federal, provincial and territorial ministers responsible can agree only on the need for closer and continuous consultation on fishery management issues. It is difficult to envisage an "ecosystem management" approach that would not complicate further the delicate jurisdictional balance, since any designated large-scale ecosystem would overlap existing jurisdictional lines, thereby creating another kind of "straddling stock".

for allegiance in the 1990s. First, in Canada more than most countries official policy emphasizes socio-economic priorities in the objectives of fishery management.[41] At the global level the trend in prescriptions is somewhat similar.[42] Downsizing of the industry is under way; but social objectives are often incompatible with the economic, and an overemphasis on the latter could result in social disorder. Second, faith in conservation or sustainability is a motif of the 1990s, but biologists and ecologists differ, often radically, on how to focus their conservation efforts: stock, species, ecosystem, or region. Faith in the ecosystem approach seems to be on the rise in some Western countries, but there is third world concern that dogma may displace reason.[43] Third, environmentalism is in part a rejection of technology or at least of certain modes of industrial technology that seem to pose threats to vulnerable sectors of the environment. Faith in appropriate technology, modified by the need for a precautionary approach to environmental management, seems unexceptionable in principle, but it has led to the mobilization of dogma and deceit in diplomatic practice.[44] Fourth, sympathy with peripheral and disadvantaged fishing communities has popularized the faith that more effective and more equitable fishery management would ensue, if controls were delegated to the local community level. Carried too far, such a policy of delegation would surely increase, not diminish, the politicization or deprofessionalization of fishery management. It may be safer for Canada to follow the less dangerous, if costly, course of closer consultation among federal, provincial, and territorial levels of government and between government,

---

41. Canada has given special weight to the socio-economic objectives of fishery management since adoption of the seminal, reformist document *Policy for Canada's Commercial Fisheries* by W.C. Mackenzie *et al.* (Ottawa: Fisheries and Marine Sciences, Department of the Environment, 1976). See also Gough, *supra* note 1 at 37.

42. Most countries trail behind Canada in the adoption and implementation of socio-economic objectives and methods of fishery management. On the need for international acceptance of a bio-economic approach, E.L. Miles, "The International Dimension of Fisheries Management: Past, Present & Future" (Paper based on presentation to SEAPOL Conference on sustainable Development of Coastal and Marine Areas, Singapore, May 1994).

43. Western delegations at UNCED in 1992 failed to persuade the Conference to incorporate into Agenda 21 a provision favouring a "large ecosystem" approach to ocean management. Apart from the special political reasons for opposing this U.S.-backed proposal, developing coastal states have a more general reason to fear the impact of the ecosystem management approach on their hard-earned jurisdictional prerogatives designed into the regime of the exclusive economic regime. Adoption of this proposal at Rio would have widened the gap between the UNCLOS III and UNCED paradigms. On the clash of mind-sets, see D.M. Johnston, "Protection of the Ocean Environment: Competing Views of the Implementation Process" (Paper presented to the meeting of the Ocean Governance Group, Honolulu, 9–11 January, 1995).

44. See Burke *et al.*, *supra* note 24.

the community, and special interests.[45] Finally, Brundtland and Rio have publicized the case for integrated coastal management, locking on to the logic of interdependence. But this logic works less for the need for coherence within the field of fishery management than for coherence within the even larger and more complex field of "ocean management". Normally the latter is a theoretical construct, mocking the structure of government, but it appears that the federal government may now be ready to raise the priority of marine affairs in this country by promoting DFO to the level of a superministry for the oceans.[46] If structure is, finally, to follow the logic of function, then faith in integration may deserve its own cathedral.

---

45. This policy of close three-level consultation was re-affirmed in November 1994. See Federal-Provincial-Territorial Conference of Ministers Responsible for Fisheries, *Press Release*, 1 November, 1994.

46. At the time of writing it has been announced that the Canadian Coast Guard will be incorporated into DFO, but this is expected to be only the first step toward the enlargement of the Department into a superministry through the incorporation of other ocean-related units currently located in Environment Canada, Energy Mines and Resources, and other agencies. The new ministry will be responsible for administration of the new Oceans Act, which is expected to be introduced into the House of Commons sometime in 1995. On the concept of such a superministry and other options, see Johnston, *supra* note 6 at 59–61.