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Marine Policy 28 (2004) 459–468
MARINE POLICY
www.elsevier.com/locate/marpol

Participatory research supporting community-based fishery management

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Accepted 20 October 2003

Abstract

This paper reports on a project to engage researchers and fishers together in adapting social science approaches to the purposes and the constraints of community-based fisher organizations. The work was carried out in the Scotia–Fundy Region of Atlantic Canada (the Bay of Fundy and Scotian Shelf). Its rationale reflects arguments that (1) effective community-based management requires that managers are able to pose and address social science questions, (2) participatory research, involving true cooperation in all stages, can support this process, and (3) there is a need to overcome practical and methodological barriers faced in developing participatory research protocols, to serve the needs of community-based management while not demanding excessive transaction costs. In this paper, we report on work with fisher organizations, both aboriginal and non-aboriginal, in which social science priorities were set by each organization, and small-scale research projects designed and carried out to meet these needs. This work identified interests among fishers in research on three different levels of meaning: (1) practical livelihood concerns, including what, when and where to fish, and with what intensity of effort, (2) social, economic and political issues (e.g., on institutional structures, politics of access and allocation, overlap and conflict between regulatory regimes), and (3) values and ethics that implicitly or explicitly guide policy development and implementation. Several research themes proved crucial, including those of power sharing, defining boundaries of a community-based group, access and equity, designing effective management plans, enforcement, and scaling up for effective regional and ecosystem-wide management. The research results demonstrate the effectiveness of extending participatory methods to challenge traditional scientific notions of the research process.

Keywords: Community-based management; Participatory research

1. Introduction

Throughout the world, small boat, inshore fishers are facing increasing difficulty maintaining their presence in the fishery relative to sectors with higher capitalization and longer territorial reach.[1] From some perspectives, this might be a necessary and economically efficient outcome; however, many researchers across the world working with small-boat fishers have questioned the long-term environmental, economic and social sustainability of abandoning this sector [1,2]. Why, then, do governments increasingly create policy that "forces people out of the coastal fisheries" [3, p. 9]?

One answer is that governments are not always internally consistent with their policy directions. One pressure to which governments have been reacting is the need to devolve fisheries management responsibilities

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[1] Small-scale fisheries and small boats are of course defined in relative terms (A.T. Charles, "Small-scale fisheries in North America: Research perspectives", p. 157–184 in: "Research and Small-Scale Fisheries", J.R. Durand, J. Lemoalle and J. Weber, editors, ORSTOM, Paris, France (1991)). In the project described here, the inshore sector is largely restricted to boats of 45 feet or less, although some of the fisher organizations in the study region of this paper have members with larger boats.

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doi:10.1016/j.marpol.2003.10.020

and costs to non-governmental organizations, a "user pays" global trend linked to fiscal restraint. But there has been less certainty over who could best absorb these devolved responsibilities, whether it should be international industrial players, local coast-specific organizations, co-management boards, or types of community-based management.[2] Some states are experimenting with multiple options for devolving responsibilities and costs. Canada is one such state, as is illustrated by the recent Atlantic Fisheries Policy Review Discussion Document of the Department of Fisheries and Oceans (DFO).[3] This policy discussion sometimes mentions the "community" as a possible locus of management decisions and responsibilities that the government is in the process of devolving. This is not to say community-based management, or community-based co-management, are the usual practices in Canada. The more common experience remains one where the federal government retains the power to make policy and the offshore, large-scale fishery sector has more influence on that policy than do small-scale fishers. Nevertheless, small-scale fisher organizations are being expected to take on additional management responsibilities, albeit without the power to determine the nature of those responsibilities.

This paper reports on a 3-year research project that is timely with respect to this devolution trend. The project focuses on community-based, inshore fisher organizations in the Scotia–Fundy Region of the Canadian Maritimes (i.e., the Bay of Fundy and the Scotian Shelf off Nova Scotia) and provides the opportunity for social scientists and fishers to work together to develop fisher social science research competencies. We began by asking fisher organizations what they needed to better understand in order to do a good job of managing their fisheries. In the past, this question has been answered for fishers by state agencies, which have primarily promoted the central importance of natural science data (stock-related information such as abundance and year-class data). One of the criteria for licensing is that fishers now routinely collect natural science data. In addition, they work with non-governmental organizations such as the Nova Scotia Fishermen and Scientists Research Society, and with government programs such as the Sentinel Fisheries that engage in cod population monitoring in various locations around Atlantic Canada, gaining valuable experience and developing a critical perspective on the reliability of the resulting data sets. In this process, the government-endorsed, narrow perspective on appropriate scientific methods has increasingly come under attack. Coastal fishers have gained the confidence to resist when their long-term observations and experiences are rejected as biased and anecdotal. And when fishers' knowledge is given more attention, evidence shows that it can be essential to improving data sets in the natural sciences.[4] Unfortunately, this positive trend with the natural sciences has not been matched by similar developments with social science research in the fisheries.

This is unfortunate because as nation states devolve responsibilities to fishers, the human side of fisheries management will only increase in importance. Jentoft [17] and others[5] have promoted a co-management approach involving coastal communities, citing potential benefits such as better information flow from fishers to managers, better compliance with rules, and lower transaction costs. But as Jentoft also points out, any pattern of cooperative management places heavy demands on the organizations to which management responsibilities are devolved. Problem areas that have been identified in such arrangements include conflicts over rule generation, monitoring difficulties, resisting industry pressure tactics, undermining of local regulations by higher authorities, and conflicting management goals.[6] All of these topics require increased fisher competence in the social sciences.

One roadblock is that collection of information is costly. Hennessey [21], for example, argues that in complex fisheries, with multiple sizes of boats seeking multiple species of catch, the available data collection and analysis processes are expensive, time-consuming and inadequate even for well-endowed government organizations, with the result that decision-making is rarely optimal. He argues for a "bounded rationality approach" that would better suit regional or local managers of resources. Although he is speaking here of natural science information, he acknowledges that the problem is equally burdensome at the social end of the information spectrum. Nevertheless, there has been a growing interest in social science information as a way of managing the fishery rather than managing the fish stock [22,2] and of addressing more focused social objectives such as livelihood needs [23].

[2] The literature contains much discussion of devolution to various types of organizations [4–13], particularly revolving around the ideas of co-management. It is helpful to note the distinction between "sector-based co-management" (in which government shares responsibility with a particular sector in the fishery, e.g., a specific gear type) and "community-based co-management" (in which a community takes on responsibility for fishery management, with some degree of remaining government involvement). Jentoft, McCay and Wilson [14, p. 429–30] argue for 'embedding' co-management institutions in communities and thereby illustrate why many prefer the community-based management option. John Kearney [15] provides deeper insights into the advantages of community-based management.

[3] See the DFO webpage for a PDF version of this document at http://www.ncr.dfo.ca/afpr-rppa/eab_e.htm.

[4] One example examines fishers' knowledge of the Bay of Fundy groundfish spawning areas [16].

[5] [7,8,11,18,19].

[6] [8,9,10,12,17,20].

We argue that if community-based management is to work, managers will need to pose and address social science questions. The devolution of management responsibilities may impose *too* heavy a burden on local managers if they do not prioritize what aspects of the management job they can best handle, and understand the information implications of the jobs they are willing to take on.[7] Unless local managers take this step there is a danger that management outcomes will show little or no improvement—given the realities of imperfect information, uncertainty and risk in decision-making—and this in turn will erode public confidence in their management process, as it did for centralized management. The overall objective of our project is to adapt social science approaches to the purposes and the constraints of local managers. In this paper, we report on several aspects of this process, that is, on the social science research priorities set by fisher organizations and on the struggle to find appropriate templates for participatory research.

2. The broader objective—new modes of research collaboration

> "Progress …will depend to a great extent on unraveling the communication and collaborative processes that affect fisheries management. Deciding who participates, how information bases are used, how conflicts are resolved and how agreement is reached are the critical issues that must be taken forward to the next millennium" [5, p. 255].

Our project addresses the problem of appropriate levels of knowledge for decision making and the process that will make that knowledge accessible to local managers at need. The goal is to promote flexible, resilient and sustainable levels of resource management. Toward this end, we have argued the need to focus on the practical and methodological barriers to developing research protocols that are participatory [26]. However, the research protocol we are aiming for must also serve the broadly defined needs of community-based resource management, and must not demand excessive transaction or information costs. These broad project aims are applicable to many resource sectors.

In our view, there is considerable scope for improvements in the nature of 'participatory' research initiatives in the fisheries, to more closely approach the full potential of the participatory research method. Specifically, we can note three common 'levels of engagement', each of which has its merits relative to past forms of research, but does not fully embrace the ideals of participatory research: (a) including fishers as "subjects" of research planned and undertaken by academics, (b) training fishers to become "research assistants" and to collect data, while academics plan what data to collect, as well as undertaking the analysis and dissemination of results, and (c) having fishers identify research questions, then having the collection of data and subsequent analysis carried out by others, such as graduate students. The problem is that each of these levels of engagement has two shortcomings. First, they often fail to allow full development of the relationship between the academic team (with its varied expertise) and the practice-engaged target group. Second, they often fail to produce research that is viewed as valid by both government bureaucrats and scientists, and by fishers.[8] Our challenge has been to explore how to fully engage the fisher's groups and their leaders in the research in order to produce results that are viewed as practical, applicable, and valid by all parties to the management process.

Participatory research must transcend the limitations of the above collaboration styles to allow for true cooperation in each stage of the research (as per Heron's [27] "cycle of experiential inquiry"). One requirement is to adapt science to deal with process in a way that broadens the definition of validity both for recipient groups and for the academic community. Any such expanded definition of validity has to include some privileging of 'knowledge in action'.[9] There must be coherence between the research conclusions and the fishers' experiences, as well as with the scientific body of knowledge.

The fishers in this project come from a number of partner organizations, some of which are very similar in scale and attributes (inshore, multi-species fishermen's associations which are embedded in communities) while others have a much wider mandate (several First Nation native communities from Nova Scotia and Prince Edward Island). Two of the five non-native fisher groups are located on either side of the Bay of Fundy (one in Nova Scotia, one in New Brunswick), while the other three are located on the eastern (Scotian Shelf) side of Nova Scotia. The four Mi'Kmaq First Nation partners have members dispersed over southwest Nova Scotia, as well as concentrated in two communities in Prince Edward Island. The project has been "multi-

[7] How much information is required to adequately manage the fisheries industry is a matter of some dispute. Wilson et al. [24] argue that the natural science information needed by fisheries resource managers may not be as extensive as government biologists would have us believe, especially if fish stocks are unpredictable over time and if parametric rather than numerical models are used. However, Fogarty [25] provides a contrasting view.

[8] This could be characterized as the difference between a focus on epistemological validity versus ontological validity. Scientists want information that is accurate and reliable; fishers want information that is consistent with a plausible view of the world.

[9] With respect to knowledge in action, Geertz [28] discusses 'thick description', Heron [29] validity, and Berkes [30] local knowledge.

sited'' then, in that it involves fishers from a variety of management areas and ecological zones.

The partners were given full control over developing all stages of the research process, including problem identification, research design, data control and analysis, and dissemination of results. The limitations imposed on them were few: the project had to involve social science questions, the focus had to involve fisheries management issues, and the results should be shared with all the other partners at the end of the process. The academic team restricted itself to providing expertise and advice when called upon. We rapidly discovered, however, that this level of control represented a burden rather than an opportunity for many fisher groups. It required significant contributions of time and effort and a level of competency that most felt they did not possess. The academic team spent considerable time discussing with fishers those problems that would be appropriate for a social science project and in evaluating alternative research approaches.

In other words, the challenge that confronted us when we attempted to develop a fuller participatory engagement was the problem of time constraints. Fishing is a full-time job and one that fishers feel they are competent to do. Most have neither the time nor the inclination to become social scientists. They also recognize, however, that increasing levels of management responsibility are matched by an increasing need for reflection on several levels. (Related to this is the fact that several partners were much more familiar with posing natural science and/or technological research questions, such as those relating to fish distribution or fishing gear impacts, and in discussions of research needs, tended to focus initially on such questions—see below.)

3. Three levels of meaning

Our research has found that fishers are interested in research on three different levels, or orders, of meaning.[10] The first level involves practical livelihood concerns including what, when and where to fish, and with what intensity of effort. At this level, the focus is often on the ability of the natural sciences and economics to provide useful information such as year-to-year monitoring and assessment of stock size and composition, reproductive success and growth rates, new commercial species and potential markets, marketing innovations and value-added options. It would be logical for these areas to receive a top priority given the importance of identifying and protecting the resource base on which fishers rely.[11] Our experience is that fishers do make large investments of time on these information requirements, partly because it is required as a condition of their licenses. It is also evident that fishers contest both the resulting science data sets and their interpretation. Some of the fisher groups in our study go further, and question the relationship between this science data and the resulting fishing regulations that shape resource access.

This leads us to the second level of analysis of interest to fishers. Many social, economic and political issues—including the kinds of institutional structures that work best in fisheries management, the politics of access (the right to fish a stock) and allocation (the division of shares in the stock), overlap and conflicts between different regulation regimes, and how best to organize lobby efforts—are also a research priority. Fishermen are particularly sensitive to the fact that in conditions of increasing stock scarcity, any allocation decision that awards fish to one community or sector at the same time takes it away from another. Where fishermen organizations have taken on management roles, these concerns have become vital, not only in terms of their relations with the state, but also in terms of their relations with each other, with other gear sectors in the industry, and with respect to internal allocations within the organizations themselves. Fishers are sensitive to the political implications of any research that touches on these political and potentially volatile relationships. Nevertheless, some of the fisher groups in our study struggled to design appropriate research into the criterion used when such allocation decisions are made, and into the decision-making process itself. Their objective was to have bureaucrats better understand the opportunity costs and consequences of decisions that are taken in favor of one gear sector over another.

The third level that proved of interest to fishers involves the values and ethics that implicitly or explicitly guide policy development and implementation.[12] Are

[10] Jentoft, McCay and Wilson [14] in their discussion of institutional change examine similar ''levels of meaning''.

[11] On this issue of research priorities, Pomeroy and Carlos [31] have assessed 104 community-based management projects in the Philippines. Among these projects, the top three reported objectives were resource assessment and monitoring, resource protection and conservation, and resource rehabilitation [31, p. 450]. Policy development, institutional capability development, and equity in access all came relatively far down the list of project priorities. However, Pomeroy and Carlos also note that when actual activities or 'interventions' of the funding agencies were examined, community organizing was a top component of over 50 percent of the projects examined, with the second most common intervention being education, training and skills development [31, p. 455]. It is worth keeping in mind within other contexts the potential for this discrepancy between reported objectives and reported activities, and to explore why it is that activities may vary so sharply from project objectives.

[12] The Writing the Rules project [32], organized for the Bay of Fundy through the collaborative effort of the Bay of Fundy Marine Resource Center and the Conservation Council of New Brunswick, is one example of a fisher-based analysis of values. For another type of discussion, see Ommer [33].

there "better" value sets and policy options? For example, is intergenerational transfer of assets and rights important, and how can this be balanced with free enterprise values and the sale of licenses and quotas in the open market? How can collective rights in a resource be balanced in general with individual rights? Sometimes the research designed around these questions brought the issue of values down to the local level. Is some form of local management workable in our community? Are the values underlying policy development sufficiently adapted to the conditions of our fishery?[13] In recent years, for example, two contrasting value sets have been represented in Canadian policy discussions as the "economic" vision versus the "social" vision. A recent example is statements made by the Department of Fisheries and Oceans Independent Panel on Access Criteria. An IPAC Panel Report [34, p. 10] summarizes the distinction between the two visions in the following way:

> The "economic" vision sees the fishery as a self-reliant activity run on business lines, with sufficient depth and means to weather periods of low harvests and weak markets, without government subsidies. In simple terms, this vision seeks to maximize returns on investment and regards the fishery the same as any other natural resource industry. The other perspective, the "social" vision, seeks to maximize employment and regards the fishery as a way to sustain the large number of Atlantic fishing communities. The social vision is based on reliance on subsidies and dependence on government assistance to help the fishery and dependent coastal communities survive difficult times.

It is unfortunate that the Panel chose to polarize community (social) interests and those of economic self-reliance, and to position community sustainability as inseparable from subsidies and dependence on government assistance. Many, perhaps most, fishers do not accept this as a valid representation of the options (cf. [35]).

Fishers in our partner organizations, for example, argue that the role of government policy in "corporatizing" the fishery has narrowed the options such that the social vision can only be realized as a form of "state welfare". Fishers who have survived to this point over years of policy change have had to be successful business people, but many continue to favor an approach to economic efficiency that is based on sustainability over the long run and that supports entire communities rather than the privileged few. The importance of getting this balance right is a frequent topic of discussion. For example, allocation issues are often understood to be livelihood issues. That is, inshore fishers rarely argue for an increased allocation because it will maximize wealth generation, but because it would allow them and their entire community to survive economically.

[13] Scotia–Fundy fishers are not unique in asking this question. In many parts of the world, values that prioritize individual economic efficiency have destroyed small-scale inshore fisheries that may have been more ecologically sustainable in the long run [2,7].

4. The special case of aboriginal fisheries

Another objective of our research is to involve communities that are just beginning to research and apply alternative management options for commercial fisheries. In this regard, we have benefited from the involvement of First Nation communities, which in the post-Marshall Decision environment have had all three of the above levels of meaning take on sharper focus.[14] All First Nations who have entered the commercial fishery as a result of the Marshall Decision have done so through a negotiation process with the federal Department of Fisheries and Oceans. They have struggled to balance their legal and constitutional aboriginal rights with the administrative requirements of fishing under a management plan designed by the DFO. Many have expressed concern about the impact of a commercial fishery on their right to an aboriginal food fishery. And finally, they questioned the DFO mandate to administer First Nation fishing, given the poor federal record of creating a commercially viable fishery in Canadian waters that is ecological sustainable.

All these concerns come to a head in the negotiations between the federal government and Atlantic First Nation communities over the question of fisheries management and policy development. Two documents illustrate how far apart the two parties stood at the outset of the negotiations. The position of the federal government was outlined in the Parliamentary Standing Committee Report on the Marshall Decision [38], released on December 16, 1999. The Atlantic Policy Congress of First Nations' Chiefs Secretariat soon after provided a response [39]. The First Nations called for the development of Mi'kmaq, Maliseet and Passamaquoddy scientific and research capacity. They also wanted legal and governance capacity and institutional

[14] The 1999 Marshall Decision of the Supreme Court of Canada recognized a "community-based" right of access to fish stocks for aboriginal descendants of Mi'kmaq or Maliseet signatories to Peace and Friendship treaties of the 18th century. This right includes involvement in commercial fishing. The Marshall Decision has generated a significant amount of literature, very little of which takes a close look at the consequences of freeing space for native entrants within a severely regulated and delimited management regime. There are two exceptions to this general principle [36,37]. For many native and non-native fishers in the Canadian Maritimes, the resulting intense press coverage has also more often distorted reality than accurately reflected it.

development, in order to facilitate a community level of benefit. The federal government, meanwhile, sought to resolve these difficult issues with a market driven policy direction. They required that native commercial fishing be done under existing federal policy guidelines. The outcome was a community by community negotiation process, with the consequence that First Nation communities have entered the commercial fisheries under a variety of different management arrangements. The First Nation communities involved in this project vary dramatically in their management of the commercial boats and the fish quota they utilize. Most partners are fishing under so-called McKenzie agreements, signed with the federal government, and after several years of fishing under these arrangements, they have broad concerns that have much in common with those expressed by non-native fishers.

For example, both the First Nation and non-native fishers have argued that community-based management must find a balance between widely distributing the benefits of the fishery to sustain their communities over the long haul, and encouraging individual investments to further commercial development. Both First Nation and non-native fishers also agree that community-based management must reach beyond particular localities and utilize linking (''scaling-up'') mechanisms to allow fishers to participate in region-wide management arrangements. In most cases, the groups involved in this project explicitly asked that important linkages with other groups be recognized within our project design, so that other organizations could be involved in the research. Native communities wanted to invite other First Nations into the research, including one community that has refused to sign a McKenzie agreement. Non-native communities wanted to involve adjacent fisher groups in their region. This expanded research network has placed strains on the financial resources available to partners, but has proved essential to the research goals identified by a number of partners. Decisions taken in one community are too important in terms of impacts on other communities to be arrived at in isolation. Fishers want to explore the most effective means of unifying their management arrangements on a region wide basis.

First Nation and non-native fishers also share a keen interest in how other groups are solving common problems. When all our partners gathered together in one room to discuss their research ideas and objectives, we discovered that ethnic and regional boundaries were not obstacles to fisher communication. Where one group had experimented with a lottery arrangement for allocating fishing rights to a community allocation of snow crab, other groups wanted detailed information on how the system was working. Community-based resource management experiments are going on in Atlantic Canada, and fisher groups are learning from each other in this regard. In some cases, this experimentation is going on without the support of the DFO while in others the DFO has attempted to harness the innovations to solve problems they identify. One of our emerging interests then has been in evaluating where and when community-based management is innovative, where it works, and under what conditions it can be encouraged to flourish.

5. Defining research questions

After our many meetings with the project's partners, we established that there were a variety of research problems of interest to fishermen's associations, and a variety of potential approaches to the research collaboration. Several key themes were crucial, including questions of power sharing, effectively defining the boundaries of a community-based group, optimum organizational structures for community-based management, access and equity issues, designing effective management plans, enforcement, managing fishing careers over the life cycle, new commercial species development, and scaling up for effective regional and ecosystem-wide management (see Table 1).

This first step of identifying problems rapidly underwent further refinement, subject to pressure of budget and time frame, as fishers met and designed projects. As a result, an interesting constellation of related interests began to emerge. One fisher group opted very quickly to tackle a number of the above issues at a very broad level of consciousness-raising among its membership. A survey of the membership identified five particular themes on which members wanted more information. The association then developed information sessions for which it brought in ''experts'' to interact with the membership. Many of these working sessions involved bureaucrats from the DFO, especially those responsible for management plans, in order to answer questions about how policy was developed, what the fit was between scientific data and new policy directions, and how fisher groups could better integrate their views in policy discussions.

In the case of the First Nation partners, a shared interest in assessing the impact of McKenzie agreements, as a lead up to the re-negotiation process, has resulted in a project that compares several different First Nation experiences, including the experience of one First Nation that refused to sign a McKenzie agreement. The variable nature of the agreements across First Nation communities, and the variation in the implementation of the agreements within First Nation communities has generated many questions. For example, some First Nations took boats and gear allocated under their McKenzie agreement and awarded private rights in them to individual band members, who then

Table 1
Fisher research priorities

Research problems	Options explored by fishers
Broad questions of power sharing	Licensing their own member's boats Relating stock assessment to policy development Developing management plans that are multi-species friendly Reducing DFO inconsistency in applying policy
Effective boundaries for community-based groups	Those with 'history' in the resource base Members (present and future) of the geographical community Gear, boat-size or 'resource dependence'
Organizational needs	Accrediting organizations (enabling legislation) Managing liability for organization directors
Allocation and equity issues	Tracking the socio-economic consequences of allocation decisions both within and across gear type and regional groups
Designing effective management plans	Balancing local knowledge with DFO demands for scientific levels of assessment Managing people as well as fish stocks
Enforcement	By-law committees and limiting DFO interference Addressing the lack of federal monitoring and enforcement Finding effective ways to punish infractions
Managing fishing careers over the lifecycle	Facilitating intergenerational transfer in the fisheries Measuring the impact of women moving into boat crew roles Managing for variable levels of fishing effort over a fishing career
New commercial species development	Identifying and testing for commercial development Managing temporary quota and the transition to permanent rights
Scaling up for effective regional and ecosystem management	Integrating CBM to allow for collaboration with other managers in a region (including First Nations). Developing regional management boards
The role of mediating organizations	Tapping into non-fisher resources in the community or region, including NGOs and universities
Adjacency, fishing history, property rights and core status	Monitoring consequences of property rights-based fishing Monitoring the effects of complex leasing arrangements including those between First Nations and non-natives Balancing individual rights against community needs Options for ring fencing quota (restricting transferability) Effect of the above on prices of licenses and quota
Local empowerment	Finding and furthering management skills within the community

made individual decisions about hiring skippers or crew. In one of these communities, the crews opted to join a national labour union, which has presented a particular challenge to the notion of a "community level of benefit". Other bands have opted to retain the boats at a band level of ownership, and to invest in training of aboriginal crews and skippers. The hope is that this will facilitate using profits from the fishing sector to support community projects. Finally, First Nations communities vary in the ways that the pre-existing "food fishery" access has been affected by commercial fishing involvement. Some bands distribute fish from commercial efforts to individual households within the community. Others continue to allow an individual-based food fishery but curtail the effort allowed.

The DFO policy of buying quota from non-native fishers in order to meet contractual obligations to the First Nation communities is also a concern.[15] Many within First Nation communities are sensitive to the impact of this program on the inshore small-boat sector, as it is the inshore sector that has been hardest hit by DFO buyouts. It is obvious that such buy-outs are increasing the cost of quota, and thus the cost to young

[15] Wiber [40] has published a critical assessment of the economic arguments in favor of quota systems.

fishers hoping to enter the commercial sector. In addition, buy-outs create tensions between First Nation and non-native fishers when buy-outs affect the levels of access of the non-native community (see the discussion of "history" below). Intermediary organizations, such as the Bay of Fundy Marine Resource Centre and the Saltwater Network, have been working to facilitate communication across First Nation/non-native boundaries in order to mitigate such tensions. Mediating organizations are also proving invaluable to fisher communities (both First Nation and non-native) on many other issues of conflicting values, including environmental concerns and the documentation of local knowledge.[16]

The question of sustainable livelihoods was addressed by the research priorities of two of the three partner fisher groups in this project. They focused on research topics involving access to the resource, flexibility in a multi-species fishery, and the resulting viability of the inshore sector. Most of the important allocation questions addressed in all partner projects are captured in the discourse on "history", a term which has very specific meaning in the context of the management regimes guiding Canadian fisheries. "History" refers to the catch history that establishes fishers as bona fide and as entitled to a share in the fishery proportionate to their recorded catches in specific species for targeted years. Once the DFO began the process of "rational adjustments" to address the supposed problem of "too many fishermen chasing too few fish", catch level records took on critical importance. They not only demonstrated a level of fishery activity that could offer some protection from unilateral loss of fishing privilege, but they also set quota levels for fisheries in which individual transferable quotas were introduced. Catch levels over a qualifying period were used in the initial allocation of quota. But it rapidly became obvious to fishing communities that transferable quota rights were mobile in a way that history is not.

Here the term "history" links into more emotional and general meanings that locate people to places. Many of the fishers told bitter tales of "losing their history" when individual quota holders from their community sold quota to fishers (or processors) from another location. In a few cases, these sales have decimated the local access to fishing resources—through individual decisions that have cumulated with resulting economic and social impacts for entire coastal communities. Rhetoric of invasion has begun to develop where communities experience such stress. Fishers often express concern when skippers and boats from far-flung places establish rights to fish on local grounds. It is interesting that First Nation commercial fishers also participate in this rhetoric. When the management plans worked out between the DFO and First Nation communities transferred 'history' to a First Nation community, entitling them to fish at a commercial level on fishing grounds near their community, they very quickly adopted this rhetoric of invasion when First Nation communities from other locations were given rights on the same fishing grounds. In these various circumstances, a place-based sense of history is increasingly at odds with allocation and access decisions made top-down by government and/or worked out through the market instrument of ITQ.

One reason for this is that history on the fishing grounds is contested and contingent as it is everywhere else. Catch records were kept for some species but not for others. Historic catch records can be and often are disputed by the parties who are affected by them. Disputes particularly arise on the topic of which years to select as the qualifying period—since different years could favor different sectors (the inshore, the mid-shore or the offshore) as well as different geographical components of the same sector, given the impact of weather, prices, gear differences and fishing patterns. The inshore sector in particular feels that the manipulation of history has reduced their access to the resource to a fraction of former levels. It is certainly true that the mid-shore draggers have a greater percentage of the current quota allocation. In two of the five fisher partner groups these questions of access were given priority. One group is examining the socio-economic impact of purchasing more quota to support their fishing industry. They particularly hope to show that the cost of obtaining more quota would be offset by the economic benefits for their community. Another partner group is examining the process of allocation decision-making when fisheries currently under a moratorium re-open, and particularly the impact of various allocation choices. Their argument is that the choices made by the government on this highly political issue are often facilitated by the relative invisibility of the socio-economic impact of their decisions.

It is precisely the complexity of fishing history that allows the government to act unilaterally. With such a fractured and argumentative constituency, bureaucrats are often able to point to disagreement as the reason for government intervention and for the lack of fisher input into policy development. Which fisher groups should they pay attention to, when diverse groups want diametrically opposed outcomes? Fisher groups involved in this research project hope to provide solid evidence in favor of the small-boat inshore sector, particularly with respect to the impact of lost history of jobs 'on the water' and 'on the wharf' as well as with spin-off industries.

[16] Our project has involved two such organizations directly, at the request of partner fishers groups. In both cases, these intermediary organizations played a role in carrying out the social science research designed by their partner fisher organization.

6. Conclusion

The process of identifying research problems when the entire research process is controlled by fisher groups has proven highly time-consuming, but has also demonstrated the effectiveness of extending the participatory method to challenge traditional scientific notions of the research process. Two points became apparent in our process. First, our partners arrived at a rich diversity of approaches for their respective 'research projects', ranging from targeted social and economic research through to one partner's series of policy workshops, and another's internal membership survey. Second, few of the topics chosen by our fisher research partners fit neatly within the pre-defined interests of the academic team. For example, while a number of the academics were interested in the consequences of a rights-based management regime, many of the partners have moved past this reactive stage and are looking instead at creatively resolving perceived problems with the ITQ system. We found that there are intense discussions throughout the inshore sector as to the best means of limiting the loss of community history that the transferable quota system has brought about. These discussions explicitly address the balance that fishers hope to see between enabling wise individual economic decisions and protecting wider community interests. Older fishers should be allowed to maximize the benefits of their quota through sale to finance retirement, but the sum of such individual decisions should not destroy community economic viability.[17] While fishers do not see the two (economic and social) objectives as inherently mutually exclusive, the infusing of rational economic logic into public policy in the fisheries appears to have precluded finding an appropriate balance, and fishers explicitly seek ways within the current management regime to address the problem. Ring-fencing quota,[18] setting up community quota banks, and pressing for community allocations are all possible strategies, each having different consequences for individual choices, and each requiring different community organizational structures. Some of these options are already developed in a number of fisher organizations, while others are under exploration.

The appropriate organizational structure for managing fishing regimes also received more attention from fishers than might have been the case with an etic (observer) defined research problem. Fisher groups are actively engaged in discussing whether sector-based, geographical or ecosystem-based organizations offer the best platform for effective fisheries management. The progressive involvement of a wider net of fisher groups in our research project was an offshoot of this struggle to define appropriate management levels. Learning from each other's experiments and mistakes is another reason for casting the net wider, as is evident from the comparative approach taken by our First Nation partners. The involvement of facilitating organizations such as the Bay of Fundy Marine Resource Centre relates to this demand for a wider focus in management planning. But facilitating organizations are drawn in for an additional reason, having to do with the increasing demands of time and other resources that local level management requires of fishers.

Devolution of management roles and responsibilities will place heavy demands on local organizations. Many authors have already pointed to the potential for failure for the devolution process, if the governments that hope to benefit from devolution do not support local organizations that are willing to take on management duties. Even if these organizations employ a ''bounded rationality'' approach to problem solving and decision-making, they will need to develop capabilities and resources that many of them currently lack. Governments need to think seriously about providing the resources during this 'capacity building' stage, so that local organizations can learn from their failures.

[17] Anthropological approaches to property systems speak of ''embedded'' property systems [41,42] in exploring the balance between public and private interests in property goods.

[18] Ring fencing quota would allow quota sales, but only to sellers within a defined geographic area. This was a common approach in several provinces under the Canadian dairy supply management system, and was used to protect the economic position of dairy processing plants that could not pick up their facilities and relocate to adapt to changing provincial distributions of dairy quota.

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