

Unclassified

AGR/FI/HSA(2006)6

Organisation de Coopération et de Développement Economiques  
Organisation for Economic Co-operation and Development

06-Oct-2006

English text only

**DIRECTORATE FOR FOOD, AGRICULTURE AND FISHERIES  
FISHERIES COMMITTEE**

## **Expert Meeting on the Human Side of Fisheries Adjustment**

**THE HUMAN DIMENSION OF FISHERIES ADJUSTMENT:  
AN OVERVIEW OF KEY ISSUES AND POLICY CHALLENGES**

**19th October 2006**

**Union de l'Europe occidentale, 43 avenue Président Wilson, 75116 Paris**

*This paper has been prepared by Anthony Charles of St. Mary's University of Halifax, Nova Scotia, Canada.*

*It is submitted for discussion under Session 1 of the Programme.*

For further information, please contact:  
Anthony COX (Email: [anthony.cox@oecd.org](mailto:anthony.cox@oecd.org))

**JT03215255**

Document complet disponible sur OLIS dans son format d'origine  
Complete document available on OLIS in its original format



AGR/FI/HSA(2006)6  
Unclassified

English text only

## TABLE OF CONTENTS

1. Introduction: Fisheries, Adjustment and Human Considerations.....	4
1.1. The changing nature of fisheries and fishing communities .....	4
1.2. The fishery and beyond the fishery .....	5
1.3. Fishery labour markets .....	6
1.4. Sustainable development considerations .....	6
2. Fisheries Objectives and Fisheries Adjustment.....	7
2.1. Fishery and societal objectives .....	7
2.2. Links to fisheries adjustment .....	9
2.3. Over-capacity.....	10
2.4. The balance of labour and capital .....	11
3. What Does Fisheries Adjustment Involve? .....	12
3.1. Choices about the future shape of the fishery .....	12
3.2. Short-term and long-term measures.....	12
3.3. Forms of adjustment .....	12
3.4. Interaction of adjustment with various aspects of the fishery.....	13
4. Policy Approaches to Fisheries Adjustment .....	16
4.1. Overall approaches .....	16
4.2. Capacity reduction.....	16
4.3. Livelihood diversification.....	17
5. Challenges in Implementing Fisheries Adjustment.....	18
5.1. Lack of clear decision making on the desired future of the fishery.....	18
5.2. Easy entry and barriers to exit.....	19
5.3. Lack of alternative economic opportunities.....	20
5.4. Lack of labour mobility .....	20
5.5. Specialised, non-transferable skills / aging work force / poor retraining .....	21
5.6. Lack of coherence between fishery policy and other governmental policy.....	21
5.7. Lack of mandate to integrate fisheries with regional/community development.....	22
6. Human Impacts of Fisheries Adjustment.....	22
6.1. Potential individual and community impacts of adjustment.....	22
6.2. Large-scale and dispersed impacts .....	24
6.3. Impacts of policy approaches to fisheries adjustment .....	24
7. Social and Community Mechanisms for Fisheries Adjustment .....	26
Interaction of social considerations and fisheries adjustment.....	26
Subsidiarity and local initiatives.....	26
8. Conclusions: Moving Forward.....	27
BIBLIOGRAPHY .....	28

**Tables**

Table 1. Factors of potential relevance in fishing communities..... 15  
Table 2. Structure to monitor fisheries adjustment measures..... 24

**Charts**

Chart 1. Societal and economic objectives in the fishery sector ..... 8

## THE HUMAN DIMENSION OF FISHERIES ADJUSTMENT: AN OVERVIEW OF KEY ISSUES AND POLICY CHALLENGES<sup>1</sup>

### **1. Introduction: Fisheries, Adjustment and Human Considerations**

1. Fisheries adjustment is often portrayed as a mechanism for restructuring the fishery to better meet economic performance goals and to bring the magnitude of the fishery system better in line with resource productivity levels (i.e. to match the fleets to the fish). Often adjustment is essentially equated with reductions in fishing capacity, whether in terms of capital, labour or both. In fact, fisheries adjustment can be seen more broadly than this, in terms of the range of objectives it should be supporting and the range of options that can be utilized. But however depicted, there is no doubt that fisheries adjustment has a human dimension – both with respect to how adjustment measures impact on people and their communities, and with respect to the underlying objectives pursued. This theme is the focus of the present paper.

2. The paper comprises eight sections. In this section is found an overview of some major elements underlying fisheries adjustment – the dynamic evolution of fisheries and fishing communities, the breadth of the fishery system and the world beyond it, fishery labour markets, and sustainable development considerations. Section 2 examines the objectives of fisheries adjustment, as well as links to societal and fishery objectives, the specific focus on dealing with over-capacity through adjustment, and the balancing of labour and capital in the fishery. Section 3 discusses the range of ‘ingredients’ of adjustment, such as (a) where to aim in terms of the future of the fishery, (b) short-term versus long-term aspects, (c) types of adjustment and restructuring, notably capital and labour reduction mechanisms, and (d) the interaction of adjustment with components of the fishery system. Section 4 presents several policy approaches to fisheries adjustment, focusing on capacity reduction and livelihood diversification. Section 5 reviews a wide range of challenges facing fisheries adjustment initiatives, from a lack of labour mobility to a lack of policy coherence, from barriers to exiting the fishery to a shortage of economic alternatives. Section 6 turns to a discussion of human impacts resulting from fisheries adjustment, ranging from those at the individual or community level, to those of a wider scope, to those arising as a result of policy measures. Section 7 discusses some potential social and community-oriented mechanisms for fisheries adjustment. Finally, Section 8 presents a number of conclusions to the paper.

#### ***1.1. The changing nature of fisheries and fishing communities***

3. Although fisheries adjustment may be pursued as a deliberate policy mechanism to meet societal objectives, dynamic change is already happening continuously in fishery systems and coastal economies. Some aspects of this dynamic change of relevance to fisheries adjustment are described by the following authors:

- Hersoug (2006) notes that “Fleet reductions imply that former fishing villages over time may become redundant. Some manage to take up new occupations, such as aquaculture or tourism. Other coastal communities experience a long drawn-out death rattle, gradually losing the public

---

<sup>1</sup> Written by Anthony Charles of Saint Mary's University, Halifax, Nova Scotia, Canada

and private service institutions (the school and the local shop), ending up as a retiree dwelling place or a community of vacationers, taking over existing houses or constructing new cabins.”

- Hamilton and Duncan (2000: p.95) describe the evolution of fisheries dependent regions of the northern Atlantic which “have experienced rapid social changes in recent decades, driven partly by globalisation and other large socio-economic forces and partly also by shifts in ocean ecology. Among the most notable social changes has been a widespread substitution of technology for labour, so that fisheries related work tends to support fewer people. ...the population of many small fishing communities has declined and grown older. Many fishing communities have also become less fisheries dependent and developed more diverse economies, commonly based on expansion of tourism, service and public-sector jobs. Families connected to fishing communities have diversified too, in their fishing and non-fishing activities.” Indeed, these authors (Hamilton and Duncan 2000: p.104) note that in addition to specific fishery-related causes, “The demographic changes also represent a more general modernisation that includes declining fertility, closer ties with global markets and trends, and increased educational attainment among fishing community residents.”
- Hamilton and Duncan (2000: p.105) also suggest that “Elements of small community fisheries have become less traditional, more professional and, at the same time, more technologically capable of rapidly affecting resources. Small communities now contain both an older, more traditional inshore group and the newer, more professional fishermen...” These two groups are “competing both with each other and with the larger corporate fleets”.

### ***1.2. The fishery and beyond the fishery***

4. There is a strong tendency in fishery management, as well as in fishery analysis, to focus on the ‘core’ aspects of fish and fleets, to the virtual exclusion of other components of the fishery system – such as aquatic ecosystems, fishing households, fishing communities, processing and marketing, ancillary services, and the overall socioeconomic environment of the fishery. Symes (2000, p.214) comments: “For far too long the fishing industry has been viewed as a separate, almost unique entity and studied more for its intrinsic interest rather than as part of the wider economic system in which it is situated.”

5. At a policy level, there have been remarkably few efforts, conceptually or in practice, to link the fishery into broader societal concerns, relating to such matters as regional development, employment and labour markets. Certainly, such considerations are noted, and the role of the fishery in supporting regional economies and in providing employment is well known, but within governmental structures, the implications of this strong inter-relationship often fail to be integrated into the decision making processes within fisheries ministries or elsewhere in government.

6. Smith (1983, p.2) advocates an integrated approach that “permits the search for solutions to the problems of low standards of living in fishing communities to expand beyond those areas which are fishery-specific”, highlighting that “The need for a holistic approach to fishing community development is obvious. What is implied is the necessity for viewing the fish production sector on the one hand as vertically integrated with factor input markets and with product markets and on the other hand as horizontally integrated with other non-fishery sectors...” This approach is echoed by Ben-Yami and Anderson (1985: p.9): “most problems affecting fishing communities are unlikely to be seriously tackled unless equal attention is also given to non-fishery needs in the community”. They suggest that “Non-fishery options include development which will diversify the social services and communal activities in the community, thereby improving the quality of life and creating employment and income”.

### **1.3. Fishery labour markets**

7. A key realm of interaction between individual participants in the fishery and the overall socioeconomic environment is through labour markets, in which people choose their form of employment from among the options available to them. In assessing the labour markets relevant to fisheries, it is important to understand both (a) internal aspects of the markets, such as the system of remuneration used by vessel owners to pay crew members (e.g., wages or a share system), and (b) external labour-oriented interactions between the fishery and other economic sectors in the local, regional, national and/or international economy. Heen (1988) has highlighted the importance of examining both income and non-income variables as determinants of labour market behaviour, and fisher decision making.

8. Various authors have emphasised the importance of examining ‘labour dynamics’ in the fishery, i.e. how fishers and others decide on their choice of livelihood, and how the supply and demand of labour evolve over time. For example, Terkla *et al.* (1985) argue that “understanding labour adjustment processes is likely to be crucial for implementing efficient and equitable management policy” throughout the fishing industry. Labour dynamics describe how fishers, fishery workers, and others in the labour force, inside or outside the fishery, shift over time (1) between occupations (reflecting *occupational mobility*), and (2) between locations (involving *geographical mobility*), in response to a wide range of factors from wage levels to social and cultural considerations. Smith (1981) noted the important relationship between labour mobility and the economic state of fisheries, and Munro (1990) has emphasized that fishery management must anticipate the impacts of changes in the employment options available to fishers by looking *beyond* the fishery, at the nature and dynamics of the larger economic system. Given all these considerations with respect to labour dynamics, Hersoug (1985, 2006) highlights a key point to be kept in mind in fisheries adjustment programs, namely that “...the migration of the fishers may therefore be as complicated as that of the fish.”

9. It is crucial as well to note that what goes on outside the fishery *per se*, but within the broader socioeconomic environment, can operate in complex ways through the labour market to influence the fishery system. For example, consider how wage rates or crew shares on fishing vessels depend on the balance of the labour supply and demand process. In the case of a high-unemployment or isolated fishing region, average wage rates throughout the economy may be relatively low (if individual workers in the economy have little bargaining power), which in turn may lead to a situation in the fishery of a balance between profits and wages that favours higher profits for boat owners. These high profits may in turn lead to greater investment in vessels, resulting in excess catching power and possibly excessive fishing effort, thus threatening the sustainability of the resource base.

### **1.4. Sustainable development considerations**

10. In recent years there has been a major emergence of a ‘sustainable development’ framework within which to address fisheries management – and indeed the management of other natural resources. Such a framework revolves around a balanced treatment of each of the aspects of sustainable development – the ecological, social, economic, community and institutional components of sustainability (Charles 2001).

11. A publication of direct relevance to the evolution of such an integrated framework is that of OECD (2006), entitled “Financial Support to Fisheries: Implications for Sustainable Development”, which elaborates a balanced understanding of financial transfers (i.e. subsidies) in the fisheries of the world. Within this document, particular chapters of note in relation to the present paper are “A sustainable development framework for assessing the effects of government financial transfers” (chapter 2), “Social impacts of government financial support of fisheries” (chapter 7 – referenced herein as Charles (2006) and

also appearing in an earlier form as Charles (2004a)) and “Social capital and fisheries subsidy reform” (chapter 8).

12. The key message from sustainable development thinking of relevance to assessing the impacts of fisheries adjustment lies in the multi-dimensional nature of the sustainable development concept. This tells us that any policy action, such as fisheries adjustment, should not be undertaken without first ensuring that the outcomes anticipated for each sustainability component are acceptable, i.e. positive or at least not overly detrimental. Since, as shall be discussed, fisheries adjustment measures are often motivated largely by economic arguments, connected in some manner to ecological ones, it is important to ensure that social and community components of sustainable development are not neglected. This holds both for assessing the adjustment measures, if they are under consideration, or for ameliorating their impact, if the measures are being implemented.

## 2. Fisheries Objectives and Fisheries Adjustment

### 2.1. Fishery and societal objectives

13. Effective management of fisheries is measured by the achievement of societal objectives through the use of appropriate policy and regulatory instruments. The objectives for a fishery can be considered as those that are *strategic* (societal) in nature – what do we want the fishery system to provide for society? – and those more at an *operational* level (Charles 2001). A major challenge lies in the fact that fisheries are very much multi-objective in nature, serving a variety of social, cultural, political, economic and ecological goals (even if these are *de facto* rather than explicitly declared). In any given situation, the multiplicity of objectives to be pursued will depend on societal policy decisions. In turn, the choice of fishery objectives helps determine a *desired fishery configuration* (fleet composition, preferred gears, etc.), the desired level at which fishing should take place (e.g., optimal harvest rate or TAC), and the desirable regulatory framework, including the choice of fishery institutions and management approaches.

14. In broad terms, strategic objectives are often seen as falling into three principal categories (e.g., Food and Agriculture Organisation 1983): Biological / resource conservation; Social / equity; Economic / productivity. In fact, the first of these groups is often treated not as an objective, but as a *constraint* on the pursuit of other goals. Among fishery-specific social and economic objectives, some that are frequently referenced include:

- production of fish for food, livelihood (income) or profit
- economic efficiency, economic viability and rent generation
- employment
- export promotion and generation of foreign exchange.

15. Other social and economic objectives may be pursued as well, including those at the ‘macro’ policy level, applying more broadly than just to the fishery, such as:

- industry diversification
- socio-political stability
- decreasing rural-urban drift
- maintaining a regional balance of development.

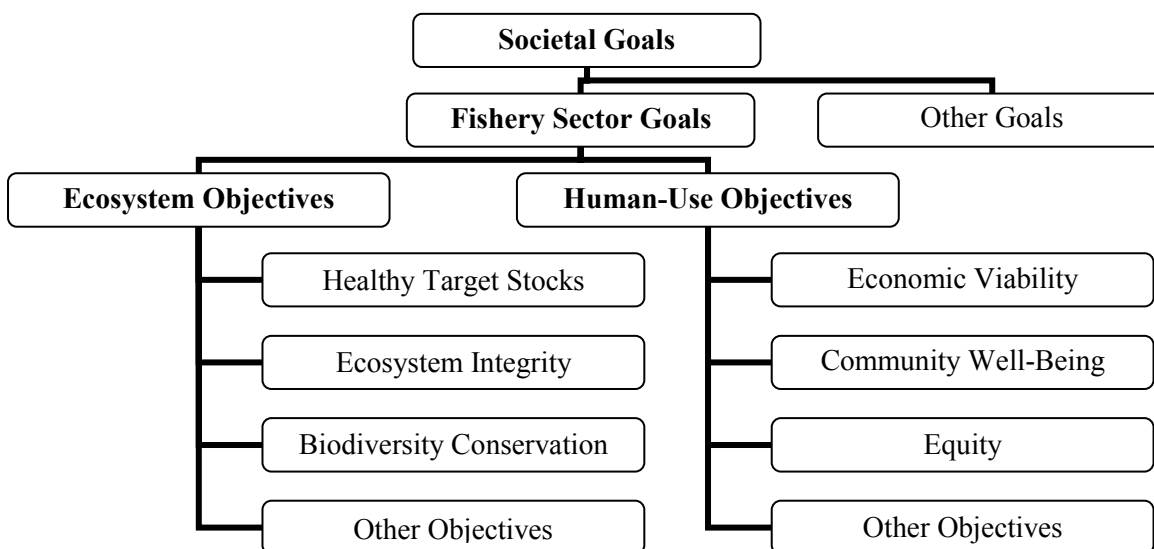
16. Fisheries adjustment is structural change that is undertaken to enable the fishery sector to better achieve the above range of societal objectives. Given that most forms of adjustment, whether in fisheries or elsewhere in society, involve a certain degree of dislocation, social stress and potential distributional impacts, it is important to ensure, before embarking on such actions, that they are indeed necessary to meet

societal objectives. The difficulty in achieving this lies partly in the reality that (1) such goals are often not fully delineated, and (2) as noted above, typically there is a multiplicity of objectives, and a lack of analysis undertaken to ascertain the impact of restructuring on each of these objectives. For example, it may be that adjustment is envisioned to improve fishery performance in meeting certain economic ends, but an understanding of impacts on the full range of fishery objectives may be lacking.

17. The necessity of a broad perspective that encompasses the full range of objectives is inherent in the concept of ‘objectives-based’ approaches to decision making in policy and management (not only in fisheries but across many sectors). Objectives-based approaches are typically based on a hierarchy of objectives, the idea being to link the actions taken to the objectives being pursued. In reality, this is little more than simple logic and reflects a standard approach utilized in planning and operations management, but the new-found popularity of the approach is useful in reminding us of the importance of having policy and management decisions being responsive to the full set of societal objectives.

18. This point is especially crucial for fisheries adjustment measures, which imply deliberate actions being taken to change certain key attributes of the fishery – such as its fleet size or capacity, its labour force, or its composition in terms of fleet sectors, gear types, etc. Any such actions are most likely to have consequences of a social and economic, as well as potentially an environmental, nature. Thus, whether an action with dislocation and cost implications, such as fleet capacity reduction, is desirable or not is a matter of assessing the full range of consequences of that action, relative to societal objectives for the fishery an action. Such actions may be unhelpful (and indeed counter-productive, if net benefits are negative) unless they serve to move forward the aggregate set of societal objectives not only for the fishery sector but also for the broader social and economic systems. This idea is at the heart of the ‘objectives-based’ approach.

**Chart 1. Societal and economic objectives in the fishery sector**



19. In an objectives-based policy framework, it is important to avoid situations in which a lower-level objective is pursued single-mindedly to the extent that policy makers lose sight of the original societal objectives from which that low-level goal was derived. It is important as well to be clear in



differentiating between the means and the ends, i.e., between objectives and methods/tools. There is a risk of mis-representing an action (such as fishing capacity reduction) as being an objective of fishery policy, whereas in reality it is more accurately expressed as one of a set of tools for potential use in meeting real objectives (such as biodiversity conservation, income and employment generation, community well-being, etc.).

20. Two realities must be noted in relation to the pursuit of multiple objectives in the fishery. First, as Hersoug (2006) notes clearly "...there are obvious contradictions between the goals, and goal attainment can only be measured as some form of compromise. Greater attention to profitability will for example lead to less employment and most probably to legitimacy problems. (In this case sustainable resource utilisation is taken as given, that is, quotas have to be fixed at levels securing sustainable stocks also in the future).

21. Second, in pursuing a multiple set of objectives through fisheries adjustment, there is a need for *efficiency* in policy implementation. To this end, a broad view of efficiency is required, i.e., seeking to obtain the greatest benefits (in terms of meeting objectives) with the least cost, within a long-term perspective. Such a perspective can be used to determine the preferred fishery configuration – i.e., what the fishery should look like in terms of a desired 'mix' among multiple user groups (such as commercial, recreational, subsistence and aboriginal fishers), scales of operation (notably small-scale versus large-scale, or artisanal versus industrial), and gear types. Also, within any single user group or gear type in the fishery, there is a need to decide on the balance among a variety of inputs that combine to produce fishing effort (labour, capital, technology, management and enforcement activity, etc.). These decisions all depend on the blend of societal objectives pursued, and the capability of the various fishery players to meet those objectives.

## ***2.2. Links to fisheries adjustment***

22. Fisheries adjustment can be envisioned as a set of structural approaches to achieving objectives specified in the fishery. While there may be a broad preoccupation on down-sizing fishing fleets (e.g., through fleet buy-back and decommissioning schemes), and certainly the overall picture of the world's fisheries is one in which there is little room for increasing global catches, nevertheless *upward* adjustment in the magnitude of fishery capacity will be desirable under certain circumstances. Furthermore, whatever the overall direction of adjustment, the achievement of societal goals may also involve 'adjustment' through re-allocation of fishery access and/or shifting fleet composition. This may be important so that those fleet sectors (e.g., large-scale or small-scale, labour-intensive or capital-intensive) or fishery types (e.g., commercial, recreational, subsistence, etc.) most able to meet societal objectives are given preference in terms of fishery access.

23. The idea of fisheries adjustment can be related to that of 'fishery development'. While the latter could be seen as having an expansionary connotation, in fact a key aspect of fishery development is to increase the overall level of benefits from the fishery without necessarily increasing the catch (or indeed, in some situations, to *maintain* the level of benefits even while *decreasing* the catch). This can be through a range of measures to (1) improve the flow of sustainable benefits from the fishery, including market development, quality control, and improvements to distribution processes, and (2) improve the physical infrastructure, technological capabilities, institutions and/or human productivity in the fishery system. Many of these interact with structural decisions in the fishery, and thus with possibilities for fisheries adjustment.

24. Finally, it should be noted that in fishery-dependent regions, where few alternative employment possibilities are available, maintenance of sustainable livelihoods, in the form of stable employment at reasonable incomes, is often a priority among society's fishery-oriented objectives. This may be seen as

both a matter of employment and of maintaining the ‘engine’ of the coastal economy, given the flow of benefits from the fishery into coastal communities.

### 2.3. *Over-capacity*

25. Adjustment measures are often advocated as a means to manage fishing capacity – the *catching power* of the fishery, which can be assessed in terms of (a) potential harvests or (b) potential fishing effort (the latter reflected in some mix of factor inputs, including fishers, vessels and gear). Specifically, a common target of adjustment is over-capacity, which arises when there is a mis-match between the capacity *needed* to take the available harvest, and the *actual* capacity – i.e. when there is greater catching power than is needed to catch the available fish. While capacity can be assessed at any point in time, it is in fact the result of a dynamic process, involving entry of fishers, expansion of fishing effort, investment in vessel construction, depreciation, and so on.

26. Why is over-capacity of concern? It has been claimed (Pascoe and Greboval 2005) that overcapacity will “lead to lower production levels than might be achieved, and also a reduction, if not total dissipation, of the economic benefits that may be generated from a fishery”. Indeed, the development of over-capacity can involve a waste of physical capital, with more used in the fishing fleet than necessary to catch the available fish. Furthermore, if there is a positive opportunity cost of labour – i.e. if other productive activities are available for fishers elsewhere in the economy, and the fishers are mobile enough to accept those opportunities – then maintaining a greater number of fishers than needed to catch the fish can be seen as wasteful economically.

27. These concerns must be modified, however, in cases where the capital invested, while excessive, is ‘sunk’ in the sense of being already in place within the fleets of the fishery. In such cases, the economic ‘damage’ of over-investment is already done. Whether it is worthwhile to worry about, and pay for, removal of that excess capacity, as opposed to focusing on controlling the fishing effort exerted by existing vessels, is not at all clear-cut. Similarly, if fishers are in place in the fishery, and have low or zero opportunity costs, then the value of diverting funds and attention from effective fishery management to labour adjustment, in order to remove those fishers from the fishery, is also not clear-cut. In such instances, the benefits of removing excess capacity may be outweighed by the costs of doing so.

28. As Pascoe and Greboval (2005) note, various authors have “identified overcapacity as the single key problem afflicting marine capture fisheries resources”. Indeed, a tendency to blame overcapacity for fishery problems is so pervasive as to become ‘accepted wisdom’ that is rarely critically evaluated. In reality, problems with overcapacity described in the literature are often those in which, for example, effort has not been managed well, leading to a shortening of the fishing season or the like, and a resulting dissipation of benefits. In such situations of ineffective management, it may be true, as Pascoe and Greboval (2005) note, that “unless capacity is effectively controlled, there exists the potential for unsustainable levels of fishing effort to be developed and exerted”. However, the idea that overcapacity is “the single key problem” even in fisheries where either total catch or total effort is effectively controlled does not seem well-supported. This highlights the importance of understanding cause-and-effect relationships – whether fishery problems actually arise as a result of overcapacity or some other cause.

29. Indeed, as has been shown previously (Charles and Munro 1985), in some circumstances it may well be optimal to have capacity greater than needed to catch the available harvest (apparent ‘over-capacity’). This can occur, for example, when capacity had been ‘optimally’ built up previously, to catch relatively abundant stocks and in the knowledge that the capacity, being nonmalleable (i.e. with a low resale value and/or no alternative uses) would thereafter remain in the fishery. Of course, the optimality of such a situation depends on the capability of management to prevent that level of capacity from excessively harvesting the stock.

30. In addition to the above-noted economic concerns about overcapacity, there are also possible conservation impacts. It is often said that over-capacity is among the greatest threats to sustainability in fisheries. However, Pascoe and Greboval (2005) note that “the existence of overcapacity does not necessarily result in unsustainability”. This is an important point in that a fishery with over-capacity may have abundant fishers, boats and gear, and thus a *potential* to exert high levels of fishing effort and thus to over-fish, yet a powerful fleet does no damage to the stocks if the boats are tied to the dock. Thus, it is not over-capacity *per se* that poses a threat to conservation, but rather its presence in combination with ineffective fishery management that is unable to control the fishing effort of the fleet and thus the killing of fish. The effect on conservation is indirect, through problems of manageability: (a) a large number of boats is presumably more difficult to manage than a smaller number, and (b) since over-capacity often reflects high investment levels, and correspondingly high debt among fishers, this can increase the pressure to increase harvests so as to pay debts.

31. Overall, then, a realistic approach to overcapacity would recognize that (1) truly excess capacity implies a waste of physical capital, and possibly of labour resources, if there are positive opportunity costs, but (2) some overcapacity can be a good thing in a fishery, allowing for responses to fluctuating resources in the face of non-malleable capital, and (3) overcapacity by itself is often not the issue, but rather its presence *in conjunction with* poor fishery management, including an inability to control effort, an inability to resist political pressure, and an inability to keep excess capacity from shifting into other fisheries, such as those on the high seas. As noted earlier, capacity reduction is not a societal objective, nor a fishery objective (just as ‘mesh size increase’ or ‘limited entry’ are not fishery objectives *per se*), but rather all of these are rightly management and policy tools that, together in a suitable portfolio, can be used to meet a multiplicity of objectives.

#### ***2.4. The balance of labour and capital***

32. Although fisheries adjustment may at times be equated to capacity reduction, it is really more multi-faceted – including aspects relating to changes in the composition of factor inputs in the fishery. For example, past efforts at ‘modernization’ often sought to make fisheries more capital intensive, at the expense of employment, in the belief that such shifts would better meet certain fisheries goals, such as profitability and safety at sea.

33. On the other hand, shifts toward more labour-intensive fisheries may be superior in terms of employment and community well-being, fleet flexibility and fuel economy. The relative use of labour in the fishery relates to the *social opportunity cost of labour* – the true cost to society of having a fisher working in the fishery, rather than doing something else in the economy. When fishers actually have no livelihood alternatives to fishing, then there is no social cost to keeping those individuals in the fishery. Indeed, the loss of fishers from the fishery may lead, through a multiplier effect, to an economic *loss* to the regional economy. Social costs may rise, due for example to increased crime and/or decreased health and welfare levels. In such circumstances, the reduction of labour in the fishery would be a social ‘bad’.

34. In any case, the key point is that adjustment measures have the potential to be designed to alter the mix of factor inputs, in order to better meet societal objectives. For example, an adjustment measure aimed primarily to reduce fishing capacity in the fishery overall (perhaps for economic and environmental reasons) might be implemented through a judicious targeting of fleet reduction to minimize social harm to regional employment and community well-being (perhaps using capacity reduction to shift toward a more labour intensive fishery).

### 3. What Does Fisheries Adjustment Involve?

#### 3.1. Choices about the future shape of the fishery

35. Fisheries adjustment involves certain actions – such as vessel decommissioning schemes, licence retirement schemes, and changes to fleet composition – but any such alterations to the structure of the fishery sector imply the need for choices to be made concerning the desired future form of the fishery, which, as emphasized earlier, depends on the societal objectives being pursued. Potential changes, such as reducing certain fleets, or shifting from a more labour- or capital-intensive fishery, certainly impact on the achievement of such societal objectives. John (1994: p.7) has expressed one aspect of this question as follows: “Within any single user group or gear type in the fishery, a variety of inputs combine to produce fishing effort, including labour, capital, technology, management and enforcement. To what extent should each of these exit from the fishery?”

#### 3.2. Short-term and long-term measures

36. Fisheries adjustment can involve either or both of short term policies and long term policies. On the one hand, short-term measures may be focused on buybacks, dealing with redundant fishers through compensation programs and the like. Longer-term measures could include the development of ‘broader policy frameworks’ that provide coherence in policy for fisheries relative to community economic development, regional development, etc.

#### 3.3. Forms of adjustment

37. Dolan *et al.* (2005) view adjustment, or ‘restructuring’, with a focus on human-induced changes in certain key variables. They differentiate between five forms of restructuring:

physical restructuring: human-induced change in physical structure or the levels and/or distribution of ‘elements or compounds’

biological restructuring: human-induced change in species attributes such as population size, spatial structure, and/or in biodiversity measures

- industrial restructuring: change in industry or employment structure
- social restructuring: socioeconomic processes such as urbanization, demographic change, generational dynamics, etc.
- institutional restructuring: change in government policies and programs.

38. These authors (p.197) also refer to *interactive restructuring* – “the multidimensional processes that are reshaping biophysical, social, institutional, and industrial structures”, including the interactions among these and the “potential consequences for health at all levels”.

39. The following briefly presents two major classes of fisheries adjustment, namely (a) buy-back and decommissioning schemes, and (b) labour market adjustments (including licensing aspects). Another form of adjustment worth noting involves management actions, reflecting the fact that fishery management itself may need to be adjusted to improve the ‘fit’ with societal policies in terms of employment maintenance, regional development, etc.

*Buy-back and decommissioning schemes*

40. As noted earlier, reductions in fleet size and other aspects of physical capital are common components of fisheries adjustment. In the short term, these most often take place through buy-back programs and vessel decommissioning.

41. Holland et al. (1999: p.62) note that such programs often are targeted on certain groups in the fishery... “For various reasons, the designers of buyback programs have sometimes attempted to direct the buyback resources toward specific groups of fishermen. This has been done with eligibility requirements, bid ranking systems and direct allocation of funds among groups.” These authors have described the wide variety of targets to be found within such capacity reduction programs:

“Some programs have been limited to only those fishermen most dependent on the fishery... Other programs have at least indirectly targeted underutilized or inactive permits... Several programs have targeted the opposite group, the most active fishers... Other programs have targeted potential rather than demonstrated capacity... There are also examples of programs that have specifically targeted groups of fishermen on the basis of demographic characteristics. Some programs have allocated funds among gear groups, vessel classes and areas...”

From a social perspective, a range of impacts can be anticipated as resulting from buy-backs and vessel decommissioning. These are discussed later in this paper.

*Labour market adjustments*

42. Two forms of labour adjustment measures have been delineated:

- **Active labour market policies**... Measures accompanying adjustment actions, focusing either (a) at an individual fisher scale, locating alternative employment or livelihood options for displaced fishers, and/or (b) at a community or regional level, involving introduction of new employment opportunities as alternatives for the fishing sector (or generally available to all, thereby implicitly increasing the opportunity cost of fishing and inducing exit from the fishery).
- **Passive labour market policies**... sets of policy measures and incentive structures that provide the policy environment in which individuals and communities are induced to make decisions in keeping with the reality of the labour market, e.g., with shifting of labour away from the fishery in cases in which that sector cannot support the previous level of labour involvement.

***3.4. Interaction of adjustment with various aspects of the fishery***

43. This section discusses some interactions that may exist between fisheries adjustment on the one hand, and a range of fishery components or considerations on the other – the post-harvest sector of the fishery, fishing households, fishing communities, the fishery’s socioeconomic environment, gender and the role of women in the fishery, and technological change. For each of these, the interactions may occur through the particular component being impacted by fisheries adjustment, or through its affect on adjustment processes.

*Post-harvest*

44. Fisheries adjustment can include changes in the processing sector, the social impact of which will vary according to the type of processing involved and in particular whether it is capital-intensive or labour-intensive (e.g., ranging from capital-intensive factory freezer trawlers and fish meal production, to relatively labour-intensive processing carried out by fishers and their families). It is important to

understand who is working in fish processing: these individuals are very often relatives of fishers, and are usually residents of the same communities in which fishers live. Particularly notable is the major role of women in on-shore fish plant work.

45. In considering fisheries adjustment options – changes to the structure of the fishery and its constituent components (fleet types) – it is also important to take into account emerging trends in fish markets. With respect to emerging certification and eco-labelling approaches, there is a possibility that certain modes of fishing may come to be seen as environmentally- or socially-destructive. It will be important to be aware of this, since restructuring decisions that are, or turn out to be, contrary to such consumer preferences, may in fact have very negative impacts.

#### *Fishing households*

46. In some fisheries and some fishing communities, multiple household members may be involved in harvesting and/or related fishery activities, or there may be broader ‘kin relationships’ involved. If household and kin participation are major aspects of the labour market, two results can be foreseen. First, fisheries adjustment can have major social (and economic) impacts on certain family units. Second, the family connections mean that labour market processes may not work in the manner that may be expected according to theory.

47. In the long term, the availability of household labour may provide greater income security, since internalising labour costs allows the enterprise to better survive fishery downturns. Other contributors to income security include (1) cases in which household members not involved in harvesting may be involved on the post-harvest side, perhaps working in processing plants, or marketing and distributing the catch within the community and beyond, and (2) cases in which household members hold jobs entirely outside the fishery system, which could have the effect of stabilising family income and reducing the risk of major loss if a disaster in the fishery were to occur (such as an unexpected stock collapse). These various labour market complexities imply there may be less responsiveness to restructuring incentives than might otherwise be the case.

#### *Fishing communities*

48. Just as the past tendency of fishery management to focus on target fish stocks is broadening through an ecosystem approach to incorporate the context of where the fish live (ecosystems), so too is it crucial to incorporate into fishery policy discussions not only fishers but also the coastal communities where the fishers live. It is important to understand the linkages between fishery management, and how communities operate – socially, economically and in terms of community institutions. In considering the impacts of fisheries adjustment, a variety of factors within coastal fishing communities may be relevant, as shown below.

**Table 1. Factors of potential relevance in fishing communities**

<p><b>Demographic:</b></p> <ul style="list-style-type: none"> <li>• community population</li> <li>• population trends</li> <li>• levels of migration</li> <li>• age and gender structure</li> <li>• education levels</li> </ul> <p><b>Socio-cultural:</b></p> <ul style="list-style-type: none"> <li>• identified community objectives</li> <li>• religious stratification</li> <li>• gender roles</li> <li>• social stratification, power structure</li> <li>• level of social cohesion</li> <li>• local traditions and norms</li> </ul> <p><b>Economic:</b></p> <ul style="list-style-type: none"> <li>• income levels and distribution</li> <li>• wealth levels and distribution</li> <li>• degree of dependence on the fishery</li> <li>• degree of fishing-related activity</li> <li>• diversity in livelihood opportunities</li> <li>• household economic structure</li> <li>• types and location of markets</li> </ul>	<p><b>Institutional:</b></p> <ul style="list-style-type: none"> <li>• pattern of community organisation</li> <li>• pattern of local resource management</li> <li>• pattern of resource ownership, tenure</li> <li>• level of community infrastructure</li> <li>• regulatory and enforcement methods</li> <li>• traditional ecological knowledge</li> <li>• involvement of women in institutions</li> <li>• interaction with upper levels of government</li> </ul> <p><b>Environmental:</b></p> <ul style="list-style-type: none"> <li>• availability/ condition of fish stocks</li> <li>• quality of aquatic and coastal habitat</li> <li>• oceanographic/environmental conditions</li> </ul>
---	---

#### *The Fishery's socioeconomic environment*

49. The socioeconomic environment around a fishery incorporates human, social and institutional elements, at the community, regional, national and global levels. The links between the fishery and the socioeconomic environment, and consequently the possibilities for interaction with fishery adjustment initiatives, can include the following:

- Interactions of demographic aspects within the fishery, such as participation by age and gender, with external influences, such as national population and migration trends.
- The broad aspects of society, culture, history and tradition that impact on decision making in the fishery system.
- Interaction of the fishery economy with the economic structure and dynamics at the regional and/or national levels.
- Relationship of local fishery objectives to broader regional and national policy goals.
- Interaction of the local institutional structure with institutions, legal arrangements, legislation and policy frameworks at national and/or sub-national levels.

#### *Gender considerations and the role of women*

50. An important consideration in fisheries adjustment is that of gender-related impacts, notably the differential effects of adjustment on women and men. In much of the world, women are either involved in fishing itself, or play a major role in on-shore components of the fishery (such as processing or marketing).

Davis (1988: p.214) suggests that there are two major forms of participation by women: “The first mode is tangible and functional and entails women’s fishery-related work roles. The second contributory mode is less tangible and involves the emotional, ideological, more rarefied contributions women make to the fishing enterprises – in terms of their roles of wife, mother, and sister of fishermen and as carriers of the family tradition.” On the latter point, Ruddle (1994) highlights the important role of women in the building up and holding of fishery and marine environmental knowledge within the community. These can be crucial roles in the functioning of the fishery, and thus gender issues need to be taken into account in implementing fisheries adjustment measures.

### *Technological change*

51. In assessing the need for fisheries adjustment measures, as important as the level of current fishing capacity is the phenomenon of technological change, since advancements in fishing technology have been the source of long-standing processes of change in the fishery. In addition to effects on catching power and catches themselves, technological change can have social impacts. For example, McCay (1979) found that the introduction of new long-liner technology in the fishery of Fogo Island, Newfoundland, affected the level of earnings, the sharing of revenues between owner and crew, returns to capital, and labour mobility. These impacts in turn produced changes in fishery participation levels, to the extent that difficulties arose in recruiting vessel crews, despite high unemployment levels in the region.

## **4. Policy Approaches to Fisheries Adjustment**

### **4.1. Overall approaches**

52. Fisheries adjustment may be envisioned as proceeding through one of three major classes of programs – depending on the mechanism for achieving the ultimate objectives. This might range from a dependence on market forces to determine the final configuration of the fishery, to planned and/or community-based approaches to meet specified objectives:

Market approaches. In a market-based approach (e.g., ITQs), the marketplace determines the eventual configuration of the fishery, e.g., through the trading of fishing rights. In theory, those who are less efficient from an individual perspective exit the fishery after selling off their rights to others.

Planned approaches. These are targeted, selective approaches (e.g., targeted vessel buy-back mechanisms) that aim toward achieving a desired overall fishery configuration, which may take into account such factors as the differential capacity of the various gear types and fleet sectors in the fishery, and the conservation impacts of the harvesting technologies.

Community-based approaches. Local-level and/or co-management approaches to capacity reduction produce a fishery configuration that is planned to meet local objectives, and to be efficient at the fishery level (reducing fishing costs by co-ordinating fishing effort among community participants) and at the regulatory level (e.g., by reducing conflict, increasing self-enforcement and decentralising management).

### **4.2. Capacity reduction**

53. In cases of over-capacity, if fishery policy were based on but a single goal, a suitable capacity reduction policy may be fairly obvious. For example, a single-minded pursuit of maximum harvesting efficiency might focus on eliminating fishers until one reached the minimum number capable of harvesting



the available catch. But if fishery policy involves multiple objectives - that is, if society seeks a balance among a range of social, economic and conservation goals - then capacity reduction must similarly be designed to consider impacts on a range of factors, such as conservation, ecological balance, rent generation and income distribution, fishing community welfare, and institutional stability. Thus the matter of how capacity reduction can contribute to achieving the multiple objectives set by society for the fishery is a key matter to be resolved at the outset.

54. This implies that capacity reduction needs to be part of a planning process that moves the fishery system toward a desired configuration. This has two key implications...

55. First, there is the possibility that capacity reduction will need to be focused selectively on certain fishery sectors or certain inputs. For example, an optimal capacity reduction scheme may be one that reduces employment to create a more capital-intensive fishery, or one that reduces capital, promoting a shift to a more labour-intensive fishery. Either might be accomplished by changing allocations of catches, or through a 'buy-back' of targeted boats.

56. Second, in developing approaches to adjustment, it is important to properly assess policy options in terms of their capability to promote societal objectives, to guard against perverse policies. Consider, for example, policies that (a) favour specialist/full-time fishers over generalist/part-time fishers within capacity reduction programs, and (b) adopt 'use-it-or-lose-it' policies that force fishers to fish regularly or risk losing their fishing rights. Both of these policies have the effect of rewarding those who place the most pressure on the resource, while perversely penalising fishers who respond to low stock abundance by reducing their impact on the stocks (perhaps by shifting temporarily to other work). Whether these policies have positive features that compensate for these negative aspects is something that can be explored within a suitably comprehensive planning process, based on objective examination of fishery configurations.

#### **4.3. Livelihood diversification**

57. Fishery policies of restructuring and adjustment, to deal with over-exploitation and over-capacity, have been long critiqued for their failure to actively address the major problem of a lack of economic alternatives beyond the fishery. For example, economist Ian Smith (1981: p.22) long ago pointed out that rationalization actions are likely to aggravate problems posed by a lack of livelihood (employment) alternatives since "Management programmes fail to deal adequately with fishermen who are displaced". Smith noted that fishery restructuring, in the absence of non-fishery economic alternatives, may fail either because it is (a) non-sustainable and politically infeasible, due to adverse impacts on those dependent on the fishery, or (b) practically infeasible, since fishers removed from a fishery, and without other options, will do what they feel necessary - including illegal fishing - to maintain their livelihood.

58. Solving the problem of a lack of *livelihood diversity* (economic diversification) is by no means simple, yet efforts in this direction seem critical in most cases to the success of programs for sustainable fishery systems – especially in the context of heavily exploited fisheries. Such efforts will typically be composed of within-fishery and non-fishery actions, including the following:

##### *Encouragement for multi-species fisheries*

59. Within the fishery, it is useful to encourage multi-species fishing, in which fishers utilise a range of fish resources, in contrast to policies that lead to specialisation of fishers in single-species fisheries. By diversifying across sources of fish, the individual fisher reduces risks, and at the same time, the collective pressure to over-exploit is also reduced.

*Encouraging multiple sources of livelihood for fishers*

60. There can be value in reinforcing or renewing the traditional practice in many seasonal fisheries of ‘occupational pluralism’ - fishers holding jobs outside the fishery during non-fishing times. Through such practices, fishers avoid total reliance on fishing for their income, reducing the pressure they would otherwise face to obtain a livelihood entirely from the fishery, and thus also reducing pressure on the fish stocks. Encouraging such practices, and by implication, discouraging excessive specialisation of fishers, boosts the resiliency of the fishery.

*Diversification of the economy*

61. Third, there is a need to diversify coastal economies by creating new, sustainable economic activity outside the fishery sector. From the perspective of the individual, this enhances the range of available livelihood choices, both for current fishers and for young people looking for a job, making it more attractive for so-inclined fishers to leave the fishery, and reducing incentives for others to enter the fishery – i.e., increasing the *opportunity cost of labour* in the fishery. This leads to an overall reduction in fishing capacity, and reduced pressure on the resources.

62. Economic diversification may, in many cases, be the single most important need in the pursuit of sustainable, resilient fisheries. It is a particularly challenging task, but there may be hope through an *integrated* portfolio of approaches, potentially involving (i) indigenously-created employment alternatives within the local region or community, taking advantage of comparative advantages in ocean-related activity (such as fish farming, coastal tourism, and the like), (ii) overcoming constraints on local development that may be due to factors at the macro-economic or macro-political level, and (iii) attention to institutional arrangements that promote effective governance at a local level.

63. Panayotou and Panayotou (1986) suggest that economic development efforts may be best focused on promoting non-fishing employment alternatives in those areas where geographical mobility is most limited. Symes (2000, p.218) makes clear the particular need for economic diversification in small and/or peripheral communities:

“the impacts of structural rationalisation, implying both the downsizing of the fishing fleets and their concentration in more favoured locations, will be most keenly felt in the smaller, more peripheral communities where the infrastructures are less developed and connectivity to the main economic centres is weak. The need, therefore, is to buttress those disadvantaged, one-sided local economies through the diversification of their employment base and the creation of a range of alternative jobs”.

## **5. Challenges in Implementing Fisheries Adjustment**

### ***5.1. Lack of clear decision making on the desired future of the fishery***

64. Without having determined the desired configuration of the fishery – in terms of fleet composition, preferred gear types, desired labour or capital intensivity, age structure of the fishermen, and the like – structural adjustment cannot be used effectively (without knowledge of the desired direction to ‘restructure’ the fishery). For example, it is sometimes claimed that in situations with extensive over-capacity, any move to reduce that capacity will be worthwhile. Such ideas are simply erroneous – without care in working toward overall societal objectives, a mis-guided reduction of fleet capacity could well have undesirable consequences, such as altering (or preserving) the fleet composition in a manner that increases inequity (by differentially impacting on certain fleet sectors) or that destroys working institutional

arrangements (such as inherent compliance mechanisms, community-based management, etc.). There are thus real risks inherent in a rush to restructure, in the absence of clear societal objectives.

### 5.2 *Easy entry and barriers to exit*

65. The number of fishers participating in the fishery, and the aggregate fishing effort, can vary over time according to such factors as (a) the perceived profitability of fishing versus other economic activity, (b) traditional practices of the fishers, perhaps reflecting religious or cultural norms, (c) policy measures and management restrictions, as well as government actions such as buy-backs of fishing vessels, and (d) external ‘forcing’ factors - changes elsewhere in the economy or society, notably in the availability of non-fishing opportunities (affecting labour mobility).

66. Entry into fisheries can be a major problem, leading to over-capacity, over-harvesting and social unrest, among other effects. Consider, for example, a situation such as one that occurred in Costa Rica, where government policy to encourage agricultural exports provided incentives for local farmers in inland areas to cut down rain forest, so as to ‘improve’ the land, which then could be sold to ranchers, coffee growers or others. The small-scale farmers, having sold the land, found it increasingly difficult to find more land - in other words, it became more difficult to obtain a livelihood inland - so many migrated to urban areas and to the coast. The latter group began fishing, for example in the Gulf of Nicoya on the Pacific coast of the country. This increase in the coastal labour force, together with an institutional environment of inadequate fishery controls, led directly to increased exploitation of coastal shrimp and fish resources, and declines in abundance (Charles and Herrera 1994).

67. At the same time, exit from the fishery can be even more problematic. Pascoe and Greboval (2005) have summarized the barriers to exit from fisheries as follows:

“These take two main forms: the lack of alternative employment opportunities and the ‘non-malleability’ of capital. In many cases, fishers have nowhere else to go. Similarly, there are few alternative uses for fishing vessels when fisheries are overexploited. As a result, the ‘opportunity cost’ of both labour and capital is negligible if not zero, and fishers will continue in the fishery as long as they can continue to cover their running costs.”

68. With respect to the *malleability* of capital, within a situation in which capital is malleable, investments are reversible, and fishers can receive a reasonable resale value for capital, when it exits the fishery. On the other hand, if, as is common in many fishery situations, the fleet of specialised vessels has few alternative uses, capital is nonmalleable and thus reducing existing capacity is made much more difficult. John (1994: p.8) has noted that non-malleable capital “tends to make capital investment relatively irreversible and labor relatively immobile, exacerbating the exit problem...”

69. It is important to differentiate among the forces influencing decisions to exit or remain within a given sector. Heen (1988) notes that with respect to labour dynamics in general, “The concepts of ‘push’ and ‘pull’ have been used to explain labour market behaviour. A person is ‘pulled’ by a better situation, for example a higher wage. ‘Pushed’ has been used in two different ways: ‘push’ by discharge or demotion, and ‘push’ of an unfavourable situation.”

70. On this point, Hersoug (2006) notes that “There is little doubt about the general decline in the number of fishers, but labour researchers have for years debated whether push or pull factors have been the most important. ...Bad times in the fishing industry may certainly explain why many quit and why few are

recruited, but good times in other industries (such as construction, oil and gas, and public and private service), may be equally important.”

### **5.3. Lack of alternative economic opportunities**

71. Perhaps the single most important challenge to be faced in putting into place fisheries adjustment measures is the lack of economic or livelihood alternatives available for those involved in fisheries – a phenomenon that seems so common in many parts of the world. This is certainly the case in fishery-dependent regions, where, by definition, the local economy depends to a large extent on fishing activity. Many coastal regions, particularly if located at the periphery of the national economy, have a strongly non-diversified employment base.

72. This implies that there will be major social impacts arising from adjustment measures that target labour in the fishery. Indeed, those removed from the fishery through adjustment processes may well be inclined to continue fishing, albeit illegally, or to leave their home communities, thereby disrupting the integrity of those communities. For those with low geographical mobility, the latter option will not be chosen, and there is thus little alternative to staying in the fishery – given the limited nature of livelihood alternatives.

73. An important implication of a lack of job alternatives for fishers is the corresponding low level of the social opportunity cost of labour – which means that the optimal level of fishing effort will be higher than would otherwise be the case. Another implication is that the option of building livelihood alternatives can, if successful, create a range of benefits from social, economic and ecological perspectives.

### **5.4. Lack of labour mobility**

74. In situations of perfect labour markets, fisheries adjustment that reduces employment in the sector will result in a shift of individuals into other occupations, or to other locations. However, it is well established that labour is relatively immobile geographically in many fisheries (i.e. fishers do not easily accept leaving their communities in search of new employment), and there is often an element of occupational immobility as well (i.e., a reluctance to change into a job fundamentally different from fishing). These realities complicate an assessment of the social impacts of fisheries adjustment, typically implying higher negative impacts, when taken in conjunction with a lack of economic alternatives, noted above.

75. The difference in the occurrence of occupational and geographical immobility has been long noted. The results of Terkla *et al.* (1985) show that in many fishing ports studied, “labour out-migration is low because of strong attachment to community and family”, and the study of Panayotou and Panayotou (1986) indicates that labour is “quite mobile between occupations but less so between locations”. In Norway’s fisheries, Heen (1988) similarly notes that “Geographical immobility is even more striking than occupational immobility”.

76. Also important in examining labour mobility, and in assessing the human impacts of fisheries adjustment on communities, is to understand the value that fishers place on the communities in which they live. As Apostle *et al.* (1985: p.256) note, “it is essential to understand how inhabitants perceive their present-day existence. ...Do people continue to live in these small villages by choice, or from lack of alternatives?”

77. In speaking of livelihood arrangements in coastal fisheries, Hersoug (2006) notes that:

“The typical trait of such a coastal system of occupation is that it is flexible. Reduction in one sector does not necessarily result in unemployment. The individual has an occupational mobility which contributes to stability of the coastal settlement pattern, because even if a former fisher starts commuting, the family remains in the fishing community. These occupations were characterised as flexible, as they all required little formal education and few specific certificates. Today, this flexibility is considerably reduced as most coastal occupations have been through a process of professionalisation, where more formal education and certificates are required.”

78. In a World Bank report, John (1994, p.18) has noted:

“Studies relating to labor mobility in some developing countries indicate that fishermen are responsive to economic incentives and move between occupations, but there is less labor mobility between locations because of the attachment of fisherfolk to their area of residence. This tendency has implications for plans to create supplementary and alternative employment opportunities for fisherfolk in fishing communities. Such programs should be locale-specific...”

79. Heen (1988) has contrasted the concept of *industrial mobility* (transferring from the fishing industry to some other industry) with occupational mobility (job change where the new position either requires new or additional skills to those needed on the previous job). Heen refers as well to geographical mobility, which, in the Norwegian context, he defines as “...a change in resident municipalities, i.e. a physical move from one municipality to another”.

80. While the lack of labour mobility is a key challenge to fisheries adjustment, there is scope for movement, in that fishery labour processes are intimately related to the overall socioeconomic environment (Panayotou 1982). Several studies (e.g., Ferris and Plourde 1982; Panayotou and Panayotou 1986) have found that fisher labour dynamics are sensitive to market signals and economic incentives, which can substantially increase occupational mobility.

### ***5.5. Specialised, non-transferable skills / aging work force / poor retraining***

81. The lack of geographical and/or occupational mobility noted above is certainly due in significant part to a real attachment to place on the part of fishers, and others in fishing communities. At the same time, immobility is presumably connected as well to the nature of the individuals themselves, as reflected for example in the specialized nature of skills held by fishers. The demographics of fishers includes an increasing average age in many situations, and this exacerbates the immobility. Finally, there are inadequacies in the re-training programs which might otherwise help to increase occupational mobility.

### ***5.6. Lack of coherence between fishery policy and other governmental policy***

82. Holland et al. (1999: p.63) have noted that in every case they have examined of fisheries adjustment, “...governments have some types of social programs designed to help individuals in economically distressed sectors to adjust. However, these programs are often funded separately and are not coordinated with fishery capacity reduction programs.” This is an illustration of a lack of policy coherence – of coordination between fishery-specific policies and those outside the sector. Other examples could include (1) a regional development policy that seeks to maintain coastal communities, at the same time as

fishery policy is seeking to reduce the number of fishers, or (2) a labour policy that supports rural employment at the same time as fishery policy indirectly aims to reduce that employment.

83. The idea of policy coherence is often used within a fishery context to bemoan the fact that policy directions elsewhere in government (outside the fishery sector) – whether with respect to labour markets, social support programs or other policy – is not supportive of (or is counter to) fisheries adjustment measures. Of course, it is equally reasonable to conclude that in situations of ‘incoherence’, fishery policy may be out of step with overall government policy directions, or at least policy in certain key areas. In this case, it is important for fishery policy to broaden its horizon to mesh better with other policy directions.

### ***5.7. Lack of mandate to integrate fisheries with regional/community development***

84. It is apparent that one of the key problems faced in fisheries – ones seeking to relieve pressure on fish stocks without causing excessive damage to livelihoods and coastal communities – is the lack of integration of fisheries into regional economic development policy. Fishery agencies may implement policy that implicitly has major community and regional impacts, yet may at the same time claim to have no mandate to deal with such matters. Alternatively, it may be a lack of will to integrate, or even to consider, social, regional and community impacts. These considerations may not be high on the agenda in situations in which the dominant culture of an agency is one of biological and/or narrow fisheries economics thinking.

## **6. Human Impacts of Fisheries Adjustment**

### ***6.1. Potential individual and community impacts of adjustment***

#### *Effects of one-time windfall payments to individuals*

85. While fisheries adjustment is often focused on buybacks of fishing vessels and/or fishing licenses, to remove capacity from the fishery, there is also often an emphasis on the allocation of fishing rights to individuals, in the belief that this will provide a framework more conducive to capacity reduction (and in the case of transferable rights, will lead to natural consolidation of rights into fewer hands, and consequent capacity reduction). Both of these actions – buybacks and rights allocations – can produce situations in which fishers receive windfall payments from the government, whether as cash for the surrendering of their vessel and license, or as a ‘gift’ of fishing rights (e.g., quota), perhaps based on their catch history, that can be sold if desired. In either case, this phenomenon produces major inequities within fishing communities, which can have negative impacts on the cohesion of those communities. A classic instance of inequity is the free provision of individual quota rights to vessel owners in a fishery, while nothing is provided to those in the same communities who happen to be crew members on the same vessels, and contributed to building the catch history on which the quotas came to be based.

#### *Loss of individual sense of identity and exclusion from community*

86. In addition to the financial aspect of the above situation, there can also be a strong impact on individuals from a social perspective. Those removed from a fishery in the course of ‘adjustment’ may well feel their sense of identity lessened, and may even feel they are no longer a full participant in their community. This can happen even if the individual was compensated well for leaving the fishery, but may be much more intense in the case of uncompensated crew members on vessels removed from the fishery when the owners accepted buy-outs or sold their fishing rights.

*Loss of 'critical mass' and consequent decay in fishing communities*

87. In fishery-dependent regions, coastal communities will typically have the fishery sector as the 'engine' of the local economy. A decline in the fishery, whether through change in resource abundance or through deliberate restructuring in the sector, can have dramatic impacts on the integrity of the communities. A process of decay can set in, both in terms of physical decay of infrastructure (e.g., wharves) and community services (e.g., libraries, schools) that can no longer be well-maintained or supported, and in terms of a decay in the 'spirit' and cohesion of the communities.

*Inequities in fisheries adjustment*

88. In examining the major tool of fisheries adjustment, buy-back programs, Holland et al. (1999: p.60) have noted that "Whether intended or not, there are always equity implications relating to the distribution of buyback funding." They go further (p.62) to discuss the limitations on what buyback programs can accomplish in terms of dealing with all the ramifications of restructuring activities:

"These programs do nothing for other groups that may have been impacted by the crisis such as crew members who lost jobs, people working in processing and other fishery support industries. In fact buyback programs typically decrease employment opportunities for these groups."

89. Holland *et al.* (1999: p.62) point out, however, that the negative repercussions of fisheries adjustment often has been recognized:

"...and supplementary programs have been created in conjunction with buyback programs. These additional adjustment programs include unemployment compensation, early retirement pensions, job training and placement programs, financial assistance for post-secondary education, grants to develop new business, etc. They provide adjustment assistance to the groups not eligible for assistance from the buyback..."

*Health impacts*

90. The interaction between restructuring processes (i.e., physical, biological, industrial, social and institutional restructuring, as described earlier) and health have been examined by Dolan et al. (2005: p.197) with respect to each of human, community and biophysical components of 'health':

- human health, i.e. direct impacts of restructuring on health measures, such as through alcoholism and suicide, as well as nutritional aspects;
- community health: related both to the ability to promote positive human health outcomes, and to the intrinsic value of the community and to "community-level condition";
- biophysical health: capability of the biophysical environment to maintain "both biological and social organization within the context of meeting human goals".

91. One could envision use of a table such as the following to monitor health impacts of fisheries adjustment measures.

**Table 2. Structure to monitor fisheries adjustment measures**

	Human Health	Community Health	Biophysical Health
Physical Restructuring			
Biological Restructuring			
Industrial Restructuring			
Social Restructuring			
Institutional Restructuring			

**6.2. Large-scale and dispersed impacts**

92. In considering the human impacts of fisheries adjustment, one naturally thinks first of the impacts on those directly affected within the fishery sector – fishers displaced through a fleet reduction program, fish plant workers out of work due to a reduction in processing activity, etc. Also commonly considered are impacts on fishing communities. However, a full assessment of social impacts must also consider societal costs incurred more broadly.

93. For example, if a small-boat fishery is ‘adjusted’ through fleet and fisher reduction measures, this may lead to direct economic and social impacts on individuals and a loss of ‘critical mass’ economically within some fishing communities. This in turn could lead to a consequent decay in coastal infrastructure such as harbours, wharves and the like, and the possibility of a centralization of fishing activities in larger centres. All this is of importance in assessing social costs of fisheries adjustment, but there are also potential impacts beyond this.

94. In Nova Scotia, Canada, for example, citizens in urban and inland areas value their proximity to the sea and to the historical fishing culture along the coast, as reflected in the above-noted harbours and wharves, along with the small fishing boats based there. In other words, a loss or decay in those aspects would generate a negative impact on many citizens – while any one resident of an urban centre would be impacted less than a displaced fisher, nevertheless the aggregate loss across all individuals could be substantial. At the same time, tourists coming to Nova Scotia do so to a large extent for the ocean and coastal experience, with the widely-distributed small fishing towns dotting the coast being a part of that experience. If fisheries adjustment leads to a reduction in the quality of that environment, we can expect tourism decline resulting in economic losses, which in turn translate into a loss of employment, livelihood and various social impacts.

**6.3. Impacts of policy approaches to fisheries adjustment**

95. Earlier parts of Section 6 of the paper have included discussions of the impacts of various forms of fisheries adjustment, such as buy-backs, vessel decommissioning and labour force restructuring. Here, the implications of a number of broad-based policy initiatives are explored, with emphasis on rights-based allocation systems, and attention as well to integrated management and community-based management.

*Rights-based systems*

96. Rights-based fisheries management is based on the recognition or allocation of two major forms of rights (Charles 2001, 2002):



- *use rights* - designating the right to access the fishery and harvest fish resources – provide an important means to avoid the problems of *open access* in fisheries, in which an uncontrolled scramble to access resources often leads to fish stock depletion.
- *management rights* – designating the right to involvement in management decision making – lie at the heart of co-management initiatives, and may be held to varying degrees by a range of stakeholders in the fishery.

97. With respect to use rights, while there is considerable diversity in such systems, they can generally be placed within two major categories: (1) access rights, which authorise entry into the fishery or into a specific fishing ground; (2) withdrawal (harvest) rights, which typically involve the right to a specific amount of fishing effort (e.g., to fish for a certain amount of time or with a certain amount of gear) or the right to take a specific catch. If the set of use rights holders is well-defined and suitably limited, then that set becomes a key relevant body to judge the desirability of fisheries adjustment. This provides a means to internalize, amongst the use rights holders, both the costs and the benefits of fisheries adjustment that may be needed.

98. Like use rights, management rights in a fishery can be allocated in various ways. For *operational* management – determining details of fishing times, allowable hook or mesh sizes, and the like – the focus may be on ensuring that fishers have management rights, so as to improve acceptance and compliance with at-sea regulations. On the other hand, *strategic* management – concerning the overall objectives and the structure of the fishery – typically involves matters of public interest, for which not only fishers but also the general public, fishing communities, and others, are legitimate stakeholders, deserving the right to be involved. The overall goal of assigning management rights lies in the idea that this leads to better ‘buy-in’ of fishery participants, who are now working together to define their own management rules.

99. The recognition of existing use rights or management rights, or the allocation of new rights, has the potential for many social, cultural and institutional impacts, as well as the economic impacts that may have been the focus of those actions. Perhaps the two key forms of impact relate to (1) deterioration of levels of collective community well-being in response to shifts in the fishery (fishery capital, labour or supporting infrastructure) out of the community as a result of shifts in rights allocations, and (2) equity and distributional issues relating to who receives the use rights – i.e., the fishing vessel owner, the licensed fisher, the crew members, etc. These matters have been discussed in detail elsewhere (e.g., Charles 2002) so the reader is referred to those original sources.

#### *Integrated ocean and coastal management*

100. Integrated management frameworks explicitly link fisheries with other uses of the relevant ecosystem (ocean, coast, watershed), with the goal of greater coordination and effectiveness in governance. A key aspect of this lies in assessing and managing the many interactions between sectors, and of the various sectors with the ecosystem. Such a framework provides the opportunity to integrate as well the adjustments made to the various sectors – for example, restructuring in the fishery, leading to reduced labour use, might either support expansion of other sectors (where the labour can be absorbed), or alternatively exacerbate the effects of downsizing in those sectors.

#### *Devolution and community-based management*

101. Increasing policy trends toward devolution of management responsibilities to more local levels, and the accompanying expansion of interest in community-based management approaches, provides both challenges and opportunities – challenges in terms of greater difficulty in carrying out conventional centralized promotion of adjustment measures (e.g., central government bodies seeking to impose fishing capacity reductions across multiple local jurisdictions), and opportunities in terms of creating local ‘buy-

in' for actions mutually agreed-upon by central governments and local/community bodies. Some of these considerations are discussed in the following section.

## **7. Social and Community Mechanisms for Fisheries Adjustment**

102. In discussions of fisheries adjustment, there is sometimes a sense that social values and social dynamics may be viewed as constraints, even annoyances, to be faced along the path to downsizing fishing fleets and fishery labour forces. This would be an unfortunate perspective. First, as highlighted in this paper, there is no reason to believe that among the multiple societal objectives being pursued through fishery policy, social objectives are any less important than economic or ecological ones. Second, it is important to realize that social and community mechanisms can assist in fisheries adjustment, assuming of course that chosen routes to restructuring are compatible with basic social realities.

### ***Interaction of social considerations and fisheries adjustment***

103. Indeed, one can envision social factors impacting on fisheries adjustment initiatives in four major ways:

- as 'driving forces' for change
- as constraints on change
- as supporting vehicles of change
- as direct instruments of change.

104. One of these, the constraining aspect, is well known – for example, when people depend strongly on fishing, cutting the fleet drastically does have social impacts, and that reality is certainly a constraining force. However, the other three ways in which social factors interact with adjustment – driving forces, supporting vehicles and direct instruments – are clearly ones with potential to help, or indeed promote, the adjustment process. Social forces may drive the need for change in the fishery, for example to ensure food security or reduce poverty. Supporting measures may include a range of social and cultural bodies that could be brought into the adjustment process, in a participatory manner that allows for compromise in designing the adjustment measures. Finally, social mechanisms can be direct instruments of change, for example through broad-based public campaigns.

### ***Subsidiarity and local initiatives***

105. The local and community impact of fisheries adjustment has been frequently noted. For example, the Pacific Marine Conservation Council / Ecotrust (2003: p.7) comment that:

“Any reduction of the fleet, whether carefully designed or the result of regulatory or market forces, cannot help but have considerable impacts on coastal communities. Social and economic impacts can vary considerably from community to community, depending on local fleet composition, traditional target species, transportation, processing facilities and other portside infrastructure, and other factors. Likewise, any change in the composition of the fishing fleet—and hence in the size, location, and timing of fishing activity and effort along the coast—has consequences on the marine environment and living resources.”

106. Given realities such as these, Symes (2000, p.219) has noted that in modern times, “There is a greater awareness of the need to tailor the solution to the particular local conditions and to rely much more on a bottom-up approach.” Local-level approaches, and community institutions, can take a wide variety of

forms. For example, while central managers may focus on reducing capacity through individual-oriented buybacks, license retirement, etc., creative alternatives at the local level might include labour pooling (such as informal agreements amongst fishers to share a vessel) and the more formal formation of fishing cooperatives, in which fishers coordinate their fishing activity and share in the results. There seems to be strong arguments for government support to local-level and/or community-specific measures such as these that may achieve at least some of the results of fisheries adjustment but from a grass-roots approach. There is also the potential at this scale to take advantage of social forces and moral pressure to increase compliance and overall support for fisheries management.

## **8. Conclusions: Moving Forward**

107. This paper has reviewed a wide range of considerations connecting social considerations with fisheries adjustment. The importance of an objectives-based approach to fisheries adjustment has been highlighted – one in which policy actions are based on multiple societal objectives, rather than single subordinate ones that may not reflect the full reality of fishery goals. The paper has described some of the approaches to fisheries adjustment, some challenges in implementing that adjustment, and some potential human impacts resulting from fisheries adjustment, as well as some opportunities to utilize social and community forces to support fisheries adjustment.

108. It has been suggested (Symes 2000: p.220) that in addressing fisheries policy needs, “A balanced and integrated approach is essential. The position of the fisheries sector undoubtedly needs strengthening... [and] ...more robust strategies are needed to stimulate new forms of employment and a reduced dependence on the fisheries sector. For both of these agendas, State support through policy direction and financial assistance will be necessary.”

109. The key in this would seem to lie in an approach to fisheries adjustment that properly takes into account the range of objectives, dynamics and structures relating to ecological, economic and social dimensions of the fishery, and of its surrounding environment.

## BIBLIOGRAPHY

### References Cited

- Apostle, R., L. Kasdan, and A. Hanson (1985) Work satisfaction and community attachment among fishermen in southwest Nova Scotia. *Canadian Journal of Fisheries and Aquatic Sciences*, No. 42, 256-67.
- Ben-Yami, M., and A.M. Anderson (1985) *Community Fishery Centres: Guidelines for Establishment and Operation*. FAO Fisheries Technical Paper 264. Rome, Italy.
- Charles, A.T. (2006) Social impacts of government financial support of fisheries. Ch.7 in: *Financial Support to Fisheries: Implications for Sustainable Development*. Organisation for Economic Co-operation and Development. Paris, France.
- Charles, A.T. (2004a) *Subsidies in Fisheries: An Analysis of Social Impacts within an Integrated Sustainable Development Framework*. AGR/FI(2004)6. Organization for Economic Co-operation and Development, Paris France.
- Charles, A.T. (2004b) Sustainability and Resilience in Natural Resource Systems: Policy Directions and Management Institutions. *Encyclopaedia of Life Support Systems*. Developed under the auspices of the UNESCO. Eolss Publishers, Oxford, UK.
- Charles, A.T. (2002) Use Rights and Responsible Fisheries: Limiting Access and Harvesting through Rights-based Management. In: *A Fishery Manager's Guidebook. Management Measures and their Application*. (Cochrane, K., editor) FAO Fisheries Technical Paper, No. 424, Food and Agriculture Organization of the United Nations, Rome Italy, 231p.
- Charles, A.T. (2001) *Sustainable Fishery Systems*. Blackwell Science, Oxford UK..
- Charles, A.T., and A. Herrera (1994) Development and diversification: Sustainability strategies for a Costa Rican fishing cooperative. In: *Proceedings of the 6th Conference of the International Institute for Fisheries Economics and Trade* (Ed. by M. Antona, J. Catanzano, & J.G. Sutinen ), pp.1315-1324. IIFET/ORSTOM, Paris, France.
- Charles, A.T., and G.R. Munro (1985) Irreversible investment and optimal fisheries management: A stochastic analysis. *Marine Resources Economics* 1:247-264.
- Coffey, Clare (2000) European funding for sustainable development of fisheries dependent regions. p.164-173 in Symes, David (ed.) *Fisheries Dependent Regions*. Fishing News Books, Blackwell Science.
- Davis, D.L. (1988) "Shore Skippers" and "Grass Widows": Active and Passive Women's Roles in a Newfoundland Fishery. p.211-229 in: *To Work and To Weep: Women in Fishing Economies* (Ed. by J. Nadel-Klein & D.L. Davis). Social and Economic Papers No. 18. Institute of Social and Economic Research, Memorial University of Newfoundland, St. John's, Canada.

- Dolan, A.H., M. Taylor, B. Neis, R. Ommer, J. Eyles, D. Schneider and B. Montevecchi (2005) "Restructuring and health in Canadian coastal communities. *Ecohealth* 2:195-208.
- Ferris, J.S., and C.G. Plourde. (1982) "Labour mobility, seasonal unemployment insurance, and the Newfoundland inshore fishery" *Canadian Journal of Economics* 15: 426-441.
- Food and Agriculture Organization (1983) *Report of the Expert Consultation on the Regulation of Fishing Effort (Fishing Mortality)*. FAO Fisheries Technical Report #289, FAO, Rome, Italy.
- Hamilton, Lawrence C., and Cynthia M. Duncan (2000) Fisheries dependence and social change in the Northern Atlantic. p.95-105 in Symes, David (ed.) *Fisheries Dependent Regions*. Fishing News Books, Blackwell Science.
- Heen, Knut (1988) "Norwegian fishermen: Labour market behaviour and analysis" *Marine Policy* 12:396-407.
- Hersoug, Bjorn (1985) Fiskernes vandringer – om yrkesskifte og mobilitet blant norske fiskere 1971-80. Serie D: Fiskeriorganisasjon nr. 1/85. IFF, Universitetet i Tromsø.
- Hersoug, Bjorn (2006) *Always Too Many? The Human Side of Fishery Capacity Adjustment in Norway*. Paper prepared for the OECD Expert Meeting on the Human Side of Fisheries Adjustment. OECD, Paris. 19 October 2006.
- Holland, D., E. Gudmundsson and J. Gates. (1999) Do fishing vessel buyback programs work: A survey of the evidence. *Marine Policy* 23:47-69.
- John, Joshua (1994) "Managing Redundancy in Overexploited Fisheries" World Bank Discussion Paper No.240. World Bank. Washington, USA.
- McCay, B.J. (1979) Fish is scarce: Fisheries modernization on Fogo Island, Newfoundland. In: *North Atlantic Maritime Cultures* (Ed. by R. Andersen). Mouton, The Hague, Netherlands
- Munro, G.R. (1990) Applications to policy problems: Labor mobility in the fishery. In: *Mathematical Bioeconomics: The Optimal Management of Renewable Resources*, 2<sup>nd</sup> edn. (by C.W. Clark), pp.76-85. Wiley-Interscience. New York, U.S.A.
- OECD (2006) *Financial Support to Fisheries: Implications for Sustainable Development*. Organisation for Economic Co-operation and Development. Paris, France.
- Pacific Marine Conservation Council / Ecotrust (2003) *Groundfish Fleet Restructuring Information and Analysis Project. Final Report and Technical Documentation*. Ecotrust, PO Box 29189, Presidio, San Francisco, CA 94129 USA.
- Panayotou, T. (1982) *Management concepts for small-scale fisheries: Economic and social aspects*. FAO Fisheries Technical Paper #228, FAO, Rome, Italy.
- Panayotou, T., and D. Panayotou (1986) *Occupational and geographical mobility in and out of Thai fisheries*. FAO Fisheries Technical Paper #271, FAO, Rome, Italy.
- Pascoe, Sean, and Dominique Greboval (2005) Capacity management and sustainable fisheries: International experiences. In: *Overcoming Factors of Unsustainability and Overexploitation in Fisheries: Selected Papers on Issues and Approaches*. International Workshop on the

Implementation of the International Fisheries Instruments and Factors of Unsustainability and Overexploitation in Fisheries. Siem Reap, Cambodia. 13-16 September 2004. FAO Fisheries Report No. 782. FAO. Rome Italy.

Ruddle, K. (1994) Local knowledge in the folk management of fisheries and coastal marine environments. In: *Folk Management in the World's Fisheries: Lessons for Modern Fisheries Management* (Ed. by C.L. Dyer & J.R. McGoodwin), pp. 161-206. University Press of Colorado. Niwot, U.S.A.

Smith, I.R. (1981) Improving fishing incomes when resources are overfished. *Marine Policy*, **5**, 17-22.

Smith, I.R. (1983) *A Research Framework for Traditional Fisheries*. ICLARM Studies and Reviews 2. International Center for Living Aquatic Resources Management. Manila, Philippines.

Symes, David (ed.) (2000) *Fisheries Dependent Regions*. Fishing News Books, Blackwell Science.

Symes, David (2000) The future for fisheries dependent regions. p.209-220 in Symes, David (ed.) *Fisheries Dependent Regions*. Fishing News Books, Blackwell Science.

Terkla, D.G., Doeringer, P.B. & Moss, P.I. (1985) *Common property resource management with sticky labor: The effects of job attachment on fisheries management*. Discussion Paper No. 108, Department of Economics, Boston University, U.S.A.

#### **Other References**

Binkley, M (2000). "From Fishing Centre to Tourist Destination: The Restructuring of Lunenburg, Nova Scotia". Lecture at the University of Faroe Islands, April 26, 2000.

Cunningham, S., and D. Greboval (2001) *Managing fishing capacity: A review of policy and technical issues*. FAO Fisheries Technical Paper No.409. FAO, Rome, Italy.

Endter-Wada, Joanna and Sean P. Keenan (2005) Adaptations by Long-Term Commercial Fishing Families in the California Bight: Coping with Changing Coastal Ecological and Social Systems. *Human Organization* 64:225-239.

FAO. (2002). "Evaluation of the Canadian Fisheries Adjustment and Restructuring Program License Retirement Programs". Accessed August, 2006 from:

[www.dfo-mpo.gc.ca/communic/cread/evaluations/02-03/fisheries\\_e.htm?template=print](http://www.dfo-mpo.gc.ca/communic/cread/evaluations/02-03/fisheries_e.htm?template=print)

Fisheries Resource Research Fund. (2004). "Structural Adjustment in Australian Fisheries". Commonwealth of Australia.

Gislason, G., E. Lam, and K. Knowles. (2002). "Western Economic Diversification and the Pacific Fisheries Adjustment". Ottawa, ON. Accessed August, 2006 from:  
[http://www.wd.gc.ca/rpts/audit/ceaia/ia\\_e.asp](http://www.wd.gc.ca/rpts/audit/ceaia/ia_e.asp)

HRDC. (2004). "Summative Evaluation of HRDC's Component of the Pacific Fisheries Adjustment and Restructuring Program". Accessed August, 2006 from:  
[http://www11.hrdc-drhc.gc.ca/pls/edd/SP\\_AH\\_673\\_09\\_04.lhtml](http://www11.hrdc-drhc.gc.ca/pls/edd/SP_AH_673_09_04.lhtml).

Lowe, M. and G. Knapp. (2006). "Economic and Social Impacts of BSAI Crab Rationalization on the Aleutians East Borough Communities of False Pass, King Cove and Akutan". University of Alaska Anchorage.

Sea Grant Oregon. (1999). "Oregon's Changing Coastal Fishing Communities". Corvallis, OR. pp. 1-82.

Ulmer, F. and G. Knapp. (2004). "Challenges in Restructuring Alaska's Salmon Fisheries". University of Alaska Anchorage.