

Sustainability in a Newfoundland Fishing Community

Petty Harbour: Managing the Commons

Abstract

The sustainability of single resource dependent communities is one of the more critical issues facing people throughout the world. The focus of this paper is a community that managed its fishing commons on a local level since the late 1600's, and continued, to the best of its ability, to retain a measure of control and governance of a diminishing resource up until 1992 when the Northern cod (*Gadus morhua*) moratorium was declared. Commons theory as understood predominately through the work of Garret Hardin (1968) has been employed by states throughout the world to rationalize privatization of fish resources in expectation that it would generate stewardship of the resource. In fact, the opposite has occurred, the net result being degradation of fish stocks globally. Industrial interceptor fleets that employ high impact 'track and catch' technologies are now being blamed for the demise of fish stocks throughout the world, and coastal communities with historical economic attachment to fish resources have been severely undermined.

In this paper I examine common property theory, the role that it played in fisheries modernization, and the impacts on single resource dependent fishing communities. I then examine the contributions that social capital and indicators of sustainability have made to local management of common property in the past, and the implications of this for regeneration of fish stocks and coastal fishing community economies. Using Petty Harbour as a case study, I will present preliminary results of recently conducted field work that involved a mail out survey questionnaire and oral interviews with local fishers. The questionnaires were designed to provide measures of social capital and indicators of sustainability in an effort to locate an explanation to the community's high level of activism and protectionism of its fish resources. I expect to find a positive correlation between social capital and activism, and that the as indicators of sustainability, sense of ownership and leadership will provide an explanation to the mobilization of social capital. In conclusion I argue that single resource dependent communities with historical that have provided protection of the commons through the use of low impact technologies

and self-governance schemes are uniquely positioned to play a role in the regeneration of fish resources and revitalization of coastal fishing communities.

Introduction

There is widespread recognition that the industrialization of modern fisheries has had a negative impact on the abundance of fish stocks (Kurien, 1995; Safina, 1995; Fairlie et al, 1995; Pauly et al, 1998) and by extension of this, the economies and well-being of coastal fishing dependent communities. The economic impacts of resource depletion for fishery dependent communities have been well documented by scholars from many disciplines (Brown, 1998; Martin, 1998; Copes, 1999; Neis et al, 1999; Neis, 2000; Silk, 2001). Central to the fisheries debate both within Canada and internationally are scientifically grounded discussions on sustainable management of migrating fishes that navigate between Exclusive Economic Zones (EEZ) and the high seas (Finlayson, 1994; Garcia, 1996). Concurrently, social scientists are examining the broad range of socio-economic impacts that are associated with the common property nature of fish and destroyed fish stocks (McCay and Acheson, 1987; Doeringer and Terkla, 1995; Ruohomaki, 1999). Industrial fishing fleets that have evolved out of complex state supported privatization schemes are now being blamed for the demise of fish stocks throughout the world, and coastal communities with historical attachment have been severely undermined.

Solutions to the environmental degradation being caused by industrial technologies are being investigated and proposed both by social and natural scientists, as well as governments, academics, development agencies, environmentalists, and grassroots organizations (Harris, 1990; Novak and Kampen, 1992; Schnaiberg and Gould, 1994; Garcia, 1999; Franklin, 1999; Jacobson, 2000). The solutions under discussion are directed at both ecosystem regeneration and the economic sustainability of coastal communities with historical attachment to fish resources. In spite of the efforts both on national and international levels to reverse the trend of fisheries degradation, progress is slow and in many cases, regeneration of fish stocks and revitalization of communities with historical attachment is looking improbable. While the problem of overexploitation of fisheries is recognized both in Canada and internationally, effective solutions to the

larger ecological and social issues associated with resource degradation are yet to be located (Schnaiberg and Gould, 1994; Doeringer and Terkla, 1995). Globally, small coastal fishing communities are bearing the brunt of destroyed resources.

In this paper I examine the way that one coastal Canadian community managed its fishing commons for over three centuries, and continued, to the best of its ability, to retain a measure of control and governance of a diminishing resource up until 1992 when the Northern cod (*Gadus morhua*) moratorium was declared. The community under study played an active role in the management of its fishing commons but has now had its fish resource severely depleted by industrial interceptor fisheries. I use the term interceptor fishery to describe fisheries that intercept and catch stocks that have historically migrated to shorelines and supported coastal fishing communities that engage in low-impact, land based fisheries. Historically, Petty Harbour has exhibited a high level of community activism, adaptation, and resilience in response to fisheries crises that resulted from external pressures on the resource. My interest is to locate a conceptual framework that can provide a sociological explanation for the community's historical level of activism and protectionism of its fishing commons, and whether the social fabric that explains this is still present in the community and the implications of this for community sustainability.

Understanding the role that common property theory played with respect to fisheries modernization can provide insights into closure of the commons through privatization schemes contributed to the present state of world fisheries. Examining the contributions that social capital and indicators of sustainability have made to management of common property in the past can provide powerful insights into potential solutions to fisheries degradation. This in turn has implications for regeneration of fish resources and coastal community economies. I examine local fishers' perceptions of how the community's fishery was destroyed, and some of the impacts on its social infrastructure and today's fishery. Single resource dependent communities that employ low impact technologies and sophisticated self-governance have in many cases provide protection of the commons. This suggests that they may well be uniquely positioned to play a role in the regeneration

of fish resources and revitalization of coastal fishing communities. I also argue that in spite of changes to the fishery, there remains a commitment to protection of the resource and that some communities have maintained the social fabric required to be key players in regeneration of the commons. The implications of this case study suggest that an extension of protected areas and increased autonomy for communities with respect to local governance, are vital to resource management. Industrial interceptor fisheries need to be either eliminated or seriously curtailed, in order that stocks may recover. This in turn will lead to the economic revitalization of coastal communities and restoration of historical intergenerational fishing rights. This study has global relevance as fishing communities throughout the world struggle with similar pressures of exploitation and the degradation of local fisheries by industrial interceptor fisheries.

Common Property Theory

It is well established that sustainability in single resource dependent communities is directly impacted not only by environmental issues of resource protection, but also by the ability of communities to manage, respect, and protect their common pool resources (Varughese and Ostrom, 2001). Commons theory as understood predominately through the work of Garret Hardin (1968) has been used as a justification by states and corporate interests to implement privatization schemes such as Individual Transferable Quotas (ITQs) (Copes, 1998; Diegues, 1998; Copes, 1999). Commons theory assumes that resource users will fall into the trap of the ‘commons tragedy’ however academics have proposed many alternatives to conventional common pool resource theory (Marchak, 1988, Ostrom, 2001). The theory has been critiqued for several reasons: it does not acknowledge traditional communities with sophisticated management systems (Diegues, 1998), it ignores the fact that resource depletion results from excessive exploitation by commercial interests, not their common property status, and it does not account for the fact that privatization of resources has not led to preservation of the environment (Marchak, 1988; Goldman, 1998).

In his widely-cited article “*The Tragedy of the Commons*” Hardin (1968) attempts to analyse the impact of population growth on natural resources, noting that the world’s

population has grown exponentially and that natural resources are finite. His discussion is framed around a story line that assumes in an open pasture situation each herdsman will try to maximize their personal gain by placing more animals on the pasture to the point where it is destroyed, this without regard to fellow citizens. As a starting point, he assumes that the main historical events which have controlled the numbers of people and animals in a territory have been famine, disease, and war. The existence of social order and community management systems that predate modernization do not factor in to his analysis. His theory states that a rational human in a common property situation will continually seek to maximize personal gain, to the detriment of others and the environment. In an attempt to identify ways in which resolution may be found to this problem Hardin questions whether one can appeal to conscience. He speculates that guilt will not work on the lay person who is exploiting the commons, and that instilling responsibility in the minds of those who he refers to as the world's "breeders" (Hardin, 1968: 26) is not possible. He proposes that mutually agreed upon coercion through social arrangements which demand individual responsibility may provide a solution to the commons tragedy.

It has been argued that Hardin starts on a flawed footing with this analysis, and likewise ends on one (Marchak, 1988; Goldman, 1998). The theory does not take into account the fact that privatization of resources has not led to preservation of the environment. It does not factor in the impacts of corporate profiteering, expansionism, and the invasive technologies used to achieve these goals. Nor does it account for traditional communities that had sophisticated management systems. It does not recognize individual agency, or the ability of groups to collectively organize and self-regulate. Individuals may not always be conservation minded, but in community based operations, there are often social norms, values, and rules that are imposed and maintained. As well, communities have a commitment to their geographical location which provides additional incentive to implement protective measures over common property. Corporate privatization has actually led to large scale destruction of resources globally, thus undermining communities (Diegues, 1998), leading to what Bonnie McCay and James Acheson (1987) state should more aptly read the "tragedy of commoners" (55).

One study that examines the fishing and forestry industry in Canada presents an alternative analysis of common property theory (Marchak, 1988). It examines the flawed logic of the theory and suggests that with regards to the fishing and forestry industries of British Columbia, the argument is misplaced because resource depletion results from excessive state supported exploitation by commercial interests, not their common property status (Marchak, 1988). Contemporary economic theory defines common property as property that no one owns but all can make use of, and it assumes that if outside forces do not implement measures of control, degradation will occur. Patricia Marchak (1988) presents a compelling argument that calling natural resources under public management common property is historically inaccurate. She suggests a more historically accurate definition would be one that encompasses the notion of a common resource where a collectivity manages and controls who has access. This is because historical usage referred to a situation where a set of rules existed to control access and management, so in a sense, there were co-owners. This perspective has been supported by the work of academics from many different parts of the world (Johannes, 1981; Doeringer and Terkla, 1995; Diegues, 1998; Copes, 1999). Given this, common property is a contradiction because it refers to property that no one owns, but every can access, and no one has the authority to manage it.

Common property theory was highly influential in shaping Canadian fisheries policy, particularly through the work of Scott Gordon (Marchak, 1988; Wright, 2000). With respect to its governance of the Canadian fishery and forestry industries, the state acted on the assumption that individuals were only concerned with maximizing short term gain with no concern for the long term status of the resource. This line of reasoning was then used to justify the transference of historical common property rights to corporate interests through privatization schemes such as ITQs in Canadian fisheries (Sinclair, 1988; Finlayson, 1994; Copes, 1999). In this way the state supported corporate interests while neglecting the reality of historical community management schemes and attachment rights. Corporations are driven by economic efficiency models that strive to achieve the higher profits, in shorter time frames, employing fewer people. When corporate

ownership takes control, the method, the pace, and the technologies utilized are such that rapid depletion of resources takes place: once the profits diminish, companies relocate (Marchak, 1988; Schnaiberg and Gould, 1994; Franklin, 1999).

Upon reviewing 'the tragedy of the commons' theory and its influence on the formation of state policies there is a certain appeal to the sentiments of Michael Goldman (1998). Goldman (1998) questions how it is that Hardin's work has sustained, and been built upon to the point where there is a virtual "'monotonal' epistemic community'" (21) of scholars and professionals who adhere to the "discursive modalities" (21) of the tragedy theory. There is no question that Hardin's topic, that of a burgeoning population in a world that on a daily basis has shrinking resources and an increasing damaged environment, was, and still is, one of critical importance. Unfortunately his theory contains what I would suggest is a fatal flaw: it does not recognize the ability of individuals and by extension of this, communities, to overcome personal greed when managing common property resources.

Fisheries Modernization.

The combination of common property theory and modernization processes that have fueled unsustainable resource extraction (predominately by corporate interests) possibly presents the greatest obstacle to overcoming environmental degradation and achieving community sustainability (see Marchak, 1988). Modernization of the fishery in Canada was heavily influenced by politicians and fishery planners who promoted a specific ideology of development, one that was part of a historical trend of large scale industrial development and privatization of resource (Wright, 2000). According to Miriam Wright (2000) the dichotomy of 'traditional versus modern' became central to modernization theory. In the case of the Newfoundland fishery, throughout the 1930's-1960's there were major shifts both in fish production and in the offshore fleets that extracted the resource (Ommer, 1988; Sinclair, 1988; Wright, 2000). It was determined that the establishment of a regular, year round supply of fresh frozen fish designed to accommodate the demands of a United States market, would resolve the problem of seasonal fluctuations (Wright, 2000). Salt bulk fish production was replaced by fresh frozen product in an effort to

access a wider market and make Newfoundland fish be more globally competitive (Sinclair, 1988; Wright, 2000).

After the Second World War, the focus on biological theories and models shifted, and economic theory started playing a prominent role in fisheries management. Several economists were appointed to key positions in the fisheries department, and the work of one highly influential economist, Scott Gordon (see Gordon, 1954) became instrumental in shaping fisheries policy through the introduction of common property theory to fisheries management (Gordon, 1954; Marchak, 1988; Wright, 2000). Coinciding with the introduction of common property theory to fisheries was the creation of a powerful, government funded, offshore industrial fleet (Finlayson, 1994; Sinclair, 1998). Throughout the world, governments have based fisheries management decisions on economic models that favour industrial fisheries to the detriment of fishing communities with historical attachment rights (Sinclair, 1988; Kurien, 1995; Doeringer and Terkla, 1995; Ruomaki, 1999; Cheung, 2001). In Canada, intervention, regulation, and privatization through limited licencing schemes and quotas were introduced, measures that coincided with the declaration of the Canada's EEZ. Creation of privatization schemes such as ITQs has resulted in corporate concentration of access to fish resources in large scale industrial interceptor fisheries, this to the detriment of coastal fishing dependent communities (Kirby, 1982; Marchak, 1987; Matthews, 1993; Copes, 1998; Copes, 1999; Silk, 2001).

While a series of reports commissioned by the Canadian government recognized the rights of communities with historical attachment to have priority access to regenerated cod stocks and that the principles of co-management and shared responsibility should be incorporated into management schemes, the Federal government ultimately implemented radically different recommendations (Finlayson, 1994). A 1982 commissioned report stated that inshore fishers were a drain on the economy due to their inability to generate year round fishing income (Kirby Report, 1982; Sinclair, 1988), whereas the offshore fishery with its year round industrial capability was deemed to be one of economical efficiency. In 1985, the first factory freezer trawler licence was issued to a new Canadian operated multinational company, thus marking a first step in the development of a

Canadian fleet with modern track and catch capabilities that ultimately contributed to the destruction of the Northern cod stocks (Sinclair, 1988; Steele et al, 1992).

Coinciding with changes to state management was the increased involvement of state employed scientists who were charged with producing predictions on stock assessments. Working on the premise that nature behaves in a predictable manner and that there could be accuracy in single stock assessment, government employed scientists provided yearly advice on allocations of ‘total allowable catch’, otherwise referred to as TACs (Steele et al, 1992; O’Boyle, 1993; Finlayson, 1994; Rose, 1996; Constanza et al., 1997; Walters, 1998). It is well established today that one of the main reasons single species stock assessment has failed is that it neglects to factor in ecosystem dynamics (Steele et al, 1992; Walters, 1998; Pauly et al, 1998). It has now been identified that there were overly optimistic assessments of the Northern cod spawning biomass during the 1980’s which led to overexploitation of the stock and by the time the 1992 moratorium was declared it was too late to protect it (Steele and Anderson, 1997). The northern cod stock remains in a precarious state today, and the fishery has not been opened to inshore fishers. It has been suggested that there is no room for any type of cod fishing at this time if the stock is to recover, and that when it does, the historical pressures of the 1980s cannot be resumed (Haedrich et al, 2000). The implications of this for coastal communities with lengthy historical socio-economic attachment to this fish resource are severe.

The world’s historical abundance of fish has supported small scale fishers for centuries and until quite recently they were contributing one half of the world’s fish (Silvestre and Pauly, 1997). Fish was caught by more efficient and less polluting, technologies, ones that provided more jobs per unit of investment than modern technologies (Berkes, 1987). Community based resource extraction economies were able to sustain either in a state of equilibrium and stability, or through adaptation (Hollings et al, 2000; Berkes et al, 2003). Arguably one of the critical differences between many of the indigenous fisheries and today’s industrial fishery is the sophisticated “track and catch” capability that now exists (Harris, 1990). The introduction of new technologies such as sonar, radar, and satellite monitoring has opened the world’s oceans to unprecedented exploitation (De Groot,

1984; Junquera et al, 1992; Fairlie et al, 1995; De Alessi, 1997). It has now been proven that the intensification of industrial technologies and the extractive processes that exist in modern industrial complexes cannot be sustained (Schnaiberg and Gould, 1994; Diegues, 1998; Jacobsen, 2000). The literature on coastal fishing communities identifies that they are unable to withstand the assault by modern extractive technologies, and many have now lost access to viable economies that have sustained them, in some case for hundreds of years (Silk, 2001). In many cases the social fabric of urban and rural communities has been severely damaged by global economic policies.

In a discussion noting that scientists have not been able to resolve the crisis in world fisheries, Fikret Berkes (1987) argues that the one of the key problems is that the “bio-economic paradigm needs to incorporate political and social considerations” (88). The model of economics that 20th century development has been based on has fueled the process of globalization, a trend that has led to widespread destruction of natural ecosystems and caused economic impoverishment of communities throughout the world (Goldsmith, 1996). At this time there is a general unwillingness both by states and the corporate world to accept blame for the way that resources have been mismanaged (Beck, 1992: 33). The combination of destroyed economies, increasing poverty and destroyed ecosystems is fueling a new wave of social theory that can move beyond describing the problem to locating concrete solutions. The study of social capital and indicators of sustainability are two developing theoretical frameworks that are showing potential for moving closer to this goal.

Social capital and indicators of sustainability

Social capital and indicators of sustainability are two areas of study being developed by academics who are seeking to explain what social factors can help facilitate community sustainability. Social capital is described as the features of social life such as networks, norms, and trust that allow people to act together effectively (Putman, 1993; Coleman, 2000; Dale and Onyx, 2005). There is recognition that the presence of high levels of social capital can contribute to community sustainability (Dale and Onyx, 2005). The study of social indicators of sustainability is being explored to make determinations about

when a community is likely to be sustainable. The dominant indicators used to measure sustainability tend to be easily quantifiable objective measures such as levels of education, access to viable employment, and real estates values (Beckley et al, 2002). One of the problems with this approach is that sustainability of ecosystems and the environment do not necessarily factor into the equation. For example, a forestry community that has exhausted its tree supply may measure up nicely with respect to indicators of sustainability if the communitiy can create an alternative economy such as tourism. My argument is that discussions of sustainability in resource dependent communities must factor in both regeneration of the resource and revitalization of community economies. It is apparent from a growing body of literature that there is a greater probability that this will occur when there is a high level of social capital that can be put to work for the community (Dale and Onyx, 2005).

Social Capital

The concept of social capital originated with the early work of Pierre Bourdieu and was then further developed by James Coleman, a well respected social theorist whose work then became influential in the English speaking world (Field, 2003). It was however predominately through the work of Robert Putman (1993) that it gained notoriety and has since become a widely studied concept with a prominent foothold in studies of development and sustainability (Woolcock, 1998; Krishna, 2002; Dale and Onyx, 2005). While there are both complimentary and competing explanations to why this has happened, a common thread of thought is that the study of social capital can provide insights into ways that sustainable development can be achieved (Woolcock, 1998; Schuller et al, 2000; Krishna, 2002; Grootaert et al, 2004; Dale and Onyx, 2005). There are many definitions of social capital and this has led to some criticisms of the concept. According to some academics, the extensive and varied applications of social capital have led to a lack of clarity raising the question of whether imprecision of definition affects the validity of the concept (Baron et al, 2000; Krishna, 2002; Newton, 2001). Others have noted the binary nature of the social capital that stems from the way it tends to be framed as either singularly positive or negative (Woolcock, 1998; Krishna, 2002). It has been suggested that the complexity and diversity of definition are a reflection of its

status as a new concept in the field of social research (Dale and Onyx, 2005). There is a general consensus that the features, networks, norms, and trust, form a triad that provides the conceptual structure that dominates the discussion of social capital and that it represents individual ability to secure benefits through membership in networks, and reciprocity (Schuller, 2003; Onyx, 2005).

Investigations into social capital with respect to the role it can play in sustainable development are of critical importance. Authors Ann Dale and Jenny Onyx (2005) explore this in detail in an effort to tease out the intricate and somewhat elusive relationship between these two concepts. Social capital is perceived by these authors as essential to sustainable development for the following reasons. They argue that sustainable development will only come about through reconciliation of what they refer to as the three imperatives of sustainable development: the social imperative that should ensure democratic governance, the economic imperative that states the basic needs of all people should be met, and the ecological imperative which refers to the need for humans to live within the carrying capacity of global ecosystems (Onyx, 2005: 2; Dale, 2005). Reconciliation will only occur through collective action which requires that a 'stock' of social capital be present and that certain mechanisms are present to activate the social capital (Onyx, 2005: 6). This notion of a catalyst, a mechanism that takes social capital from a static state to a working tool is important. Anirudh Krishna (2002) suggests that the presence of social capital in most communities is a 'given' based on studies that have been conducted throughout the world. He states that social capital is context driven, and that cross-culturally it will manifest in different ways, suggesting that the key issue is to understand the mechanisms by which it becomes a working community asset.

Social Indicators of Sustainability

In the wake of the 1992 World Summit, sustainable development gained both definition as a concept and a solid foothold in the global world of environmentalism (Gale and Cordray, 1994; Macnaghten and Urry, 1998). The release of the Brundtland Report (1997) that examined how modern development is linked to environmental degradation and expanding poverty gave rise to a new public discourse on sustainability (Macnaghten

and Urry, 1998). This definition of sustainability, meeting the needs of today without comprising the ability of future generations to meet their needs (World Commission on Environment and Development, 1997: 43), is problematic. It is apparent that in many instances the ability to meet present need has been exceeded, and that the elasticity of some ecosystems and natural resources has been pushed to a breaking point (Murphy, 1994). The concept is fraught with tension given the contradiction that lies between reconciling economic expansion with environmental preservation (Novek and Kampen, 1992; Schnaiberg and Gould, 1994). In spite of this, efforts to create a working tool out of the concept have given rise to sustainability indicators. There is now a substantial body of literature that examines how the presence of specific indicators in resource dependent communities can help to predict when a community will be able to adapt and sustain in spite of external forces (OECD, 1998; Nadeau et al, 1999; Beckley et al, 2002).

The field of research on community stability and sustainability has identified several key indicators of sustainability in forestry communities (Nadeau et al, 1999; Beckley et al, 2002; den Otter and Beckley, 2002). These include population, employment, income, human capital, poverty, and real estate (den Otter and Beckley, 2002). Some of these studies focus on indicators that make predications about how individuals who, when faced with the dilemma of common pool resource exploitation, will organize and self-regulate in order that a resource not be overexploited (Varughese and Ostrom, 2001; Nadeau et al, 1999; Beckley et al, 2002). A study of forest communities in Nepal shows that in over 80% of the communities with high levels of collective action, the forest is improving, and where there is poor collective action, over 80% of the forests are deteriorating (Varughese and Ostrom, 2001). The study clearly reveals that if a group of people share common goals such as trust, autonomy to make rules, similar interests, and a common understanding of the gains to be achieved, there will be a stronger impetus to organize and establish fair and encompassing rules for governance of natural resources (Varughese and Ostrom, 2001). These attributes combined with access to a viable resource, are more likely to lead to a situation where self-governance endures and the state of the resource benefits (Ostrom, 2001; Varughese and Ostrom, 2001). What this suggests is that working with communities to determine if these social indicators of

sustainability exist may present a potential solution to the restoration, and sustainability both of human communities and fish resources.

There are many academics who now suggest that the complexities involved in sustainability and resource management demand an interdisciplinary approach if solutions are to be located. The intent my research in Petty Harbour is to take an interdisciplinary approach to locate the contributions that coastal communities can make to sustainability by examining how sustainable practices evolve. Understanding the relationship of social capital to activism that results in stewardship of the commons has much to offer the sustainability debate. It is argued that social capital evolves through a lengthy historical process (Putman, 1993) however recent work shows that it can be built up in communities in a relatively short period of time (Krishna, 2002). This presents a compelling reason for further investigation into how social capital evolves or how it can be built up in resource dependent communities.

Petty Harbour: a history

Petty Harbour is a Newfoundland fishing community of approximately 1000 people situated on one what was, one of the most prolific fishing areas of Atlantic Canada. The economic mainstay of the community since it was established in the late 1600's has been *Gadus morhua*, commonly referred to as Northern cod (Martin et al, 1996). Northern cod refers to the cod found in Northwest Atlantic Fishery Organization (NAFO) divisions 2J, 3K, and 3L (Hutchings, 1999). In 1992, a moratorium on cod fishing was called, leaving approximately 40,000 fishers and plant workers unemployed in Newfoundland; approximately 300 of these people were employed in fishery related activities in the community of Petty Harbour (Martin, 1998; Clarke, 2003). The predominant form of fishing in Petty Harbour-Maddox Cove up until the moratorium of 1992 involved the use of two passive gears types: the cod trap and the baited hook and line fishery (handlines).

The community is unusual in that it has protected area legislation that can be traced back to the 1800s (Section 49, 50 of the Fisheries Board Act, 1895, respecting the Department of Fisheries, British Rule). The legislation states that no gill nets or long lines can be used

in the legally recognized fishing commons of the community. The cod migrated on an annual basis to the shores of the community, following a small fish called capelin (*Mallotus villosus*). Prior to the Northern Cod moratorium of 1992, one could generally start handlining in late May, and cod traps were usually set by early to mid-June and removed by the end of August. Winter storms usually set in around the beginning of November and cod was usually too scarce by this time for handlining to be viable and boats would be pulled ashore. Fishers fished in small boats, generally 6 to 10 metres with carrying capacities of anywhere from 1000 to 20,000 kilograms. An average catch from handlining would be around 500 kilograms while traps would usually produce between 1000 to 5,000 kilograms both morning and evening, sometimes more. Other less lucrative species have been fished over time such as mackerel, herring, lump roe, capelin, and squid.

In spite of the fact that the Newfoundland fishery has been plagued with cycles of instability both in the market and in fish catches, cod remained the economic backbone of many fishing communities in Newfoundland until 1992 (Candow, 1997). Throughout its history of fishing, Petty Harbour, like many other Newfoundland communities, has been forced to respond to pressures of exploitation, and has exhibited ongoing adaptation and resilience, as well as resistance to external resource extraction (Candow, 1997; Martin et al, 1996; Wright, 2000). The recent patterns of exploitation are not new however, what is different about today's fishery is the intensification of effort, the highly sophisticated technologies that are employed, and the scale of economy that drives the industry (Martin, 1998; Haedrich et al, 2000; Silk, 2001). As of today, there is still no cod fishery in the community and the numbers of people involved in the fishery have decreased by well over fifty percent.

The crisis that has occurred in Newfoundland communities as a result of the Northern cod closure is much more than an economic one (Tisdall, 1997). Newfoundland fishing communities have engaged in a cultural, social, and spiritual relationship to the exploitation of fish, forests, and other wildlife, a pattern that has been well documented for cultures throughout the world (Johannes, 1981; Berkes, 1987; Bess, 2000). Once a natural resource is identified as something to be exploited, there is a tendency for state

institutions to become involved in complex management schemes that undermine the power of local institutions. Privatization schemes are implemented and natural resources become corporately dominated, marketable items, isolated and disembedded from complex socio-ecological systems. The concept 'disembedding' has been used to describe the way processes of modernization cause social relations to be lifted out of local contexts of interaction and then restructured across time and space (Giddens, 1990). The term has subsequently been employed by some academics to describe the social change that occurs when external processes of resource extraction lead to a social crisis such as can be witnessed with the destruction of the Northern cod fishery (Sinclair et al, 1999). It seems appropriate as an applied concept, particularly in light of the fact that stewardship of natural resources is more likely to occur in communities where social relations are embedded, rather than in a disembedded, profit driven, industrial complex where the only hope for stewardship is that responsible action will be legislated, and then enforced. In spite of the major changes that have occurred in Newfoundland communities, it appears that many have engaged in an ongoing process of change that reflects resilience and adaptation, (Candow, 1997; Wright, 2000). The remainder of this paper will examine some preliminary results of field research that was conducted in Petty Harbour during the early spring of 2006.

Research Methods

Historically Petty Harbour exhibited a high level of community activism usually in response to fisheries crises that resulted from external pressures on the resource. Collective activism is an obvious manifestation of individual activity, so by understanding factors that lead individuals to become politically and socially active in their communities, one can better understand how sustainable practices evolve and are maintained. I recently conducted field research designed to determine the role that social capital may have played with respect to the community's activism that has contributed to community sustainability and what the implications of this are for going forward in time for community management of its commons. I am now in the process of starting to analyse the data and am able to provide some preliminary descriptive findings, particularly with respect to oral interviews I conducted.

I began my study with the assumption that social capital, described as involvement with, and attachment to, informal and formal community networks would be present in Petty Harbour (Krishna, 2002). Having been a resident fisher of the community for almost 20 years gave me an advantage with respects to knowledge of its social history. My hypothesis is that the presence of social capital is necessary but not sufficient to explain levels of individual activism. I introduce leadership and sense of ownership as independent variables to further explore explanations activism and stewardship of resource. I expect that my data analysis will point to a positive correlation between levels of social capital and activism, and that leadership and sense of ownership provide what could be described as a catalyst that allows social capital to become a working asset. Arguably, data collected in a single case study such as mine cannot realistically be generalized to a broader population (statistical generalization); it can however provide analytical generalizations that can be extended to theoretical propositions (Yin, 1989: 21).

My data collection took place in the months of January to March, 2006 and during this time I conducted a mail out survey and several lengthy oral interviews. My target population was both men and women who have been licenced by the Department of Fisheries and Oceans (DFO) to fish commercially in the past and/or present and who have fished either because they are resident fishers, related fishers, or people from outside the community who locate their commercial enterprise on the legally recognized fishing grounds of the community under study. I was surprised by the dramatic decrease in the numbers of licenced fishers, down from 112 in 1985 (Anon, 1985) to 54 in 2005. My survey questionnaire was designed to provide information on past and present indicators of sustainability, networks and trust, and trends in fishing practices. The oral interviews I conducted were designed to compliment the survey questionnaire by collecting information about the perceptions that fishers have of their present role in the fishery, causes of the destruction of the fishery, and perceived solutions to the fishery crisis.

The intention with my research is to locate sociological theory that can explain the unusually high level of activism that Petty Harbour has exhibited with respect to protection of its fishing commons. My survey questionnaire was designed to capture information on levels of social capital, activism, community leadership, and sense of ownership over local fish resources. When the data analysis of these questionnaires is complete, I expect to be able to determine whether there are positive correlations between levels of social capital and activism, whether leadership and sense of ownership factor into the equation with respect to being influential on the community's protectionism of its common property resource, and what the implications are for both resource and community sustainability.

Knowing that I was dealing with a small sample population and with concerns of poor response rate, I formatted my oral interview questionnaire such that I would capture a similar body of information. I was able to do this, and in particular, capture the perceived presence of strong leadership (note this is of particular interest to social capital theory as per Krishna). However other themes emerged, striking ones that have powerful implications to the issue of stewardship and common property protection. One very powerful theme that emerged was the importance of local knowledge, concerns over the erosion of it, and the disturbing discrepancy between local knowledge and formalized western science knowledge, as transmitted through the DFO scientists. The second striking issue was concern over loss of access to fishing and intergenerational rights, which addresses the sense of ownership concept. A third and unexpected theme that emerged was the way that the state as an external institution is reshaping the social fabric of the community by imposing rules and regulations that prevent access to local knowledge, to fishing, and to traditional patterns of social interaction and norms. Many of the responses to the question: do you think Petty Harbour has managed its fish resources well resulted in answers that make it apparent that management and stewardship are inextricably linked. (All of these issues have implications for common property. I need to develop a concept or phrase to encompass this idea.) All of these points are salient to my main argument that communities such as Petty Harbour are uniquely positioned to provide management-stewardship of local resources, and that the

negative impacts of external forces, be they industrial interceptor fisheries or centralized state management, need to be controlled.

Local Knowledge

Asking questions about the sentinel fishery provided a tool for gaining insights into the way fishers feel about DFO's knowledge base, and also to determine whether local fishers perceived the sentinel fishery as a meaningful endeavor on the part of science. The apparent intent of the sentinel fishery was to provide DFO with information on local fisheries as historically there was an exclusive focus on gathering data on fish stocks through surveys of the offshore. There were multiple benefits according to fishers interviewed and much disappointment when it ended abruptly, apparently with little explanation. The sentinel provided an opportunity to get on the water, to stay in touch with their profession, and it provided the fresh fish for consumption. All people interviewed felt strongly that the sentinel fishery was important, particularly the tagging component which was seen by local fishers to be the best indicator of what was going on with the fish. Just to clarify, in Newfoundland, cod is fish, everything else has a name like salmon or capelin.

According to the fishers I interviewed, a percentage of the tagged fish from Petty Harbour showed up in a southern part of Newfoundland, suggesting that some of the local fish belonged to a different stock to the Northern cod. It has been understood down through the generations that there were two different stocks of cod that came through Petty Harbour and many 'old timers' talked about the two different fish, and the way you could tell them was through the coloring, the size, and the seasonal migratory patterns which varied substantially temporally speaking. There are DFO documents on the tagging experiments that appear to lend credibility to this idea. The predominate perception of fishers interviewed is that DFO eliminated the sentinel fishery in Petty Harbour because it was revealing that some of the community's fish was migrating in from an area that to this day has an open commercial fishery, whereas Petty Harbour still does not. My review of DFO documents that analyse data from the sentinel fishery revealed that the community's data was missing.

During an informal discussion with a DFO scientist about why the Petty Harbour data could not be located in any of the published results of the sentinel, it was suggested that Petty Harbour data was not compatible with the quantitative analysis that was being conducted throughout the province. Gill nets and longlines were being tracked because they are highly quantifiable however as both these technologies were banned in Petty Harbour, the fishers insisted that the hook and line fishery, and cod traps be the measuring tool. The fishermen were aware of the controversy surrounding their insistence on using the community's historical technologies, and to quote one fisher 'the scientists did not want the trap information, they did not see the traps as reliable.....in order to keep fishing we had to set gill nets'. At this time the data from Petty Harbour remains unanalyzed. There is a sad irony in the fact that the one of the world's least destructive technology, hook and line, one fish at a time, cannot be factored into stock assessment because it is not considered quantifiable.

Fishers unanimously agreed that the indigenous knowledge was being lost and they cited two reasons for this: not being able to enter the fishery, therefore the younger generation is not getting an opportunity to learn from the older fishers, and the new technologies such as GPS. There is a dependency on new electronic technologies which means that the older methods of using marks to locate specific fish grounds are lost. Local knowledge involves more than the visual marks and locating grounds: there was a sophisticated knowledge of tide, winds, seasonal cycles, implications of fishing on different grounds seasonally etc. Several fishers mentioned the importance of temporal knowledge, knowing the fish patterns year after year. This issue was highlighted with one of my questions that asked: where do you see the crab fishery five years from now? There was a carte blanche response that there is not enough local history with the fishery to make an educated guess, "we don't know, how could we know", "I am only at it less than 10 years". This response is striking given that most people with a decade of experience on a job would consider themselves to be quite knowledgeable. In the case of Petty Harbour crab fishers, most of who have been fishing for well over 30 years, it is notable that they did not feel confident to make even so much as a guess. This highlights the fact that

people recognize that in order to know fish, you need to know long term patterns of catch, migratory, seasonal and annual fluctuations in species abundance.

The Critical Issues of Common Property

Input here the results from the questions on access, rights of access, management in the past and today's capability, and also where people see the cod moving forward in time. It is important to note with respects to management the community lobbied actively for protected measures for the cod. They sought a closed season and actually took the federal government to court arguing that it was negligent in its mandate to protect fisheries. This came up in some of the interviews, the notion of no protection in other fisheries, such as the offshore, whereas with the inshore, there was respite for the fish once they left the area, they could no longer be exploited. This really is the crux of my research, the transition from a seasonal to year round track and catch fishery which has undermined every single major migratory fishery in the world.

There is a very strong sentiment that intergenerational fishing rights should be a given. Everyone talked about the lack of youth entering the fishery and some of the reasons why: out-migration to mainland jobs paying higher, and the difficulty getting hours on the water. The overall uncertainty, some discussed the issue of safety particularly because Petty Harbour was always a day fishery, as one person put it "Petty Harbour fishers are different, they were never meant to go out overnight. We used to hug the rocks but now we're off 20 miles or more".

Of key interest here is the way that fishers blend management with social responsibility, norms and obligations, again, this links to social capital as community norms and obligations, also trust on the water further on. To give an example one question asked: do you think Petty Harbour managed its fishery well? One fisher noted: 'they did the best they could, they did a marvelous job, for a start they had a protected area, they drew trap berths so everyone had a fair shake at getting a good summer, and even then they would share with their neighbour that had nothing.....and when there was a quota, all hands would get a bit'. What becomes apparent is that the boundaries between management

and social concern become quite blurred. This links to much of the literature on traditional economies and indigenous communities. It also ties into the theoretical literature on stewardship, and when it is likely to occur. This same fisher suggests that this behaviour was passed down through the generations and probably stemmed from the fact that when the community was settled in the 1600s people were forced to rely on each other in order to survive. Social responsibility and social cohesion are apparent. It was noted by another fisher that “Catholics and Protestants were always at each other but they lost their religion on the water” again, a strong indicator of the interdependence, denoting a high level of social capital. Historically there have been strong religious divisions in Newfoundland communities between the Catholics and the Protestants, and most communities such as Petty Harbour clearly defined geographical separations based on religion. In spite of this, levels of trust were, and still are high in this community.

Does Krishna talk about structural (norms) and cognitive (trust) social capital; review this for a theoretical link here.

Conclusion

Offshore interceptor fisheries have proven fateful to fishes and fishing people in communities that are positioned on virtually all shorelines of the world. I argue that it will only be through de-legislation of these fisheries and a shift from economic to conservation and biological models that incorporate local knowledge that there will be ecosystem recovery leading to community sustainability. To this day there is no Northern cod being fished in Newfoundland, and according to DFO there is little recovery in site. DFO maintains that the only fish ever fished in Petty Harbour was northern cod, however fishers will tell you there were always two stocks in Petty Harbour: one from the north, the Northern cod, and one from the south. DFO does not acknowledge the southern fish stock in spite of the fact that tagging experiments reflect a certain amount of cod movement between Petty Harbour area and the south coast of Newfoundland. This highlights the complexities, the uncertainties in fisheries science, the discrepancies between local knowledge and science, and the need for change to the modern approach to fisheries management.

Bibliography

- Anon. (1985). *Atlantic Fishery Licencing Directory*. Department of Fisheries and Oceans, Government of Canada: Ottawa.
- Beckley T.M. (1995). "Community Stability and the Relationship Between Economic and Social Well-Being in Forest-Dependent Communities." in *Society and Natural Resources* 8(3): 261-266.
- Beckley, Thomas, John Parkins, and Richard Stedman. (2002). "Indicators of Forest-Dependent Community Sustainability: The Evolution of Research." *The Forestry Chronicle* 78(5): 626-636.
- Berkes, Fikret. (1987). "Common-Property Resource Management: Indian and Cree Fisheries in Subarctic Canada, in *A Question of the Commons*, Bonnie J. McCay and James M. Acheson. Tucson: The University of Arizona Press. 69-91.
- Berkes, Fikret, Johan Colding and Carl Folke, Eds. (2003). *Navigating Social-Ecological Systems*. Cambridge, UK: Cambridge University Press
- Bess, Randall. (2000). *New Zealand Maori: Claims to Fisheries Resources*. Paper presented to IIFET, Oregon State University.
- Brown, Robert C. (1998). "Community-based cooperative management: renewed interest in an old paradigm" in *Reinventing Fisheries Management*, Eds. T.J. Pitcher and D. Pauly, 185-193. London: Kluwer Academic Publishers.
- Bunker, Stephen G. (1984). "Modes of Extraction, Unequal Exchange, and the Progressive Underdevelopment of an Extreme Periphery: The Brazilian Amazon, 1600-1980", in *American Journal of Sociology* 89 (5): 1017-1064.
- Cadigan, Sean. (2003). "The Moral Economy of Retrenchment and Regeneration in the History of Rural Newfoundland" in *Retrenchment and Regeneration in Rural Newfoundland*, Ed. Reginald Byron. Toronto, Canada: University of Toronto Press Inc. 14-42.
- Cheung, Wai Lung. (2001). *Changes in Hong Kong's Capture Fisheries in the 20th Century and Reconstruction of the Marine Ecosystem of Local Inshore Waters in the 1950s*. Masters of Philosophy, University of Hong Kong.
- Clarke, Matthew. (2003). "The Professionalization of Inshore Fishers", in *Retrenchment*

- and Regeneration in Rural Newfoundland*. Ed. Reginald Byron. Toronto, Canada: University of Toronto Press Inc. 134-157.
- Coleman, James S. (1994). *Foundations of Social Theory*. Cambridge, MA: Belknap Press.
- Copes, Parzival. (1998). "Adverse Impacts of Individual Quota Systems in Small-Scale Fisheries: What are the Positive Alternatives?" in *Managing Our Fisheries, Managing Ourselves*. Eds. L. Loucks, A.T. Charles, and M. Butler, 23-30. Proceedings of Symposium on Fisheries That Work: New directions in the North Atlantic.
- Copes, Parzival. (1999). "Common-property fishing rights: Coastal Resources for whom?" *Samudra Report*, 23: 14-19.
- De Alessi, Michael. (1997). Technologies for Sequestering and Monitoring Ocean Property, in *Fish or Cut Bait! The Case for Individual Transferable Quotas in the Salmon Fishery of British Columbia*. Eds. Jones, Laura and Michael Walker. Vancouver, BC: The Fraser Institute. pp 125-150
- De Groot, S.J. (1984). The Impact of Bottom Trawling on Benthic Fauna of the North Sea, in *Ocean Management* 9. pp 177-190.
- den Otter, Michael A. and Thomas M. Beckley. (2002). *This is paradise: community sustainability indicators for the Western Newfoundland Model Forest*. Fredericton Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre.
- Diegues, Antonio Carlos. (1998). "Social Movements and the Remaking of the Commons in the Brazilian Amazon" in *Privatizing Nature: Political Struggles for the Global Commons*. Ed. Michael Goldman. London: Pluto Press. 54-75.
- Doeringer, Peter B. and David G. Terkla. (1995). *Troubled Waters: Economic Structure, Regulatory Reform, and Fisheries Trade*. Toronto: University of Toronto Press.
- Fairlie, S., M. Hagler, and B. O'Riordan, 1995. The Politics of Overfishing. *The Ecologist* 25, 2/3, 46-73.
- Field, John. (2003). *Social capital*. London: Routledge.
- Finlayson, Alan Christopher. (1994). *Fishing for Truth: a sociological analysis of*

- northern cod stock assessments from 1977-1990*. St. John's, NL: Institute for Social and Economic Research, Memorial University of Newfoundland.
- Franklin, Ursula M. (1999). *The real world of technology*. Toronto: Anansi
- Gale, Richard P. and Sheila M. Cordray. (1994). "Making Sense of Sustainability: Nine Answers to 'What Should Be Sustained?'" in *Rural Sociology*, 59 (2): 311-332.
- Garcia, Serge. (1996). "The Precautionary Approach to Fisheries and its implications for Fisheries Research, Technology and Management: An Updated Review", in *Precautionary Approach to Fisheries – Part 2: Scientific Papers*. Rome, Italy: Food and Agriculture Organization of the United Nations. 1-63.
- Goldsmith, J. (1996). The Winners and the Losers, in *The Case Against the Global Economy – and a Turn Toward the Local*, eds. Mander, J., and E. Goldsmith. San Francisco: Sierra Club Books. 171-179.
- Gordon, H. Scott. (1954). "The Economic Theory of a Common-Property Resource: The Fishery" in *Journal of Political Economy* 62 (2): 124-142.
- Grootaert, Christiaan, Deepa Narayan, Veronica Nyhan Jones and Michael Woolcock. (2004). *Measuring Social Capital: An Integrated Questionnaire*. Washington, DC: The World Bank.
- Haedrich, Richard L. and Lawrence C. Hamilton. (2000). "The Fall and Future of Newfoundland's Cod Fishery", in *Society & Natural Resources* 13: 359-372.
- Hardin, Garret. (1968). "The Tragedy of the Commons" in *Science* 162: 1243-1248
- Harris, Leslie. (1990). *Independent Review of the State of the Northern Cod Stock*. Ottawa: Department of Fisheries and Oceans.
- Henderson, Hazel. (1991). "The Indicators Crisis: Toward Post-Economic Policy Tools for Post-Industrial Societies" in *Paradigmes in progress: life beyond economics*. Indianapolis, IN: Knowledge Systems. 147-192.
- Holling, C.S., Fikret Berkes and Carl Folke. (2000). "Science, Sustainability and Resource Management", in *Linking Social and Ecological Systems: Management Practices and Social Mechanism for Building Resilience*. Fikret Berkes and Carl Folke, eds. Cambridge, UK: Cambridge University Press. 342-362.
- Hovgard, H. and Hans Lassen. (2000). *Manual on estimation of selectivity for gillnet and longline gears in abundance surveys*. Danish Agency for International Development.

FAO.

- Hutchings, Jeffrey A. (1999). "The Biological Collapse of Newfoundland's Northern Cod", in *Fishing Places, Fishing People: Traditions and Issues in Canadian Small-Scale Fisheries*. Eds. Diane Newell and Rosemary Ommer. Toronto, Canada: University of Toronto Press Inc. 260-275.
- Jacobsen, Kurt. (2000). *Technical Fouls: Democratic Dilemmas and Technological Change*. Boulder, CO: Westview Press.
- Johannes, Robert E. (1981). *Words of the Lagoon: Fishing and Marine Lore in the Palau District of Micronesia*. Berkeley: University of California Press.
- Junquera, S., S. Iglesias, and E. de Cardenas. (1992). Spanish fishery of Greenland halibut (*Reinhardtius hippoglossoides*). In 1990-91 NAFO SCR document 92/28.
- Kirby, Michael J.L. (1982). *Navigating troubled waters. A new policy for the Atlantic Fisheries*. Supply & Services, Ottawa.
- Kodera, K. (1971). "Aimed Bottom and Midwater Trawling Techniques of Japanese Factory Stern Trawlers. Fish finding, purse seining and aimed trawling" in *Modern Fishing Gear of the World 3*, Ed. Hilmar Kristjansson, 411-419. London, England: Fishing News (Books) Ltd.
- Krishna, Anirudh. (2002). *Active Social Capital: Tracing the Roots of Development and Democracy*. New York: Columbia University Press.
- Kurien, John. (1995). "Joint Action Against Joint Ventures" in *The Ecologist* 25, 2/3: 115-119.
- Macnaghten, Phil and John Urry. (1998). *Contested Natures*. Thousand Oaks, CA: Sage Publications.
- Marchak, Patricia. (1988). "What Happens When Common Property Becomes Uncommon?", in *BC Studies* Winter 1988-89, Number 80: 3-23.
- Martin, Bernard. (1998). "A fisherman's tale". *Our Planet* 9 (5): 25-26.
- Martin, Bernard and Shelley Bryant. (1996). *Ancient Rights*. Protected Areas Association of Newfoundland and Labrador. St. John's, Newfoundland.
- McCay, Bonnie J. and James M. Acheson, Eds. (1987). *The Question of the Commons: The Culture and Ecology of Communal Resources*. Tucson: University of Arizona

Press.

- Morgan, Lance and Ratana Chuenpagdee. (2003). *Shifting Gears: Addressing the Collateral Impacts of Fishing Methods in U.S. Waters*. Pew Science Series. Washington DC: Island Press Publications Services.
- Murphy, Raymond. (1994). *Rationality and Nature: A Sociological Inquiry into a Changing Relationship*. Boulder, CO: Westview Press.
- Nadasdy, Paul. (1999). "The Politics of TEK: Power and the "Integration" of Knowledge." in *Arctic Anthropology* Vol 36, No 1-2: 1-18.
- Nadeau, Solange, Bruce Shindler, and Christina Kakoyannis. (1999). "Forest Communities: New Frameworks for Assessing Sustainability." *The Forestry Chronicle* 75(5):747-754.
- Neis, Barbara, Lawrence F. Felt, Richard Haedrich, and David C. Schneider. (1999). "An Interdisciplinary Method for Collecting and Integrating Fishers' Ecological Knowledge into Resource Management", in *Fishing Places, Fishing People: Traditions and Issues in Canadian Small-Scale Fisheries*. Eds. Dianne Newell and Rosemary E. Ommer. Toronto: University of Toronto Press. 217-238.
- Neis, Barbara. (2000). "In The Eye of The Storm: Research, Activism, and Teaching Within The Newfoundland Fishery Crisis" in *Women's International Studies Forum* Vol. 3, No. 23: 287-298.
- Novak, Joel and Karen Kampen. (1992). "Sustainable or Unsustainable Development? An Analysis of an Environmental Controversy", in *Canadian Journal of Sociology*. 17 (3) 249-273.
- OECD. (1998). *Towards Sustainable Development: Environmental Indicators*. France: OECD Publications.
- O'Boyle, R. (1993). "Fisheries Management Organizations: A Study in Uncertainty" in *Fishery Aquatic Science* 120: 423-436.
- Ostrom, Elinor. (2001). "Reformulating the Commons", in *Protecting the Commons: A Framework for Resource Management in the Americas*. Eds. Joanna Burger, Elinor Ostrom, Richard Norgaard, Davie Policansky and Bernard D. Goldstein. Washington: Island Press. 17-44.

- Pauly, Daniel, Villy Christensen, E. Froese, and E. Torres. (1998). "Fishing down marine food webs" *Science* 279: 860-863.
- Pitcher, T.J., and Chuenpagdee, R.Y. (1996). Bycatches in Fisheries and their Impact on the Ecosystem, *Fisheries Centre Research Reports*. Vol 2 No 1 Vancouver, BC: Fisheries Centre, University of British Columbia.
- Putman, Robert. (1993). *Making Democracy Work: civic traditions in modern Italy*. Princeton: Princeton University Press.
- Report on the Task Force on Incomes and Adjustment in the Atlantic Fishery. (1993). *Charting a New Course: Towards the Fishery of the Future*. Ottawa, Ontario: Communications Directorate, Fisheries and Oceans. Minister of Supply and Services.
- Rose, George. (1997). "The trouble with fisheries science!" *Reviews in Fish Biology and Fisheries* 7: 365-370.
- Ruohomaki, Olli-Pekka. (1999). *Fishermen No More? Livelihood and Environment in Southern Thai Maritime Villages*. Bangkok, Thailand: White Lotus Company Ltd.
- Safina, C. (1995). "The World's Imperiled Fish" in *Scientific American* 273 (5): 46-53.
- Santos, M.N., Erzini, K., Gaspar, M.B., and Monteiro, C.C. (1997). *Fantared II: a study on ghost fishing in European waters*. NAFO 2001 SCR doc 01/87.
- Schnaiberg, Allen and Kenneth Alan Gould. (1994). *Environment and Society: The Enduring Conflict*. New York: St. Martin's Press.
- Sherman, K., L.M. Alexander, and B.D. Gold. (1993). *Large Marine Ecosystems*. Washington, DC: AAAS Publications.
- Silk, Victoria. (1994). "Impacts of Dragger Technology on Women in the Fishing Industry" in *Samudra*. Vol 9. Madras, India: Nagaraj and Company. 3-6.
- Silk, Victoria. (2001). "MPAs: process, privilege, and participation, a sociological discussion" in *Economics of Marine Protected Areas*. Eds. Rashid Sumaila and Jackie Alder. Vancouver, BC: Fisheries Centre, University of British Columbia.
- Silvestre, G. and D. Pauly. (1997). Management of Tropical Coastal Fisheries in Asia: an overview of key challenges and opportunities, in *Status and Management of Tropical Coastal Fisheries in Asia*, Silvestre, G. and D. Pauly, eds. ICLARM Conference

- Proceedings 53. pp 8-25. Sinclair, Peter R. (1988). *A Question of Survival*. St. John's, Newfoundland: Institute of Social and Economic Research.\
- Steele, Donald. H., Raoul Andersen, and J.M. Green. (1992). "The Managed Commercial Annihilation of Northern Cod". *Newfoundland Studies* 8 (1): 34-68.
- Steele, Donald Harold and Raoul Anderson. (1997). "The Commercial Annihilation of Northern Cod: The Fate of the 1986 and 1987 Year-Classes" in *How Deep is the Ocean? Historical Essays on Canada's Atlantic Fishery* Eds. James E. Candow and Carol Corbin. Sydney, NS: University College of Cape Breton Press. 261-268
- Tisdall, Simon. "Canadians overdraw on the Grand Banks," *Guardian Weekly*, 17 October 1993, *International News*: page 7.
- Varughese, George, and Elinor Ostrom. (2001). "The Contested Roles of Heterogeneity in Collective Action: Some Evidence from Community Forestry in Nepal." *World Development* 29(5): 747-765.
- Walters, Carl. (1998). "Designing fisheries management systems that do not depend upon accurate stock assessment" in *Reinventing Fisheries Management*. Eds. Tony J. Pitcher, P. Hart, and Daniel Pauly, 279-288. London: Kluwer Academic Publishers.
- Woolcock, Michael. (1998). "Social Capital and Economic Development: Toward a Theoretical Synthesis and Policy Framework" in *Theory and Society* 27 (2): 151-208.
- World Commission on Environment and Development. (1997). *Our Common Future*. Oxford: Oxford University Press. 27-66.
- Wright, Miriam Carol. (1992). *The Smile of Modernity: The State and the Modernization of the Canada Atlantic Fishery 1945-1970*. Unpublished thesis, Queen's University.
- Wright, Miriam Carol. (2000). *A fishery for modern times: the state and the industrialization of the Newfoundland fishery, 1934-1968*. Toronto: Oxford University Press.
- Wuthnow, Robert. (2004). "Trust As An Aspect of Social Structure", in *Self, Social Structure, and Beliefs*. Eds. Jeffrey C. Alexander, Gary T. Marx, and Christine L. Williams. Los Angeles: University of California Press. 145-167.
- Yin, Robert K. (1989). *Case Study Research: Design and Methods*. England: Sage Publications.