THE FEMINIST POLITICAL ECOLOGY OF FISHING DOWN: REFLECTIONS FROM NEWFOUNDLAND AND LABRADOR

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Introduction Over the past decade, natural scientists working on large data sets and at broad spatial and temporal scales have identified regional and global trends in marine and fresh water fisheries, and linked these to stock collapses. For example, Deimling and Liss have done a longitudinal analysis of landings data from three different areas of the eastern North Pacific. Based on this work, stock collapses can be seen as the most dramatic occurrences in a series of human-environmental interactions taking place at multiple spatial and temporal scales. The authors refer to this series of interactions as “fishing up.” Fishing up includes: spatial shifts in fishing location along coasts and from coastal areas to the offshore; reductions in the size of fish; a sequence of ascents, peaks and collapses in the landings of particular species over time with some species largely disappearing, and a long-term trend from higher to lower trophic levels in landings. Trophic levels refer to the distance between the primary producers (algae) that convert solar energy into usable energy through photosynthesis and the consumers that feed on the algae. Thus, fisheries dominated by shrimp and crab are lower trophic-level fisheries than those for cod, haddock and salmon because there is less distance between crab and shrimp and primary producers.

Pauly et al have identified a similar pattern using landings data from multiple marine ecosystems. They focus more, however, on the downward trend in the trophic level of landings in various ecosystems, leading them to describe this process as “fishing down.” Pauly et al’s findings point as well to a decline in the overall volume of landings from many ecosystems over
time. They interpret this trend as indicating that fishing down may, over
time, erode the overall productivity of marine ecosystems, or divert that pro-
ductivity into noncommercial or less valuable organisms such as, for exam-
ple, jellyfish. Jellyfish blooms can affect the potential for natural recovery
of commercial fish stocks.\(^5\)

All fisheries researchers should be aware of this work linking commer-
cial marine fisheries to large-scale marine ecosystem restructuring. Social and
natural scientists, policymakers, workers, industry and fishery commu-
nities must grapple with the extent to which we have degraded and trans-
formed marine ecosystems. One lesson from this work demonstrates the need
to focus on ecological recovery of wild fish stocks rather than simply on
sustaining and allocating the dwindling resources that remain. A second
lesson is that the potential for such recoveries may be compromised, even
in the absence of fishing.\(^6\)

Much of the fishing up and fishing down research done by natural sci-
entists is part of a larger scientific literature that interprets overfishing as
the consequence of certain “ratchet” effects. For instance, Deimling and Liss
attribute fishing up to interactions between expanding markets, improved
technology and patterns of abundance of different taxa. Proponents of the
fishing down thesis argue that “people make profound changes to marine
ecosystems. Industrial fisheries first reduce the abundance and diversity of
top predators, then, when economic returns fall off, gear up to catch what
the top predators were eating. The productive potential is still there, but
biodiversity and abundance are severely reduced.”\(^7\) While insightful, these
“ratchet” effect explanations understudy the temporal, spatial and ecologi-
cal dimensions of fishing down,\(^8\) oversimplify the political, social and ecoso-
cial interactions associated with these processes, and frequently essential-
ize the relationships between human societies and marine resources.

The new field of environmental history has produced some detailed and
useful accounts of the gender, ethnic, class, sectoral, and political dynamics
associated with regional histories of overfishing and failed conservation in
marine and freshwater fisheries.\(^9\) The social science literature on common
property has explored the relationship between conservation and alterna-
tive types of property including the importance of common property.\(^10\)
Other recent work has examined the history of fisheries science, the social construction of scientific knowledge within fisheries, as well as the existence of different knowledge systems within fisheries and their potential contributions to fisheries science and management. While useful, environmental history and fisheries social science generally fail to document with sufficient spatial and temporal precision the evidence for, and precise ecosystems' interactions associated with, overfishing, stock collapses and ecosystem change. In some cases, nature is treated as a backdrop to the central activity of resource extraction rather than as an actor.

This paper draws on insights from political ecology and feminist political ecology to help bridge the gaps between these various literatures. To simplify, we will use the term “fishing down” but take it to mean all of the processes identified in the “fishing up” and “fishing down” research. Using a case study of the Newfoundland and Labrador fisheries, this paper identifies some of the key elements of a feminist political ecology of fishing down. Our framework considers gender relations at two levels: first, as a structuring principle in society and, second, as an integral part of women’s and men’s daily interactions with each other. Our analysis considers gender, class and race asymmetries and the ways they inform knowledge systems, management, access, and control within fisheries. Drawing on the work of ecofeminists and other scholars, we explore links between the oppression of women and the degradation of nature that have been historically embedded in fisheries science and policies. We highlight issues related to the subordination of the human body, female and male, hierarchical notions of labour and participation, colonialism, and disembedded and individualist concepts of self.

In many fishery-dependent communities, particularly within industrialized and state-managed fisheries, women have become largely marginal or invisible, low-paid or unpaid workers with limited access to fisheries wealth, and little influence over the nature and dynamics of human interactions with marine resources. Forms of ecological degradation like fishing down threaten to deepen this marginalization and extend it more completely to men and families, and indeed threaten the continued existence of many rural communities, particularly those dependent on small-scale fisheries. We strive for a non-essentialist situated feminist political ecology informed by political
economy that allows for integration across natural and social science domains. We are concerned that accounts of fishing down take account of agency in human and nonhuman nature to avoid both a fatalistic attitude toward socioecological change and a fixed notion of gender and other forms of identity.

**Political Ecology and Feminist Political Ecology** Political ecology is an interdisciplinary field of study that was originally devoted to combining the concerns of ecology and political economy and was focused on the “constantly shifting dialectic between society and land-based resources.” It has developed in many different directions, including a larger focus on post-structural critiques of instrumental reason and a focus on discourse analysis, especially discourses of “nature,” “environment,” “resources,” and “management.” The field of political ecology has also expanded to include a focus on marine as well as terrestrial ecosystems and to recognize the situatedness of the researcher in what s/he explores. Recent studies have linked biological relations, relations of production, and state, market and community forms of regulation. In particular, “market integration, commercialization, and the dislocation of customary forms of resource management—rather than adaptation and homeostasis” have become the focus of contemporary and more critical forms of political ecology that attempt to understand the complex processes associated with globalized capitalist development. Political ecologists have developed a radical critique of the Malthusian and Hobbesian “pressure-of-population-on-resources view” and Hardin’s highly influential *Tragedy of the Commons* thesis that continues to dominate fisheries policy and management worldwide. This critique has strong parallels with ecofeminism and emphasizes that ideas about ecoscarcity and natural limits are never neutral and often display political origins and provoke political effects. These political ecology arguments have sought to counter those emanating from the natural sciences, including fisheries science, which often derive rules for human behaviour from natural laws, such as the laws of thermodynamics. In these accounts, physical laws tend to be presented as objective, universal, nonnegotiable truths that emanate from nature, placing stark limits on how societies can and
should be structured. Among social scientists, human ecologists focused on these natural limits have proposed that knowledge from the natural sciences can and should form a foundational context to guide understandings about how people live out their lives in particular contexts. In contrast to human ecologists, many political ecologists favour complex socioecological process thinking, thus opening up to scrutiny the nonhierarchical, multifaceted, context-specific and often ambiguous relations that exist between biophysical, knowledge production and socioeconomic processes, especially those involving domestic politics, class, gender, race and ethnicity. In related work, Brosius advocates multisitedness in research because it is a condition of contemporary environmental projects due to capitalist penetration, state regulation and globalization. Yapa advocates a “nexus” approach that weaves together complex narrative descriptions from a multitude of voices and actors as opposed to a linear storyline based on the search for universal Truths.

In recent years, there has been a reaction against the strong emphasis on social construction within political ecology and to the neglect of gender. Political ecologists are being encouraged to capture more fully in their work “real people, doing real things” in different social and historical contexts. From the point of view of feminist political ecology, gender (a social construct) plays an important role “in shaping resource access and control, interacting with class, caste, race, culture, and ethnicity to shape processes of ecological change, the struggle of men and women to sustain ecologically viable livelihoods, and the prospects of any community for ‘sustainable development.’” Critiques of science and development initiatives based on gender-blind theories of resource management and use are central to feminist political ecology. Many of the important feminist debates about environmental issues are taking place within ecofeminism which explores connections between the domination and exploitation of nature and the oppression of women. Agarwal suggests two levels of feminist analysis: the ideological which analyzes constructions of gender, nature, and the relationship between the two, and the material which analyzes the gender and class organization of production, reproduction, and distribution. In terms of strategies for change, she recommends that feminist environmentalists work to
transform both ideas about gender and the actual division of work and property resources between women and men. She also suggests that we work to challenge and transform dominant ideas about the relationship between people and nature, and actual methods of appropriation of nature’s resources. Anna Tsing emphasizes the need to address the complexity of “environmental projects,” which she defines as “organized packages of ideas and practices that assume an at least tentative stability through their social enactment, whether as custom, convention, clubbish or professional training, institutional mandate, or government policy.”

Despite their important contributions, still somewhat lacking in political ecology and feminist political ecology, is the “materiality of nature,” i.e., the biophysical realities of natural systems and the way these have constrained but not determined the development of natural resource-based industries, property relations, gender relations, regulation, the dynamic of colonialism, and other political economic processes. From the perspective of a refined approach to political ecology and feminist political ecology, processes of fishing down are a consequence of interactions between people and their environments. These interactions are shaped by the biophysical and chemical materiality of marine and freshwater ecosystems, as well as by gender, race, class asymmetries which determine, in part, formal and informal laws, discourses, and knowledge production. The interactions occur at varying spatial, temporal, and organizational scales and contribute to the restructuring of biophysical and social systems that, in turn, respond to this restructuring. Fishing down contributes to the restructuring of the lives and experiences of those who are interacting with marine systems, their knowledge of those systems, and the larger social processes in which they are embedded. The basis for these interactions and processes need to be explored in multisite analyses and from numerous perspectives to understand more fully what is occurring in particular places at particular times, and to establish links with global social and environmental change. This approach encourages researchers to document the marine species and fishing areas that disappear over time, as well as those that survive or appear. It encourages us to explore different forms of data as social-ecological constructs and document the power relations revealed in discourses associated with different social groups, ecosocial relationships.
and knowledge systems. Finally, it alerts us to compare environmental projects and their related discourses that can redefine the potential for exploitation, creativity, and exclusion.

Exploring fishing down processes from within this framework requires that we pay attention to values and to the ways understandings of, and actions within, natural environments are socially constructed and biophysically constrained. Environmental projects can threaten species and ecosystems; they can also become the starting point for ecosystem and community recovery. By restructuring nature, environmental projects can interact with industrial, social, and political restructuring to transform households, workplaces, and workplace health risks, communities and regions. Changing physical and work environments, changes in employment, incomes, social relationships (such as class and gender relations), new property relations, and outmigration can influence the health of people and their communities as well as the health of ecosystems.34

The next section of this paper uses some of the existing research on fishing down in Newfoundland and Labrador to illustrate the potential insights that can come from applying this framework. While the account is partial, as is the nature of all research, we begin to situate this example in elements of its historical, political and ecological contexts, identifying the gendered constructs, discourses and impacts, including the short-and long-term human and environmental consequences of fishing down in Newfoundland and Labrador.

**Fishing Down, Communities of Fish and Fishing Communities in Newfoundland and Labrador** Since 1990, the composition of fish and shellfish landings in Newfoundland and Labrador has changed dramatically. Whereas landings of cod, turbot, flounder and other groundfish species exceeded 300,000 tonnes in 1989, by 2001 they had declined to 70,500 tonnes. Landings of pelagics, such as capelin and herring, have displayed similar declines. In contrast, shellfish landings increased from about 30,000 tonnes in 1989 to 156,000 tonnes in 2001.35 When aggregated and placed in the context of fishing down, a troubling pattern emerges from landings data. Shrimp and crab are invertebrates that are lower trophic-level organisms
than cod and other groundfish. A decade after the collapse of the northern cod and other groundfish stocks around Newfoundland and Labrador, most groundfish stocks remain at or close to historic lows.\textsuperscript{36} Indeed in 2003, fisheries within two cod stock complexes (northern cod off the northeast and Labrador coasts and northern Gulf stocks off the coast of western Newfoundland) were closed. The northern cod and some other species like northern wolffish have been declared endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and major quota cuts have also occurred in the snow crab fishery, particularly off southern Labrador. The overall biomass of marine resources harvested in 2001 in Newfoundland and Labrador was roughly half of that landed in 1989, causing some to wonder what is happening to the overall productivity of the marine ecosystem and others to argue that there has been an ecological regime change.

Over the past few years, a large amount of research has investigated the collapse of the groundfish stocks, particularly the northern cod stocks located off the northeast coast of Newfoundland and the Labrador coast. The factors responsible for the collapse of the northern cod stocks in the 1990s have been debated extensively.\textsuperscript{37} Initially, the apparent suddenness of the collapse led most to focus on environmental and fishing events during the late 1980s as the probable cause of the collapse. Since then, some have suggested that a more appropriate point of departure might be the late 1960s when northwest Atlantic groundfish landings peaked before collapsing. The so-called “killer spike” in northern cod landings in particular was primarily the result of massive and largely uncontrolled exploitation by huge distant water fishing fleets after the early 1950s.\textsuperscript{38} According to Hutchings, between 1962 and 1977 “the reproductive portion of the northern cod stocks (cod seven years and older) had declined by 94 percent from 1.6 million tonnes to 93,000 tonnes.” By 1992, the northern cod spawner biomass was only about one percent of its historical maximum.\textsuperscript{39} By 2003, the Northern and Gulf cod stocks had failed to recover across their range and an indefinite closure of the fishery was announced with no comprehensive stock rebuilding plan or compensation package for fishery workers.

Some research suggests that we need to push our time frame for understanding fishing down even further back to the early to mid-nineteenth
century.\textsuperscript{40} It can be argued that in the Northwest Atlantic, fishing down may have begun in the 1600s with the first visible consequence being the plundering and eventual extinction of the great auk in the nineteenth century. In contrast to the 1950s, nineteenth century landings were composed largely of whales, a single species of groundfish (cod), seals, and salmon. Newfoundland cod fisheries began with hook and line technology, moved to line trawl (bultows), cod seines, and then to cod traps. The cod they were catching got smaller and catch rates declined despite spatial expansion along the northeast coast of Newfoundland and up along the Labrador coast.\textsuperscript{41} Populations of large marine mammals including some species of whales, walruses, and seals were devastated by the late nineteenth century.

The political, ecological and gender history of Newfoundland in the nineteenth and early twentieth centuries favoured the development of a fishery dominated by small enterprises primarily organized on the basis of familial patriarchy and relatively isolated single industry communities with little economic diversification.\textsuperscript{42} Merchant capitalists controlled access to the fishery and to fishery-generated wealth by controlling government, access to credit and international markets for fish. Women’s work was central to the fishery. They were economically dependent on men but men also required women’s contributions in order to establish their enterprises, operate them successfully and produce and train the subsequent generation of fishery people.\textsuperscript{43}

The household-based fishery was associated with occupational pluralism and technological and social innovations that compensated, in the short term, for the effects of poor landings resulting from overexploitation tied to uncertain and fluctuating resource yields. Over the longer term, however, occupational specialization, technological innovations, and state-led fisheries management tended to degrade local resources and to erode collective support for conservation initiatives.\textsuperscript{44} Increasing numbers of fishing households, combined with limited diversification within fisheries and from fisheries to other sectors, tended to increase pressure on local fish stocks and undermine catch rates.\textsuperscript{45} The Newfoundland government, like many other governments, failed to support attempts to develop local governance regimes while also failing to provide an effective national regime.\textsuperscript{46}
Historians such as Cadigan have drawn attention to the need to look beyond nineteenth and twentieth century government records and scientific research to explore public debates and the latent assumptions and ideologies in policy, science and local ecological knowledge at different points in time. Such debates or points of disagreement point to different, often conflicting representations of “nature” related to cod and other species, the relative abundance of the resource, the capabilities and knowledge of fishers and fishing communities, and the need for and desirability of fisheries management in the past and in the present. The relative silence of fisheries-dependent women in the public record means we know little about their beliefs, concerns and actions related to fisheries conservation, and is an indication of their social and political marginalization during this period.

In 1949, Newfoundland joined Canada and sea fisheries fell under federal jurisdiction. A new period of fishing down was triggered by the development of growing international markets for fresh/frozen fish, markets for fish meal, technological and managerial innovations, and corporate, state and market support for the development of the distant water fleets that arrived off the coasts of Newfoundland and Labrador in the 1950s and 1960s. The post-World War II period was also associated with a shift from merchant to industrial capital. As Wright details brilliantly, this modernization, rationalization and industrialization of the Newfoundland fishery involved the “development” of human and natural communities and archetypical “male” fishermen in order to make them more legible to both the Newfoundland and Canadian States which were interested in large-scale modernization programs. The Walsh Report, which guided this phase of modernization, attempts to remake women’s identities and interests by describing the withdrawal of women from the fishery as a step towards a modern society: “The general social improvement which has been taking place … is resulting in the liberation of women from the hard and unsuitable work of fish-making and allowing them to devote their time to their household duties and to live in an atmosphere of human dignity as wives and mothers.”

Fishing down persisted after 1977 with the establishment of the 200 mile Exclusive Economic Zone (EEZ). With the 200 mile EEZ, fish resources
became the property of the state. This expansion of state property brought with it new forms of science and management to represent ecosocial systems (through fisheries models and stock assessments) and to intervene in this vast new territory (through quotas, licences and fisheries officers). Claims to scientific and instrumental rationality helped to legitimize the EEZ and the new science and management regimes. As suggested by Villagarcia et al., catches between the mid-1980s and mid-1990s followed a trajectory similar to that described generally by Deimling and Liss, with the original groundfish fishery buildup followed by a decline and the buildup of a pelagic fishery for species that were the food of the depleted groundfish. Finally as the pelagic fishery began to wane, harvesting shifted to the shellfish (crab and shrimp), also groundfish food, that became more plentiful after cod stocks collapsed.

Newfoundland research on the dynamics of fishing down in the 1970s and 1980s suggests that they were more complex and multidimensional than is recognized in the work of Deimling and Liss and Pauly et al. Complex processes with spatial, temporal, ecological, political, industrial, gender, and knowledge production axes created a highly flexible and destructive ecosocial system. As an example of this complexity, McCay and Finlayson link the northern cod collapse to “territorialization.” “Territorialization of state control” refers to attempts to control people and their actions by establishing boundaries around geographic space, excluding some categories of individuals from this space, and proscribing or prescribing specific activities within these boundaries. The poor fit between the 200 mile EEZ and the ecology of Grand Banks groundfish left a portion of these fish susceptible to largely unregulated foreign overfishing on the Grand Banks after 1977. Within the 200 mile EEZ, the spatial framework for northern cod science (North Atlantic Fisheries Organization areas 2J3KL) fit neither with the existing scientific data on stock structure for cod and other species, nor with twentieth century scientific understandings concerning the requirements for understanding fluctuations in fisheries. It also did not fit with inshore fishers’ knowledge of stock structure, the structure of human habitation along the coast, nor with fisheries and cultural dynamics. The result was enhanced scientific uncertainty as
it was difficult to distinguish between resource decline and the movement of cod.

Other factors such as hierarchical control, aggressive competition, and exclusionary practices associated with fisheries knowledge contributed to failures to control overfishing inside of the 200 mile limit in the 1980s. These included a DFO management-endorsed virtual monopoly on stock assessment data among scientists committed to the belief that the stocks had rapidly recovered, related hostility towards scientists who challenged this belief, and a requirement for scientific “consensus” in the communication of stock assessments to the government and the public.64 Stock assessments were based on offshore research vessel surveys and commercial catch rates (catch/haul) in a mobile offshore trawler fishery where nets were likely to come up full until most of the fish were gone. A similar approach characterized assessments for other groundfish species. This larger context contributed to the rapid expansion of a Canadian offshore trawler fishery and the marginalization of concerns about the accuracy of stock assessments voiced by coastal harvesters and related processors in the mid-1980’s. Optimism, weak constraints on entry into the inshore and nearshore fisheries, corporate demand for fish, state subsidies, and large incomes from lucrative inshore fisheries for squid and caplin combined to provide the means and the opportunity for an intensified seasonal, inshore northern cod fishery, and expansion of that fishery further offshore and into other seasons during the 1980s.65

Neoliberal policy initiatives that have become increasingly popular since the mid-1980s have recast wild marine ecosystems and fish harvesters as tragedies waiting to happen, while encouraging the transfer of regulation from the visible hands of the state to the invisible hands of the market. This neoliberal logic is presented succinctly in a recent article in *The Economist* magazine: “In fact, [the ocean] is a resource that must be preserved and harvested. To enhance its uses, the water must become ever more like the land, with owners, laws and limits. Fishermen must behave more like ranchers than hunters.” Neoliberal management initiatives like Enterprise Allocations and Individual Quotas that allocate quotas to individual enterprises or harvesters and, in some case, permit these to be trans-
ferred, are spreading through Canadian and many other fisheries and have been associated with some significant adverse effects.67 Fisheries in Newfoundland, like fisheries elsewhere, are “embedded in the social networks, social structures and culture of the local, geographically and historically defined community.”68 Rich and varied regulatory practices were often associated with these communities69 and the fisheries of these communities have been shaped by social, economic and cultural histories as well as by biologically dynamic and diverse bay stock populations and metapopulation dynamics. The local embeddedness of marine species and people means decisions about investments and responses to ecological, policy and industry change have been shaped, to varying degrees, by the concerns and issues of spouses, friends, and members of older and younger generations. They have also been influenced by local environments, the legacies of past fishing practices, and by environmental change. Neoliberal initiatives that insist on abstraction by ignoring the embeddedness of marine species in marine ecosystems, harvesters and processing workers in socially produced single industry communities,70 and fisheries science and management within government bureaucracies can easily produce unanticipated social, economic, human health and environmental consequences. Separating class, sectoral, gender and ecological relationships from the practical issues of regulation and management has contributed to escalating fishing effort and differential impacts of policy change for owners and crewmembers, women and men,71 and those living in different regions of the province.

Gender, class, and race are critical elements shaping knowledge systems, fisheries management, access and control, wealth production, and distribution and they shape the options available to fisheries producers, communities and economic systems.72 Women in fishing-dependent communities and small-scale fish harvesters have often had different ideas than scientists, managers, and policymakers about how people should use and interact with marine resources.73 Small-scale fish harvesters,74 Inuit and Métis Labrador communities,75 and harvesters’ wives and processing workers76 have been progressively marginalized within knowledge production about marine ecology, the effects of fishing, and discussions about management during the decades prior to the collapse of the Atlantic groundfish stocks. Within
Newfoundland, colonial attitudes and policies towards Labrador, combined with greater ecological fragility associated with more northern waters, make Labrador’s fisheries and its coastal people particularly vulnerable to overfishing.

**Post-Collapse Dynamics: Economic Growth Amidst Fishing Down**

Despite social and ecological crises in the groundfish fishery, since 2000 the landed value and export value of fish and shellfish for Newfoundland and Labrador have reached historic highs. In 2001, the fishing industry in Newfoundland and Labrador was worth one billion dollars, over half of this coming from shellfish. Access to this fishery wealth is much more concentrated than in the past and provides less processing work. The transition from groundfish- to shellfish-based fisheries has been associated with layoffs or “downsizing,” particularly within the processing sector, and with regional shifts in the concentration of work. Fish harvesters and processing workers recognize their vulnerability in the “new” fishery.

The small boat sector has been hard hit by the collapse of the groundfish stocks and subsequent restructuring policies. Indeed, many women and men in this sector feel constant pressures on them to leave the industry altogether. Some have managed to acquire permits for harvesting crab and shrimp but those without such permits are struggling to survive. This reality and reductions in alternative employment opportunities for women in fishing communities have been associated, ironically, with an increase in the proportion of women fishing in the 1990s. In 1981 1,480 women reported an income from fishing, representing eight percent of the fish harvester workforce. By 2000, Professional Fish Harvesters Certification Board (PFHCB) data indicate that 3,097 women were given certification to fish, making up 20 percent of the fish harvester workforce.

The subordination of the human body is especially evident among workers in the small boat and processing sectors. Tighter regulations, shifting to new species, and spatial shifts in fishing effort that are partly a product of the materiality of fish (e.g., snow crab tend to be in deeper water and farther from shore than cod during the seasonal inshore fishery) have been associated with a greater than 100 percent increase in the ratio of “search-
and-rescue incidents reported” to “number of registered vessels under 65 feet in length” in recent years. Gendered apprenticeship practices have resulted in some women being poorly prepared for the health and safety risks associated with fishing. Processing workers with few alternatives for work other than processing crab are confronting different occupational health risks such as occupational asthma to snow crab and shrimp. These risks are a combined result of the different materialities of crab and shrimp versus cod (different proteins) and of substantial institutional weaknesses within the province in the field of occupational health research and prevention.

At the same time that the provinces’ fishing industry has been undergoing a process of restructuring and downsizing, changes have also occurred in critical support programs to these largely rural, seasonal, and often relatively poor women and men. Overall, government initiatives are encouraging the concentration of fishing and processing work in the hands of fewer workers, professional fish harvesters, companies, and communities. This might simplify the fisheries management challenge on the social side but will not adequately address equity, the protection of marine species, sustainable livelihoods or the complexity of the ecosocial systems in which they are embedded.

The continued scarcity of groundfish, combined with the overfishing of other species and cuts to the “adjustment” benefits, are contributing to growing support for a more limited access, professionalized fishery in the future. Recent moves to professionalize fish harvesters reflect attempts to turn fishers into entrepreneurial selves. Fisheries professionalization will restrict fish harvesting to those who meet established guidelines for full-time harvesters (and keep out moonlighters) and, ostensibly, will improve the status of the occupation and the safety of fish harvesters. It is based upon a vision of a fish harvester who is a formally trained male fisherman dedicated solely to fishing in an enterprise that is abstracted from the fishing family. It is unclear at this time how professionalization will respond to women fish harvesters’ different work patterns and disproportionate responsibilities for the home and children. It may, however, reinforce patterns established with fisheries rationalization in the past, where women’s work in fish processing was
deemed to be unproductive, inefficient, temporary, and unnecessary, and was increasingly superseded by institutions focused on large capital and mass production. All these issues have an impact on the household income of fishing families and women and men’s future employment in the inshore fishery, their access to fishing and licenses, learning opportunities, and their health and safety as fishery workers.83

The aggressive development of industrial aquaculture in Newfoundland and elsewhere threatens to reinforce the fishing down sequences associated with wild stock harvesting. While overall aquaculture production in Newfoundland and Labrador is relatively small when compared with other Canadian provinces and international producers, the industry is being encouraged to expand by federal and provincial governments and has grown rapidly since 1995. In 2001, the industry generated an export value of 20 million dollars by growing 5,400 tonnes of seafood and employing 500 people.84 Government support for the industry includes the creation of growth-friendly regulatory and policy frameworks; financial support for infrastructure development; the creation of a national commissioner for Aquaculture Development who reports directly to the Federal fisheries Minister, and funding for Aquanet, a four-year 14.4 million dollar aquaculture research network.85

Naylor et al86 and other marine biologists have pointed to the global effects finfish aquaculture is having on marine food webs and marginalized fishing communities. Farmed carnivorous fish such as salmon and cod are fed fishmeal that is produced by harvesting small wild fish, such as anchovy and herring, mostly in the waters off South America and Africa where developing countries sell off their national fishing rights within their 200 mile exclusive economic zones to obtain badly needed foreign exchange to service external debt. This represents a transfer of much-needed fish protein from people struggling with poverty and hunger in the South, to the desires of affluent consumers who create effective market demand for farmed products.87 This trend in industrial aquaculture has led fisheries ecologists to note that fishing down sequences are associated with farming up—growing carnivorous fish such as salmon, by feeding them wild fish from lower trophic levels in the food web.88 Finfish farming is therefore encouraging fishing
down sequences and is responsible for expanding the scale and scope of the effect globally.

Industrial aquaculture development in Newfoundland also has an impact on local women’s lives. While significant numbers of Newfoundland women have successfully completed aquaculture training in the province, they appear to face institutionalized and systemic discrimination in terms of the types of work they are involved with on farms, the ownership patterns developing in the industry, and the need to leave the province to find aquaculture-related employment. One aquaculturalist explains the tendency for a gendered division of farm labour in the following way: “I’ve heard some very prominent aquaculturalists from Maine and New Brunswick say they prefer to hire women in hatchery settings because women bring more of the skills required. I’ve argued with people on that. Yes, I agree that women are good in the hatchery but they also have a place on farm sites as well.”

Aquaculture also strengthens the ideology of enclosure as coastal spaces become privatized through leasing arrangements. The need for high levels of capitalization, technical, management and marketing expertise in finfish culturing have led to concentrated ownership patterns and vertical integration in areas where production has experienced exponential growth rates and strong global competition. The capital demands of intensive cod aquaculture can average over one million dollars per farm site. These demands along with the high levels of risk associated with industrial aquaculture have produced concentrated ownership patterns and vertical integration in the province with fish plant owners taking the lead on the development of cod hatcheries and full-cycle grow out sites. Therefore, while possibilities exist for women to make inroads in aquaculture, many men and women will face circumstances similar to the older battles associated with class, exclusion, and gendered patterns of work and ownership tied to the industrialization of wild fish harvesting and processing.

**Conclusion** The environmental and social processes associated with fishing down are making it easier for the federal government to pursue a decades-old agenda. By limiting the funding for adjustment programs targeted at displaced fishery workers on the basis of fiscal restraint, by imposing
individualistic eligibility criteria that ignore the household and community basis of the industry, by professionalizing the fishery that remains, and by cutting social programs particularly in education and health, the federal government is compromising people’s health and well-being and gradually forcing many current and future fishery workers out of the industry and out of fishing communities altogether. They are simultaneously creating the conditions (individual self-interested entrepreneurs and enclosed coastal spaces) for the corporate ownership of fish stocks and privatized coastal tenures that encourage the development of intensive industrial aquaculture. The federal government has treated the crisis with short-term programs, cutting the budgets for scientific research at a time when the need for research has increased. Furthermore, there continues to be no plan for marine restoration or sustainable livelihood initiatives for rural Newfoundland and Labrador ten years after the initial moratorium.

Patriarchy, capitalism and science have cooperated in the devastation of global fish stocks. Science-based, centralized, state-controlled fisheries management, an abstract tool that was supposed to constrain this destruction, developed from a single species focus that promised an ability to predict fish numbers by conceiving of them as simplified populations that could be fed into an exponentially expanding industrial capitalist system. Awareness of fishing down flows from a broad view of nature as a complex thermodynamic ecosystem as opposed to an inventory of independent natural products amenable to predictable exploitation modeled on the image of the industrial factory. From this perspective, nature is not so much a Newtonian machine as a complex and somewhat unpredictable ecological system of which humans are an integral part. By documenting the global scale and some of the history of fishing down, Deimling and Liss, Pauly et al and others have opened the door for serious discussions of new approaches to fisheries science and management. However, a fuller understanding of fishing dynamics—and elaboration of effective, equitable strategies for not only halting fishing down but for achieving recovery of degraded marine ecosystems and viable, diversified coastal communities—requires insights from a broader range of participants.
Often ecological science universalizes the experiences of women and men and promotes a highly simplified view of social reality and political economy that makes human activities appear simple and amenable to managerial control. If biologically sustainable and socially just arrangements in the fishery are to be achieved, we believe that the complex ideas developing in the science of ecology need to be balanced by sufficiently nuanced insights from political ecology and feminist political ecology that present an equally complex picture of social relations. As the case of fishing down in Newfoundland and Labrador fisheries shows, gender, race, and class relations characterize fisheries policies and fisheries science at both ideological and material levels. Women in fishery-dependent communities, including those who fish, have been marginal and invisible, struggling for some degree of influence over policy and the nature and dynamics of human interactions with each other and marine ecosystems. The implications of their exclusion are wide ranging and include gendered social, economic, and health effects associated with fishing down, as well as the loss of insight into creative opportunities for ecosystem recovery and protection.

Notes

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2. Ibid.
7. Ibid., p. 92.
Regeneration in Rural Newfoundland (Toronto, Ontario: University of Toronto Press, 2003).


23. ibid.


31. Ibid., p. 198.
39. Ibid., p. 262.
Studies in Political Economy

43. Cadigan, Hope and Deception in Conception Bay.
45. Ibid.
50. Wright, A Fishery for Modern Times.
56. Ibid.
57. “Pelagic fish” live at the surface of the ocean usually away from the coast. “Demersal fish” are often referred to as groundfish, they dwell at, or near, the bottom of the ocean.
59. Ibid.

80. B. Grzetic, “Between Life and Death: Women Fish Harvesters in Newfoundland and Labrador.”
Studies in Political Economy


89. A 1996 study of graduates from the Advanced Diploma in Aquaculture offered by the Marine Institute in St. John's noted that 35 percent of the graduates were women and 60 percent of all the graduates (male and female) had left the province to seek employment within one year of graduation. The other provincial aquaculture program, Nortech College's Aquaculture Technology diploma, reported an 18 percent female enrollment. Government of Newfoundland and Labrador, "CareerSearch: Employment Experience and Earnings of Recent Graduates 1999—Memorial University and Sir Wilfrid Grenfell College" (St. John's Newfoundland: Department of Education, 1999) and Government of Newfoundland and Labrador, "CareerSearch: Employment Experience and Earnings of Recent Graduates 1999—College of the North Atlantic and Private Colleges" (St. John's, Newfoundland: Department of Education, 1999).


93. Ibid.


