

Stewardship and Risk: An Empirically Grounded Theory of Organic Fish Farming in Scotland

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Abstract

It has long been assumed ownership gives farmers incentives to act as stewards of the land. On this basis, quasi-property rights are granted to fish farmers to encourage them to manage risks to the aquatic environment.

This paper offers an empirically grounded theorisation of fish farmers' perspectives on these issues. Data were gathered via field research with Scottish salmon farmers who had switched from conventional to organic modes of production. Our findings suggest organic fish farmers' risk management strategies offer little support for the view that property rights automatically create incentives for stewardship of the marine environment.

Keywords: Risk, organic, fish farming, grounded theory

Introduction

It has long been assumed that ownership of land gives farmers incentives to act as stewards and cultivate land in a manner that optimizes long-term returns (e.g. its intergenerational sustainability) (Gordon 1954, Perman et. al. 1999). Current modes of regulating fish farming appear to reflect this assumption. They include, *inter alia*, granting individual producers exclusive rights (subject to continuous regulatory monitoring) to use coastal, lake or river delta locations (Ransom 2007, Scottish Executive 2003, Scottish Natural Heritage 2002, Sutherland 2000, Highlands and Islands Enterprise and The Scottish Office 1998, Hill and Ingersent 1977). The offer of

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limited rights to operate in specific coastal locations was assumed to create stewardship incentives parallel to those of land-based owner-operated farming. The implied expectation is that these quasi-property rights are sufficient to overcome fish farmers' traditional act as stewardship orientation. On this point, for example, the UK Royal Commission on Environmental Pollution (2004, p.53) report on marine pollution notes:

“...the lack of property rights causes a strong divergence between the short term interests of fisherman and the long term social interest...(This contrasts with agriculture where)...property rights provide incentives to exercise stewardship to ensure the future fruitfulness of the land.”

Indeed, we would argue that because aquaculture is closer to fishing than agriculture, stewardship is highly sensitive to how property rights are specified (as is the case with natural resources of the marine environment in general, see for example Gordon 1954, Perman et. al. 1999 and numerous others).

The possibility that property rights in non-renewable resource does not ensure stewardship was initially argued by Hotelling (1931) who demonstrated that it may be “optimal” to harvest a resource to extinction. Clark (1990) has challenged this, arguing that extinction is highly improbable. However, Perman et. al. (1999) have sought to demonstrate that even if Hotelling type projections are wrong (with respect to the likelihood of extinction) the implications of his model are still quite serious. They emphasise that given uncertainty about current and/or future conditions and the interrelationships between species, it is possible that extension of property rights will create the perverse incentives identified by Hotelling (1931) and actually lead to the unintended collapse or extinction of populations (Perman et. al. 1999).

The aim of this paper is to contribute to research on the subject of stewardship of marine resources. We offer an empirically grounded case study of aquaculture in Scotland focussing on the farmers' perspectives on environmental stewardship. We chose salmon farming because of the controversy surrounding its social and environmental resource impacts (Hites et. al. 2004, Dillard et. al. 2005, Georgakopoulos 2005, Georgakopoulos and Thomson 2005, 2006, Georgakopoulos et. al. 2006) as well as its political and economic importance in Scotland.

The first salmon farms were set up in Scotland about 30 years ago as largely owner-managed operations. Along with those in Norway, these farms enjoyed first-mover advantage and were initially quite profitable. However, over the past decades, these producers have had to face increasingly international competition (and concomitant price pressures) and tighter environmental standards as problems in disease control became apparent (Highlands and Islands Enterprise and The Scottish Office 1998). The result has been considerable structural change, with owner-managed operations taken-over or merged with large foreign players. Currently the bulk of Scottish operations are branch plants of vertically integrated foreign conglomerates; very few small producers remain (Highlands and Islands Enterprise and The Scottish Office 1998). Currently the industry is under attack by environmentalists who charge that it is ecologically destructive and damaging to health. They have highlighted the potential impacts of chemical additives, of the potential health hazards arising from pollutants in salmon-food, from chemical residues from disease and parasite treatments and from the artificial flesh colouring pigments introduced to make farmed salmon flesh the same colour as that of wild salmon. Supporters of the industry argue that environmental

concerns are exaggerated and emphasise that salmon farming is a key industry in remote rural and island communities, that it provides a valuable alternative food source and a way of protecting ever-declining stocks of wild salmon (Scottish Salmon Growers Association - www.scottishsalmon.co.uk)

The result of such debate has been that the subject of salmon farming has been subject to a complex network of laws, regulations and voluntary certification schemes. However, these solutions have only served to further fuel debate culminating in considerable disagreement on the ability of this regulatory regime to protect coastal ecosystems and the health of consumers (Georgakopoulos and Thomson 2005). Some within the industry have responded to the situation by investing in organic production methods. Since there is some research that suggests organic producers prioritize stewardship over profitability (Kassa et. al. 2002), we decided to make this group the focus of field research on stewardship in aquaculture.

Data were gathered via field research in Scotland with fish farmers who had switched from conventional to organic modes of production. By focussing on organic producers, the research followed the lead of previous environmental economics research that proposes land-based organic producers have stronger environmental stewardship motives than conventional farmers. In using qualitative data, we follow the suggestion of Kassa et. al. (2002) and others (Denzin and Lincoln 2000, O' Dwyer 2004 to name but few) that highlight the importance of shedding light on the perceptions and value orientations of those who exploit the resource directly.

The method of Grounded Theory (Glaser and Strauss 1967) was used to analyse the data and construct an interpretation of the Scottish organic salmon farmer's value orientation. The results of that effort suggest that Scottish organic salmon farmers construct the problem of production and resolve it in ways that are fundamentally different to land-based organic farmers. Moreover, the specific elements of their construction offers little support for the view that property rights automatically create incentives for stewardship of the marine environment.

The remainder of the discussion is organised into three main sections. In the next section, the method of data collection and its analysis using the procedures of Grounded Theory are set out. This is followed by a discussion of the main findings of the research — an empirically Grounded 'Theory' or conjecture on the value orientation of Scottish organic salmon farmers. The last section situates our results in previous agricultural and environmental research on farming, property rights and stewardship.

Section 1: Data Collection and Method of Analysis

The aim of this section is to clarify the main features of the research including a brief description of data collection and a more extensive discussion of Grounded Theory, the method used to analyse the type of data collected.

Field Research

A: Data Collection

The data analysed consist of the transcripts of interviews with Scottish organic salmon farmers and notes taken on site visits including details of the researchers'

experience of the environments in which the interviews were conducted. All of the interviews were carried out in the farmer's work place and lasted between one and two hours. The experience of carrying out interviews in remote farm sites provided valuable insights into the social and cultural contexts in which the farmers' environmental attitudes were forged.

Initially, a series of pilot interviews were undertaken and these interviews led to the selection of a particular salmon-farming region where organic salmon production is concentrated.

In the next step, subjects were identified who were willing to discuss, in detail and in depth, the particulars of their situation and the 'solutions' they saw to the problems they identified. This resulted in in-depth interviews with the representatives/owners of organic and mainstream fish farms [1]. A range of external actors and stakeholders were also interviewed and these data were used to clarify the context of the views held by the fish farmers interviewed. A brief description of the interviewed representative organisations of the Scottish salmon farming industry can be found in Table 1.

Table 1. Salmon farming organisations from which representatives were interviewed

OS1, small family organic fish farm.
OS2 small family organic fish farm.
ML1 subsidiary multinational group producing conventional and organic salmon.
ML2 subsidiary of multinational group producing conventional and organic salmon.
TM1 subsidiary family run group producing conventional salmon.
MK marketing company of TM1.
MM large salmon UK company producing conventional and organic salmon.
Sm large smolt producer.
SMK a small salmon smoking company.
SSGA – Scottish Salmon Growers Association running the Scottish Quality Salmon (SQS) product-labelling scheme.
RGA– Regional Salmon Growers Association running the Regional Quality Salmon labelling schemes (RQS).

Analysing Qualitative Data

Most research in agricultural economics, whether traditional or behavioural, assesses theory by reference to quantitative data; the data provide empirical proxies for the conceptual variables deduced from theory (Denzin and Lincoln 2000, Perman et. al. 1999). In this respect, agricultural economics has been less open to qualitative methods, than perhaps research in subjects such as agribusiness studies, rural sociology and home economics that routinely publish work in which qualitative data (e.g. focus groups, interviews, etc.) are the basis for conjectures and hypotheses on decision-making by actors in the agriculture sector. As argued by Kassa et. al. (2002) and others, qualitative

data are seen to be particularly useful for situations (problems and settings) that do not involve large numbers and concern conditions that are novel or not well understood (Guba and Lincoln 1989, Denzin and Lincoln 2000).

The aim of our research was to use interviews as the basis for a more realistic portrayal of the value orientation of farmers. Rather than assuming that farmers are rational social actors who optimise according to incentives, such as property rights, we were interested in exploring, the social-psychological basis for farmers choices. Thus, in-depth interviews with organic and conventional salmon farmers aimed to bring to light greater depth of conceptual understanding regarding farmers' perception of their situation and the importance (if any) given to environmental stewardship. We were especially interested in any contrast that might arise between land-based and marine-based organic farming because previous research claimed that organic producers could be expected to have a different value orientation towards environmental protection.

Grounded Theory is a method for analysing qualitative data that is particularly suited to studies of this type because the method is highly focused on the social-psychology of the actors studied (Glaser and Strauss 1967, Glaser 1978, 1992, 2001 and 2004). This means that data are analysed solely in terms of their bearing on interpreting the actor's problem and the ways in which he or she resolves the problem.

The method of Grounded Theory makes certain assumptions about qualitative data, described by Van Maanen (1979) as first and second order findings. Accordingly, interview materials can be described as first order findings rather than 'data' in order to emphasise that these materials consist of the interpretations made by different individuals playing the same socio-economic role (e.g. salmon fish farmer). It is to be expected that their interpretations of similar economic situations will differ if only because what is the same role, from an economist's standpoint, is not played out in identical circumstances. At this level, the issue facing the researcher is not the 'truth' or plausibility of the various opinions recorded in the interviews but the extent to which they can be aggregated (or synthesised) into a representation of the farmer's problem that would be recognizable to the informants themselves (Glaser and Strauss 1967; pp.122). When aggregation is achieved, what others usually call the (empirically) Grounded Theory of the actors problem, is described by Van Maanen (1979), as the 'second-order' finding. Van Maanen's (1979) usage clarifies that a Grounded Theory is itself a representation (interpretation or theorisation) of the informants' problem based on a particular way of aggregating the first order representations of that problem made by the informants themselves.

Aggregation (of theoretical synthesis) can be said to be achieved through fixed steps in which abductive inference is made from the data being analysed (Ciancanelli and Pastra 2006). Reliance on abduction, rather than induction, is the main difference between the classic Grounded Theory method and other methods of qualitative data analysis (Glaser 2004, Ciancanelli and Pastra 2006).

The difference between inference via induction, deduction and abduction can be illustrated by considering the following illustration. Deduction infers the unknown from the known (or what is taken to be true). For example, if all beans from this bag are white (the Rule) and these beans are from this bag (the Case), then these beans must be white (The inferred 'result' or conclusion). It can be shown that induction and abduction do not move between these three elements of reasoning (rule, case and conclusion) in the same way as in deduction. Inductive inference starts from the specific case "the

beans are from this bag” then moves to the conclusion “these beans are white and from these ‘givens’ infers the ‘rule’ or generalisation “all the beans in that bag are white”. Abductive inference moves from the rule, “all beans in this bag are white” to the result “these beans are white” and from rule and conclusion infers the properties of the case “these beans are from this bag.” Wirth (1998) describes abduction as “inference to the best explanation” to highlight its difference from induction which is “inference of the rule (generalisation) from particular cases.

In the classic Grounded Theory method, the analysis of data is referred to as coding. Coding is an iterative procedure in which concepts and categories that best explain the common factors in the data are inferred. The aim is to find concepts that aggregate the particular complaints, proposals and representations of the social situation articulated in the interviews in order to clarify the underlying driver(s) of the farmer’s preoccupations. This is referred to as the *core phenomena* or *central finding* of the analysis. Because the raw materials analysed are the statements of those interviewed (rather than their actions) and because analysis itself is a series of thought experiments (abduction or inference to best explanation) [2], the central finding is described as a ‘theory’. It could just as easily be described as a conjecture or hypothesis and as such serve as the basis for more conventional empirical tests of its explanatory capacity (Strauss and Corbin 1990).

In light of these features of Grounded Theory, it must be clear that the intention is not to deliver statements regarding the objective ‘problem’ of organic salmon-farmers in Scotland. The question is not whether the theory is ‘true’ (supposing such a truth is possible) but whether anything can be learned from it that might warrant further investigation. In that sense, the usefulness of the theory lies in its contribution to making sense of the motivation of organic fish farmers, as social actors, in order to ascertain its implications for environmental stewardship.

Section 2: A Grounded Theory of Risk Construction

In the section that follows the Grounded Theory of the actor problem (second order findings) is outlined and illustrated with reference to specific examples drawn from (first order) interview findings. Our interpretation of the data proposes that the Scottish organic salmon farmers’ problem is grounded in ‘risk’ theory [3] and that this problem is resolved via the adoption of two quite different social-psychological strategies for managing risk: denial and affective bias.

Denial

Denial is the first risk management strategy identified in the analysis of the interviews. Denial is a commonplace defence mechanism in which social actors insist that certain facts are not true—despite significant evidence to the contrary (Freud 1937, Paulhus et. al. 1997). Farmers use this strategy primarily in relation to the possible adverse impacts on the marine and coastal environment of their production practices.

Denial, as a strategy to manage risk, manifests itself in three ways. Firstly, informants sometimes denied the possibility altogether that fish farming could harm the environment.

“No environmental risk exists anyway because salmon are like canaries. They can only grow in perfect environmental conditions. It is self defeating to pollute the

sea/fresh-water because fish will not grow and you will be forced out of business. Environmental groups seem to have forgotten this.” (SMK)

“Environmental regulation in Scotland is financially choking the salmon farming industry to death unnecessarily because the industry is environmentally friendly anyway.” (MM, SMK)

From a psychological perspective, denial of the possibility of harm provides the fish farmers with the greatest comfort. However, it is clearly maladaptive from a social standpoint. For this type of denial to be sustained, the farmers must engage in some sort of ‘lie’, either through misrepresentation of their own practices to others or by ignoring the often-observable polluting effects of their practices. Moreover, this type of denial can explain the often-intemperate reactions of fish farmers to environmentalists and other critics of aquaculture.

“Escaped farmed fish spawning in rivers have a positive impact on the wild salmon populations which have decreased due to environmental changes in the ocean.” (SMK)
 “Environmental groups are absolute nutcases ruining the public image of the industry for no good reason whatsoever.” (SSGA)

Through denial of impact, the farmers avoid having to think about (or make the effort to understand) how their conduct affects the environment and this can be seen as an indicator of ineffective stewardship of the marine environment.

A second form of denial is one in which farmers accept the possibility that fish farming may cause environmental harm but minimize its seriousness.

“The farmed stocks are only ten generations away from the wild and there is very few genetic improvement that can be done from one generation to another (4% improvement).” (SMK)... “If escaped farmed fish have some negative traits in them, they will not survive in the wild.” (SSGA)... “Escapees are very few but what about the risks posed by releasing fish in rivers by the Fishery Boards for wild stock enhancement purposes?” (MM)

“If there are environmental impacts, these are managed professionally in a positive manner.” (ML1)... “Environmental impacts existed perhaps in the past because the industry did not have the technology, the science and/or the appreciation for the environment. These things have changed now.” (ML2)... “In the past, fish farming was not scientifically grounded. People were experimenting and for that reason environmental problems were created. The industry is a much better performer today, with universal technological practises in Chile, Norway, Canada and Scotland but because of its past practices there is a negative perception by environmental groups.” (SSGA)

In some cases, the fish farmers admit to the seriousness of (at least some) environmental risks arising from their production practices but deny responsibility for it. For example, there was candid discussion of the environmental effects of sea lice infestations arising from the overcrowding of fish cages. However, most farmers rationalised the problem by arguing that it was not due to their practices.

“Environmental risk from sea-lice passing from farmed to wild stocks is not proved...Wild salmon stocks had sea-lice problems even before the industry's initial setup, so the sector cannot be held responsible for those.” (OS2, Sm, SMK)

“The salmon farming industry did not create sea-lice. They always existed. The Scottish Executive and Scottish Environment Protection Agency (SEPA) have acknowledged this. No regulation exists for sea-lice levels.” (SSGA)

A second feature of the fish farmer's construction of environmental risk is assignment to the regulator of ultimate responsibility for environmental damage. For example, all interviewees commented that Salmon farming is one of the most monitored and heavily regulated industries in Scotland, and as a result, its practices do not pose any environmental risks. Based on the assignment of responsibility to the regulator, farmers reject (often vociferously) any criticisms of their practices made by non-statutory environmental organisations, on grounds that the regulator permits it and would not do so if it were not environmentally safe. Typical quotes include:

"Risks from non responsible production practices exist in theory. However this cannot happen because SEPA monitors the industry closely." (TM1, MK)

"Risk of operations termination by SEPA if limitations for sea lice treatment or environmental limitations regarding freshwater and seawater activities are exceeded." (SMK, SSGA)

Affective Bias

Research in economics as well as psychology has demonstrated that under conditions of uncertainty, decision making strategies are based on an individual's ability to recall or imagine a probable event (Tversky and Kahneman 1973). However, accumulated empirical evidence from psychometric and social psychological investigations support the view that purely individual-based analysis is only part of risk perception and posit that there is a need to account for emotional responses and social aspects of trust to reduce complexity and manage risk (Kahneman et. al. 1982, National Research Council 1989, Renn 1992, Royal Society 1992, Lupton 1999, Steele 2004, Zinn 2006). Based on this social psychological premise we advocate that the second strategy used by the fish farmers to manage risk is a version of affective theories of risk perception, sometimes referred to as *affect heuristics*.

Affect heuristics highlight the role of feelings in shaping risk perception (Lupton 1999, Beck et. al. 1994, Sheldon and Golding 1992, Wynne 1989, 1996 and others). The central idea is that a negative emotional disposition towards an activity provokes individuals to assign it high risk weighting. As a social-psychological strategy to manage risk, our subjects used it primarily in relation to those economic structures (market structure, supply chains, etc) they must navigate in order to sustain their fish farms and their way of life.

As a coping mechanism, *affect heuristics* provide rules of thumb by which to rationalise behaviour. The direction of effect is from the informants' feeling towards the object (say market competition) to their perceived risk-reward from engagement with the object.

Generally, organic producers do not see themselves as having significant, if any, negative environmental impacts partly because of the friendliness of their practices to the environment but mainly because of compliance to strict environmental regulation. In terms of regulation farmers reflect the following view:

"we are basically environmental friendly because we follow SEPAs regulation and monitoring of the industry." (SSGA)

Fish farmers further evidenced a strong negative attitude towards market forces. It was indicated by all our interviewees that:

“The industry has been facing overproduction and poor profitability issues at both national and international levels that make financial survival of both small and large scale fish farming corporations very difficult if possible at all. A situation that has been driving the increased levels of consolidation in the sector.” (SSGA)

This negative attitude influences producers’ perception of fish farming as an extremely hazardous (highly risky) business offering very low rewards. For example producers commented that:

“The mainstream side of things is now highly unprofitable with the selling of conventional salmon being much lower than the production costs” (ML1)... “everyone in the industry tries to cut corners and out do its neighbours” (ML2)... “without realising that this is self-defeating since the production costs can be cut in the beginning but then it becomes very difficult to further reduce. The solution is to bring the price up by controlling the volume of the output at industry’s level and not to behave according to the economic expanding web graph based on previous years’ prices.” (SSGA)

The hallmark of this social-psychological mode of managing risk is the informants’ high estimation of the hazards and low estimation of the rewards of fish farming. For example producers indicated that:

“In the beginning of the sector (some twenty years ago) there were huge margins of profit to be made. However this is not the case anymore and all producers struggle to survive financially” (Sm)... “as a result some of them thought organic production could generate the required turnover and because of appropriate but difficult to adopt in general modes of production switched in organic fish without really considering any other but the economic issues.” (SSGA, OS1, OS2, ML1, ML2, MM)

The implication of this for stewardship is high estimates of hazard that support farmers’ indifference to environmental protection since they identify themselves as “underdogs” in the overall market situation.

Section 3: Risk Perception and Stewardship

Fisher (1981) argued that much of the concern about resource exhaustion involved renewable resource use and the loss of biodiversity, having in mind mainly land-based organisms. Since then, however, significant evidence has accumulated that freshwater lakes, streams and rivers, rather than land-based organisms, are probably the most threatened terrestrial ecosystems. Since marine waters contain over 90% of the world’s living biomass, the greatest threat to biodiversity arises from resource exhaustion of marine waters (WRI 1994).

In the past, resource exhaustion of marine waters has been due to the hunting or harvesting of particular species (such as Whales) for recreation or commercial purposes (Perman et. al. 1999). However, today the evidence suggests that a far greater threat is posed by pesticide intensive land farming, pollution and associated climate changes. Even those activities that aim to substitute marine cultivation for marine hunting and harvesting, such as salmon farming, are now thought to pose threats to biodiversity and the marine habitat (Royal Commission on Environmental Pollution 2004).

Unfortunately, theory development in environmental economics has tended to concentrate its attention on the adverse conditions that could arise from the over-harvesting of species without exploring in sufficient detail other factors that contribute to the loss of biodiversity. For example, non-targeted species are sometimes casualties

of aquaculture (Marine Stewardship Committee 2003, Scottish Natural Heritage 2002, Friends of the Earth Scotland 2001, www.salmonfarmmonitor.org). Many forms of resource harvesting, particularly marine fishing (or aquaculture as indicated to us by local environmental groups) directly or indirectly reduce stocks of other plants or animals that happen to be in the neighbourhood or which have some complementary relationship with the target resource (Royal Commission on Environmental Pollution 2004, Perman et. al. 1999).

Mainstream theories of commercial resource harvesting have tended to ignore Hotelling's work and argue that extinction of renewable resource stocks is possible only in conditions of open access where the species in question are commercially valuable. However, if property rights are absent (implied open access), the incentives to conserve stocks for the future are weak. Thus, the main policy focus of environmental economic theory is construction of various quasi-property rights in the harvesting of resources on the basis that such rights generate environmental stewardship incentives among the harvesters (Conrad 1995 and Rettig 1995, Clark 1990, Conrad and Clark 1987, Dasgupta 1982 to name but a few).

Kassa et. al. (2002) is one of the few qualitative studies that explore the attitudes and motives of organic and conventional farmers. Their research suggests that organic and conventional farmers have different value orientations towards stewardship. In their study, conventional farmers believed that organic production was undertaken in the mistaken belief that a higher return would be achieved because of the higher prices charged for organic outputs. However, their research indicates that organic producers' primary motive for adopting organic modes of production was concern for the environment.

Our study of organic salmon farmers suggests that organic production can be motivated by a profit orientation rather than an environmental one. Thus, it offers material that can be used to assess the claims and counter-claims regarding the power of property rights to ensure sustainable modes of production. Our results suggest that when viewed in terms of risk management, the fish farmers' problem is resolved by denial and affective bias. Both enable farmers to transfer environmental stewardship responsibilities to regulatory organisations.

There is some justice in this stance. Scotland's regulatory framework provides weak property rights when it structures quasi-property as leases (exclusive rights to the use) of specific locations on the seabed and foreshore property (Royal Commission on Environmental Pollution 2004). Other countries such as New Zealand construct stronger property rights by extending fish farming rights that are permanent and transferable via sales in the open market (in strong contrast to Scotland where there is no market in leases). In the UK, the price of the lease is set by a public body (the Crown Estate) whose duty is to maximize its revenues earned from leasing (Scottish Executive 2003). This places Scottish fish farmers (whether organic or not) in a position analogous to land-based tenant farmers. Neither is able to appropriate the benefits that might arise from investments to maintain or improve the environment in which they cultivate.

The leasing arrangements in the UK give farmers incentives for short run exploitation rather than long-term stewardship. Fish farmers in New Zealand, however, can appropriate the benefit of investments since they have permanent and transferable rights to fish farming locations. It is in their interest to act as stewards of the marine environment. Thus, it should not be surprising that UK fish farmers assign

responsibility for environmental stewardship to the regulator and are preoccupied with income risk whilst seemingly indifferent to the risks to their environmental capital. The leasing arrangements limit the amount of their own money capital at risk; their fixed capital is composed mainly of “natural capital” (the marine environment in which the fish farms are situated) that is owned by someone else.

Concluding Comments

Aquaculture is seen as a possible solution to three related problems in Europe: the exhaustion of fish stocks in the North Sea, the limited scope for investment and employment in remote fishing areas affected by it, and fish as a source of ‘healthy’ food. However, the industry has been dogged by controversies about food safety and adverse environmental impacts arising from intensive aquaculture practices (www.salmonfarmmonitor.org)

These controversies have highlighted the need for practices that minimize its social and environmental risks. One such strategy undertaken in Scotland was a shift to organic salmon farming, building upon the perceived success of organic land based agriculture. Organic aquaculture was seen to offer a commercially viable solution to the problems created by conventional fish farming (Sutherland 2000, Scottish Executive 2003, ORGSAL 2000).

Surprisingly, organic practices were not supported by environmental protection groups. Indeed, some pressure groups have attacked organic salmon farming as equally environmentally threatening and unsustainable (see for example: FOE 2001; Scottish Natural Heritage 2002; Georgakopoulos and Thomson 2005; Georgakopoulos et al 2006; www.salmonfarmmonitor.org).

The application of Grounded Theory in this study provided a means to conceptualise how the fish farmer constructed the problem of environmental stewardship, drawing attention to its links to risk perception and risk management. As noted previously, the usefulness of this application lies, not in representing risk perception as an objective phenomenon, but in its ability to make sense of the motivation of fish farmers and the implications of that motivation for environmental stewardship.

Our findings suggest that organic fish farmers in Scotland adopt one of two strategies to manage risk: denial or affective bias (see for example Zinn 2006). In our judgement, these strategies are linked to the UK government’s failure to construct a property rights regime that encourages farmers to act as stewards of the marine environment.

The research undertaken led us to conclude that Scottish organic fish farmers construct the problem of production in ways that are fundamentally different to land-based organic farmers who own the land they cultivate. Moreover, the specific elements of their construction offer little support for the view that property rights automatically create incentives for stewardship of the marine environment.

Our analysis implies that Scottish salmon farmers do not consider environmental risk in the same way as farmers who own the land they cultivate. In successive rounds of cultivation, the latter face the environmental consequences of previous period production decisions. Fish farms, however, perceive that they make use of a number of renewable (self-reproducing) resources. These findings have important implications for policy makers who seek to regulate the stewardship of fish farmers according to property rights and aim to protect the marine environment.

Notes

- [1] Twenty-three interviews were conducted with salmon farmers and representatives of their associations, regulators, political institutions, pro- and anti-fish farming stakeholders. Documentary analysis included FOE (2001), Scottish Executive (2003) and SNH (2002). The specific regional location of the salmon farmers shall remain anonymous to respect the potential commercial sensitivity of data gathered. See Georgakopoulos and Thomson (2005, 2006), and Georgakopoulos et. al. (2006) for more information on the interview data and on the conceptualisation of the arena model (Renn 1992).
- [2] In qualitative research, abductive inference is rarely referenced even though some widely used interview transcript analysis techniques, such as word mapping are derived from it. However, most qualitative data analysis employs inductive inference, including automated versions of it found in qualitative data analysis software packages.
- [3] By risk we do not refer to an objective feature of the farmers' situation but their subjective perception of events, institutions and social relations that are seen as important to sustaining their occupation and way of life (an overview of the sociological perspectives on risk can be found in: The Royal Society 1992; Lupton 1999).

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