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Public attitudes toward aquaculture: An Irish and Norwegian comparative study

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ABSTRACT

Around the world, there is a growing emphasis on developing the aquaculture industry in an environmentally, economically and socially sustainable manner and this is the case also in Norway and Ireland. The impact of aquaculture on the environment is currently evaluated by the use of a set of indicators focusing mainly on physical and chemical parameters, while to date social acceptance has not been integrated fully into aquaculture sustainability evaluation. With this in mind, this paper examines the public attitudes of the Irish and Norwegian general public to marine aquaculture. Both countries have long coastlines, a growing aquaculture industry and a strong emphasis on public participation in decision-making. The results indicate that both the Norwegian and Irish public recognise the potential of aquaculture to create opportunities for employment in coastal areas but opinion is much more divided on some of the more controversial impacts of aquaculture on the marine environment. The results also suggest that the Norwegian general public may be better informed on issues related to aquaculture development.

1. Introduction

It is generally accepted that wild capture fisheries will not be able to produce high enough yields in the future for an expanding world population. Aquaculture on the other hand has been the fastest growing food production sector over the past 20 years. However, the expansion of the sector has raised a number of concerns for the public. Chief among these concerns has been the issues of sea lice on farmed fish, the use of antibiotics, the sourcing of fish feed, waste accumulation on the seafloor and the potential impacts of escaped farm fish on wild stocks [1]. While these same concerns are felt across many societies, the industry has not expanded at the same rate in what should be similar environmental conditions. Take for example the case of Ireland, Scotland and Norway where salmon production currently stands at approximately 16,000, 162,000 and 1,310,000 t respectively [2–4]. What explains theses widely diverse production levels? In this paper we explore the attitudes of the public towards aquaculture and salmon farming in Norway and Ireland in light of difference in fish farming activity in the two countries.

According to figures from the Bord Iascaigh Mhara (BIM) Annual aquaculture Survey [2], Ireland produced 44,000 t of farmed seafood in total in 2016 of which the majority were engaged in shellfish aquaculture. Farmed salmon comes second to shellfish output in volume and value. Salmon farming in Ireland declined from a peak in production of 23,000 t in 2001 to a low of 13,000 t in 2005 [5]. The most recent data from the BIM survey indicates a gradual increase in production to 16,300 t in 2016 [2]. A National Strategic Plan for Sustainable Aquaculture Development (NSPSAD) sets out a target of achieving production levels, for all aquaculture sub-sectors, at or near previous historic maxima simultaneously. This equates to a relatively modest target of just 25,000 t for Irish farmed salmon annually.

In contrast, aquaculture and related industries contribute substantially to the economy of Norway with farmed salmon being one of the main export commodities from the country [4]. Just over 90% of Norwegian aquaculture production in 2015 was reared salmon. In total, 1.31 million tonnes of salmon were produced in Norway in 2015. According to a recent Ernst and Young (EY) report the output and export value of salmon farming has doubled since 2006 [6]. The key driver of this growth has been the increase in the price of salmon, following the decline in salmon harvest volumes in Norway and Chile in 2015. However, while the industry experienced record high revenue levels, profitability in the industry was down due to the rise in operating costs, which according to the EY report was mainly driven by the increasing challenges with sea lice and diseases. The Norwegian Government presented a White Paper to the Norwegian Parliament on growth in the Norwegian salmon farming industry in 2015. The White paper proposes

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a new monitoring system that would use the industry's environmental impact as the main factor to determine expansion in the salmon farming industry. In particular, sea lice impact on wild populations would be used as a key indicator when determining whether a production area is suited for growth or not.

This new approach being adopted by the Norwegian government demonstrates the increasingly important link between perceived environmental impact and consumers' and societies willingness to accept and/or consume a product [7–11]. Previous research has also shown public attitudes toward aquaculture is largely determined by what the public believe or understand in terms of environmental impact – understanding that is often driven by the media and vested interest groups rather than scientific facts [12–15]. Two recent studies examining the public attitudes towards the marine environment across a number of European countries found that aquaculture was generally seen to be less harmful than other threats such as industrial pollution, litter and climate change [16,17].

A number of studies in the Irish and Norwegian case have also previously examined societal attitudes to aquaculture. In 2015 the Irish Farmers Association commissioned an opinion poll on aquaculture [18]. The objective of the opinion poll was to gather data on concerns, perceptions and information sources for the Irish public on the industry and to compare it to a similar opinion poll conducted by the IFA in 2008. The study found that increasing acceptance of possible fish farms in a person's area was driven by a belief that such activity brings about job creation locally. Also, the reasons given for being against possible fish farms in their local area suggested the need for a communication programme to help people understand the issues better. In the Norwegian case, [15] conducted a small scale internet based study (500 observations) of the Norwegian general public's perceptions of aquaculture in general and integrated multi-tropic aquaculture in particular as part of a broader cross country analysis. Elsewhere, [19] examined how different stakeholder perceptions in the USA and Norway contribute to the likelihood that an agent is willing to support aquaculture expansion in those countries. In a more recent study, the content, positions, and producers of debate contributions in nine Norwegian newspapers was analysed in order to sheds light on the public perception of aquaculture and its environmental credentials [20,21].

Interestingly, Rudd et al. [22] found that the controversy relating to the environmental impacts of salmon farming may be more of a concern amongst academics and non-government organisations than amongst consumers. Having said this, a positive consumers' willingness to pay has been identified in several studies for salmon produced in a more environmentally friendly manner [1,23–25]. Also, in earlier research, [12] found that public attitudes towards the future of the salmon farming industry in Scotland were a function of the weights people attached to the beneficial effects of industry expansion (e.g. job creation) as against the perceived negative effects associated with environmental degradation. Their survey of the general public also found significant regional variations in attitudes towards salmon farming in Scotland.

This paper adds to the above literature by providing an in-depth analysis of the knowledge and variation in the attitudes to aquaculture in Norway and Ireland as found in a comprehensive survey of the general public in both countries. The current plans to expand aquaculture and invest in the sector in both countries, coupled with EU policy goals to expand the food we produce from EU waters while at the same time protect marine ecosystems, means that uncovering evidence related to the attitudes of the general public for aquaculture production should lead to a deeper understanding of the priorities present across different groups in Irish and Norwegian societies. It should also highlight potential conflicts of interests. In what follows, the methods section describes the data collection approach and provides a general outline of the survey instrument. The results section then presents the descriptive statistics for the sample and an analysis of the observed attitudes to aquaculture in both countries. The final section concludes by discussing the implications of the results for the aquaculture industry and policy makers.

2. Methods

Data for the analysis was collected via a nationwide survey conducted in both Ireland and Norway over a 3 month period from April to June in 2016. Only respondents aged 18 years or older were interviewed in both countries. The interviews resulted in 859 complete Irish surveys and 1001 Norwegian surveys. While the data collection method employed in each country was different the sampling method employed in each country was the same. In the Irish case a quota controlled sampling procedure was followed to ensure that the survey was nationally representative for the population aged 18 years and above. The quotas used were based on known population distribution figures for age, sex and region of residence taken from the Irish National Census of Population, 2011. Survey collection was through face to face interviews at the respondents' homes.

In Norway, telephone interviews were carried out rather than door to door surveying due to cost and time constraints. In this case, representative sampling weights based on Census of Population statistics for Norway were also used in the analysis to insure that the interviewed sample is representative of the national population. A survey company was used which had a panel of 40,000 persons. Again, based on a quota sampling approach, participants were sampled strategically from the panel in order to achieve representativeness in terms of sex, age and region. Due to the different interview collection method a small number of questions were asked using a different format in both countries. The responses analysed in this paper are however based on the same question format unless otherwise stated.[1]

Pilot testing of the survey instruments was conducted in the months prior to the main survey. Along with observations from earlier focus group discussions, results from the pilots were used to refine the questions asked in the main surveys. In the final survey instrument, respondents were asked a series of questions related to their attitudes toward the marine environment and aquaculture and their fish eating habits. A number of socio-demographic questions were also asked related to age, gender, marital status, occupation, working status, income, number of persons in household and education and housing characteristics. Finally, a contingent valuation method (CVM) based question was asked of respondents that examined the Norwegian and Irish public's willingness to pay a premium for sustainably farmed salmon.[2]

Respondents were probed on their awareness and concerns in relation to fish farming using a series of Likert scale questions. These questions provided a series of statements or posed a question that the respondents were asked to provide a response to on a 1–5 scale. For example, respondents were asked how important they thought salmon fish farms were to the livelihood of their local community. They were then asked to answer on a scale of 1–5 where 1 is not at all important and 5 is extremely important. Similarly respondents were asked to what extent a number of issues such as climate change, over fishing, etc. posed a threat to the marine environment. They were asked to answer on a scale of 1–5 where 1 was 'Does not pose any threat' and 5 was 'Poses a severe threat'.

Data were analysed using STATA 14. Descriptive statistics were used to report percentages, means and standard deviations. Excel was

[1] While quota sampling is relatively easy to administer, can be performed quickly, is cost-effective and accounts for population proportions there is a potential for selection bias, which can result in a sample that is unrepresentative of the population for certain non-quota controlled characteristics particularly if the sample size is small.

[2] The response to the CVM question is not analysed here as we just concentrate on the attitudes to aquaculture in this paper. The CVM analysis is reported in [26].