

Local knowledge, social identity and conflicts around traditional marine salmon fisheries – A case from Mid-Norway

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Abstract

Natural and cultural diversity is gaining wider global recognition as the key to sustainable development. This article looks at the challenges of conserving marine biocultural diversity by investigating the unique heritage of marine salmon fisheries through a case study of a small group of marine fisheries in Norway, still fishing for Atlantic salmon *Salmo salar* L. Tight relationships between declining natural resources and daily struggles to keep cultural heritage alive are highlighted through theoretical perspectives of social identity and local ecological knowledge. The theoretical lens of social identity contributes to better understanding tensions between scientific and local knowledge by bringing forward social categorisation, polarisation and power relations as drivers of conflicts. Involvement of local communities and respect for their cultural heritage, knowledge and practices can assist in more effective management and governance of multifunctional biocultural landscapes, and contribute to their resilience and adaptability.

KEYWORDS

coastal heritage, cultural and biological diversity, local ecological knowledge, salmon, small-scale fisheries, social identity, traditions

1 | INTRODUCTION

Biodiversity and ecosystem functions and services have been deteriorating worldwide (IPBES, 2019). Along with this, the nexus of natural and cultural diversity is gaining wider global recognition as intrinsically and inextricably linked, together holding the key to sustainable development (UNESCO-CBD, 2014). As a result, the concept of biocultural diversity has been championed by a series of international declarations (Parrotta & Trosper, 2012; UNESCO-CBD, 2014). For example, the Florence Declaration on the Links between Biological and Cultural Diversity emphasises that “rural and urban livelihoods and wellbeing are closely connected to the status and trends in biological and cultural diversity” and that “landscapes rich

in biocultural diversity are often those managed by small-scale or peasant farmers, traditional livestock keepers/pastoralists, and small-scale/artisanal fishers” (UNESCO-CBD, 2014, n.p.). In practice, however, the holistic approach to biocultural diversity often remains underutilised in management of ecosystems and cultural heritage. Here, the challenges of conserving biocultural diversity of coastal landscapes are explored by investigating a case of small-scale salmon fishers in Norway.

There has been a global decline in the total abundance of wild Atlantic salmon *Salmo salar* L. during the last three decades (Anon., 2019). Along with this, the number of marine salmon fishers in Norway has also been declining, for example from 3,000 in the 1990s to 915 in 2019 (Statistics Norway, 2019). The decline in traditional

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fishing culture is caused by complex socio-economic transformations, including changing lifestyles among coastal communities, decreasing prices for wild salmon and political pressure on marine fisheries (Fangel et al., 2008; Fiske et al., 2012; Liu et al., 2011). In this context, the paper focuses on a small group of marine fishers in Norway, who still fish using traditional bagnets and are carriers of traditional knowledge and culture around Atlantic salmon.

When looking into the tradition and current status of marine salmon fisheries in Norway, one cannot avoid the ongoing heated debates around the fishing rights. Conflicts over management and distribution of salmon among various stakeholders, including river owners, marine net fishers, governmental and non-governmental organisations, show up regularly in the local media and escalated during spring 2021 (e.g. Mugaas, 2019; Rotevatn, 2021; Sandnes, 2020, 2021; Skjelde, 2019). In March 2020, the Norwegian Scientific Advisory Committee for Atlantic salmon issued a report that contained recommendations for the future of marine salmon fisheries (Anon., 2020). As of March 2021, this means that the salmon fisheries will be further regulated (Miljødirektoratet, 2021). All marine fisheries are now being prohibited, and the result is that the cultural heritage of marine fishing communities is endangered (Kalak & Johansen, 2020).

The disappearance of marine fishing heritage is seen as part of a larger trend of biocultural homogenisation, one of the Anthropocene's wicked problems, defined as "interwoven losses of native biological and cultural diversity at the local, regional, and global scales" (Rozi, 2018, p. 21). As a contributing factor to biocultural homogenisation, there is a tendency to prioritise monetary metrics, simplify complex sociocultural contexts and underestimate traditional knowledge when it comes to natural resource use. Scientific research has focussed extensively on economic value of salmon fishing (e.g. Fangel et al., 2008; Fiske et al., 2012), while comparatively less research has been undertaken to understand these marine fisheries in terms of their cultural and historical significance for the coastal communities in Norway (notable exceptions being Hoelting, 2008; Rybråten & Gómez-Baggethun, 2016). Similarly, little has been done to understand motivations, beliefs and values of marine fishers who continue to engage in marine fishing despite the comparatively little income it generates. This paper contributes to understanding the cultural dimension of Norwegian marine salmon fisheries by using theoretical perspectives of social identity (Colvin et al., 2015) and local ecological knowledge (LEK) (Berkes, 2012), posing the following questions:

1. How do lenses of social identity and LEK allow understanding the motivations and meanings behind traditional marine salmon fishing practices?
2. How do traditional marine fisheries contribute to sustaining biocultural diversity?

To achieve this, the role of LEK and social identity in the culture and tradition of marine fisheries are examined, and together with how this insight can be used in the context of management of marine

salmon fisheries and conservation of biocultural diverse landscapes in general. Empirically, the study is grounded in a qualitative case study around the Trondheim Fjord in central Norway – a historically important region of fisheries for Atlantic salmon.

1.1 | Identity and local ecological knowledge (LEK)

Human relationships with nature are complex and multi-faceted, including usage of natural phenomena as confirmation of who we are, and linking our identity to nature through beliefs and practices (Clayton & Opatow, 2003; Ritov & Kahnemann, 1997). Social identity theories explain how we perceive ourselves, based on how we interact with others, our perceptions of group belonging (Bryan, 2008). As stated by Colvin et al. (2015, p. 237), "An individual's social identity is not simply a statement of who they are, but also describes how they perceive their place in social groups and indicates the social norms to which they are likely to adhere."

Most of our everyday decisions are made based on intuitive reasoning and previous experiences. However, this can also hinder learning, innovation and problem-solving, as well as create bias (Stern, 2018). Moreover, we naturally develop ideas and stereotypes that influence how we interact with other people and social groups. A group's social identity leads its members to act in accordance with its goals, values, beliefs and behaviours (Stern, 2018). We tend to define ourselves and our peers as members of an in-group, while viewing outsiders as members of out-groups (Bryan, 2008; Tajfel & Turner, 1979). It is important to emphasise that social identity is linked to local cultures and traditions and spans beyond purely economic status (Bogadóttir & Olsen, 2017).

Traditional knowledge and practices have always sustained livelihoods, culture, identities and agricultural resources of local and indigenous communities throughout the world. Non-scientific knowledge is increasingly recognised as an important source of information about ecosystem processes and sustainable natural practices. This recognition is, for example, embedded in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (Brondizio et al., 2019; IPBES, 2019), and UNESCO's recommendation of closer links between modern science and other forms of knowledge. Many terms exist for non-scientific knowledge, for example traditional knowledge, traditional ecological knowledge and local ecological knowledge (LEK). Traditional knowledge is often defined as a dynamic form of knowledge that contains practices and beliefs – a way of living (Berkes, 2012, p. 4). LEK, in turn, can be defined as practical, informal knowledge, obtained through direct interaction with the natural surroundings. Common to these terms is the focus on knowledge as a system and an emphasis that this knowledge is drawn from lived experiences of people throughout their history of interaction with the environment (Agrawal, 1995; Berkes, 2012; Brattland & Mustonen, 2018;).

In this paper, LEK is used as an umbrella term for place-specific, non-scientific, informal knowledge that is passed down the generations through cultural practices and traditions. Local knowledge,

therefore, is different from the scientific one, both in content and expression (Berkes, 2015). In this context, LEK and social identity are assumed to be inextricably linked, since perpetuation of cultural continuity as a transfer of knowledge between generations forms and maintains the feeling of belonging to a certain group, in this case marine fishers.

1.2 | Specifics of small-scale fisheries

Many traditional small-scale salmon fisheries have seen dramatic institutional and sociocultural changes in the last few decades, including the transition to limited access regimes and increasing economic importance of tourism and leisure fisheries (Pinkerton, 2019; Stensland, 2011). Ageing trends, also known as “greying of the fleet” in rural fishing communities, provide a growing concern for the sustainability and identity for the local cultures and economies (Donkersloot & Carothers, 2016).

Small-scale fisheries are systematically excluded from access to fish globally, resulting in disappearance of coastal culture and heritage (Pinkerton, 2019). Fisheries have conventionally been managed as economic entities, meaning that conflicts around fisheries have similarly been framed in primarily economic, utilitarian terms (Acheson, 1981; Pinkerton, 2017, 2019). However, critical scholars have pointed out the dangers of neoliberal economics tendency for reductionism, excessive reliance on utilitarian logic, monetary metrics and failure to contribute to sustainability (Eikeset et al., 2018; Hadjimichael, 2018; Perkins, 2019; Pinkerton, 2017; Romano, 2012; Sabau & van Zyll de Jong, 2015). As early as 1981, Acheson (1981) highlighted that framing conflicts around fisheries as “tragedy of the commons” implies that fishers’ motivations and social organisations are focussed on maximising their catch for monetary reasons alone, which is not the case for all small-scale fisheries (and for rural communities in general, as pointed out by Ostrom, 1990). Alternative economic approaches, for example the degrowth perspective (Pinkerton, 2017), urge the public to bring financial goals in line with the complexities and limitations of the natural world, arguing that it is important for small-scale fisheries to be seen as contributors to sustainable solutions, stewards of natural resources and holders of valuable knowledge, rather than inefficient and unsustainable economic actors.

2 | MATERIALS AND METHODS

2.1 | Case study: Marine salmon fisheries in Mid-Norway

This study was carried out in the middle part of Norway with long-standing traditions in both marine and river fisheries. The fjords are also important habitats for the stocks of Atlantic salmon. In the northern part is the Namsen Fjord, which is 35 km long and has ten salmon rivers, with renowned Namsen as the most important (Anon.,

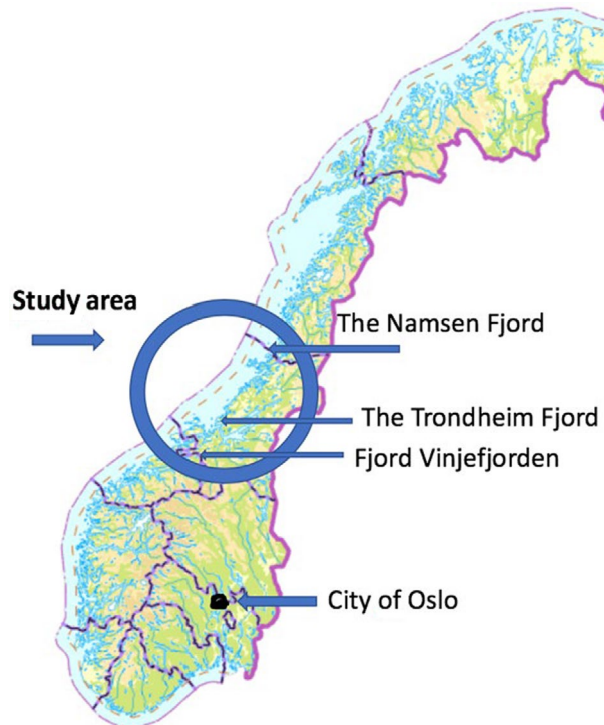


FIGURE 1 The fjords of central Norway have a long-standing tradition of marine salmon fisheries and are important habitats for the Atlantic salmon stock. The Trondheim Fjord has six major salmon rivers and 30 smaller salmon streams (Fiske et al., 2012; Stensland, 2010). Around a quarter of the recreational salmon angling in Norway takes place in the rivers around the Trondheim Fjord (Stensland et al., 2015) and there are considerable marine fisheries for salmon in the fjord (Fiske et al., 2012). The Namsen Fjord is 35 km in length and has ten salmon rivers with renowned Namsen as the most important (Anon., 2019). Map by norgeskart.no

2019). The largest fjord, Trondheim Fjord, has six major salmon rivers and 30 smaller salmon streams (Fiske et al., 2012; Stensland, 2010). The last and southernmost fjord is the Vinjefjorden (Figure 1).

Regulation of fishery and private ownership of fishing rights dates to Gulating law from approximately 1200 AD. The bagnets were introduced from Scotland around 1840–50. Fisheries were economically important and targeted salmon in the fjords and along the coast (Fiske et al., 2012). The number of bagnets stayed around 8000 up to the mid-1960s. Marine commercial fisheries in the study area still use traditional bagnets (which are connected to and tied up to old inherited and legally established places on land). Fishing salmon with bagnets in Norway is a legally private property right, which normally is tied to a family farm. These rights have been very valuable for coastal farmers (Laksegård), and many families have historically depended on those rights. Seasonal fisheries had high impact on economics, social life and culture of the coastal regions in Norway (Hoelting, 2008; Oterholm, 2019). From the mid-1800s, salmon was exported to England. Tourists and families from the nearby cities visited coastal regions in summer. Fish buyers and salesmen travelled from farm to farm and there was a lot of activities



FIGURE 2 Double bagnet (kilenot). Fixed gears seen from above. Tied up to land with a net who leads salmon in to the “fish rooms” in the ends of the net. Salmon swim through wedges into the “big room” and further into the “fish room” where they normally are caught alive

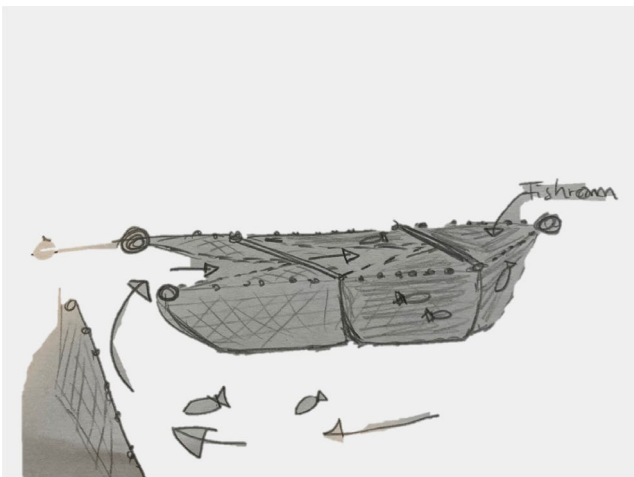


FIGURE 3 Traditional bagnets (kilenot), fixed gear seen from land. Tied up with a net to lead salmon in to the “fishrooms” in the ends of the net. The bagnet is divided in separate and closed “rooms” which are like bags – the salmon cannot escape these bags

related to these fisheries, and knowledge and skills were passed down from grandfathers to fathers and sons. Fishing was a hard and often dangerous work, since it was done at sea in open boats (Oterholm, 2019) (Figures 2 and 3).

2.1.1 | Marine commercial fisheries versus recreational river angling

This paper focuses on two ways of fishing salmon—marine fishing with bagnets and river angling. Back in the 1970s, the marine fishing season lasted from April to August. Currently, the season in

Trondheim Fjord has been reduced to two and a half to four weeks in July, depending on local regulations. In the Namsen Fjord, the season lasts about eight weeks and fishing is only allowed from Monday to Friday, and only with traditional bagnets. An average catch is usually a few hundred kilograms, but could reach 3000–4000 kg at good sites. The gross income from marine fisheries is estimated at around €2 million (Fangel et al., 2008). There are 117 fishers registered in the study area (Statistics Norway, 2019). The marine commercial fishers have regional organisations as well as a national organisation (Norwegian Salmon Net Fishers, hereafter the NSF). The NSF has limited human resources with only one part-time employee (Table 1).

Recreational angling for Atlantic salmon in the prime river destinations of Norway, Canada, Iceland, Russia and the United Kingdom is an important tourist activity and has provided significant income for fishing rights holders, the tourism industry and rural economies for over a century (Øian et al., 2017; Stensland, 2010). In Norway, 65,000–80,000 anglers generate a revenue of about €126 million annually in local communities (Andersen & Dervo, 2019). The national river owners’ association, *Norske Lakseelver* (Norwegian Salmon Rivers, hereafter NL), represents and conducts lobbying at the national level for around 7000 river owners (see Table 1). Around a quarter of all recreational salmon angling in Norway takes place in the rivers around the Trondheim Fjord (Stensland et al., 2015).

Marine fishers, anglers and river owners have had a history of disagreements around fisheries regulations and management goals (e.g. Fiske et al., 2012). In this multi-stakeholder process, marine fishers have found themselves on the losing end, lacking power to leverage their interests (discussed below).

2.1.2 | Marginalisation of marine fisheries through lease agreements

In the recent decades, marine salmon fisheries in Norway have become marginalised compared with recreational anglers (Fangel et al., 2008; Kalak & Johansen, 2020; Statistics Norway, 2019). In 2009, the Atlantic Salmon Committee issued new conservation regulations, which included quotas and shorter fishing hours (Fiske et al., 2012; Forseth, et al., 2017). Restrictions resulted in a reduction of marine fishers’ share of the total salmon harvest in Norway from 60% in the early 1990s to 40% in 2019 (Statistics Norway, 2019).

Regulations have generally reduced marine fisheries because they mainly harvest mixed stocks, meaning a mix of salmon from several different stocks and watercourses, where the weakest stocks must be protected (Miljødirektoratet, 2016). Total catches were reduced considerably, and the conflicts between the marine fishers, anglers, river owners, science and government around management goals escalated. The new management scheme invigorated the public debate between the riverine and marine interests (Forseth et al., 2013). Perceived as disproportionately benefitting the former and disenfranchising the latter, new regulations affected stakeholder cooperation negatively.

TABLE 1 Overview of participating actors

Parties/Organisations	
Parties	Responsibilities
Norwegian Salmon Fishers (Norske Sjølaksefiskere)	Organisation for marine fishermen in Norway (130 members). Secretariat in part-time position.
Norwegian Salmon Rivers (Norske Lakseelver)	Business organisation for river fishing licence holders. Has five full-time employees in addition to project positions. Represents around 7,000 fishing licence holders in over 100 salmon-bearing watercourses.
Trondheim Fjord Rivers (Elvene rundt Trondheimsfjorden)	Umbrella organisation of the riverine organisations, which aimed to get the salmon caught in the sea into the rivers by means of a lease agreement. From 2005 to 2009, most bag nets in the Trondheim Fjord were kept on land. Landowners in the fjord were offered compensation by the regional river owners' organisation if they agreed to keep their nets ashore during that period. This policy allowed more salmon to return to the rivers, increased anglers' spending and financially benefited those holding fishing rights (Fiske et al., 2012).
Norwegian Environment Agency (Miljødirektoratet)	The central public executive and advisory body for the management of salmon in the sea and rivers.

Between 2005 and 2009, stakeholders' management led to a lease agreement in the Trondheim Fjord, where river landowners were willing to pay net fishers not to fish in the fjords in an attempt to reduce exploitation by bagnets in the area (Fiske et al., 2012; Liu et al., 2011). Marine fishers disagreed with the new restrictions and felt that they were put in a difficult position because they were offered less compensation. The new managements restrictions of fishing hours contributed to deepening the conflict (Fiske et al., 2012).

2.2 | Data collection and analysis

This study is grounded in interpretivist qualitative research tradition. Data include 12 interviews with net fishers, representatives of state authorities, scientists, river owners' associations and net fishers' associations, conducted in the autumn of 2018 (see Table 2). Both directed and "snowball" sampling strategies were used (Creswell, 2018). Fishers were selected based on their membership in marine salmon fishing associations, peer recommendation and authors' previous knowledge of the community. Representatives of river owners' associations and experts were selected based on their involvement in and knowledge of salmon management in Norway.

Interview questions aimed to understand the meanings of marine fishing and motivations behind this practice, and perception of fishing policies and their effects. Special attention was paid to how resource management is framed by different stakeholders, and how the resulting tensions are experienced on the ground. In line with the interpretivist stance, the researchers focussed primarily on how the interviewees interpreted and made sense of the issues in question, "to see a slice of social world from an informant's perspective" (Boeije, 2009, p. 63; Kvale & Brinkmann, 2009; Creswell, 2018). The interview guide was adjusted with each subsequent interview, refining existing questions and adding new emerging themes (Boeije, 2009; Ruddell, 2017). As the interviews progressed, the focus of

this study was recalibrated towards traditions, identity, culture and rights.

The interviews were conducted face-to-face, in offices and fishers' homes. Interviews lasted between 45 min and 3.5 hr, depending on the informant's cooperation and enthusiasm and ranged from semi-structured to "relatively unstructured" (Kvale & Brinkmann, 2009). In the latter case, the interviews resembled life story interviews, where the interviewer was a listener, withholding desires to interrupt, and occasionally asking questions that may clarify the story (Kvale & Brinkmann, 2009). All the interviews were conducted in Norwegian by the lead author, who is originally from the area and has a background on a farm with marine salmon fishing. Knowledge of the local dialect, personal ties to the region and familiarity with the practice of fishing possessed by the lead author, helped establish rapport with the interviewees. The quotes used in this paper were translated from Norwegian by the authors. The guidelines of the Norwegian Centre for Research Data (NSD) on confidentiality and anonymity were followed. All informants are named by pseudonyms. All interviewees were male of middle age and above (Table 2), which reflects the homogenous demographic of the marine fishers group. Therefore, it was relatively easy to reach theoretical saturation within the selected sample of in-depth interviews.

Interviews were transcribed verbatim and thematically analysed with the help of NVivo software. Memos were written in relation to each interview and used in the analysis (Boeije, 2009). A three-step coding approach was used during the analysis, (Boeije, 2009; Creswell, 2018), together with the principles of constant comparison, analytical induction and theoretical sensitivity (Boeije, 2009).

2.3 | Limitations

The climate of conflict around marine fisheries in mid-Norway was a limiting factor for the study. Lack of trust among the stakeholders and beliefs that all research is eventually translated into "anti-marine

TABLE 2 Informants

Informants		
Informant ^a	Sea, river, management	Age
Karsten	Net fisherman, member NSF	Retired, 60–70
Arne Johan	Net fisherman, member NSF	Retired, 70–80
Stein	Net fisherman, member NSF	working, 40–50
Arnt	Net fisherman, member NSF	Working, 60–70
Thor	Net fisherman, member NSF	Working, 40–50
Kristian	Net fisherman, member NSF	Working, 60–70
Kåre	Net fisherman	Working, 60–70
Arnstein	Net fisherman	Retired, 70–80
Kjell	Trondheim Fjord Rivers	Retired, 70–80
Reidar	Norwegian Salmon Rivers	Employed, 40–50
Nils	Norwegian Environmental Agency	Employed, 40–50
Roger	Scientist	Employed, 50–60

^aAll informants' names are pseudonyms.

fishing" regulations were tangible. This made it impossible to collect survey data, as was initially planned for this study. Qualitative interviews proved to be a more winning data collection strategy, presumably due to the perception that qualitative data are considered "soft" and less threatening than quantitative data. Even though it was possible to get accepted and establish rapport with the interviewees, it was nevertheless striking how strong the scepticism was towards researchers and the state institutions, as well as the fear that the information they share would be used against them. Net fishers are a small group, and although anonymity and confidentiality were guaranteed, the overall context certainly affected what and how much they were willing to share.

3 | RESULTS

3.1 | LEK and identity as lenses to understand the fishing practice

Social identity and LEK emerged as an important theme during the interviews as a way to understand the importance of fishing rights, integral role of marine fishing as a part of coastal culture, history and traditions, family and fishers' relationship to self and nature.

Fishers shared their stories about stocking and conservation of salmon, fishing gear and maintenance, and history of fishing in the area. They told the history of salmon fishing rights on their farms and

showed catch diaries, dating back to the 19th Century. There were also narratives about fish merchants, summer visitors and the great economic, social and cultural importance of salmon. Passing on this knowledge and traditions to future generations was highlighted as important.

Fishers spoke about the knowledge accumulated over several generations of salmon fishing, which was closely linked to their identity and a part of their family history. Net fisherman Karsten was particularly proud about the hatchery operation that his family had contributed to in the past. He described cooperation with the river fishers and other net fishers, recalling how they were organised into local salmon management boards (Laksestyrer). Karsten told about how all the fishers used to pay tax from the harvested salmon, which contributed to hatchery cultivation. He told about his grandfather, who was a pioneer in the local salmon board and received the King's Merit Medal for his cultivation work. Another net fisherman also described the history of cultivation and stocking from the hatchery below his farmhouse. Both stories illustrate that net fishers were once heavily involved in conservation and cultivation in the Trondheim Fjord. Fishers expressed that the local knowledge of salmon, in terms of different fishing methods, habitats and conditions that affected the stocks, had created a great sense of commitment and strong ties to salmon. They also pointed out that there used to be collaboration between the river and the sea actors, which had stopped after the Salmon and Freshwater Fishing Act of 1992. This, one fisherman expressed, stopped because the mixing the stocks from different rivers in the fjord systems became prohibited, and therefore, their common work with cultivation for all the rivers also had to end.

Local knowledge, however, is still valuable and is used, for example, to monitor salmon runs to the fjord. Nevertheless, there are tensions between us and them, between LEK and scientific knowledge. For example, at the inlet of the Trondheim Fjord, local knowledge about salmon migration routes has proven to be consistent with scientific monitoring over time. This can be illustrated by a quote from Birger, who worked with monitoring salmon runs for scientific purposes:

My claim at the time was that when the salmon pass here, 90% belongs to the Trondheim Fjord. They [the researchers] laughed at me and said that I could not claim this – I had no grounds to say so. But I was saying that three generations, who have studied the salmon before me, also said this. Then they evaluated after 15 years of monitoring and found that I was wrong ... They found that 95% of the fish tagged here belonged to the rivers in this fjord!

Net fishers emphasised the value of passing the salmon-related knowledge on to future generations. Fishers said they were mainly driven by personal commitment to the craft and maintaining the tradition and local knowledge, not the economic interests. Kristian, who runs a tourism business based on salmon fishing, said after pointing out the importance of passing this tradition on to his son:

What drives me to do this is that it is a great thing to do – the anticipation and all that. I would probably put out my bagnet even if it was just fishing for myself ... in fact, yes, tradition, I think, comes very high. Actually, it's not the money that drives me to do this.

Fishers said that the knowledge and values they grew up with formed the basis of their current values and identity. From childhood on, all net fishers were involved in outdoor recreation activities such as fishing, hunting and harvesting wild foods. These skills were transferred from people in their community – family members and neighbours. Several of the fishers mentioned they had been fishing with their own bagnets since the age of 12–13, often together with siblings. In reference to their own childhoods, when they were introduced to salmon fishing, they described how it got “into the blood” and was “in the genes.”

Also, some of the retired fishers seemed to find it difficult to quit fishing and expressed their desire to continue as long as they had the health to do it. Arnstein describes his reaction when he was offered the opportunity to continue salmon fishing:

....., I thought. I have been here before. It's a lot of trouble ... But the temptation was too great anyway, because as that time of the year approaches, it's almost like a fever in the body. Just like hunting. Then you've just got to go there!

Fishers' narratives reflected their respect for and personal ties to salmon, deep understanding salmon as a species, fascination by it and its habitat. Salmon was referred to as “wonderfully beautiful,” and the process of looking for and listening to it in the bagnets was described as thrilling. As fisherman Karsten elaborates:

I've been doing this for 60 years, you know, and my brother was with me, you know. We hung over the gunwale and looked down [...] He makes the sound - the salmon! Yes, we heard, you know! [...] Obviously, when you are fishing, it is scared...

The fishers talked on end about the time and location of salmon runs, weather conditions, wind and the ocean currents influencing the salmon runs. They explained this with a close connection between preserving knowledge as a way of living and passing their culture down to their children and grandchildren.

3.2 | Feeling of marginalisation and economic framing

Another important narrative that emerged during the interviews was the perception of fishing practice as a right, the historical fight to do so, as well as economic and utilitarian framing of fishing practice. In short, fishing was perceived as a historical right, and

the fishers viewed protecting that right as their duty. Fishers linked their identity to the history of family rights and preservation of fishing, knowledge and family values. Fishers argued that there must be mutual respect for fishing rights in the sea and rivers, and emphasised that in a democratic society “one should not only care for those who earn the most” and compared it with the rights of other low-income groups. Fishers said they could not understand why net fishing should be unfavoured just because it was less profitable than angling.

To put it this way, what has been going on for many years now... I feel that there are several river organisations that have decided that marine salmon fishing should go away. I do not like this, not in any other social context. One has to accept that there are property rights holders in both sea and in the rivers; we have always had this right. And why should marine salmon fishers be held down in an effort to increase the value of salmon in the river compared to the sea?

Economy and ripple effects appear as a theme during all interviews. They point out that the river anglers claim to contribute more to the community than the commercial marine fisheries. Consequently, the fact that marine fisheries generated less economic value is used as the main argument against them. Fishers believed that the lease agreement to suspend fishing temporarily had been detrimental to their culture in the Trondheim Fjord. They believed that the lease agreement contributed to regulating fisheries primarily on the basis of economic calculations rather than biological conditions. As one fisherman said, with a little sadness, “It is our own fault,” and regretted that they did not charge enough for their catch, which had resulted in arguments about the low economic value of marine fisheries.

Experience of marginalisation is prevalent among the marine fishers' perception of the current situation around their fishing fights. The fishers felt their voices were not heard, and that they had no power to influence the decision-making process around salmon management. The fishers also frequently hinted to the “river interests” (represented by the NL, scientists and the state authorities), which they perceived to be a long-term alliance with an end goal of abolishing marine commercial fishing and thereby increase opportunities for river angler fishing, which once again exemplifies the feeling of marginalisation.

Mistrust towards scientific knowledge and feeling threatened by it became visible from the very beginning of this study. Feeling of scepticism towards science and state institutions was evident among the interviewees. General opinion was that the economic analysis of marine fishing always showed low economic contribution to society than river angling, which in turn was translated into unfavourable harvest distribution and negative public image of marine fishing. The local marine fishing actors were quite vocal about their lack of confidence in the impartiality of scientific and management authorities, as member from the NSF said:



Scientists, managers and bureaucrats are not unbiased ... We think that the river organisations ... and part of management ... and some of the researchers want to get rid of the marine fisheries or limit it as much as possible!

The high level of conflict is also illustrated by a conversation between two fishers, who spoke about controlling the marine fisheries with what they called “cannon-carrying vessels,” that is the coast guard. Several fishers talked about taking their case to court – which shows a high level of perceived conflict, and fishers stressed that both river and marine rights should be treated more equally by the state authorities and researchers, as an issue of social justice and respect.

The interviews with river owners’ associations, on the other hand, believed that compensating the net fishers had been a reasonable way to resolve a conflict between recreational anglers and commercial marine fisheries. The regional river owners’ association Elvene rundt Trondheimsfjorden (ERT) said that the lease agreement showed that “salmon created more value in the rivers” and that the agreement also increased the attractiveness and catch opportunities for recreational river angling. The research representative, river organisation and public authority informants also pointed to the scientific evidence of declining stocks. They pointed out that management of rivers is done in a sustainable way, as opposed to commercial marine fisheries:

We have a sustainable approach [...] we harvest from robust stocks which can withstand being harvested [...] This is a bit challenging when it comes to marine fishing, when you have fjord systems with different stocks, what you call mixed stocks, ...[you] cannot decide which river and stock the fish you get in the bagnet comes from.

Roger, a scientist, claimed that the net fishers “got stuck in the past” and wanted fishing regulations to stay as they used to be, rather than keeping up with the new scientific knowledge and new management practices:

... it has to do with the power relations that are quite different, and perhaps also a slightly different perception of reality and a different understanding of the situation. But I think maybe the relationship of power and the inequality that many marine fishers perceive, makes it feel very frustrating to work with sea salmon fishing [...] This, I think, is one of the aspects that makes it the most difficult [...] They have not kept up with time when it comes to things that have been institutionalised on the river side. They have been very keen on keeping the regulations as they once were.

Both the scientist and the representative from NL said that it had been a reasonable way to resolve a conflict between anglers’

interests and commercial fisheries – compensating marine fishers for not fishing.

4 | DISCUSSION

4.1 | Beyond utilitarian framing: Marine fishing as a way to maintain identity and LEK

This study showed that the fishers’ social identity and local knowledge are shaped by values and interests that span beyond utilitarian framing. Fishing was identified as an integral part of social and family relationships – their identity and cultural values. Strong emotional ties to the fishing practice, seen as way to maintain family values, traditions, local heritage and a feeling of belonging, cannot be simply replaced with financial compensation. The practice of fishing itself is a value the fishers “could not live without” – which is a strong statement that shows the desire to maintain fishing regardless of the income it generates. The right to fish is anchored in a generational struggle for existence, local history and perpetuation of local knowledge. Similar findings were discussed in the context of fishing in Alaska by Donkersloot and Carothers (2016).

Historically, the importance of net fishing to coastal culture and economies resulted in rich cultural heritage, which became a part of people’s social identity. Perpetuating traditions emerged as an important value that can be seen in the context of social categorisation, leading fishers to act in accordance with group goals, values, beliefs and behavioural patterns (Bryan, 2008; Tajfel & Turner, 1979). Thus, the results of this study support previous research indicating that traditions and assertion of rights appear as strong motives for marine fishers (Acheson, 1981; Fangel et al., 2008; Fiske et al., 2012; Miller & Van Maanen, 1979). The current study demonstrates why these motives and sentiments are so prominent. It is argued that the reasons underlying the fishers’ fight for their rights stem primarily from their identity, expressed through family values, history and the fishers’ relationship with nature – LEK and a way of life.

A closer look into the role of local identity, knowledge, traditions and history is vital for understanding the driving forces behind this perceived conflict and low popularity of new marine salmon management policies. Ignoring the importance of these factors can result in a failure of inclusive and socially sustainable decision-making in natural resource management. It is, therefore, hardly surprising that the multi-stakeholder process around river and marine salmon management has been counterproductive. The representatives of the state institutions and interviewed experts heavily relied on scientific knowledge in their argumentation, ignoring the importance of LEK and cultural values of marine fishing. In contrast, scientific knowledge was not a source of trustworthy authority for the net fishers. Net fishers felt marginalised, believing that all previous research had been weaponised against them, wherein their cultural values, historical rights and knowledge were neither appreciated nor respected. Even though the state

officials emphasised their neutral stance, stating that they issue regulations based solely on biological measurements, the fishers perceived them as biased.

These findings are in line with the salmon river fishery discourse, discussed by Øian et al. (2017), where on the one side, there is a marginalised group with “folk model-inspired beliefs,” and on the other side, there are stakeholders adhering to official scientific knowledge. This suggests the need for cooperation and involvement in management processes to prevent marginalisation and polarisation in interpersonal and intergroup conflicts. To balance the complexities of sustainable resource management, the authorities need to be more aware of the role of hegemony and power relations among the stakeholders (Øian et al., 2017). Hodgson et al. (2019) also pointed out that conflict resolution is a result of the ways knowledge is used by different actors: what views on conservation are justified as the right ones, who make contribution to conservation, which parties have the right argumentation, and also about how and which knowledge benefits their own goals and motives. Colvin et al. (2015) argued that in a conflict where a group is placed in a conflictual intergroup context, stakeholder groups are likely to pursue polarised agendas. This is found in the example of marine salmon fisheries.

Phasing out of net fishing due to its low economic value creation has currently been a topic of heated public debates in Norway (Miljødirektoratet, 2016; Skjelde, 2019). The lease agreement, which emphasised that river fishing had a higher economic value than marine fishing, undermined the cultural value and heritage of the marine fisheries. Both the fishers' local knowledge and their identity were challenged. Although financial incentives can be a good solution to many problems, attention must be paid not only to economic but also cultural needs of both parties (Redpath et al., 2013). River fisheries benefitted from the restrictions and new regulations regime (Forseth et al., 2013, Fiske et al., 2012), while utilitarian framing undermines traditional activities and challenges maintaining biocultural diversity. This study demonstrated that utilitarian framing alone can result in marginalisation of a specific social group and cultural heritage in general, and generate polarisation and a climate of mistrust and conflict. Although financial arguments are undoubtedly important for marine fishers, preserving knowledge and identity – a way of life—seems to be the key underlying motivation behind the desire to continue fishing.

4.2 | A need for an integrated approach to sustain biocultural diversity

As biocultural diversity is increasingly recognised, its conservation is impossible without strong local support, without synergetic cooperation between scientific and local knowledge, and without overcoming natural and cultural divide in decision-making (Dobrovodská & Kanka, 2019; Rozzi, 2018; Parrotta & Trospen, 2012). LEK is inextricably linked to local peoples' identity, their experiences with the natural environment and their historical rights. This corresponds to the findings of fishing practice as part of their identity. LEK is usually collectively owned and passed down orally from generation to

generation (Agrawal, 1995; Berkes, 2012; Brattland & Mustonen, 2018). Passing this knowledge on to future generations, which came up as an important theme for the marine fishers, is therefore considered essential to sustaining knowledge as well as their cultures and identities (Parrotta & Trospen, 2012).

The general principle for biocultural conservation emphasises full and effective participation of all relevant actors, and in particular indigenous and local communities (Dobrovodská & Kanka, 2019). There is also specific attention to holistic and interdisciplinary frameworks, taking into consideration multiple ways in which cultures shape biodiversity in a sustainable way (e.g. cultural landscapes, traditional agricultural systems and culturally significant species) (Dobrovodská & Kanka, 2019). Rozzi (2018), for example, talked about the “3H” conceptual framework of the biocultural ethic, which values the links among unique life habits of co-inhabitants who share specific habitats. In other words, there is a need for a more integrated approach that leaves spaces for multiple values in addition to the monetary ones. Harrison et al. (2018), for example, found that cooperation around conservation and cultivation of salmon is driven by strong psychological and social motivations, spanning beyond the financial gain, such as feelings of care for the salmon and doing something important for the community. Similarly, Pinkerton (2017) argued that the authorities should protect fisheries that resist profit-maximising neoliberal thinking, but contribute to local communities and their welfare in many other ways. This is highly relevant for the case of marine salmon fisheries, which are driven by a cultural tradition and perpetuation of a lifestyle and LEK, despite comparatively low economic profitability.

In Norway, local and traditional knowledge is included in environmental governance through the Norwegian Nature Management Act (2009). Even if importance of LEK is recognised on paper, there is still a gap between theory and practice (Brattland & Mustonen, 2018; Eythórsson & Brattland, 2012). As pointed out by Harrison et al. (2018), synergies between LEK and scientific knowledge are highly valuable for management and research. Without this recognition, scientists and policy-makers can, albeit involuntarily, contribute to conflicts, thus undermining conservation efforts (Redpath et al., 2013). As argued by Tengö et al., (2014), the science-policy community needs to embrace a diversity of knowledge systems, when supporting governance of biodiversity and ecosystems towards sustainability. Successful long-term management of marine salmon fisheries can be secured only with mutual respect, knowledge transfer and allowing space for management practices based on LEK. Disappearance of local support, interest and the whole culture and LEK around salmon is ultimately detrimental for conservation of both cultural and natural heritage, that is, biocultural diversity.

5 | CONCLUSIONS AND IMPLICATIONS FOR MANAGEMENT

With increased recognition of the importance of biocultural diversity, one can argue that natural resource management policies should allow

space for preservation of heritage and traditional livelihoods beyond their momentary economic value. This can contribute to ecological and biological knowledge important for conservation of salmon and coastal culture. To achieve this, marine fishers deserve recognition as a distinct group, along with the value of their social identity and heritage (Tengö et al., 2014). The best way to preserve their knowledge and values, it can be argued, is through continued active fishing and involvement in conservation and management practices. According to fishers' experiences, salmon policies, supported by monetary and utilitarian metrics, have so far favoured river interests over marine fishing, resulting in marginalisation of the latter, which affects the knowledge base for management and preservation of Atlantic salmon.

In addition, it was demonstrated that these policies have contributed to the erosion of cooperation among salmon stakeholders, polarisation and culture of mistrust towards science and state authorities. This has created a conflict, which has often been framed in utilitarian terms, explaining only one part of a complex story. Conflicts hinder efficient natural resources management processes that are time-consuming and expensive, in addition to being detrimental to the social fabric of local communities. Facilitation of multi-stakeholder processes in a more inclusive manner, where all parties feel heard and valued, can contribute not only to improved natural resource management, but also provide other social benefits, such as conservation of local cultural heritage, strengthening trust and cooperative spirit around common sustainability goals.

This study showed the importance of social identity and LEK to understand commercial marine fishers' motivations, appreciate the unique cultural heritage of marine fisheries for Atlantic salmon, and to include marine fishers in conservation and management of salmon. This is in line with the UNESCO-CBD Declaration (2014) "The involvement of local communities, and recognition of and respect for their cultural heritage, traditional knowledge, innovations and practices can assist in more effective management and governance of multifunctional biocultural landscapes and contribute to their resilience and adaptability."

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CONFLICT OF INTEREST

Authors have no conflicts of statement in this article.

DATA AVAILABILITY STATEMENT

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REFERENCES

- Acheson, J.M. (1981) Anthropology of fishing. *Annual Review of Anthropology*, 10(1), 275–316. <https://doi.org/10.1146/annurev.an.10.100181.001423>. [Accessed 15th March 2018].
- Agrawal, A. (1995) Dismantling the divide between indigenous and scientific knowledge. *Development and Change*, 26(3), 413–439. <https://doi.org/10.1111/j.1467-7660.1995.tb00560.x>
- Andersen, O. & Dervo, B.K. (2019). *The consumption of goods and services by anglers and hunters in Norway in 2018*. In NINA Rapport 1605. Available from: <https://brage.nina.no/nina-xmlui/handle/11250/2580264>. [Accessed 21st June 2020].
- Anon. (2019) *Status for norske laksebestander i 2019 (Status of Wild Atlantic Salmon in Norway 2019)*. In Rapport fra Vitenskapelig råd for lakseforvaltning nr 12, pp. 126. Available from <http://hdl.handle.net/11250/2619889>. [Accessed 20th March 2020].
- Anon. (2020) *Råd om beskatning av laks i sjølaksefiske (Advice for marine salmon fisheries)*. In Rapport fra Vitenskapelig råd for lakseforvaltning nr 14, pp. 155. Available from: <https://hdl.handle.net/11250/2648469>. [Accessed 15th March 2021].
- Berkes, F. (2012) *Sacred ecology*, 3rd edition. New York: Routledge.
- Berkes, F. (2015) *Coasts for people: Interdisciplinary approaches to coastal and marine resource management*. New York: Routledge.
- Boeije, H. (2009) *Analysis in qualitative research*. London: Sage Publications.
- Bogadóttir, R. & Olsen, E.S. (2017) Making degrowth locally meaningful: The case of the Faroese grindadráp. *Journal of Political Ecology*, 24(1), 504–518. <https://doi.org/10.2458/v24i1.20888>
- Brattland, C. & Mustonen, T. (2018) How traditional knowledge comes to matter in Atlantic salmon governance in Norway and Finland. *Arctic*, 71(4), 375–392.
- Brondizio, E.S., Settele, J., Díaz, S. & Ngo, H.T. (2019) *IPBES global assessment report on biodiversity and ecosystem services*. Bonn: IPBES. [Accessed 20th June 2021].
- Bryan, T.A. (2008). *Aligning identity: Social identity and changing context in community-based environmental conflict*. Ph.D. thesis, University of Michigan. Available from <http://hdl.handle.net/2027.42/58511>. [Accessed 10th March 2018].
- Clayton, S. & Opatow, S. (2003) Identity and the natural environment. In: Clayton, S. & Opatow, S. (Eds.) *Identity and the natural environment: The psychological significance of nature*. Cambridge: MIT Press, pp. 1–24. . [Accessed 15th March 2018].
- Colvin, R., Witt, G.B. & Lacey, J. (2015) The social identity approach to understanding socio-political conflict in environmental and natural resources management. *Global Environmental Change*, 34, 237–246. <https://doi.org/10.1016/j.gloenvcha.2015.07.011>
- Creswell, J.W. (2018) *Qualitative research and research design: Choosing among five traditions*. Thousand Oaks: Sage.
- Dobrovodská, M., Kanka, R., David, S., Kollár, J., Špulerová, J., Štefunková, D., & Gajdoš, P. (2019) Assessment of the biocultural value of traditional agricultural landscape on a plot-by-plot level. *Biodivers Conserv*, 28, 2615–2645. <https://doi.org/10.1007/s10531-019-01784-x>
- Donkersloot, R. & Carothers, C. (2016) The graying of the Alaskan fishing fleet. *Environment: Science and Policy for Sustainable Development*, 58(3), 30–42. <https://doi.org/10.1080/00139157.2016.1162011>
- Eikeset, A.M., Mazzarella, A.B., Davíðsdóttir, B., Klinger, D.H., Levin, S.A., Rovenskaya, E. et al. (2018) What is blue growth? The semantics of 'Sustainable Development' of marine environments. *Marine Policy*, 87, 177–179. <https://doi.org/10.1016/j.marpol.2017.10.019>
- Eythórsson, E. & Brattland, C. (2012). New challenges to research on local ecological knowledge: Cross-disciplinarity and partnership. In Carothers, K.R.C.C., Chambers, C.P., Cullenberg, P.J., Fall, J.A., Himes-Cornell, A.H., Johnsen, J.P., Kimball, N.S., Menzies, C.R. & Springer, E.S. (Eds.) *Fishing people of the North: Cultures, economies, and management responding to change. Alaska Sea Grant, University of Alaska Fairbanks, Fairbanks*, vol. 2012. Fairbanks, Alaska: Universtiy og Alaska, Fairbanks, pp. 131–152. [Accessed 10th April 2021].



- Fangel, K., Andersen, O. & Aas, Ø. (2008) *Salmon fishing with fixed nets along the Norwegian coast in 2007. Fisher characteristics, fishing behavior and attitudes towards harvest regulations*. NINA Report 406, pp. 56. Available from <http://hdl.handle.net/11250/2561598>
- Fiske, P., Baardsen, S., Stensland, S., Hvidsten, N.A. & Aas, Ø. (2012) *Final report and evaluation of the lease agreement regarding salmon netting in the Trondheim fjord*. (Corrected version of NINA Report 546) - NINA Report 854, pp. 70. Available from <http://hdl.handle.net/11250/2467753>
- Forseth, T., Barlaup, B.T., Finstad, B., Fiske, P., Gjørseter, H., Falkegård, M., ... Wennevik, V. (2017) The major threats to Atlantic salmon in Norway. *ICES Journal of Marine Science*, 74(6), 1496–1513. <http://dx.doi.org/10.1093/icesjms/fsx020>
- Forseth, T., Fiske, P., Barlaup, B., Gjørseter, H., Hindar, K., & Diserud, O. H. (2013) Reference point based management of Norwegian Atlantic salmon populations. *Environmental conservation*, 40(4), 356–366. <http://dx.doi.org/10.1017/s0376892913000416>
- Hadjimichael, M. (2018) A call for a blue degrowth: Unravelling the European Union's fisheries and maritime policies. *Marine Policy*, 94, 158–164. <https://doi.org/10.1016/j.marpol.2018.05.007>
- Harrison, H.L., Kochalski, S., Arlinghaus, R., & Aas, Ø. (2018). "Nature's Little Helpers": A benefits approach to voluntary cultivation of hatchery fish to support wild Atlantic salmon (*Salmo salar*) populations in Norway, Wales, and Germany. *Fisheries Research*, 204, 348–360. <http://dx.doi.org/10.1016/j.fishres.2018.02.022>
- Harrison, H.L., Rybråten, S. & Aas, Ø. (2018) Hatching knowledge: A case study on the hybridization of local ecological knowledge and scientific knowledge in small-scale atlantic salmon (*Salmo salar*) cultivation in Norway. *Human Ecology*, 46(4), 449–459. <https://doi.org/10.1007/s10745-018-0001-3>
- Hodgson, I.D., Redpath, S.M., Fischer, A. & Young, J. (2019) Who knows best? Understanding the use of research-based knowledge in conservation conflicts. *Journal of Environmental Management*, 231, 1065–1075. <https://doi.org/10.1016/j.jenvman.2018.09.023>
- Hoelting, K. (2008). *Vossolaksens betydning for kultur, livskvalitet og økonomi i fortid, nåtid og framtid (The salmon of river Vosso - history of culture) Nå eller aldri for Vossolaksen - anbefalte tiltak med bakgrunn i bestandsutvikling og trusselfaktorer*. https://www.miljodirektoratet.no/globalassets/dokumenter/publikasjoner/overvaksingsrapporтер/vossolaksen_rapport.pdf. [Accessed 10th April 2021].
- IPBES. (2019) *Global assessment summary for policymakers*. Available from: https://ipbes.net/sites/default/files/inline/files/ipbes_global_assessment_report_summary_for_policymakers.pdf. [Accessed 10th April 2021].
- Kalak, L. & Johansen, B. (2020) *Tradisjonell kunnskap og forvaltning av sjølaksefisket*, vol. 1. Kautokeino: Sámi allaskuvla. Sámi University of Applied Sciences.
- Kvale, S. & Brinkmann, S. (2009) *Det kvalitative forskning intervju [The Qualitative Research Interview]*. Oslo, Norway: Gyldendal Akademisk.
- Liu, Y., Olaf Olaussen, J., & Skonhoft, A. (2011). Wild and farmed salmon in Norway—A review. *Marine Policy*, 35, (3), 413–418. <http://dx.doi.org/10.1016/j.marpol.2010.11.007>
- Miljødirektoratet. (2016) *Utfordringer knyttet til reguleringer av laksefisket – behov for avklaringer*. (Challenges in salmon fishing regulations - need for clarification) Unpublished note. Norwegian Environmental Agency.
- Miljødirektoratet. (2021) *Her er de nye reglene for laksefiske (New regulations)*. Available from: <https://www.miljodirektoratet.no/aktuelle/nyheter/2021/mars-2021/her-er-de-nye-reglene-for-laksefiske/>. [Accessed 15th April 2021].
- Miller, M. & Van Maanen, J. (1979) 'Boats don't fish, people do': Some ethnographic notes on the federal management of fisheries in Gloucester. *Human Organization*, 38(4), 377–385. <https://www.jstor.org/stable/44126308>. [Accessed 15th April 2021].
- Mugaas, P. (2019) *Ti viktige kampsaker for villaksen (Cases important for wild salmon)*. Available from: <https://lakseelver.no/nb/news-2019/ti-viktige-kampsaker-villaksen>
- Øian, H., Aas, Ø., Skår, M., Andersen, O. & Stensland, S. (2017) Rhetoric and hegemony in consumptive wildlife tourism: Polarizing sustainability discourses among angling tourism stakeholders. *Journal of Sustainable Tourism*, 25(11), 1547–1562. <https://doi.org/10.1080/09669582.2017.1291650>
- Ostrom, E. (1990) *Governing the commons: the evolution of institutions for collective action*. New York: Cambridge University Press.
- Oterholm, E. (2019) *Kroknes laksevorpe (The setnet at Kroknes)*. Einar Forlag.
- Parrotta, J.A. & Troster, M. (2012) *Traditional Forest-Related Knowledge*. Dordrecht: Springer. <https://link.springer.com/book/10.1007/978-94-007-2144-9>. [Accessed 10th April 2021].
- Perkins, P.E.E. (2019) Climate justice, commons, and degrowth. *Ecological Economics*, 160, 183–190. <https://doi.org/10.1016/j.ecolecon.2019.02.005>. [Accessed 15th June 2021].
- Pinkerton, E. (2017) Hegemony and resistance: Disturbing patterns and hopeful signs in the impact of neoliberal policies on small-scale fisheries around the world. *Marine Policy*, 80, 1–9. <https://doi.org/10.1016/j.marpol.2016.11.012>
- Pinkerton, E. (2019) Strategies and policies supporting small-scale fishers' access and conservation rights in a neoliberal world. In: Chuenpagdee, R. & Jentoft, S. (eds) *Transdisciplinarity for small-scale fisheries governance*. MARE Publication Series, vol 21. Cham: Springer. https://doi.org/10.1007/978-3-319-94938-3_13
- Redpath, S.M., Young, J., Evely, A., Adams, W.M., Sutherland, W.J., Whitehouse, A. et al. (2013) Understanding and managing conservation conflicts. *Trends in Ecology & Evolution*, 28(2), 100–109. <https://doi.org/10.1016/j.tree.2012.08.021>
- Ritov, I. & Kahnemann, D. (1997) How people value the environment. Attitudes versus economic values. In: Bazerman, M.H., Messick, D.M., Tenbrunsel, A.E. & Wade-Benzoni, K.A. (Eds.) *Environment, ethics, and behavior*. San Francisco: New Lexington Press, pp. 33–51. https://books.google.no/books?hl=no&lr=&id=bghyGE8sRO0C&oi=fnd&pg=PA33&dq=How+people+value+the+environment&ots=V1hrOPce5D&sig=WCB8UyKcV_ueaYqET6-Ga9TrokE&redir_esc=y#v=onepage&q=How%20people%20value%20the%20environment&f=false
- Romano, O. (2012) How to rebuild democracy, re-thinking degrowth. *Futures*, 44(6), 582–589. <https://doi.org/10.1016/j.futures.2012.03.019>
- Rotevatn, S. (2021) *Laksefisket må være bærekraftig (Fisheries need to be sustainable)*. Available from: <https://www.intrafish.no/kommentarer/laksefisket-ma-vere-berekraftig/2-1-980645>
- Rozzi, R. (2018) Biocultural homogenization: A wicked problem in the anthropocene. In: Rozzi, R., May, R.H., Chapin, F.S., Massardo, F., Gavin, M.C., Klaver, I., et al. (Eds.) *From biocultural homogenization to biocultural conservation*. Dordrecht: Springer, pp. 1–17. https://doi.org/10.1007/978-3-319-99513-7_2. [Accessed 10th April 2021].
- Ruddell, E. (Ed.) (2017) *Qualitative research in leisure, recreation and tourism*. Wallingford, UK: CABI. <https://www.cabi.org/cabebooks/ebook/20173122718>
- Rybråten, S. & Gómez-Baggethun, E. (2016). *Local and traditional ecological knowledge in research and management of Atlantic salmon. A pre-study*. NINA Report 1290, pp. 80. Available from: <http://hdl.handle.net/11250/2418802>.
- Sabau, G. & van Zyll de Jong, M. (2015) From unjust uneconomic growth to sustainable fisheries in Newfoundland: The true costs of closing the inshore fishery for groundfish. *Marine Policy*, 61, 376–389. <https://doi.org/10.1016/j.marpol.2014.11.012>
- Sandnes, T. (2020) *Er det bare sportsfiskere som skal ha rett på villaksen? (Wild salmon- reserved for anglers only?)*. Available from <https://forskersonen.no/debattinnlegg-hav-og-fiske-meninger/er-det-bare-sportsfiskeresom-skal-ha-rett-pa-villaksen/1664954>. [Accessed 20th June 2021].
- Sandnes, T. (2021) *Rotevatn må gjerne fiske laks, så lenge han respekterer Stortinget (It's ok that the Minister go fishing as long as he respects the Government)*. Available from: <https://www.intrafish.no/komme>

- ntarer/rotevatn-ma-gjerne-fiske-laks-sa-lenge-han-respekterer-stortinget/2-1-1026248
- Skjelde, A. (2019) Også kilenotfiskerne må ta ansvar. (*Bag-net fishers also need to take responsibility*). Jakt & Fiske. Available from <https://jakto.gfiske.njff.no/fiske/2019/02/ogsa-kilenotfiskerne-ma-ta-ansvar>
- Statistics Norway. (2019) *Sea catchers of salmon and sea trout*. Available from: <https://www.ssb.no/en/jord-skog-jakt-og-fiskeri/statistikker/sjofiske>
- Stensland, S. (2010). Fishing Rights and Supply of Salmon Angling Tourism in Mid-Norway. *Scandinavian Journal of Hospitality and Tourism*, 10(3), 207–230. <http://dx.doi.org/10.1080/15022250.2010.495483>. [Accessed 10th June 2018].
- Stensland, S. (2011). *Angling tourism and landowner-based management of Atlantic salmon stocks in the Trondheim fjord region of Norway*. Ph.D. thesis. Norwegian University of Life Sciences, Ås. Available from: <http://hdl.handle.net/11250/243410>. [Accessed 10th April 2018].
- Stensland, S., Fossgard, K., Andersen, O. & Aas, Ø. (2015) *Changes in the salmon sport fishery:- A survey of anglers who fished for Atlantic salmon, sea Trout and sea-run Arctic Char in Norwegian rivers 2012–2014*. Norwegian University of Life Sciences. Available from: <http://www.umb.no/statisk/ina/publikasjoner/fagrappport/if29.pdf>. [Accessed 10th March 2020].
- Stern, M.J. (2018) *Social science theory for environmental sustainability: A practical guide*. Oxford: Oxford University Press.
- Tajfel, H. & Turner, J.C. (1979) An integrative theory of intergroup conflict. In: Austin, W.G. & Worchel, S. (Eds.) *The social psychology of intergroup relations*. Monterey: Brooks/Cole, pp. 56–63.
- Tengö, M., Brondizio, E.S., Elmqvist, T., Malmer, P. & Spierenburg, M. (2014) Connecting diverse knowledge systems for enhanced ecosystem governance: the multiple evidence base approach. *Ambio*, 43(5), 579–591. <https://doi.org/10.1007/s13280-014-0501-3>
- UNESCO-CBD. (2014). *Florence declaration on the links between biological and cultural diversity*. Florence, Italy, April 2014. Available from: <http://www.cbd.int/portals/culturaldiversity/docs/21040410-declaration-florence-en.pdf>. [Accessed 04th April 2020].

SUPPORTING INFORMATION

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