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The Endangered Coastal Fishers along the Coast of the Archipelago Sea The Environmental Conflict in Policy-making

Abstract

The small-scale fisheries of the Finnish archipelago are in crisis. Three major problems were identified during an ethnographic study of the different stakeholders in the fishing sector: the grey seal, the great cormorant, and regulation of pikeperch harvesting. Within the framework of political ecology, developments in the current state of the fisheries are examined and the policy-making processes are analysed. Additionally, the notion of knowledge and the role of both scientific knowledge and local ecological knowledge in the context of fisheries management and fisheries management science are discussed.

Keywords: Fisheries, resilience, local ecological knowledge, seals, pikeperch, great cormorant, policy-making, The Common Fisheries Policy

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Introduction

In the past 40 years, fisheries all over Europe have been heavily regulated by fisheries management in order to rebuild diminishing fish stock and to ensure that limited resources are also available to coastal states dependent on fishing and the fishing industry in general. This increasing regulation has compromised the flexibility of individual fishing operations, which have been of major importance to adapting to changing conditions, since the exhaustive number of regulations make their business difficult. Fisheries have been under significant stress due to demographic changes and re-evaluation of fishing as an occupational choice. The impacts of fisheries policy have been substantial as well (Symes, Phillipson & Salmi 2015, 251). Similar to developments in other European coastal fisheries, the fisheries along the Finnish coastline are in crisis. The number of fishers has decreased from 1950 onwards. In the southern parts of the Archipelago Sea, which is part of the Baltic Sea, there were 3447 fishers in 1934, but by 2015 there were less than 100 (Salmi 2018, 70). Only a small proportion of these fishers are full-time operations.

Many factors have influenced the distress of fisheries in the past decades, such as urbanisation, increasing competition due to globalisation and changes in the vocational structure. Taken together with the increasing numbers of two competing species, the grey seal and the cormorants, the situation of fisheries seems even worse. Similar conflicts between nature-based livelihood practitioners and predators are common around the world, including for example among reindeer herders and wolves (*Canis lupus*) in Finland's southeast reindeer herding area (e.g. Heikkinen, Moilanen, Nutall & Sarkki 2011) or brown bears (*Ursus arctos*) and livestock keepers in Slovenia (e.g. Reljic, Jerina, Nilsen, Huber, Kusak, Jonozovic & Linnell, 2018). Connected to this discourse, researchers studying conservation from the perspectives of the social sciences and cultural studies are advocating for more participatory policy-making (e.g. Gavin, McCarter, Mead, Berkes, Stepp, Peterson & Tang 2015; Bennett et al. 2017). This article examines the processes and impacts of policy-making related to conservation and scientific research on the social and cultural resilience of fisheries. The focus of this text is on the fishers in four different locations at the Archipelago Sea: Rymättylä, Parainen, Velkua and Kustavi.

Fisheries policies in Finland are subject to the EU Fisheries Act, meaning the country must follow the guidelines defined by the Common Fisheries Policy. The Common Fisheries Policy aims to ensure that fishing and aquaculture are environmentally, economically and socially sustainable and that they provide a source of healthy food for EU citizens (European Commission 2018). Even so, it has become evident that neither the aims of economic nor social sustainability have been reached since the profitability of fisheries is decreasing

and the fishers are shifting to other vocations or retiring. According to the ethnographic material I collected during my PhD research,¹ the fishers feel like their voices are not heard and the decision-making process is beyond their reach. This article examines the reasons for this crisis and the current state of fisheries, also focusing on the problems behind the decision and policy-making processes based on ethnographic research among fishers, researchers, administrators and other stakeholders involved in the fishing sector. From the material I collected, I identified three cases that illuminate the problems regarding fishers' ability to practice their livelihood. This research focuses on these three intertwined cases: the grey seal, the great cormorant and the regulation of pikeperch harvesting. By examining these cases from the fishers' perspective, the article also suggests new perspectives for the discussion on sustainability and resilience.

Theoretical and conceptual approach

In fisheries research, scholars have argued that the analysis of socio-ecological systems is beneficial in developing successful management strategies (e.g. Huntington 2000; McClanahan, Castilla, White & Defeo 2009; Sonck-Rautio 2017). This approach requires, in addition to an ecological approach, also input from the social sciences and management research. For management research to best benefit the fisheries, it should focus on building resilience. Derived from ecology, resilience is a term that describes a system's ability to recover from stress and still maintain its state-defining variables (Holling 1973, 14). The resilience of both ecological and social systems must be analysed within the context of socio-ecological systems, since resilience is strongly connected to social structures, which in the context of fisheries is the coastal communities where fisheries are operating (Symes et al. 2015, 249). Resilience literature often suggests the diversification of livelihoods as an effective way of enhancing resilience (e.g. Adger 2000), but not every community is willing or capable of diversifying, since it is seen as reducing local autonomy, independence and the ability of people to practice their livelihood in a traditional manner (Symes et al. 2015, 250). Resistance to diversification demonstrates a need to account for other dimensions of resilience, categorised as cultural resilience. Cultural resilience can be seen both as a way of enhancing the resilience of a community in its entirety (e.g. Forbes 2013, 7) or as a communi-

1 My doctoral thesis, entitled 'The Fishers of the Archipelago Sea – Resilience, Sustainability, Knowledge and Agency', examines the changes in small-scale fisheries in the Archipelago Sea region and focuses on studying the ways in which fisheries could adapt to environmental, cultural, political and social changes in ways that would maintain overall sustainability, including cultural sustainability.

ty's ability to maintain its characteristics and cultural heritage in the manner most desired (Crane 2010, 3). With respect to the latter definition, a decline in cultural resilience could lead to a total transformation of the community, thus raising the question of whether communities that are not culturally resilient can survive at all. Yet, if cultural resilience is lost in the process of



Image 1. The Archipelago Sea area.

successfully adapting by enhancing resilience via diversification, can we still consider the adaptation successful? (See also Sonck-Rautio 2018.) Therefore, it is crucial to emphasise cultural resilience when scrutinising communities and their ability to adapt.

One way to promote cultural resilience is to acknowledge local ecological knowledge as a valid form of knowledge in terms of explaining the environment. Local ecological knowledge, as defined by anthropologist Julie Cruikshank (2005, 9), is tacit knowledge, which is acquired by extensive observation of one's environment and reproduced through everyday practices of behaviour and speech. The notion of local ecological knowledge is closely linked to the field of ethnoecology, which addresses the differences between Western science and local knowledge, but more importantly it questions the ways in which Western science disregards local knowledge or utilises it only for its own purposes, for example to justify Western ways of categorising nature (e.g. Nazarea 2006, 35). Geographer and ecologist Bruce Forbes (2013, 7) points out that one critical aspect of cultural resilience among the indigenous Nenets whose socio-ecological system he studied is their intimate relationship with such animals as reindeer. Folklorists and ethnographers Sandy Rikoon and Robin Albee (1998) have also pointed out that conservation policies should be rethought with regards to inhabited environments and developed in ways that are more considerate of nature-culture interfaces as well as government agencies and local communities. But, as they say, 'too often the knowledge and needs of local residents are discounted by more powerful outsiders who feel themselves possessors of a privileged knowledge of the world. Such perspectives ultimately defeat themselves by alienating the very people whose support is crucial if the environment is to be protected in sustainable way' (Rikoon & Albee 1998, 219). The socio-ecological system analyses done in fisheries management can also benefit from the extensive knowledge of fishers about the behaviour of the fish. As with people, fish also have agency within the system, and the local ecological knowledge of fishers could provide valuable information about this non-human agency that could be applied in conservation (Sonck-Rautio 2017, 127–128).

The guidelines for EU fisheries policies highlights the three pillars necessary for the promotion of sustainability: economic, ecological and social sustainability. From the fishing communities' point of view, one important dimension of sustainability is lacking – that of cultural sustainability. Fishing is a way of life, and everything affecting fisheries also affects the local cultures formed around fisheries, thus affecting both tangible and intangible cultural heritage. Defining cultural sustainability is not easy, since there are many ways of defining culture itself. For the most part, though, culture serves as

the fundamental coordinator of all sustainable actions (Dessein, Soini, Fairclough & Horlings 2015, 29). UNESCO defines culture as including multiple dimensions ranging from heritage to creativity, and it sees culture as both the enabler and driver of more economically, socially and ecologically sustainable development (UNESCO 2019). Another view is that cultural sustainability forms an essential component of a community having agency and guiding its own direction of development (Siivonen 2007, 17; Sonck-Rautio 2018, 134), meaning that a community should not be subjected to a top-down- definition of local cultural heritage in the name of cultural heritage tourism instead of ensuring opportunities for people to continue practicing their traditional livelihoods, such as fishing (Feltault 2006; Siivonen 2007). Cultural sustainability is also an important factor in promoting the resilience of fishing communities (Sonck-Rautio 2018, 134).

Symes et al. (2015, 251–253) argue that besides other factors external to the socio-ecological system of local fisheries, policy-making has become the most potent source of instability. It is very common for policies –which are initially implemented as solutions –to actually create problems. This article employs the framework of political ecology to examine the impacts of policy-making on fisheries from the fishers’ point view, applying ethnographic methods. Political ecology offers a framework for examining the intertwined relationships between ecology, politics and knowledge. Paul Robbins (2012) has divided the political ecology framework into five theses: degradation and marginalisation, conservation and control, environmental conflict, environmental subjects and identities, and political objects and actors. While the five theses can be overlapping, the analysis presented in this paper focuses on three in particular. The first relevant thesis is that of *degradation and marginalisation*, which highlights the tendencies of environmentally inoffensive production systems to be labelled as exploitative, only eventually to become so due to the intervention of the state or authorities. It is common for traditionally – and communally – managed systems to become unsustainable because traditional ways of dealing with, e.g. property, are being imposed by new institutions. Quite often this development leads to decreasing sustainability as well as to decreasing equity in resource distribution (Robbins 2012, 159–160). The second important thesis is *conservation and control*, which examines the process of implementing conservation procedures to ensure the protection of sustainability, community or nature, which consequently leads to a loss of resources for some groups. In the efforts to conserve resources, local systems of livelihood, local institutions and maybe even local ways of life are often restricted by officials, legislation and regulations. In many instances, the local subsistence systems were already productive and relatively

sustainable, only to be declared unsustainable by the state actors willing to take control of the resources (Robbins 2012, 178–179). The third thesis, *environmental conflict*, addresses situations where different types of regulations enhance the tensions between stakeholders, politicising the environmental dilemmas at hand and eventually even creating serious conflicts between the groups (Robbins 2012, 200). The ignoring of local voices, voices that have been denied access to resources and other safeguards, has become a global problem not only in small-scale fisheries, but also in other small-scale rural activities, such as agriculture, so much so that in 2019 the United Nations approved the Declaration of Rights of Peasants and Other People Working in Rural Areas (United Nations 2018).

The notion of knowledge has become an important field of study, including within the framework of critical political ecology, where the problem is often framed by questions regarding how environmental science is shaped by social and political factors and how science shapes politics. At a more concrete level, studies increasingly examine how policy-makers and decision-makers can recognise and acknowledge the impacts of science in politics and, similarly, promote public participation and governance (Forsyth 2003, ii). In its most basic form, '[a] key ambition is to avoid the simplistic separation of science and politics (or facts and norms), and the use of a priori notions of ecological causality and meaning, and instead to adopt a more politically aware understanding of the contexts within which environmental explanations emerge, and are seen to be relevant' (Forsyth 2003, 21). Since the policies influencing fisheries are commonly imposed based on the scientific knowledge provided by the researchers, I extend my research to the relationship between scientists, policy-makers and fishers.

Material and Methods

I collected the primary material for this article using ethnographic methods, such as interviews and participant observation in the field. I also attended two seminars for fishing stakeholders in 2017 and 2018, which provided important sources of information. In the 2017 seminar, I was also one of the presenters. I conducted 21 in-depth interviews between the years 2006 and 2007 and 2015 and 2018. The interviewees represented different roles within the fishing sectors, such as fishers (or members of fishing households), researchers, administrators, policy-makers or teachers. I have divided my interviewees into four different categories based on the interviewee's position in the fishing sector. These categories are as follows: fishers (9 interviewees), policy-makers or officials (5 interviewees), members of fishing households (4 interviewees) and researchers (3 interviewees). All the interviewees are re-

ferred to anonymously by their occupation, with each informant separated by a running number. Other than ethnographic research material, the data also consists of media material, including newspaper articles or writings in opinion sections of printed and/or digital newspapers, as well as conversation threads on the Facebook pages of various local fisheries action groups. Previous research from the case area has also been extensive and includes policy documents, such as the 'reports on conditions' conducted among the fishers by the Finnish Natural Resources Institute (LUKE). The research material is in Finnish, and I am responsible for all translations presented here.

As an analytical tool, I used NVivo software to help me organise my material. At the preliminary stage of the research, I conducted the interviews with fishers and their household members. Based on these interviews, I identified a number of themes that fishers considered of utmost importance. All the identified themes were somehow related to environmental conflicts and policies. This is why I decided it would be important to broaden the scope of my material to include the views of people working in other sectors, such as researchers and administrators. Based on the material, three major cases demonstrating environmental conflict emerged as clearly being the most important. With respect to these cases, and for the purposes of this article, I concentrated my analysis on the different points of views and different types of knowledge systems, emphasising the notion of environmental conflicts not being only environmental and political, but also cultural and social, problems.

Three cases: The grey seal (*Halichoerus grypus*), the great cormorant (*Phalacrocorax carbo*) and the pikeperch (*Sander lucioperca*)

Regarding the question of the capacity of fisheries to adapt and their ability to enhance their resilience and sustainability, the interviewees identified three principal reasons for the endangering of fishing as a livelihood and the lifestyles related to it. Here, the three most crucial and acute cases, according to the material, are introduced in more detail. They are inter-related problems, all connected to the larger conflict over resource management, conservation and economic worries of coastal fisheries.

The grey seal – the biggest competitor

Among the fish, the grey seal has also played an important role in facilitating habitation along the coastal areas of Finland (Pääkkönen, Bläuer, Evershed & Asplund 2016). Seal hunting has been extensively practiced in the coastal areas of Finland since the early Neolithic era, maintaining its importance until the Middle Ages. In the archipelago, seal hunting was important as late as the beginning of the 20th century. Later, bounties were paid to hunt seals, which

consequently led to a serious decline in the size of the grey seal population. During the 1970s and 1980s, the grey seal was declared a protected species (Ylimaunu 2000, 129–133). Protection measures have proved to be successful and the number of grey seals has grown significantly ever since.

The fishers began having problems with the seal in the mid-1990s. According to one informant (researcher), the grey seals appeared in the Archipelago Sea area around the year 2000:

I remember it quite well, when in the year 2000 the seals came here [the archipelago region]. Some fishers called and asked, do we have any information as to why the fish in Airisto [part of the sea] are gone. (---) One of them said that there has been a lot of seals in Selkämeri, so could it be ... since there had been some individual sightings of the seal in the area also. But they did not think of the seal as the culprit. Until the nets were full of holes or torn altogether, and they started to talk with other fishers in Selkämeri, then they realised that it is the seal. (Researcher 2.)

Indeed, the number of grey seals started to increase rapidly. During the period of 2000–2005, the population size of the grey seal in the Baltic Sea almost doubled from 9 700 seals to 18 300 seals (Salmi & Salmi 2006).

The Ministry of Agriculture and Forestry granted permits to hunt 30 seals in 1998 after it became evident how much damage the seals had caused for fishing sector. As the population has grown ever since, the number of licenses to hunt seals increased to 1050 seals per year in 2018 (Finnish Wildlife Agency 2018). Even so, the population has reached a new peak, as a census conducted in 2017 revealed that the population in the whole Baltic Sea area is now 30 300, 9 689 of which reside in the sea area Around Finland (Natural Resources Institute Finland 2018). In 2006, the Natural Resources Institute Finland (then the Finnish Game and Fisheries Research Institute) conducted a survey among fishers, interviewing (by phone and/or in written form) them about their thoughts and views on the grey seal, especially in the context of the protective reserves set up for them (Salmi & Salmi 2006). The material consisted of 97 fishers, 18 of them from the Archipelago Sea area. Seventy-two per cent of the fishers interviewed believed that the general increase in the number of seals has had an impact on fish stocks. The fishers explained that the seals eat the salmon, pikeperch and herring and probably disturb the spawning of the fish as well. They also thought that the fish have changed their schooling habits, and instead of exhibiting their traditional behaviour, they now seek shelter from the seals by swimming to the inner archipelago and the shallow bays (Salmi & Salmi 2006). More than a decade after the study, the situation for fishers has not gotten any better, but even worse. All but one of the fish-

ers I interviewed views the seal as the number one enemy negatively affecting their livelihood (Field journal 2018). The Natural Resources Institute Finland interviewed 28 fishers for the Report of Fisheries Conditions (2016), 21 of them coastal fishers. Among other things, the fishers were asked to name the biggest obstacle they faced in practicing fishing as a livelihood. The one obstacle that stood out was that of the other competitive species, especially the grey seal and the great cormorant (Setälä et al. 2017).

The problem with the seal is manifold. First of all, the grey seals have learned to catch the fish from the fishers' gear, thus not only eating the fish but also tearing the nets, causing considerable economic loss. A compensation system was established to compensate fishers for the economic loss. The compensation system, though, at least according to the fishers, has some major problems. For example, the system is bound to the fishers' annual income, which can be low because of the seals. Therefore, the fishers who are most affected by the seal receive less compensation:

Well, it's a bit twisted [the system], since if your income is low – which it easily is if the seals and great cormorants preventing one from fishing – then you won't get monetary compensation. So, if you are doing well, you get more compensation. Where I'm from, the seals came to the nets every night and tore them. But when one got no fish, there was no income and no compensation. (Fisher 5.)

Each of the fishers interviewed felt that the compensation system was insufficient and had not been planned to take into account the needs of the fishers. The other major problem with the grey seal is that according to most of the informants, the fish escape from the seal, seeking hiding places in hallow bays. Almost all of the fishers reported that their fishing waters have run out of fish, and they blame the seal:

I had to buy some new water areas to get rid of the seals. (---) Here [in the old area], there is no point in having nets at all. I have lost my waters. That saddens me. (Fisher 7.)

This area is huge [the sea area], but there is no one else around. I'm the only one, and my volumes are really small. So, this whole area has been conquered by the seals. I don't know if there would be anyone else regardless. I am the only one left, sort of like the last of the Mohicans. (Fisher 7.)

The fishers' view is that the seals are not only destroying their livelihood, but they also constitute the greatest threat to the continuance of fishing as a livelihood altogether. It is not that the fish are gone, it is just that they are

no longer where they should be, since they have changed their behaviour due to a predator that had been absent for decades. Since most of the fishers are elderly, already past the retirement age or getting close to it, their fear is that there will be no one to carry on their work in the future. The cultural resilience of the livelihood and the lifestyle connected to it are in serious danger. The development is not culturally sustainable. There is a consensus among fishers that due to the seal problem, there is no new, younger generation to take up fishing as livelihood. This view is shared by many other stakeholders in the fishing industry, as one representative from the administrative sector explained:

This cultural sustainability, it is at a crucial point. This from-father-to-son tradition, which enabled people to get into business, it is breaking up. And although it is claimed that the EU is making a great effort to enhance the conditions of coastal fisheries, we have not been able to create conditions for the fisheries to make a living. At the national level, we have not been able to regulate such competing species as the grey seal or the great cormorant. So, the scenarios for the future, in the context of fishing cultures, look really bad. In these circumstances, there is no way we can attract new fishers. (Administrator 1.)

The informant also pointed out that even though there is no lack of fish, the operational environment of the fishers has changed too much since the arrival of the new predators. The problem is that the waters are privately owned, so the fishers are not allowed to fish anywhere but in their own waters. If the fish change their behaviour and start avoiding specific water areas, then the fishers cannot follow the fish, but are left with empty waters, so to speak.

Even if the fishers and many of the other stakeholders believe that the fish are changing their behaviour – thus complicating the means of fishing – not everyone agrees. This notion of vanishing fish stock is mainly based on the observations and local ecological knowledge of the fishers themselves, and no extensive scientific research on the subject has been conducted. In fact, this subject is rather controversial within the scientific community as well as in the administrative and public service sector. Some agree with the fishers that the seal is to blame, while others think that other explanations are more rational. One challenge is then to recognise what knowledge can be regarded as valid and unbiased, and once recognised, to answer the question, how could this knowledge be best implemented in practice? This controversy, however, is only one aspect of the multi-layered environmental conflict between what could be described in generalised terms as pro-seal and anti-seal views. We will examine this conflict in more detail later in this article.

The great cormorant – a great nuisance

Another species involved in this battle over resources (in addition to humans and seals) is the great cormorant. The great cormorant is subject to the EU bird directive. In some cases, however, it is possible to regulate with special permits (Merimetsotyöryhmä 2016, 9). This rather globally common bird has aroused a great deal of controversy in relation to fisheries or living in coastal areas. Due to heavy overhunting, the great cormorant practically disappeared from its breeding range in north-western Europe. Slowly it began to live in the coastal areas of Denmark and Sweden from the 1930s onwards, reaching Finland in the 1990s, with the first breeding cormorants being observed in 1996. In 2004, the number of cormorants had grown to 3000 couples, after which the cormorant population plan was introduced (Merimetsotyöryhmä 2016, 5). In 2018, the number of breeding couples reached its peak, 26 700 pairs. Twenty-one per cent of this population lives in the Archipelago Sea area (Finnish Environmental Institute 2018).

From the fishers' point of view, the great cormorant is not a welcome returnee. The Natural Resource Institute Finland conducted a study among fishers on their views regarding the cormorants (Salmi et al. 2010). It interviewed 124 fishers in Finnish coastal areas on their views of the great cormorant. The interviews were done over the phone and followed the same survey-like structure. Seventy-nine per cent of those interviewed had observed cormorants on a daily basis. 48 % of them felt that cormorants have a negative impact on their livelihood, with 27% claiming that the negative impact was substantial. The ways in which the bird causes harm are numerous: for example, the cormorant can 'steal' fish from the fishers' nets, thus also tearing the nets. Their numbers have grown so large that the amount of fish they are consuming is affecting the harvest of fishers (Salmi et al. 2010). Cormorants are generalist predators, preferring species like perch or ruffe, but they seize the opportunity to eat other species as well (Heikinheimo et al. 2016, 84). As the most common part of their diet (in biomass) is perch, their share of pikeperch, which is the most important commercial fish for small-scale coastal fishers, was on average 6%, varying from 0.04 to 10% depending on the colony or year of study (Salmi et al. 2015, 30). It was also estimated by Salmi et al. (2015) that the total mass of pikeperch consumed by cormorants in the Archipelago Sea in 2010 was 50–63 tonnes, which corresponds to 460 000 – 570 000 individual pikeperch. The annual catch of pikeperch by professional fisheries during the period 1998–2010 has varied between 150 and 370 tonnes. Since pikeperch prefer to spawn in shallow bays in the inner part of the archipelago, this is also the area where cormorants eat the largest share of pikeperch. Many fishers are trying to catch fish in these same areas (Salmi et al. 2015, 301–333).

The negative attitudes can be seen in the interview material collected for this article also. One of the fishers emphasised the affect that the cormorants can have locally:

The arrival of the cormorants messed up the whole system. The balance is gone. When they are flocking over a lake, they can empty the lake in no time. I have a friend (---) who told me that he was at the beach one summer night and heard a big whoosh as a flock of them came there to fish. He told me that they separated into groups, some chasing the fish under water while the others gathered to catch the escaping fish. And the noise was horrible. The water was just churning, and it did not take long for them to get their stomachs full. But they do know how to fish alright. (Fisher 7.)

The antipathy towards cormorants is quite vocal in various newspaper commenting sectors and on social media:

'The massacre of the cormorants would be a [good] ecological deed. The eagles are doing their best, but there are still not enough of them.' (commenting sector, *Iltasanomat* 2016.)

'(---) Cormorants, an invading species, are destroying the whole herring stock with their parasites, and the whole ecosystem of the Baltic Sea is starting to be in such a state that soon there will no longer be domestic fish to eat.' (commenting sectors, *Turun Sanomat* 2018a.)

The research done by the Natural Resources Institute Finland (Salmi et al. 2010) shows, however, that not all the fishers have such negative feelings towards the cormorants as others. Every fourth fisher interviewed said that they do not think cormorants are harmful to their livelihood – mostly because their fishing area is far from the cormorant colonies. The same type of neutral attitude towards cormorants was found in some interviews conducted for this article:

I haven't seen so many cormorants. I think the disturbance is more connected to nesting really. (---) I don't think it's about them eating all the fish; the problem is more between one's ears than in reality in nature. And they don't harm the nets either; mine are mostly fine. Sometimes there is a hole. (Fisher 10.)

The nesting and the colonies of cormorants are viewed as big problems, though, not only among fishers but among many coastal dwellers or owners of summer houses in the area, as the colonies take over the islets and small islands and their faeces destroy the flora of the area. The proximity of cormo-

rant colonies has even lowered the prices of the land in certain areas (*Turun Sanomat* 2018b).

The need to regulate the cormorant population is a very controversial subject. Since the hunting of cormorants is not permitted due to the EU bird directive, the only option is to apply for special permits to regulate their breeding or nesting in certain areas. Most fishers are advocating moderate regulation procedures, such as egg pricking or oiling the eggs. The most common form of regulation, the disturbing of the colonies (in order to make them relocate), does not receive support from the fishers: ‘There is no point. They just go somewhere else and problem is not solved’ (Fishers, interview 2016); or:

Well, now it is permitted to go to some islets and disturb them, but that’s just childish. At some point, they put out some plastic wire to scare them off, but the cormorants just figured that it was good building material for the nests. (Fisher 7.)

The environmental conflict around the great cormorant, as with the grey seal, has many stakeholders. There are fishers, researchers, policy-makers and administrators, NGOs and citizens, all of whom have their own, or a collective, opinion on how this problem with cormorants should be dealt with, or even if it is the cormorants who are the problem in the first place. This conflict, especially with respect to the fishers, administrators/policy-makers and researchers, is examined in more detail later in the article.

The regulation of pikeperch – an additional obstacle

The third conflict regarding the fishers and other stakeholders is over the regulation of pikeperch harvesting. Pikeperch gained an important role as a commercial fish in Finnish fisheries in the middle of the 1990s due to increased eutrophication, a number of warm summers, which enhanced their growth, and the disappearance of cod in the area. For Finnish fishers, pikeperch is the third most important species commercially, and half of the catch is harvested from the Archipelago Sea (Heikinheimo et al. 2006, 192). According to the interviews with small-scale fishers in the Archipelago Sea area, with few exceptions they listed the pikeperch as the most important fish (Field journals 2018).

There are different ways of regulating pikeperch fishing, such as mesh-size regulations, but this article emphasises regulations regarding the minimum allowable landing size of the pikeperch. Researchers have noted that fishing-induced evolution in the maturation schedules of commercially important fish is rather common, which can potentially cause significant harm to fish stocks (e.g. Vainikka & Hyvärinen 2012). The pikeperch in the Archipelago Sea are among the fish most influenced by fishing-induced maturation, resulting in

a decrease in size and age of maturation (e.g. Kokkonen, Vainikka & Heikinheimo 2015). The abundance of large (over 40 cm) and old (over 6 years) individuals is declining, but so is the abundance of smaller individuals and year-class strength in areas with significant fishing pressure and high numbers of cormorants (e.g. Mustamäki, Bergström, Ådjers, Sevastik & Mattila 2014). In order to maintain ecologically and economically sustainable fisheries, the minimum allowed landing size of pikeperch was set at 42 cm, with the exception of class 1 professional fishers,² who were permitted to catch fish up to 37 cm in length from the transition time until the end of 2018. After 2018, the minimum allowed landing size for professional fishers was set at 40 cm. Since most of the fieldwork for this article was conducted in 2017 and 2018, the end of the transition time was a very current and worrying topic. Many of the fishers feel that since the pikeperch is the most valuable fish for them, this transfer to a minimum allowed landing size of 40 cm is going to put them out of business (Field journal 2018).

The main reason for worry is that according to fishers (Field journal 2018), the pikeperch they are currently harvesting are so small that only approximately 10% of the catch exceeds the upcoming requirement of 40 cm in length. That would mean that their income from the harvesting of pikeperch (which in most cases is the most important fish commercially) would decrease substantially. This view was confirmed by one of the researchers interviewed, who explained that fish retailers have noticed that of the fish they are selling forward, only 5–10% reach a length of 40 cm (Researcher 2). However, it is predicted that the strict regulations will relieve the fishing-induced evolution in the maturation schedules, thus enabling pikeperch to decrease their growing rates and consequently improve the yield of fisheries. According to the experts, it would take 2–3 years to see the results, but even more for the fishers to regain their former yield. Unfortunately, since warm summers are beneficial for the growth rate of pikeperch, the timing for the end of the transition period is quite poor. For the past few years, the summers have been relatively cold, and consequently, the year classes from previous summers have been rather small in size (Researcher 1; Administrator 1; Field journal 2017).

The endangered fisheries – the conflict between science, decision-making and knowledge

Although presented as a three separate cases, the grey seal, the great cormorant and the pikeperch form a triangle of conflict within the fisheries sector. The issues are overlapping, as are the stakeholders. Here, as the context of the

² Registered professional fishers whose income from the fiscal period exceeded 10 000 €.

article is decision-making and a different spectrum of knowledge, the focus is on the conflict between the fishers who hold local ecological knowledge and who are most affected by the decisions, the policy-makers who make the decisions, the administrative-level actors who enforce the decisions and researchers who provide the knowledge upon which the decisions are most often based.

To put it simply, the fishery yield has been decreasing for a while now, as has the number of professional fishers. The main reasons for this decline, according to the studies and the fishers themselves, are the three reasons mentioned above. As the grey seal is eating fish from fishers' gear, tearing the nets and driving the fish away from fishers' waters, they are causing significant economic loss, but are also sometimes driving the fishers away from the waters they have owned for generations. This has caused a great amount of anger among fishers, targeted at both the seal and the people who are willing to protect the seal. The seal is also cited as the main reason for the disappearance of fishing as a livelihood – there is no point in trying since the seals are taking over all the waters anyway (Field journal 2018).

Even if the great cormorants are not seen as such a general problem for fisheries as are the seal, they are causing controversy and taking the blame, along with the grey seal, for the decline in the fishery yield. Among fishers, the general perception is that cormorants both consume a significant amount of fish from the waters and from the fishing gear and are also an invasive species that is ruining the natural balance of the Archipelago Sea. The fishers see the connection of a decreasing amount of (grown) pikeperch as (partly) the cormorants' fault, and the fishers feel that they are unfairly punished with regulations specifying the minimum allowed landing sizes and blamed for exploiting and over-fishing the pikeperch, since it is the cormorants and seals who are consuming hundreds of tonnes of pikeperch as well (Field journal 2018).

Considering the fact that cormorants are a protected species and that seals can only be hunted with within certain quota, the fishers feel rather bitter:

There is nothing to protect. They [the seals and the cormorants] are so common nowadays. We [the fishers] are the ones who are endangered, the ones who are going to be extinct. You are looking at the last generation of coastal fishers. (Fisher, personal communication during seminar 2017.)

Fishers feel like their opinions are not heard and their knowledge is not valued. They feel like their loss of waters and worry about the future of their livelihood is ignored (Field journal 2018). Fishers say they are not included in decision-making and even that the researchers are working against them: 'There are so many things I know, some many things I could tell them. But no one asks'

(Fisher 6). The fishers are quite reluctant to work with scientists anymore, since, in their opinion, their co-operation has gained them nothing but more regulations and loss of benefits. This antipathy towards scientists was, however, more personal than general. According to one informant, some fishers would rather throw their fish samples back into the water than give them to certain researchers (Manager 1). In a fishing sector seminar, the researchers were asked why the fishers would help scientists, since there was no personal gain for them and certainly no extra money. They are working for science for free and they are not recognised as experts, the fishers claimed (Field journal 2018). In another fishing sector seminar in 2017, one fisher proclaimed in his presentation that scientists should have asked them, before things got this bad: 'Young researchers behind their desks, they are not experts; the experts are the old men and the old women beside the ATV' (Fisher, presentation in seminar 2017). The fishers' suspicious attitude towards researchers became clear in the early stages of this research project, since it was rather difficult for me to find fishers who wanted to be interviewed. They had had several negative experiences in working together with researchers, and they felt that often they had been labelled as bad people for wanting to hunt seals, with public opinion being very supportive of protecting the seals. Once they heard that this research project is actually about fishing and fishers, they were more forthcoming (Field journal 2017).

The concept 'local ecological knowledge' was not familiar to all the interviewees, actually, only one of them used that particular term to describe fishers' perceptions of their own environment. The term was, however, understood if I used it in an interview. Fishers themselves did not once question the existence or the relevance of their local ecological knowledge, although they did not call it that. The administrators, policy-makers and researchers interviewed for the project concurred that the views of the fishers are not often enough taken into account – but there were differences in opinion as to whether their views should even be considered. According to one interviewee, the ignorance among some sectors of research is rather obvious, even offensive to fishers (Researcher 2), whereas another concluded that fishers' knowledge would be valuable when, for instance, collecting data, but that analysis and the formulating of conclusions should be left to scientific experts (Researcher 1). One interviewee said that for administrators, it should be clear that local ecological knowledge is important, since there is already research emphasising its importance; but for now, it is only acknowledged in theory, not in practice (administrator 1):

I think it is just shameful to go there [to the fishers] and tell them that you are wrong, because we did this scientific model and it says that is not true. (Researcher 2.)

Maybe, the fishers can observe things that happen in nature, but it is up to us researchers to do the interpreting of why these things are happening. (Researcher 1.)

Well, they claim that they consider the fishers, but that is just not true. Local ecological knowledge should be acknowledged way better than it is [at present]. (Administrator 1.)

One way of including fishers in the policy-making process is the Report of Conditions conducted by the Natural Resource Institute Finland (Setälä et al. 2017; Setälä et al. 2018). These reports are used as a tool for policy-making, since their results are presented during the policy-making processes. Also, every year a seminar is organised for the actors in the fishing sector, which has increased the dialogue between fishers and other actors. One concrete example of fishers' successful lobbying efforts has been the question of the minimum allowed landing size of pikeperch. Since it had become obvious that the current year classes are relatively small, the policy-makers have been considering postponing the deadline for the transition period in order to relieve the economic stress of fishers (Field journal 2018; Administrator 1). Nevertheless, in the beginning of October 2018, the Ministry of Agriculture and Forestry announced that the deadline for the minimum allowed landing size for pikeperch will not be postponed. One important factor contributing to this decision could be the fact that the summer of 2018 was extremely hot, thus positively affecting the growth of pikeperch and improving fishers' opportunities to harvest large pikeperch that fit the landing size (Ministry of Agriculture and Forestry 2018).

Division between stakeholders

This research challenges the view that the field is divided into two camps, with the one camp consisting of fishers and the second including all the other actors. Actually, many fisheries related researchers, policy-makers and administrators within the fishing sector, share the views of the fishers. But since the policies and decisions are quite often based on scientific research, it is the scientific knowledge we need to focus on here. The views of researchers regarding the harmfulness of the grey seal and the great cormorant and the regulations for the minimum allowed landing size of pikeperch are quite diverse.

Some studies show that cormorants can impact fisheries locally (e.g. Salmi et al. 2015), whereas others suggest that the calculations are biased and ignore many factors, such as the fact that the mortality caused by cormorants may not be additive to other mortality factors (Heikinheimo & Lehtonen 2016). It is evident, though, that cormorants do consume large amounts of fish. The question really is whether this consumption has had impacted the system, and

therefore, is relevant to conservation and fishing management efforts – and thus to studies in ecology, fisheries management and conservation.

Regarding the question of ecosystem analyses and stock assessment – which affect fisheries management – an extensive study on fish extraction from the Baltic Sea was recently conducted (Hansson, Bergström, Bonsdorff, Härkönen, Jepsen, Kautsky, Lundström, Lunneryd, Ovegård, Salmi, Sendek & Vetemaa 2017). The research group compared the extraction of humans, aquatic mammals and birds. Their research showed that the seals and birds (mainly cormorants) consume significant quantities of fish; whereas the number of fish caught by fishers is higher than the number of fish consumed as a result of wildlife predation in the Baltic Sea in general, the state of affairs is different in the coastal areas. In the coastal area, birds are consuming 4×10^4 and seals 1×10^4 tonnes of coastal species, whereas fishers' catch is substantially lower, at 2×10^4 tonnes (Hansson et al. 2017, 1002). Since management practices are commonly based on the assumption that fish populations are impacted by fisheries (e.g. Mustamäki et al. 2014), the authors of the study concluded that the impact of wildlife predation should also be included in the ecosystem models and stock assessments, especially in the coastal areas. This point of view complements the views of fishers and many other stakeholders in the fishing sector (Field journal 2018). To demonstrate, one interviewee noted that if the impact of the cormorants and seals on the system is being questioned, why are we still thinking that fisheries have the greatest impact, since locally the animals are extracting more fish from the sea? (Administrator 1). Some researchers note that comparing fishing catch and wildlife predation is not justified, since they are not comparable (Heikinheimo et al. 2018). Birds, such as cormorants, prefer small fish, as studies have shown that their diet consists of pikeperch between the sizes of 10 and 38 cm (Salmi et al. 2015, 30), whereas fishers harvest fish size-selectively, targeting the big fish – and thus promoting fishing-induced evolution in maturation. (Heikinheimo et al. 2018, 3) It is also argued that the piscivorous fish are also great consumers of fish, and the pikeperch alone consumes 1000–43 000 tonnes of fish (Heikinheimo et al. 2018, 3). Scholars have pointed out that a poor catch can usually be explained by natural year-class fluctuations (Heikinheimo et al. 2018, 2), which can mistakenly be interpreted as being the cormorants' fault, as the arrival of the cormorants occurred simultaneously (Heikinheimo et al. 2016, 90).

The views on cormorants among researchers are much more polarising than those regarding the seal. No one denies the obvious harm that seals are causing to fisheries. However, an agreement on the measures to be taken and the severity of the seal problem has still not been reached. Fishers think that licenses to kill seals should be considerably easier to acquire, and it should be

legal to view the seal as a resource. But since profiting from any seal kill is forbidden due to the EU's seal trade ban (Regulation (EC) No 1007/2009), the seal, from the perspective of fishers, is just a nuisance. There is really nothing much that fishers and fishers' organisations can do apart from lobbying for more special permits for killing seals. The debate is mainly focusing on the level of harm the seal is causing as well as the amount of damage compensation. The fishers have substantial experience based on ecological knowledge on the behaviour of the seal and the fish. They are rather unanimous in their view that the seals are changing the behaviour of pikeperch, since the fish is seeking hiding places from new spots. This change in behaviour may even be more harmful for fishers than the gear tearing and catch stealing. The fishers no longer know where to fish, or even if they did know, the fish have probably left the waters already and have scattered to areas where they are not allowed to fish (Field journal 2018). There is no consensus among researchers as whether the observations of the fishers are accurate, or to be more precise, whether they are interpreting their observations correctly. Some researchers argue that the pikeperch is just following its prey to shallow bays, not seeking shelter from the seals.

If you are a scientist, you just cannot believe what you are told. We are always told off for not listening to fishers. But it does not work like that. You must think from different points of view and study and get to know the literature and so on. And then there are fishers who tell different kinds of things. Some say that there are no pikeperch because of the seals, and then another one comes along and tells me there are plenty of pikeperch. And they come from the same area. (Researcher 1.)

Most of the researchers and administrators contacted for this article, however, are leaning towards the views of the fishers, i.e. that pikeperch are fleeing from the seals, thus causing the fishing waters to run out of fish, despite the fact that no conclusive scientific research has been conducted on this phenomenon (Field journal 2018).

There is research proving that fish react to the smell of predator fish. I would imagine that mammals like seals have even a more distinctive smell. So why would they [pikeperch] not react to an approaching seal by fleeing. (Researcher 3.)

Seeking solutions

According to my observations and interviews, each stakeholder within the fishing sector agrees on one thing: the small-scale fisheries along the Finnish coast are in serious crisis. Administrators in the fishing sector concur

that the great weakness of policy-making is its inability to effect decisions (Administrator, presentation in seminar 2018; Field journal 2018). Depending on the position of the viewer, the solutions for the crisis vary. The fishers seem to agree that instead of regulating pikeperch harvesting by mesh sizes and landing sizes, the old policy of a closed season during the spawning of the pikeperch would be a better option: 'It would be extremely important to get closed seasons back' (Manager, presentation in seminar 2017). The closed season is seen as an older and more traditional way of regulating pikeperch, one that is more sustainable than the means used today: 'I wonder why they think that our ancestors were so stupid that they must stop every policy they found functioning' (Manager, presentation in seminar 2017).

The old fishers, they knew when to fish, and no one disturbed the pikeperch when they were spawning. And now those technocrats are telling us what to do, and they do not listen to us! One of them once said that you should not listen to the fishers, they are just seeking their own advantage – well, who has the advantage now when the coastal fish are almost gone? (Fisher, presentation in seminar 2017.)

The fishers' answer to the problems with seals and cormorants is simple. There should be ways to decrease the population of both animals. Some are advocating just such a strict philosophy with the seal: 'It should just be BANG BANG!' (Fisher 5). Others, however, think that it would be enough if the damage compensation system was fairer. Fishers also think that being able to hunt more seals would make the seals more timid and prone to avoiding humans, thus making it possible for fishers and seals to co-exist. Some interviewees also stated that if the seal could be seen as a resource, it would not be so hated. But with this current situation, both the seal and the fish are lost as potential resources (Fisher 7; Administrator 1; Researcher 2; Field journal 2016). A similar discourse concerning wildlife conservation versus economic resources is present in other conflicts between local people and protected predators, such as the case of Slovenian brown bears mentioned earlier (Reljic et al. 2018). According to fishers, the cormorant issue could be resolved if more permits would be issued for – not only to harass the bird, which only makes them move elsewhere, to become someone else's problem – egg pricking, which would not harm individual birds, but regulate the birth of new chicks, thus affecting the size of the population. None of these means suggested by the fishers have yet been realised, nor has the problems been solved in any other way, which, according to the administrator in policy-making, shows that the decision-making process is somehow broken (Administrator, presentation 2018).

One of our primary goals [in fisheries management] is to develop the means for practicing our livelihood. In my interpretation, preventing it from developing is not the way to help it develop (---) the decision-making 'machine' has ways to find appropriate means to prevent development also. (Administrator 1.)

Scientists working for different institutes or ministries are trying to find solutions for these problems. They too acknowledge that 'small-scale coastal fisheries are on the verge of disappearing' and that 'the situation is acute and something needs to be done before it is too late' (Development manager, presentation 2018; Fisheries counsellor, presentation 2018). Since it has been acknowledged that little can be done with the seals and cormorants, new ways of co-existing have been developed, for example new types of 'seal-proof' gear and developing the sector of fish processing. Even re-introducing older fishing methods, such as seine fishing, has been suggested (Researcher, presentation 2018).

Fishers have for centuries been adapting to the changing natural environment, but they find the ever-increasing amount of bureaucracy and number of regulations difficult to adapt to (Field journal 2018; Researcher 2). What makes it even harder is the disregarding of their local ecological knowledge and the feeling of being left out of the decision-making process. The presented conflict is not merely an environmental one, but also a cultural and social conflict. Conflicts here are mainly entangled within the question of knowledge. Different types of knowledge systems and values related to them are colliding. Researchers unanimously think – regardless of their views on seals, cormorants or pikeperch in the context of fisheries – that local ecological knowledge is important, but the degree to which it should be acknowledged, applied and included in the policy-making processes and management plans is subject to disagreement. Some of the interviewed researchers, each of them natural scientists, feel it is difficult to recognise the types of local ecological knowledge that are important, relevant and not biased. Relating local ecological knowledge to scientific knowledge is challenging. However, all the interviewed administrators and public servants agreed that fishers' views should be included more in both research and policy-making.

The conflict, then, is not only between fishers and scientists, fishers and administrators or even among the scientists. Even if the fishing sector (including fisheries researchers) would to some extent agree on the problems and solutions, the problems lie elsewhere too. Some conservation organisations are complicating the processes for permit applications (esp. with cormorants) by criticising the existing permit processes or, for example, by orchestrating major campaigns in support of seals, thus guiding public opinion against the fishers and in favour of the seals (Fisher interviews; Field journal 2018; Ad-

ministrator presentation 2018; Fisheries counsellor 2018). It is the function of environmental administration to decide when the population of a certain species is sufficient and sustainable, a decision which is based on the scientific research they receive from the researchers.

Environmental administration and the people working in that sector, they are honestly working on behalf of an animal that is being protected. It is their job to ensure that no one touches the protected animal. It is genuine conservation and protection, without having to think about the subsistence of people trying to make a living in the same system as the animal is living and consuming the same products that people want to buy from the supermarkets. This is where the conflict originates! To understand that someone is actually making a living there, and there should be something left for them too. (Administrator 1.)

The ability of fishers to practice their livelihood is then, to some extent, dependent on the decisions being made by environmental administrators, although other administrative institutions, such as the Ministry of Agriculture and Forestry and Centre for Economic Development, Transport and the Environment, are in charge of developing and monitoring fisheries. A common sentiment among the fishers and other stakeholders in fisheries is that perhaps there is no more room for fishers in the Baltic Sea, and that the conservation of cormorants and seals has become more important political question than securing the existence of fisheries and the continuance of fishing as a livelihood. In other words, animal conservation is more important than securing the resilience of the livelihood and the lifestyles and cultures connected to it: 'I have been fishing and selling fish for 60 years. I never ever thought it would come to this; the state of fisheries is awful. I am very sad' (Fisher, conversation 2017). In the words of several other fishers: 'It feels like we are being hunted' (Fisher, presentation 2018), and 'people want domestic fish, but they don't want us' (Fisher, presentation 2018). It is not only the loss of livelihood that saddens fishers. They feel like their whole way of life is in jeopardy (Field journal, 2018).

Discussion

Finland and Finnish coastal small-scale fisheries are no exception to the global crisis affecting fisheries. The main reason for the distress of fisheries in Finland is the growing competition over resources. Fishers face competition from the re-introduced grey seal and the recently introduced cormorants. Since the seals are, according to the fishers, causing damage to the fishers' gear and eating the fish from the nets, they are also having an impact on the behaviour

of the fish, making the fish (especially pikeperch) flee their native fishing waters in favour of areas where fishers do not have permits to fish. The number of cormorants has multiplied in the last decade, and they are consuming significant amounts of fish. According to research, the amount of fish consumed by cormorants in coastal areas exceeds the amount extracted by the fisheries. Fishers are competing with cormorants and seals for the same resources, yet it is not permitted to limit the population of either species due to EU directives and/or national legislation. At the same time, the pikeperch is being affected by the fishing-induced evolution of the maturation schedule, thus negatively affecting their yield. Therefore, to enhance the profitability of fisheries, regulations regarding the minimum allowed landing size were introduced. Since the pikeperch is the most important fish for the fishers commercially, this situation seems unfair from the fishers' point of view. Due to these regulation and legislation regarding both the protection of competitive species and the harvesting of pikeperch, small-scale coastal fisheries can no longer function profitably, nor can they promote overall sustainability. Thus, it is no longer only a question of low resilience, but also of the actual threat to their existence.

Finnish coastal small-scale fisheries have in fact been degraded and marginalised, as the political ecology thesis suggests. The fisheries are described as exploitative, since the blame for diminishing fish stock is quite often put on fisheries, as is the case with pikeperch. Also, as the degradation and marginalisation thesis suggests, this development has led to decreased equity in resource distribution. In this case, the processes regarding conservation have led to a loss of resources for other groups, and local livelihoods and the older practices and habits have been disregarded, and even the local subsistence methods have been declared unsustainable, as was explained in the political ecology thesis on conservation and control. This is not to say that Finnish small-scale fisheries were more sustainable in the past, though there is no evidence to the contrary. The thesis of political ecology on environmental conflict has proved applicable here as well; regulations regarding resource use have in fact created conflicts among different resource users and stakeholders; in this particular case, the human stakeholders are mainly NGOs, researchers and fishers.³

Since the fisheries are facing multiple threats, it is crucial for those with a stake in fisheries management to propose management plans that would enhance the resilience and sustainability of fisheries. However, the policy-making in the Finnish fishing sector seems to be doing the reverse. Symes et al. (2015) have suggested that policies are creating new problems instead of solving them. The current policies do not reflect the needs of fishers and do not

3 Another conflict that has emerged is between professional fishers and recreational fishers, but the analysis of this conflict is not included in this article.

promote sustainability in its entirety—cultural sustainability in particular is absent, and the cultural dimensions of both resilience and sustainability are not often recognised. Most conservation policies focus on the ecological and economic dimensions of sustainability, but it is important to note that they can be, and often are, incompatible with cultural sustainability. If so, whose sustainability are we really talking about? On the other hand, cultural sustainability can stand in stark contrast with ecological sustainability. There are elements in fisheries culture that certainly do not promote ecological sustainability. Then, cultural transformations are required in order to meet ecological needs (Siivonen 2018, 24). However, people are more prone to advocate change and the conservation policies related to it if they are included in developing the policies that affect them (e.g. Berkes et al. 1994; Rikoon & Albee 1998). In other words, change in the eyes of local people becomes more acceptable if it is conducted in a culturally sustainable way. It is impossible to exclude humans from conservation, so the most effective means of advocating for every facet of sustainability is to empower people by giving them access to the policy-making and conservation process and the ability to determine their own way of achieving sustainability, within certain limits. Officials in the fisheries sector and conservation should be more engaged with each other when creating policies and they should include representatives of local communities in policy-making that will have local effects.

Since the legislation, regulations and policies are often based on the scientific knowledge that policy-makers and administrators are provided with, it would be important to ensure they receive research on every aspect of the issue, including research involving local ecological knowledge. For example, the Natural Resource Institute Finland, which provides significant scientific knowledge for policy-makers, could develop its expertise in local ecological knowledge as well. At the administrative and managerial level, more education on and experience with local ecological knowledge and cultural sustainability would be essential. I argue that acknowledging the importance of local ecological knowledge and applying this type of knowledge in research and decision-making would increase both cultural resilience and cultural sustainability, since both can be seen as dependent on the ability of communities to guide their own development and define their own needs. One way of doing this would be to involve local ecological knowledge in the process of both research and policy-making. Participatory workshops and forums provide some solutions for such involvement, but there is an urgent need to develop more innovative ways of co-creating. Then, of course, it is also crucial to develop ways to recognise and evaluate local ecological knowledge and to develop ways through which the integration of scientific knowledge and local ecological knowledge would be possible. Local ecological knowledge at its best

could work as a cultural element that would both promote overall sustainability and also ease the tensions between the different actors with a stake in fisheries. Since this study shows that although they are not directly involved with fisheries management or monitoring, environmental administrators, environmental NGOs and other conservation-related actors have a major impact on the fishing sector. Therefore, it is crucial to conduct further research on environmental conflicts by analysing them from a more ethno-ecological perspective and focus on ways to include a more varied range of stakeholders in environmental policy-making.

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All the transcripts of the interviews are stored in the History, Culture and Arts Archives at the University of Turku. Each transcript has an individual archive code (in brackets). All the field journals are in the possession of the author.

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