Local communities in the archipelagoes are often dependant on many different local resources.

PHOTO: ROLAND STENMAN

Continued use of ecosystems:

Challenges for fishing and farming communities

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Most of the Swedish east coast consists of archipelagoes with a vast number of islands, islets, and skerries facing the Baltic Sea (the Baltic Sea proper and the Gulf of Bothnia, including the Bothnian Bay). The first hunter-gatherer inhabitants appeared already at the end of the last Ice Age, between 12,000 and 9,000 years ago, along the border of the melting glacial ice, and the Baltic Sea archipelagoes have been populated ever since. Hunting, gathering, and fishing were complemented with agricultural activities in the gradual emergence of farmers and farming from the south beginning some 6,000 years ago.[1] Life in the archipelagoes has for millennia been dependent on a diversity of activities where harvesting of local biodiversity has remained the base together with transportation of people, animals, and goods and other activities. Local biological resources have constituted the base of the economy, and life has consequently been dictated by the periodic shifts in the occurrence of different species. For the people in the archipelagoes, life changes were generally slow over the centuries until the mid-20th century when things started to happen much faster with major social and economic changes as well as changes in land use patterns.[2]

In parallel with the recent societal changes, there is also an ongoing transformation of the landscape due to climate change and, in the north, post-glacial isostatic rebound, i.e. land rising from the last Ice Age. As the decades pass, the shallow bay will turn into a coastal meadow and eventually a new forest. This rebound is today about 10 mm/year in the northern parts of the Baltic Sea and around 1 mm/year in the most southern parts.[3] Particularly in the Kalix Archipelago along the most northern coast of the Baltic Sea, these changes are very real for the local people.

During the past fifty years or so, the societal changes in the archipelagoes have included an increasing urbanization, and the number of permanent residents along the coast and in the archipelagoes has decreased. Fewer active farms and a growing number of summer houses for urban people is the current norm in many areas. Fewer active farms means fewer grazing animals and an increasing encroachment of woody plants, resulting in a changing flora and fauna and a lower biodiversity.[4] Technical developments in the fishing industry over the last half-century have resulted in larger and stronger boats and more efficient fishing tools.[5] Heavy industrial fishing has changed the balance between different fish species in the Baltic Sea, and it has also changed the relations between large-scale fishers and small scale (often part time) fishers in the archipelagoes. National and EU legislation has favored industrial-scale fishing, making it difficult for small-scale fishers to continue their practices.[6]

Over the past century, toxins have heavily affected the populations of many fish species as well as top predators, e.g. seals and white-tailed eagles. The present trend shows decreasing levels of toxins in the Baltic Sea, and they are today below EU threshold values with a few exceptions.[7] However, there is an ongoing problem with increasing concentrations of nitrogen and phosphorous in the sea water and related blooming of blue-green bacteria.[8] During recent years, seal, cormorant, and white-tailed eagle populations have recovered and grown considerably, and in particular seals and cormorants are today a major problem for the local fishers.[9]

The purpose of this paper is to highlight some perspectives on local human-nature relations and future challenges for local residents along the Baltic Sea coast who still live an essentially traditional lifestyle.

Methods and sources

In this essay we have chosen to abandon the academic tradition of describing the local community and its reality from a purely academic perspective, and instead we have worked across knowledge traditions. Our methodology has therefore been a direct co-production of knowledge and the inclusion of the life experiences of the people directly involved in the reality being studied. Consequently, the writing of the essay has been based on the observations of Marie Kvarnström and Håkan Tunón as researchers, together with observations from the local land and sea users Anna-Karin Utbult Almkvist (a farmer in the Sankt Anna Archipelago) and Joakim Boström (a fisherman in the Kalix Archipelago). Hence, the process has been both emic and etic (emic is the perspective of the community, while etic is the perspective of the researcher) with a strong focus on transdisciplinary collaboration in order to achieve a richer picture. We have in this process tried to create an objective text that at the same time highlights the concerns of some of the practitioners living in the archipelago.

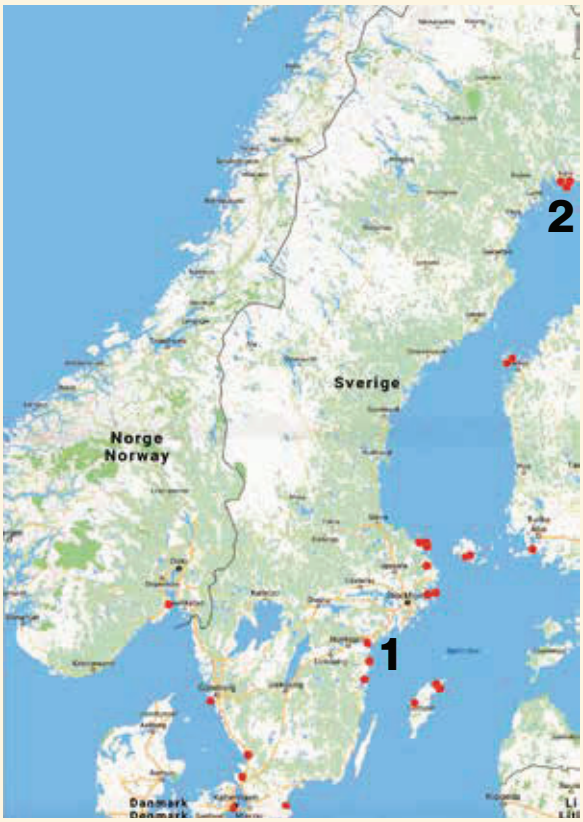
Our study thus comprises both academic knowledge production and local knowledge production combined in a similar manner as the procedures and work of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).[10]

Focus areas: In this study we have mainly focused on and compared two different archipelagoes: the Sankt Anna Archipelago in the Southern Baltic Sea (approx. 58°20' N 16°50' E) and the Kalix Archipela-

abstract

Although there have been great changes in the lives and livelihoods of people in the Baltic Sea archipelago during the last century, the lives of local inhabitants are still strongly linked to the local nature, culture, and history. Customary use of local ecosystems provides resources for the household, but it is also an important carrier of local identity, culture, and way of life. Fishing, hunting, and harvesting of berries, mushrooms, etc., function as cultural and intergenerational glue for the local community context even today. This paper reflects upon the cultural and social importance of the small scale and informal economy in the Swedish Baltic Sea archipelago for sustainably living local communities, some of the present challenges to its continuation, and the potentials for positive change. It is based on participatory research on customary use of biodiversity and local and traditional knowledge in the Kalix Archipelago in the northern Bothnian Bay and in the Sankt Anna Archipelago in the Baltic Sea proper.

KEY WORDS: local community, customary use, bio-cultural heritage, local and traditional knowledge, Sankt Anna Archipelago, Kalix Archipelago.



A map showing the locations of local community informants in the process of the Nordic project Biodiversity and Ecosystem Services in Nordic Coastal Ecosystems – An IPBES-like assessment (2015–2018). 1 = The Sankt Anna Archipelago. 2 = The Kalix Archipelago.

go in the northern part of Bothnian Bay (approx. 65°44' N 23°6' E). Data were also collected from informants in other parts of the Baltic Sea (see map above).

The main data collection for this paper took place within two different research contexts – NAPTEK (Swedish National Programme on Local and Traditional Knowledge related to Conservation and Sustainable Use of Biological Diversity, a governmental initiative within the Swedish implementation of the UN Convention on Biological Diversity, 2006–2012) and the Nordic project Biodiversity and Ecosystem Services in Nordic Coastal Ecosystems – an IPBES-like assessment (2015–2018).[11] The latter was mainly financed by the Nordic Council of Ministers and the Swedish Environmental Protection Agency. Within these two contexts, multiple interviews and participatory workshops have been performed, and there has been close communication between the participants in both projects.[12] Furthermore, in the Kalix Archipelago some 40 local community members are involved in a long-term local ecomapping initiative by the community-based organization Kustringen regarding land use and fishing.[13]

The study areas

Sankt Anna Archipelago is situated east of the town of Söderköping: The name is taken from the patron saint of sailors – Saint Anne – due to the difficulties in navigating this shallow archipelago. The parish was formed in 1521, and the first settlements are probably from a time when they were mainly used for seasonal fishing. The number of inhabitants increased until l the late 19th century when the land was redistributed, farms became scattered, and some families moved to other islands. Today, the number of permanent residents is around 65 people. The area is forested and fertile in the inner archipelago and has countless bare islets and skerries in the outer parts. The waters are shallow and rich due to the large amount of light reaching the sea floor. Most of the archipelago is still owned and used by permanent residents. The area is today set to become a Baltic Sea Protected Area named Helcom Marine Protected Area Missjö-Sankt Anna, which has been developed in cooperation between the county administrative board and the land owners. The farms in the archipelago are adapted to the available resources, and there is arable land in the inner parts and areas for grazing, hunting, fishing, and previously egg harvesting in the outer parts of the archipelago. The land rights are connected both to land and water, and for the farms in the outer part fishing has been the most important activity. This gave food for the people and the surplus could be sold. Previously all farms had fields and animals, mainly sheep and cattle, but when the fishing became more important or when other incomes were made available, many people quit farming. However, there are still plenty of grazing animals in the archipelago, but there are fewer farmers, with larger numbers of animals. Fewer farms are now situated in the archipelago, but animals are transported temporarily from the mainland for shorter periods. This, and the increasing numbers of tourists who disturb the animals, constitute a threat to the farmers who reside in the archipelago.

Kalix Archipelago: The archipelago outside the mouth of the Kalix river is low-lying land that has only relatively recently risen from the water. In the mid-16th century, Kalix municipality consisted of 27 villages and around 140 farms. Hunting, fishing, harvesting, and trade made the living fairly comfortable, and shipping, forestry, animal husbandry, and fishing were the most important sources for income. The villages along the Kalix River each had their own stretch of the river for fishing whitefish (*Coregonus lavaretus*) and salmon (*Salmo salar*), and in the archipelago the villages shared fishing rights in a similar way. The coastal villages caught whitefish, salmon, vendace (*Coregonus albula*), and herring (*Clupea harengus*). Seal hunting on the winter ice continued until the early 1970s. Many products, like salted fish, tar, and seal blubber, where exported to the more southerly parts of the country. In the 17th and 18th centuries, mining started in the area, and from the mid-19th century forestry and sawmills became more important. During the past century, the number of farms has decreased while the remaining ones have grown. There has been a similar development when it comes to fishing. Even if many people fish for their own household, the number

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Small-scale fishing is important in the Kalix Archipelago. Baltic herring has been highly valued for many centuries. The "caviar of Kalix" — Kalix löjrom (vendace roe) — is a product of Protected Designation of Origin in the EU and a product of great importance to the area.

of commercial fishers has gone down. Fewer people are getting their incomes from fishing, and municipal activities, e.g. healthcare and education, are now the most important source of income. Still, the use of the landscape for the household and for recreation remains of vital importance, i.e. fishing, hunting, and harvesting of berries and mushrooms. Many inhabitants are self-sufficient when it comes to meat, fish, berries, and mushrooms, and this knowledge is transferred to new generations. Furthermore, from 2010 the "caviar of Kalix" – Kalix löjrom (vendace roe) – has been a product of Protected Designation of Origin[14] in the EU and a product of great importance to the area.

The local perspective on life in the archipelagos

Although there have been major changes in the lives and livelihoods of local people in the Baltic Sea archipelagos during the last century, the lives of most local inhabitants are still very strongly linked to the local nature, culture, and history, and many different resources are still commonly harvested.[15] Furthermore, the harvest of biological resources is often still regarded as an important part of the local cultural identity. For instance, household fishing is not only a way to get food on the table – it is also a way of life and a socially important way for people from different generations to interact and a way to pass on local knowledge to future generations.[16] It is perceived as an inalienable way of life.[17] Even if the people in the local coastal communities could physically survive without the fish, the social and cultural loss would be very high for many people. The surplus of the catch can be given away to relatives, friends, and neighbors, and this strengthens the social bonds in the community. Extensive household fishing could be a valuable source of income for all ages if the regulations were more forgiving, but changes in regulations have gradually deprived the land and water owners of economic resources. The use of local biological resources and the transfer of related local knowledge from generation to generation are important social aspects of living in the archipelago. The local area is not just a geographical site for one's livelihood, and here one often talks in terms of a deep sense of place or belonging to the land. The biological, cultural, and societal aspects thus make the place special and unique to the local people.[18]

When living for several generations in a certain area, the local community develops a vast body of knowledge regarding the local geography, biodiversity, local climate variations, and different types of customary use of biological resources. The transfer of such local and traditional knowledge from generation to generation is still an important social aspect of living in the archipelago, both as a cultural heritage and for the expertise needed for everyday life when dependent on local biological resources.[19]

"TRADITIONAL LAND USE SHAPES THE LANDSCAPE AND THE COMPOSITION OF SPECIES IN THE AREA, CREATING A BIO-CULTURAL LANDSCAPE."

Biocultural heritage is a concept that has evolved over the last decades and is used to describe the interactions between local culture and biodiversity as well as the results of these interactions. Traditional land use shapes the landscape and the composition of species in the area, creating a bio-cultural landscape. For instance, grazing on islands creates an open landscape with grass and a rich diversity of herbs, insects, and birds rather than dense bushes of only a few species. When grazing, animals are moved between the islands, hence they are also important for seed dispersal.[20] Previously, local people have made different efforts in

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Kayaks make it easy to visit bays and lagoons with shallow waters.

PHOTO: ANNA-KARIN UTBULT ALMKVIST

Sheep and cattle still graze on some of the islands of the archipelago.

order to favor the desired species and increase the possibility for future harvesting. One example is nesting boxes for seabirds like goldeneye (*Bucephala clangula*) and goosander (*Mergus* sp.) that used to be put up for egg harvesting, an effort that also benefited the breeding success of these species. The landscape in the archipelago of today is filled with traces of the historical use of the landscape, such as clearance cairns, stone walls, old house foundations, remnants of jetties, etc.[21] These traces are remnants of activities with a vital function for life in the archipelago, and the landscape should be seen as a cultural landscape that has been shaped and maintained by traditional land use.[22]

Present challenges

The rapid changes during the last half century have created multiple strains on the traditional way of life. There are several conflicting interests in the Baltic Sea archipelago area involving different constellations of actors, creating what appears to be a wide variety of conflict areas viz-à-viz the local community and the connected way of life.[23] Below we discuss some of the important challenges to the continuation of traditional lifestyles in the archipelago.

Tourism vs. local communities: Tourism is often highlighted as a way to contribute to the conservation of natural and cultural values as well as a way to bring increased income to the local community. However, in the archipelago the benefits from tourism seldom reach the local communities, while traditional culture and resource use are suffering from some of tourism's negative effects.[24] Tourism in the archipelago mainly focuses on boating, swimming, hiking, and sport fishing. These uses are often considered to be fairly non-problematic, but they come with a host of problems. The archipelago has recently been made more readily accessible, for instance with kayaks that make it easy to visit bays and lagoons with shallow waters, i.e. the biodiversity-rich nurseries for many species. The use of GPS on larger boats makes it easier for such vessels to navigate in shallow waters. Visitors, sometimes with loose dogs, on the islands during the summer often disturb grazing animals and wildlife such as nesting birds. Jet-skis move loudly about at high speed, disturbing both animals and people. Commercial sport fishing tours might affect the local catch, and cases of disturbances in spawning areas have been discussed. Furthermore, sport fishing tackle sometimes becomes entangled in nets used for smallscale household or commercial fishing.[25] More local involvement in ecosystem management might benefit local biodiversity. One example in the Sankt Anna Archipelago is the desire of many residents to protect perch and pike from fishing in the spring, which the authorities have not approved so far. Each spring large sport fishing competitions are held in the archipelago with boats fishing in most places. The local residents see this as a disturbance of spawning fish and breeding birds, which they would like to curb. Land owners cannot even protect their own waters and adjoining land areas, and they find little space for dialogue with the authorities.

In Sweden and in the EU there are strong lobby groups favoring industrial fishing and sport fishing over household fishing, and recent changes in legislations and other regulations have made household fishing more difficult (see further below).[26]

Grazing of animals from the mainland farms vs. from resident farms: Many islands in the Sankt Anna Archipelago are still grazed, which helps maintain their biodiversity when the grazing is undertaken with knowledge of the local ecosystems and traditional land use.[27] The farmers move the animals from island to island during the grazing period, transporting them by boat. Previously, the grazing was by resident farmers' animals, but in the last few years an increasing number of animal farms on the mainland have brought their animals to Sankt Anna Archipelago islands for grazing during a limited period in the summer because they have discovered the opportunity to seek both environmental compensation and transportation support for grazing on the islands. They thus get the benefits from grazing in the archipelago but without the extra costs and work of living year-round on an island. In 2017 the funds for transportation support were used up early, and some island farmers had to manage without. This development might mean the end of some of the

year-round animal husbandry in the archipelago, which is important for maintenance of island biodiversity since it includes the opportunity to observe the ecosystems and meadows on the islands year-round and allows the flexibility to choose early or late grazing or to let some areas rest as needed.

Industrial fishing vs. local fishing: Coastal fishing in the Baltic Sea, including the Bothnian Bay, has undergone great changes from the 1950s to today. In the Bothnian archipelago there were no specialized commercial fishers before the Second World War – this is a very recent development. Fishing was earlier always one of several legs that underpinned the livelihoods and economies of coastal families.[28] One often had a small farm that was complemented with small-scale forestry, hunting, fishing, day labor, and seasonal employment. These small-scale, coastal fishers were the ones who introduced trawling for vendace in the Bothnian Bay, which is of fundamental importance in the area today. However, nowadays the vendace fishing has largely been taken over by a few commercial fishers. Similar developments have taken place in the Sankt Anna Archipelago, where fishing used to be more important than farming. The farms consisted of strips of land in an east-west direction in order to create opportunities for all for different kinds of seasonal fishing in shallow as well as deeper water. Eel fishing was the backbone of the fishing during the last century according to older fishermen. However, since 2007 only a few registered fishers have been allowed to fish for eel due to the threatened conservation status of the species. Generally the fish stocks have gone down and there are annual variations as well as differences between different parts of the archipelago and local knowledge. Local knowledge is of utmost importance because such fluctuations are followed closely by the local people, especially in the inner parts of the archipelagoes, in order to safeguard fish populations for the future. There is no industrial fishing in the more shallow inner parts, and the specialized commercial fisher is a fairly recent result of modern society's drive for large-scale operations and economic profitability. Recent developments in fishing along the coasts of the Baltic Sea favor industrial-scale fishing further from the coast and with fewer and larger ships. It is therefore increasingly difficult for the small-scale coastal fishers to compete with the industrial fishing. The present legislation and the system with fishing quotas makes it almost impossible to establish a fishing enterprise or to maintain the heritage and traditions around fishing.[29] Previous generations of part-time fishers have had the possibility to sell surplus in order to develop their enterprise step by step, but today there are strict regulations with licenses for commercial fishers in order to be allowed to sell fish, with strict requirements on economic profitability and a boat with sufficient tonnage. Hence, there is little recruitment of new younger fishers. At present, an EU law prohibits fishers without a license from selling any surplus fish from subsistence fishing in the sea.[30] A fishing legislation from 1993 made fishing with fishing rods in coastal waters free for everyone, even in private waters[31], and at present there is a new suggested legislation under review that might result in the removal of the rights of household fishers to use nets and similar fishing gear. The purpose of this would be to safeguard the fish populations for industrial fishing and sport fishing and to increase the fiscal control of catches made[32] even though household fishing in all of Sweden only constitutes a few percent of the total fish landed in Sweden.

Protection of species vs. local fishing: When the number of residents in the archipelago goes down, the number of people that perceive the area as "pristine" goes up. The biocultural heritage of historical land use is considered to be a "natural landscape" and the continuous land use, like farming and household fishing, which has shaped the landscape, is misunderstood as a potential threat to the "natural values" of the area. This can be compared to the ideas behind the formation of Sweden's first national parks, e.g. Ängsö in 1909, where the local farmer and his grazing animals, which had shaped and maintained the rich biodiversity, were considered a threat to the pristine leaf meadows that needed to be protected.[33] Meanwhile, the populations of different fish-eating species, especially the gray seals (*Halichoerus grypus*), ringed seals (*Pusa hispida*), and great cormorants (*Phalacrocorax carbo*), have increased rapidly over the last couple of decades and are now strongly competing with local small-scale fishing.[34] Because these species are on the list of threatened species at the EU level, they are subject to protective EU regulations resulting in conflicts between the protection of these species and human interests in the areas where they are more numerous. For instance, the seals in the Baltic Sea are today estimated to eat two to three times as many coastal fish as are caught in the fishery[35], and in the Gulf of Bothnia small-scale fishing in the archipelago has become extremely difficult in some areas, with seals appearing on the nets within minutes of the catch.[36] The seals might even threaten the future production of Kalix löjrom (the vendace roe). It has also been highlighted that the present seal population might be on the verge of starvation due to its large size. Local people have observed a change in the seal's menu from previously mainly fatty fish, like Salmonides, to leaner fish like perch (*Perca fluviatilis*) with much lower amounts of energy per fish. This is considered a sign of starvation. Protective seal hunting in the vicinity of fishing equipment is legal but very difficult and often risky, and since 2010 there has been a ban on seal products on the EU market.[37] The ban can be seen as a disincentive to hunt because the byproducts from the hunt have lost most of their potential use, and the people from the local communities generally consider it disrespectful to the hunted animal to let the products go to waste. There is an exception in

"THE BENEFITS FROM TOURISM SELDOM REACH THE LOCAL COMMUNITIES, WHILE TRADITIONAL CULTURE AND RESOURCE USE ARE SUFFERING FROM SOME OF TOURISM'S NEGATIVE EFFECTS."

the regulation for seal products "which result from hunts traditionally conducted by Inuit and other indigenous communities and which contribute to their subsistence" if the hunts "are part of the cultural heritage of the community and where the seal products are at least partly used, consumed or processed within the communities". Seal hunting and the use of the catch used to be an important part of the diverse culture in local communities along the Swedish Baltic Sea coast prior to the population decline in the 1960s and 1970s. Knowledge on how to use different parts of the seal for food and other purposes is still present among some parts of the local community, but this will probably gradually disappear unless the EU ban is lifted.

Authorities vs. local communities: An often highlighted complaint from the local communities in Sweden is that the authorities do not really listen to the knowledge and perspectives of the local residents and communities and that there is no space for dialogue with the authorities.[38] In some cases the knowledge of the local communities is ignored or is even ridiculed, which creates a feeling of mutual disrespect and suspicion if a dialogue were to take place. This might give rise to decisions and regulations that have strong implications on factors that are seemingly unrelated to the initial focus of the regulation. For example, in order to protect the wild sea trout (*Salmo trutta*) populations in the region, a general ban was issued in 2006 regarding fishing in waters less than 3 m deep in the Bothnian Bay and Kvarken between April 1st and June 10th and between October 1st and December 31st. However, the local villages in Kalix have documented their catches during the seasons and shown that their bycatches of sea trout mostly are in outer parts of the archipelago and not in the shallow waters in the inner archipelago, meaning that fishing in the inner archipelago should pose no threat to the trout population. The ban has had a significant negative impact on the local culture and quality of life of the local communities, and fishing is now prohibited in large areas of the traditional fishing waters for a large part of the season. The traditional artisanal fishing practices for whitefish, perch, and pike (*Esox lucius*) during spring and autumn are now almost non-existent because the prohibition periods coincide with the main traditional fishing season. As mentioned above, there is also today a political suggestion for a general ban on household fishing with nets in favor of sport fishing and industrial fishing.[39] The local people expect that the effect of such a ban will be devastating to their way of life in the archipelago.[40]

There is a problem with rapid changes in the ecosystems, and there is a risk that regulations regarding protection and management might be quickly outdated. For instance, the conflict between fishing and seals has been highlighted from the local communities for a long time, and both household and commercial fishers have wanted to establish a dialogue with the regional authorities regarding this. The fishers think that the processes that lead to decisions about governance are too slow and not concrete enough, and local experiences of the seal problems are that they have worsened dramatically in just the past couple of years.

Pollution and climate change – large-scale impacts from non-local sources: For many decades, the Baltic Sea has been affected by nutrient discharges and hazardous substances. In the past century, poisoning from heavy metals, PCB, DDT, dioxins, and other chemicals along with more efficient fishing, heavily affected the populations of many fish species as well as top predators. In the late 20th century, toxin levels in some of the fish from the Baltic Sea were so high that they were banned on the EU market. The present trend shows decreasing levels of toxins in the Baltic Sea, and they are today below EU threshold values with a few exceptions.[41] However, there is an ongoing problem with increasing concentrations of nitrogen and phosphorous in the sea water and related blooming of blue-green bacteria.[42] Although improvements have been made in recent years, a lot of work remains before the marine ecosystems can be considered close to a natural state. Climate change is already affecting the waters of the Baltic Sea, and projected future changes include acidification, rising sea level, decreasing ice cover, and different precipitation patterns.[43] Climate change is expected to have a major impact on marine ecosystems and fish populations in the Baltic Sea and the Bothnian Bay, with inter alia a decrease in cold water-favored fish species such as burbot (*Lota lota)*, grayling (*Thymallus thymallus*), salmon, trout, vendace, whitefish, and herring.[44] One concern is also a potential 3- to 6-fold increase in methylmercury in the Bothnian Sea due to biogeochemical changes from climate change.[45] On land in the archipelagoes, the summer drought of 2018 showed how difficult a predicted hotter and drier climate might be for local farmers and other local residents. While the causes of climate change are caused on and need to be mitigated on a global scale, the impacts are felt at the local level. The urgency to curb the use of fossil fuels and arrest climate change is monumental, and much will depend on what decisions are made over the next few years.

"CLIMATE CHANGE IS EXPECTED TO HAVE A MAJOR IMPACT ON MARINE ECOSYSTEMS AND FISH POPULATIONS IN THE BALTIC SEA."

Monetary and non-monetary ecosystem services: Companies and authorities often perceive short-term monetary values as one of the most important indicators in planning and governance of resources and the landscape. To some extent this is also true in local communities, but most often other non-monetary values are included in the calculation. With a good proportion of resources harvested from the sea and land, the household income might be sufficient and sustainable at a much lower level than if it were to have to rely solely on monetary sources. Short-term profits often jeopardize the long-term sustainability of the use of a resource, but local communities that are dependent on

Like a lighthouse, "indigenous and local knowledge" should guide us in our quest for sustainability, according to IPBES. The lighthouse at Lutskärsgrund in the Kalix Archipelago.

PHOTO: JOAKIM BOSTRÖM

local resources have an incentive not to overuse such resources, and this is often stressed by local residents. Often in these contexts the issue of the tragedy of the commons is brought up, but in both archipelagos studied here there is a fair bit of collective governance of the resources.

To the people in the archipelago, the sea and all the islands of the archipelago have provided livelihoods for centuries through a variety of resources. In every farm or village there are still traces of the close connection to local resources. All year long the archipelago is accessible by boats, skis, or snowmobiles, and people go there for recreation as well as for the resources that can be found there. Fishing areas have been inherited for generations, and the emotional loss through, for instance, the 3 m fishing ban that now makes fishing illegal in many places is tremendous. Either the people continue their cultural heritage and engage in illegal fishing or they simply abandon their traditions. The local people explain that there is a freedom and a sense of belonging in eating your own fish, game, or products harvested from the land. The very reason why the local people live in the archipelago has in our interviews been stated to be the closeness to the sea and its resources.[46] The way of life and the local culture is centered around the archipelago and the intergenerational learning on how to use and respect the resources of the area.

Needs for change and possibilities for the future

Because the local community members of the archipelagoes often have a close and intimate relationship with nature and spend most of the year in the area, the people have the possibility to follow changes in nature when it comes to fluctuations in populations, habitats, and climate. The local users of biological resources often notice anomalies very quickly. If these are to be detected through research studies or inventories made by the regional authorities, there is a time lag between the change and the relevant inventory or similar activity that can observe the change. Furthermore, a change can then only be detected if a baseline inventory has previously been carried out. For instance, test fishing in order to determine the size and compositions of local fish populations is sometimes performed only once a year or with several years' interval and only at a certain location, and inventories of seabirds are often done at irregular intervals and only seldom at a yearly interval. Internationally, the concept of community-based monitoring has been used to describe monitoring projects that are planned and performed by the local communities. The permanent residents living in the archipelago spend most of the year in the area observing changes and often have long-term experiences of what might be perceived as some kind of baseline. They are often more likely to observe a change at an early stage than the regular inventories, and together they cover a far larger area of the coast.

Community-based monitoring systems can be used to get more detailed monitoring data from many different locations and might lead to closer communication between authorities and local communities. An interesting example is the PISUNA project. Since 1999 the Greenland government has been piloting a monitoring project of the existing natural resources along the west coast of Qaasuitsup municipality. The municipality has a total area of 660,000 km^2 and a low population density, and thus conventional biodiversity monitoring would demand huge resources in time, personnel, and money. Consequently, the local people have become directly involved, not only in data collection, but also in analysis and in making suggestions for resource management. Studies have shown that the statements from the hunters and fishers are well in accordance with the predictions of scientists based on conventional inventories.[47] However, there is still a way to go before PISUNA is systematically used to inform management decisions.[48] A parallel and increasingly appreciated concept among scientists is that of citizen science, where ordinary people contribute with data collection for the scientists who then do the analyses and make the interpretations. One difference between community-based monitoring and citizen science is that the initiative and design of the work in community-based monitoring comes from the local people rather than from the involved scientists.[49]

According to the local community members, there is an urgent need for a dialogue with the authorities and a need of the authorities to take the experiences of the local people more seriously. From our previous work we have argued that there is a lack of arenas for dialogue between local users of biological resources and the authorities in order to safeguard a sustainable use and conservation of biodiversity.[50] We would also argue that there is a need for a transdisciplinary sharing of knowledge and experiences in order to make well-founded decisions. The IPBES was formed in 2012 to create a better basis for decisions, and it

represents the idea of co-production of knowledge through the meeting of different knowledge systems.[51] Even if the intentions are good, the methods for the local communities to have their voices heard in the international and national academic and political arena remains to be solved. The IPBES also emphasizes the need to acknowledge the interaction between biodiversity, ecosystems, and human society as well as human wellbeing. The UN Convention on Biological Diversity argues for the importance of "full and effective participation of indigenous and local communities" at all levels of decision making regarding conservation and sustainable use of biodiversity and states that local and traditional knowledge as well as customary use should be encouraged and respected. But what does "full and effective participation" mean and how do we interpret "respected" in the administrative work of conservation and the sustainable use of biodiversity?

Concluding reflections

It is possible to estimate the economic values of local biological resources and to valuate the more tangible ecosystem services, but the social, cultural, and spiritual ecosystem services are often inadequately dealt with in planning and decision making. How can we put a price on the love of our homeland? What is the price of the joy you feel when bringing your own food to the table? How much is it worth to be able to transfer the local knowledge and tales of your parents to your children or grandchildren? It is important to emphasize the value of the cultural dimensions of the use of natural resources in an area and to take them into account in the governance of landscapes and their resources. There is often a multitude of values in a particular use of a biological resource according to the local community, and the "resource" is seldom seen as just a commodity. The economic values are reasonably easy to calculate, but how do we deal with the social, cultural, aesthetic, and spiritual ecosystem services connected with the use? What kind of natural resource use gives us the optimum societal value? How do we achieve the sustainable society that so many are speaking about, and what space in that society should be given to local, small-scale users of ecosystems? As is so often the case, this seem to be a matter of a clash between two different world views.

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