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Local ecological knowledge as source material for historical research

Reflections on interdisciplinary collaboration, politics and history through the Fávllis network and the Porsanger Fjord

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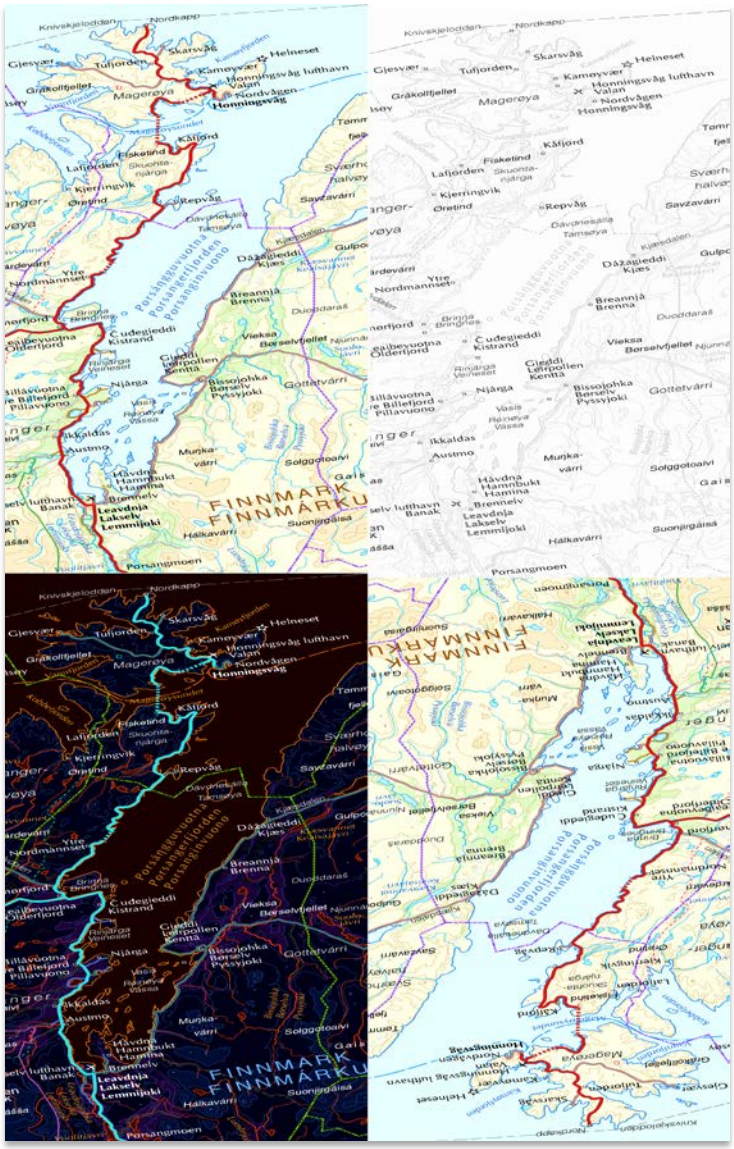

Fávllis

UNIVERSITY OF TROMSØ

Abbreviations:

ANT: Actor-Network Theory
CAQDAS: Computer Assisted Qualitative Data Analysis Software
CSRC: Coastal Sami Resource Center
FEK: Fishermen's' Ecological Knowledge
FFB: Fjord Fishing Board
GIS: Geographic Information Systems
ICES: The International Council on the Exploration of the Seas
IK: Indigenous Knowledge
IMR: Institute of Marine Research
LEK: Local Ecological Knowledge
NCR: Norwegian Research Council
NFA: Norwegian Fishers' Association
NIKU: Norwegian Institute for Cultural Heritage Research
TEK: Traditional Ecological Knowledge
TK: Traditional Knowledge
UiT: UiT The Arctic University of Norway

Map of Porsanger

Acknowledgements

My master's thesis is complete. At long last. If the process had gone as first planned, you would now be reading about economic strategies employed by well-off families in the southern parts of Troms county in the early eighteenth century to consolidate their wealth. Think Pride and Prejudice by way of David Warren Sabean's work on Neckarhausen in Germany. Well, that did not happen.

My next idea was to analyze the cultural memory implications of what I perceived as the Norwegian Armed Forces' single-minded obsession with the Second World War. Well, that attempt was half-hearted and never really got off the ground either.

In essence, I had really given up and abandoned the idea of finishing my master's degree. Then, through a stroke of sheer luck, I was hired as a research assistant in the Fávllis network. It has taken a while to get into a new field of study, and combining writing with work has slowed down the process as well. Finally, done.

First, a huge thank you to the entire Fávllis network. Especially to Svanhild Andersen for taking a chance on me, and for interesting discussions about local ecological knowledge. That is where this thesis began, as well as my renewed interest in finishing my degree. Also to Camilla Brattland for good feedback and input on drafts of the thesis.

I am incredibly grateful to the Coastal Sami Resource Center in Indre Billefjord, Porsanger. Thank you for good cooperation during my work on the Fávllis material and for allowing me to make use of it in my thesis.

Thank you to the Centre for Sami Studies at UiT, especially Else Grete Broderstad and Hildegunn Bruland, for providing a good and accommodating framework for combining work and studies. Without this, it would have taken me even longer to finish.

This thesis would not have had this shape, form or coherence without the guidance and input from my supervisor Hallvard Tjelmeland. Thank you for asking questions and pointing out concrete structural weaknesses, as well as numerous good suggestions on literature and lines of inquiry I had not considered.

I owe an enormous debt of gratitude to my family for tremendous patience, support and encouragement over the years. Thank you.

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Finally, thanks to the best student association of them all: Imladris. Delightful distractions is an important part of any academic endeavor.

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Chapter 1: Introduction

I first encountered the term *local ecological knowledge* (LEK) when I started as a research assistant in 2010. The project I worked for, Fávllis, is a Sami fisheries research network that I will describe in detail in 1.2. My job was initially to transcribe interviews of local fishers and other locals in the Porsanger Fjord in Finnmark. The material deals with the informants' knowledge about and opinions on the ecological changes in the fjord, seen in relation to the changes in the local community, industry, technology, language and culture. From my previous studies, I was already interested in collective and cultural memory, as well as the use of oral sources in historical research. As my work on the interviews progressed I also became involved in the qualitative analysis of the material, and I was convinced that the material could be a solid foundation for a master's thesis about how to use LEK as source material for historical research.

The effects of ecological change on society, both in general and for arctic areas in particular, are highly topical in management and policy, and a focus for scholars in many academic disciplines. A term that is currently getting a lot of academic interest is the Anthropocene Era, which historian Paul Dukes describes as "the recent geological phase during which human activities have had a global impact upon the planet"[1], spanning from the late 18th century when the effects of the industrial age began to become noticeable and measurable in the atmosphere. Dukes traces this age by examining the development of science and history and the challenges society has faced throughout the following centuries, up to our current age and the threats posed by, amongst other factors, climate change. He calls for a move towards pandisciplinarity in understanding and responding to these challenges. The use of local knowledge in understanding the effects of ecological changes and responding through policy and management measures is a dimension that has gotten more attention in the past decades, and the interdisciplinary nature of LEK might offer some opportunities for responding to his call to action.

LEK is just one of many terms that is used to describe knowledge systems; I will therefore review the historiography of the study of these systems and the literature on its use. I will look

[1] Dukes, P. 2011: *Minutes to Midnight: History and the Anthropocene Era from 1763*. Anthem Press. London.

at the tools the history discipline has for making use of such material. I will view this through the lens of environmental history, and I will therefore account for the historiography and methodology of this sub-field. As will be shown, this necessitates a focus on interdisciplinary collaboration, and I will discuss the ramifications of this. In doing so, I am attempting to place LEK in environmental history specifically, and in the history discipline in general.

This means that this master thesis will focus mainly on theory and methodology and that it is not an empirically focused thesis. In some ways my thesis is inspired by historian Kari Aga Myklebost's master thesis[2], which I will make use of in 3.2. In her thesis, she discusses the theory and methodology of oral sources and subjects them to her empirical data. I will attempt to do something similar, in that I will look at the theory and methodology of LEK and environmental history, and then try to relate them to my cases. I use the plural here, because as I see it I am using both the Fávllis research project as a case of the process of doing LEK research, and the interview material gathered by the project as a case of a type of LEK.

Finally, a note on why I choose to write this thesis in English. Much of the research on LEK is in English, and the same applies to environmental history. Academia in Norway is becoming increasingly international, and I believe that by writing in English I can contribute in making the Norwegian context more available.

1.1 Research questions and narrowing

Over the course of the past decades, LEK has become an increasingly present factor in policymaking and management internationally. As mentioned, the effects of climate change are topical, which makes it important to explore the possibilities of LEK in all disciplines of the social sciences.

As indicated by the title, the main research question of this thesis is *how can local ecological knowledge be utilized as source material in historical research?* This question has many facets and brings up reflections on interdisciplinary collaboration, history, politics and policy[3] that I will explore through the cases of the Fávllis network and the LEK material gathered in the

[2] Myklebost, K. 2002: "Muntlige fortellinger som kilder - refleksjoner rundt teoretiske og metodiske aspekter ved bruk av muntlige kilder som inntak til identitet". Available online.

[3] While these two are related, I make a distinction between politics, which I understand as relating to the organizational processes of the overall political systems, including government, and policy, understood as principles or strategies as well as the applied actions of governance.

Porsanger Fjord. Answering this question requires a comprehensive look at many questions of theory and methodology. I have defined the following secondary research questions:

- What is LEK, and how does it relate to other knowledge systems?
- To what extent has LEK been used in research and management in the Norwegian context?
- What methodological considerations must be kept in mind when working with LEK, and how do they compare to the methodology of the history field in general and for environmental history in particular?
- How is LEK collected and processed when used in research?
- Does the use of LEK facilitate different portrayals than other historical accounts?
- What are the implications and possibilities in using LEK as source material?

Research on epistemology and different knowledge systems is a large field, which I will account for in 2.1. and 2.3. I will focus on local ecological knowledge. Furthermore, with the nature of my cases, this is further narrowed to LEK in connection with a marine resource environment. I will also clarify my understanding of the LEK term. Social scientists Einar Eythórsson and Camilla Brattland, two of the researchers in the Fávllis network, give the following, narrowed definition of LEK as:

> "experience-based knowledge, continually derived from fishing practices within a community of fishers in the same area. LEK, as we understand the term, emphasizes the spatial aspect of knowledge about the environment in a resource user's (and in this case particularly fishers') vicinity, without discrimination between traditional knowledge and contemporary knowledge derived from fishers' continuous interaction with a changing marine environment."[4]

This is the basic understanding of LEK I will use in context of the Fávllis material and marine resource use. I will note when I deviate from this in some of the more general discussions of epistemology.

[4] Eythórsson, E., and Brattland, C. 2012: New Challenges to Research on Local Ecological Knowledge: Cross-Disciplinarity and Partnership" in: Carothers, C., Criddle, K.R., Chambers, C.P., Cullenberg, P.J., Fall, J.A., Himes-Cornell, A.H., Johnsen, J.P., Kimball, N.S., Menzies, C.R. and Springer, E.S. (eds.), *Fishing People of the North: Cultures, Economies, and Management Responding to Change*. Alaska Sea Grant, University of Alaska. Fairbanks: 131-152.

The time frame will mainly follow that of the interview material, which spans from the 1950s to the late 2000s. The main focus in the material is from the 1970s to the late 1990s, but many of the developments in the LEK-research field are from the past decade. As mentioned above, the focus of this thesis is primarily oriented toward methodology and theory rather than historical analysis. As such, I believe it can be argued that this thesis is about, rather than an example of, environmental history.

1.2 The Fávllis network

Fávllis is a research network that was established in 2003 by the Centre for Sami Studies at the University of Tromsø. Fávllis is a Sami word that means "on the deep" or "on the sea". The network's area of interest centers on knowledge about the fisheries in Coastal Sami areas; i.e. fjord ecology, small-scale fisheries and rights-based issues related to the exercise of such fishing activities.

From its beginning in 2003, there were several partners involved. The network arranged many seminars and applied for research funding. I will mainly deal with the activities in the period after the network's "major breakthrough" in 2008, when two larger grant proposals were funded by the Norwegian Research Council (NRC). I became involved in the network as a research assistant in June 2010, and worked on various parts of the project in the following years.

The Fávllis network had participants from several units at UiT The Arctic University of Norway (UiT) including the Norwegian College of Fisheries and Tromsø University Museum. The research grants were formally managed by the Centre for Sami Studies. In addition, there were participants from other research institutions in the Tromsø area: the Norwegian Institute for Cultural Heritage Research (NIKU) and the Institute of Marine Research (IMR). International partners were from Memorial University (Newfoundland) and Malaspina University College (British Columbia). The project had several Sami partner institutions: Sámi Ealáhus- ja Guorahallangguovdás (Sami Trade and Development Centre) in Tana, Mearrasámi Diehtoguoddás[5] (The Coastal Sami Resource Centre) in Indre Billefjord, Porsanger (CSRC), as well as the Varanger Sami Museum in Nesseby.

[5] Website: http://www.mearrasapmi.no. All websites references were last accessed on May 11 2016.

The two large research grants that were funded were:

- Fávllis 1 (2008-2011): *Fjord ecosystems – Sami communities: Local ecological knowledge and socio-ecological history*. Funded by the Norwegian Research Council's "The Sea and the Coast" program.[6]
- Fávllis 2 (2008-2012): *Traditional knowledge and management of fjords as ecosystems and cultural landscapes*. Funded by the Norwegian Research Council's program for Sami research.[7]

These two projects were closely linked, and Fávllis 2 secured funding for some of the work packages that were not funded by the first grant. I will therefore mainly refer to them as the Fávllis project. The projects had several goals, as described in the project proposals:

> "The primary goal of the project is to document and analyze local knowledge on ecological change and socio-ecological history in fjord environments. Secondary goals: 1) Develop a LEK database and make it accessible for marine resource management and coastal zone planning, in close cooperation with local Sami institutions. 2) By means of cross-disciplinary research on socio-ecological history, assess the role of human impact on ecological change in the fjord areas during the last decades, and the role of ecological change in the transformation of coastal Sami communities and cultural landscapes. 3) Analyze past and present resource conflicts related to access and harvesting practices. 4) Explore how links between identity, rights and knowledge are expressed and maintained in coastal Sami communities (PhD study)".[8]

Fávllis 2 added a stronger focus on the cultural aspects, both in terms of the emphasis on cultural heritage, language practices connected to resource use, and an expansion of the goals for the LEK database to also include management of cultural landscapes (including cultural heritage) and research and education purposes. Another additional goal was to make traditional ecological knowledge in resource use visible through documentary film, and contribute to discussions of this knowledge's relevance for fisheries- and land management. The CSRC was an especially close partner in the implementation of the research projects.

[6] NRC project number: 185182. Summary in NRC's project database: https://www.forskningsradet.no/prosjektbanken/#!/project/185182/no

[7] NCR project number: 189482. Norwegian title: *Tradisjonell kunnskap og forvaltning av fjorder som økosystemer og kulturlandskap*. Summary in NCR's project database (in Norwegian): https://www.forskningsradet.no/prosjektbanken/#!/project/189482/no

[8] Fávllis 1 grant application.

In addition, there were several smaller part-projects funded by the FRAM Centre's flagship projects[9] that continued after the main grant period was over, focusing on completing some of the sub-goals. While the network is currently dormant as there are no active research projects under the formal Fávllis umbrella (except for the writing of this master thesis), the partners are still in contact and are collaborating on other projects.

I will account for the activities and research of the Fávllis project in chapter 4.

1.3 Previous research and sources

In answering my research questions, I will draw upon literature from many disciplines in addition to history. As a central part of my thesis is attempting to link LEK and environmental history, a thorough literature review of two fields is necessary. I will make use of many Norwegian and Scandinavian historians' work on theory and methodology, and many international scholars of environmental history. Reflections on the study of different knowledge systems can be found in anthropology and political science, and often in interdisciplinary works. Fisheries science and community planning are also highly relevant. Chapter 2 deals with the broad historiography of both LEK and environmental history, as well as an account of LEK in Norwegian marine research and management.

The main case I will make use of is the Fávllis project. As mentioned already, I consider both the project itself and the data it collected as my cases. In chapter 4, I will review the project and interview material, which also serves as a source for this thesis. I will compare the portrayal of the Porsanger fjord found in the interviews with some other portrayals of the area from local history, a regional study and Norwegian Coastal and Fisheries history.

1.4 Theory and methodology

As the major themes of this thesis is methodology and theory, much of it will deal with related topics. In chapter 3, I will discuss considerations for working with LEK as source material, and review perceptions on its epistemology. I will look at theory on historical sources and the use of oral sources. I will examine the approaches used in environmental history, focusing on narrative and reflections on the need for interdisciplinary collaboration. I will also look at the process of using LEK, and the transformation of the material that takes place when it is

[9] Website: http://www.framsenteret.no/

integrated in research. In chapter 4, I will go into detail about the process of data collection and processing that was used in the Fávllis project.

Even though most of these discussions will be taking place in the other chapters, I will make some initial comments. LEK, like other interview-based data, is of a qualitative nature. Many of the implications of this is dealt with in the methodology chapter, especially 3.2., but my basic understanding of this is from Harald Grimen's handbook in philosophy of the social science.[10] In addition, the specific process and methodology of the qualitative analysis of the Fávllis interviews is described in 4.1.2. and 4.1.3.

While most of this thesis deals with methodology, I also reflect on how LEK can affect how an area is portrayed. Although my comparison with a local history account is brief, I find it useful to bring up some initial thoughts about the topic of theory in local history. While this might seem like a detour, I think it is important as it illustrates some of my inspiration for attempting to develop method and theory for using LEK.

Historian Einar Niemi discusses the place of theory in local history.[11] One of the approaches he discusses is particularly relevant in regards to the use of LEK as source material, namely the extent to which a historian should let the sources speak for themselves, and how driven by sources the portrayals should be. As I will show in chapter 4, LEK material is often collected via semi-structured interviews and the information can be communicated in a bottom-up fashion where the sources speak for themselves. Niemi comments on the opportunities found in focusing on theory: greater awareness to bias; improvements in the selection of research questions and criteria for narrowing of source material; and a theoretical foundation being necessary for writing history that integrates the totality of a community. This can also contribute to make history visible and increase the understanding of its relevance and significance for people and society. Niemi makes a point that is especially relevant in my context, that through development of operational terms, especially interdisciplinary or comparative ones, and using them systematically, it can be possible to avoid arbitrary selections or dead-ends when working in a local context. He also points out that Norwegian

[10] Grimen, H. 2004: *Samfunnsvitenskapelige tenkemåter*, *3. utgave*. Universitetsforlaget. Oslo.
[11] Niemi, E. 1991: "Har lokalhistorien behov for teori?" in: Marthinsen, L. and Winge, H. (Eds.): *Bygdesamfunnet - en sammensatt helhet* NLI, (Skrifter fra NLI ; Nr. 25) NLI. Oslo: 7-22.

local history has become increasingly multidisciplinary oriented and borrows methods from other disciplines.[12]

LEK research is commonly multi- or interdisciplinary and analytical categories are an important part of doing qualitative analyses of the material. I will discuss this further in chapters 3 and 4. Niemi also comments on the then ongoing discussion of "amateur vs professional" in the Norwegian local history discipline, and notes that while the discipline clearly has academic roots and formal research competence, the debate had become near-sighted in its focus on amateurism vs professionalism rather than questions of theory. Thus, it might have contributed to the discipline not being sufficiently involved in debates relating to scientific theory.[13] Historian Aud Mikkelsen Tretvik comments on the professionalization in her book on local and regional history.[14] She states that there has traditionally been academic support structures in place for the amateur historians, from the latter part of the 1900s mostly through the Norwegian Institute of Local history[15] (NLI) and the Norwegian Historical Society.[16] Today most of the local historical work is done by professionals with higher degrees, and the status has also improved.[17] In some ways, the question of "amateur versus professional" also mirrors some discussions on the relevance of LEK, which at times, mostly in the earlier phases of development, has been claimed to be unscientific and anecdotal information that is of little use in research by various actors, such as representatives from fisheries management and marine scientists. This point will be explored further in chapters 2 and 3.

Niemi's article was a part of a larger debate where many scholars participated. NLI and Landslaget for lokalhistorie's journal *Heimen*[18] were drivers in this, publishing anthologies on different topics of local history. I will bring up a couple of different perspectives to complement Niemi's. Tretvik reviews the debate, and notes the difference between local history represented as collections of source material without interpretation and analysis, and as a discipline with academic ambitions that requires awareness of theory and methodology.[19] There are several areas where this has relevance, such as geographical delimitation, choice of

[12] Ibid.: 17-19
[13] Ibid.: 12-13.
[14] Tretvik, A. M. 2004: *Lokal og regional historie*. Det Norske Samlaget. Oslo.
[15] Website: http://www.lokalhistorie.no/english
[16] Website: http://hifo.b.uib.no
[17] Tretvik 2004: 76-77.
[18] Website: http://www.landslaget.org/ (Norwegian language only)
[19] Tretvik 2004: 87-107.

perspectives and topics and interdisciplinary orientation. Historian Ingar Kaldal wrote about how he thinks local history should not be too caught up in the "ideology of the local community" and the idea of a total local identity. He warns against constructing strict definitions for what is true local history, and states that the field should aspire to be of interest to readers outside of just the local context it describes. He points at the opportunities that lie in using a local context to show the interaction of different forces, such as interdisciplinary collaboration and long-term perspectives. Kaldal also notes the importance of not pursuing the portrayal of idyllic fellowships, but letting conflicts and differences be shown. Finally, he calls for different and wider delineations and topics than just geography or municipal borders, and more reflection on the local history itself.[20] While local knowledge is anchored in a specific context, Kaldal's warnings against a too narrow focus are of use. As will be shown, LEK deals with connected factors, and I believe it represents a venue for exploring the opportunities Kaldal describes.

Historian Ole Alsvik offers some reflections on the different roles of the local historian that have relevance for the "amateur vs professional" topic, as well as the use of analytical categories. He makes a comparison to the general medical practitioner, claiming that local history as a discipline has tended to be broad and perceived as subordinate to, or of lower status than, the specialist fields. There are many dimensions of tension between and within the expectations of both the public and the scholars, and the local historian has to negotiate these. He highlights the market and economic framework conditions as troublesome for the field, as they have helped cement the dominant norm of encyclopedic local history where the different topics are partitioned into analytical levels and covered in an orderly fashion. He considers this to contribute to the scholarly prejudice, as well as not being in tune with modern public expectations. However, even with these concerns he argues that by taking the local place and actors as the starting point and then combining the different levels and topics, the true total history project of local history can emerge.[21] I find Alsvik's views useful. Differences in expectations from locals and representatives from management authorities or scientists is also a factor for LEK, and low status is an element of this. As LEK can cover many topics, his

[20] Kaldal, I. 1995: "Fram for lokalhistorie, som historisk refleksjon" in: *I arbeid for lokalhistorie og kulturvern: Landslaget for lokalhistorie 75 år 1920-1995* (anthology), Landslaget for lokalhistorie. Trondheim: 127-132.
[21] Alsvik, O. 2001: "Lokalhistorikeren - spesialist i småsamfunn?" in: Løyland, M. (Ed.): *Framtid for den lokale fortida? Norsk lokalhistorie ved millenniumskiftet*. Landslaget for lokalhistorie. Oslo: 74-87.

call to make sure the local context is in charge instead of the analytical categories is also relevant advice.

1.5 Thesis structure

The thesis consists of the following chapters:

Chapter 2: The historiography of local ecological knowledge: Origin of the LEK term, general historiography of environmental history and on the Scandinavian and marine offshoots. A review of the use of LEK in research and management, focusing on the Norwegian context.

Chapter 3: The local ecological toolbox: An overview and reflections on the use of oral sources, perspectives on different knowledge systems, the methodological approaches of environmental history and reflections on the process of transformation that is involved when using LEK as source material.

Chapter 4: The Fávllis material and portrayals of the Porsanger fjord: An overview of the data-collection and processing of the Fávllis interviews and the outputs it was used to make, the main findings in the material and comparisons with other historical portrayals and reflections on the use of LEK as source material for historical research.

Chapter 5: Reflections on interdisciplinary collaboration, policy and history: Looking at the complete picture to answer the research questions. Reflections on the political entanglement of LEK and on a possible LEK-inclusive contemporary environmental history.

Chapter 2: The historiography of Local Ecological Knowledge

Even though the interest in LEK has increased over the past decades, the concept has roots in earlier studies of traditional knowledge. In this chapter, I will review the historiography of the LEK-field as well as the sub-discipline of environmental history. I will start by discussing the origin and development of the LEK term itself. I will continue with a review of the environmental history field, as well as its position in the Nordic countries and of marine environmental history. I will then return to LEK, and look closer at the development of the field in general and for fishers' knowledge specifically. Finally, I will review the how LEK has been utilized in research, policy and management in Norway, focusing on marine resources and fisheries.

2.1 Origin and development of the LEK term

As mentioned in the introduction, local ecological knowledge must be seen in connection with other terms, such as traditional ecological knowledge (TEK) and Indigenous Knowledge (IK).

Svanhild Andersen, a researcher in the Fávllis network with a background in anthropology, reviews the origin of the TEK-field in her 2012 article "Fiskerkunnskap og forskerkunnskap – motsetninger og muligheter".[22] The term TEK has been in use since the 1980s, but it builds upon other fields: ethnoscience and cultural ecology. These fields were respectively oriented towards describing cultures from the inside and their taxonomies, and modes of productions being adaptations to the physical environment. Some TEK researchers consider it to be a supplement to "western science"[23], while others see it as an equal paradigm for the basis of both science and management. The work of Barbara Neis[24] on fishers' knowledge in Newfoundland was a big influence on the Fávllis project.[25] An often-cited article on how non-

[22] Andersen, S. 2012: "Fiskerkunnskap og forskerkunnskap – motsetninger og muligheter" ("Fisher's knowledge and researcher's knowledge – contrasts and opportunities", my translation) in Andersen, S. 2012 (Ed.): *Skriftserie for Senter for samiske studier NR. 18*: "Fávllis. Innblikk i et forskningsprosjekt om lokal fjordkunnskap". Available online.

[23] I will discuss this in detail later in this chapter and in chapter 3.3, but in short there is and has been a perceived divide or dichotomy between "global" or "western" science and "indigenous knowledge" as separate knowledge systems.

[24] Neis was made an honorary doctorate of UiT in 2008: https://uit.no/startsida/uit/artikkel?p_document_id=70332

[25] See chapter 4.1.1.

indigenous groups also possess LEK is her 1992 article "Fishers' Ecological Knowledge and Stock Assessment in Newfoundland and Labrador".[26]

Fikret Berkes, a marine scientist, is one of the big figures in the study of TEK. In his 1993 article "Traditional Ecological Knowledge in Perspective", he discusses the lack of a universally accepted term and definition for this type of knowledge, pointing at the ambiguity of the words in the term, before offering this working definition:

> "TEK is a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment. Further, TEK is an attribute of societies with historical continuity in resource practices; by and large, these are non-industrial or less technologically advanced societies, many of them indigenous and tribal."[27]

Berkes also discusses the relationship and differences between TEK and western science, the social context of TEK and the practical significance of TEK. This definition, however, emphasizes the historical continuity and non-industrial context, which makes it impractical to apply to many places and cultures in the world. This emphasis also makes TEK appear as a static form of knowledge. Berkes and others' use of this and similar definitions and approaches has been criticized for romanticizing ecological wisdom by using adjectives like "sacred" in describing them.[28]

Polar scientist Henry P. Huntington offered a working definition that also accounts for the ongoing process in which the knowledge is created:

> "TEK is the system of experiential knowledge gained by continual observation and transmitted among members of a community. It is set in a framework that encompasses both ecology and the interactions of humans and their environment on physical and spiritual planes."[29]

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[26] Neis, B. 1992. "Fishers' Ecological Knowledge and Stock Assessment in Newfoundland and Labrador" In: *Newfoundland Studies Vol. 8* (2): 155-178.
[27] Berkes, F.1993: "Traditional Ecological Knowledge in Perspective". In: Inglis, J.T.: *Traditional Ecological Knowledge, Concepts and Cases*. Canadian Museum of Nature. IRDC Ottawa.
[28] Davis, A. and Ruddle, K. 2010: "Constructing confidence: rational skepticism and systemic enquiry in local ecological knowledge research" in: *Ecological Applications Vol. 20(3)*: 880-894. Available online. This particular reference is to page 889.
[29] Huntington, H. P. 1998: "Observations on the Utility of the Semi-directive Interview for Documenting Traditional Ecological Knowledge" in: *Arctic vol. 51*:*3*: 237-242. Available online.

Serena Heckler, an ethnobotanist, comments on how the research on TEK developed and dealt with a broad variety of themes, from socio-economic transformations to changes in environments, expanding the field beyond its original boundaries:

> "In the new millennium, researchers have become more nuanced and critical in situating TEK alongside other types of knowledge and in particular social, political and economic contexts, contexts which themselves are changing. Gone are the days when TEK could be considered 'ancestral' or 'timeless' or as simple systems of classification. Today it is conceived of as emerging from ecopolitical discourse, practical engagement with the landscape and social relationships all at the same time".[30]

Heckler points out that it is not the details of *what* and *how* TEK systems classify knowledge that interests researchers today, but the contexts in which TEK emerge. She concludes that:

> *"*TEK emerges as an interaction of movement through and engagement with a particular landscape and the socio-economic context in which this knowledge is developed, evaluated, transmitted and applied. This, perhaps overly reified, perspective is inherently historical, with people's past land use and social relationships informing current TEKs".[31]

Marine ecologist Robert E. Johannes was also an important figure in the study of traditional knowledge, and I suggest Ruddle for an overview of his work.[32] Since the study of TEK has been developed by researchers from many disciplines, who have used a variety of methodological approaches to study different places and situations, there exist several different terms that are used to describe the field. These include rural knowledge systems, traditional ecological/environmental knowledge, indigenous knowledge, indigenous knowledge systems, indigenous technical knowledge, local knowledge, folk science, people's science, and ethnoscience.[33]

While this wide number of terms might give the impression of a highly disorganized field, Stanford Zent, an ecological anthropologist, argues that it is actually a sign of strength, as it reflects the fact that it is a field with a high level of activity, and that there are many efforts to

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[30] Heckler, S. 2009: "Introduction". In Heckler, S. (Ed) 2009: *Landscape, process and power: a re-evaluating traditional environmental knowledge*. Berghahn Books. New York: 1-2.
[31] Ibid.: 15.
[32] Ruddle, K. 2007: Ruddle, K. 2007: "Introduction" in: Ruddle, K (Ed.) 2007: *The collected works of R. E. Johannes: publications on marine traditional knowledge and management*. International Resources Management Institute. Hong Kong: 1–17.
[33] Ibid.: 3.

increase the understanding of the complexities of different knowledge systems.[34] Zent has written "A Genealogy of Scientific Representations of Indigenous Knowledge" where he discusses the different phases of the development of the study of IK systems, which I will return to in 2.3.1. Anthropologist Anthony Davis and geographer Kenneth Ruddle also provide a thorough review of the different scholarly approaches to LEK, and conclude that the terms and concepts have different meanings for different people.[35]

Why, then, is it relevant to use the term LEK instead of TEK or IK? Andersen discusses the choice of term for the Fávllis project, and states that by using the term *local*, the specific local contexts in which the knowledge is acquired is made explicit. This includes ecological circumstances, types of resource utilization, social relationships and the framework conditions for experience and knowledge generation that these contexts have.[36] The term *traditional* could also be practical, but as the concept of tradition is commonly understood as implying old and inherited knowledge, it can be a hindrance for an inclusive understanding of knowledge where information about a recently introduced species, such as king crab, is just as relevant as knowledge of older species.[37] The term *Indigenous* could also have been used, but Andersen notes that despite IK is being used to describe local knowledge that is unique in a given culture or community, using the term in this manner could be confusing. When taking into account that in Norway, the term *indigenous* is primarily associated with political status in relation to the nation state.[38]

The communal aspect of LEK is also important. Murray, Neis and Johnsen discusses how LEK is both individual and collective.[39] Important in this is how each member in a community does not know the totality of the LEK. What they know is in part based on the activities they perform in connection with the resource area. Murray et al. also maintain how this knowledge relates to not only the biophysical environment, but also the social and economic factors that is part of their connection with the marine resource area, and how these change over time.

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[34] Zent, S. 2009 "A Genealogy of Scientific Representations of Indigenous Knowledge". In: Heckler 2009: 19-68. This citation: p. 20.
[35] Davis and Ruddle 2010.
[36] Andersen 2012: 22.
[37] Ibid.: 22-23.
[38] Ibid.: 23.
[39] Murray, G., Neis, B. and Johnsen, J.P. 2006: Lessons Learned from Reconstructing Interactions Between Local Ecological Knowledge, Fisheries Science, and Fisheries Management in the Commercial Fisheries of Newfoundland and Labrador, Canada in: *Human Ecology* vol. 34: 4: 549–571. Available online.

Building on all of this, Einar Eythórsson and Camilla Brattland, two of the researchers in the Fávllis project, offers this definition of LEK referring to:

> "experience-based knowledge, continually derived from fishing practices within a community of fishers in the same area. LEK, as we understand the term, emphasizes the spatial aspect of knowledge about the environment in a resource user's (and in this case particularly fishers') vicinity, without discrimination between traditional knowledge and contemporary knowledge derived from fishers' continuous interaction with a changing marine environment".[40]

This understanding of LEK is important in the context of the Fávllis interview material that I will return to in chapter 4. As specified in 1.2., this is the basic understanding of LEK that I make use of in this thesis. It centers on the landscape and socio-economic context from which, as described by Heckler, TEK emerges, and Andersen points to as the core of the knowledge that has been studied by Fávllis. While Andersen discusses the choice of term in the context of one research project, I think the reasoning is also valid for a broader use of LEK. Again taking into account Heckler and how the field has expanded beyond its original boundaries and puts emphasis on the process of these knowledge system, using *local* brings to the fore the *where* and *who* of ecological knowledge. Eythórsson and Brattland also put special emphasis on the practice and social context or network in which the resource users produce LEK.

On a related note to LEK, a comprehensive work was done by the Sami University College on Sami traditional knowledge as part of the Árbediehtu pilot project. For more information, see the issue 1/2011 of the *Dieđut* journal, where a collection of the work was published.[41]

2.2 Environmental history

In this subchapter, I will first look at the origin and development of the sub-discipline, before looking closer at the Scandinavian and marine offshoots.

2.2.1 Origin and development

In the introduction of his book *What is Environmental History?*, J. Donald Hughes writes that "It is a kind of history that seeks understanding of human beings as they have lived, worked

[40] Eythórsson and Brattland 2012.
[41] Porsanger, J. and Guttorm, G. 2011: "Working with Traditional Knowledge: Communities, Institutions, Information Systems, Law and Ethics: Writings from the Árbediehtu Pilot Project on Documentation and Protection of Sami Traditional Knowledge." in *Dieđut 1/2011*. Sami University College. Available online.

and thought in relationship to the rest of nature through the changes of time".[42] Donald Worster writes that the origins of the field can be traced to the 1970s and the growing awareness on global environmental challenges, both in academia and the public at large. He states that the field initially had a moral purpose with strong political agenda, but as the field matured, it was no longer as closely tied to a single agenda.[43] Two of the important centers in the early development of the field were in the United States (Roderick Nash, Richard White, Samuel Hays) and in France (the Annales School).[44] Hughes comments on how earlier history writing focused on the exercise of power within and between human societies.[45] Marxist historians later added the dynamics of the economy to this, but nature and the environment was mainly dealt with as a "backdrop, or setting". Hughes notes how the history field has grown to include the perspectives of groups who have to a lesser extent participated in the exercise of power (for instance women's history and various minorities), and compares how the growth of these fields was connected to political and social movements with the link between environmental history and conservation- and environmental movements. He claims that environmental history should not just be considered a development within the discipline of history but must be seen in relation to studies of all types of power. As he sees it, the entirety of human activity is enveloped by nature, and it follows that accounts that do not consider this element are incomplete. James O'Connor does a thorough review of the development of the field in relation to the development of the preceding "major" types of history writing: political, economic and social/cultural. He notes that each new type of history incorporates the previous ones, and environmental history is "turning out to be political, economic and social history – widened, deepened, and made more inclusive".[46]

This approach to writing history covers many different topics. Worster described three levels, or clusters of issues, addressed by it: "understanding nature itself, as organized and functioning in past times", "the social-economic realm as it interacts with the environment", and "the purely mental or intellectual, in which perceptions, ethics, laws, myths, and other

[42] Hughes, J. D. 2006: *What is Environmental History?* Polity Press. Malden: 1.
[43] Worster, D. 1988: "Doing Environmental History". In: Worster, D. (Ed.*): The Ends of the Earth: Perspectives on Mordern Environmental History*. Cambridge University Press. Cambridge: Appendix: 2.
[44] Ibid.
[45] Hughes 2006: 15-17.
[46] O'Connor, James. 1997. "What is environmental history? Why environmental history?" in: *Capitalism Nature Socialism*, vol. 8:2: 3–29. Available online.

structures of meaning become part of an individual's or group's dialogue with nature".[47] Hughes later identifies three similar broad categories for the themes environmental historians have chosen to study:

> "(1) the influence of environmental factors on human history; (2) the environmental changes caused by human actions and the many ways in which human-caused changes in the environment rebound and affect the course of change in human societies; and (3) the history of human thought about the environment and the ways in which patterns of human attitudes have motivated actions that affect the environment."[48]

In order to be able to delve into these themes it is necessary to make use of material and sources of many types and from other disciplines. Worster notes that there are many types of historical data available, such as information on tides, wind, ocean currents, geological and hydrological forces, climate and weather.[49] He points at the natural sciences as essential in uncovering information about past landscapes, and how they were before human society began to modify them. He especially points at the field of ecology, with its focus on how organisms and the physical environment interacts, as the discipline that is of greatest use for environmental historians.[50] As an important element of these interactions deals with the material cultures of societies, including issues related to tools and sustenance, another discipline that is of use is anthropology.[51]

As both Worster and Hughes state, the ways in which humans have thought about and perceived nature is an important theme. Worster claims some of the best work by environmental historians has been analyses of people's perceptions of and values about nature.[52] In order to do this one must look at all aspects of culture where the meaning of nature has been an object, and on the range of perceptions and values within a given culture, not just exceptional individuals. Worster warns against the trap of eco-romantic notions and easy generalizations of cultures and peoples living "in harmony" with nature. The modern scientific method is generally considered to be a neutral and pure means of obtaining facts about the understanding of nature, and Worster points out the need to also consider the

[47]Worster 1988: 4.
[48] Hughes 2006: 3.
[49] Worster 1988: 3.
[50]Ibid: 4-5.
[51] Ibid: 7-8.
[52] Ibid: 10-11.

history of science when writing environmental history. He also call for "ideas as ecological agents" to be taken into the account when analyzing how decisions regarding the environment are made, what they entail, and where they are made. Again, he notes anthropology can be a good source for insight and methods.

Worster concludes by commenting on how environmental history might seem so broad and complex that it lacks any coherence, and by including everything, it deals with nothing. While focusing on environment might still seem like a too broad approach, he sees no other alternative for historians.[53] O'Connor notes that this totalizing possibility is not met with a "totalizing method", but rather deals with the "interconnectedness between specific historical projects and processes" based on what they have in common. He argues that:

> "The argument here is that all historical relationships are *simultaneously* and *irreducibly* social; social-material; material-social; and material (natural). Historians have to operate at all levels of abstraction (and their many mediations) to delineate exactly how and why economic and other forces have depended upon the environment; how nature is both enabling and constraining of human material activity; and how changes in the environment modify (and are modified by) political, economic and cultural/social changes".[54]

2.2.2 Environmental history in Scandinavia

It is apparent that environmental history has gained a foothold in the wider, international community of historians. Seeing as I am looking at it through a somewhat more local lens, I find it useful to take a closer look at the field in the Scandinavian context.

In 2013, Finn Arne Jørgensen, Unnur Birna Karlsdóttir, Erland Mårald, Bo Poulsen and Tuomas Räsänen published an article titled "Entangled Environments: Historians and Nature in the Nordic Countries".[55] This gives a broad overview of the state of the field in the Nordic region, and I will therefore draw upon this substantial work for summarizing this context. The authors do not try to make a comprehensive listing of all the related research. They have rather chosen to examine the main themes, and present what they consider good examples of the field in Nordic scholarship, and discuss the implications of writing about nature in history. The authors state that the field has had less focus in the Nordic region than in North America, but that this

[53] Ibid: Last page.
[54] C'Connor 1997: 14.
[55] Jørgensen, F. A., Karlsdóttir, U. B., Mårald, E., Poulsen, B. and Räsänen, T. 2013: "Entangled Environments: Historians and Nature in the Nordic Countries" in: *Historisk Tidsskrift Bind 92/01*: 10-34. Available online.

is changing. There have been several Nordic conferences on the topic in the past 25 years, but the publications have been mostly in Scandinavian languages and therefore not readily accessible to the rest of the world. They note that the Nordic work in the field is not just a regional offshoot of international trends, but must be seen in connection with them.[56]

Regarding the institutional status of the field, the authors note that it has not managed to become a mainstay in Nordic academia and that despite there being a few dedicated positions, most of the scholars working with environmental history have their employment in other sub-disciplines. Since 2008, there has been a Nordic Environmental History Network[57], originally funded by Nordforsk, an organization under the Nordic Council of Ministers. Commenting on the position of the field in Norway, the authors claim that it is institutionally weak, and that several scholars with interest in the field have had to move to other countries in order to find academic positions.[58]

The authors examine the Nordic branch of the field through three "entanglements" they see within it: 1) defining nature, 2) disciplinary knowledge and 3) national, spatial and temporal boundaries.

The problem of defining "nature" and "environment" has been as present in the Nordic countries as elsewhere, and the authors put forth the works of Sverker Sörlin as particularly well known.[59] There exists an ideal of "nature" as a pure wilderness without human presence and "environment" implying human interaction and involving degradation. Wilderness remains a strong ideal in the Nordic countries, something that the authors link to the abundance of uninhabited nature in the region. They point at terms like *environing*, meaning "the portrayal of historical processes in which humans domesticate nature and the mutual shaping that follows", as being useful when dealing with the presence of humans in nature and the human–nature interaction in what is often considered social, cultural and political processes.[60] While this entanglement is of course important, I find that LEK generally deals

[56] Ibid: 10-12.
[57] Website: http://norden.miljohistorie.net/
[58] Jørgensen et al.: 12-14.
[59] The authors refer to Sörlin, S.: 1991 *Naturkontraktet. Om naturumgängets idéhistoria.* Stockholm and Sörlin, S. and Öckerman, A. 2002: *Jorden en ö. En global miljöhistoria.* Stockholm.
[60] Jørgensen et al.: 15-18.

with defined resource areas. However, the idea of the "natural" order or balance is a part of how the informants relate to the abovementioned processes.

In the same way as humans and nature are "entangled", a variety of disciplinary methodologies are intertwined the field. The authors discuss the benefits of interdisciplinary approaches in environmental history, noting that studies of human–nature interaction are more nuanced when perspectives from both social and natural sciences are included. They comment that Nordic historians have not been as leading as archeologists and anthropologists, but point at good examples in history on agrarian practices, forestry, marine resources and climatology. In addition to this, Nordic scholars have participated in the discussion of more sophisticated theoretical frameworks for the field. They refer to Kristin Asdal and her critique of environmental history from a theory of science point of view, which I will discuss further in chapter 3.4.1. Especially relevant to this thesis is the work on marine environmental history, which the authors consider to have a strong interdisciplinary presence. They point at the recognition by marine scientists in the 1990s for the need for longer time frames in order to avoid "shifting baselines syndrome"[61] as an important factor in the development of this part of the field, something I will return to later in the chapter when I review the use of LEK in research.[62]

The third entanglement deals with the national, spatial and temporal boundaries of the objects of study. The authors point at debates on wolves crossing over national borders as one example of boundary problems, where animal migration is entangled with the environmental history of both the local–social kind and of international diplomacy. The utilization and management of marine resources are also examples of complex entanglements over the course of several centuries. This is an example where LEK could be of use, considering the international dimensions of fisheries management. Nordic perceptions and ideas connected to nature, such as conservation and national parks, has also been influenced by developments in other countries and global movements. This represents another element of this

[61] See: Pauly, D. 1995: "Anecdotes and the shifting baseline syndrome of fisheries" in: *Trends in Ecology and Evolution* 10: 430.
[62] Jørgensen et al.: 18-25.

entanglement, namely the different ways in which ideas are expressed in different national contexts.[63]

The authors note a lack of research dealing with the Nordic region as a whole, and rather a tendency for publications to feature articles on separate countries. They see the focus on national histories as representing lost opportunities for cross-national research projects. Furthermore, they maintain that the Nordic countries' partly overlapping ecoregions, economic and legislative similarities, and common ecological challenges illustrates possibilities for collaboration. Other factors related to this entanglement are transboundary pollution, geopolitics, globalization, as well as the influence of European colonization on global environments. The authors refer to several works on the environmental circumstances facilitating this.[64] Regarding temporal boundaries, an interesting point the authors bring up is how environmental and technological practices can "colonize the future of societies". Once a society has invested heavily in a particular system, it can be difficult to change course ("technological lock-in, path dependency or momentum"). They point at Arne Kaijser's work on the spread of technical infrastructure in Sweden as a possible example of this perspective, and I imagine that the development of both Norwegian commercial ocean fishing and small-scale fjord fisheries could also be approached from this perspective.[65]

The authors are of the opinion that these three entanglements show that nature and society are "mutually constitutive"; they are inseparable, and it is not possible to deal with them independently of each other. This is the foundation of environmental history. Discussing the future of the field, they bring up how practitioners must often justify their perspectives, as well as the general pressure on the humanities to show their relevance and usefulness for modern society. They argue that environmental history is well positioned to counter this criticism. They bring up the criticism of environmental history exceedingly dealing with ecological problems and catastrophes, and calls for deeper stories where the human–nature entanglement comes to show on several levels, hereunder cultural, political and historical. They point at connecting historical processes to current challenges as one of the ways the

[63] Ibid: 25-28.
[64] The authors refer to for instance J. R. and William McNeill, Jared Diamond and Robert Marks.
[65] Ibid: 28-32.

environmental history approach can increase the relevance of historical research. In this thesis, I hope to show that LEK can be a contribution to meet these calls.[66]

2.2.3 Marine environmental history

Chiarappa and McKenzie organized a forum on marine environmental history, published by the journal *Environmental History* in 2013.[67] They offer an overview of a variety of developments and directions of this subfield within a subfield[68]. Given the marine LEK focus of this thesis, I consider it appropriate to briefly comment on this.

A central theme is the willingness of marine environmental history to engage with policy. Historians Chiarappa and McKenzie cite William Cronon's warning against concentrating too much on the topics that are of interest to policy makers and management. They maintain that the marine environmental historians of the past decade have managed to combine engaging with these topics without losing sight of the bigger picture, and that these accounts are important for debates on management of marine areas.[69] Furthermore, they point at how the field spans areas from the local to the global, and how marine science related to marine species is often tightly connected to, and key in defining, the discourse on marine resource use. Another interesting observation is that the focus has often been on "the commodity itself – the how, when, why and where it was farmed, caught or killed".[70]

Historian of science and technology Christine Keiner reflects on the interdisciplinary strength of marine environmental history[71], a topic that will be further explored in 3.4.3. Keiner, referring to Sörlin and Warde, notes that environmental history's low status among some mainstream historians can to some extent be attributed to the close relationship to natural- and life sciences being seen as problematic. She, however, considers this to be of critical value for the marine subfield and warns against the construction of disciplinary barriers. She points to the past 150 years of scientific and technological developments related to human interaction with marine resources as evidence for this. She notes how historical perspectives

[66] Ibid: 32-34.
[67] *Environmental History Vol. 18/1, January 2013*. Available online.
[68] Chiarappa, M. and McKenzie, M. 2013: "New Directions in Marine Environmental History" in: *Environmental History Vol. 18/1*: 3-11. Available online.
[69] Ibid: 5.
[70] Ibid.: 9.
[71] Keiner, C. 2013: "How Scientific Does Marine Environmental History Need to Be?" in: *Environmental History Vol. 18/1*: 111-120. Available online.

are key in avoiding, or even conceptualizing, the idea of the "shifting baseline syndrome", and the importance of preserving fishery/ecological documentation in order to have the material for doing so. Keiner also discusses some potential pitfalls, such as "being colonized by science", where the main contribution is providing the historical context needed to verify data sets.

Historian Joseph E. Taylor III offers some insight on the epistemological issues posed by working on the marine environment.[72] He uses the "black box" as an analogy for the ocean systems. He claims its composition and complexity differs greatly from terrestrial ecology, requiring a stronger dependency on proxy data and natural sciences in order to study properly. He notes how the "strength" of LEK in policy and management in the 19th century weakened as industrial fisheries moved seaward, away from the local context, and marine science and mathematical models for stock sizes became the norm. Taylor notes the importance of methodological rigor when making use of old records, remarking that translating past observations (here understood not as exact counts, but different more-or-less vague descriptions) into a form of quantitative data is not trivial. One element is understanding the context of where these observations were made, and thus judging reliability. He makes three concrete recommendations for marine historians: Keeping up to date on the general developments of science, building partnerships with other disciplines across institutions and spheres of consensus, and actively looking for new approaches to methodologies that combine archival material and scientific results.

A particularly interesting perspective is found in historian Brian Payne's article on fishers' role in conservation of marine resources.[73] Commenting primarily on the North-American context, he looks at the stewardship roles fishers have played in an economic rather than ecological fashion. He draws attention to how E. P. Thompson's concept of moral economy has been central in marine environmental history, how this in many works has also spilled over into moral ecology, and challenges idealized notions of fishers as natural ecological stewards. He maintains that there exists a false dichotomy between fishers' agency as conservators vs. as capitalists. By making use of various examples from the 1800s, Payne illustrates how small-

[72] Taylor, J. E. 2013: "Knowing the Black Box: Methodological Challenges in Marine Environmental History" in: *Environmental History Vol. 18/1*: 60-75. Available online.
[73] Payne, B. 2013: "Local Economic Stewards: The Historiography of the Fishermen's Role in Resource Conservation?" in: *Environmental History Vol. 18/1*: 29-43. Available online.

scale fishers have opposed various industrial changes to fisheries from positions of protecting profitability and rights to access resources, and not based on local ecological knowledge. In essence, he argues that the fishers have acted in their own, non-romantic, interests, which have included both ecological and economic stewardship.

2.3 Review of LEK use in research, policy and management

As I am exploring the use of LEK as source material, I find it necessary to give an account of the development and use of LEK. I will first look at the overall evolution, then look briefly at fishers' LEK specifically. Finally, I will review the use of LEK in the context of Norwegian marine research and management from the latter part of the last century onwards.

2.3.1 Zent's phases of IK development

Anthropologist Stanford Zent has written "A Genealogy of Scientific Representations of Indigenous Knowledge"[74] (IK) where he discusses the development of the study of IK systems. While the focus of his article is on *indigenous environmental knowledge*, it is similar to and a part of the same broad field as LEK, so I will use his choice of term in my review. As I am exploring the use of LEK as source material, I find it necessary to give a thorough account of the field's development. Similarly to Jørgensen et al. above, Zent's article gives an in-depth overview that I will draw heavily upon in doing so. Zent defines seven phases of development, which are intended to reflect the overall chronology of their appearance, although with some overlap between them.

The seven phases of IK development he identifies are:

1. Environmental ethnoscience;
2. Theorization of folk biological classification;
3. Modelling the relationship between knowledge and behavior;
4. The significance of indigenous knowledge for sustainable development and conservation of nature;
5. Debates about valuation, exploitation and compensation;
6. IK as a critical ecopolitical discourse;
7. Processual perspectives of IK.

[74] Zent 2009.

The first phase, *environmental ethnoscience*, took place in the 1950s and 1960s. It centered on ethnographic description of classification systems. It grew out of field studies of kinship, pronominals, color terminologies and folk biology. Over time, the range of ecologically relevant topics of study increased. Zent points at the work of Harold Conklin on the study of human–environmental relationships in the 1950s as pioneering in this phase. Conklin's work on the Hanunóo people in the Philippines was remarkable in that it differed from earlier depictions of non-western mentality as primitive, and demonstrated that IK systems could be complex and systematically organized. Zent considers this phase mainly academically oriented, and considers the lasting impact of it to be a change in the scientific attitudes toward non-western, non-literate peoples and their knowledge systems.[75]

The second phase, *theorization of folk biological classification*, begins in the 1970s. This phase focused more on the field of ethnobiology, which was oriented towards studying the core foundations of folk (understood as non-scientific) classification systems. This work was highly interdisciplinary, comparative and theoretical. Zent gives Brent Berlin and his collaborators much of the credit for this theoretical development. Like the previous phase, the work in this phase also contributed to an increased acknowledgement of IK by providing scientific credibility to how IK about the biological environment could also be systematic, detail oriented and empirically accurate.[76]

The third phase, *modelling the relationship between knowledge and behavior*, sprung out of criticism from cultural ecologists and others on the shortcomings of structural ethnosemantic treatments of folk classifications; questions on the selection of taxa, and the effect of IK on behavior and adaptation, but also critique of cultural ecology not being applicable to studies of more modern societies. Zent considers the work on describing decision-making models as the key theoretical undertaking in this phase. He points at many scholars making important contributions, especially related to agriculture, and on building models for decision strategies and expert systems. The focus of this phase was both academic and applied.[77]

The fourth phase is *the significance of indigenous knowledge for sustainable development and conservation*. In the late 1970s, a shift took place, from the established idea of development

[75] Ibid: 21-23.
[76] Ibid: 23-27.
[77] Ibid: 27-32.

through technological import to the importance of *indigenous technical knowledge* for social and economic growth in the third world, a larger focus on the local context, and the traditional knowledge of the population. Zent points at several labels for the new paradigm: farmer-system, farmer first, farmer-back-to-farmer, populist, and participatory or agro-ecological development. Sustainability, participation and cooperation between locals and the development agents were important elements. Throughout this, IK to a greater extent came to be considered an undervalued resource, which in turn increased the amount of research on the field. Much of this by agricultural research centers and development agencies, with outcomes like large IK libraries and databases, a lot of this *ex-situ* – outside of the local context. I will return to this in 3.5. IK also became a more important factor for both environmental conservation and development initiatives. Zent considers this phase mainly oriented towards applied research and to be highly interdisciplinary. He notes that weak theory building is a striking element of this phase.[78]

Zent connects the start of the fifth phase, *Debates about the valuation, exploitation, and compensation of IK*, to the growing environmental concerns and advancements in biotechnology in the 1980s. The idea that IK could be a tool to prospect biodiversity rich areas more efficiently gained momentum, as well as conservation movements. There was more focus on *in-situ* conservation and the local context of biodiversity. Bioprospecting motivated by commercial interests was a big driver for research, which lead to discussions about the economical, ethical and legal implications. Controversy arose from the lack of compensation to nations and indigenous peoples whose IK was used to generate profit. These developments had large impacts on the field of IK studies. Zent points at the impact of the UN Convention on Biodiversity on policymaking. Another trend was indigenous organizations and local communities taking a more active part in the regulation of access to their areas. Zent notes that the emphasis was on the economic, ecological and ethical significance of IK from a world systems perspective.[79]

The sixth phase is *IK as a critical ecopolitical discourse*. In the 1990s a new critique emerged, centering around the dynamic between IK and scientific knowledge, both in epistemological authority and the power relationships between IK holders and outsiders. In addition, the

[78] Ibid: 32-36.
[79] Ibid: 36-40.

impacts of globalization contributed to various re-evaluations of native vs. foreign knowledge amongst peoples all over the world, which Zent refers to George Dei describing as a "crisis of knowledge". This all contributed to the IK field becoming more oriented towards ecopolitical discourse, heavily influenced by postmodernist and poststructuralist approaches. Zent points at two general tendencies, one constructive and one deconstructive. The former tends to center on the narrative of the "ecologically noble savage". The latter on analyzing the social and historical understandings of IK. Zent maintains that this phase displays ties to ideological criticism and socio-political activism. The study, theory and application of IK has been further developed in many ways throughout this phase, such as increased focus on gender aspects, and reassessment of the IK vs global science dichotomy, which I will return to in 3.3.[80]

The seventh, and current, phase is *Processual perspectives of IK*. In the mid-1990s and onwards, alarm was voiced about the decline in biological, cultural and linguistic diversity around the world, as well as loss of TEK. As a response, researchers started to focus on empirical-based studies of the processual aspects of IK: "creation, transmission, transformation, conservation and loss". Zent remarks that this phase is still quite recent, and points at what he considers four broad themes: (1) the social organization of knowledge; (2) knowledge as socially situated performance; (3) the transmission and acquisition of knowledge; and (4) cultural modernization and the intergenerational retention/loss of knowledge. As is apparent, the process and context of IK is a key element. While this phase has utilized a broad variety of integrative methodologies, one of the main criticisms has been a lack of standardized methodologies, which makes comparisons between different case studies and generalizations of broader trends difficult. This phase is both academic and applied, and a common theme in much of the scholarship is oriented towards the preservation of local knowledge, specifically *in situ* and *in vivo* conservation measures.[81]

2.3.2 The waves of fishers' knowledge

Having dealt with the general development of the LEK field, I will briefly look at Edward J. Hind's recent review that specifically deals with fishers' LEK.[82] This article represents a comprehensive examination of the research on fishers' knowledge. In it, Hind joins the list of

[80] Ibid: 40-45.
[81] Ibid: 45-49.
[82] Hind, E. J. 2014: "A review of the past, the present, and the future of fishers' knowledge research: a challenge to established fisheries science" in: *ICES Journal of Marine Science Vol. 72 (2)*: 341-358. Available online.

LEK scholars that point towards the lack of inclusion of LEK in maritime management and policy. He also points at the scarcity of published articles about LEK in the top fishery-centered journals.

Hind defines the "waves" as follows:

1. The first wave: birth – natural history;
2. The second wave: rebirth and radicalism – ethnography;
3. Third wave: growth and reform – applied social science;
4. The fourth wave: reinvention – quantitative biology;
5. A fifth wave? Reconciliation – applied social science and quantitative biology.

Like Zent's phases, these are also somewhat overlapping, and the researchers in them build upon the previous ones and some take part in several of their waves over the course of their careers.

The first wave, in the beginning of the 20th century, consisted of unorganized amateurs who qualitatively documented their observations of fishers in areas where professional fisheries scientists were not yet actively doing quantitative studies, and their efforts of trying to communicate their findings to fisheries specialists.[83]

The second wave came about with scholars working ethnographically with subsistence fisheries in developing nations and indigenous peoples in the West. From the late 1970s, these scholars pointed at the utility of fishers' knowledge for management. The focus on marine LEK was small compared to the work being done on terrestrial LEK in the same period. Most of the early work dealt specifically with freshwater fisheries in the developing world where professional fisheries science was absent, before some turned their focus to indigenous fisheries in North-America. Hind claims the field developed to being practically divided in two. He observes a trend towards LEK based researchers considering their field to be in conflict with "positivist fisheries science", calling for LEK to be taken seriously by the establishment, or even replacing it completely. Hind places Fikret Berkes, already mentioned, as part of this wave.[84]

[83] Ibid.: 343-344.
[84] Ibid.: 344-346.

The third wave began in the early 1990s, and during this wave more research began to be published on the topic. An early focus was on how fishers' LEK could have helped prevent stock collapses if it had been taken into account by management, and worked towards having LEK integrated to complement the existing fisheries science. The commercial fisheries of the developed world were a main theme. The participants utilized applied social science methods, collecting data from informants via interviews to document LEK, as well as a focus on spatial mapping. Participants came from both the social- and natural sciences, often as part of interdisciplinary collaborations. During this wave, the social dimension of LEK became prominent. LEK was also to some small degree integrated in management, making this become a topic for research as well. Hind places Neis, as well Maurstad and Sundet (who I will mention in 2.3.3.) in this wave.[85]

The fourth wave started around 2000. *Fishery-dependent information* was central here, meaning that fishers were enlisted in collection of quantitative biological data for researchers and management. The fishers' LEK was initially not a part of this, and Hind notes the absence of references to the first three waves in the works of these researchers. However, around 2010 the perspectives of fishers' LEK started to be included in conferences in connection with fishery-dependent data, and to some extent being included in quantitative biological data collection surveys. However, often terms like "stakeholder perspectives" are used, not "fishers' knowledge". The members of this wave are mainly biologists working with fisheries, and mainly publish in the mainstream fisheries science publications.[86]

Finally, Hind claims that a fifth wave might recently have emerged during the past decade, as a response to the lack of integration of third wave LEK into management and the development of the quantitatively focused fourth wave. This wave of researchers has focused on creating more complete quantitative sets than what was possible from the previous qualitative data collected. However, the methods employed do not yield the same type of non-biological knowledge that is part of this thesis' understanding of LEK. Hind concludes that these researchers cite the second and third waves, but their output is more like that of the fourth.[87]

[85] Ibid.: 346-348.
[86] Ibid.: 349-350.
[87] Ibid.: 350-351.

The third, fourth and fifth wave are all active at present. Hind asserts that fisheries science is no longer an uncontested discipline. This creates an opening for fishers' LEK to become part of the mainstream. However, the questions of integrating qualitative LEK with quantitative natural science is not trivial, and there are issues of politicization, perceived conflicts of interest, epistemological prejudice and so on. As he sees it, attempts to integrate LEK into the mainstream will probably be through reform or reconciliation with the establishment, and an important element of this is in finding effective venues for communicating LEK to representatives of management and fisheries science.[88]

In a response to Hind's review, an interdisciplinary group of researchers applauds his summary, but further specifies some advancements that have taken place in integration of fishers' knowledge in the field of "Fishers' Knowledge Research".[89] They warn against a false dichotomy of research on LEK vs. mainstream fisheries science, and point at considerable moves towards integration of LEK in research and management. Their point is that there is a wide spectrum of integration, not only participation in data collection but also various types of collaborative/participatory research and inclusion of stakeholders. They agree that fishers' experience, especially in regards to social and economic elements must to a larger degree be integrated, and maintain that capacity building is needed on the social-science side for this to be done. Furthermore, with the current increased focus on legitimacy and civil society participation in management processes, they believe interdisciplinary LEK-based research will become the norm in the future.

2.3.3 LEK in Norwegian marine research and management

It is within the sphere of marine research and management a lot of the work on LEK in Norway has been conducted, and this was the also the focus of the Fávllis project. I will return to the Fávllis project and describe it in detail in chapter 4, but to conclude this chapter I will move from looking at the historiography of environmental history and LEK to the development of Norwegian marine research, management and use of LEK.

[88] Ibid.: 351-353.

[89] Stephenson, R. L, Paul, S. Pastoors, M. A., Kraan, M., Holm, P., Wiber, M., Mackinson, S. Dankel, D. J., Brooks, K. and Benson, A. 2016: "Integrating fishers' knowledge research in science and management" in: *ICES Journal of Marine Science* Advance Access, March 16 2016. Available online.

Historian Vera Schwach offers some perspectives on the background and context of the Norwegian fishery management, and reviews the impact marine science had on the management system in the period 1860-1970.[90] She highlights the importance of geography when looking at Norwegian fisheries: most of the population was settled close to the coast or a fjord, and the large size of the sea territory under Norwegian disposal. Her claim is that economic concerns were the central motivation for management in the period rather than ecological ones, and that a collapse in the fish stocks was necessary before management approaches were changed in the 1960s and onwards. Schwach points at the long tradition of fisheries as a backbone in the national economy, with stockfish exports dating back to the 12th century. Marine science became important relatively early on, with scientific investigations being established in 1860. This was in service of a management system that was part of a closely centralized state system that focused on modernization and improvement of the fishing economy. While the marine science field combined many natural sciences, biology was the leading one, with economy becoming equally dominant after the Second World War. As part of the highly centralized system, fishers were involved with scientists, and with the establishment of the Norwegian Fishers Association (NFA) in 1926, a major industry counterpart emerged. Schwach maintains that the collaboration between marine scientists, managers and NFA was an important factor for the success of the sea fisheries going from unregulated to regulated in the 1970s. When looking at Schwach's description of this system, a perspective that comes to mind is the idea of socio-technological path dependency mentioned in 2.2.2.

The management of ocean fisheries in Norway has not been a purely national matter. For the Barents Sea, there has been a long history of cooperation with Russia. The 2011 book *The Barents Sea: Ecosystem, Resources, Management – Half a Century of Russian-Norwegian Cooperation* edited by Tore Jakobsen and Vladimir K. Ozhigin gives a comprehensive overview of the Norwegian-Russian collaboration in fisheries management.[91] See Alekseev et al.'s chapter for a brief history of the cooperation in marine research.[92]

[90] Schwach, V. 2013: "The Sea Around Norway: Science, Resource Management, and Environmental Concerns, 1860–1970" in: *Environmental History Vol. 18/1*: 101-110. Available online.
[91] Jakobsen, T. and Ozhigin, V. K. (Eds.) 2011: *The Barents Sea: Ecosystem, Resources, Management - Half a Century of Russian - Norwegian Cooperation*. Tapir. Trondheim.
[92] Alekseev, A. P., Bjordal, Å. Røttingen, I., Zilanov, V. K. and Shevelev, M. S. 2011: "A brief history of Russian–Norwegian cooperation in marine research". In: Jakobsen and Ozhigin 2011: 15-38.

Einar Eythórsson is a prominent scholar in the field of LEK-based studies on Norwegian marine resource use, with a background in community planning. His 1993 article "Sami Fjord Fishermen and the State: Traditional Knowledge and Resource Management in Northern Norway"[93] looks at local knowledge in resource management in the context of conflict between small-scale fishers in Finnmark and larger vessels using the active gear Danish seine.[94] Eythórsson discusses the relationship between traditional knowledge and scientific knowledge, and referring to Freeman (1985) comments on how both types of knowledge are based on systematic, empirical observations, but that the modes of collection and analysis differ. I will deal more closely with this in 3.3.2. Biologists rely on large amounts of quantitative data over a period of time. Local fishers observe qualitative changes that deviate from the normal pattern, and react based on experience and traditional knowledge. He notes that these knowledge types are not in opposition, and should be complementary for use in management.

Eythórsson then looks at how the traditional knowledge of the Coastal Sami relates to their economic adaptations: "definitions of which components of nature are 'resources'", "how these resources can be utilized" and "ecosystem functions, relations between species and sustainability of different resources". He notes how the moral element can be found in norms and unwritten rules about resource use. Furthermore, this traditional knowledge has formed the basis for a flexible economic adaptation that relies on a variety of different resources over the annual cycle. Each community has a resource area about an hour's range from home. In regards to fjord fishers in Finnmark, the traditional knowledge includes information about the migration and spawning behavior (which informs an annual cycle of catch of different species) and the locations, bottom characteristics and tidal currents of good fishing spots (which informs what gear is suitable). For instance, the spring cod fisheries utilize gill nets. Some of this information is known throughout the community, while some information pertaining to specific fishing spots is "inherited" within a family. Eythórsson also notes a local taxonomy that describes three different species of cod. An example of the utilization of fishers' LEK is in how the local fishers argued for a ban on active gear: the gill nets are not able to catch the largest and most reproduction capable fish, while the Danish seine harvests all the fish

[93] Eythórsson, E. 1993: "Sami Fjord Fishermen and the State: Traditional Knowledge and Resource Management in Northern Norway". In: Inglis, J.T.: *Traditional Ecological Knowledge, Concepts and Cases*. Canadian Museum of Nature. IRDC Ottawa.

[94] Danish seine is an active fishing gear. In Norwegian it is called "snurrevad".

regardless of size. In addition, Eythórsson also notes that he observed that the locals generally referred to the Danish seine fishing in moral terms, both ecological (destruction of local stocks) and social ("stealing" from the locals). In terms of environmental history, this can be seen as examples of how LEK can contribute to studies of perceptions of human–nature interaction.

With the backdrop of the decline in global marine resources despite much research and monitoring, the use of marine LEK to improve the knowledge base became more topical in the 1990s. Anita Maurstad and Jan Sundet's collaboration[95] is an example of an interdisciplinary research cooperation on fishers' LEK about coastal cod in Finnmark, combining social science and marine biology. Maurstad has a social science Ph.D. in fisheries science, while Sundet is a marine biologist. While this particular study is not recent, it serves as a good example of LEK-research on marine resources and deals with a similar group of resource users as the Fávllis project.

The study aimed to answer if LEK could contribute to answering questions about the existence and size of local fish stocks. This was both about if LEK could answer biological questions, and if qualitative methods could contribute to natural scientific queries. The foundation of the study was the well-established scientific knowledge on northeast Atlantic cod and the management practices. LEK was gathered through interviews with fishers, where information was also mapped to sea maps during the process. The interviews focused on two topics: (1) current and previous activity and (2) local marine resources: the existence and location of fish stocks both temporal and spatial. This mapping indicated 34 current spawning grounds and 10 now-empty ones on the coast of Finnmark. This was a significant difference from the then current scientific knowledge of spawning grounds, with implications for management principles. The findings indicated that LEK could contribute nuanced and detailed information about the spawning grounds and behavior of the cod population. In order to answer the second part of their research question, they proceed to discuss the validity and reliability of the material. They review several scientific criteria for the plausibility of spawning in the coastal fjords, and find that the information from the fishers satisfies them: the amount of spawning ready cod taken in the fjords at the time of the spawning and the water

[95] Maurstad A. and Sundet J. 1998: "Den usynlige torsken – Forsker- og fiskerkunnskap om lokale fiskeressurser". In: Sagdahl, B. K. (Ed.): *Fjordressurser og reguleringspolitikk. En utfordring for kystkommuner?* Kommuneforlaget. Oslo: 9–25. "The invisible cod – scientific and fisher's knowledge about local fish resources" (my translation).

temperatures in the fjords are plausibly the optimal temperature for spawning. They also point at the taxonomy for the cod tied to its maturity and spawning cycle as a sign of this knowledge being known and self-evident. The fishers' experience and observations based on this makes it evident for them that the spawning grounds are located locally.

Fishers' LEK is of course strongly tied to their individual fishing patterns, and the study showed that fishers in the outer coastal areas were less specific in placing the spawning grounds. Part of their catch is spawning-ready coastal cod, so they know that the spawning takes place in the local fjord systems, but not the precise locations of the spawning grounds. Maurstad and Sundet finds this knowledge about spawning to be based on the fishers' experience, "it is the fish that comes over the railing of the boat that gives them reason to conclude on the issue of local spawning grounds"[96] (my translation). They therefore consider the information reliable, and as it is not contradictory to the scientific criteria for cod spawning, the reliability is strengthened further. The possibility of strategic reasons for fishers to talk about local spawning grounds are also discussed. Maurstad and Sundet refer to Eythórsson (1993, 1996) and Jentoft and Mikalsen (1994) for discussions of local fishers' calls for ban on the use of active fishing gear throughout the 20th century; both for concern for local spawning, as well as negative impact on their own catches. These demands were dismissed, with the lack of scientific proof being an important part of the argumentation for dismissal.

As mentioned above, the management of fisheries is not only a national concern, and the Barents Sea outside of Finnmark has been managed in cooperation with Russia for the past 60 years. Alekseev et al. describe the cooperation from the 1970s in arenas such as the International Council for the Exploration of the Sea (ICES)[97] and the Joint Fisheries Commission for determination and allocation of quotas on a scientific basis. This represents some of the international circumstances that had to be taken into consideration in forming the Norwegian policy in addition to national factors, illustrating the entanglement of national boundaries.[98]

The discussions Maurstad and Sundet bring up makes it clear that local spawning grounds has been a political issue for a long time, but the existence of local spawning grounds has not been used as an explicit argument by the fishers for the ban of active gear in the fjords. One reason

[96] Ibid: 18.
[97] Website: http://www.ices.dk/
[98] Alekseev et al. 2011: 32-37.

for this can be resignation due to long-time ridicule by scientists and claims of fishers' claims as superstition or attempts at gaining profit. Maurstad and Sundet refer to Eythórsson (1996) for a discussion of this. Another reason they bring up is how fishers' LEK about spawning grounds has been framed: the focus has not been on issues like the importance of local stocks for the management of the cod population as a whole, or the possible loss of genetic material if local spawning grounds are depleted. Regarding the representativeness of the material, they note that while the study is based on interviews with 70 fishers, and generally 1-2 fishers from each place, they find no reason to doubt the representativeness. The indicated spawning grounds are their primary fishing grounds in the winter cod season; the fishers talk about the local spawning in the same manner; there are no inconsistencies in the interview materials – neither in separate or compared, and no examples of fishers negating spawning grounds others have indicated. Also taking into account different types of social control, they conclude that they find no reason to doubt the representativeness of the material, and its validity for the whole of Finnmark.

Maurstad and Sundet contend that LEK is a good source for reliable and valid information about local spawning grounds. They point at implications this information should have for the management of the cod fisheries of that time, which operated on the principle of biological optimality and taking only northeast Atlantic cod into account. Local cod stocks with different biological characteristics being exempt from this management regime would mean that the management as a whole was not biologically optimal. They also point at the focus on total catch in the then current management system, and ask if regulations on fishing periods and gear might be better for the management of coastal cod. As the traditional methods for estimating fish stocks were primarily developed for open sea areas, they were not considered well suited for coastal areas at the time. Historical age class-analyses and catch statistics for the local coastal areas were also hard to find or not existent. With these shortcomings of the traditional quantitative fishery biological methods for the management of local cod stocks, as well as the depletion of ten local spawning grounds, in mind, Maurstad and Sundet called for new and alternative approaches to management and point at the integration of qualitative information in fishers' LEK as part of the solution. See Kovalev and Bogstad[99] for a relatively

[99] Kovalev, Y. A. and Bogstad, B. 2011: "Stock assessment and management advice". In: Jakobsen and Ozhigin 2011: 621-646.

recent overview of the stock assessment methods, and Bogstad and Filin[100] for a description of multispecies and ecosystem modeling. Maurstad later returned to this study and commented on the process and challenges of the interdisciplinary cooperation, which I will discuss in chapter 3.4.3.

The use of LEK in matters relating to management of marine resources has increased from the 2000s and onwards. One of the largest undertakings for cooperation between fishers and marine researchers in Norway is the reference fleet. In her Ph.D. dissertation on the topic, Maiken Bjørkan[101] describes it as "an arena where stakeholders (fishers) are invited to participate in knowledge production for fisheries management in cooperation with scientists". She refers to the official presentation that states that it is "a small group of Norwegian fishing vessels that are paid to provide the Institute of Marine Research (IMR) with detailed information about their fishing activity and catches on a regular basis". The arrangement started in 2000 for ocean going vessels, and a similar one for the coastal fleet was established in 2005, and consists mainly of small boats from 9-15 meters in length. Together with IMR's own vessels and other samplers it is the main source of age- and length-data, which is used as basis for the advice on stock assessments and quota determinations for the most important commercial species. The participating vessels are provided with training and equipment, and conduct sampling and measurements of length, otoliths for age determination, genetic samples, stomach content and contaminants as well as logging catches.[102] Bjørkan notes that the contribution of the fishers via the reference fleet is not through their experience-based knowledge (that is, LEK), but by performing the traditional data collection in a new way, in a process designed and controlled by the marine scientists. The collected data makes its way up through "the chain" to ICES where it is used in the models.[103] This shows that the reference fleet can be considered an example of Hinds' fourth wave, as described in 2.3.2.

[100] Bogstad, B. and Filin, A. A. 2011: "Multispecies and ecosystem modelling as tools for fishery management". In: Jakobsen and Ozhigin 2011: 647-663.
[101] Bjørkan, M. 2011: "Fishing for advice: The case of the Norwegian reference fleet". Ph.D. dissertation. Norwegian College of Fisheries, Universitetet i Tromsø. Available in Munin.
[102] *Focus on Marine Research 3/2013*. IMR. Available online.
[103] Bjørkan 2011: 174-177.

Ann-Magnhild Solås and Bjørn Hersoug[104] look at LEK (using the broad term "fisher knowledge") in the context of land-use planning, but their article summarizes recent developments in regards to marine management from the turn of millennium. They note that while local knowledge has a long tradition for use in practical administration matters, such as division of Lofoten for different types of gear, the modern fisheries research and resource management began using total quotas and stock models from the 1970s. They discuss the difficulty of getting support for the use of LEK in fisheries management, and refer to Petter Holm (2003)[105] pointing at the proponents of increased use of LEK in the management bodies only recognize the knowledge when it is in agreement with already established scientific knowledge. They draw on Holm in describing a three-part process in the use of LEK: "First the knowledge is extracted (gathered from the fishermen), then it must be refined (made useable and operative), and finally certified (approved by the ones with scientific authority)" (my translation). They refer to Bjørkan (2011) who shows that fishers in the Norwegian reference fleet at the most contributes on the level of a research assistant; contributing to the collection of data, but not having an influence on the assessment of the data. It is IMR and ICES who are the considered experts in matters related to fishery politics in Norway. I will discuss the process of refining LEK in 3.5., but I note that with the international circumstances of the management systems, knowledge needs to be translated in order to be communicated in the international context. This means that the process in itself does not necessarily represent a demotion of the worth of the "unprocessed" knowledge. See Davis and Ruddle (2010) for some reflections on this.[106]

Mapping of usage has been one of the most important tools for the management authorities, especially for the Directorate of Fisheries, and it is now done mostly through Geographic Information Systems (GIS) and digital map resources. Solås and Hersoug note how Norwegian commitment to international agreements on biodiversity have resulted in increased mapping efforts. For the coastal zone this has been divided between IMR (research cruises) and the Directorate of Fisheries (interviews fishers conducted by the regional offices). The interviews

[104] Solås, A. and Hersoug, B. 2012: "Fra fisker, via byråkrat og forsker til plan – om bruken av lokal kunnskap i arealplanprosessen". In Hersoug and Johnsen (Eds.) 2012: *Kampen om plass på kysten – Interesser og utviklingstrekk i kystsoneplanleggingen*. Universitetsforlaget. Oslo: 138–158.
[105] Holm, P. 2003: "Crossing the Border: On the Relationship Between Science and Fishermen's Knowledge in a Resource Management Context" in *MAST 2003 Volume 2 No. 1*. Available online.
[106] Davis and Ruddle 2010.

gather a variety of information, including the species caught, gear used, seasonal use, estimate of the number of vessels using each area, the local/regional/national importance of the areas, and what sort of area it is for the fish stocks. After the gathering, the data goes through a process of quality assurance. The result is a map tool on the website of the Directorate of Fisheries[107], where the information is viewable as map layers together with other sources, such as information from the IMR's research cruises. Brattland discusses this mapping process, and finds that it successfully serves to integrate fishers' experience-based knowledge in the management system.[108] Not all of this information is uncontroversial; while the information from the interviews to a large extent has been confirmed by the research cruises, the information from the fishers is considered biased by representatives from the fish farming industry. Solås and Hersoug notes that while both the Directorate of Fisheries and the Norwegian Environmental Agency acknowledges the importance of local knowledge they are focused on the utility value of the knowledge for management and not for possible co-management. The knowledge passes through the three stages of extraction, refinement and certification before it is made use of by the management agencies. Solås and Hersoug summarize that while acknowledgement of LEK's utility has become more common, this has not yet resulted in very concrete effects on resource management or planning. Although it is not directly related to LEK, there have been some other developments in the field of planning that I find relevant to bring up. Maaike Knol, Ph.D. in marine ecosystem management, has studied the development of the Norwegian management plan for the Barents Sea and Lofoten, that was passed in 2008.[109] She notes that there has been an ecological turn in the management of petroleum resources, and an increased focus on coexistence with other marine industries. The ambition of integrated management plans requires continuous ecosystem monitoring that is more coordinated than the separate monitoring that is done by for instance IMR or the Norwegian Polar Institute, and the development of the plan required a high degree of collaboration between different directorates and research institutions. Knol

[107] Available at: http://kart.fiskeridir.no/default.aspx?gui=1&lang=2

[108] Brattland, C. 2013: "Proving Fishers Right. Effects of the Integration of Experience-Based Knowledge in Ecosystem-Based Management" in: *Acta Borealia: A Nordic Journal of Circumpolar Societies, Vol. 30:1*. Available online.

[109] Knol, M. 2010: "Mot en miljøorientering i planlegging av petroleumsvirksomheten?" in: Arbo, P. and Hersoug, B. (Eds.) 2010: *Oljevirksomhetens inntog i nord: Næringsutvikling, politikk og samfunn*. Gyldendal Akademiske. Oslo.
Knol, M. 2011: *Marine Ecosystem Governance in the Making Planning for petroleum activity in the Barents Sea-Lofoten area*. Ph. D. thesis. Available in Munin.

finds that the complex process served to create a mutual understanding between the participants that made it possible to find compromise solutions. I find this to be interesting, and wonder if LEK can be a part of monitoring systems and data collection, for instance through the mapping described above. By being part of processes like this, LEK might be able to have a more concrete presence in planning.

In a later article, Johnsen, Hersoug and Solås explore how they see a possible use for LEK in management in the creation and visualization of coastal spaces as governance object, and not as a source of empirical data. A central part of this is how the information contained in LEK is "three-dimensional". This is both literal, as it deals with topography etc., but also figurative in regards to other features, characteristics or meanings it involves, such as the behavior of the fish or the social or cultural value of specific places. This information can be made visible through mapping, where it is shown as data layers on the map, similarly to what is described above. They maintain that this information emerges from a process of interpreting the information that its holders have collected through practical experience.[110]

The Official Norwegian Report *Retten til å fiske i havet utenfor Finnmark*[111], which was the result of a committee charged with reporting on the rights of Sami and others to fish in the coastal areas outside of Finnmark. Svanhild Andersen wrote the chapter on the settlements and culture of the Coastal Sami, which includes a section on local knowledge and influence. Andersen reviews various international agreements Norway has committed to, especially the UN convention on biological diversity[112], and the significance these put on the inclusion of LEK in management and precautionary principle-based ecosystem approaches in conservation and sustainable use of resources. She notes that these goals have not been a very noticeable concern in the management of the fjords, and that many fishing communities have had difficulties getting their local observations and assessments heard in central political and managerial bodies. As a result, several new organizations aiming to speak on behalf of Sami and coastal/fjord-based fishers were established from the late 1980s and onwards. One of the

[110] Johnsen, J. P., Hersoug, B. and Solås, A. 2014: "The creation of coastal space – how local ecological knowledge becomes relevant" in: *Maritime Studies Vol. 13:2*. Available online. See specifically p. 15–18.
[111] NOU 2008:5 *Retten til å fiske i havet utenfor Finnmark*. "The right to fish in the sea on the coast of Finnmark" (my translation). Available in Norwegian at http://www.regjeringen.no/nb/dep/nfd/dok/nou-er/2008/nou-2008-5.html?id=499796
[112] The convention's official website: http://www.cbd.int/

proposals from the committee was the establishment of a new regional body for the management of the fisheries in Finnmark that would strengthen the local influence.

The costal fisheries committee's NOU resulted in a proposition to the Norwegian Parliament, the Storting, in 2012[113], where changes were proposed to various laws regulating the fisheries in the coastal areas of Finnmark, including an extra quota of 3 tons in the open group for cod, haddock and saithe in the traditional Coastal Sami areas. The changes that were passed to the Participation Law were a specification that the law was to be used in accordance with international law on indigenous peoples and minorities, an affirmation of the local population's right to fish cod, haddock and saithe with conventional gears in the Coastal Sami areas. The Marine Resources Act was amended to include the creation of a fjord fishing board, and that Sami use and impact on Sami communities should be emphasized in quota allocations. In addition, a new provision declaring that the Finnmark Commission should also report on individual and collective rights to fishing grounds if demanded by a stakeholder was added to the Finnmark Act.[114]

The regional management body proposed in *Retten til å fiske i havet utenfor Finnmark* was not implemented, but an advisory Fjord Fishing Board (FFB) with representatives from the three northernmost counties and the Sami Parliament was suggested. In December 2013, the government and the Sami Parliament agreed on the establishment and mandate for the FFB.[115] In addition to give advice for strengthening coastal- and Sami communities, it includes the gathering of scientific, local and traditional knowledge about important spawning grounds for stocks that are harvested in coastal and fjord areas, and assess regulations and measures that safeguards sustainable harvesting and the facilitation of local resource use. The regional office of the Directorate of Fisheries in Finnmark will serve as the FFB's secretariat. As described earlier, the regional offices have experience in the gathering of LEK from fishers.

[113] St. Prop. 70 L (2011-2012) *Endringar i deltakerloven, havressurslova og finnmarksloven*. "Changes in the participation law, marine resources law and the Finnmark Act" (my translation). Available in Norwegian at http://www.regjeringen.no/nb/dep/nfd/dok/regpubl/prop/2011-2012/prop-70-l-20112012.html?id=675139
[114] Protocol in Norwegian: https://www.stortinget.no/no/Saker-og-publikasjoner/Vedtak/Beslutninger/Lovvedtak/2011-2012/vedtak-201112-062/
[115] Available in Norwegian at http://www.regjeringen.no/nb/dep/nfd/aktuelt/nyheter/nyheter-2013/fjordfiskenemnda-blir-oppretta/mandat-for-fjordfiskenemnda-.html?id=748027

Jentoft and Søreng discuss the FFB in the context of the 2014 United Nations Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries[116] in a forthcoming book chapter.[117] Jentoft and Søreng see the FFB as an institutional compromise between Sami rights claims and Norwegian national interests, and it enters into the existing governance system that has some established power structures. This entails a process of finding its place in the overall scheme, which has not been trivial for an advisory board with a broad mandate. The FFB has not been uncontroversial, and has been met with criticism and opposition from for instance the NFA, that has had a traditionally central advisory role in the management of Norwegian fisheries. Some of the local organizations in the Norwegian Coastal Fishers' Association were also critical. Reviewing the FFB's activities during the first two years of operation, Jentoft and Søreng point out that much effort has been used on the assessment of the fjord lines, that is the regulation of where vessels over 15 meters are not allowed to fish. This topic was discussed at all the ten first meetings of the FFB. They note that the members of the FFB have repeatedly stated that the board does not have sufficient funding to fully implement the mandate. The part of the mandate that deals with LEK can seem like one of the areas that has not been prioritized. Jentoft and Søreng note that since the FFB covers a large geographical area it can be hard to manage and argue for a variety of local regulations, and that it remains to be seen how LEK will be integrated in the process.

As this chapter shows, the study of LEK is broad and field of environmental history is just as vast. Hopefully, both the term and the general field have now been more clearly defined. The general context of the Norwegian fishery management system and how LEK has been related to it has also been accounted for. I will discuss the Fávllis project's LEK-based research in chapter 4, but first I will look at the methodological considerations for working with LEK, and for writing environmental history.

[116] Website: http://www.fao.org/fishery/ssf/guidelines/en

[117] Jentoft, S. and Søreng, S. U. (forthcoming book chapter): "Securing sustainable Sami small-scale fisheries in Norway; Implementing the SFF Guidelines". It will be part of a publication in Springer's MARE series. Website: http://www.springer.com/series/10413. I am very grateful for Jentoft and Søreng allowing me to cite an advanced draft of their chapter.

Chapter 3: The Local Ecological Toolbox

As shown in the previous chapter, both environmental history and local ecological knowledge are fields that to a high degree rely on interdisciplinary cooperation. I will first deal briefly with some considerations about source material in historical research, and look more closely at the use of oral source material and source criticism. I will then discuss the perceived "divide" between different knowledge systems and so-called "western science" and the implications this has for the use of LEK as source material. Following this, I will review some methodological questions in the context of environmental history. I will then return to LEK and look at how such material is processed and transformed by research, and the implications of this.

3.1 Source material and source criticism

Source criticism has long been the basic tool of professional historians. In their 2015 article "Changing the Subject"[118], historians Peter Edelberg and Dorthe Gert Simonsen examine "the epistemology of source criticism; its theory of knowledge as constituted by the source critical conception of subjective agency"[119], giving a comprehensive account of the developments and discussions within Scandinavian professional history from the early 20th century up to the present. The authors approach the topic from the basis of a perceived "source critical fundamentalist" or "foundationalist" mindset amongst Scandinavian historians, where questions connected with subjective agency were considered core problems throughout the development of the discipline. They investigate the issue by reviewing the classic textbooks for historical methods and the major discussions in the historical community on issues of methodology, illustrating the changes that have occurred in the field over time. I will not summarize their review, but refer to the whole of their article for a thorough look at source criticism in Scandinavian history.

They bring up the influence of the linguistic turn in the 1990s and particularly Foucault's theories of knowledge as important in inspiring new thoughts around source criticism. They point at historian Narve Fulsås as an important contributor in this, especially his 2001 article questioning the source term itself. In it, he argues for moving away from the traditional view of sources as relics or narratives. He identifies three questions: the perception of the source's

[118] Edelberg, P. and Simonsen, D. G. 2015: Changing the Subject, in: *Scandinavian Journal of History Vol. 40:2*: 215-238. Available online.
[119] Ibid.: 216.

reality; ways of using the source; and the characteristics of the source itself. These have resulted in a source term he considers to be entangled in a "positivist ontology and epistemology". He maintains that by instead using the terms relics or narratives in a functional fashion, it would be possible to open up source criticism and interrogate the sources differently.[120]

Edelberg and Simonsen consider the effects of several developments in the social sciences; including the linguistic turn, postmodernism and Actor-Network Theory (which I will come back to in 3.4.1.) on source criticism. In their view, "the multiplicity of theoretical reflections and methods used cannot be assembled under the heading 'source criticism' unless the term becomes so broad that it simply means anything pertaining to the validation of results".[121] They refer to Swedish historian Rolf Torstendahl's call to "divide source criticism into minimum demands and optimum norms". These include "logical consistency, empirical verification, inclusion of all available evidence, a coherent historical representation, and new results" as well as "critique of bias". His argument is that these "source critical procedures should be perceived as one kind of method among other methods, (…) specifying statistics, oral history, social science methods, etc. as alternatives".[122] Building on this, Edelberg and Simonsen contend that source critical methods are specific, not universal or foundational. In no way does this imply an abandonment of source criticism, but considering the developments in the discipline that have displaced the autonomous subject; they think it is necessary for source critical methods to respond to specific questions and agendas.[123]

3.2 Oral source material and source criticism

An important method of collecting LEK is through the use of oral sources. The Fávllis project gathered much of its data through semi-structured interviews with a life-course focus. Interviews are an established and common method of data collection in historical research. As a discipline, history has a long tradition of developing methods for source criticism of oral sources, and thus it is fitting to include some reflections on this.

[120] Fulsås, N. 2001: "Kva er gale med det historiske kildeomgrepet?" in: *Historisk tidsskrift Bind 80/2*: 231-246.
[121] Edelberg and Simonsen 2015: 231.
[122] Ibid.
[123] Ibid.: 230-232.

Historian Kari Myklebost's 2002 master thesis deals with theoretical and methodical aspects in the use of oral sources in relation to identity in historical research, using the youth music milieu of Tromsø in the 1960s as the backdrop.[124] As I stated in the introduction, I am somewhat inspired by her approach of examining theory and methodology and subjecting them to her empirical data. I will therefore draw upon her work even though it is a master thesis. While this is a somewhat different field than LEK, Myklebost's reflections on theory are useful in seeing LEK in the context of historical scholarship, and pose some interesting possibilities in regards to the role of LEK for local identity.

Myklebost considers several definitions of the term "oral sources" and the close relation these sources have to memories. She discusses some of the main characteristics of oral sources, namely that they are personal and self-experienced. She sees this in connection with the increased focus on identity and interdisciplinary theory in the social sciences, and notes a lack of development of source material in light of this thematic expansion.[125]

A recurring objection to the use of oral sources is representativeness. Myklebost points at then current developments in theory dealing with the importance of the social context of the informants in the process of creating and shaping memories, and how this process is concurrently both individual and collective.[126] She also points at the anthropological turn towards focusing on the role of individuals as actors.[127] Furthermore, she emphasizes how these two notions are central as a framework for viewing history from below and from within, and how the subjectivity of oral sources can be of value in addition to posing as potential sources of error.[128]

Myklebost notes that the reliability of oral sources and methods for using them has been a central topic in discussions of their use. She goes through various positions in this debate; focusing both on the perspective that memory is not a passive container but rather an ongoing process of selection and re-edits, and the increased interest of researchers in the dynamics of how this works and how this should influence the discipline.[129] Core in this is how memory

[124] Myklebost 2002
[125] Ibid.: 14-17.
[126] Ibid.: 17-18.
[127] Ibid.: 21.
[128] Ibid.: 22-24.
[129] Myklebost refers the works of Thompson (1978), Fentress and Wickham (1992), Hjartarson and Björnsson (1991), Kjeldstadli (1991), Slettan (1994), and Bull (1958).

does not serve as a source of what literally happened, but can be useful in understanding questions related to norms, opinions and identity in a past context, especially for the field of cultural history. Myklebost refers specifically to the works of historians Alistair Thomson, Paul Thompson, Dagfinn Slettan, Knut Kjeldstadli and ethnologist Liv Emma Thorsen for insight on these issues. Briefly summarized, Slettan accounts for opportunities in using oral sources to uncover the values and norms at the foundation of the subject's experiences through studying the transformation of the subject's memories to a part of a collective narrative. Kjeldstadli raises the objection that the interview situation where the oral material is gathered has implications for the framing of the memories. Thorsen argues for the value of life-course research in understanding culture from within.[130]

The use of transcripts from recorded interviews and the interviewer's own notes as source material is also discussed, referring to the works of ethnologists Anne-Berit Ø. Borchgrevink and Göran Rosander. Whether written transcripts should be considered *oral sources* or *oral source material* is an important question, as elements related to the auditory nature (intonation, laughter, etc.), or the interview situation (body language) can be lost or diminished in the transcription process. Myklebost recognizes these elements and the differences in the material, but maintains that transcripts are useful tools for historians. She brings up ethnologist Asbjørn Klepp's points about how the oral form of the source must be viewed in relation to the purpose the source is being used for. She argues that the style of language must be presumed as important for understanding the cultural and societal context of a source, and that source material of different categories must be subject to the proper source criticism for its type.[131] Based on this, the type of LEK I am discussing would be considered oral source material. Taylor's observations on the use of older records discussed in 2.2.3. also comes to mind in relation to this.[132]

Myklebost compares contemporary interviews with her informants with retrospective accounts, and looks at differences in the portrayals. She finds that the backwards-looking accounts reflect the informants' self-experienced cultural processes of change. She notes the contrasts between the composed contemporary depictions and the analytical, retrospective

[130] Myklebost 2012: 24-27.
[131] Ibid.: 27-30.
[132] Taylor 2013: 63.

ones. The variations in form and content do pose problems for interpretation, but drawing on Slettan, she maintains that the informants' reflections can be useful in generating hypotheses for historical analysis.[133] She also analyzed the narrative structure of the sources, and found that both the contemporary and retrospective material clearly displayed narration, where the informants' portrayals were constructed to answer the implicit "why" of the events they described.[134] While LEK is different from Myklebost's subject of youth music culture, it partly deals with the people's current and past experiences of ecological change, and similarly their hypotheses and the "why" of how they portray them might also be useful in historical analyses of for instance environmental change.

She finds that her analysis of her source material generally shows that a constructivist approach can be useful for exploring identity through oral sources. The collection of oral sources also helps shed light on the past that is not well represented in written material, but require some reflection on their characteristics. The communication between informant and interviewer and the retrospective process of interpretation are of special significance, for instance in whether or not controversial topics or conflicts comes up. She claims it is hard to make general observations about the impact of the interviewer's participation, but that it makes it clear that the oral source is a dialogue and not a direct flow of information from the informant, and that the interviewer's general authority in the situation must be considered. She also concludes by proposing that her findings show that by collecting oral history, the historian interacts with and contributes to a local historical process that interprets and includes memories in an identity creating collective narrative.[135] Her conclusions are very intriguing in the context of using LEK as source material, for instance in how collecting LEK can contribute to increased awareness of the effects of ecological change for a local area over time. I will return to this point in chapter 5.

Historian Ingar Kaldal also reflects on some methodological questions for the use of memories and myth as source material.[136] He suggests three possible levels of meaning for memories:

[133] Myklebost 2002: 105-127.
[134] Ibid.: 128-151.
[135] Ibid.: 161-168.
[136] Kaldal, I. 2008: "Minna og mytane – og verdien av dei som historisk materiale" in: *Historisk tidsskrift Bind 87/4*: 665–679. Available online.

1. They are *descriptive* in ways that can give useful material for constructing historical representations.
2. Through the narrative structure, they can *reveal* the possible values, norms, or mentalities of a milieu, inferring the basis from the characteristics.
3. Through communication, memories can have taken part in *creating*, *defending* or *changing* not only norms and values, but actions, practices and life courses.[137]

Furthermore, he suggests combining three broad lines of question for analyzing these levels: What does the memory describe? What has created the memory? And finally, what can the memory have created? This line of questioning is not very innovative for examining sources, but Kaldal maintains that trying to shed light on the process of how the memories were created and what they themselves can have created is key.[138]

Kaldal also reviews parts of the debate amongst Norwegian historians on the use of interviews, relating them to his own doctoral work that relied on the use of memories. In that context he considered the myths that had grown in the time that had passed since the events of the memories to not necessarily be lies or faulty, but potentially useful in uncovering the meaning of things in the culture of the informants.[139] He describes the process he went through for using his informants' memories of work pride and the methodological problems involved with memories changing over time, the impact on the informants of being in an interview situation, and the implicit act of interpretation that an interview represents. His overall point is that the definition of culture you use is important for the narrowing of any cultural history project. He refers to his book on the development from social history to cultural history where he suggests differentiating between *culture as daily life and ways of life*, *culture as subjective thoughts and feelings*, and *culture as meanings and context*.[140] In particular, he views the last definition as most inspiring for analyzing memories and finding the patterns in them. He discusses the criticism that this takes the focus away from past realities, which he finds to have a fruitless basis. He points at his own research for examples of how people's stories of lived lives have enabled him to analyze the formation of wood workers' professional identities. In conclusion,

[137] Ibid.: 668.
[138] Ibid.: 669.
[139] Ibid.: 671.
[140] Kaldal, I. 2002: *Frå sosialhistorie til nyare kulturhistorie*. Det Norske Samlaget. Oslo.

he argues that while memories do not uncritically offer historians views of the past, they should not be seen as divorced from reality.[141]

I find Myklebost's and Kaldal's reflections helpful in anchoring LEK as historical source material. Several points are highly relevant when considering this thesis' understanding of LEK as experience-based knowledge that is created and maintained within a community of resource users, and the ambition of using the experience of the resource users as seen from their own point of view. The issues of representativeness, reliability and validity also comes up for the use of LEK, as already discussed in chapters 2.2.3. and 2.3.3. and will be discussed further in 3.5., to a large extent in connection with management systems. The lessons and frameworks from cultural history can serve as a basis for using the life-course perspectives from LEK in writing environmental history, for instance experiences with ecological change and variation in resource access. Likewise, the communal process of LEK corresponds to the subjective-collective transformation of experience to narratives described by Slettan. The use and processing of transcribed interviews was a central part of the Fávllis project, and will be considered more closely in chapter 4.

3.3 Perceptions on the difference between LEK and science

Before moving further into discussing methodological approaches, I will discuss different perspectives on epistemology, and ways in which LEK has been used.

3.3.1 Different ways of knowing

Part of what makes LEK interesting is that it enters into a broad field that deals with many different ways of examining knowledge. This tangled web of terms can be quite complex, so I find that a small clarification of terms will be useful. As touched upon in the previous chapter, there are different views on the relevance, accuracy and general epistemological purity of local/traditional/indigenous knowledge systems when compared to "Western" or scientific knowledge. Several scholars have participated in this discussion. I will for the most part use the term LEK in my discussion. The type of LEK this thesis focuses on is observation-based knowledge that is shared and discussed within a community of resource users. When referencing articles I will generally use the term used in the articles themselves, but with the underlying assumption that it is in ways this knowledge can be related to LEK.

[141] Kaldal 2008: 677-679.

Another necessary clarification in regards to what is meant with "Western" knowledge or science. In literature about different types of knowledge, these terms are often used in an implicit opposition to "Western knowledge", contending that there is a divide between them. This is a discussion with many perspectives and participants from many different contexts and disciplines. Historian and policy analyst Michael Davies states that it "refers in this context to all modes of knowledge and practice that form dominant epistemologies, have claims to truth or authority, and are said to be 'derived from facts'".[142] He acknowledges that this understanding is problematic, and adds that the basis for the idea of a divide has been the "view that Western science and allied systems of knowledge have formed a dominant discourse that has obliterated, marginalized, or assimilated local, traditional, and indigenous traditions and discourses".[143] In his opinion, these systems should be looked at as "complementary, or parallel, systems of knowledge, rather than as fundamentally incommensurable".[144] Professor of indigenous education Linda Tuhiwai Smith deals extensively with this topic in her book *Decolonizing Methodologies: Research and Indigenous Peoples*.[145] Smith has been a central figure in the development of the field of indigenous methodology.[146] Smith views research as a "significant site of struggle between the interests and ways of knowing of the West and the interests and ways of resisting of the Other". She points at how both the process of, and the results of, research is linked to European imperialism and colonialism when seen from the perspective of the colonized, and how the context in which this occurs represents political and social conditions. This has implications for how research should be designed and carried out, as well as disseminated and shared.[147]

In my understanding, LEK does not exist in a separate, isolated sphere, but it is created within and continually contrasted and combined with other knowledge the community uses. When LEK is to be utilized as source material in research within the discipline of history, it must be

[142] Davies, M. 2006: "Bridging the Gap or Crossing a Bridge? Indigenous Knowledge and the Language of Law and Policy". In: Reid, W., Berkes, F., Wilbanks, T. J., Capistrano, D. (Eds.): *Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessment: A Contribution to the Millennium Ecosystem Assessment*. Island Press. Washington-Covelo-London: 146.
[143] Ibid.
[144] Ibid.
[145] Smith, L. T. 2012: *Decolonizing Methodologies: Research and Indigenous Peoples, Second Edition*. Zed Books. London-New York.
[146] For an overview of Indigenous Methodologies, see for instance: Porsanger, J. 2004: "An Essay about Indigenous Methodology" in: *Nordlit No. 15*. Available online.
[147] Smith 2012: 1-19.

subjected to the same source criticism methods as any other source material. With Edelberg and Simonsen in mind, this is not necessarily a straightforward maneuver. However, a useful starting point is to take a closer look at the perceptions on similarities and differences between what some describe as different knowledge systems.

3.3.2 "The divide" between LEK and "Western knowledge"

Arun Agrawal, a political scientist, has written extensively on what he describes as a "divide" between indigenous and scientific knowledge. His work is oriented towards IK in the development field, but it is also relatable to the general theoretical discussion of IK and its place in an academic context, as well as in relation to power structures and mechanics. This can be seen as part of the sixth (critical ecopolitical discourse) and seventh (processual perspectives) phases, as described in 2.3.1. An important element in his work is his criticism of the ways in which IK has been collected, stored and archived (a process he calls warehousing). I will return to this in 3.5., but begin by focusing on this "divide". Even though his 1995 article "Dismantling the Divide Between Indigenous and Scientific Knowledge"[148] is not recent, it is a seminal work on different perceptions on IK. For more reflections, especially on LEK in particular, see for instance Davis and Ruddle (2010).[149]

Agrawal's starting point is the change in rhetoric of development from being oriented towards economic growth to focusing on sustainable development, and the increasingly positive presentation of IK in the debate throughout the 1980s and onwards. Agrawal notes that while IK/TK was generally viewed as backwards and a hindrance to progress by development theorists of the 1950s and 1960s, the proponents of IK (which he refers to as neo-indigenistas) focused on the potential for improvements in agricultural production and sustainable development it offered. With this as a backdrop, Agrawal comments on how this change in tone contributed to, instead of diminishing, the perception of a dichotomy between IK and Western science.

Agrawal points at the World Bank and other development funding agencies' focus on IK as an important step in the rise of indigenous knowledge. This was partially caused by the lack of success of traditional approaches to development in bringing about lasting progress. As

[148] Agrawal, A. 1995: "Dismantling the Divide Between Indigenous and Scientific Knowledge". In: *Development and Change Vol. 26*: 413–439.
[149] Davis and Ruddle 2010.

Agrawal puts it: “The relative failure of externally introduced development initiatives has impelled a shift towards participatory and decentralized motif in development”.[150] The new approach would focus more on the local participation, and the empowerment of the marginalized. However, the rationale for these was generally based on the traditional view of IK as static, closed knowledge system that could primarily be utilized for solving “minor puzzles”. Agrawal considers this differentiation made between IK and scientific knowledge to be based on methodological rather than substantive grounds.[151]

Agrawal summarizes the themes used by the advocates of IK to reinforce the separation from Western science as centered on these dimensions: substantive, methodological/ epistemological and contextual. He follows by commenting on what he perceives as inconsistencies and problems with these differences. In regards to substantive differences, the general claims were that IK was more practical and non-abstract oriented, while Western science was more analytical and abstract. Agrawal finds these claims overblown, pointing at studies showing the broad, non-practical parts of IK as well as commenting on the omnipresence of science in all aspects of life “in the west”.[152]

Regarding methodological and epistemological differences, the general claim was that Western science was open, systematic, objective and analytical, thus separable from common sense. On the other hand, IK was closed, non-systematic, non-objective and unanalytical and generally not different from common sense. As Agrawal sees it, the neo-indigenistas were promoting the same line of reasoning as Levi-Strauss in the 1960s. He points at the long tradition in philosophy of science of failing to find “a satisfactory methodology to distinguish science from non-science”[153], and notes that it is strange that proponents of IK seemed to be going through the same motions. Regarding the claim of IK-systems being closed, he remarks that it is incredibly totalizing, and points to the work of Thrupp for descriptions of the range of attitudes to new knowledge in local populations.[154]

One of the most important characteristics of LEK is the connection with a context, and this element is a part of “the divide”. Western knowledge is perceived to be universal. Agrawal

[150] Agrawal 1995: 416.
[151] Ibid: 417.
[152] Ibid.: 422-423.
[153] Ibid: 424.
[154] Ibid: 423-425.

comments on the critique of development initiatives based on Western technical solutions and their failure in part due to not being sufficiently anchored in the local context. In his view, everything has a context and the choice is which one to highlight, independent of knowledge system. Attempting to use IK from one source when planning development somewhere else is really just finding a new context for it. In the same way as with the methodological/epistemological divide, Agrawal links this to the larger debate of "science as practice" in the philosophy of science, and the diversity that exists within knowledge creation in general. Regarding the possibility of "radial subjectivism", he notes that "All abstractions about different kinds of knowledges, ultimately, must submit to assessments and undergo a process of validation by a community of peers".[155]

Agrawal links the neo-indigenista movement closely to politics. "Saving" IK and advocating its use for utilitarian purposes, as well as increased focus on the interests of the local population in development are obvious, political goals. He notes how that in order to reach these goals, it is important to make the connection between knowledge and power sufficiently explicit, especially the asymmetry when it comes to relationships involving marginalized groups. Agrawal is of the opinion that the neo-indigenistas have not paid enough attention to this difference in power. He argues that through focus on the perceived divide and the method of conservation of IK in *ex situ* archives, they "fail to address the underlying asymmetries of power and control that cement in place the oppression of indigenous and other marginalized social groups".[156] Stakeholders such as national governments, scientists, bioprospecting companies and development agencies are able to exert power through knowledge generation and access to the generated knowledge. Acknowledging this divide in power between locals and external groups and changing the dynamic will require giving the local population control over both their resource area and the process in which their knowledge is to be "saved" or utilized. As seen in 2.3.3., there seem to have been improvements in this regard in the context of Norwegian marine resource management. In order to solve the dilemmas related to this, Agrawal points at focusing on the possibilities that exist in the diversity of different knowledges, bringing us over on a related topic, namely the origin of empiricism.

[155] Ibid.: 425-427.
[156] Ibid.: 431.

3.3.3 On the origins of empirical "Western knowledge".

Anthropologists Roy Ellen and Holly Harris have also written about IK[157], and specifically in the context of "local *environmental* knowledge (knowledge of plants, animals, soils and other natural components) with *practical* applications".[158] This makes their writing interesting to bring up for discussing LEK, but I also find it relevant to bring up some of their points in the context of Agrawal's description of "the divide". Empirical knowledge has existed in various forms throughout history, including within local knowledge. Ellen and Harris claim that there exists a notion in the West that it no longer has any relevant IK, but it has been replaced by science and technology. They point at how codified medical knowledge to some extent displaced local and oral traditions, exemplified by Dioscorides' *De Materia Medica*[159], but also assert that folk knowledge, understood as "non-professional, experimental, uncodified, *ad hoc*, often orally transmitted", of different types throughout history has been and still is important in a variety of contexts, and often also informed by science.[160] They also note how these folk traditions currently have cultural significance, as shown in for instance museums and craft fairs.

Ellen and Harris describe the long process that took place in Europe in the medieval and early modern periods. Over time, proto-scientific knowledge of animals and plants replaced folk knowledge. This is of methodological significance, as this happened through practices of generalization such as classification, analysis, comparison and dissemination.[161] Furthermore, they point at how the "epistemic origin" of much of this knowledge was hidden, as they tended to not make how it was discovered known. Later in the process, knowledge of Asian and American origin was also included, and practical folk experience played an important part in the emergence of natural history. This is of interest in the context of "the divide". Ellen and Harris state:

> "What we now recognize as scientific knowledge of the natural world was, therefore, constituted during the eighteenth and nineteenth centuries in a way which absorbed such pre-

[157] Ellen, R. and Harris, H. 2000: "Introduction" in Ellen, R. Parkes, P. and Bicker, A. (Eds): *Indigenous Enviromental Knowledge and its Transformations: Critical Anthropological Perspectives*. Harwood Academic Publishers. Amsterdam: 1-34.
[158] Ibid.: 26.
[159] A 1st Century AD encyclopedia of pharmacopeia and herbs.
[160] Ellen and Harris 2000: 5-6.
[161] Ibid.: 6.

> existing local folk knowledge as was absorbable and, ultimately, confined what was not to oblivion. The latter was at best of antiquarian interests, at worst denied any existence as a meaningful and credible set of practices, precisely because of the inability of the new paradigm to absorb it."[162]

The significance of integration of folk knowledge from outside Europe is also of relevance for the development of methodology in Western science. Ellen and Harris see a connection between the European global expansion and a self-conscious interest in acquisition of new knowledge. They point at how travelers were asked to observe practices and bring back materials for the purpose of increasing medical knowledge as early as in the sixteenth century, and bring up examples from the Portuguese and Dutch colonial ventures in South Asia. An important element in this knowledge transformation was how the Hippocratic tradition at the time focused on accuracy and efficiency, and favored local medical knowledge over older natural history texts and systems. Together with other contemporary developments, European botanical science was transformed through contact with indigenous South Asian methodologies of classification, instead of the other way around.[163] Later, in the nineteenth and twentieth centuries, local knowledge in these areas became an object for systematic codification by Western science. Ellen and Harris point at the irony of local knowledge being systematized through practices whose origin was based on earlier codifications of indigenous knowledge.[164]

Tuhiwai Smith also discusses how Western research has drawn upon many different systems of classification, representation and evaluation and the "rules" under which this process has taken place.[165] Using Foucault's concept of a cultural archive to describe the idea of "the West", she points at how some scholars have argued that several non-Western knowledge traditions and experiences have been appropriated and subsumed into "Western epistemology". Though the cultural archive has undergone change in the process, the modes of classification and representation have not been destroyed. She puts this process into the context of colonization, and how it has had "real, material consequences for colonized peoples".[166] These consequences can be seen in light of the ways the West has looked at,

[162] Ibid.: 7.
[163] Ibid.: 8.
[164] Ibid.: 10.
[165] Smith, L. 2012: 44-45.
[166] Ibid.: 45-47.

talked about and interacted with the rest of the world. Smith considers several instances where the interests of "the West" and those colonized has been in opposition: Race, gender, different disciplines of social science, ideas, space and time.[167] While these reflections are interesting, they are beyond the scope of this thesis to explore in depth.

With these perspectives on different ways of looking at knowledge in mind, I will move on to discuss methodological approaches.

3.4 The methodologies of environmental history

As a sub-discipline, environmental history has developed a set of approaches to writing history. These are not necessarily very distinct from the other types of history, but help assert the boundaries of the field. In this section, I will first summarize some main trends, and then look specifically at the place of narrative as I consider that of special importance to the use of LEK as source material, before finally looking closer at interdisciplinary considerations.

3.4.1 Environmental history and approaches to methodology

As already described in chapter 2.2.1., environmental history is an ambitious discipline. Hughes devotes a chapter in his book to "Thoughts on Doing Environmental History"[168], and gives some recommendations on how to approach the field. He specifically calls attention to Donald Worster, Carolyn Merchant, William Cronon and I.G. Simmons as "masters of the craft".

I have already discussed Worster in chapter 2, and I will return to his work in the discussion of interdisciplinary methodology in 3.4.3. Hughes considers Merchant's greatest contribution to be "pointing out the kinds of questions that environmental historians ask, or could ask".[169] In her book, *Columbia Guide to American Environmental History*[170], she outlines five possible perspectives from which one can approach the field:

1. "Focus on biological interactions between humans and the natural world".
2. "In terms of a series of levels of human interaction with nature, such as ecology, production, reproduction, and ideas".

[167] Ibid.: 47-59.
[168] Hughes 2006: 114-126.
[169] Ibid.: 115.
[170] Merchant, C. 2002: *Columbia Guide to American Environmental History*. Columbia Univ. Press. New York.

3. "In terms of environmental politics and transformations in political and environmental power".
4. "Focus on the history of ideas about nature".
5. "In terms of narrative".[171]

Merchant gives a general description of how each of these approaches can be used in a North American context. As might be evident, these different perspectives are overall useful for framing research questions and narrowing the focus of inquiry. Specifically, all these approaches can be used with LEK as part of the source material. For example, the first two perspectives are interesting when using LEK about fluctuations in the size of stocks or migration or introduction of new species, or the effects of changes in harvesting equipment. When using the third approach, LEK about the effects for the local population of new conservation measures or regulations can be valuable. The fourth approach looks at "the ideas and creative products of artists, nature writers, science writers, explorers and travelers for clues about how people felt about nature"[172], and how this is reflected in actions and behavior. The life-course interviews of resource users is rich in this sort of information. The fifth approach is very interesting, and I will look at it in detail in the next sub chapter, 3.4.2.

According to Hughes, historical geographer I.G. Simmons "envisions environmental history as a method combining scientific and humanistic approaches and mediating the two", studying the interaction between cultural ecology and natural ecology over the long span of ages.[173] In his 2012 book chapter "Environments, Ecologies, and Cultures across Space and Time"[174], Simmons discusses some perspectives on how to look at the ecological changes of the past 10,000 years. He identifies three major themes for looking at these: harnessing energy, scales of alteration and nature-culture interactions. Furthermore, he discusses the usefulness of two broad categories for the tensions between society and nature, *coalescence* and *fragmentation*, for "examining both current and historic dynamics in the relations between environments, ecologies, and cultures".[175] Though Simmons' methods for looking at the effect

[171] Ibid.: xv-xvi.
[172] Ibid.: xvi.
[173] Hughes 2006: 117.
[174] Simmons, I. G.: 2012 "Environments, Ecologies, and Cultures across Space and Time" in Northrop, D (Ed.): *A Companion to World History*. John Wiley & Sons, Ltd. Chichester: 143–155.
[175] Ibid.: 147.

of humankind on nature and vice-versa in the long term certainly are interesting, I will mainly make use of his viewpoints in the context of interdisciplinary work in 3.4.3.

Another perspective that has gotten the attention of historians, as well as LEK-researchers, and must be mentioned is the Actor–Network Theory (ANT), for which science and technology scholar Bruno Latour is especially known. In his 2005 book *Reassembling the Social: An Introduction to Actor–Network-Theory*[176], he writes that "the sociology of associations" could be a more descriptive term, but that the established one "is so awkward, so confusing, so meaningless that it deserves to be kept".[177] To state it in a simplistic manner, he takes a critical look at the traditional way *social* and *society* is constructed and used as terms in the social sciences. He offers a different perspective where "'social' is not some glue that could fix everything including what the other glues cannot fix; it is what is glued together by many other types of connectors".[178] Central to this is the tracing of associations and connections between things, things that are not necessarily inherently social. This is a complex venture, but as one of the core concerns of environmental history is human–nature interaction there is potential in utilizing ANT. Johnsen et al. also provide an approach for applying ANT on LEK.[179] For a recent overview of the theory and criticism against it, see Ewin Sayes' 2014 article.[180] Jon Elster, professor of political science, has been particularly vocal opponent in the Norwegian context, calling it "obscurantism" and criticizing weak empirical evidence for hypotheses.[181] After Latour was awarded the Norwegian Government's Holberg Prize[182] for "outstanding contributions to research in the arts and humanities, social sciences, law or theology" in 2013, Elster called for the prize to be discontinued.[183]

Historian and professor in science and technology studies Kristin Asdal has argued that ANT can contribute to more radically historicize environmental history, and illustrates this by

[176] Latour, B. 2005: *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford Univ. Press. UK.
[177] Ibid.: 9.
[178] Ibid.: 5.
[179] Johnsen et al. 2014: 4-6.
[180] Sayes, E. 2014: "Actor–Network theory and methodology: Just what does it mean to say that nonhumans have agency?" in: *Social Studies of Science vol. 44/01*: 134-149. Available online.
[181] See: Elster, J. 2006: "Kvalitet i forskning" in *Nytt Norsk Tidsskrift 4/2006*: 295-302. Available online; Elster, J. 2007: "Formalisme på tomgang: hard obskurantisme" in *Nytt Norsk Tidsskrift 04/2007*: 394-402. Available online; and Elster, J. 2013: "Obskurantismen" in: *Minerva 03/2013*. Oslo.
[182] Website: http://www.holbergprize.no/
[183] Aftenposten, March 21st 2013: http://www.aftenposten.no/meninger/Holberg-prisen-bor-nedlegges-7153713.html (Norwegian only).

contrasting it with Annales-school.[184] She states that ANT has been seen as controversial for not limiting itself to human actors, and that its proponents have been engaged with showing how a heterogeneous set of material and immaterial resources are needed to transform societies.[185] Furthermore, ANT attempts to illustrate how humans and non-humans (including nature objects and technology) are connected through relationships and develop together, and that these relationships form different subjects. However, Asdal notes that there are some problems involved when including "nature", especially when it comes to the relationships between actors and structures. Some of these problems are related to environmental history failing to properly problematize the term "nature", hereunder the implicit idea that "nature" is static and unchanging. Asdal maintains that what Latour and ANT can contribute to environmental history is "bringing in nature – in plural – at the expense of Nature". Part of this is in understanding how history is created not only by human actors by analyzing the objects of nature, science and policy together. Her claim is that in order to do this ANT must be used as an approach to empirical data instead of just a theoretical framework around it.[186] Chiarappa and McKenzie, referred to in 2.2.3., claim that marine environmental historians have been very willing to abandon the separation of humans and the non-human world and assign the marine realm historical agency. As I understand them, they consider the mutual influence between the marine realm and society to be an expression of this.[187]

3.4.2 Environmental history and narrative

Story is an important element in all history. This topic has engaged historians, and there are many perspectives on it. As mentioned above, Merchant considers it one of the main approaches to environmental history. As part of my goal with this thesis is to look at if LEK can assist in creating different portrayals, I find it necessary to look at narrative in depth.

Some seminal works on the topic is Hayden White's *Metahistory: The Historical Imagination in Nineteenth-Century Europe*[188] and "The Question of Narrative in Contemporary Historical

[184] Asdal, K. 2005: "Miljøhistorie som politikk- og vitenskapshistorie – Franske forbindelseslinjer". In: *Nytt Norsk Tidsskrift 03/2005*: 301 – 311. Available online.
[185] Ibid.: 302.
[186] Ibid.: 305-309.
[187] Chiarappa and McKenzie 2013: 9.
[188] White, H. 1973: *Metahistory: The Historical Imagination in Nineteenth-Century Europe*. Johns Hopkins University Press. Baltimore.

Theory".[189] In his 2005 article on history and narrative, historian Narve Fulsås reflects on how the linguistic turn in history centered on the discussion of the relationship between history and narrative.[190] He gives a broad account of the development of the academic discipline, the idea of a single (untold) History and the breakdown of this idea. Based on this, Fulsås discusses three different theoretical perspectives on the relationship between historical reality and history writing. The three perspectives are 1) a discontinuous relationship between history life and narrative where narrative distorts reality (represented by Hayden White), 2) narrative as an addition to, or re-figuration of, reality (represented by Paul Ricoeur) and 3) that life and narrative are inseparable and we are continuously attempting to narrate our reality (represented by Dag Anderson, David Carr and Dominick LaCapra).[191]

Fulsås raises some objections towards the view offered by White that historians shape data from "the unprocessed historical record" based on their ideological and esthetical preferences. He makes the case that this idea is "an idealistic fiction that mainly seems to legitimize presentist and constructivist practices of interpretation"[192] (my translation). Furthermore, he raises the point that claims of history writing being disconnected from "the concrete past reality" presuppose access to a vantage point from which history can be compared to "the real past", understood as how it must have seemed to the contemporaries, making the ideal historian the equivalent of Danto's "ideal chronicler". Fulsås notes how this approach does not describe what historians do: selecting and describing events in the context of how they have influence later events, in a process that creates a dialogue between the past and the present. This process is fluid, and what is understood as "the past" thus changes over time, weakening the idea of a single History. This becomes an even more interesting when also considering Asdal's earlier referred point of plural natures at the expense of Nature. As Fulsås sees it, the existence of many histories, blurring of disciplinary lines and the linguistic turn have not and will not cause a breakdown in the boundaries between history, literature and fiction. The work of historians as research is held to demands of documentation and

[189] White, H. 1984: "The Question of Narrative in Contemporary Historical Theory" in *History and Theory Vol. 23/1*: 1-33. Available online.
[190] Fulsås, N. 2005: "Historie og forteljing". In: *Nytt Norsk Tidsskrift 03/2005*: 287-300. Available online.
[191] Ibid.: 287-293.
[192] Ibid.: 293-294: "Det frie formande medvitet som står ovenfor eit uordna kaos er ein idealistisk fiksjon som ser mest ut til å skulle legitimere presentistiske og konstruktivistiske tolkningspraksisar."

verification, as well as to discuss the findings in light of different interpretations and explanations in the field.[193]

In the context of environmental history, William Cronon has a very relevant discussion of narrative in his 1992 article "A Place for Stories: Nature, History, and Narrative".[194] Cronon, like Fulsås, states that historians combine and simplify past events into stories in a process where they can exert a strong editorial power over the story that is told. Cronon observes that stories that result from this process of selection are indeed artifice, and that "narrative prose poses particularly difficult problems for environmental historians, for whom the boundary between the artificial and the natural is the very thing we most wish to study".[195] In the article, Cronon uses differences in the narration of the history of the Great Plains and the Dust Bowl[196] by historians Paul Bonnifield and David Worster as the basis for discussion. Specifically he explores how two accounts that were published around the same time and based on much of the same material and sources, could end up with very different conclusions. Cronon summarizes Bonnifield's narrative as one of how a community triumphed over natural disaster through struggle, while Worster's account is one of failed adaptation to nature by humans.[197]

While the Great Plains and the Dust Bowl might seem quite different and not easily related to LEK in the marine resource area of Northern Norway, Cronon's observations about narrative are quite applicable to my research questions. Not only for how a local population's observations of ecological changes over time is portrayed, but also in regards to the political subtext of how such observations are discussed in research, media coverage and so on.

Cronon notes that an important difference between a chronicle, or list of events that occurred, and a narrative is the presence of a plot. Bonnifield's can be described as a "progressive" history of improvement, while Worster's is a "declensionist" history where the end state is negative compared to the beginning. Cronon notes how plots like these are cultural constructions with deep roots in human discourse and not remotely unique to history. Furthermore, he maintains that their familiarity can enable them to shape storytelling in ways

[193] Ibid.: 293-298.
[194] Cronon, W. 1992: "A Place for Stories: Nature, History, and Narrative". In: *Journal of American History Vol 78/4*: 1347-1376. Available online.
[195] Ibid.: 149-1350.
[196] https://en.wikipedia.org/wiki/Great_Plains and https://en.wikipedia.org/wiki/Dust_Bowl
[197] Cronon 1992: 1348.

that make it hard to exert control over them.[198] The aforementioned works by Hayden White deal with this *emplotment* or *encoding* of historical events into classic story types, such as epics, romances, tragedies, comedies or satires[199], and the plots Cronon describe corresponds with these.

Cronon illustrates this through the early Great Plains histories that use the narrative plot of frontier progress and pointing out the framing devices used in them. The untamed wilderness is transformed to civilized communities portrayed as linear progress, where setbacks and hindrances (such as the Native American population) are overcome by the settlers' hard work. The narratives start with the arrival of the settlers, and conclude some generations later, focusing on local events and communities. This supports a plot that builds towards a successful conclusion. The change, from grassland into cultivated land is essential in this. This progress plot required the transformation from something of less value into to something more valuable. Cronon puts this as a conversion from "raw material" to "finished product".[200]

Other, less optimistic plots are also used, where there are more complications and struggles in settling the land. The environment is not passive, but a hostile obstacle. Central here is human invention and technology in overcoming this obstacle, and the settlers' adaptation from the European forested environment to the semi-arid grassland of the Great Plains. This plot and the portrayal of the harsh environment makes the struggles seem more heroic than in the progress narratives. The focus was still small-scale, but more regionally oriented and cover the period from the arrival to the early twentieth century. What Cronon considers most interesting in this plot is how it centers more broadly on civilization, not individuals or communities. Although, this leaves little room for minorities such as the Native Americans and ethnic groups.[201]

Finally, Cronon deals with the declension plots that started to appear in the Dust Bowl period. These focused on how the settlers had not considered the changing weather conditions during the expansion of settlement, with disastrous results when the prolonged periods of drought occurred. This tragic view is the opposite and contradictory of the earlier, positive histories.

[198] Ibid.: 1352.
[199] White 1973: 7-10. and White 1984: 20-21.
[200] Cronon 1992: 1352-1354.
[201] Ibid.: 1355-1357.

To some extent, the settlers are blamed for causing the problems by not properly considering the cyclical nature of the ecosystem and exceeding what the environment could sustain. Where the environment had been described as obstacles to be overcome, it was now defined by factors that human technology could not alter, but rather had to adapt to accommodate. Cronon points at the context of the New Deal politics of the time, and thus the implicit political subtext. Some of the policies and narratives promoted government intervention ("the enlightened perspective of scientific management") as the solution to the problems. Others were critical of the policies, and gave significance to the continual process of adaptation by "ordinary" local population rather than the involvement of the state in overcoming the ecological challenges.[202]

An obvious element of any narrative is the actors, and the agency they display. Not only people, governments, technological advancements or the environment are portrayed as actors in the plots Cronon describes. He shows how Worster makes use of the capitalist economic system as the main agent in his narrative, where the use of technological advancements by the farmers serves to escalate the ecological decline. Perhaps this can be an example of an area of application for ANT? This turns the narrative of the frontier plot on its head as it starts out with a positive view of the landscape and ends with an ecological wasteland. This illustrates what might be obvious: the choice of scenes has a great effect on the "shape and meaning" of the narrative. However, using capitalism as a frame ties it to the same timeline as the other narratives, meaning the period before the settlers is left out. Narratives that focus on the original American inhabitants tend to follow different plots and timelines than those dealing with Frontier progress: These narratives end with the extinction of the Buffalo herds and relocation of the Native Americans to reservations, an endpoint that sets the stage for the Frontier plots.[203]

This leads into one of the main points about the place of narrative in writing history: There is no single narrative. Cronon calls us to "confront the challenge of multiple competing narratives in our efforts to understand both nature and the human past". He relates facets of narrative theory to writing environmental history. Central to this is what narrative is: how human beings organize our experience of reality. By organizing experiences into narratives we

[202] Ibid.: 1357-1362.
[203] Ibid.: 1362-1367.

assign plots to events, and these structures describe a storied reality where people are presented as the main actors and not "exogenous variables". This also draws attention to the Fulsås's points about historians facilitating dialogue between past and present. It follows from this that the narratives are not neutral, but involve human values and the consequences of actors' agency. Stories are structured with a purpose, having a beginning, a middle and an end, which in the context of environmental history are manifested by changes in landscapes and ecosystems. This process of narrative is not unproblematic, and very differing stories can be constructed from the same material. As historians, we subscribe to different "virtues" for what constitutes "good" history, but in the end, the accuracy of the work will be evaluated by others, which informs the choices we make when writing history. In Cronon's words: "We tell stories *with* each other and *against* each other in order to speak *to* each other". In conclusion, Cronon warns against the dangers of taking postmodern deconstruction too far, and points at the virtues of narrative as good tools for grounding the writing of history in reality: Effective histories are not just passive accounts of events, but stories that make human actors care and thus contribute to shaping how they act.[204]

Cronon's observations are highly relevant for the use of LEK as source material for environmental history. It is possible for historians who base their work on the same material to present different conclusions. Again, I refer to the points of Asdal and Fulsås of there being plural natures and many histories. The choice of plot is a central part of writing a narrative. Does it describe the collapse of an ecosystem, or is it an optimistic view of resilience through adaptation to changes in the resource access? Who are presented as the main actors, and who are omitted? In the context of the use of a resource area, the presence and form of the local resource users' observations is something to consider. This can for example have an indigenous dimension, relate to epistemological hierarchy or a general center-periphery focus. The relationship between natural cycles and effects from human interaction with nature plays a role, such as the introduction of new species or changes in the governance of natural resources. Moreover, while these stories have a purpose of conveying an understanding of reality, they must be grounded in what the evidence shows and hold up to rigorous scrutiny, a point also underscored by Fulsås.

[204] Ibid.: 1367-1376.

3.4.3 Interdisciplinary methodology and working with LEK

As has been pointed out repeatedly, environmental history requires historians to make use of many tools in order to meet the ambitions of the discipline. Much of LEK deals with observations of, and thoughts about, the biophysical world. This has some significance when working with it. I have already referred to Worster's "three levels" in chapter 2.2.[205] Hughes points out that dealing with these different levels is a challenging task that requires the use of several approaches, if not most of academic methodology.[206] He further claims that the interdisciplinary opportunities is one of the reasons that environmental history has persevered, pointing at collaborations with geographers as one prominent example.

Worster pointed at the tools of ecology in the natural sciences and anthropology in the social sciences as being particularly useful.[207] The extent to which this has been done is debated. Simmons claims that "there has been a relatively low level use of the findings of the natural sciences, particularly those of ecology".[208] When it comes to social context, his impression is that many scholars seem to be comfortable within the bounds of their own discipline. In discussing the "scales of alteration", meaning the extent to which human activity has had an impact on the biophysical world, he points at several measurable factors where data from the natural sciences are useful: changes in terrain due to deforestation or soil erosion, energy consumption, changes in biodiversity, concentrations of greenhouse gases and bioaccumulation of chemicals.[209] In her discussion of the interdisciplinary orientation of local and regional history, Tretvik also points at similar uses from non-written source material when doing local studies, and that some local history accounts are well inside the boundaries of environmental history in the way they study the relationship between community and nature.[210]

Eythórsson and Brattland[211] thoroughly examine the topic of cross-disciplinary collaborations about LEK, drawing on their experience from the Fávllis project. They note that in addition to the non-trivial task of crossing disciplinary boundaries between the social and natural

[205] Worster 1988: 4.
[206] Hughes 2006: 116.
[207] Worster 1998: 5, 8.
[208] Simmons 2012: 147.
[209] Ibid.: 144-146.
[210] Tretvik: 100-106.
[211] Eythórsson and Brattland 2012.

sciences, LEK also adds the ambition to integrate itself in the research.[212] In addition to working with a local knowledge center, the CSRS, Fávllis had a partnership with biologists at the IMR's EPIGRAPH program.[213] The biologists did not participate in the data collection, but were involved in designing the interview guide and discussing the results. EPIGRAPH's stock assessment surveys started in 1992, and a set of locations are trawled annually. Eythórsson and Brattland note that this meant there was little overlap between the LEK and the surveys: "To compare LEK on the same spatial and temporal scale as the biological data was feasible only at the points where survey data intersected with fishers' observations".[214] Furthermore, they state that they experienced this as a more significant hindrance for integration than epistemological differences.[215] One intended outcome of the collaboration was to find ways to present LEK as dynamic information to management institutions. As part of the data collection, information about the fishers' spatial use was mapped in order to be combined with the resource mapping from the Norwegian Directorate of Fisheries. However, despite the collaboration and intentions, the research efforts were to a small extent integrated. Eythórsson and Brattland note that the social scientists worked on the human and political dimensions, while the biologists worked on the ecological relations. The results of the research also read very differently, which is interesting with Cronon in mind: one story "where loss of resources is connected with sorrow" and another where "data on temperature and reductions in size of fish are answers to scientific curiosity and perhaps even joy of finding new and unique habitats".[216] They maintain that the necessary frameworks for true interdisciplinary collaboration exist, but that disciplinary boundaries are still difficult to traverse.

For a concrete example of interdisciplinary cooperation in LEK-research that is interesting to look at in depth, I will return to Anita Maurstad, whose work I referred to in chapter 2.3.3. In her article "Trapped in Biology: An Interdisciplinary Attempt to Integrate Fish Harvesters' Knowledge into Norwegian Fisheries Management"[217], she presents her experience as a social

[212] Ibid.: 134.
[213] EPIGRAPH's goal is to uncover the different parts of the ecosystems in Porsanger and Hardanger, and how human activity interacts with the ecological cycles. Project website: http://www.imr.no/epigraph.
[214] Eythórsson and Brattland 2012: 138.
[215] Ibid.: 146.
[216] Ibid.: 147.
[217] Maurstad, A. 2000: "Trapped in Biology: An Interdisciplinary Attempt to Integrate Fish Harvesters' Knowledge into Norwegian Fisheries Management". In: Neis, B. og L. Felt (eds.) 2000: *Finding our Sea Legs. Linking Fishery People and Their Knowledge with Science and Management*. ISER Books, St. John's. Newfoundland: 135-152.

scientist with a background in fisheries science working with a marine biologist in collecting fisher's knowledge. Their project was to collect LEK by conducting interviews, present the findings, and implement the knowledge in management practices. She describes the initial process of discussing and finding a common approach and methodology for the project. Her role as a social scientist would be to contextualize the knowledge gathered. In addition, she had experience from working as a fish harvester and approached the project as a caretaker of the knowledge, wanting to prevent misrepresentation and abuse. The initial experience with the data collection was good, and the interviews provided much information. However, disagreement arose on the structure of the interviews and what data was collected, meaning that the broad social information was recorded at the expense of information relevant from a biologist's perspective. In Maurstad's own words:

> "The problem of how to conduct interdisciplinary research was continuously before us. We had an ongoing discussion concerning what we *should* do, and as time went by, we had frequent observations about what we *were* doing. At the time, however, we saw this discussion as critical. Perhaps our interdisciplinary approach was wrong. Perhaps it was not space in the interview setting for our two different perspectives on what was fishers' knowledge".[218]

The collaboration survived this crisis, and Maurstad points at the anchoring in a dual identity as a former fish harvester, as well professional interests and friendship, were key factors. It would have been easier to abandon the project due to the gap between disciplines being seen as too wide. However, the scope of the project was narrowed. The structure of the interviews changed, and investigating the basis of the LEK was dropped. In the next phase, disagreement arose on the scientific construction and presentation of the knowledge. This was a multifaceted issue: would publishing maps based on the LEK be revealing fishers' production secrets, or could it be considered common, public knowledge? Did the interviewed fishers have a right to share the information? Was there a difference in making the information available outside of the local cultural context? Publishing the information would serve to document ongoing activity, and the findings were scientifically very interesting in documenting new knowledge about cod spawning grounds.

[218] Ibid.: 142-143.

Maurstad's analysis of how the process of presenting the knowledge and then implementing it in management turned out shines a spotlight on some matters to keep in mind about interdisciplinary collaboration. She describes becoming "trapped in biology"[219]; realizing that it was via biologists and their direct connection to the management systems that LEK had the best chance of being made use of, and this influenced the framing of it. In other words, she accepted the focus on biological knowledge in order to gain access to management. The selection of what was seen as relevant by the researchers resulted in the fishers in effect becoming research assistants (a point also later made by Bjørkan, as referred to in 2.3.3.), and that this in turn also could turn the focus towards teaching "proper science" to fishers instead of accessing their LEK. There were also good experiences from the collaboration: by combining disciplines, reflections about knowledge systems became apparent. It also showed the importance of "knowing enough" biology to properly be able to contextualize the social dimension of LEK. As discussed in 2.3.3., LEK has to some extent been integrated in Norwegian management over the past 15 years. Again, Hind's fourth wave comes to mind, and what Maurstad describes as accepting biology in order to get access to management can be seen in light of processing LEK, that I will return to in 3.5.

When considering how to use LEK in historical research, I see some lessons to be drawn. In the initial project design, looking at what the fishers' LEK was based on was one of the (admittedly vague) goals, but this was cut when the focus was narrowed. In using LEK to meet the various approaches to environmental history dealt with earlier in this chapter, the information about the social context and processes of interaction in which it was formed is valuable, if not fundamental. When collecting LEK it is important to negotiate a proper interdisciplinary approach between participants, but Maurstad's account illustrates that it is important that the inclusion of the information on the knowledge's basis is championed. Maurstad was in a position to function as a caretaker of the resource user's perspective as well as that of the social scientist, and this had a positive effect on the outcome. The presence of this competence is not necessarily the case in all projects. Johnsen et al.'s reflections on the depth of what is constitutes LEK, described in 2.3.3., are also of relevance here as they illustrate the importance of mapping all aspects.[220]

[219] Ibid.: 146.
[220] Johnsen et al. 2014.

While LEK in itself is not a discipline in the traditional sense, collection and use of LEK can benefit from including representatives of the informants in the project design and research activity. This was done in the Fávllis project, and Eythórsson and Brattland state that in hindsight they consider integration and development of knowledge in partnership with local people and across academic disciplines to be the best approach, which in turn requires competence and capacity at local knowledge centers or other local participants.[221] A question that can be asked in this context is if one possible way of meeting environmental history's call for interdisciplinary focus is to attempt to treat LEK as a separate field and not only source material, and try to identify what types of local partners are suitable for achieving this?

When viewed through the lens of working with other disciplines, some interesting questions about using LEK in science are raised. This takes us to the final part of this chapter: What happens to LEK when it is integrated and used in research?

3.5 Processing and "scientisation" – Integrating and transforming LEK

As we have seen, when scholars make use of LEK, it goes through different processes: Collection, sorting, verification, analysis and so on. I will address the implications of this.

As I mentioned in 3.3.2., Agrawal has some opinions on the practice of gathering LEK and taking it out of its context. As he sees it, the participant in the neo-indigenista movement were concerned that useful knowledge was undervalued and disappearing, and engaged in activities for conserving it. Their main choice of strategy was to isolate, document and store this knowledge in archives. Often international, national or regional "warehouses". In any case, this removed the knowledge from the local context, a process called *ex situ* preservation. Agrawal considers this to be very ironic, as the approach to him "demonstrate their lingering belief in system, reason, order, centralization and bureaucratization as the hallmarks that must mark solutions to the problems of 'development'".[222] By following this approach, the knowledge is often rendered static, made inaccessible and preeminently subjected to scientific method. Agrawal finds that this undermines many of the arguments made by the neo-indigenistas, and he speculates that is stems partly from the desire to uphold the idea of a dichotomy between LEK and scientific/traditional/western knowledge.[223] One strategy to

[221] Eythórsson and Brattland 2012: 147-148.
[222] Agrawal 1995: 428.
[223] Ibid.: 429-431.

avoid this is to involve local partners that have possession of the collected knowledge, keeping it *in situ*. See also Ellen and Harris for further comments on practices in the recording of indigenous knowledge.[224]

In the 2002 article "Indigenous knowledge and the politics of classification"[225], Agrawal returns to the political elements of LEK. He asserts how LEK has achieved attention through its connection with the fields of development and environmental conservation, leading to larger awareness and inclusion in research as well as a decrease of easy dismissal. The bulk of this IK use was in creation of databases for various development agencies, such as the International Development Research Centre, World Bank, United Nations Educational, Scientific and Cultural Organization, and United Nations Development Program. These databases are excellent examples of the warehouses described above. However, this resulted in a process where only LEK that was seen as potentially relevant to development or environmental conservation was seen as relevant for protection. Agrawal calls the process of identification and separation of useful knowledge *particularization*. In connection with this, the collected knowledge is tested, examined and documented using the scientific criteria that are considered appropriate, as well as abstracted. Agrawal calls this *validation*. Finally, the resulting knowledge is cataloged, archived and circulated or rather, put through *generalization*. Together, these three processes constitute what Agrawal calls *scientisation*.[226] Through this LEK is "made true" and helped to "emerge as facts", and Agrawal notes that this in effect strips it of the characteristics that could potentially make it "indigenous", or in the context of LEK, "local". As an example, he points at the neem-tree in India, which the local population had traditionally used for many purposes. In a five-year period, over 500 articles on the tree were published.

As touched upon in 2.3.3., Petter Holm describes a similar process for the use of fishers' LEK in management.[227] In an article written in the context of the perceived rise of prominence of LEK in the 1990s and 2000s[228], he offers a perspective on the integration of LEK, where he sees

[224] Ellen and Harris 2000: 14-19.
[225] Agrawal, A. 2002: "Indigenous knowledge and the politics of classification". In: *International Social Science Journal, Vol. 54*: 287–297.
[226] Ibid.: 290-292.
[227] Holm uses the term fishermen's ecological knowledge (FEK).
[228] Holm 2003.

it in connection with the discussion of "orthodox" versus "reformed" science[229], as well as bringing in the work of Latour. While LEK was being increasingly included, this was in practice mostly when it corresponded with scientific findings. He notes that LEK research "sometimes looks more like a ventriloquist act, in which fishermen are made to speak the truths of science".[230] Referring to Agrawal, he comments on how the fishers' LEK goes through a scientific refinement process of where the output is something different: LEK is translated into LEK*, and why this distinction is important when analyzing the place and use of the material.[231] He discusses two main strategies employed by researchers when they make use of and translate LEK:

1. LEK as hypotheses: "To treat fishermen's knowledge claims as sources of hypotheses, which then can be validated or rejected".
2. LEK as data: "To accept fishermen as capable observers, so that their observations, when properly collected and sorted out, can be transformed into reliable and valid data fit to enter scientific analysis".[232]

Holm focuses mostly on the second strategy, and comments on the significance of how data is collected: the training of field workers, collection techniques, selection of informants, selection of what to knowledge to collect – and selection of what not to include, such as politically controversial topics or if there is a conflict of interest. He sees the transformation of LEK to LEK* as not just removing the cultural, political and social context but also re-embedding them into scientific practice. Holm's conclusion is in agreement with Agrawal in that LEK research "confirms the epistemological privileges of science", but he asserts the opportunities in alternative approaches and arenas of mixing different types of knowledge.

In a recent article, Holm and Soma comment on some new developments in the use of fishers' LEK (or rather LEK*) in environmental governance.[233] They state that they prefer the term *fishers' information*, as they focus on the process of how the LEK is "processed through

[229] I will not go into this in detail. For a summary of the Mode-1 vs. Mode-2 science debate Holm refers to Nowotny, H., P. Scott, and M. Gibbons 2001: *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty*. Polity press. Cambridge.
[230] Holm 2003: 8.
[231] Ibid.: 10.
[232] Ibid.: 12.
[233] Holm, P. and Soma, K. 2016: "Fishers' information in governance—a matter of trust" in *Current Opinion in Environmental Sustainability Vol. 18*. February 2016: 115-121. Available online.

governance of marine resources", and note that this involves the actors in different ways: *information transfer*, *transformation* of existing knowledge, as well as *information translation* when the actors are dissimilar.[234] The first process has fishers' contributing input to science, while the latter ones represent co-creation with science. They point at trust between the actors and stakeholders as an important factor in successful integration of this information, and that this topic is currently getting a lot of attention in research on governance.

Clearly, resource management is a big topic for LEK in general, not only fisheries management in a Norwegian context. Many of the questions that are posed about the collection and processing deals with taking knowledge out of a context or transforming it in order to use it for some other purpose. As discussed briefly in 2.3.3., the management of fisheries is a highly international process, and stock assessments and ecosystem modeling hinges on specific input. In these contexts, maybe there is nothing "wrong" as such in fishers participating in data collection, as these systems are not really built for qualitative data. Davis and Ruddle state that rational skepticism and calls for transparent examination of knowledge claims are not in themselves disrespectful, but necessary for both sustainable management and processes of empowerment, and that LEK-research has not sufficiently embraced systematic examination of the material.[235] However, as shown, there are many examples of areas where LEK can contribute: avoiding sliding baselines, identifying local stocks, providing longer time series or identifying changes that do not show up in annual research cruises at specific locations. Bjørkan notes that to the extent the fishers in the reference fleet have been used in an advisory capacity, it has been informal – but there could be benefits in making it more systematic.[236] In addition, as mentioned in the discussion of Maurstad above, I think information about social context is vital in order for using LEK for history. The element of local cooperation and including the local population in the process must also be kept in mind. Scientists going in and taking the information they find important is not conducive to collaboration, especially in an indigenous context.[237]

All use of LEK involves processing, not only matters of pharmaceutical qualities found in trees or for the basis of resource management. Eythórsson and Brattland reflect on how this occurs

[234] Ibid.: 116-117.
[235] Davis and Ruddle 2010: 881, 891-893.
[236] Bjørkan 2011: 225-228.
[237] Smith 2012.

in the social sciences, and thus I believe this is applicable to using LEK in history as well: "LEK research always involves a transformation of local knowledge into a decontextualized and constructed form of knowledge that is removed from its local context".[238] The LEK collected from the Fávllis project dealt largely with socio-ecological themes and not just ecological information, which necessitated that "socio-ecological knowledge had to be operationalized as an analytical concept, in terms of which elements of social change were relevant to ecological change (and vice versa), within a defined spatial and temporal frame".[239] This knowledge was used as the basis for writing scholarly articles and making narratives of the ecological changes and their social context.

It is apparent that there are many possible uses for LEK and methodological approaches to using it. Researchers from a multitude of disciplines see benefits and challenges, and offer different perspectives. It is also apparent that there is a broad consensus that the process matters and must be considered when using this sort of material as a basis for research. When knowledge is taken out of the context it is created in, it is transformed into a different type of knowledge. Similarly to how LEK (or parts of LEK) is refined when used for management purposes, it is operationalized in different ways for use in historical analysis. There might be ways to make a case for a complete divide between different knowledge systems, but I believe the case for LEK's usability in "traditional" academic disciplines has been sufficiently argued for. That being said, it is clear that there have been situations where local people have not been treated fairly. Tuhiwai Smith's reflections on the importance of perspectives are useful to keep in mind.[240]

For use as source material in writing environmental history, the transformation of local ecological knowledge into social-ecological knowledge seems to be an approach that shows promise. It can contribute to writing on all three of Worster's levels, as well as Merchant's and Simmons' suggested approaches. When writing narratives of ecological change, and how people experience them, the possibilities becomes specifically evident. Especially, like Cronon shows, if the experiences give different portrayals based on the same material. LEK research invites interdisciplinary collaboration with the natural sciences and other social disciplines.

[238] Eythórsson and Brattland 2012: 133.
[239] Ibid.: 139.
[240] Smith 2012.

While there are some problems involved in this, the situation seems to be improving. Perhaps a focus on LEK might even offer environmental historians a point of entry for increasing these efforts. Collaboration with the local people whose knowledge is being made use of is also an important element, with several factors to consider. There are also possibilities in the use of ANT, as suggested by Asdal.[241] The socio-ecological narratives involve a combination of human–nature interaction, the effects of technology and impact of animal behavior, and ANT might be a useful perspective in unraveling the knot of these connections.

When reviewing the historian's tools of the trade, integrating LEK as source material hardly seems like a controversial suggestion. Edelberg and Simonsen point at a trend in the fields of history towards a multiplicity of approaches to source criticism that opens it up for more customized tools for different research questions. As shown in 2.2.3., marine environmental history has a tradition of utilizing "past" LEK extracted from archival material. Myklebost and Kaldal demonstrate that oral sources are nothing new to history. There are well-developed tools and methods for the use of memory as sources, and the pitfalls and possibilities entailed in doing in so. Some of the discussions of the impact of the interview situation on the source material fit right in with the reflections on how collection and processing of LEK changes its nature. Kaldal's suggested ways to question the meanings found in memories are highly relevant for the socio-ecological narratives that LEK can produce. Maybe one of the possibilities for LEK material is to write socio-ecological cultural histories, considering the different possible definitions of culture that are available.

History as a discipline is no stranger to new approaches. Fulsås observes that the boundaries between history, literature and fiction were not in danger of caving in when met with the pressures from the linguistic turn, interdisciplinarity and existence of several histories. As referred to in 2.2.1., O'Connor reflected on how environmental history is another turn in the discipline having been widened, become deeper and been made to include more perspectives. The inclusion of local ecological knowledge in the source material base is maybe another, if minor, step in this direction. The tools and frameworks for making use of it are in place.

[241] Asdal 2005.

Chapter 4: The Fávllis material and portrayals of the Porsanger Fjord

As mentioned in the introduction chapter, Fávllis is a research network that was established in 2003 by the Centre for Sami Studies at the University of Tromsø. In this chapter, I will give an account of the method of data collection and processing used in the research project, and the outputs produced. I will then comment on the main findings in the interview material and look at how they compare to other portrayals of the fjord. Finally, I will comment on some lessons from Fávllis, and how they relate to the endeavor of making use of LEK as source material in historical research. In doing this, I am making use of both the Fávllis research project itself and the material it collected as my cases.

4.1 The Fávllis interviews - methodology for data collection and processing

4.1.1 Data collection through semi-structured interviews

The data collection for the Fávllis project took place in in the period 2008-2010, before I became involved in the project. This consisted of interviews as well as filming for the documentary films. Some shorter follow-up interviews with some of the informants were conducted in 2011, and I assisted in the preparation of the interview guide for these interviews. In addition, some interviews from a previous project on similar topics from Porsanger were also made available. These had been conducted in 2001-2006, and was made use of in some of the project outputs.

In total, nineteen informants were interviewed for the Fávllis project in the period 2008-2010. The 2001-2006 set totaled eight informants. As part of the collaboration agreement with CSRC they would own and store the interview material the project produced, keeping it in *in-situ*.

While I did not participate in the initial data collection, the methodology was accounted for in the project proposal. For the design and planning of the data collection, the expertise of the international partners was utilized. In particular, the Canadian experiences with LEK research related to inshore stocks of Atlantic Cod and data collection among indigenous and non-indigenous fishers was an inspiration for the project: Wroblewski, Neis and Gosse (2005)[242];

[242] Wroblewski, J., B. Neis and Gosse, K. 2005: Inshore Stocks of Atlantic Cod are Important for Rebuilding the East Coast Fishery in: *Coastal Management, vol. 33*.

Neis, et al. (1999)[243] and Murray, Neis and Johnsen (2006).[244] A methodology workshop was arranged in October 2008, where the international partners Barbara Neis, Grant Murray and Peter Armitage participated. The topics were multidisciplinary collaboration, ethical concerns when working with indigenous groups, participatory research, field methodology and technology use. Geographer Kevin St. Martin was a visiting scholar at the Center for Sami Studies, and provided input and inspiration to the project as well, especially on spatial mapping.[245]

The format of the data collection was semi-structured interviews where the informants also mapped their resource use and observations on maps, inspired by the work of polar scientist Henry P. Huntington and the scholars mentioned above.[246] An interview guide was developed to serve as a basis for the conduction of the interviews, designed to activate the informants' experience and memories of fishing places and fjord use, both currently and in the past. The goal was to bring forth their knowledge and views on the current use and change in the use of the fjord on several topics: societal changes, business and industry, technology and culture/language. The guide had several pre-defined milestones or "time-constitutive events" from various time periods, spanning from the time before the second world war up to then present day. Many of these were well-known and publicized socio-ecological events pertaining to the topics above. Most of the information collected dealt with the period from after the 1970s up until time of the collection. In addition, the guide included some specific questions that were of special interest to the partners at IMR on some of the topics and events. The interview guide is attached in appendix I.

[243] Neis, B., Felt, L.E., Haedrich, R.L. and Schneider, D. C. 1999: An Interdisciplinary Method for Collecting and Integrating Fishers' Ecological Knowledge into Resource Management. In: Newell, D. and R. E. Ommer (eds): *Fishing Places, Fishing People. Traditions and Issues in Canadian Small-Scale Fisheries*. University of Toronto Press. Toronto, Buffalo, London.
[244] Murray, Neis and Johnsen 2006.
[245] St. Martin, K. and Hall-Arber, M. 2008: "The missing layer: Geo-technologies, communities, and implicartions for marine spatial planning" in: *Marine Policy Vol. 32:5*: 779-786. Available online.
[246] Huntington 1998.

The CSRC served as a door opener in the local communities in Porsanger during the process of selecting the informants. This was done using the snowball-sampling method.[247] Eythórsson and Brattland further describe this process:

> "In the selection of persons for interviewing, we relied on our local partner to find knowledgeable people to represent observations and interpretations of ecological change in the fjord. The sample of informants included retired as well as active fishers, a geographic distribution between inner and outer districts of the fjord, and different fisheries adaptations (economic, spatial, and temporal). In order to represent a prolonged timeline of ecological change and changing fisheries strategies, it was important to include retired fishers. Gender was not a major issue, but in order to include women's narratives on socio-ecological change in the fjord, four women were interviewed as a part of a sample of 19 interviews".[248]

In an article published after Fávllis conducted its data collection, Davis and Ruddle outline their proposed standards for LEK collection and research.[249] These focus on many of the elements Fávllis had taken into consideration, such as awareness on the concept and scope of LEK and the social process of how it is created, transparency and dissemination about the results, and selection of informants via a process that ensured the breadth of the community was represented.

While I did not participate in the Fávllis data collection, I made use of a similar approach when doing interviews in Porsanger for another project in 2011.[250]

4.1.2 Processing the interviews

It was in this phase of the project I became involved as a research assistant. At first, I transcribed the interviews. This work was done under the supervision of Fávllis researcher Svanhild Andersen, who provided training in the topics of the research project and quality assurance of the transcripts. The interviews were transcribed orthographically, with annotations for long pauses, laughter and so on. After the interview transcripts were

[247] Neis, B. and M. Morris 2002: "Fishers' Ecological Knowledge and Fisheries Science: The Capelin Fishery 1975-1996". In: Ommer, R.E. (ed): *The Resilent Outport: Ecology, Economy and Society in Rural Newfoundland*. ISER books. St. Johns.
[248] Eythórsson and Brattland 2012: 139.
[249] Davis and Ruddle 2010: 889-891.
[250] FRAM Centre project: Atlantic salmon; biological and genetic knowledge and resource use among local people. Project information in FRAM research project database.

completed and proofread, they were added to a database and "coded" using NVivo, a software for qualitative data analysis.

4.1.3 Coding the interviews using NVivo

The process of coding the interviews was an important part of how the data was processed, and must be explained. During the design of the research project, the participants decided to use this approach for the qualitative data analysis of the material. There are several types of software available for this purpose, collectively called Computer Assisted Qualitative Data Analysis Software (CAQDAS). Based on recommendation from partners with previous experience, Fávllis decided to use the NVivo software from QSR International.[251] Initially NVivo 8 was used, but during the process, the database was upgraded to the newer NVivo 9 version.

In making the database, the following information was registered about the informants:

Table 1: Information about the informants

Category:	**Data registered:**
Decade born:	From 1920s to 1950s
Gender:	Male/Female
Primary language:	Both during childhood and present
Decades when active in fishing :	Pre-WW2, 1945-1970, 1970s, 1980s, 1990-present
Fishing industry experience	Not-applicable / receiving terminal / fish buyer
Active in out of fjord commercial fishing:	Yes/no
Personal relationship to fishing:	Subsistence/leisure/professional

In short, the process of coding text material involves two phases. First, a set of categories or topics must be created. Then, sequences of the text material is coded with the categories that apply to it. This makes the material more searchable, in that it is possible to easily access all segments in a corpus of texts that deals with one or more of the defined categories. For example, by coding the Fávllis interviews it would be possible to look up all the instances where informants talked about a specific species of fish or about the disappearance of the kelp forests without having to search each interview manually. In addition, these categories can be organized in hierarchies. So for example, there can be one category for seals in general, with subcategories for different species of seals.

[251] Website: http://www.qsrinternational.com/

A set of analytical categories was made to serve as the basis for the coding of the interviews, based on the interview guide and guidelines agreed upon on during a project workshop. This process was inspired by the work of geographer Peter J. Usher.[252] Andersen and I made some modifications to this framework throughout the initial coding phase, based on our observations of the content of the interviews and their general usability.

The categories were as follows:

Table 2: Categories in the first coding phase

Community	Market
Ecological change	Perceptions on fishery management and other
Fishing gear and boats	Perceptions on future development
Fishing practices	Personal observations and hypotheses
Fjord ecology	Time
Identity and ethnicity	Tipping points
Landscape	(Categories for place names)
Language	(Categories for each species)

In addition to the categories, we made a primer with the list of keywords and examples for each category that I used when coding the transcripts to make sure that the relevant categories were added to each section.

The design and planning of the coding process was done using Patricia Bazeley's handbook *Qualitative Data Analysis with NVivo*.[253] An updated edition of this book has since been published, but this was after the Fávllis database was completed.[254]

According to Bazeley, effective coding hinges on finding the balance between clear text sequences whose meaning is readily understood, and preserving the context of the sequence. She identifies two main approaches to coding text material, *splitting* and *lumping*. This describes how finely- or coarsely grained you want the different categories to be: the extent to which you split up the text or lump sequences together.[255] For the Fávllis material, we decided to code entire paragraphs with the question/answer exchange intact. In some situations with specific follow-up questions and such, several paragraphs were coded as part

[252] Usher, P. J 2000: "Traditional Ecological Knowledge in Environmental Assessment and Management" in: *Arctic vol. 53, No. 2*: 183–193 Available online.
[253] Bazeley, P. 2007: *Qualitative Data Analysis with NVivo*. Sage. Los Angeles.
[254] Bazeley, P. and Jackson, K. 2013: *Qualitative Data Analysis with NVivo (Second edition)*. Sage. Los Angeles.
[255] Bazeley 2007: 66.

of the same sequence. Another concept Bazeley discusses is *slicing*, which deals with the importance of having sufficiently specific categories.[256] If the material is coded with separate categories for "what is going on" and "what is the source of the action", it is possible to search for both instances. If there is a single category for that specific combination of action and source of action, the search-ability of the coded material is not optimal. For instance, in the Fávllis material we used separate categories for each type of fishing equipment and for each species, instead of too specific categories like "cod fishing with Danish seine".

After the first phase of coding was completed, we revised the set of categories and added several new categories based on input from the project researchers' interests. Most of these categories were sub-categories of the initial set. The complete listing of the revised categories can be found attached in appendix II.

Transcribing interviews is a time-consuming process, and the same goes for coding the material. As a project research assistant, I performed both of these tasks. This had some advantages, such as already being familiar with the content of the interviews before coding them. In my opinion, this mitigated my not having participated in the data collection and made the coding process more effective.

One benefit of processing the interview material in this way was that several project researchers could access and navigate the entire set of transcripts in an effective way, finding the information "sorted" under the pre-defined topics and analytical categories without looking through every interview separately.

While the database of coded transcripts was useful in the Fávllis project, this approach is not universally applicable for all research. As part of a preliminary project about the collection, processing and storage of oral sources, I assessed the possible use of CAQDAS and found that for more focused and structured data collections with very specific goals, this approach would be of limited benefit. If interviews follow a questionnaire strictly, or otherwise have relatively few and contained topics, the transcripts themselves will be adequately organized so coding will not improve search-ability sufficiently to warrant the investment. In addition, if the

[256] Ibid.: 72-73.

transcripts are not to be used by several researchers, the benefit of the coding process is also diminished.[257]

4.2 Utilization of the processed interview material

The project researchers used the NVivo database of coded interview transcripts to produce outputs of different types: scholarly articles, a model for a website about LEK, a popular science publication, a documentary film, a master thesis and a Ph.D. dissertation. In addition, several seminars and meetings were arranged. I will begin by giving a brief overview of the outputs, before commenting in-depth on the narratives that were produced.

4.2.1 Overview of scholarly outputs

Throughout the project period, the project researchers published several articles, as well as presenting on conferences and seminars. Some articles were completed after Fávllis had concluded, in combination with other research projects. Eythórsson and Brattland collaborated on the articles: "Mapping Ecological Change in Northern Landscapes / Seascapes: Resources, Livelihood and Cultural Heritage in Coastal Sami Fjord landscapes in Finnmark"[258] and "New Challenges to Research on Local Ecological Knowledge: Cross-Disciplinarity and Partnership", which I already have referred to.[259] Broderstad and Eythórsson published the article "Resilient communities? Collapse and recovery of a social-ecological system in Arctic Norway".[260] The project also published a themed edition in the Centre for Sami Studies' journal[261], with articles on the production and perception of LEK, as well as on Coastal Sami revitalization and rights claims.

One of the major research efforts in the project was Camilla Brattland's Ph.D. dissertation *Making Sami Seascapes Matter*.[262] In it, she addresses the "lack of knowledge production on

[257] Eythórsson, E., Myrvoll, M., Weines, J., Hansen, H. and Länsman, T. 2011: *NIKU Oppdragsrapport 261/2011: Innsamling fra muntlige kilder - Utredning for Finnmarkskommisjonen*: 34.
[258] Eythórsson, E. and Brattland, C. 2010: "Mapping Ecological Change in Northern Landscapes / Seascapes: Resources, Livelihood and Cultural Heritage in Coastal Sami Fjord landscapes in Finnmark" in Bryn, A., Dramstad, W. and Fjellstad, W. (Eds.) 2010: *Mapping and monitoring of Nordic vegetation and landscapes. Conference proceeding*. *Viten fra Skog og landskap 01/10*. Available online.
[259] Eythórsson and Brattland 2012.
[260] Broderstad, E. G. and Eythórsson, E. 2014: "Resilient communities? Collapse and recovery of a social-ecological system in Arctic Norway" in *Ecology and Society 19(3):1*. Available online.
[261] Andersen, S. 2012 (Ed.): *Skriftserie for Senter for samiske studier NR. 18:* "Fávllis. Innblikk i et forskningsprosjekt om lokal fjordkunnskap". Available online.
[262] Brattland, C. 2012: *Making Sami Seascapes Matter: Ethno-ecological governance in coastal Norway*. Ph.D. dissertation, UiT The Arctic University of Norway. Available online.

impacts of new marine industries on coastal Sami culture", "asks how Sami culture matters in contemporary Norwegian marine governance" and looks at "how ecosystem mapping practices facilitate knowledge production on Sami relations and the use of the marine environment". It is a comprehensive thesis consisting of five articles and a short film. Her findings are diverse. She finds that concern for Sami matters has been increasingly integrated into Norwegian governance, but that the governance practices revolve around universal systems. Fishers' combined use of traditional knowledge and technology dispels the assumption that there is just one Sami cultural seascape. However, she finds that through mapping it is possible to find ethno-ecological spaces that are vulnerable to changes in the environment. Overall, these contribute to illustrate the importance ethno-ecological practices and knowledge has for Sami culture, and is thus a valuable and self-evident supplement to the universal and centralized systems.[263]

There are a couple of points in Brattland's articles I would like to bring up. First, the use of mapping in the collection of LEK. In their 2011 article, Brattland and Nilsen used information gathered in the interviews, by the CSRC and the Central Place Name Registry[264] to map Sami names on fishing grounds.[265] In part, they relate this to "toponymic resistance" and counter-mapping as strategies in reclaiming silenced or subjugated place names in majority–minority contexts. Using GIS, they placed the Sami names on the official sea charts. In doing this, they found that the Sami names were largely "systematically silenced". They then sorted the place names in six categories based on the language, and if the names had the same or similar meaning in Sami and Norwegian. In their analysis of the categories, they concluded that the name material in fact showed a harmonious co-existence in an area with settlements of several ethnic groups.

Second, Brattland also analyzes the development and integration of new technology in the small-scale fisheries in Porsanger.[266] She does this by mapping the careers of fishers interviewed by Fávllis and comparing this with archival material from the Directorate of Fisheries and Vessel Registry. By using the information in the vessel registry she is able to show

[263] Brattland 2012: 59-61.
[264] Website: http://www.kartverket.no/Kart/Stedsnavn/Sentralt-stadnamnregister-SSR/
[265] Brattland, C. and Nilsen, S. 2011: "Reclaiming indigenous seascapes. Sami place names in Norwegian sea charts" in: *Polar Geography, vol. 34: 4*: 275–297. Available online.
[266] Brattland, C. 2014: "A cybernetic future for small-scale fisheries" in: *Maritime Studies, 13:18*: 1–21. Available online.

the changes in the number of active vessels, and the changes in equipment as they are retrofitted with new technology. Through the information in the interviews the experiences of some of the fishers show their understanding of the context in which these changes occurred. This is a good example of how LEK-material can be combined with other source material. It also functions to show the diverse factors that are in play in the changes in the fisheries, technology, ecological changes, the personal lives of the resource users and their families, management policies and so on.

Pål Julius Nilsen also completed a master thesis in community planning as part of the project, on the topic of map use in making Coastal Sami traditional knowledge visible. His thesis was on the Varanger fjord, and was based on material gathered by Johan Albert Kalstad.[267]

4.2.2 Overview of popular science and dissemination outputs

Dissemination and communication of results was an important part of the project. One of the major outputs was a popular scientific publication titled *At That Time There Was an Abundance of Fish*[268] (my translation). This publication was a collaboration between Fávllis and the CSRC, edited by researcher Svanhild Andersen and leader of the CSRC, Sigvald Persen. The book has articles on the role of local knowledge in democracy, Coastal Sami resource use in Porsanger, ecological changes in the Tana fjord, LEK about Porsanger, Coastal Sami vocabulary in connection with resource use, Sami landscapes underwater and stories about moving islands.

Two documentary movies were made as part of the project. One smaller ethnographic film in connection with Brattland's Ph.D.: *Learning hoavda's seascape*[269] by Reni Wright and Camilla Brattland. In addition, Sirkka Seljevold produced the documentary/research movie *Det hadde vært godt med seimølja*[270], which shows different types of knowledge: Fishers and local people in their daily use of the fjord, marine biologists during a research cruise and the interaction between them during an open seminar.

[267] Nilsen, P. J. 2010: *Kart som verktøy for synliggjøring av sjøsamisk tradisjonskunnskap*. Master's thesis. Available in Munin.
[268] Andersen, S. and Persen, S. (Eds.) 2011: *Den gang var det jo rikelig med fisk*. Mearrasámi diehtoguovddáš. Porsanger.
[269] See Brattland 2012 for information about and a summary of the film.
[270] Seljevold, S. 2011: An excerpt from the movie is available online: https://vimeo.com/36280365

Another major effort in the project was the development of a model for a knowledge base for LEK.[271] I was involved in its development, and the process went through several iterations. The ambition for the database model was to combine LEK and scientific material about a specific area for improving management, planning, preservation of cultural heritage, research and education. To this effect, material from the project was made accessible, giving a summary of LEK from Porsanger linked to maps of the area, both in the form of text and video-clips. The pages also links to various other websites with information and statistics, such as the EPIGRAPH project. The CSRC later developed a more comprehensive website, *Meron*, for communication of LEK.[272]

Finally, over the course of the project several meetings and seminars were held. Several in Porsanger, but also in Kåfjord. During these, the findings from the project were disseminated to the informants and other local inhabitants. An element of this was also to verify and confirm the findings made in the interviews.

4.2.3 Socio-ecological narratives

One of the major uses of the coded transcripts was to produce narratives about different topics. The idea was to make short stories based on the collected LEK as examples of how the views of the informants on different topics related to the LEK and socio-ecological history of the Porsanger fjord could be communicated. The foundation was a bottom-up approach, where the interview material would be in the spotlight. The design of this approach was discussed and agreed upon by the project researchers and the CSRC partners. The narratives would not be raw data, but be contextualized in the frame of the ecological changes in the Porsanger fjord, and effort was put into avoiding a too strong direction, or staging of the material. During a project meeting, one of the researchers summarized this as "research-based communication of LEK", and it represents an obvious example of the process described in 3.5. For further information on the approach, as well as reflections on the combination of first-hand and second-hand observations, see Eythórsson and Brattland (2012).[273] These narratives were used as part of the Fávllis knowledge base model, and can be viewed on the Fávllis site referred to above (albeit in Norwegian). The production of the narratives was a

[271] The Fávllis knowledgebase website model: http://site.uit.no/favllis/
[272] Meron website: http://meron.no/nb/
[273] Eythórsson and Brattland 2012: 141-142.

collaborative effort, where Andersen and I played a central role. I translated one of these narratives to English for a workshop with an international partner, and it is attached as appendix III.

4.3 Main findings in the Fávllis interviews and portrayals of the fjord

4.3.1 Main findings in the interviews

Having worked very closely with the interview material, both by transcribing the interviews and coding the transcripts, I became very familiar with the material. This gave me both a good overview of the material in the database as well as thorough, in-depth knowledge of the content. Working as a research assistant, this enabled me to function like a type of filter in that I could inform the researchers about the overall trends in the material as the process was going on. I also used the finished coded transcript database to export the categories from the database, providing the researchers with complete sets of the different data they were interested in writing about. As the interviews were semi-structured and centered on ecological changes framed around several predefined socio-ecological events, these topics were obviously well represented in the material. I have gone through the coded database, and summarized the topics that were talked about by most of the informants:

Table 3: Topics mentioned by most of the informants

Gear (passive, active)	Information about traditions
Fishing boats (small, large)	The ecological cycle (seasonal changes)
Customary and current use (fishing practices)	Ecosystem (species behavior, movement and interaction, general ecological changes)
Dating of own participation in fishing	Fish disappearance
Personal observations (stories)	Overfishing (or not)
Conveyed observations	Community (various topics)
Subsistence fishing	Commercial fishing, profitability and markets
Value statements (social, legal, economic and ecological)	Local perceptions on the management systems (quotas, etc.) and on legislation
Reflections about research projects/researchers	General reflections about the past

Some of the categories above are in reality meta-categories, where the text is tagged based on whether or not observations are of first- or second-hand nature, as well as when informants date their stories or give general reflections.

Many (that is, over half) of the informants talked about the following topics:

Table 4: Topics talked about by many of the informants

Changes and adaptations in equipment use	Empirical observations about the fjord
Professional fishing (full-time)	Pollution/acidification
Social processes like kinship and economic relationships	Local participation in fishery management and politics
Emotional impact	Impact on local economy, local markets
Sense of justice	Farming
Factors related to identity and ethnicity	Usage of places in the fjord (leading lines, etc.)
Usage of places in the fjord (spatial)	Interplay between sea landscape, fish and gear types
Factors related to language and language connected to resource utilization	Reflections on the future of settlement and fishing

The informants talked about many different species, here summarized by the proportion of informants that mentioned them:

Table 5: Species mentioned by the informants

Species	**Mentioned by proportion of informants**
Cod (fjord, coastal, and ocean), coalfish, flounder, salmon, seals (harbor seal, grey seal harp seal)	Practically all informants
King crab, kelp, sea urchins, herring	Most of the informants
Haddock, Wolffish,	More than half
Capelin, trout, seabirds, sand eel, shrimp	Less than half
Horse shells, lumpfish, otter and mink, bottom fauna, charr, redfish	Very few

In addition, the transcripts were coded for the use of place names (including fishing grounds) both in Norwegian and Sami, as well as different locations in the fjord (inner, outer). Coding was also done for the major time periods defined in the interview guide.

Andersen's article "Local Ecological Knowledge about the Porsanger Fjord" (my translation) from *At That Time There Was an Abundance of Fish*[274] presents LEK about the topics that several of the informants spoke about. Andersen makes use of quotes from the material that she states are expressions of what can be understood as collective views amongst the informants. The article covers LEK on three broad topics; cod, flounder and possible explanations for the decrease in fish stocks. In connection with these, other elements from the interviews are invoked, showing how several elements of LEK are linked. For cod, the existence of several types, both from the local fjords and from further out on the coast is a

[274] Andersen, S. 2011: "Lokal økologisk kunnskap om Porsangerfjorden" in Andersen and Persen 2011: 64-79.

central observation, as well as the dating of changes in the fish stocks. For flounder, there are comments on its importance for subsistence as well as it being a source of subsidiary income. The informants have many views on a variety of explanations for why a reduction of the local fish stocks happened over time. The informants see many of these explanations as being connected. Examples are different causes of overfishing, for instance due to the use of overly effective gear types or spawning grounds being fished empty, and the resulting effects, such as imbalances between species creating ripple effects within the ecosystem. The increase in the number of harp seals, the so-called "seal invasion", is one prominent example, and the more recent arrival of the king crab is another. Changes in the bottom of the fjord from pollution or increase in the sea urchin population is another ecological change that is an element in many of the explanations.

The narratives described in 4.2.3. were a way of highlighting the topics that many informants commented on, and the selection of topics upon which to base narratives reflected the common themes in the interviews, as seen in tables 3-5.

An important point to make about the content of the database is of course the relationship between the questions that are asked and the answers that are given. The interview guide outlines several broad and open-ended lines of questioning quite clearly, as described in 4.2.1. It therefore comes as no surprise that many of the recurring topics the informants talk about are the ones mentioned in the guide. The data collection was based on the semi-directed method as outlined by Huntington, and the flow of conversation led the informants to talk about a broad variety of topics in relation to the overall focus.

Something that might not come clearly across from the tables and summaries above is that in the interview material, many of the informants' stories and explanations have interwoven elements. There are many co-existing and connected causal relationships in the observations, and they tell a story of a fjord that has gone through considerable change over the course of the lives of the informants, ranging from many decades in the past and up until when the interviews were made. In addition to the ecological changes, stories about the changes in the community, such as economic ones, emerge as well, and it is clear that these are matters that the informants care about. There are also some different points of view and some informants who have opinions that can be understood as controversial. It is also interesting to see the differences in perspective on the relatively recent arrival of the king crab between the older

resource users and those who are involved in commercial fishing who rely on the new resource for income.

All in all, the LEK contained in the interviews offer a portrayal of the Porsanger fjord where the ecological changes are central. So then, how is the fjord portrayed in other accounts?

4.3.2 Portrayals of the fjord

I will give a brief overview of some ways the Porsanger Fjord has been portrayed in earlier accounts, hereunder: local history, regional studies and as part of a national historical publication.

While I will only look at Porsanger since that is the area where the LEK material is from, there are portrayals of similar areas I could have used as well. I have already referred to Eythórsson's work on other fjords in 2.3.3. Broderstad and Eythórsson (2014), which is based in part on the Fávllis material, and compares the socio-ecological histories of Poranger and Nesseby.[275] The works of anthropologist Robert Paine on Coastal Sami fjord fishers are also examples of ethnographic fjord portrayals.[276] In addition, these portrayals are not separate from the rest of reality. Volume IV of *the Fishery and Coastal- History of Norway* (my translation) presents the broad context for Norwegian coastal and fisheries history in the period between 1970 and 2014.[277]

Two volumes of the local history of Porsanger have been published. The first was released in 1984, covering the late Stone Age to 1910, written by Einar Richter Hanssen.[278] The second was released in 1994 and covers 1900 to the 1960s, written by Arvid Petterson.[279] As the Fávllis material mainly deals with the time after the period covered by the second volume the overlap is not perfect. Furthermore, the mandate for the volume was to focus on the Second World War and the reconstruction period[280], thus this dominates the portrayal. In the chapter on the industrial base from 1900-1940[281], the importance of the fisheries is described. Local

[275] Broderstad and Eythórsson 2014.
[276] For instance: Paine, R. 1960: "Emergence of the Village as a Social Unit in a Coast Lappish Fjord" in: *American Anthropologist, New Series, Vol. 62, No. 6*: 1004-1017.
[277] Christensen, P. (Ed.) 2014: *Norges fiskeri- og kysthistorie, Bind IV:* Havet, fisken og oljen, 1970-2014. Fagbokforlaget. Bergen.
[278] Hanssen, E. R. 1986: *Porsanger bygdebok, bind 1:* Fra eldre steinalder til 1910: Porsanger Kommune. Lakselv.
[279] Petterson, A. 1994: *Porsanger bygdebok, bind 2*: Småfolk og drivkrefter: fra 1900 til 1960-årene. Porsanger Kommune. Lakselv.
[280] Ibid.: 267.
[281] Ibid.: 51-66.

accounts, from letters and interviews, are used, in addition to the fisher registers. Petterson tells a story of a fjord where fishing is an important source of income for many of the locals, both as main occupation and as part of a combined adaption with farming or other work. It also tells of variations in the resource access based on years with large seal populations. The impacts of large trawlers and local opposition to them is also discussed. The development of the fisheries in 1954-65 is summarized in a brief paragraph[282], and some of the themes are similar to the ones before the war: The fjord was not included in the Government's heavy investments in the fisheries, but some locals invested in vessels and the combination of fishing and farming. The lack of regulations against the use of active gear, and the local people's view that overfishing by large vessels from outside of the fjord contributed to a deterioration of the basis of existence for the locals, and thus depopulation and the loss of the traditional cultural life in the rural areas.

Ragnar Nilsen, associate professor in community planning, has written extensively on fjords in Finnmark, and his work also offers some portrayals of the Porsanger fjord. The first is a report on employment based on fieldwork in the mid-1980s[283], which places it in the middle of the period Fávllis focused on. Nilsen observed varied adaptations and combinations of wage work, education and farming/fishing. This involved a large extent of commuting for the younger segment of the population. He sees this as part of an effort to build an income base in order to settle permanently in their home communities. As the fjord is large, the local communities had three larger district centers available for commuting. A centralization of public services to Lakselv took place from the 1970s, which had an impact on the possibility for flexible job-combinations for the rural population. Nilsen notes the multicultural composition of the population, and the relative strength of the Coastal Sami culture in the area. Some areas became depopulated due to lack of infrastructure. Nilsen points at changes in trends in migration, from people moving to Hammerfest and Honningsvåg for jobs connected to fisheries, to settlement in Lakselv or southern Norway.

For my review, the central topics of interest in Nilsen's portrayals are the interdependencies of the local economic system based on small-scale fjord fishery, the demand of protection of

[282] Ibid.: 272.
[283] Nilsen, R. 1990: *Gjenstridige fjordfolk. Arbeidsliv, etnisitet og rekruttering i to nord-norske fjordområder*. FORUT. Tromsø.

the fjord from active fishing gear, and the Coastal Sami mobilization for this. Nilsen notes the local fishers' claims of the existence of local stocks of cod in the fjords, and the general decrease in fish stocks they believed happened due to the use of active gear in the 1950s and 1960s. The season-based nature of this fishery made it suitable to be part of a combined adaption. Lack of fish resulted in a decrease in recruitment to fisheries and people finding other work throughout the 1970s, but it remained an important part of the employment adaption. The large structural factors in the industrialization of the fisheries are described as being a detriment to the local, small-scale fisheries, contributing to marginalization of the rural areas and Coastal Sami culture. Nilsen revisits the fjord in his 1998 book on fjord fisheries and resource use in Northern- Norway.[284] In it, he deals more thoroughly with the Coastal Sami mobilization in the effort to protect the fjord from the use of active gear. He also analyzes the conditions for small-scale fjord fishers in Northern-Norway after the new quota scheme that was introduced in 1990, and notes that the downturn in Porsanger seemed to have reversed by 1996, through both the versatility of the local adaption and the introduction of development support from the Sami Parliament.

A more recently published portrayal of the Porsanger fjord can be found in historian Bjørg Evjen's chapter on Sami fisheries in volume IV of *The Fishery and Coastal- History of Norway*.[285] The chapter deals with the question of specific rights for Coastal Sami fishers, and is mostly concerned with issues related to fishery regulations and small-scale fisheries in the Sami areas in general, with Porsanger being one of many municipalities referred to in all of the three northern counties. Evjen describes several local initiatives to protect fjord fisheries, as well as importance of the local receiving terminals. She also notes the Sami Parliament's involvement in fisheries policy and the national processes: The Sami Fishing Committee in the 1990s, which did not result in exclusive Sami fisheries rights, and the Coastal Fishing Committee in the 2000s, which did not either grant any specific Coastal Sami rights but resulted in some regulatory and law changes, as discussed in 2.3.3. In her conclusion, Evjen notes that while the processes did not result in specific ethnic rights, they did show political will to secure the material basis for Coastal Sami communities, and put emphasis on the historical roots of the Coastal Sami population. For the specific case of Porsanger, the "Coastal Sami Revolt" is one

[284] Nilsen, R. 1998: *Fjordfiskere og ressursbruk i nord*. Gyldendal. Oslo.
[285] Evjen, B. 2014: "Åpning for sjøsamiske rettigheter?" in: Christensen 2014: 251-279.

of the primary topics in the portrayal of the fjord. Similarly to Nilsen's account, this describes Coastal Sami organizations' demand for protection of the fjord from active gear, the resulting conflict with the fishers' associations and the long term effects for the fishery policy of the Sami Parliament.[286] Evjen also devotes several pages to the Fávllis project in her discussion of two topics: the debate of including LEK in management to help protect and preserve fjord fishing as the material basis for local communities, and the mapping of the place names in Sami, Kven and Norwegian. Evjen makes use of Brattland and Nilsen's[287] map of fishing grounds to "illustrate how several peoples have coexisted for centuries" (my translation).[288] Furthermore, she notes the changes in the management systems over the past decade, with a focus on democratizing ecosystems and sustainability, and that although it is a different type of knowledge than fisheries science, integration of LEK is a premise for this. Holm, Christensen and Finstad's earlier chapter, as well as Finstad's, in the same volume also gives a thorough overview of the general context for coastal fisheries from 1989-2014.[289]

In his review of the volume[290], historian Einar Lie comments that while he finds that Evjen's chapter is interesting and deals systematically with the topic of fishery regulations and Coastal Sami rights, he perceives the style as being more in the form of a report than a traditional book chapter. He does not comment on or mention the topic of LEK. Lie also comments on the relative invisibility of the eastern parts of Norway he perceives in the volume in general, and asks specifically if the words spent on describing the example of salmon fishing in Nesseby could not just as well have been spent on fishers in the southern or eastern parts of Norway. I am sure there is an abundance of LEK among the resource users in the Oslo fjord that can be gathered and used as the basis for a volume of the coastal history of that region.

The portrayals of the Porsanger fjord found in these accounts are not dramatically different from the fjord that is presented in the Fávllis material. The local history is varied, covering a broad variety of topics with the "main event", the Second World War, playing a prominent role. The local perceptions on marine resource use are to a certain extent represented and voiced through letters and interviews. Nilsen's account focuses mainly on the structural

[286] Ibid.: 258-260.
[287] Brattland and Nilsen 2011: 289.
[288] Evjen 2014: 274-278.
[289] Holm, P., Finstad, B-P. and Christensen, P. 2014: "Aldri mer 18. april!" in: Christensen 2014: 185-214. Finstad, B-P. 2014: "Markedstilpasning og globalisering" in: Christensen 2014: 215-250.
[290] Lie, E 2015: Review of Christensen 2014 in: *Historisk tidsskrift Bind 93/02*: 308-312. Available online.

economic, political and ethnic factors, but draws somewhat upon the local population's observations of local fjord cod stocks and the importance of having fishing grounds available close to their homes in making the small-scale fisheries adaption possible. In their article based on the Fávllis material, Broderstad and Eythórsson examine the Porsanger fjord and look at many of the same challenges and topics as Nilsen by using the concept of resilience. They find that that the communities in Porsanger have shown a remarkable adaptive capacity, which in part can be explained by the Sami Parliament's fisheries policy.[291] Evjen also focuses on rights issues and puts it in the larger Coastal Sami context, but she comments specifically on the developments in LEK in regards to management. She also makes use of some of Fávllis findings to show the multicultural history of the area. As her chapter deals with the overall topic of rights, it is understandable that LEK perspectives are not utilized further, but in putting the spotlight on the process of LEK being brought into management she also makes a major contribution towards bringing it into history writing.

It is hardly surprising that these accounts do not display the same focus on ecological changes as the material from a project that specifically focused on collecting information about the topic does. However, I believe that the main findings in the Fávllis material highlight the impact that ecological change has had on the lives of the local inhabitants in the fjord, and how many of the events and changes are experienced as interacting and connected by them. Through LEK it might be possible to bring into focus the realities of ecological change on the ground, so to speak. Future portrayals of the fjord can benefit from including them to a larger extent, or rendering them more visible.

4.4 Lessons from Fávllis and their possible application in historical research.

So, what are the lessons that can be drawn from the Fávllis project, the data collected by it and the outputs it produced? How can these lessons be applied in historical research? As it turns out, there are several lessons. However, I think it is just as prudent to turn the question around and ask: what can LEK research gain through applying approaches from history?

One clear observation is that a broad project that spans a diversity of disciplines in the humanities and social sciences, as well as involving local partners, can result in similarly broad

[291] Broderstad and Eythórsson 2014.

results. Fávllis produced several scientific outputs, broad documentation and dissemination of local knowledge, and a strong relationship with a local partner.

It also shows that good intentions are not enough to cross all disciplinary barriers, with reference to Eythórsson and Brattland's reflections mentioned in 3.4.3. There is unfulfilled potential in collaborating more closely with the natural sciences. The original design of the project intended for the interviews to be conducted by both a social scientist and a marine biologist, but this was not possible to do in the implementation phase. For gathering LEK for an environmental history-focused project, data collection in collaboration with ecologists could be beneficial. Some examples can be found in ecology's fields of expertise, as put forth by Simmons: changes due to deforestation or soil erosion, energy consumption, biodiversity, or accumulation of pollutants.[292] Through closer collaboration, questions regarding these topics can come up during the research design and data collection. One concrete example of ecologists and social scientists working together in data collection and analysis can be found in TUNDRA, an international research project on environmental governance and socio-economic conditions as drivers for ecosystem management.[293] A team consisting of a political scientist and an ecologist conducted the data collection for the Norwegian part of the project, Finnmark Landscape in Change. The format was questionnaire and map-based interviews.[294] For some analyses, bringing in competence from the field of economics could also be sensible, for instance in a regional study similar to Nilsen's, an economists' competence on new theories and models for market mechanisms can add different perspectives or open up other lines of questioning.

Another general observation is that Fávllis fulfils its stated goal of contributing to answer Huntington's call for more work on analyzing LEK and applying it in research and management.[295] The use in research is evident from the project's LEK-based scientific production. Eythórsson, who lead the first Fávllis project pointed at the management utility in the report to the NRC, stating that the project had developed:

[292] Simmons 2012: 144-146.
[293] Project website: http://site.uit.no/tundra/. I worked as a research assistant on Finnmarkslandskap.
[294] Broderstad, E. G., Josefsen, E. and Søreng, S. U. 2015: *Finnmarkslandskap i endring – Omgivelsenes tillitt til Fefo som forvalter, eier og næringsaktør*. NORUT rapport 1/2015. Available online. (Norwegian).
[295] Huntington 1998: 241.

> "a practicable and fruitful method to improve the knowledge base on marine resources and ecological change in a defined geographic sea area, such as the big fjords. The method gives improved insight into spatial and temporal parameters, connections between ecology and human activity, and opens for dialogue and participation, which contributes to increased legitimacy" (my translation).[296]

Eythórsson puts forth new requirements from legislation for integration of local knowledge (biodiversity act, marine resources act) in management for issues such as fjord lines, coastal planning, tourist fishing, marine conservation areas and aquaculture as examples of why this is topical. While these statements are in the context of management, the lessons on what LEK can contribute knowledge on, and how local partnership increases legitimacy, can be applicable for local history projects, or for projects involving historical mapping.

One example could be Brattland and Nilsen's aforementioned mapping of names of fishing grounds in different languages. It maps resource use, but also illustrates the multicultural history of the area. The LEK-based narratives combine a number of elements and communicate the local population's stories of use and ecological change. Using them in local history accounts is one way of including the voices of the locals, in the same way as interviews or excerpts from written records are already used.

The use of semi-structured interviews has proved to be an effective way of collecting LEK. This approach is well within the bounds of methods employed by historians, and as discussed in 3.2., the tools for determining what can be learned from interviews are well developed in the history discipline. The interview guide makes use of several socio-ecological events, but the open format allows for the flow of conversation to lead to other topics. From the perspective of a historian, some additions could improve future data collections. For instance, there were defined follow-up questions to bring up for the topics that were of special interest to the marine biologist partners. Similarly, there could be defined follow-up questions that are relevant for historical studies, such as informants' knowledge of other sources that can be sought out. Andersen points at catch diaries or reports from receiving terminals as examples of sources to be combined with LEK[297], but other questions could address whether the informants have memories of discussions in local papers, or if they know about the existence

[296] *Særskilt rapportering – forvaltningsrelevante forskningsresultater*. NCR project number: 185158.
[297] Andersen 2011: 78.

of other written material. In addition, questions that assist in achieving Kaldal's advice of trying to uncovering the process of what memories have created as well as how they were created. Maurstad's reflections in 3.4.3. can also be applied here; their vague goal of uncovering the basis of the fishers' knowledge was cut during their collection. Historians being present in the research design and data collection, as well as a clearly defined idea of what questions that are to be considered might be a requirement to get "broad" LEK.

As is apparent from the discussions of the LEK field in chapters 2 and 3, a common theme is categorization. How different types of knowledge are seen and categorized in different ways, such as LEK vs. science – or even social science vs. natural science. When looking at resource use and ecological changes, the information is categorized. When the boundaries for the time period and geographical area to be explored are set, categories are defined. Moreover, when dealing with indigenous groups, or local communities, the act of categorization is obvious. History is a discipline that brings in an awareness to this factor, and has a broad scholarship on ethical reflections on doing research on groups and minorities and issues related to compensatory research. For discussions of this, see for instance several works by historian Einar Niemi[298], as well as Niemi and Semb's text for The Norwegian National Research Ethics Committees.[299] In the context of LEK, I would also like to put forth Davis and Ruddle's article as a supplement to these, as they reflect upon questions of essentialism and compensatory research.[300]

Finally, there is the big picture. While LEK is certainly an incredibly interesting, extensive and versatile type of material it is important to recognize its limits. Part of environmental history's ambition and appeal is to answer broad questions on many levels. This requires interdisciplinary approaches and uses different types of source material. While LEK can provide information on some of the entanglements between human activity and the environment, others are necessary to give a comprehensive account, as I will come back to in

[298] Niemi, E. 2000: "'Urfolk', 'nasjonal minoritet', 'innvandrer'. Minoritetspolitikken og kampen om kategoriene", in Myhre, J.E. (ed.) 2000: *Historie, etnisitet og politikk*. Tromsø.
Niemi, E. 2006: "National Minorities and Minority Policy in Norway" in: Åkermark, S. S. (Ed.) 2006: *International Obligations and National Debates: Minorities around the Baltic Sea*. Mariehamn.
Niemi, E. 2002: "Kategorienes etikk og minoritetene i nord. Et historisk perspektiv", in: *Samisk forskning og forskningsetikk*. NESH-publikasjon 2/2002. NFR. Oslo.
[299] Niemi, E., Semb, J. A. 2009: "Forskningsetisk kontekst: Historisk urett og forskning som overgrep". Text from the Norwegian National Research Ethics Committees. Available online.
[300] Davis and Ruddle 2010: Entire article, but specifically p. 888-889, 891-893.

4.4.2. Returning for a moment to my reflections on local history in 1.4., I will again bring up Kaldal's point about avoiding adopting a too local focus and Alsvik's warning against letting the analytical categories dictate the agenda. The historical perspective of utilizing source material to produce a synthesis must be kept in mind. LEK gives a piece of the picture, but as historians we must make sure that the pieces are put together in a cohesive, non-arbitrary way. In continuation of this, maybe in processing LEK for use as historical source material it can also be possible to avoid a preoccupation with questions of resource and environmental management.

Which leads into what some of the more practical applications of these lessons can be, seen through some of the terms utilized in the Fávllis LEK-research.

4.4.1 Terms in LEK research and application for writing history

Interdisciplinary work consists of more than just sprinkling another field's terms on top of one's own work. However, I find that there is some use in discussing some of the terms that are used in Fávllis' LEK research and their applicability for historical research. Or rather, in how to link LEK and history, as some arguably direct connections are made visible through these terms.

First, the term *social-ecological history* is prominent in many of the Fávllis project documents. I find this to be a pertinent term. It is history that seeks to answer several of the questions that are asked by some of the approaches to environmental history described in 3.4.1., such as interaction between humans and ecosystem, both biophysical and societal. As we have seen, LEK is also very suitable for narrative approaches. One can ask if these types are not really just the same type of history. I would say that largely they seem to be, but I believe they probably can comfortably exists separately depending on one's research interest. However, working within the field of scholarly history adds some overall demands to the enterprise – just as working within any discipline does. Writing *socio-ecological history* can serve as a framework for working with, for instance, anthropology, political science and ecologists, narrowing the scope and making it manageable, while it might not fit for other, broader environmental history endeavors. Continuing my analogy from above, operationalizing *socio-ecological* issues uncovers parts of the big picture. LEK might lend itself naturally to answer questions dealing with these relationships, but it must also be seen in relation to other possible contexts.

Second, the *socio-ecological events* that were defined in the interview guide served not only as tools to structure the interviews and broad dating of the material, but also as analytical categories. Some are monumental events in the local history and the lives and consciousness of the local population. A term that was also used in discussing them were *time-constitutive events*. When I first started working on this topic, I was reminded of the concept of *lieux de memoire*, which is central in the field of cultural memory.[301] These are, in my understanding, generally used to deal more with deep symbolism on a regional or national level than with smaller-scale, local events. In reviewing the Fávllis interviews and the interwoven stories of ecological events, animal interactions, fishing grounds and specific geographical places, I wonder if it might be fruitful to apply some of these frameworks from cultural memory in studying these. Again making use of the narrative about seals, can the local experiences of the "seal invasion" in the late 1980s be an example of a regional time-constitutive event? It might also serve as a fruitful point of entry to explore the significance of the many topics that it is related to? It could also serve as a point of departure for comparisons, both temporal with previous periods with an abundance of seals (as described in Petterson's volume) and with other areas that also experienced "seal invasions" earlier in the 1980s. In some ways, many of the events described in the Porsanger interviews can be seen through an "invasion" oriented lens: the large trawlers coming from outside the fjord, the sudden increase in the sea urchin population and the arrival of the king crab.

Third, *socio-ecological knowledge*. As mentioned in 3.5., Eythórsson and Brattland operationalized this as the term for the refined LEK that dealt with interconnected social and ecological changes. While the utility of this venue of analysis has been shown above, it is not exhaustive for the matters that LEK can be used to reflect on. The use for biologists and resource management has also been show. Another example could be the data collected in the Finnmark Commissions' mapping of traditional resource use[302], or even the Coastal Fishing Committee mentioned in 2.3.3. It is arguably LEK, but is it operationalized as *juridical-*

[301] See for instance: Nora, P. (Ed.) 1996-1998: *Realms of Memory: Rethinking the French past, Volume I-III*. University of Chicago Press. Chicago.
Warring, A. 1996: "Kollektiv erindring – et brugbart begreb?" in: Jensen, B. E., Nielsen, C. T. and Weinreich, T. 1996: *Erindringens og glemslens politik*. Roskilde Universitetsforlag. Frederiksberg.
Eriksen, A. 1999: *Historie, minne og myte*. Pax forlag. Oslo.
[302] The Finnmark Commission maps the rights to land and waters in Finnmark. Website: https://www.domstol.no/no/Enkelt-domstol/Finnmarkskommisjonen/, law: http://lovdata.no/dokument/NL/lov/2005-06-17-85/KAPITTEL_5#KAPITTEL_5 (in Norwegian).

ecological knowledge? To connect it with the previous term, maybe there can be some use in operationalizing *cultural-ecological knowledge*? My point is not that the use of LEK lies in all the new terms it can be used to coin, but that the knowledge can be put into use in order to look at many different questions. This also ties in with Alsvik and avoiding too partitioned and ordered perspectives on local events. While the use of analytical categories for studying different facets is obvious, they are tools that serve the purpose of writing historical accounts.

Having discussed these terms, I will move on to discuss the overall theme: linking LEK and environmental history, and integrating them.

4.4.2 Linking LEK and environmental history

As I have touched upon already, there seem to be places where LEK research appears to be close to the tenets, or approaches, of environmental history. I find this to be true both in regards to content and methodology. Coming back to Hughes' previously referred statement that "It is a kind of history that seeks understanding of human beings as they have lived, worked and thought in relationship to the rest of nature through the changes of time"[303], I think the Fávllis interviews shows the potential LEK has to assist in answering this comprehensive scope.

I do not have to look hard in order to find examples. Take for instance the narrative about seals found in appendix III. While it is only a short text, it refines and summarizes a large amount of LEK. When exporting the sections of the transcript database that are coded with the category "seals", the result fills 43 pages. The narrative has elements of many of the approaches to environmental history as they are outlined in 3.4.1.; it deals with several types of interaction between humans and seals, and between the seals and other species. The relationships between society, ecology, economy and (conservation) policy are articulated. How the locals understand the place of different species in the ecosystem and nature in the past and present emerges. Even the place of LEK in relation to science and management makes an appearance. A short text like this narrative does not in itself answer all the questions, but it serves as a way to vocalize local perceptions on a specific set of topics.

It would be possible to explore each of these elements in depth, and the interviews contain more information that shows the links between the different topics better or deeper. One

[303] Hughes 2006: 1.

example is the ripple effect of many fishers seeking other work due to the seal invasion, and their difficulties getting back into the fisheries later due to the changes in the quota regulation system that happened around the same time. The informants offer their views on this and on the social consequences it had for the local communities.

In addition to the role of the seals, the LEK collected about the recent arrival of the king crab could be used to shed light on many of the same topics. Both the effect on other species and damaged gear, and on how the regulation policies affect livelihoods and the society as a whole by adding a new resource to the industrial base of the local economy. The cases of the seal and the king crab could probably also be used in an ANT-approach, focusing on their roles as actors in the connections and relationships between the ecosystem, the resources and fjord communities.

Combined, these elements can also fit into larger scale stories about the series of adaptations made by the inhabitants of the fjords over time. The structure and framing of these can vary, similarly to the different portrayals of the Dust Bowl described by Cronon, conforming to different plot types. As referenced in 3.4.3., Eythórsson and Brattland notes the contrast between the local population's sorrowful account of reduced access to resources in Porsanger and the more positive view found in the description of the results from the research cruises that were interesting from a biologist's perspective.

When considering the possibilities for large, comprehensive ways to portray Porsanger, I find Nilsen's account incredibly interesting. In some ways, an outline of an environmental history of Porsanger can be seen in the way he describes the local and regional premises for the fjord fisheries.[304] The significance of the geography in how the boats and gear are adapted to the resource access offered by the small distance to the fishing grounds; the existence of these fishing grounds; the regulation policies that ban large vessels; the importance of the year-round local receiving terminal as the core of the local commercial fishing system; how all these conditions make small-scale fisheries possible and all elements tying into how these interdependencies together form the local adaptation. While they are not environmental history accounts, both Broderstad and Eythórsson (2014) and Brattland (2014) are examples of how LEK can add local perspectives to portrayals of the development of local communities.

[304] Nilsen 1990: 103-107.

Payne's reflections on the ecological and economic stewardship roles of fishers' mentioned in 2.2.3. also comes to mind in this context as a possible interesting venue that could be explored.

There are many places in this outline that could be filled out and supplemented by using LEK, but part of what makes it interesting is that it also points to the complementary material that is needed that cannot be gathered from LEK. Examples are: information and statistics from the fisher registers, catch data from receiving terminals, official statistics on employment, newspaper archives and so on. Of course, access to archive material is important for all historians, but Keiner's notes on the importance of preserving fishery-oriented archives are also highly relevant in this regard.[305] Without access to records (scientific, management, newspapers or other types), it will be difficult to contrast or substantiate oral sources, or put them into a longer time perspective, and cuts in financing to library systems as well as more information being available exclusively online represents some challenges to the source material basis of future historical analyses. Contemporary work on LEK might be helpful in order to mitigate this. The use of archive material and other old written sources also brings up Taylor's observations on mining old records for semi-quantitative data. As he experienced, the process of "converting" data from old material into semi-quantitative information is both time-consuming and dependent on meticulous attention to detail, and the benefit of the results is not unquestionable: "As a way to represent relative ecological change, this seems defensible, but it tells us little we do not already know".[306] However, I want to point out that with the focus on the process of how LEK is made, and the idea of it being knowledge of a non-static nature, information from old records cannot be perceived as a substitute or direct equivalent to recently gathered LEK. However, archive data obviously represents something we can compare and contrast it to, presenting earlier states of a group's local knowledge.

This brings me back to the question of source criticism. As discussed in 3.1., Edelberg and Simonsen describe a diversified approach to source criticism that is adapted to verifying the sources in answering specific questions and research agendas. Statistics, oral history and methods from other social sciences are put forth as some of the alternatives. Based on the LEK found in the Fávllis interviews and the abundance of other historical information available

[305] Keiner 2013: 117-118.
[306] Taylor 2013: 61-64.

about the same area shown in this chapter, I think environmental history seems to be a perfect match for this approach.

Returning to the perspectives of the Scandinavian environmental historians I referred to in 2.2.2., they call attention to how the humanities are under increasing pressure to prove their relevance and utility for modern society, and maintain that environmental history, and environmental humanities, is a way of doing this.[307] As we have seen, much of the literature on LEK, in particular in the Norwegian context, focuses on possible application for management purposes. Integrating LEK into the source material for environmental history will certainly contribute in responding to these pressures. However, I hope this chapter has assisted in showing that the scope of the sub-discipline is not only limited to this application, and that LEK can contribute to a broader environmental history, as well as to the broader cultural history. This final notion could potentially fit well with Worster's previously mentioned praise of environmental history that analyzes people's perceptions of and values about nature.[308]

[307] Jørgensen et al. 2013: 32.
[308] Worster 1988 : 10-11.

Chapter 5: Reflections on interdisciplinary collaboration, policy and history

In 1.1. I posed my research question: *how can local ecological knowledge be utilized as source material in historical research*? In order to answer this, I defined secondary questions that broke this up into questions of epistemology, methodology and practical use. I have focused on a marine resource setting, and environmental history as my main approaches for exploring these questions, and have therefore used the Fávllis project, the Porsanger Fjord and the material gathered there as my cases and sources. As the focus in this thesis is not on empirical analysis but theory and methodology, I will further some of my discussions in addition to summarizing my findings. While this deviates from the norm for concluding chapters, I think it is the proper way to resolve my research questions.

So, what are my conclusions? I think the clearest approach is to begin with my secondary questions.

First, in order to fully describe what local ecological knowledge (LEK) is, in 2.1. I have looked at the general historiography of the term, and more closely on marine LEK in 2.3. This has illustrated how LEK is a part of a broad field of research on different knowledge systems. There is an abundance of terms describing them, putting stress on different elements, such as the indigenous or traditional nature of the knowledge, or if it is about technical or ecological topics. Despite the differences, there are enough similarities that make understanding the development of this broader field important in order to analyze LEK specifically. I emphasize that the core of LEK is that it is experience-based knowledge that is generated, maintained and changed in an ongoing process within a network of its users. The focus on the process of knowledge has become an area of focus in the study of knowledge systems and this aspect is very important when using LEK. This has some implications for how I see the process of using LEK in history that I will discuss further below. In order to place LEK in relation to other knowledge systems, I also examined the perceived differences between knowledge systems such as local, traditional or indigenous knowledge and "Western" science in 3.3. I find that while some scholars see reasons to promote a divide between these, it is no longer controversial to make use of such knowledge in academia and resource management, such as

the recent literature I have referenced and the current mapping activities performed by the Norwegian Directorate of Fisheries, described in 2.3.3.

In 2.3.3. I have also presented an overview of how LEK has been used in marine management and research in Norway. In order to do this I have also considered the general history of the management of fisheries. It is a good approach for looking at the link between LEK and environmental history on a summarizing level. It deals with how the coast and ocean have been understood as environments, the importance they have had for society, and the variety of interaction with the environments they represent. These interactions are social, economic, juridical, technological, and so on. They have also changed over time through local, national and international processes. The outputs from Fávllis highlight these. Andersen (2012) presents LEK about several ecological changes, such as the cod and flounder stocks and the arrival of the king crab. Brattland (2014) shows the changes in technology over the span of fishers' careers. The overview has shown that the extent to which LEK has been utilized has increased over time, and is still evolving. Marine research-based management has a history stretching back to 1860, and the national focus on industrial fisheries has strengthened its position. Over the past 20 years, LEK has started to play a larger role in Norwegian research and marine management. I have referenced much of the research in this thesis, but the extent of the practical inclusion is debated. Local participation in data collection for management is certainly happening as shown by Bjørkan (2011) and others, but it is mostly not experience-based knowledge that is integrated. One exemption is the mapping done by the directorate of Fisheries, where information from fishers are the basis for information layers.[309] I put forth that those interested in LEK should pay attention to the following two recent developments, both mentioned in 2.3.3: when and if the Fjord Fishing Board (FFB) starts to fully operationalize their mandate for collection of LEK, and whether Johnsen et al.'s call for using LEK in conceptualizing the space of governance instead of empirical observations for resource management is heeded.

In Chapter 3, I reviewed the historian's methodological toolbox and looked at how it can be applied to building history from LEK. Looking at the question of source criticism I find that Edelberg and Simonsen's views on how the discipline has moved towards a diversity of

[309] Brattland 2013.

approaches fits well for using LEK as source material.[310] In 3.2. I have made use of Myklebost and Kaldal in looking at theory and methods for the collection and use of oral source material for historical analysis.[311] I find that they are also well suited for use in LEK, particularly for analyzing life-course perspectives and the process of how memories can show the meaning of things in the informants' culture. One particular example is socio-ecological narratives, such as those created from the Fávllis interviews, described in 4.2.3. These represent a synthesis of the general trends and collective narratives of ecological changes that can be seen in the material as a whole. One of these, translated to English, is found in appendix III.

I find two of Myklebost's reflections to be of specific interest for LEK. First, the significance of the informants' own analysis of past events and how these can give insight into the self-experienced processes of change and thus be useful in creating hypotheses for historical analysis. Second, how the process of interviewing the informants can set in motion a local history process where memories are interpreted and integrated in the collective narratives. When it comes to LEK, the informants' reflections on the causes and effects of the ecological changes correspond to the implicit "whys" that Myklebost sees in the retrospective reflections of her informants. Additionally, I would argue that the collective creation and sharing of LEK could be seen to be similar to the formation of collective memories or narratives in a community. One potentially interesting venue in environmental history for this is to explore how the process of collecting LEK might serve to increase awareness on ecological changes and the effects they have had on a community over time. To some extent, the narratives and articles based on the Fávllis material reflect on this, but the material has not been approached and subjected to a complete historical analysis on this basis. This could be part of a possible follow-up activity for Fávllis or an approach to be included in the design of future LEK research projects.

In looking at the approaches of environmental history, several factors make LEK appear to be suitable source material. Obviously, ecological knowledge is of general use when writing about environmental matters. Specifically, LEK deals with experiences of ecological changes over time, the interactions of individuals and communities with nature, and people's thoughts about these. These speak directly to Worster's levels, Hughes' categories, Merchant's

[310] Edelberg and Simonsen 2015.
[311] Myklebost 2002 and Kaldal 2008.

approaches and so on as laid out in 3.4.1. I think the potential for narratives stands out as a core match for LEK and environmental history, providing an opportunity for local perspectives to be a part of how stories of ecological change are told, which could be explored further. In order to be used, the knowledge has to be operationalized. The researchers in the Fávllis project did this by focusing on the socio-ecological dimension of the collected LEK, described in 3.5. and 4.2. Examples are articles about place names and terms[312], and resilience of local communities.[313] *Socio* is broad, and in general, the articles and narratives are also broad in scope. For the narratives, this is by design as they are supposed to represent collective views. I think it is possible to focus more closely on other dimensions, such as the cultural or juridical significance of local knowledge, depending on the type of historical analysis that is being written. Brattland's exploration of the technological changes over the course of informants' careers in the fjord fisheries represents one example of a focused analysis.[314]

As mentioned above, the focus in research on LEK and similar systems has shifted towards the process of knowledge. Operationalizing LEK for use in management or research represents processing and transformation, which I discussed in 3.5. How this is done varies based on the purpose it is to be used for. For instance, international management systems require specific inputs of data, making qualitative LEK difficult to integrate. Agrawal and Holm present perspectives on how this processing can involve scientific verification as well as de-contextualization of LEK, something that has activated discussions of whether or not local people have been taken seriously or seen as unreliable. In the Norwegian context, earlier dismissals of fjord fishers' claims is an example of this. The developments of the past decades, for instance mapping done by the Directorate of Fisheries or the inclusion of stakeholder perspectives, is not based in suspicion but quality assurance, as seen in how different resource users are used to verify the mapping before it is published.[315] I agree with Davis and Ruddle's view that transparent examination of knowledge is not only necessary to ensure good management outcomes, but also for empowering the knowledge holders.[316] I think engagement with locals, both individuals and institutions, is a key factor in doing this in ways that secure participation and anchoring between local communities, management and

[312] Brattland and Nilsen 2011, Nilsen 2011.
[313] Broderstad and Eythórsson 2014.
[314] Brattland 2014.
[315] Solås and Hersoug 2012, Johnsen et al. 2014.
[316] Davis and Ruddle 2010.

researchers. A central part of the Fávllis project in the Porsanger fjord was the collaboration with the Coastal Sami Resource Center (CSRC) in Indre Billefjord. The CSRC facilitated the process of finding informants, collaborated on arranging seminars, workshops and in creating a popular science publication. In addition, as part of the cooperation agreement, the CSRC is the owner of the gathered material. In the context of fisheries management, Bjørkan's suggestion for a more systematic use of resource users in advisory capacities could be one way of achieving closer cooperation with local people and institutions in the future.[317]

I find the processual aspects of LEK to be interesting. In looking at them, it might be possible to see some approaches for to how to use LEK as source material. It is experience-based knowledge that is continually created and changed in a network of resource users. These resource users interact with each other, the environment and other parts of society that collectively make up their extended resource area. Much of this interaction is through different, and changing, types of technology. The environment is in this context also not static, as made apparent for instance by climate change (illustrated by for example increased water temperatures) and the arrival or introduction of invasive species, such as the king crab. All these factors play a part in the network where the process of how LEK is generated takes place. I look at how this is shown in the Fávllis material in 4.3.1.

This might be an opportunity to apply the perspectives of Actor–Network Theory (ANT), mentioned in 3.4.1. Concretely, what I am thinking about here is if LEK is an arena where nature, or parts of it, as well as other non-human factors (such as technology) can emerge as actors. Since both LEK researchers and environmental historians use ANT, it can also be a further point of contact between the two fields, and it must thus be considered. While I admit that the idea of non-humans having, or sharing, agency was a bit of a strange concept to me when I first read about this approach, I believe it can be of use. In order to explain how, I must bring again up Johnsen et al.'s take on using ANT on LEK that I mentioned in 2.3.3. Their approach centers primarily on practical governance.[318] I find inspiration in it for articulating how to relate LEK to environmental history through ANT. In essence, they outline a process where all the relationships that makes up LEK are mapped. This anchors the LEK, in a way binding it to a spatial dimension. In doing this, the space is made complex as a multiple object

[317] Bjørkan 2011.
[318] Johnsen et al. 2014: 4–6, 15–18.

due to the variety of relationships that are involved in forming LEK, and this also serves to give it identity. This complexity is important in many ways: It makes visible the place of all the actors that are involved, and it makes nature appear not as a single and uniform whole, but as an environment that is composed of many parts.

For using this on LEK in a historical context it is not only about mapping actual activities and visualizing them on a map, but also all the relationships and interactions within the network that creates it. Much can be visualized on maps, but I believe historians can show what lies beneath the surface, explore all aspects of the events, and make storied narratives. Here I would also draw in Myklebost again, and consider how a process of mapping such as this can also contribute to a process of reflection on changes in the environment within a community. Brattland and Nilsen (2011) and Brattland (2014) are practical examples of how mapping of LEK can contribute to a process like this, respectively illustrating the multi-ethnic dimension of an area and the significance of technological changes for fjord fishers.

One further point I will bring up here is how ANT has been criticized for being weakly connected to empirical data. Asdal called for ANT to be used on empirical data rather than around it.[319] LEK represents empirical observations, which I believe makes it well suited for doing exactly this. In 4.4.2. I put forth the cases of the effects seals and king crab in Porsanger have had on the ecosystem and communities as two possible examples. While it is outside of the scope of this master's thesis to do an analysis like this, it is one possible approach that could be included in a future LEK-research project.

In chapter 4, I presented the Fávllis network as an example of a research project collecting and using LEK, giving an account of the outputs it produced, especially the socio-ecological narratives. In 4.1. and 4.2. I accounted for the method and process of collecting data and processing it, and the main findings in the material. LEK is generally collected through interviews. Fávllis conducted semi-structured interviews. This approach allows for other topics that the informants bring up to be recorded in addition to the exact, defined questions of a survey. In order to facilitate the qualitative analysis, the interview transcripts were coded using the NVivo software. This made the material more searchable, and made it possible for the researchers to look more easily at the totality of the different topics in the material.

[319] Asdal 2005.

Another example of LEK collection is the mapping and interviews done by the Directorate of Fisheries.[320] Archival material and older written accounts can also be used to find information similar to LEK, but not without some problems.[321] With the focus on LEK as non-static knowledge, I see the use of recorded memories of ecological change mainly as a basis for comparison and not as a replacement for current LEK. In connection with this, collecting LEK in the present day serves to create source material for future research as well. The next generation of environmental historians that want to look at ecological changes can benefit from having access to the snapshots of LEK as it is now, rather than having to reconstruct it from other source material. By collecting broad information and not only about matters that are of interest for management purposes, the utility of LEK is increased.

I have compared the portrayal of the Porsanger Fjord in the interview material with other accounts in 4.3.2. I find that the portrayals are not radically different, which is not surprising since they describe the same area, but the comparison clearly illustrates that the choice of emphasis is significant when writing history. This is hardly striking, but I think that my review of the Fávllis material in 4.3.1. shows that it contains much information about the different relationships that are set in motion by ecological changes. This means that LEK can be leveraged to tell stories about the realities on the ground that are impacted by environmental changes if that is the chosen emphasis of a historical analysis. In doing this, history can also contribute to lift LEK out of the one-track orientation toward management purposes, and into a broader local or cultural historical context. The Fávllis project included several dissemination components, described in 4.2.2.: a knowledge base model, documentary films and a popular science publication. These contribute to a broader communication of the material that was gathered.

I have attempted to point at some lessons to draw from a project like Fávllis, and reflect on possible linkages between environmental history and LEK, as seen in 4.4. Some of these I have summarized already in this chapter. My main take away from it is that LEK and environmental history are well positioned for combination, seeing as both deal with enquiries about the same topics and are equally accommodating for interdisciplinary collaboration. Environmental history seems to be very broadly oriented, focusing on large time-spans and effects on the

[320] See Solås and Hersoug 2012 and Johnsen et al. 2014 for in depth descriptions of this.
[321] Taylor 2013.

scale of large eco-regions. LEK has focused narrowly on questions of relevance to development or resource management, in the Norwegian context on fisheries. In combining the approaches from both fields, it might be possible find a middle course. Where environmental history offers the broad framework for writing history based in human–nature interaction, LEK provides the local context of how this has shaped communities and lives. As mentioned above, the Fávllis project is also a practical example of the benefits of having a strong partnership with a local institution in order to anchor research in a community.

To concisely sum up the answer to my main research question: LEK can be used as source material for historical research in many ways. As has been shown, history is a discipline that is well equipped to use material from oral sources and memory. Ecological knowledge lends itself to answering questions regarding nature and our interaction with it. LEK is part of a broader field of research on different knowledge systems, and is therefore highly interdisciplinary. These two factors makes environmental history a very suitable choice of approach for making use of LEK material. However, both cultural and local history also seem to offer some interesting possibilities. The literature and research on LEK reveals that questions related to management utility and rights have been and still are the focus. History can contribute with some alternative and supplementary uses by providing the opportunity to tell stories of how all the different relationships between the actors that make up the environment and society have played a part in the series of events that local communities have gone through over the course of time. The Fávllis project gathered LEK through semi-structured interviews. This has been used to produce various outputs, such as scholarly articles and popular science dissemination. The material deals primarily with socio-ecological topics in connection with ecological changes, and shows how the locals' experiences of these changes are part of the broader collective local history.

This leads me into my final reflections. First, I will make some remarks about the political entanglement of LEK and some possibilities I see in that, before looking at the big picture: do all the parts I have examined in this thesis fit together in a LEK-inclusive contemporary environmental history?

5.1 The political entanglement of LEK

As should be apparent from the previous parts of this master's thesis, LEK and related fields come with many political and policy implications. These relate to resource and environmental management, rights issues for both indigenous peoples and the population in general, as well as on the ideas of knowledge itself. In many ways, it seems as if LEK is entangled with politics and policy. Working with LEK necessitates coming into contact with them. As mentioned in 3.3.2., Agrawal called attention to the importance of being aware of power relationships when working with LEK. Davis and Ruddle's perspective is that all research that deals with resource management and empowerment of resource users, especially in contexts with asymmetrical power relationships, is "inescapably and justifiably politically charged".[322] In the case of LEK in Norway, this has been articulated in the clash of interest between small-scale fishers and industrial fishing, as well as in the indigenous rights dimension for Coastal Sami fishers' rights. I believe this entanglement is a dimension that should be considered when using LEK as source material for any research. As referred to in 2.2.3., Chiarappa and McKenzie consider marine environmental history's willingness to engage with policy to be a strength, which I think also makes it a good match for integrating LEK into the source base.

In my own region, Northern Norway, there has been a lot of development since the turn of the millennium and it seems more is on the horizon. Looking at Bjørkan, Solås and Hersoug it is clear that management and planning is beginning to accept the utility of LEK, but that the large-scale, practical results are yet to be seen.[323] Johnsen et al.'s view on how LEK adds complexity means that it should be included in the broader levels of governance systems, such as coastal planning, rather than on the level of commercial fishing management; this represents one possible way practical changes might become manifest in the near future.[324] LEK has so far not been a part of large policy endeavors such as the integrated management plan for the Barents Sea and Lofoten, but maybe a stronger integration in the general framework like Johnsen et al. suggests is the way forward.

The indigenous dimension of LEK is essential. In writing this thesis, I have attempted to look more at theory and methodology in general and not write through a primarily ethnohistorical

[322] Davis and Ruddle 2010: 891.
[323] Bjørkan 2011, Solås and Hersoug 2012.
[324] Johnsen et al. 2014.

lens. Throughout the development of the LEK field, much of the groundbreaking work was done in (or on) indigenous peoples' areas. For fishers' LEK there was a shift towards the small-scale fisheries in the developed world, c.f. Zent and Hind in 2.3.1 and 2.3.2. As we have seen from both Nilsen and Evjen in 4.3.2, although small-scale fjord fishing is traditional in all of Norway, it is largely through the Coastal Sami dimension that LEK in practice has been lifted into the Norwegian political and management context. Evjen states that in the past decade a general trend towards democratization of management has appeared.[325] With the establishment of the FFB and the inclusion of LEK in their mandate, the board is set for a continued entanglement between Coastal Sami resource use and LEK, underscored by Jentoft and Søreng maintaining that the FBB represents an example of legal pluralism.[326] While the FFB has been in operation for two years, the part of the mandate dealing with LEK has not yet been activated to a large extent. Assessing the fjord lines has understandably taken a lot of effort and resources, but maybe it is yet an example of Norwegian fisheries management primarily being geared towards economic concerns, as Schwach claims. The tension between small-scale and industrial commercial fisheries can be argued to represent continuity in LEK's Norwegian context, in the same way as it is for Norwegian fisheries policy in general.[327] This also highlights how it is not exclusively tied to the Coastal Sami dimension. One could argue that this is another reason why LEK can be an interesting source of material for historical analysis.

Nevertheless, it is not only a matter of management. Sigvald Persen, leader of the CSRC, reflects on the place of local knowledge for communities and democracy in general, and connects the exclusion and inclusion of LEK with questions of marginalization, identity and real participation in democracy and history, as well as local people's sense of justice. As he sees it, with the focus on national resource policy after the Second World War, the arena for local knowledge changed and lessened the place of local knowledge, with large consequences for Coastal Sami adaptations. In order for this to change, new arenas for local knowledge must be created.[328]

[325] Evjen 2014, also Stephenson et al. 2016.
[326] Jentoft and Søreng (forthcoming).
[327] Finstad 2014.
[328] Persen, S. 2011: "Lokalhistorien, kunnskapen og demokratiet" in Andersen and Persen 2011: 15–21.

Although the relative situation for LEK seems to be good in the Norwegian context, both for status in research and integration in management,[329] the situation is different in other parts of the world. While it is outside the scope of this thesis to deal with the global situation of LEK in general, the literature I have referenced provides examples and points at further reading for those interested.

I believe this entanglement with policy issues of many natures (including economic, rights, and environmental), illustrates ways in which LEK represents good source material to explore what several environmental historians have stated in different ways: that the sub-field encompasses the "previous" branches of history. As discussed in 3.4.2, Cronon pointed out that accounts of the Dust Bowl can be read in a way where the capitalist economic system emerges as the main agent.[330] I will posit that something similar can be done for LEK, with the different levels of environmental governance emerging as the main actor, on the local, regional, national and international arenas. Policy regulates the many interactions between human beings, society and nature. Maybe it can even be said that policy represents these interactions. This makes it one possible point of entry to environmental history. One approach could be through an examination of national licensing laws, arguably the ultimate expression of political domestication of nature and their impacts on local resource use and LEK.[331] Professor of history Randi Rønning Balsvik discusses some of the points of contact between such policies, economic power and rights.[332] While her comments are primarily on the Norwegian Hydropower concession laws from the early 1900s, the current debate on the seafood industry in Norway makes it clear that this is still a highly topical issue. The latest development was that the Parliament's Standing Committee on Business and Industry recommended a new committee be established to study the delivery obligations of the fishing

[329] Eythórsson and Brattland 2012, Bjørkan 2011, Solås and Hersoug 2012, Brattland 2013, Jentoft and Søreng (forthcoming).
[330] Cronon 1992: 1363–1364.
[331] I got this idea from a public lecture by Else Grete Broderstad and Eva Josefsen titled "Urfolkspolitikk i nord, grensesprengende eller bremsekloss for lokal utvikling?" ("Indigenous policy in the North, ground-braking or hindrance for local development", my translation) on February 6th 2016, in which they referred to Balsvik.
[332] Balsvik, R. 1995: "Lokale ressurser og politisk styring: de norske konsesjonslovene" (Local Resources and Political Control: the Norwegian Laws of Concession) in: Brantenberg, T., Hansen, J. and Minde, H. (Eds.): *Skriftserie for Senter for samiske studier NR. 2:* "Becoming Visible - Indigenous Politics and Self-Government". Available online.

industry.[333] The recommendations were passed by the Parliament on April 5 2016.[334] Another example of an area where this can be relevant is in regards to aquaculture, where debate is created when local concerns of different types collide with commercial interests.

The benefits of working with anthropology, ecology, fisheries science and geography for writing environmental history are well established. Many of the abovementioned points are highly topical in several fields, and taking a closer look at collaboration with political science could be a good idea for further exploring LEK's entanglement with politics and policy. There is currently a focus on neo-liberalization in governance research, and questions of indigenous self-determination, participation and legal pluralism are highly relevant. International processes through the United Nations and management organizations like the International Council for the Exploration of the Seas are also examples of overall policy frameworks that, in theory, are exerting increasingly more control on national legislation and thus local communities.

5.2 Towards a LEK-inclusive contemporary environmental history?

With the discussions of theory and methodology for both LEK and environmental history in mind, how do these two fields fit together? What are the main points of contact?

As discussed in 3.4.3., environmental historians must make use of data about the biophysical world as source material in order to answer some of their research questions, while other questions are more oriented toward studying the environment-oriented ideas, perceptions and values of a community or society. For all these questions, the human–environment interaction must be a part of the analysis. LEK, with its emphasis on the ongoing process of the experience-based knowledge within a community making use of an environment, can contribute to all of these aspects. While it can seem apparent that LEK might mainly be relevant for studying the socio-ecological dimensions of society, there are well-documented empirical applications. Examples include proving the existence of local fish stocks, documenting longer-term data sets to avoid shifting baselines, or discovering changes in the ecosystem that are missed by annual natural-science data collections (such as unusual migrations of seals, or fish appearing later in the season). However, in order to get the whole

[333] Proceedings in Norwegian: https://www.stortinget.no/no/Saker-og-publikasjoner/Publikasjoner/Innstillinger/Stortinget/2015-2016/inns-201516-215/?lvl=0.
[334] Protocol online: https://www.stortinget.no/no/Saker-og-publikasjoner/Vedtak/Vedtak/Sak/?p=63666.

picture it is necessary to collaborate with other disciplines, including the natural sciences. For some purposes, scientific verification is necessary for management to work as intended.[335] This can be complicated and not without some pitfalls, as we have seen from Eythórsson and Brattland, Maurstad, Keiner and others: integrating the disciplines in the practical research, agreeing on the scope of the research and finding balance between the disciplines, and not mainly serving to provide context for verifying data sets.

One of the core areas that can cause problems is lack of overlap between what LEK covers and what is covered for instance by research cruises.[336] There might be some similar problems for LEK-based environmental history as well. The ambitions of environmental history stretch far beyond the lifespan of an average fisher (or historian, for that matter), which is the core timespan covered by LEK. Much marine of environmental history deals with the 1800s and early 1900s; Taylor accounts for the challenges involved in mining old archives for data on the past environment.[337] Collecting LEK takes a snapshot of an evolving knowledge at a given point in time, but can also be compared with earlier sources in order to study the process and examine relatively recent changes. LEK also contains the collective memories of the previous states that the current generation of resource users compare their experiences with, which in a way can be said to function like its own historiography. This can be an argument for using LEK primarily for studying near past and contemporary contexts, and relying on the "traditional" environmental history for connecting it to the longer time spans that are outside the memories of the most recent generations.

This has several potential consequences. Interdisciplinary collaborations with other social sciences or the humanities is not hard to argue for when looking at the near past or contemporary events. This is further strengthened by the close relationship between the issues LEK deals with and policy. Nevertheless, there are other avenues to explore as well. The local perspective from LEK might also serve historical analyses that deal with questions of local history, identity and memory. Through mapping all the parts that make up LEK, as discussed above, the complexities of the relationships and the fragmented nature of the environment

[335] Davis and Ruddle 2010.
[336] Eythórsson and Brattland 2012.
[337] Taylor 2013.

are made visible. Through studying these relationships I believe it is possible to use LEK as an entryway into broader topics than resource management.

In his concluding remarks on the future of environmental history, Hughes predicted that the field would continue to grow. He attributed part of this to the openness to interdisciplinary collaboration. Furthermore, he identified the growing global concern to the negative effects of ecological change. He points at tension related to demography, resource access, the use of resources between actors on different levels and threats to biodiversity as themes for changes in the environment, and proposes that environmental history can provide the long-term perspectives necessary to avoid hasty, short-term solutions.[338] Looking at these themes, it is apparent that perspectives on local resource use and ecological changes are useful to include. Practical examples from the Fávllis material are numerous: The effects on settlement patterns in the rural areas from changes in the employment opportunities in the fisheries, as well as other changes in the economic system. The decline in the local fisheries attributed to changes in resource access due to the seal invasion and overfishing, and political changes in the quota system also played a role. Local views on the differing interests of small-scale fisheries and commercial fisheries shows the tension between actors on different levels. The ripple effects of the disappearance of the kelp-forests and the arrival of the king crab are also major ecological changes that display issues of biodiversity.

While it is tempting to launch a new sub-field (maybe *local-environmental history* could be a suitable title?), I believe that the existing branches of history can cover these themes adequately. While I do not see the need for a separate form of history, I posit that in this thesis I have made the case that there is a use for an emphasis on local-environmental lines of inquiry when writing many different types of stories. Furthermore, I find that including the narratives of local experiences is a fruitful approach for operationalizing local-environmental history.

Referring to the title of this sub-chapter, I maintain that LEK can be part of the source material for a contemporary environmental history, but the LEK-inclusive part implies that it is one piece among many.

[338] Hughes 2006: 124-126.

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Appendices

I: Fávllis interview guide

II: Node structure for coding

III: Narrative about seal

Appendix I – Interview guide

Intervjuguide for kartfesting av ressursbruk
Våren og sommeren 2009

Intervjuet/møtet tar utgangspunkt i informantens egne erfaringer og minner omkring hvor det foregår fiske og hvordan fjorden ble og blir brukt og kartfeste dette.

Gjennom dette vil en også få fortellinger om viktige hendelser/tidsperioder som har tilknytning til naturressurser og ressurshøsting i området.

Målet er å få fram informantenes kunnskaper og synspunkter på bruk og endring i bruk av fjorden, i sammenheng med endringer i lokalsamfunnet, næring, teknologi og kultur/språk.

Et kart over fjorden skal brukes aktivt under intervjuet/møtet, med tanke på stedsnavn på hav og land, fiskeplasser og fiskegrunner, kunnskap om hvordan det ser ut på havbunnen, ressursområder, gytefelt, bruksområder og kartfesting av fortellinger og informasjon. Det beste er sjøkart kombinert med stedsnavn, eller økonomiske kartverk (fra kommunen) så langt en har disse. Bruk ett kart per informant og lag oversikt over både kart, informanter og digitalt opptak av samtalene.

Intervjuguiden er veiledende, og må brukes ulikt avhengig av informantens alder, kjønn og yrkesbakgrunn. Hvis tiden ikke strekker til bør det avtales et nytt intervju.

Intervjuperson/informant:
Kommune/område:
Kjønn:
Bosted (nåtidig og ved fødsel)
Fødselsår:
Aktiv som fisker i tidsrommet:
Hjemmespråk:
Arbeidsspråk:

Erfaringer med bruk av fjorden

1. Hva er din erfaring med bruk av fjorden generelt, hvordan begynte du å fiske?
Innledende spørsmål for å komme i gang. Presentasjon av kartet som en oversikt over fjorden for å holde orden i intervjuet/møtet.

2. Hvor har du fisket/fisker du hen i fjorden? Er det noen viktige fiskeplasser i fjorden?
Fokus på fiskeplasser, garnsett, fiskegrunner. Skille på ulike arter, ulike perioder av året, med ulike redskaper. Ved bruk av kart blir stedsnavnene viktig, la informanten selv merke av hvor på kartet de vil sette stedsnavn og fiskeplasser.

3. Hvor og hvordan har du lært dette, og hva ble fortalt deg om de ulike fiskeplassene (og hva de ellers hadde slags betydning)?
Her kan det komme opp ulike fortellinger om folk, fortida, hva plassene ellers ble brukt til. Médpunkter på land kan ha andre navn enn det som står på kartene.

4. Hvem bruker disse plassene i dag, og ble de brukt i samme grad før? Er det noen som ikke vet om disse plassene?
Skille mellom meg og min familie, folk i bygda, folk i fjorden, folk utenfra fjorden, og de som fisker med andre type redskaper (aktive eller passive) enn meg. Kan også være at informanten har brukt ulike typer redskaper gjennom ulike perioder. Bruk livsløp som ledetråd for å skille mellom dette.

5. Er det navn på disse fiskeplassene, og hvordan finner en dem (médpunkter)?
Er det andre som vet navnene på disse plassene om ikke informanten vet om det?

6. Hva slags fisk er det på disse plassene, og har fisket forandret seg etter som du har observert? Eventuelt hvorfor det?
Her kan en komme inn på gytemønster, og sammenhenger mellom tareskog, de ulike fiskeslagene, og fiskepress. Skille på observasjoner informanten har gjort, tolkninger av dette, og verdiutsagn.

6. Hører fiskeplassen til noen, er det en gruppe folk som bruker disse plassene spesielt?

7. Hvordan vet du at det er fisk på disse plassene, har det skjedd endringer i bruken av plassene og hvorfor det?
Her er det fritt rom for egne tolkninger fra informanten om bruken.

Hendelser i ulike tidsperioder:

1. Tiden før krigen (1900-1940): Ressurssituasjonen, høsting og næring (næringskombinasjoner). Fiskebruk, tørrfiskproduksjon, økonomi, bosetting, kultur og språk.

2. Krigsårene, før evakueringen (1940-44): Hvordan ble lokalsamfunn, ressurshøsting, økonomi og kultur påvirket av den tyske okkupasjonen?

3. Gjenreisningsårene (1945-1950): Ressurssituasjonen i fjorden, endringer i næring og bosetting, språk og kultur.

4. Sildeårene: Utviklingen av sildefisket, hvordan påvirket det ressursene og fiskeriene i fjorden? Konflikten om sildefisket, fiskarlagenes fredningskrav, virkninger på lokalsamfunnet. Hva skjedde med torsken når silda var borte? Hva skjedde med garnfisket når torsken ble mindre i størrelse? Finnes det en lokal sildebestand i fjorden?

5. Laksen og sjølaksefisket: Betydningen av sjølaksefisket i fjorden fra etterkrigstiden til i dag. Hvordan har det utviklet seg? Ble det påvirket av småsildfisket? Ble det påvirket av drivgarnfisket etter laks? Blir det påvirket av oppdrettsnæringen?

6. Ressurssituasjonen på 1970- tallet: En oppgangstid for torskefisket i fjorden? Betydningen av reketråling, snurrevadfiske, nylongarn (maskevidde?), seinotfiske. Hva skjedde med seibestanden? Når merket man at gytefelt for torsk begynte å bli utfisket? Så man forskjell på de ulike torskestammer i fjorden?

7. 1980-tallet: Fjordfredningskonflikt og økologisk ubalanse i Barentshavet.

Appendix I – Interview guide

Hvordan var fisket på 80-tallet? Betydningen av de tidsbegrensede fredningene av gytefelt? Betydningen av at man ikke fikk helårsfredning mot snurrevadfiske? (Hvordan virket selinvasjonen inn på fisket og ressurssituasjonen i fjorden, og hvor lenge varte den?) Fikk nedgangen i loddebestanden innvirkning på ressursene i fjorden?

8. 1990-tallet: kvoteregulering, kystsel, nedbeiting av tareskogen, kråkeboller. Når ble det "svart hav" i fjorden? Hvordan virket fartøykvoteordningen inn på fisket?

(Når begynte **kystselen** å bli et problem i fjorden? Hvorfor er den et problem?)

Når merket man **nedbeitingen av tareskogen**? Øker den fortsatt, eller har den endret seg? Hvorfor ble det "svart hav" i fjorden? Hva burde vært gjort annerledes? Har fisket skylden eller fins det andre årsaker?

(I forhold til Havforskninga er det viktig å spørre om 1:kystselen før og nå, uenigheten om bestandsstørrelse og jakt, og oppfatninger om selens negative rolle for fisket. 2: Tareskogen, har den vært nedbeitet i tidligere tider? Observasjoner og oppfatninger om sammenhenger; hvorfor kråkebollebestanden har økt, virkninger av nedbeiting av tareskogen.)

9. 2000-tallet: Endringer i ressurssituasjonen, tegn på at kysttorsken er tilbake? Kråkeboller som ressurs?

(Negative og positive sider ved at kongekrabben er kommet til Porsanger? *Kongekrabben som ressurs: nye tilpasninger i fisket, hvordan påvirkes de av at krabben i fjorden er underlagt to motstridende forvaltningsregimer; utryddelsesfiske og næringsfiske?)*

Fiskeriene i fjorden, bosetting og kultur langs fjorden i dag – og utsikter framover.

Appendix II – List of coding categories

Community:

- Community
- Demographic data
- Impact on local economies
- Local participation (in management and fishery politics)
- Processes like kinship
- Social differences in the fjord

Ecological change (explanations, hypotheses):

- Climate
- General ecological changes
- Overfishing (or not)
- Pollution, acification
- Species interaction (i.e. ”overgrazing”)
- Fish disappearance – empty fishing grounds

Fishing gears and boats:

- Active gears (tråL, not, snurrvad, ++)
- Passive gears (garn, jukes, line, otring, ++)
- Large boats
- Small boats
- Changes and adaptions in equipment use

Fishing practises and connection to fisheries:

- Customary and current use/practices.
- Dating of own participation in fisheries
- Fishery as a main occupation versus part-time
- Leisure fishing
- Professional fishing (full time)
- Professional fishing (part-time)
- Receiving terminals and processing industry
- Subsistence fishing

Identity and ethnicity:

- Connection between fjord ecology and identity
- Factors related to identity and ethnicity
- Information about traditions

Landscape:

- Customary use and territoriality
- Knowledge of the interplay between sea landscape, fish and gears
- Open access vs. practice
- Usage of places in the fjord (See description)
- Landscape – Geographical (*empty*)
- Landscape – Social (*empty*)
- Landscape – Cultural (*empty*)

Language:

- Factors related to language
- Lanuage related to resource utilization

Appendix II – List of coding categories

- The origin of Sami place names

Local ecological knowledge of the fjord:

- Ecosystem - species movement and interaction
- Empirical data about the fjord
- Species behavior
- The ecological cycle (seasonal changes)
- Weather and climate

Market:

- Economic relationships
- Fish buyers/Receiving terminals
- Relationships: economic relations (e.g. Sami speaking buyers versus non-Sami speakers)
- Local markets
- Out of fjord markets
- Salmon farming
- Size of catch for sale (market)
- Variations in the resource foundation

Observations:

- Conveyed observations
- Emotional impact
- Personal observations (stories)
- Sense of justice (rettsoppfatning)
- Value statements (Ecological)
- Value statements (social, legal and economical)

Perceptions on legislation, fishery management and other actors:

- Earlier management systems
- Local perceptions on the management systems (quotas, etc)
- New quota system, 1990 - a tipping point
- Perceptions on legislation and legislators
    - Violation of the law

Perceptions on the past and future development:

- General reflections about the future
- General reflections about the past
- Past reflections on the future
- Reflections about research projects
- Reflections about future settlement and fishing

Places:

- (Nodes for places)
- Fishing grounds
- Fishing grounds – inner Porsanger
- Fishing grounds – outer Porsanger
- Fishing grounds – spawning grounds
- Porsangerfjorden – Inner
- Porsangerfjorden - Outer

Appendix II – List of coding categories

Species:

- (Nodes for the various species)
- Drifts (innsig)
- Stock (fish and other) – Decrease
- Stock (fish and other) – Increase

Subsistence:

- Own subsistence (e.g. ”kokfisk”, hunting, gathering)
- Sharing and exchange of goods
- Size of catch (subsistence)
- Subsistence economy
- Farming

Vedrørende tidfestelse og tidskonstituerende hendelser er det kategorier for både tidsperiodene og de tidskonstituerende hendelsene. Tanken er at det kan være fruktbart å ha et rammeverk for tidsfestelse av endringer i fjorden som ikke er direkte knyttet til de tidskonstituerende hendelsene.

Time periods for dating:

- (-1940) Før krigen
- (1940-45) Krigen
- (1945-55) Gjenreisningen
- (ca. 1950-1975) Sildeårene
- (1970-1980) Oppgangstid (og overfiske?)
- (1980-1990) Fjordfredingskonflikt og økologisk ubalanse i Barentshavet, selinvasjon
- (1990-2000) Store endringer (kvoteordning, tareskogen, kråkeboller)
- (2000-) Endringer i ressurssituasjonen

Time-constitutive events:

- Personal time-constitutive events
- Andre verdenskrig
- Gjenreisningen
- Sildeårene (ca. 1955-65)
- Da seien forsvant (1970-80)
- Ny kvoteordning (1990)
- Da Porsangerfjorden ble fisket tom
- Selinvasjonen (1987-89)
- Kongekrabben kommer (2000-)
- Fangst av kongekrabben (2004-)

Tipping Points:

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Appendix II – List of coding categories

Free Nodes:

Impact:

- (Kategori for å markere steder hvor informantene snakker om virkningen forskjellige momementer har hatt på fjorden og lokalsamfunnet, for å bedre søkbarheten).

Causes:

- (Kategori for å markere steder hvor informantene snakker om årsakene til endringer i fjorden og lokalsamfunnet, for å bedre søkbarheten).

Resource Conflicts:

- (Kategori for å markere steder informantene snakker om ressurskonflikter, for bedre søkbarhet)

Personal Hypotheses:

- Kategorie som markerer hvor informantene snakker om egne hypoteser.

Informantinformasjon:

- Informasjon relevant for profilering av informantene.

Appendix III – Narrative about seals

Seal in Porsanger.

The seal is a fjord-dweller that has been living in Porsanger for a long time. It is mostly talk of three types of seals in the fjord, the native gray seals, harbor seals and ringed seals (coastal seals). However, harp seals also come to the fjords sometimes. If you ask a fisher in the Porsanger fjord to mention one special event that has had great impact on the ecological changes in the fjord, the answer will often be "the seal invasion at the end of the 1980s." At that time, there came a large amount of harp seals to the fjord. This contributed to poor fishing for several years, which many believe had major consequences for the local communities.

For good and bad, the seal has been of great significance for the people of Porsanger throughout history. In earlier times, the seal was an important resource for those who lived along the fjord. Hunting for seal was an important source of food, and skins and blubber were valuable trade goods and raw materials for crafts. From the time around the Second World War and onwards, the use of seal as a resource has played a reduced role.

During the latter half of the 1900s, there have been many significant changes in the fjord, which has also affected perceptions on the seal and its role in the fjord ecosystem and as a resource for the locals. The prevailing perception gives the impression that the seal has gone from being considered a welcome utility animal to be a troublesome pest. As the size of the fish stocks in the fjord has also lessened, the fjord fishers and seals compete for the same reduced resource. The seal also creates problems for fishers by damaging fishing gears and causing a deterioration of the quality of the catch. The latter by both by eating fish that have been caught in the nets, and that nematodes spread from seals to fish. The seal is also seen as partly responsible for changes in the ecosystem and decline in fish stocks; it claimed that it scares the fish deeper into the fjord, and that the increase in the seal population causes a number of fish stocks to be grazed down, which contributes to destroy the ecological balance of the fjord.

In some ways, the seal became a catalyst for major changes in the economic base of the fjord. The harbor and gray seal populations in Porsanger have remained sizeable in period after the so-called “seal invasion”. In addition, there has been considerable disagreement between the locals, researchers and managers about the size of the seal populations and conservation regulations. There is great frustration with the way seals are managed in the fjords, and many consider it a nuisance and hindrance to the fisheries. It can seem like much of the local’s frustration with and distrust of the central government comes to show in the conflicts about the seal. Even though many think that the seal is one of the main causes of the current resource situation (in addition to overfishing in the close and distant waters over a long period of time), there are several who have sympathy for the seal, and point out that it also needs to eat. Some state that that seals have a place in the fjord, but that the population has become too large for the well-being of the economic basis (mainly fishing).

The locals do not doubt that that the seal is adaptable and changes it’s behavior in order to acquire fish. Perhaps the versatile fjord fishers see bit of themselves reflected in the seal?

Despite the fact that many have a strained relationship with the seal, it comes across that it is an important part of the traditional fjord culture, as is shown for example by the Coastal Sami Resource Centre’s project on the seal as a resource in Coastal Sami culture.