

CLIMATE CHANGE ADAPTATION IN TRADITIONAL LIVELIHOODS

A study of facilitation in Norway and Nepal



Margrethe Rake Zeiffert

Master Thesis in Climate Change Management

Department of Environmental Sciences, Faculty of Engineering and Science

WESTERN NORWAY UNIVERSITY OF APPLIED SCIENCES

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Climate Change Adaptation in Traditional Livelihoods

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Author: Margrethe Rake Zeiffert	Author sign. <i>Margrethe Rake Zeiffert</i>
Thesis submitted: Spring 2021	Open thesis
Main Supervisor: Marte Lange Vik Co-supervisor: Torjus Solheim Eckhoff	
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Preface

The last two years of the master's program in Climate Change Management have offered many ups and downs. The covid19 situation has characterised the everyday life and made the study a quite different from what I had expected. Despite this, I look back at many good memories. The last semester of writing this thesis has been challenging, but also an exciting and educational process. Much of the reason for this is the people that have surrounded me and who have helped me along the way. Therefore, there are many who deserves to be thanked for leaving me with the good feeling I now have, when my writing is completed.

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I would like to thank GRID-Arendal who was willing to help me design the project and to find useful informants.

Further, I would like to thank all my fellow students for the good memories attained throughout these last years, and for the conversations and tips over the last couple of months.

I must also thank all the informants who took the time to talk to me and wanted to share their knowledge and experiences. This information was greatly valued.

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Abstract

The climate changes are now leading to a common understanding of the importance of adaptation to prevent disastrous outcomes on nature and people. In Norway and Nepal people engaged in reindeer herding and agriculture, which are highly affected by the changes, are in need of good adaptation actions to sustain their traditional livelihood. Traditional knowledge in combination with the established scientific knowledge are said to enhance the success of adaptation. Moreover, ecosystem-based adaptation (EbA) is getting increased attention as a sustainable way to adapt. Based on this, I have developed one main research question with two associated sub questions, these are: How do public authorities in Norway and Nepal facilitate local climate change adaptation in communities with traditional livelihoods? How is traditional knowledge and ecosystem-based adaptation included in the climate change adaptation policies at national level? How are these national policies implemented at local level? By having a comparative design and comparing the Norwegian and the Nepalese case, the similarities and differences stand out and the phenomenon can be clearer. To answer these questions, interviews with relevant informants and a document analysis of the national climate change policy documents were conducted. The findings show that there are several differences between the countries. Traditional knowledge and EbA are mentioned in both documents, however, to a higher degree in the document from Nepal. Nepal's policies include options for adaptation at local levels, whereas the Norwegian document lacks these guidelines. This is also reflected in the implementation of climate change adaptation at local levels, where there is seemingly more focus on traditional knowledge and of using the nature to adapt in Nepal than in Norway. In the thesis I am discussing how knowledge, inclusion and conflicts have affected the facilitation of climate change adaptation within the traditional livelihoods. The study concludes that both countries have room for improvement regarding their national climate change adaptation policies and implementation at local level. This is something that should attain more focus in order to prevent the livelihoods of reaching a tipping point, and the loss of all the valuable traditional knowledge becomes a fact.

Sammendrag på norsk

Dagens klimaendringer har nå ført til en felles forståelse av viktigheten av klimatilpasning for å forhindre katastrofale utfall for natur og mennesker. I Norge og Nepal er menneskene som driver med reindrift og jordbruk sterkt påvirket av klimaendringene, og i disse sektorene er det behov for gode tilpasningsløsninger for at de skal kunne å leve etter sin tradisjonelle levemåte. Tradisjonell kunnskap i kombinasjon med etablert vitenskapelig kunnskap sies å øke suksessen med tilpasning. Videre får økosystembasert tilpasning (EbA) økt oppmerksomhet som en bærekraftig måte for tilpasning. Basert på dette, har jeg i denne oppgaven utviklet et hoved-forskningsspørsmål med to tilhørende underspørsmål, disse er: Hvordan legger offentlige myndigheter i Norge og Nepal til rette for lokal tilpasning til klimaendring i samfunn med tradisjonell levemåte? Hvordan er tradisjonell kunnskap og økosystembasert tilpasning inkludert i klimatilpasningspolitikken på nasjonalt nivå? Hvordan implementeres disse nasjonale retningslinjene på lokalt nivå? Ved å ha et komparativt design og sammenligne den norske og den nepalske saken skiller likhetene og forskjellene seg ut, og fenomenet kan bli tydeligere. For å svare på disse spørsmålene ble det gjennomført intervjuer med relevante informanter og en dokumentanalyse av de nasjonale klimapolitiske dokumentene. Funnene viser at det er flere forskjeller mellom landene. Tradisjonell kunnskap og EbA er nevnt i begge dokumentene, men i høyere grad i Nepals dokument. Nepals klimapolitikk har også inkludert muligheter for tilpasning på lokalt nivå, noe det norske dokumentet ikke har. Dette gjenspeiles også i implementeringen av klimatilpasningen på lokalt nivå. Der det tilsynelatende er mer fokus på tradisjonell kunnskap og å bruke naturen til å tilpasse seg i Nepal enn i Norge. I oppgaven diskuterer jeg hvordan kunnskap, inkludering og konflikter har påvirket fokuset på klimatilpasning innenfor tradisjonelle levemåter. Studien konkluderer med at begge landene har rom for forbedring av sin nasjonale politikk og implementering på lokalt nivå. Dette bør gis mer fokus for å forhindre at levemåtene når et vippepunkt og tap av all verdifull tradisjonell kunnskap blir et faktum.

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List of abbreviations

CEAPRED	The Centre for environmental and agricultural policy research, extension and development
EbA	Ecosystem-based Adaptation
HKH	Hindu Kush Himalaya
HDI	Human development index
ICIMOD	The International Centre for Integrated Mountain Development
LAPA	Local adaptation plan for action
LDC	Least developed country
NAPA	National adaptation plan for action
NAP	National adaptation plan
NOU	Official Norwegian Reports (Norges offentlige utredninger)
NSD	Norwegian centre for research data
UNFCCC	The United Nations Framework Convention on Climate Change

1. Introduction

The fact that mitigation is no longer enough to cope with the expected climate changes has now been recognized for a while, and the understanding of the need of climate change adaptation to prevent disastrous outcomes on both nature and people is growing (Noble et al., 2014, p. 837). This has led to an increasing amount of adaptation research over the last two decades (Sietsma et al., 2021, p. 4). We have already experienced many of the impacts of the changing climate all over the world, and these are expected to be even worse in the future (Allen et al., 2018, p. 53; Collins et al., 2013, p. 1082). The United Nations Framework Convention on Climate Change (UNFCCC) therefore stresses that it is important to find good solutions to adapt to the climate changes now, as adaptation will be even more difficult and expensive in the future (UNFCCC, n.d.). Since natural changes in climate has always occurred, both people and nature have needed to cope with this and to adapt to survive (Miljødirektoratet, 2020). As we know today that adaptation is needed, and the importance of it, we need to figure out what the best approaches and solutions are. Additionally, site-specific adaptation solutions are required, since there will be variations in how climate change affects the different parts of the world (Burkett et al., 2014, p. 180).

Higher temperatures is now being experienced all over the globe, and the Intergovernmental Panel on Climate Change (IPCC) has projected that by the end of this century the global mean surface temperature can potentially increase by several degrees (Collins et al., 2013, p. 1055). The climate changes will vary depending on the location, and some areas are expected to experience changes in drought events, while other areas will face changes in precipitation patterns (Pfahl et al., 2017). Extreme weather events are anticipated to happen more frequently and can cause severe damage on humans, nature and infrastructure. However, the occurrence of extremes will have huge regional differences (Hoegh-Guldberg et al., 2018, pp. 210, 249). All these above-mentioned projections and changes are already experienced globally, and the impact will likely increase gradually towards the end of the century (Collins et al., 2013). The regions close to the poles and high mountain areas are likely to be highly exposed to these changes. Here, the temperature is likely to rise faster and higher than the global average (Hock et al., 2019, pp. 137-138; Hoegh-Guldberg et al., 2018, p. 259; Krishnan et al., 2019, p. 78). The Arctic and Hindu Kush Himalaya (HKH) are found in these regions, making them very vulnerable

in terms of climate changes. As the Arctic and HKH are located in regions that will be highly impacted by climate change, this further means that the nature and ecosystems in these areas are put under a lot of pressure (Cornell et al., 2016, p. 41; Hoegh-Guldberg et al., 2018, p. 254; Xu et al., 2019, p. 154).

Both Norway and Nepal are located within the Arctic and HKH. In these countries, many people with traditional livelihoods are living, which are highly dependent on the nature and its resources, and when the nature is changing, these communities are affected (Hock et al., 2019 pp. 154, 163; Mishra et al., 2019, pp. 459-460). The two countries are quite different in terms of vegetation, culture, economy and development, however, their location in the Arctic and HKH respectively, makes the countries face similar climatic challenges. In Norway one of the traditional livelihoods is reindeer herding, while agriculture is most common in Nepal. Both these livelihoods are vulnerable to the impacts of the changing climate (Landbruksdirektoratet, 2021; MoPE, 2017, pp. 11-12). Since these populations have lived in these areas for a long time, they have experienced a variety of natural changes and have shown to be very adaptable and able to cope with these local climate variations (Mazzocchi, 2006, p. 464). However, local and indigenous communities have pointed out that in addition to climate changes, land use changes are one of the most important drivers for change in nature (Ichii et al., 2019, p. 75). This put additional pressure on the livelihoods. A combination of today's rate of anthropogenic forces, and the impacts that these have on the traditional livelihoods, in addition to societal changes constrains or barriers to development, create new and greater challenges for these communities (Magga et al., 2009, p. 14; Mishra et al., 2019, p. 460).

Traditional livelihoods can further be vulnerable due to conflicting interests or skewed power relations when it comes to climate change adaptation and societal development. In Norway for instance, the modern management of land areas has shown to be a challenge for some reindeer herders, making it harder for them to adapt. This management, often based on scientific knowledge, is designed to optimize the usage of nature for harvesting resources. This type of management can often be in conflict with the interest of reindeer herders, and thereby affect them and their livelihood negatively (Benjaminsen & Svarstad, 2017, pp. 193-194). This also reflects how scientific knowledge have gained more universal acknowledgement in recent history, while the knowledge of people within the traditional livelihoods is less appreciated and valued (Ichii et al., 2019, p. 14). Further, Nagoda and Nightingale (2017) show how climate change adaptation can make marginalised groups in Nepal even more

vulnerable due to the power relations connected to the planning and implementation. Here the lower classes and marginalised people are often not heard in the process of planning, even if the project are intended to decrease their vulnerability. These examples show that in some instances, the exclusion of the knowledge within traditional livelihoods have led to less sustainable outcomes. This is further emphasised in the study by Sietsma et al. (2021, p. p. 11), where they found that even as there is a huge increase in adaptation research, there is yet a need for more research and adaptation work that includes local communities.

The above-mentioned examples show how there can be different barriers to adaptation both in terms of conflicting development interests and in the distribution of power. However, as the climate changes is a fact, and are already affecting nature and people, the importance of finding good adaptation solutions is increasing (UNFCCC, n.d.). This task is not easy, especially since there can be many different interests and considerations to take. Even though finding the best solution to adapt in each location and situation is hard, there exist several different approaches to adapt, ranging from engineered and technological measures to ecosystem-based solutions (Noble et al., 2014, p. 845). Ecosystem-based adaptation (EbA) have gained increased attention as it is likely to give multiple benefits and be a low-cost solution to implement (Jones et al., 2012, pp. 504, 506). However, there exist many different EbA options, and the most favourable measure to implement will depending on the location. Therefore, in order to implement a successful measure, site-specific information is needed (Nalau, Becken, & Mackey, 2018, p. 362). As the EbA approach is based on utilizing the nature and its services (CBD, 2009, p. 10), many people engaged within traditional livelihoods, like reindeer herding and agriculture, are likely to have used such approaches when coping with climatic variabilities over time. Within these communities, information gathered over a long time and many generations, often called traditional knowledge, have been important in finding good solutions to adapt to environmental changes (Mazzocchi, 2006, p. 464). These communities' interaction with, and knowledge about nature, are also likely why research highlights the importance of including traditional knowledge in the planning for EbA (Nalau, Becken, Schliephack, et al., 2018, p. 852). This is in contrast to many of the other adaptation approaches which are mainly based on scientific knowledge and do often not use natural resources for adaptation, which can further make them in need for more maintenance and hence, more expensive to implement (Jones et al., 2012, p. 507; Noble et al., 2014, p. 845).

Even though literature state that traditional knowledge is important to include in planning for EbA, Karki et al. (2017, p. 1) points out how the increasing speed of changes and number of challenges have revealed limitations in traditional knowledge. The climate change and other societal factors put too much pressure on the livelihoods for them to adapt the way they have been used to. This has led some people holding on to valuable traditional knowledge shift to using modern technologies, instead of combining it with the traditional knowledge, and further evolve the old practices and knowledge (Karki et al., 2017, p. 14). However, even as traditional knowledge holders have met new challenges in the face of climate changes, they still hold on to valuable knowledge that can be used to increase the quality adaptation measures, especially EbA. This is also advocated by the parties of the UNFCCC. They highlight the importance of awareness of the vulnerable communities and ecosystems, and to include the best available knowledge, including traditional knowledge, when planning for climate change adaptation (UNFCCC, n.d.). Nakashima et al. (2012, p. 65) further states that policies which include traditional knowledge in defining priority concern are more likely to succeed in adaptation actions. In addition, traditional knowledge, is of particular importance for effective implementation in vulnerable livelihoods, like reindeer herding and agricultural (Nakashima et al., 2012, p. 69). With increased emphasis on, and amount of research about adaptation in general, there is now a possibility of combining traditional knowledge on adaptation approaches with new science to find good adaptation solutions for future climate change (Cornell et al., 2016, p. 36).

There are several different organisations working with adaptation and to protect the rights and livelihoods of vulnerable people. In Nepal the International Centre for Integrated Mountain Development (ICIMOD) are working to improve livelihoods and simultaneously protect mountain environments and cultures (ICIMOD, 2021). Furthermore, the Center for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED) is a non-governmental organisation working to empower the local communities and to promote inclusive and sustainable agricultural practices (CEAPRED, 2021). In Norway the Saami Council are promoting the rights and interest of Saami people (Saami Council, n.d.). In addition, the Arctic Council is an intergovernmental forum promoting coordination and interaction among Arctic states and indigenous and other inhabitants in the Arctic on issues in the Arctic region. Their main goal is to promote sustainable development and environmental protection in the Arctic regions (Arctic Council Secretariat, n.d.).

As there is a growing importance of climate change adaptation, an increasing number of countries have started to develop national adaptation plans and strategies in the last decades, including Norway and Nepal (EEA, 2019; UNFCCC, 2021b). In Norway, the government formulated a white paper where the climate change adaptation policy is described in 2012, and this is still the current national guidelines to follow in adaptation work (Meld. St. 33 (2012–2013)). Nepal prepared in 2010, on initiative of the UNFCCC, a National adaptation plan for action (NAPA) (Ministry of Environment, 2010). The NAPA is an initiative for least developed countries (LDC), which is made to help identify what to prioritise and the urgent needs regarding climate change adaptation (UNFCCC, 2021a). In 2011, the government of Nepal further developed a national framework on local action plan for adaptation (LAPA), which are designed to help the municipalities implement the NAPA priorities (GoN, 2011). Although there has been an increase in research and planning for climate change adaptation worldwide the over last decades, there was long a lack of studies investigating how climate change adaptation have been implemented (Mimura et al., 2014, p. 877). However, in their computer-assisted and expert-informed method for mapping the progress in adaptation research, Sietsma et al. (2021, p. 11) points out to how research within this field has recently grown, indicating a maturity in the field of adaptation research, making the researchers move to more specific sub categories of climate change adaptation, like implementation. Even though implementation has gotten more focus in the research, there are fewer studies within this field than other adaptation topics. Moreover, to further study different adaptation practices and implementation approaches can give better insight into challenges and success factors, so that we can learn how to successfully adapt. Hopefully, this might help us to find and to implement more successful and robust solutions, to better withstand both existing and future climate changes.

1.1. Purpose of the study

As there is limited research focusing on implementation of climate change adaptation, this study seeks to illuminate how national climate change adaptation policies are facilitated and used at local levels and gain deeper knowledge of how traditional knowledge and ecosystem-based adaptation is used when facilitating adaptation in traditional livelihoods in Norway and Nepal. A reason for studying this is to better understand how people with traditional knowledge are included in the climate change adaptation process, from planning to implementation, and how nature is used as a way of adapting. I want to investigate how the adaptation practises differ, or not, both in different countries and in different parts of the world, as I think to study this can help increase the understanding of the complexity of this task

and all aspects that needs to be taken into consideration (Burkett et al., 2014, p. 180). By having a comparative design and comparing the Norwegian and the Nepalese case, the similarities and differences become clearer. In this sense, comparison functions as a way of discovering phenomena in the social sciences (Ragin, 2014, p. 6). I am hoping this can help create a better awareness of the importance of site-specific local adaptation planning and inclusion of all available knowledge, as all contexts are different and have different requirements to achieve successful adaptation (Ensor et al., 2019, p. 229).

Based on this, I have developed a main research question with two associated sub questions:

- ***How do public authorities in Norway and Nepal facilitate local climate change adaptation in communities with traditional livelihoods?***
 - *How is traditional knowledge and ecosystem-based adaptation included in the climate change adaptation policies at national level?*
 - *How are these national policies implemented at local level?*

To answer the main research question and sub questions, I have collected empirical material by conducting interviews and a document analysis. GRID Arendal (GRID-A) have contributed with input in the process of forming this project and assisted me in the process of contacting informants. The interviews were conducted with relevant informants from the two countries and of the document analysis it was the national policy documents that were studied. Some parts of the national policy documents are used to present the background of climate change policy in the two countries, while the chapters regarding traditional knowledge and EbA are analysed in the document analysis and presented in the analysis and discussion. Further, I have taken a municipality in each of the countries as a point of departure, to gain more in-depth information about the situation within the two countries. Moreover, to get a better picture of the situation beyond the studied municipalities, I have used the knowledge and perceptions provided by the informants, in addition to research and literature from both countries.

been involved in the development of the theme of the study and contributed in the process of finding informants.

1.1.1. Scope and limitations

In terms of the documents analysed, I have focused on the current national adaptation policy guidelines. There are several other documents and guidelines that refers to climate change adaptation planning and implementation in both countries, like the guideline for developing LAPA and Nepal's National Adaptation Plan (NAP) process in Nepal or the Norwegian environment agency's guidelines on climate change adaptation and the Official Norwegian reports (NOU) in Norway. However, due to the scope of this study, and the fact that they are not the current national adaptation policies to follow, I have not used these in the analysis.

Further, community-based adaptation and participation are often mentioned in relation to the theme investigated in this study. However, due to the scope of this study, I have chosen not to focus on this, as it also involves other forms of knowledge and approaches than what of traditional knowledge systems. Even though I do not focus on this approach, it will likely be involved and be closely connected to some process behind climate change adaptation actions described in this study.

Additionally, I did not have the opportunity to do fieldwork in any of the study areas due to national covid19 restrictions. This can potentially have affected my understanding of the context, and further the policies, structures and other challenges affecting the traditional livelihoods and implementation of adaptation strategies in the two countries. As I am Norwegian citizen and have not been to Nepal, I was not familiar with the country's political structure nor the culture before I started this research. This can likely have affected my interpretations of the findings. I have however, tried to include literature and research that supports and contradicts the collected data to reduce the potential constrains this barrier have introduced.

Finally, since I do not know more about the context in Nepal than what I have learned from literature and through other information provided by political authorities and informants, there are limitations to the knowledge I have of the country. This has further prevented me from going into depth in the Norwegian context, as I have tried to balance the focus on the two countries to be somewhat similar.

1.2. Structure of the thesis

This thesis is divided into 6 chapters with belonging sub sections.

In chapter two, I give a presentation of the countries and municipalities of interest, where I present background information relevant for answering the research question.

Chapter three presents literature and concepts that have been important for framing the study and the analysis of the results.

Chapter four describes the methods with all choices and considerations taken when conducting this study, and I discuss how this have affected the final outcome.

In chapter five I present the main findings from the collected data and discuss this information in relation to relevant literature. The chapter is structured according to the research questions.

In chapter six I give a summary of the main findings and present the conclusion of the study, and also further recommendations to future studies within this theme.

2. Background

In the following sections, I will present some background information about Norway and Nepal that I find important for the understanding of the context. I will start by introducing basic information about the governmental systems and the human development in the two countries. Then I will present the information about the two countries separately, with information regarding Norway first, before I move on to Nepal. In these sections I introduce the municipalities taken as a departure for investigating climate change adaptation and traditional knowledge at local level. I will present an overview of the climate, topography and demography, in addition to some other information I have found relevant to make up the analysis and discussion in chapter 5. Furthermore, I move on to introducing the traditional livelihood I focus on in each country. Finally, I will give a brief summary of the similarities and differences presented about the two countries.

2.1. Point of departure for adaptation in the two countries

Literature show that countries have different approaches to climate change adaptation, both in terms of amount of focus and how the planning and implementation is done (Mimura et al., 2014, p. 876). This is also the case for Norway and Nepal. Moreover, in addition to the differences between the context and countries, it is expected that the impact of climate change will be more severe in developing countries and within marginalised groups, as they often have more limited adaptive capacity (Mimura et al., 2014, p. 876). There are several differences between Norway and Nepal. Development and governmental structures are some of them. Norway is a parliamentary democracy and constitutional monarchy with three governmental levels, national, county and municipality (Thorsen, 2020). While Norway have had its governmental structure for long, Nepal only recently got its current structure. The country was declared a Federal Democratic Republic in 2008, after a 240-year long period of monarchy with conflicts, unrest and civil wars (MoFA, n.d.). The constitution was not approved before 2015, and the country is now its first period of elected representatives (MoFA, n.d.). With the new constitution, the country was divided into three government levels: Federal, state and local (MoLJPA, 2015). Both countries have elected bodies on each level, and in Norway the election happens every fourth year, while in Nepal the representatives sits for 5 years (MoLJPA, 2015; Thorsen, 2020).

The two countries are placed far apart on the human development index from 2020 (HDI). At this list, Norway is ranked at the top, while Nepal is located at the lower end, at the rank of 142 out of 189 countries (UNDP, 2020). Nepal is also classified as a least developed country (United Nations, 2020). In Norway, the societal development is high. This is likely to facilitate a better starting point in terms of climate change adaptation than that of many other countries. The country has a good economy, which can facilitate more technologic and economic development for both the country and the inhabitants. This is also an important foundation in terms of possibilities to invest in research, to improve the knowledge on climate change and adaptation practices, and further in the implementation of efficient and solid climate change adaptation measures (Klein et al., 2014, pp. 911, 914). In contrast to Norway, Nepal is likely to encounter more obstacles in planning and implementation of climate change adaptation than several of the countries ranked higher at the HDI list. Economy is one of the constraints, as it set limits in terms of general societal development, as well as it can constrain the possibility to invest in adaptation strategies and options (Klein et al., 2014, p. 914). Second, lack of knowledge within the government sector, and among the inhabitants, both in terms of what climate change is and how to deal with it, can limit the adaptation (Klein et al., 2014, p. 911). In addition to the different ranks at the HDI, it is likely that there are regional variabilities within the countries. The climate will have different impacts depending on location, and there are differences in how various regions are able to cope with these climate changes. Some communities are again more vulnerable to the changes than others, like reindeer herders in Norway and the people engaged in the agricultural sector in Nepal. This means that despite the countries having different prerequisites, they face some similar challenges in terms of facilitating climate change adaptation for vulnerable communities.

Regarding climate change adaptation, the white paper in Norway is made to provide a basis for effective adaptation of Norwegian society. The white paper describes how the climate will affect different parts of the country and parts of the society in different ways and to different degree and time. It is written in the document that a basic principle for the work on climate adaptation is therefore that the responsibility for climate change adaptation lies with the actor who has been responsible for a task or function that is affected by climate change. This means that everyone in society has a responsibility for climate change adaptation; the individual, households, private companies and authorities (Meld. St. 33 (2012–2013), , p. 35).

In the end of the document, it is further described that governments, counties, as well as municipalities are all responsible to account for climate change and its affects within relevant parts of their activities. In regard to this, it is stated that this is not anything new, however, the white paper emphasizes and specify this responsibility. Moreover, it is described that the measures announced in the report will facilitate for climate change adaptation in municipal planning work (Meld. St. 33 (2012–2013), , p. 99). Further, they write that due to the climate changes local characteristics, the municipalities are placed first in line when facing climate changes (Meld. St. 33 (2012–2013), , p. 6). The ones affected by climate changes are therefore in need of knowledge about how the changes affect them and how to cope with these changes. This is also emphasised in the document, as it is written that it is important with a common knowledge base and that the government have guidelines to how the society, and especially municipalities should relate to climate changes (Meld. St. 33 (2012–2013), , p. 36). By claiming this, they show that the national government need to provide a knowledge foundation so that the municipalities to know how to adopt. In order to ensure this knowledge base, the report states that the government are offering all municipalities courses in climate change adaptation work (Meld. St. 33 (2012–2013), , p. 37).

In terms of the Nepal's NAPA, it is suggested in the document that local governments should prepare a Local Adaptation Plan for Action (LAPA), as there is a wide diversity of ecosystems, micro-climates, cultures and socio-economic circumstances within Nepal. The NAPA states that national adaptation programmes should, in order to address impacts of climate change in vulnerable communities, be complimented by a LAPA that reflects the site-specific adaptation needs (Ministry of Environment, 2010, p. 17). This is similar to the Norwegian practice and shows an example on how the national government puts the main burden of climate change adaptation onto the local governments. Moreover, the NAPA suggest several climate change adaptation projects, and regarding this, the plan states that the projects will be developed at local levels, but the main responsibility will be on the appropriate ministry depending on the project. Different local groups which have technical capacity, can be in charge if the implementation of the projects, such as for instance farmer's groups, but this are depending on the suggested adaptation actions. As the national framework puts the municipalities in a leading role in local development planning, it is stated in the NAPA that the municipalities will be supported to incorporate adaptation perspectives in their plans in line with the NAPA (Ministry of Environment, 2010, p. 23). Here again, one can draw lines to the statements by the Norwegian white paper, as even though much of

adaptation actions needs to be taken at local levels, it will be by guidance from ministries or other institutions that possibly have important additional knowledge and capacity to help them. The NAPA does also state that adaptation approaches in some instances will cross political boundaries to be effective, and therefore there is a regional unit that have been formed to provide technical support to the local governments (Ministry of Environment, 2010, p. 22).

2.2. Norway

2.2.1. Prevalence of Reindeer herding in Norway

There are 6 regional reindeer herding areas in Norway, and within these, the Saami people, which is considered as the indigenous people of Norway, have an exclusive right to conduct reindeer herding. Outside these areas, there is a need of a special permission to conduct reindeer herding (Landbruksdirektoratet, 2021). For many Saami people, the reindeer herding is a part of their livelihood. There are around 3000 people connected to Saami reindeer herding and about 215 000 reindeers in Norway (Landbruksdirektoratet, 2021). It can be considered as a small industry from a National perspective, however, for the Saami people, it is important for their economy, employment and culture (Landbruks- og matdepartementet, 2019). Magga et al. (2009) explains that the: “The basic needs for the animals are access to food and water, space for rest and shelter and space for physical activity” (p. 7). In addition, Reindeer herding are dependent on large areas, as the reindeers moves to different grazing areas depending on the season. This industry is therefore characterized by the reindeers naturally movement to optimize the production (Landbruks- og matdepartementet, 2019). In addition to these needs, altered by nature, the herders need to master different techniques that are depended on the conditions in the nature (Magga et al., 2009, p. 9). The reindeer herding in Norway is regulated through the Reindeer Act (Landbruksdirektoratet, 2021; Reindriftsloven, 2007). Saami people have a historical right of conducting reindeer herding, and the government are committed by the constitution to facilitate indigenous inhabitant ‘rights (Reindriftsloven, 2007). As the reindeer herding is important to preserve the Saami culture, language and livelihood, the government is responsible to facilitate economic, cultural and sustainable reindeer herding to fulfil these obligations to the Saami people.

2.2.2. Karasjok

Karasjok is a municipality in Troms og Finnmark county ¹, the northernmost and largest county in Norway. The municipality is located at Finnmarksvidda, Norway's biggest mountain plateau, and borders Finland to the east (Dalgest & Askheim, 2020). Karasjok has a population of 2641 inhabitants (SSB, 2021). Most of the inhabitants are living in or near the town with the same name as the municipality, namely Karasjok. The population trend has been increasing in the post-war period and onto the beginning of 2000s, however today, and in the coming decades, it is expected to decrease (Dalgest & Askheim, 2020). Over 80% of the inhabitants are Saami people, and reindeer herding is one of the most important industries in the municipality (Karasjok kommune, 2018). The area of Karasjok stretches over 5 452,95 square kilometres, making it the second largest municipality in Norway (SSB, 2021). The climate has continental characteristics with cold winters and mild summers, where July is the month with highest average temperature at 13°C , and February is the coldest with an average of -14 °C (Yr, 2021). The average yearly precipitation is 365mm, making it one of the driest municipalities in Norway (Norsk klimasevicesenter, 2021). In the valleys of Karasjok, you will mainly find forest, while at the plateau low-growing scrubs are dominating (Dalgest & Askheim, 2020).

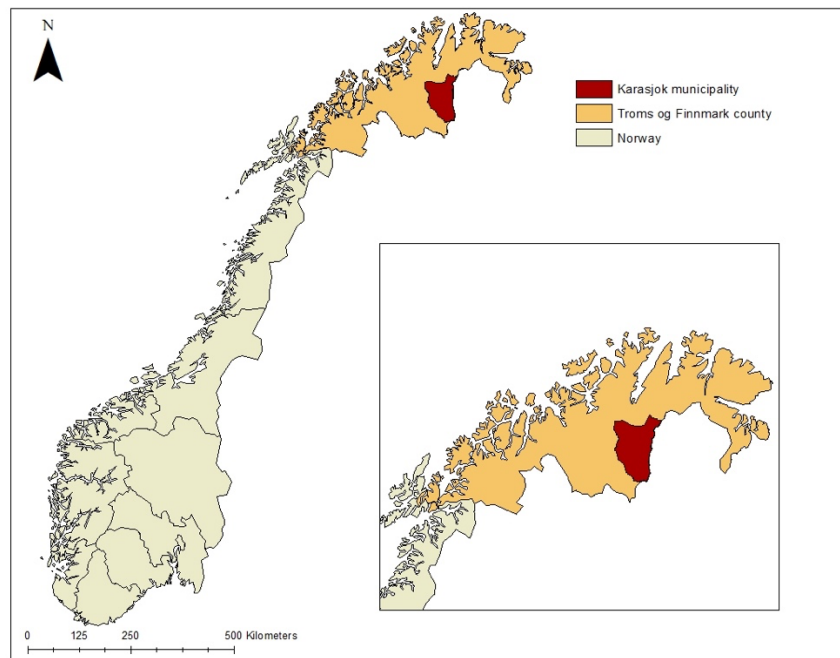


Figure 1: Map of the location to Karasjok municipality within Norway

¹ Troms and Finnmark were previously two separate counties, but 1. January 2020 they were merged into one and are now Troms og Finnmark. Some of the references used will therefore only concern what was previous Finnmark country which is where Karasjok is located.

2.2.3. Expected climate changes and reindeer herding vulnerability

It is expected that the temperature will increase by between 5-6 °C in Troms og Finnmark on average towards the end of the century, where the highest rise will occur in the summer (Norsk klimasevicesenter, 2021). The average precipitation is calculated to increase by around 20% by the end of this century. Furthermore, it is likely that there will be more intense and frequent precipitation events year-round. Due to the expected temperature rise, there will be an increase of snow melt and shorter seasons with snow cover. In addition, many areas with permafrost are now thawing (Norsk klimasevicesenter, 2021).

As reindeer herding depends on the nature, they are becoming vulnerable to climate changes. Both increases in the temperature and precipitation has already been experienced, and as this is expected to rise, it will lead to shorter winters and more challenging and hazardous conditions for both reindeers and the herders. Lakes and rivers covered by ice can become dangerous to cross as the ice is getting thinner, and the danger of avalanches and extreme weather events can also occur when they are moving the reindeers between the different pastures. In addition, more unstable freezing and thawing conditions will make it harder to access the food for the reindeers, as they usually dig through the layers of snow to reach the food. With more layers of ice, this becomes more difficult (Magga et al., 2009, p. 11).

2.3. Nepal

2.3.1. Agriculture in Nepal

Agriculture is the most important contributor to Nepal's economy, accounting for about 27% of its GDP, and over 60% over the inhabitants are working within the agricultural sector (MoALD, 2021). The agricultural land areas are covering approximately 29% of Nepal's total land area (The World Bank Group, 2018). The country has three different ecological zones, the Terai, the middle hills and the mountains region. In the different zones, there are some variations in the agricultural practices, but for all zones, it is common to engage in multiple practices or to have multiple crops to enhance income and increase resilience against climatic variabilities (Selvaraju et al., 2014, p. 19). In the Terai region, cultivation of cereal is most common, in the mid hills many have started to cultivate fruit and vegetables,

while livestock have been most common in the mountain areas. Some of the reason for the different practises are due to the differences in climatic and topographic conditions from the Terai in the low land to the mountain regions (Selvaraju et al., 2014, pp. 16-17). Almost 69% of the agricultural land is rainfed, meaning that they are highly depending on the monsoon season for water (MoPE, 2017, pp. 11-12).

2.3.2. Namobuddha Municipality

Namobuddha Municipality is found in the Mahabharat mid hills, in central Nepal. It is located within Kavre district in Bagmati Province and covers an area of 102 square kilometres (GGGI, 2018, p. 9; Namobuddha Municipality, 2021). Namobuddha has a population 29 519 inhabitants and is defined as an urban municipality. Even though it is defined as an urban municipality, it is characterized as a region with steep hills and predominantly rural landscapes (GGGI, 2018, p. 12). There is a high elevation range in the municipality, where the valley floors are around 900 meters high, and the heights are almost reaching 2000 meters. This makes the winters cold, especially in the heights, while the rest of the year the climate is usually warm and sub-tropical (Namobuddha Municipality, 2021). The month with highest average temperature in the municipality is June, with 25 °C, while the coldest is January with 11 °C. The annual average precipitation is about 1154mm, where most of the precipitation occur in July (300mm) and august (264mm), which is in the monsoon period. In the winter there is relatively little precipitation, and it is dry for about 152 days a year (CustomWeather, 2021). In the valley floors there are rivers running through, giving good access to water. However further up in the mountainside, there is water-deficit. The April 2015 Nepal earthquake made this even worse, as it shifted the rock strata, making many of the natural springs the local people relied on, drying up (Namobuddha Municipality, 2021). Additionally, several rivers, streams and ponds have been shrinking the last years, and the brick industries are drilling borewells which lead to lowering of water tables and drying up additional water sources (GGGI, 2018, p. 16). Due to urbanization and loss of farmlands, there is an increase of people working in non-farming industries, however, the traditional occupation of the inhabitants is within agriculture (GGGI, 2018, p. 17).

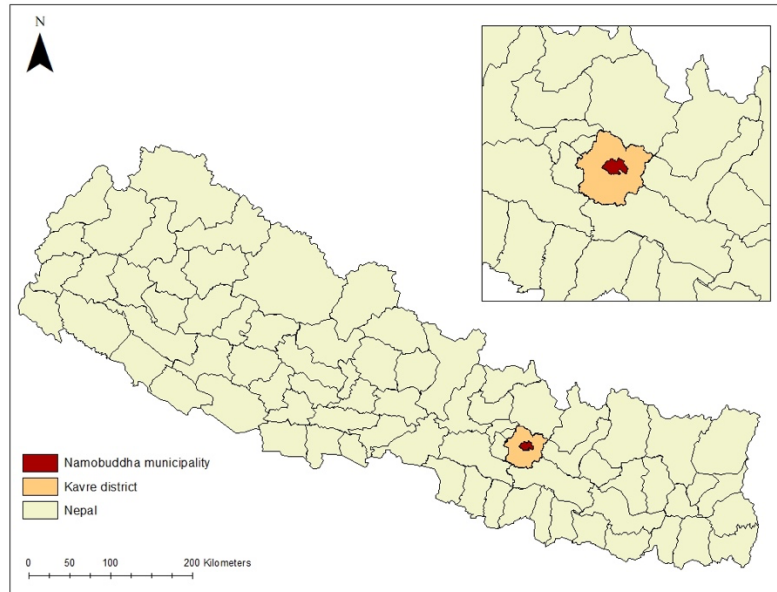


Figure 2: Map of the location of Namobuddha municipality within Nepal

2.3.3. Expected climate changes and vulnerability in the agricultural sector

There is no specific data showing what the expected temperature increase will be in Kavre district, however, there is expected to be an increase in temperature all over Nepal, and following the worst case scenario, the temperature is likely to increase by up to 3.58 °C by the end of this century (MoFE, 2019, pp. 19-20). Regarding the trend for change in precipitation in Nepal, there is a lot of uncertainty, and different models gives various results (MoFE, 2019, p. 21). However, there is expected to be an increase in precipitation in Kavre overall, but the number of days with precipitation are likely to decrease (MoFE, 2019, pp. 41-50). This means that more precipitation is likely to fall over shorter amount of time, possibly creating more water-related hazards. Extreme weather events are also more likely to occur both in short and long term (MoFE, 2019, p. 24).

The agricultural sector is one of the most sensitive sectors in terms of climate change (MoPE, 2017, p. 11). Some of the inhabitants are especially vulnerable to the climate variabilities and changes, this includes smallholders, landless labourers, indigenous people, and people from low classes or with low income. (Selvaraju et al., 2014, p. 21). With the changing climate, the agricultural sector is becoming even more sensitive as there is no stable access to water, and extreme weather events are more likely to

occur. Making the local inhabitants forced to adapt and to find good solutions to make their crops withstand the changes (MoPE, 2017, p. 11).

2.4. Summary

To summarise, there are several similarities and differences between Norway and Nepal. Both Norway and Nepal have three levels of government with elected bodies. Furthermore, both countries have communities engaged in traditional livelihood that are vulnerable to the climate changes. This means that these livelihoods and the traditional knowledge of these people, must be considered and facilitated in the adaptation actions.

Additionally, both countries have developed climate change adaptation strategies, and these are both putting the main responsibility of climate change adaptation onto the local authorities and municipalities. However, this is supposed to happen with the help of the national governments. Even as these factors are similar, there are several differences. These will be elaborated in the analysis and discussion chapter. Moreover, even though the countries face many similar climatic challenges, the different climate and vegetation in the countries have likely affected what types of livelihoods that have been normal. In Nepal, there are good agricultural conditions, making this the most widespread livelihood, and in Norway it has been a need for movements due food availabilities and weather conditions in different season, which has made it more appropriate engaging in pastoralism, like reindeer herding (Magga et al., 2009, p. 7; Namobuddha Municipality, 2021)

Even though there are some similarities between the countries, the differences are giving them somewhat different starting points when facing climate changes and the challenges they pose. Despite this, there are some aspects that are frequently considered to lead to more successful adaptation. These will be presented more thoroughly in the next chapter, where I will discuss literature connected to climate change adaptation, traditional knowledge and EbA. This is to highlight the importance of including all three concepts when facing climate changes, and to give a better insight and starting point to understand the complex task and challenges met when studying this theme.

3. Theoretical framework

Climate change adaptation, traditional knowledge and ecosystem-based adaptation are all concepts that are cited in literature about climate change, with different frequency. How the concepts are interpreted and used in the political documents and by the informants might somehow differ from how they are used in research. I will therefore use this chapter to discuss and present how the concepts are framed in research to give them more depth and nuance than what might emerge from the documents and interviews. To give a theoretical approach to why the concepts can be connected to facilitation of local climate change adaptation in communities with traditional livelihoods, I will elaborate them in the following sections. First, I will present an overview of the concept of adaptation and how this is used in climate change literature, before I move on to traditional knowledge. Furthermore, I will introduce the concept of EbA and its potential role in climate change adaptation. Finally, I will show how all the concepts are related and important in climate change adaptation policy making.

3.1. Climate change adaptation and strategies in traditional livelihoods

In the past decades there has been an increasing focus on adaptation in climate change literature and more research are highlighting the importance of adaptation approaches to deal with climate changes (Noble et al., 2014, p. 837). In this study, I lean on the definition provided by the IPCC and in the fifth assessment report they defined adaptation as: “The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects” (Noble et al., 2014, p. 838). As understood from this definition, climate change adaptation is important to make both humans and nature more resilient to the changes.

There exist several different types of adaptation, including reactive and anticipatory, autonomous and planned, and incremental and transformational adaptation. In all these types of adaptation the distinction is clear, but in practice, it often gets hard to separate them, as climate change and often the adaptation are a continuous process, and there might be several factors that affect the actions (Fankhauser et al., 1999, p. 69; Noble et al., 2014, p. 838). In the traditional livelihoods of reindeer herding and agriculture, we can see that several of these types of adaptation are used. Both reactive and autonomous adaptation are actions that happens as a response to a stressor that has happened or

happens now (Engle, 2011, p. 648; Fankhauser et al., 1999, p. 69). While reactive adaptation are actions due to impacts of climate changes, this does not necessarily need to be the case for autonomous adaptation. Here, changes in human systems, market or welfare can also be the reason for this type of adaptation (IPCC, 2001, p. 982). Reactive adaptation action can be diversification of crops and livestock in the agricultural sector, or for the reindeer herders to change migration patterns or pastures to avoid areas with difficult grazing conditions (Risvoll & Hovelsrud, 2016, p. 102; Selvaraju et al., 2014, p. 82). Further, supplementary feeding is an example of autonomous adaptation for reindeer herders due to encroachment and fragmented landscapes. Here the external forces and societal development are forcing the herders to adapt (Risvoll & Hovelsrud, 2016, p. 103). Anticipatory and planned adaptation, on the other hand, are often long-term approaches that need knowledge and planning (Engle, 2011, p. 648; Fankhauser et al., 1999, p. 69). In the glossary of the IPCC report "TAR Climate Change 2001: Impacts, Adaptation, and Vulnerability", anticipatory adaptation is described as actions taking place before changes occur, while planned adaptation is defined as: "Adaptation that is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state" (IPCC, 2001, p. 982). Engle (2011, p. 648) explain how these types of adaptation are based on the ability to understand what the future might bring, and further, knowledge about the past experiences and of experiences of actions that have or have not worked. In the case of Nepal, an example of anticipatory adaptation can be that people are migrating to the cities or other countries to get jobs and education. This can both be due to previous experiences of the instability and challenges in the agricultural sector, or be due to the wish for a higher education and better income (Ensor et al., 2019, p. 230), making it possible to also to be defined as an autonomous adaptation action.

Furthermore, incremental actions, is adaptation which can be described to have an aim to keep the main essence and integrity of the existing systems. This can for instance be adjustments in agriculture where different forms of irrigation are used or change planting times (Noble et al., 2014, p. 839).

Transformational adaptation contrast his, and concerns adaptation actions taken at larger scale or intensity (Kates et al., 2012, p. 7156). Here, the aim is to completely change the attributes of a system to cope with actual or expected changes. Examples can be to change livelihood or our perceptions or about climate change adaptation (Noble et al., 2014, p. 839). Looking at this definition, to migrate from the agricultural sector into other jobs could also be a transformational adaptation action. Additionally, to

stop engaging in reindeer herding due to the challenges the climate is posing could be another example of this. In some cases incremental adaptation can over time become transformational change, making these types of adaptation to sometimes overlap (Kates et al., 2012, p. 7157). The above-mentioned examples show how hard it is to distinguish between the different types of adaptation, and why the reasons behind the actions can change the way we categorize them. This can be the reason why the usage of the different types and terms have been inconsistent in the literature (Noble et al., 2014, p. 839).

Several studies have shown that autonomous and incremental adaptation have been the most widespread types of adaptation, as they have been a response to experienced changes (Klein et al., 2014, p. 927). However, with the growing understanding of the importance of adaptation, anticipatory and planned adaptation actions are increasing, and there have been a growing amount of adaptation strategies and plans developed in national, sub-national and local levels (Mimura et al., 2014, p. 874). This is also the case for Nepal and Norway, where in Nepal a NAPA is made, which further advocates for the development of LAPAs, and in Norway, the white paper on climate change adaptation is developed (Meld. St. 33 (2012–2013); Ministry of Environment, 2010). As stated above, to implement adaptation measures, there is a need of having knowledge of future changes and information about local variabilities, as each action needs to be site-specific (Engle, 2011, p. 648; Ensor et al., 2019, p. 229; Fankhauser et al., 1999, p. 74). This also apply for the implementation of adaptation measures within the traditional livelihoods of agriculture and reindeer herding. These factors make the adaptation planning complicated, as one cannot come around that there exists a lot of uncertainty connected to this. We do not know what will happen or how the nature or people will react to the changes, and the further into the future we want to plan, the more uncertainties we face. How the climate will change locally is even more uncertain than what will happen at a global scale (Orderud & Naustdalslid, 2018, p. 579). On top of this uncertainty of local impacts, there will be a variety of different considerations to take in terms of topography, culture, economy, climate, social and other differences (Engle, 2011, p. 648). This is something the livelihoods of reindeer herding in Norway and agriculture in Nepal and the different challenges they face are good examples of. All these factors must be considered thoroughly to avoid maladaptation, something in which is a complicated task (Engle, 2011, p. 648). Maladaptation can be actions that may lead to increased vulnerability to climate change and reduced welfare (Noble et al., 2014, p. 857). Noble et al. (2014, pp. 858-859) state that actions that benefit one group or community

can be maladaptive in other communities, and that interventions that are beneficial in short term can be maladaptive in a long-term perspective. This makes maladaptation to a concern in the planning sector, as implementation of adaptation measures can affect some communities negatively. Moreover, it can be difficult to predict if implemented measures will be sustainable or lead to maladaptation, something that makes the planning and implementation even more challenging (Engle, 2011, p. 648). Due to these uncertainties and challenges, the study by Orderud and Naustdalslid (2018, p. 586) found that local levels calls for clearer regulations from the national level, as that can make it easier for them to carry out adaptation activities.

In addition to the complex above-mentioned issues, there are few studies focusing on the implementation of adaptation, hence making it difficult to go from the strategies stated in the plans to the implementation of measures (Mimura et al., 2014, pp. 873, 877). A reason for this might be that there exist several challenges to implementation of adaptation measures, such as capacity, resource and institutional barriers (Mimura et al., 2014, p. 876). Further, when there is little research to learn from and to support the decisions taken, it can be hard to know what the best approach to implement the measure is. Additionally, the adaptation strategies and approaches in adaptation planning and implementation will vary depending on the context and government level (Mimura et al., 2014, p. 881).

3.2. Traditional knowledge and its role in modern management

In the glossary of the IPCC report “AR5 Climate Change 2014: Impacts, Adaptation, and Vulnerability”, traditional knowledge is defined as:

The knowledge, innovations, and practices of both indigenous and local communities around the world that are deeply grounded in history and experience. Traditional knowledge is dynamic and adapts to cultural and environmental change, and also incorporates other forms of knowledge and viewpoints. Traditional knowledge is generally transmitted orally from generation to generation. It is often used as a synonym for indigenous knowledge, local knowledge, or traditional ecological knowledge (IPCC, 2014, p. 1774).

Traditional knowledge has always existed, and been a concept used in the literature for long (Nakashima et al., 2012, pp. 31-32). The concept is found in several disciplines and depending on what discipline and

subject you are studying, there can be slightly different terms of this concept (Nalau, Becken, Schliephack, et al., 2018, p. 852). Multiple studies state that the different concepts are synonyms, while other state that they have slightly different meanings (Mazzocchi, 2006, p. 463; Nakashima et al., 2012, p. 30). However, the definition from the intergovernmental panel on climate change indicates that all these concepts are used interchangeably in the majority of research. Following this, with the aim of this thesis, where both indigenous and local knowledge is in focus, it was naturally to use the term traditional knowledge, and look at this holistically.

As stated in the introduction, the knowledge systems, traditional knowledge and scientific knowledge are often in opposition to each other, which is also emphasised by Mazzocchi (2006, p. 464). He further states that in scientific knowledge, the science and knowledge production are often objective and quantitative, and based on academic and literate transfer. However, traditional knowledge is more subjective and qualitative, and as mentioned the knowledge is passed through generations orally and is generally not written down (Mazzocchi, 2006, p. 464). This might also be a reason for why modern management can pose challenges to the communities with traditional livelihood. This is because the modern management often challenge the established traditional knowledge within indigenous and local communities by control and quantifiable indicators (Benjaminsen & Svarstad, 2017, p. 182).

Management like this can affect the local inhabitants badly, as it does not take them or their livelihood into consideration (Benjaminsen & Svarstad, 2017, pp. 193-194; Campbell, 2017, p. 37). The modern management has a knowledge-based perspective where the opinion is that scientific information is what is right and fits in all situations. However, traditional knowledge has a more holistic perspective which focus more natural variabilities and how they can have an effect on the final outcome (Benjaminsen & Svarstad, 2017, p. 194). Timsina and Ojha (2008) points out how this have been an issue in the agricultural sector in Nepal. Here they explain that the government meant to increase agricultural productivity and production by using new technology. The development of these new technologies did however, not recognise the traditional knowledge to full extent, as it was dominated by the interest of professional scientists (Timsina & Ojha, 2008, pp. 24-27). In the study, it is stated that the local farmers felt that their knowledge were not in recognised, and that their suggestions were never utilised. Furthermore, the local farmers expressed that the scientist implementing measures did not have sufficient knowledge of the location to know what the best practises would be (Timsina & Ojha, 2008, pp. 28-29). Moreover, the study found that the introduced technologies often favoured the rich farmers,

while the poor farmers could not afford to invest in the new technologies. This further increased the difference between the rich and poor, and hence, making the poor farmers and marginalised groups more vulnerable as a consequence of the introduction of technologies based on scientific knowledge (Timsina & Ojha, 2008, p. 32). Atreya et al. (2018, p. 750) further discuss how modern management practices and intensification in the agricultural sector leads to loss of traditional knowledge, and that this loss of knowledge leads to less sustainable adaptation. Hence, this study conclude that inclusion of traditional knowledge is important when planning for and implementing adaptation actions (Atreya et al., 2018, p. 752).

Risvoll et al. (In press, p. 4) do also discuss how conflict between scientific knowledge and traditional knowledge has evolved in Norway between the reindeer herders and the Norwegian government. They point out how the regulatory framework do not capture the needs of the reindeer herders and their connection to the nature. The opinion from the herders is that they are ignored in the decision making, and instead forced to adapt in a way that are counteractive in the long term. This again, can lead to loss of important traditional knowledge (Risvoll et al., In press, p. 4). As traditional knowledge have been ignored in decision making, and the fact that the governmental institutions are not including traditional knowledge in the development of strategies, have made the traditional knowledge holders creating a distrust to the governmental institutions. Further, as this mismatch often leads to limitations in the herders possibilities to adapt, this can further lead them towards a tipping point, where the traditional livelihood are at stake (Risvoll et al., In press, pp. 20-21). Risvoll et al. (In press, p. 21) do also point out that the modern management we see today is a static way of land use management, which is used to manage a dynamic ecosystem. It underestimates the herder's knowledge gained over time which have been proved to be a success, and a sustainable way of life.

Alone, both scientific and traditional knowledge could lack important perspectives and information to make them successful (Finucane, 2009, p. 2; Makondo & Thomas, 2018, pp. 89-90). Mazzocchi (2006, p. 465) states that even though scientific knowledge has had a dominant position in developed societies for long, it is important to not ignore the other existing knowledge systems. The usage of scientific knowledge has the potential of ruin traditional knowledge. He further states that collaboration between traditional knowledge and scientific knowledge can lead to new discoveries and enhancing knowledge. Karki et al. (2017, pp. 14, 16) does also highlight this in their study, where they explain that to date,

traditional knowledge has not been efficiently combined with scientific knowledge in the planning and implementation, and to bridge these knowledge systems, adaptation can be increased. These statements are also supported by other research, which show that the combination of knowledge systems can lead to more successful adaptation approaches (Magga et al., 2009, p. 59; Nakashima et al., 2012, p. 37). Benjaminsen and Svarstad (2017, p. 17) writes about the combination of knowledge systems as a hybrid science. This type of science is an interdisciplinary approach that tries to counteract the weakness from the two approaches standing alone. However, in order to do this, is important to understand nature of the other knowledge systems to be better equipped to address potential conflicts (Dannevig & Hovelsrud, 2016, p. 272)

3.3. Ecosystem-based adaptation

Ecosystem-based adaptation was first defined by The Secretariat of the Convention on Biological Diversity (CBD) in 2009, stating that: “Ecosystem-based adaptation uses biodiversity and ecosystem services in an overall adaptation strategy. It includes the sustainable management, conservation and restoration of ecosystems to provide services that help people adapt to the adverse effects of climate change” (CBD, 2009, p. 10). Ecosystem services are the benefits the nature is giving us and affects the human well-being. It can be regulatory services like regulation of climate, provisioning services like food and water, supporting services like soil formation or cultural services like spiritual fulfilment (Millennium Ecosystem Assessment, 2005, pp. 1-2). EbA supports the environment and is a natural way of coping with climate changes. As it takes care of the ecosystem services and strengthen them, it will likely be beneficial for humans in long term, and it can preserve endangered species and ecosystems (World Bank, 2009, p. 49).

Even though EbA and the need for this approach has gained a growing attention, until now, technological and engineered solutions have been more widespread, at least in literature. With all the different existing adaptation approaches, it can be hard to identify the best options at local level. (Mimura et al., 2014, p. 881, 877). Despite having several adaptation approaches, and that the technological and engineered being the most common, literature show that there are multiple reasons to why EbA would be the more favourable to cope with the climate changes. First of all, EbA is often low-cost solutions that are likely to require less maintenance compared to many other options, hence it can be more successful

than other alternatives in some parts of the world (Chong, 2014, p. 402; Jones et al., 2012, p. 507). Another reason for choosing EbA, is that technological and engineered solutions can potentially harm the nature, and will, in contrast to EbA, not give any other benefits than for what they were made for (Jones et al., 2012, p. 506; World Bank, 2009, p. 59). Due to this, Chong (2014, p. 402) states that EbA can possibly provide communities with more sustainable outcomes than other options. All these benefits are likely why EbA is recommended as a favourable approach facing climate change challenges, especially as it can address the needs of the most vulnerable communities that are already highly affected by climate change (Chong, 2014, p. 402).

There are many different actions that can be defined as EbA. Some examples of this type of adaptation are to protect watersheds, restoration of vegetation for protection against extreme events, water catchment management, protection of ecosystems that are vital for food security and general land areas that are important for peoples livelihoods (Chong, 2014, p. 394). In oppositions to these measures that are all using the nature, are the technological and engineered options, like defence structures such as floodwalls, or built irrigation structures and water reservoirs to provide farmers with water or inorganic fertilizers (Jones et al., 2012, p. 505). Seen from these examples, the different measures would require different knowledge and approaches, which is something one should be aware of when planning for climate change adaptation.

3.4. The relation of the three concepts

All three concepts, Ecosystem-based Adaptation, traditional knowledge and climate change adaptations are tightly related to each other. As discussed above, literature highlights that to combine scientific knowledge and traditional knowledge can be an important step towards finding a successful adaptation approach (Karki et al., 2017, p. 16; Mazzocchi, 2006, p. 465). Today there is much focus on climate change adaptation, and scientific knowledge is frequently used in this relation. However, without traditional knowledge, some important aspects leading to more sustainable solutions in the long-term might miss. Hence, to focus more on this knowledge when approaching climate change adaptation, would be of huge value. A combination of information that can predict future climate and risks associated with it, and how the nature react locally at different changes would be very valuable in the adaptation planning and implementation. Indigenous and local communities have coped with natural

variations and have passed their techniques and knowledge through many generations. This has made it possible for them to survive the changes. However, as climate change is now going faster than ever due to the anthropogenic emissions, old traditions and knowledge alone might no longer be enough to deal with the changes (Karki et al., 2017, p. 1). Simultaneously, Finucane (2009, p. 2) states that scientific knowledge alone is likely to be less sustainable in the long term, as it can ignore some important dynamic factors that all affect the climate impacts. So, as traditional knowledge can provide more local information about how things have been affected by change in the past, which can help predict future consequences. Based on this, it is clear that a combination of the two types of knowledge can make the adaptation more successful than one of them can alone (Makondo & Thomas, 2018, pp. 89-90). The findings of these studies show that climate change adaptation and traditional knowledge are two concepts that are highly relevant to use in relation to each other in adaptation contexts.

Furthermore, as mentioned, the EbA uses the ecosystems and its services to adapt (CBD, 2009, p. 10), and as the nature has huge possibilities to reduce adverse effects of climate changes, Noble et al. (2014, p. 389) state that successful adaptation depends on our abilities to maintain ecosystems and the facilitation for these to adjust in a changing climate. This, in addition to all the benefits of choosing an EbA option for adaptation, is likely why this approach has gotten increased attention in research (Chong, 2014, p. 403). Regarding the EbA approach, traditional knowledge can often be important for successful implementation, as local inhabitants can have knowledge about the nature and systems in areas that the government and planners do not have (Nalau, Becken, Schliephack, et al., 2018, p. 852). Moreover, Makondo and Thomas (2018, p. 89) points out that without cooperation with local communities, implemented measures are likely to become less sustainable, as there is no guarantee that maintenance or usage of the measures will continue in a targeted area after the implementing organisations or governments leave and the funding stops. So, as EbA is getting more attention to be a favourable climate change adaptation approach, especially in vulnerable communities, and the fact that traditional knowledge is seen as important for successful implementation of EbA, they are highly relevant concepts to use when planning and implementing climate change adaptation measures.

Even though both countries have a different point of departure, there is no question of the importance of good adaptation practices. Furthermore, the usage of EbA can be beneficial in both these countries, but as all adaptation needs to be site-specific, the optimal measures to implement will likely be different,

also within the countries and the municipalities (Nalau, Becken, & Mackey, 2018, p. 362). However, no matter what EbA solutions is chosen, the need for traditional knowledge will likely enhance the success of this implementation (Nalau, Becken, Schliephack, et al., 2018, p. 852).

4. Methods

With the aim of getting more insight to and understand how Norway and Nepal have facilitated ecosystem-based approaches and further traditional knowledge in the climate change adaptation planning and implementation, there have been multiple considerations and choices that I have had to take during this study. As this can impact my conclusions, I will use this chapter to justify and explain the methodological decisions made when writing this thesis. First, I describe the research design for the study. Second, I present the data collection, how I did it and choices made along the way. Third, I move on to how I interpreted and analysed the findings. Finally, I discuss the approval from NSD and informed consent, reliability and validity, and limitations to the chosen methods.

4.1. Scientific approach to the research

Due to the aim and research question of this study, I found a qualitative approach most appropriate, as this approach makes it possible to go into depth and get insight into different nuances about a theme (Jacobsen, 2015, p. 64). The methods I chose to answer the research questions, included interviews and a document analysis, which will be further explained in section 4.2. As I wanted to fully understand the topics studied and the perceptions and knowledge the potential informants had, it was natural to have a small selection, as many interviews would be too time consuming for the scope of this thesis. Further, I only found it relevant to study the current national policy documents on climate change adaptation in the document analysis, as one of the aims was to understand how the national governments facilitated for climate change adaptation and not to look at everything written about the theme.

When doing qualitative research, it is important to be critically reflexive, meaning to be aware of your own social position and how interpretation of data and information collected are affected by that (Dowling, 2016, p. 41). It is likely that the researcher's subjectivity and positionality will affect the result to some degree. The interaction with, and information obtained from, the informants will also depend on the above-mentioned elements. In addition, the researchers' characteristics will affect the interpretation and information obtained. In the case of this study, I can be seen as an outsider, in terms of for instance my background, age and insight into the themes studied. Dowling (2016, p. 40) states that

being an outsider can make the interpretations less reliable as one does not understand the context completely. However, this can also have benefits, as the distance between researcher and informant can also lead to a higher effort from the informants to answer questions and explain the issues more thoroughly. The experience from the interviews in this case, supports the latter. My perceptions being an outsider will be further discussed in section 4.3.

This study has a comparative design. Ragin (2014, p. 4) describes that: “While cases may be analysed in terms of variables (for example, the presence or absence of a certain institution might be an important variable), cases are viewed as configurations — as combinations of characteristics. Comparison in the qualitative tradition thus involves comparing configurations”. In my analysis of the Norwegian and Nepalese cases, I use such a comparison of configurations. How are the governmental policies disseminated and implemented downwards in the governmental systems, and how is the traditional knowledge disseminated upwards in the same management channels. The fusion of these processes affects the climate change adaptation. By conducting a comparative study, these differences in these configurations are revealed, and thus how different cultures and countries adapt to the climate change adaptation measures in different ways.

4.2. Data collection

4.2.1. Semi-structured interviews

One of the aims in this thesis was to get insight into how traditional knowledge and ecosystem-based adaptation were facilitated in the national climate change adaptation guidelines, and to further see if it was included in the implementation of adaptation measures. To investigate this, I found the usage of interviews as an appropriate method. The findings from the interviews are mainly used to answer the second sub research question.

Dunn (2016, p. 149) explains an interview as a type of data collection involving oral exchange of information between researcher and informant(s). He further describes that some of the strengths of interviews are that they can give details and fill gaps that other methods cannot. Additionally, he states that they can be used to explore different meanings and experiences and to investigate complex cases. One of the reasons for why I found this method appropriate for my study, was that it enabled me to talk

to people with knowledge about the themes of interest, and as Dunn (2016, p. 150) mentions, this information can be hard to retrieve by other methods.

When deciding upon the structure of the interviews, I found semi-structured interviews to be the type that best fitted my intentions and study. A Semi-structured interview implies that the researcher has a set of themes and subjects intended to touch upon, and often follows an interview guide. However, it is flexible, and possible to change questions and subjects during the interview (Dunn, 2016, p. 158), making it appropriate in my case, as I wanted to have a conversation where the informants were able to tell about their experiences and opinions, and not being limited by the framing of the questions.

Ahead of the interviews I prepared an interview guide divided into two main parts, one focusing on climate change adaptation, and one on traditional knowledge. The main essence was similar in all the interviews; however, the questions were made slightly different depending on the informant and the country in focus (see appendix 1). I also added some questions during the interviews to follow up answers from the informants, in addition to exclude or change some, as the conversation naturally touched upon the selected topics without having to ask the questions. In the end of the interview, I asked all the informants if there was something they wanted to add. This was to make sure that they were not left with information they wished to share (Jacobsen, 2015, p. 159). In some of the questions, the informants were asked to explain their understanding of different concepts. This was to ensure that we had a mutual understanding of what we discussed, and to further be sure that when analysing the data, I used the information they provided correctly. The interviews lasted between 35 and 60 minutes.

Because of the travel restrictions due to covid19, all the interviews were held over Zoom or Teams. The interviews were recorded with video, something all the informants approved ahead. This allowed a more natural conversation, and I was able to focus more on organising the next question and maintain a natural flow in the conversation. However, it can also make the informants more restrained, as everything they say can be played again on a later occasion (Dunn, 2016, p. 169). In this case, the question asked dealt with topics they are all working with, something that likely made them feel more confident about the theme, and seemingly they were not bothered by the recording. The recoding further made it possible to transcribe the interviews properly afterwards.

4.2.2. Selection of informants

In this study I conducted 5 interviews, 3 with informants in Nepal, and 2 with informants in Norway (see table 2). To answer the research questions, I wanted to find informants who had knowledge and experience within the field of climate change adaptation, traditional knowledge, or both combined. I focused on finding representatives from different fields, so that I got different perspectives on the case. I also wanted to find informants in similar positions in the two countries, as I felt this would help to better understand similarities and differences in the processes of how climate change adaptation is planned for, implemented and perceived.

Table 1: Overview over the interviews with information about the informants belonging and country

Informant:	Country:
ICIMOD	Nepal
CEAPRED	Nepal
Namobuddha municipality	Nepal
Arctic and Environmental Unit	Norway
Reindeer herder	Norway

GRID-A had the main responsibility in the process of finding informants in Nepal. This was natural, due to their work within in the field of study, and that they had established contact with many of the organizations doing research and fieldwork in the area of interest. They contacted the international centre for integrated mountain development (ICIMOD), who further provided me with contact information to relevant informants based on the wishes I had given in advance. I wanted to find informants that were both in need of and affected by climate change adaptation and the ones that was in charge of implementing it, to get more points of view of the theme. This was achieved to some degree. Due to limitations in time, economy and covid19, it was not possible to get in contact with local

inhabitants local engaged in the agricultural sector, as that would require a translator and would be hard in terms of arranging the meeting.

Regarding the interviews in Norway, I had the same wishes in terms of the position of the informants as for the ones in Nepal. Here, GRID-A helped me in the process of finding one of the informants, and the other I found through different web pages, based on their connections to reindeer herding and municipal planning. In this case I contacted all the informants directly. They were chosen based on their apparent role connected to the themes of the thesis. I contacted a reindeer herder to get insight from someone engaged in the traditional livelihood studied, a representative working with these perspectives in the Saami council, and finally an informant working in the municipality. The reason for choosing these three informants was to get information about the topic from different points of view. These informants also matched somewhat the positions of the ones in Nepal. However, I was not able to conduct an interview with the municipality, which will be further discussed in section 4.3 and in the analysis and discussion.

4.2.3. Document analysis: Policy documents

As a part of the aim for the study is to look at how the two countries plan and implement climate change adaptation, I found the usage of document analysis relevant. This method is differing from many other qualitative methods, as it is a method where the researcher reviews and evaluates documents which are already written down. This makes the study object the same for all investigating it, as it is recorded without the intervention of the researcher (Bowen, 2009, p. 28). The documents studied for this research have included Nepal's National Adaptation Programme for Action and Norway's white paper on climate change adaptation. Both the documents are the national guidelines for climate change adaptation. Since these are current guidelines, the documents are highly relevant to answering the research question of the thesis, as they can give insight and answers to how the countries plan for climate change adaptation and how traditional livelihoods are facilitated in this process. The documents are therefore likely to provide me with important data on the context I am studying (Bowen, 2009, p. 29). I will mainly use the findings from the document analysis to answer the first sub-research question.

4.3. Interpretation and analysis of the data

After the interviews were conducted all of them were transcribed word by word to ensure that no meaning was lost. This also made me able to go back and double check the information when using it in the analysis and discussion. To do this, I used the automatic transcribe option in Microsoft Word, and then I manually quality assured text against the recording, to see if this was done correctly. Further, the interviews were imported to NVivo12, where they were coded into different topics. This was also done with the policy documents. In this case an inductive approach was used to code the data. This means that I developed the codes based on the provided information from the interviews and policy documents (Braun & Clarke, 2006, pp. 83-84). Before I coded the data, I read through both documents and conducted all the interviews. This made me familiar with the data and able to identify themes that were relevant to answer the research question of the study. Since I have divided the aim of my thesis into sub research questions, it was easier to decide upon the topics the data should be coded into, as there were several obvious key words that were relevant for answering both research question and sub questions. The codes I ended up using were the ones made from the beginning (see table 2). The main purpose of coding is that it can help reducing the data, organize it and be a starting point for the analysis (Cope, 2016, p. 379). In this case the coding helped me to get an overview of all the data, to compare the information obtained from the different informants and documents and to connect the data to the literature. The analysis is conducted based on the knowledge and theory presented in the introduction and theoretical framework section. When writing the analysis and discussion chapter, I used the different codes to see what was written and said about the different themes, and then I utilised the coded data to find the relevant information for each topic and points I discussed. This way, I have used the analysis and discussion chapter to fill codes with content to answer the research questions.

Table 2: Overview of the topics the documents and interviews were coded into.

Climate change	Policy	Ecosystem-based Adaptation
Climate change adaptation	Traditional knowledge	Reindeer herding
Implementation	Conflict	Agriculture

4.1. NSD approval and informed consent

When conducting research, there are some important ethical aspects that need to be considered. First, when dealing with personal data in empirical research, the study must be reported to the Norwegian centre for research data (NSD) (Jacobsen, 2015, p. 51). This was done and approved before I started the project.

Second, there is a requirement of informed consent. This implies that the informants have the competence, understanding and information to consent to participate in the study, and that they are doing this voluntarily (Jacobsen, 2015, pp. 47-48). I argue that all these requirements are fulfilled in this study. When the informants were contacted, they were sent an information letter, following NSD's template. This included information about the research, what the participation meant for them, and information about their rights as informants. This was to give them the information needed to understand what a participation in study implied (Dowling, 2016, p. 33). The informants were able to freely chose if they wanted to participate or not, and this was explained in the information they got. In terms of consent, I argue that due to their connection and work with either or both climate change adaptation and traditional knowledge, all the informants were able to consider their participation after they had gotten all the information about the project.

Third, the privacy of the informants needs to be considered, to make sure that private details about the participants are not shared with the public (Dowling, 2016, p. 31). To protect the participants privacy, all the data collected were stored at a password protected computer. The data gathered for this study do not include information about sensitive or private subjects, and all informants was okay with me presenting the organisation they worked in or their occupation, and all but one informant were also okay with having their names presented. To protect this one informant, I chose to keep all the data confidential and are therefore only presenting the organisation or occupation the informants are connected to.

Last, it is a requirement of correctly presentation of the data. This means to try to present the data completely and in its right context, and to prevent any falsification of the results (Jacobsen, 2015, pp. 49-

50). To make sure I fulfilled this the best way possible, I tried to clarify any uncertainties during the interviews, and to ask if I correctly understood the information they provided. In addition, one of the informants asked to review how the statements and information given was framed in the thesis, and I therefore sent a draft of the preliminary results in advance, to fulfil the informant's request. This was not done to the other informants, due to limitation in time, and as this was not requested by either of them, I considered that to be okay.

4.2. Validity and reliability

When conducting this study, I have been aware of the quality and trustworthiness of the data collected, interpreted and presented. I have also tried to have a transparent and open process of how the study was conducted and choices made along the way, in order to increase the validity and reliability of the research, as this can enable other researchers to know my process, and further, to adapt it in future research (Mansvelt & Berg, 2016, pp. 411-415).

The internal validity of this a study concerns the compliance between the reality and me as a researcher's description of this reality, and the sources' ability of providing rightful information (Jacobsen, 2015, p. 228). I argue that the documents analysed was highly relevant to answer my research question. Further, as all the informants were first-hand sources engaged within the subject studied, the probability that they provided me with rightful information was strengthened. There is always a risk that they could have provided falsified information. However, as I have had more informants giving me with the same information, and literature supporting these statements, I argue that the internal validity is increased.

External validity deals with to what degree the results can be generalised, and as this study is based on a small number of documents and informants, it is what is often referred to as analytical or theoretical generalisation that are in question. This type of generalisation concerns how the findings apply to other cases of the studied phenomenon (Baxter, 2016, p. 142). As I have analysed and discussed the findings against existing literature, I argue that the credibility is increased, and thereby also the external validity (Baxter, 2016, p. 143).

There are several aspects and decisions made during the execution of this study that affects how reliable the empirical data presented in this thesis is. The chosen research design, implementation, context and analysis do all affect the reliability (Jacobsen, 2015, p. 241).

All the interviews were held over video chat, but as this seemingly was something they all were used to, the possibility of them feeling uncomfortable by this setting was somehow reduced. Further, all informants were provided with information about their rights and themes in advance, making them prepared for the interview. Additionally, as all the interviews were recorded and later transcribed, making the likeliness for including and presenting all relevant information obtained in the study is increased. However, in terms of the information obtained from the informants, it is important to be aware of the fact that it is a possibility that I would receive other information than another researcher with other characteristics (Jacobsen, 2015, p. 242). Regarding the documents analysed, the documents will stay the same, making the basis for forming the argument the same for all researchers. However, other people could draw other conclusions from the same literature and analyse it differently. Therefore, I have tried to be observant in the interpretation and analysis, and to be consistent and thoroughly when categorizing the data (Jacobsen, 2015, p. 245).

4.3. Methodological reflections

In this chapter I have tried to explain and justify all the choices I have made in the study, to increase the trustworthiness of the research. However, there are still some potential flaws that are worth mentioning, for the reader to be fully aware of all the aspects of the conducted project.

One limitation in this study is the language barrier. All the interviews with the informants in Nepal were held in English. This is neither their, nor my first language, making it possible that some points can have been lost in the conversation. The informants could have misunderstood the questions, and I can have interpreted their answer another way than what they meant. As mentioned in the previous sections, I have tried to limit this possible misunderstanding by asking confirming questions to what they told me during the interviews. Further, the interviews with the Norwegian informants were conducted in Norwegian, and then later translated when presented in the thesis. This could have led to some

formulations changing to some degree. However, since the most important was to understand the context and not specific details, it is likely that none of the potential language barriers have affected the analysis to a considerable degree.

Second, as I have chosen to investigate two different cases in two different countries, Norway and Nepal, I argue that this have had both benefits and disadvantages. First, to have two cases means that there is more to get acquainted with. In this case, this has been very time consuming, as I had limited knowledge about Nepal and the reindeer herding in Norway before I started the study. If I had chosen to only look at one case, it is likely that I could had dug even deeper into the theme. However, I found it very rewarding to have two study areas, as it made me, and hopefully the reader of this thesis, more aware of the importance of investigating each location thoroughly before implementing adaptation measures. Additionally, even with different prerequisites and conditions, the two study areas met many of the same challenges, which I found interesting and helped me realize that even if climate change adaptation is difficult it can meet similar challenges at different parts of the world. I also wanted to understand how climate change adaptation was approached in different countries. Investigating two cases like this, can give more insight into that.

Third, to have two study areas did also affect the collection of data to some degree. I did only have a few interviews in each country, and if I had only looked at one area, it is likely that I could have talked to more people with knowledge and insight about the theme studied. This could have strengthened the result by having more voices to confirm or contradict the findings obtained from my present informants and documents. Furthermore, I was not able to get an interview with the municipality of Karasjok. And due to limitations in time, I did not contact any other institutions that could represent the governmental sight either. It is likely that the omission of this aspect can somehow have affected the results in the study to some degree. I did, however, get a response and a reason to why they meant the interview would be unnecessary, which I have further discussed in the analysis and discussion. In addition, I have tried to include literature from a diverse point of view and to carefully discuss different aspects in the analysis and discussion section, to reduce the potential flaws of this shortage. However, despite limitations in amount of material, I have conducted a full analysis with a conclusion based on findings from literature, informants and the documents analysed.

Fourth, the selection of informants is a crucial part in a research, regardless of whether you have one or more study areas, as different informants can have different opinions, and thereby give different results. The selection of informants in Nepal can possibly be biased, as they were all found through ICIMOD, which is working with adaptation in vulnerable communities. The informants they found are therefore likely to have more knowledge into the theme than the average inhabitant, as these were people the organisation had connections to. Further, as I were not able to get in contact with anyone from the local communities or engaged in agriculture, there is a possibility that some issues or precipitations have been missed. However, also here I have tried to use literature and discuss the findings to confirm or contradict my findings.

Fifth, the Nepal has recently gone through a change in the political structure (elaborated in 2.1). Due to this, most of the literature used in this study were either written or had conducted field work before this change occurred. This has limited the possibilities to confirm some of the findings with published literature. To make up for this, I have tried to carefully discuss the statements in the NAPA and those provided by the informants. I have also tried to highlight the that it likely exists issues and conflicts undiscovered by this study.

Finally, as mentioned in section 4.1, my character as an outsider, and young female student are likely to affect what information the informants provide to some degree. In the case of this study, I perceived that my position as an outsider was beneficial in the in the interviews, as I felt that it made the informants provide me with more detailed information. However, when looking at this study as a whole, I found it a bit challenging to be an outsider and to not know more about Nepal as a country, and the reindeer herding as a livelihood, as it made me afraid of stating or interpreting something wrong or to offend anyone. I believe that I have avoided this by being careful in my wording, confirming the information from the informants during the interviews, and to back up the statements with literature. The issue of deciding upon a selection, and the influence of researchers' position will be the case for all qualitative research and is hard to do anything about. However it is important to be aware of when doing the research, and further when reading the study.

5. Analysis and discussion

In this chapter I will present and discuss my findings from the document analysis and the semi-structured interviews. The findings and discussion will be presented interchangeably as this enhance the ability go into depth and nuance the findings. By using a comparative approach helps enlighten the distinction between the two countries. This study found that Nepal is seemingly better than Norway at including traditional knowledge and ecosystem-based adaptation, and further at facilitating traditional livelihoods in both planning and implementation of climate change adaptation actions. These aspects had might not been noticed to same degree without studying the two countries in a comparative way. First, I will answer the two sub questions one by one by presenting the findings and discuss what they can imply. Second, I move one to answer the main research question based on the findings and the discussions from the first two sections.

5.1. National climate change adaptation strategies and the inclusion of traditional knowledge and ecosystem-based adaptation

In this sub chapter I find it relevant to first present the responsible developers and the aims of the policy documents. Thereafter, I present the similarities and differences between the documents regarding their focus on traditional knowledge and ecosystem-based adaptation. Finally, I discuss some of the most important findings.

The Norwegian white paper was developed by what is today the ministry of climate and environment and approved by the Norwegian parliament. It is stated in the document that the aim is to give an overview of the climatic challenges the society are likely to face to make it easier for those affected to develop an effective adaptation strategy (Meld. St. 33 (2012–2013), p. 9). The Nepal's national adaptation plan for action was prepared by engaging different thematic working groups, ministries and departments, local governments, academia, NGO's, youth, women, indigenous communities, and civil society representatives. In the NAPA, it is described that the document addresses the most urgent adaptation needs and further prioritise adaptation options. This is done based on a country-driven and consultative proses. (Ministry of Environment, 2010, p. 6).

In both the documents traditional livelihoods, agriculture in Nepal and Reindeer herding in Norway, are identified as vulnerable. Further, there is a focus on knowledge and the importance of this in adaptation in both the documents and they do also mention EbA. Moreover, in terms of the approach to climate change adaptation, there are several differences in the documents. All these aspects will be elaborated further in the following sections.

5.1.1. Traditional livelihoods

In the NAPA, agriculture is identified as a main area that is important for the development policy in the country which will be affected by climate changes, and in the Norwegian white paper, reindeer herding is stated to be strongly affected by these changes (Meld. St. 33 (2012–2013), p. 28; Ministry of Environment, 2010, pp. 12, 15). The white paper describes that both climate changes and pressure from other economic and social conditions can have a huge impact on Saami peoples industries and their culture (Meld. St. 33 (2012–2013), p. 33). In the NAPA, it is not mentioned anything about factors that can have negative affect on the agricultural sector other than climate changes. However the NAPA describes how climate changes, such as changes in precipitation patterns and the reliability on stream flow and potential for flooding is making the sector sensitive and how this is posing a threat to food security in the country (Ministry of Environment, 2010, p. 12). These provided statements in the documents show that both countries are aware of several factors causing vulnerability to the livelihoods in their country.

Indigenous and vulnerable groups and the importance of protecting them is also highlighted in the documents. In the white paper it is stated that it is important to consider how adaptation measures can affect the indigenous societies when planning for how to cope with climate change (Meld. St. 33 (2012–2013), p. 33). Further, it is stated that one of the challenges seen from an indigenous preceptive is to adapt to the expected climate changes, and at the same time take care of the values and knowledge they already have. Therefore it is important to implement adaptation in a way that do not affect the traditional Saami livelihoods negatively (Meld. St. 33 (2012–2013), p. 34). In the NAPA, similar aspects are in focus. When developing the NAPA, after the different vulnerabilities and adaptation options was identified, these options was prioritised according to national interests and needs (Ministry of Environment, 2010, p. 19). A priority list of adaptation options was developed, some of the priorities

listed are: The inclusion of local people in design and implementation of measures, inclusiveness of indigenous communities, potential to secure livelihood, local ownership, coherence with local urgent and immediate needs (Ministry of Environment, 2010, p. 20). As seen in this list, options that focuses on indigenous protection, local needs and to secure livelihoods are highlighted. Showing that the NAPA try to protect indigenous people and livelihoods when planning and implementing adaption options.

5.1.2. Emphasis on knowledge

Knowledge has been focused in both documents. In the Norwegian white paper, there is a section on the importance of knowledge to plan for and implement robust adaptation measures. It is stated that there is a need of knowledge about what considerations to take in terms of climate change in politics and specific measures. The document also state that there is a need for more knowledge about the effect of climate change in vulnerable sectors (Meld. St. 33 (2012–2013), p. 41). In Nepal, the NAPA do not mention the need for knowledge directly. However, the government do seemingly focus on this, as they have organized workshops and meetings with different stakeholders, including indigenous communities, youth and other interested to identify key vulnerabilities and adaptation options in the country.

The documents do both touch upon the importance of traditional knowledge, however, to different degrees. A further aspect on the priority list of adaptation action in the NAPA that was highlighted as important was the potential to use local knowledge and technology in implementation (Ministry of Environment, 2010, p. 20). This priority was general for all adaptation actions and shows that traditional knowledge has been a priority for adaptation implementation. In the Norwegian white paper however, traditional knowledge is only mentioned in relation to the Saami people. Here it is stated that this knowledge is important for the Saami people when facing climate changes as it can equip them to take advantage of opportunities that might arise when adapting (Meld. St. 33 (2012–2013), p. 36). Traditional knowledge is not mentioned in any other parts of the white paper, nor in relation to enhance adaptation generally. This indicate that Nepal has taken a broader approach to the usage of traditional knowledge compared to Norway.

Further, in the annex of the NAPA, there is an overview of consultation and awareness rising. Here they identify how important local knowledge is and that this should be linked to scientific knowledge. They

also write about how indigenous should be recognised and that the local knowledge is useful for coping with climate change (Ministry of Environment, 2010, pp. 62-63). These statements indicate that the developers of NAPA have understood the importance of combining different knowledge systems to achieve more successful adaptation. For the white paper, this link is not explicitly there. Even though traditional knowledge is only mentioned at one place, knowledge in general is mentioned several other places. By looking at the different context's knowledge is highlighted, there are several missed opportunities where it would be appropriate to mention traditional knowledge, also in relation to scientific knowledge. First, the importance of developing knowledge about climate change adaptation and to enhance the guidance and information to municipalities, industries or other relevant actors about the value of nature to ensure climate resilient societies are highlighted (Meld. St. 33 (2012–2013), p. 73). Second, it is stated that there is a need of more knowledge about how climate change will affect the different areas where reindeers are grazing (Meld. St. 33 (2012–2013), p. 78). Third, the white paper states that it is important to always use the best available knowledge about climate changes and how these can be handled (Meld. St. 33 (2012–2013), p. 39). In all these examples it could be relevant to mention traditional knowledge. The document also states that Saami people have experienced, and gained knowledge about previous changes in the climate, and this has made the livelihood versatile in terms of coping with these changes, and that this has been important in adaptation (Meld. St. 33 (2012–2013), p. 33). This statement shows how the government clearly considers the Saami people able to adapt to the climate changes by using their traditional knowledge, and yet, they do not mention traditional knowledge in any of the above-mentioned examples.

5.1.3. Ecosystem-based adaptation

In the NAPA, several possible adaptation projects are suggested. Here they have combined some of the priority activities, as they found that several options could benefit many sectors. In some of these projects, ecosystem-based adaptation is highlighted. One of the purposed projects is promoting EbA and emphasize that the conservation of ecosystems is important to support livelihoods of poor people. In this section they also write that they will study and document indigenous skills in conservation of wetland (Ministry of Environment, 2010, p. 44). This shows that they are aware of the importance of traditional knowledge, also in relation to EbA. However, EbA is not mentioned directly in relation to agriculture in the plan. But even though they do not use the concept, there are several examples of measures throughout the report that are based on the nature. Such as soil mulching, a practice of

covering the soil to give better conditions for plant growth, bio-fertilizers, which is fertilisers developed by organic material, having a diversity in the crop types or water harvesting ponds (Ministry of Environment, 2010, p. 26). The NAPA further states that the regional unit, presented above in this study, in the background chapter, among other things will ensure an EbA across all projects. This regional unit will also work as a monitoring arm for the ministry of environment who are in charge of climate change actions (Ministry of Environment, 2010, p. 22). Here, it is shown that EbA are supposed to be in focus in all the adaptation projects in the country.

The white paper does also have sections about EbA, but in this document, it is seemingly not a focus for adaptation planning and implementation in all sectors. It is not mentioned directly in relation to traditional livelihoods, and not in any context of reindeer herding or Saami people. However, the plan states that one should preserve the nature, and that much of the work within nature management today can be seen as climate change adaptation measures (Meld. St. 33 (2012–2013), p. 68). Additionally, it is stated in the plan that one should avoid fragmentation and loss of habitats in areas where alpine species, such as reindeers, are living. The government will further focus on this in development of plans, and consider the climate changes effect on alpine species in the planning (Meld. St. 33 (2012–2013), p. 71). Moreover, the white paper does state that there is a need for more knowledge and an overview of how ecosystems can provide benefits in planning and management nationally, how the ecosystem services can impact economic growth and wealth, and the potential consequences of loss of ecosystems (Meld. St. 33 (2012–2013), p. 69). But as this has not been done before finalizing the white paper, it is possible that absent knowledge can have impacted how EbA and traditional are framed or not framed in relation to each other in the final document.

5.1.4. How adaptation actions are approached

The white paper does not describe how the preservation of traditional livelihoods or usage of traditional knowledge can be done. There is nor any specific examples of measures based on ecosystem-based adaptation. However, it is stated that Saami peoples livelihood is vulnerable to climate changes, and that changes in economic and societal factors are likely to alter their livelihood. Even if this is mentioned, it is not directly stated that these impacts should be avoided. Further, in terms of reindeer herding, the document rather describes that the Reindeer Act has given the different reindeer herding districts more

responsibility for the management of grazing areas, and that it is important to keep a stable level of reindeers to ensure flexible use of land areas. Moreover, it is pointed out that the Reindeer Act shall facilitate the sustainable utilization of reindeer grazing resources in a way that benefits the reindeer husbandry population and society in general (Meld. St. 33 (2012–2013), p. 78). So, seen by these examples, the document gives information about vulnerability within Saami peoples livelihoods, but not how to adapt or deal with the challenges. Moreover, regarding reindeer herding, the Reindeer Act is mentioned as an act that apparently is supposed to facilitate for adaptation for this livelihood, and this will be the herding districts responsibility.

The NAPA of Nepal do, in contrast to the white paper, provide several examples of adaptation options and processes to protect vulnerable livelihoods. The suggested projects with priority activities suggest actions that can be taken to reduce vulnerability in exposed sectors. Here, they provide the goals, objectives and activities that can be taken to reach these goals. The document describes who will be responsible for taking these actions and also potential barrier along the way. They have for instance a suggested project where it is identified that there are many communities vulnerable to climate changes. Here, it is stated that several actions can be taken to increase their adaptative capacity, and to find the best adaptation options, these communities needs are identified at region and local levels. Another project exemplifies how to enhance the resilience within the agricultural sector. Here it is also stated that farmers' cooperatives and agricultural producer groups are main stakeholders at local level (Ministry of Environment, 2010, p. 36). As mentioned above, the document does also provide specific examples of different measures that can be adapted by the agricultural sector. Local communities are also specifically described to be involved in the implementation in some of the suggested projects (Ministry of Environment, 2010, pp. 43, 45). This shows that in the development of the NAPA, the local communities have seemingly been included. Moreover, it shows that at national level, the inclusion of the local communities is important to enhance climate change adaptation and adaptive capacity within the country.

5.1.5. Discussion of the most central findings in the policy documents

Seen by the aims and contents of the documents, the Norwegian white paper is mostly highlighting climatic challenges, while the NAPA do also suggest and prioritise options to deal with these challenges.

By including adaptation options, like they have done in the NAPA, they are likely making easier for the local authorities to approach the adaptation, and simplifying the process local levels to develop and implement their own LAPA. A reason for this is that local governments can struggle to understand what the national guidelines mean and how to implement them. Suggestions of measures can therefore be helpful to increase the understanding of possible adaptation solutions (Orderud & Naustdalslid, 2018, pp. 585-586). It is likely that the lack of such suggestions in the white paper can make it harder for institutions to follow up on the national adaptation strategies, as this is a comprehensive task, and there might be little knowledge of how to do this, especially at local levels (Orderud & Naustdalslid, 2018).

In terms of the NAPA, the findings show that traditional knowledge is more in focus here than in the Norwegian white paper. The fact that the NAPA is promoting to combine scientific knowledge and traditional knowledge, show that the developers of the document have both understood the value of traditional knowledge and importance of combining different knowledge systems to enhance adaptation (Nakashima et al., 2012, p. 37). There are no such examples in the Norwegian white paper, however, it is stated that it is important to use the best available knowledge. To use the best available knowledge is also highlighted by UNFCCC (n.d.), and they state that this includes traditional knowledge. However, as traditional knowledge is not mentioned in relation to this statement in the white paper, this can indicate that the importance of combining these knowledge systems is not understood, or as literature shows, that the scientific knowledge is found to be more trustworthy and valuable (Ichii et al., 2019, p. 14). The white paper does only mention traditional knowledge in relation to adaptation within Saami peoples livelihoods, but even as it is important with traditional knowledge to adapt in the Saami industries and cultures, literature have stated this knowledge can be important and enhance the success of adaptation measures in general, and not only within the livelihoods of people holding on to this knowledge (Karki et al., 2017, p. 16).

In the Norwegian white paper, it could be natural to mention traditional knowledge where the document states that there is a need of knowledge about both the value of nature and the climate changes effect on reindeers. As seen by several studies, people holding on to traditional knowledge do often have a close connection to the nature, making them in possession to provide valuable information about this when planning and implementing climate change adaptation (Magga et al., 2009, p. 9; Mazzocchi, 2006, p. 463). Additionally, the reindeer herders themselves possess lots if knowledge about how the climate

changes affect them and their livelihood (Magga et al., 2009, p. 11). This traditional knowledge would then probably be the most natural knowledge to use in the above-mentioned situations where white paper points out that more knowledge is needed. Moreover, traditional knowledge is not mentioned in relation to the protection of indigenous peoples and the value of the knowledge they have, and neither in relation to the importance of implementing adaptation that do not harm the Saami livelihoods. However, these statements point out to the importance of protecting this knowledge, which show that Saami peoples knowledge and livelihoods is seemingly identified as valuable also by the white paper. These statements do also, even if not mentioned in the white paper, indicate that traditional knowledge is highly relevant in the adaptation planning to protect the vulnerable livelihoods of Saami people.

Regarding the focus on EbA, even as the NAPA do not mention EbA in relation to the adaptation approaches where they use the nature, following the study of Vignola et al. (2015, p. 128) these measures can be defined as agricultural practises of EbA. In addition to this, the created regional unit which works to promote EbA across all implemented projects is a good example of how EbA is in focus in all adaptation actions, which can indicate that some of the possibilities, benefits and advantages of using this approach is understood and used by the developers of the NAPA (Chong, 2014, p. 402; Jones et al., 2012, pp. 506-507; World Bank, 2009, p. 59). There are few such examples in the Norwegian white paper, and by not including any more information of how to approach EbA, it can be difficult to implement such strategies at local levels. As this requires knowledge and understanding about the nature, something political authorities often do not have (Nalau, Becken, Schliephack, et al., 2018, p. 852). However, despite not mentioning EbA directly in relation to reindeer herding, the document says that it is important to protect land areas for alpine species, which also includes reindeers. Further, to protect these areas, can be an example of EbA, as preserving the nature is commonly known to be such a measure (CBD, 2009, p. 10; Chong, 2014, p. 394). In the NAPA, the suggested project that concerns EbA and use of indigenous skills to promote this is a good example of how the developers of the document have understood that the combination of EbA and traditional knowledge is valuable. Examples like this are not identified in the white paper, thereby likely making it hard for the local levels to understand the value of this when they are implementing measures.

As seen from the findings in the policy documents, traditional knowledge and EbA are touched upon in both the NAPA and the white paper, but to different degrees, and in some cases, more information could

have been provided. However, how these strategies are implemented locally, and if the perceptions from the informants about this reflects the statements from the policy documents, reminds to explore, and this will be elaborated further in the next chapter.

5.2. Implementation of national strategies at local level

In terms of the implementation of the national strategies, the response from the informants in the two countries showed that there exist several differences, however, there was also some interesting similarities that stood out. When presenting these findings, I have divided them into sub chapters with different topics where I discuss the different statements against the findings from the national policy documents and relevant literature.

5.2.1. Inclusion of traditional livelihoods in implementation of national strategies

When it comes to inclusion of and focus on the traditional livelihoods when implementing climate change adaptation strategies, the feedback indicated that there apparently are big differences in Norway and Nepal. This inclusion can reflect how traditional knowledge is viewed and valued in the two countries, something I will elaborate on in next sub chapter. In Norway, the informants did not feel that the voices of reindeer herders were included in implementation of adaptation strategies, and here, there was several challenges and stories about distrust brought up by the informants. In contrast to Norway, the informants in Nepal were seemingly more positive to the inclusion of local inhabitants in implementation of these strategies. These findings will be further elaborated in the next sections.

The Norwegian informants did both refer to the Reindeer Act as an example of where the reindeer herders and their knowledge were not considered. The informant from the Arctic and environment unit said that the Reindeer Act is not based on Saami habits and does not consider how the Saami society is organised. At least not very much she said. The reindeer herder further stated that the national regulations like this act, control the herding industry with several rules that do not necessarily take the natural variations into account. This information indicates that the act, is not developed based on what the reindeer herders experience as the best solutions and regulations, even if it is indicated in the white paper, where it is stated that the act will facilitate utilization of recourses to benefit the reindeer

herding. As Dannevig and Hovelsrud (2016, p. 272) describe in their article, to address potential conflicts, it is important to understand others knowledge systems. The Reindeer Act is an example where other knowledge systems, in this case the traditional knowledge of the reindeer herders, are not understood, and thereby causing a conflict which further limit the herder's possibility to adapt. Both the informants brought this act up as an example where the local voices were not taken into account. This can indicate that the regulation has a huge negative impact on the reindeer herder's livelihood. It also shows, what other literature emphasises, that modern management affect the traditional livelihoods, here reindeer herders, negatively, as neither them nor their livelihood are understood or heard when developing the framework (Benjaminsen & Svarstad, 2017, pp. 193-194; Campbell, 2017, p. 37). Risvoll et al. (In press, p. 4) do also highlight this, they write that the regulatory framework does not capture the needs of the reindeer herders and their connection to the nature. The study by Risvoll et al. (In press, p. 4) also found that herders felt they were ignored in the decision making, which is exact the same impression the informants in this study had and expressed. The informant from the Arctic and Environmental unit told me that there is lots of incompetence in the management and that many firms conducting impact assessments, and other firms, claim that they know more about reindeer husbandry than reindeer herders themselves. She also said that she and other Saami people experience that indigenous peoples' knowledge is not valued, and that it is not considered correct or credible until a western researcher has researched for 20 years and suddenly found that what they say is true. So there exist a lot of distrust to both the management, municipalities and to research she said. The informants did also tell me that societal development projects often had negative impacts on the reindeer herding, but there were little done to prevent this. However, recently there has been some cases where the voices of herders have been heard, and damaging development has been prevented, but this is usually not the case. The fact that societal development have continued, despite the reindeer herders telling that it affects them negatively, is a good example of what Noble et al. (2014, pp. 858-859) emphasises. Namely, that in this case, societal development actions that benefit one community, are maladaptive for the reindeer herders. Engle (2011, p. 648) states that it is hard to know if measures will lead to maladaptation or not. However, I argue that if the reindeer herder's knowledge had been more considered in societal management or cases like the development of the Reindeer Act, it would be a huge step towards preventing maladaptation in Saami peoples livelihoods.

However, the reindeer herder informant adds that from the reindeer herding side, in the development of district and crisis plan for instance, there has not been a big priority or need from them to participate either. They have made some plans, like climate plans and contingency plans, but there is still a lot of undocumented knowledge among the reindeer herders. Despite this, he said that the knowledge does exist, and that is a part of the problem. The fact that he mentions this, shows that there might be more than just downgrading from the governmental side. There might be lack of interest from the herders' side as well. However, the herders have lived with this knowledge for many centuries without any plans, and this has worked well. Seemingly, by the information provided from the informants and literature, the problem has come due to additional pressure from multiple sides in addition to the fact that their livelihood is becoming more politically controlled, like by the Reindeer Act (Risvoll et al., In press, pp. 20-21).

The reindeer herder said that there is little to be found about reindeer herding in municipal plans, and if it is mentioned, it is very general and only short concepts. Moreover, he said that in relation to reindeer herding, there is generally little information to be found overall. This also reflects the white paper, as the sections talking about Saami people and reindeer herding were small with only brief explanations when mentioned. The informant from the Arctic and Environmental unit told about some of the same issues brought forward by Ichii et al. (2019, p. 14), that reindeer herders are less appreciated and valued compared to people with scientific knowledge. She said that there is never someone talking about how to develop the Saami industries and society. Moreover, she expressed that they never have the opportunity to develop their industries or their society, because they must always give. This is something that she does not think is clear enough in the national discourse around Saami industries or Saami society in general. She further said that no one talks about making the reindeer herding industry grow, and from a Saami point of view, it is perceived that the government wants them to be so few left that they finally stop engage in their own livelihoods.

In the case of Nepal, the response was totally different. Here, the informants meant that the local inhabitants had been included in the planning process, hence, the local voices were heard and taken into account in implementation. The informant from Namobuddha told me that they had made a LAPA in cooperation with the local inhabitants, as suggested by the NAPA. Here, they discussed with the local people and listened to what they wanted. They are now trying to incorporate this knowledge and views

in the adaptation work. This is a good example of a situation of where the local voices are seemingly included. The representant from ICIMOD stated that after the new governmental structure, representatives of the people are invited to take part in the adaptation planning, and that their views and needs are included in the planning. The informant from CEAPRED further said that projects in Nepal are generally focusing on developing the livelihoods and helping people in different areas. These statements show that the local inhabitants and people holding onto traditional knowledge are apparently well included in the planning process and that statements from NAPA about including local inhabitants in planning for adaptation is also seemingly being implemented at local level. To have this focus and listen to the local inhabitants is what literature state as important in adaptation actions, as they can provide context specific information that help identify the best adaptation approach to that specific case (Ensor et al., 2019, p. 229)

5.2.1. Inclusion of traditional knowledge

The informants in Nepal gave me several examples of where traditional knowledge had been included in adaptation planning and implementation. The informant from the municipality in Nepal said that they are trying to implement traditional activities in the plan, as they are easier to implement because they are cheap and often uses easily accessible materials from nature. The informant from CEAPRED did also have the impression that traditional knowledge is used when planning for climate change adaptation and said: “They use some of the traditional knowledge in planning, while sometimes they also mix up that knowledge with the scientific knowledge and innovate to new ideas based on those traditional as well as the modern knowledge”. This shows that they are following the suggestions from the NAPA which highlighted the importance of combination of scientific knowledge and traditional knowledge. It also shows that at least some local authorities has grasped what the research are saying: that the combination of these knowledge systems can lead to more successful adaptation outcomes (Mazzocchi, 2006, p. 465; Nakashima et al., 2012, p. 37). The fact that the informant stated that these knowledge systems are combined to implement better innovative options, challenges the statements highlighted in Karki et al. (2017, p. 14), that to date traditional knowledge and scientific knowledge have not been efficiently combined. A reason for why these findings is contradictory might also be due to the new governmental structure, as this can possibly have changed the way adaptation is approached.

Moreover, the informant from CEAPRED did mention building of ponds as an example to where they have used traditional knowledge and said that this was implemented by some municipal authorities. Here, adaptation measures are good examples of incremental adaptation actions, as they thrive to keep a stable state in the systems (Noble et al., 2014, p. 839). These examples show that the municipalities are both following national strategies that suggest natural ways of coping with the climate, and they are including traditional knowledge in the process.

The informant from ICIMOD said that she has the impression that the government and planners are trying to include everyone and their knowledge in the planning, also the indigenous people. However, it is a bit difficult sometimes, as people can live in very remote areas. The interview with the informant in Namobuddha shows that seemingly, this municipality does also have focus on including every group in adaptation actions. The informant told me that all their projects have an aim to uplift the living standard of marginalised and indigenous people, so they are trying to facilitate this aim by making them participate in all the projects. He further stated that everyone has the right to participate in their planning process, and that they are listening to the people's demands when they are implementing projects. Following this, it seems that they are trying to include everyone, and that would probably mean that they are gathering several different possible adaptation approaches and traditions based on the knowledge from the different communities. However, even if he stated that they are trying to include everyone and that everyone is allowed to contribute, the study by Nagoda and Nightingale (2017) shows that this is not necessarily always the case. Their study found that vulnerable people could become even more vulnerable due to power relations within the communities. They found that people from the higher classes were often heard while the voices of the more marginalised were ignored. This also made the marginalised people stop sharing their needs, as they would not be prioritised anyway (Nagoda & Nightingale, 2017, p. 89). As such power relations could be hard for governmental institutions to catch, this could potentially be an issue in Namobuddha as well. It is therefore important for the developers of adaptation actions to be aware of possible power relations, so that this can be prevented to the degree in which it is possible. The potential conflicts which can make some inhabitants avoid contributing and telling their needs and meanings is also touched upon by the informant from CEAPRED. He first told me that he has the impression that indigenous people are included in the planning in the municipalities, as there is a person from all the communities represented in the planning. However, then he further told me that sometimes the ones from a higher class have more powerful voices compared to the indigenous

people and that they often are more prioritised, a statement that supports the findings by Nagoda and Nightingale (2017, p. 89). So here, we can see examples of that even though traditional knowledge are included in the planning, there might be some knowledge and needs that are excluded.

In Norway, the informants expressed dissatisfaction in terms of lack of inclusion of traditional knowledge. The reindeer herder told me that the authorities have been bad at including traditional knowledge for a long time, and that this knowledge is not included in national regulations. This is also shown in the white paper, as there are several occasions where it would have been natural to mention traditional knowledge as a way of enhancing knowledge in order to identify successful adaptation options. The fact that the national regulations do not focus more on traditional knowledge, is likely one reason for the lack of attention at the local level. The informant from the Arctic and Environmental gave an example of how the Saami peoples traditional knowledge was not heard in several big cases that highly affected the reindeer herding. She told me, for instance, in the case of developing windmill parks, scientists have for many years meant that the windmills will not have any significant effect on the reindeers, and even if the reindeer herders have stated otherwise, the government have approved several development projects of windmills in areas of the reindeers' pastures. She further stated that recent research based on scientific knowledge is now showing that the windmills did in fact have a negative effect on the reindeers, but now the parks have been developed and the damage have already been done. This conflict is also elaborated in the report by Lund et al. (2020), which show that this is a theme that engages many people. The informant claimed that due to incidences like this, and the fact that Saami people over and over are not heard or prioritised, are some of the reasons for the distrust to the government and academic environment within the Saami communities. This example clearly shows that the statement from the white paper of using the best available knowledge, has clearly not been followed. And if the decision makers in this case meant that the scientist knows the best, it is a clear example of how traditional knowledge still is being downgraded compared to scientific knowledge, which further can enhance the conflict between reindeer herders and the government in Norway. The example also shows how the modern management in Norway sees the scientific knowledge as the best, and as the most valuable in all situations (Benjaminsen & Svarstad, 2017, p. 194)

5.2.2. Loss of traditional knowledge

Loss of traditional knowledge is something the informants in Norway worries about. The informant from Arctic and Environmental unit expressed concerns in terms of the climate changes, as she said that this will not only lead to loss of the reindeer industry itself, but also loss of the Saami culture and the connected knowledge. The herder did also touch upon loss of knowledge and said that he for instance knows less about the traditional practices than his grandfather did, and like this, little by little the old and traditional knowledge disappear with each generation. However, he also said that the reindeer herders are learning new things every day, so he has accumulated knowledge his ancestors probably did not have. So, even as they are losing some knowledge, they are learning continuously. This means that some of the old traditional and valuable knowledge to cope with climate changes can be gone forever. The reindeer herder further stated that there can be several reasons to this loss of traditional knowledge, both climate change, societal change and political pressure such as the one above-mentioned example. Mazzocchi (2006, p. 465) states that usage of scientific knowledge can lead to loss of traditional knowledge. The national regulation like the Reindeer Act is a good example in this case. This regulation does for instance lead to herders not conducting and using some of the elements that the traditional knowledge would have used. This shows that regulations and the political authorities' way of approaching reindeer herding do not facilitate for traditional knowledge nor climate change adaptation within their livelihood. However, the herder said that the Norwegian government has in the recent years tried to change some of the regulations to incorporate old traditions of reindeer herding. Despite this, the reindeer herder told that since the strict regulations was in us for many years, almost the all the herders active before the regulations was implemented, are not engaged in the reindeer herding anymore. This can make the process of going back to the old traditions a challenge. Yet another good examples supporting the findings from Risvoll et al. (In press, p. 4), which show that the modern management has led to loss of important traditional knowledge, as they have had to adapt in a way that is counteractive in the long term.

In the case of Nepal, the governmental regulations do seemingly not have any negative effects on the preservation of traditional knowledge. Here, it seems like the roles are turned, and that the traditional knowledge holders do not value their knowledge as much as the government do. The informant from ICIMOD talked about traditional knowledge holders and stated that: "They want to hear solutions from the scientists' level or the people who work from that side". In cases like this I would argue that it is

important for the local planners to be aware of the value of other knowledge systems with more holistic perspectives and focus on natural variabilities, rather than just scientific knowledge. This can be important when planning for adaptation in livelihoods relying on the nature (Benjaminsen & Svarstad, 2017, p. 194). Research have also highlighted that the traditional knowledge is valuable and should be used together with scientific knowledge, when developing adaptation measures, as both the knowledge systems could lack important aspects when used alone (Finucane, 2009, p. 2; Karki et al., 2017, p. 1). However, there are many people having this knowledge that do not know about this research. Hence, it would be a job for the ones who do know this value, to make them understand that their knowledge is equally as important as the scientific knowledge. The informant from the municipality told me similar stories to the one from the informant from ICIMOD regarding the implementation and planning of adaptation programs in their municipality. He said that in the planning process where they talked to the local inhabitants to hear what they wanted, some wanted to use new technologies which are not relevant to their societies, so that was somehow a challenge when they worked to develop their LAPA. This description of what the local inhabitants wish for, are in opposition to the examples from the study by Timsina and Ojha (2008, pp. 28-29). Here they found that the local farmer felt that their traditional knowledge was not considered in adaptation planning, and that technological measures was implemented instead of measures based on their traditional knowledge. This shows that there can be differences in what the inhabitants emphasises in different communities and parts of the country.

The informant from Namobuddha further said that some of the old practices have gotten lost in new generations, and that these new generations do not see the value of this knowledge. However, in their municipality they are now trying to bring back some of the old traditions and knowledge, as they can be relevant for climate change adaptation and in the future adaptation planning. He mentioned building of ponds and planting of more trees as examples of this. These actions by the municipal authorities show what the literature state, that traditional knowledge is important to include. Again, these examples are in opposition to the findings from Timsina and Ojha (2008, pp. 28-29), which can indicate that there have been a change in the climate change adaptation focus in Nepal the last years or that there are different focus in different municipalities within the country. Further, this shows that at least in some municipalities, there are focus on sustainable and long-term adaptation options that acknowledge traditional knowledge, rather than the modern management and intensification of agriculture, which

Atreya et al. (2018, p. 750) say can lead to loss of traditional knowledge, and thus less sustainable adaptation.

So, even if the traditional knowledge holders do not always see the value of their knowledge themselves, there are municipalities including their needs and knowledge local planning, Namobuddha being one of them. The informant from the municipality said that when they were making their adaptation plan, they talked to people with traditional knowledge, as they had already faced many of the different scenarios that were expected in the future. They talked to people with old traditions, marginalised people, indigenous groups and listened to how they have used to adapt. Gathering knowledge this way, can perhaps make these communities share more about what they know rather than what they want, as here the questions is how they have used to adapt instead of what they think need. In this way traditional knowledge is transferred and documented, even holders of this knowledge do not see the value of it themselves.

5.2.3. Barriers to implementation

Mimura et al. (2014, p. 876) state, that capacity and institutional barriers can make implementation more challenging. This matches the information from some of the informants and is applicable for both countries. In Nepal, the representant from ICIMOD told me that after the new federal structure, there have been some challenges in the implementation of the adaptation programs. One of the reasons for this is that the programs now must go all the way from national to local level before they are implemented. Before the new structure the programs were implemented directly from the central level. She further told me that in addition to the struggles with setting up the system, there are many new elected staff and people. The new representatives will have to understand what climate change is. Many of these representatives are lacking the scientific knowledge about climate changes, and thereby the importance of climate change adaptation. This is a good example showing that also scientific knowledge is important for successful adaptation (Karki et al., 2017, p. 1; Mazzocchi, 2006, p. 465), as without this, the understanding of the importance of adaptation might be missed. Additionally, she stated that there are capacity constraints. Not all municipalities have the technical capacity to adapt. The informant from Namobuddha further said that knowledge within the inhabitants is also a barrier to adaptation. He stated that many people are living in remote areas, some are poor and some illiterate, making it hard for

them to understand the importance of climate change adaptation. Yet another need of the scientific knowledge, as this can make people understand the need of climate change adaptation. After this is understood, traditional knowledge can be used together with the to find the most suitable solutions (Makondo & Thomas, 2018, pp. 89-90). The informant from the municipality said that what they have done in Namobuddha is to develop a public awareness program. The main thing they need to do for climate change adaptation is to make people aware. This is how they will be able to adapt, he said.

Furthermore, the reindeer herder in Norway told me how there could be more reasons than just downgrading of the reindeer herding and their knowledge that have affected amount of focus and attention from public authorities and in municipal plans. Lack of competence could be an additional reason for why traditional knowledge is not in focus in the local plans. Also here, we see what the literature state, that lack of competence is a limitation to adaptation, as to include traditional knowledge in the plans could give new and important perspectives (Klein et al., 2014, p. 911; Magga et al., 2009, p. 59). The only difference from Nepal is that in this case, the lack of competence concerns traditional knowledge which is opposite of Nepal where many elective representants lack overall knowledge about climate change and the importance of adapting. When there is no focus of this in the municipal plans, it is natural that reindeer herding is not more prioritised or described in further development and planning, the informant said. He also described that there can be a combination of reasons to why their livelihood is not more in focus, and as traditional knowledge is omitted orally it can be hard for outsiders to grasp the importance of this knowledge and to understand their needs.

Even as there are different barriers that can have led to little focus on reindeer herders and their knowledge in at local levels, both informants gave examples of cases where the government are trying to include traditional knowledge more and that the importance of this knowledge and the value of the reindeer herders' livelihoods are more accepted. Something that shows that the main barrier, to acknowledge the reindeer herders and their knowledge is maybe overcome, at least for some public authorities. The reindeer herder said that even as they are trying to use more of the traditional knowledge, they must learn this knowledge first, and to truly understand before they can use it, so the implementation of this in the management will take time and that it is going very slow, but they should have credit for the effort. Despite the effort, there is a long way to go. From the examples shown and the

informants experience there is a clearly huge gap from acceptance to the implementation of sufficient climate change adaptation measures.

5.2.4. Differences within the countries

Even though the informants have stated that the reindeer herders and their knowledge are not considered and recognized by the governments, and that there are struggles with adaptation implementation in Nepal, there are differences within the countries. The informants from ICIMOD and CEAPRED do both stated that there are differences between the municipalities. They said that the elected representatives and their knowledge about climate changes and adaptation have a huge influence on how climate change adaptation is facilitated in the municipality. Some municipalities have not prioritised adaptation, while others have carried out adaptation programs. This depends on the different politicians' education and experience with climate change adaptation. Namobuddha is an example of a municipality which have had focus on climate change adaptation, showing that the local representatives here are aware of the importance of such work.

In Norway, even as the informants gave me many examples of where the government or other industries clearly did not consider the reindeer herders in the implementation, they both said that there existed differences between different municipalities. They both referred to Karasjok as one of the municipalities where they felt that the reindeer herders and their needs were more prioritised. The informants stated that there were examples of societal development projects that were not approved due to the harm it would have caused onto the reindeers, for instance development of mining industries. It is possible that a reason for this priority, is that a majority of the inhabitants are Saami people and that the political authorities have more connection to and knowledge about this livelihood (Karasjok kommune, 2018). Another reason to why reindeer herding is well facilitated in Karasjok can be that there are great areas where there is not relevant to introduce societal development due to the low number of inhabitants, making the conflict less oppressive. But even in this municipality, the reindeer herder informant stated that there is a potential for improvement. He also said that if you do not have a clear voice, you are not prioritised. Here, we see that just as in the informant from CEAPRED explains, that it is the ones with most powerful voice that are heard and considered in the end, which is further what it indicated in the study by (Nagoda & Nightingale, 2017). Additionally, even if one municipality does facilitate for the

reindeer herding livelihood, the reindeer herder informant said that the herders can meet challenges, as they often move across municipal, county, and sometimes country borders when moving between the different pastures.

Even though the informants mention that Karasjok considers the reindeer herding higher compared to most other municipalities, the municipality does seemingly not have any specific focus on climate change adaptation regarding reindeer herders. This highlights what the reindeer herder said, namely that there is room for improvement within this municipality as well. In the white paper, there are some sections that refer to reindeer herding, and even if they are not very comprehensive and show some lack of knowledge about this livelihood, they are still present. So, when the municipalities are not following the guidelines, it seems like the national strategies from the white paper are not well implemented locally. The answer from Karasjok municipality concerning my request for an interview does also reflect this. When I asked the municipality for an interview regarding climate change adaptation and traditional knowledge, I got a reply that they do not have much knowledge on this topic and that their plans do not have any guidelines that connects reindeer herding with climate change adaptation. The contact person stated that they are following the guidelines provided by the government and since the reindeer herding is a private industry, the municipality will not be directly involved in climate change adaptation regarding this livelihood. However, the contact person also stated that many of the guidelines within reindeer herding are developed in areas where reindeer herding is not practiced, and whether these guidelines are discussed with people engaged in the herding, is hard to tell. If regional differences had been taken into account, the guidelines would probably have had regional differences. Moreover, the contact person stated that even though the reindeer herders have been affected by the climate changes, there are no guidelines linking usage of outfields to climate challenges, and neither here, any regional differences. The contact person in the municipality also indicated, that guidelines developed by political authorities not familiar with reindeer herding, might not be best fitted for all reindeer herding districts, including Karasjok. This suggests that the public authorities at some local levels see the same picture as the other informants and the literature, that regulations such as the Reindeer Act can have negative consequences on the reindeer herding livelihood (Risvoll et al., In press, p. 4). In terms of adaptation within the reindeer sector, not much has been done, and this might also be due to the complex task and the uncertainties or lack of knowledge within municipalities of how to approach this challenge. This

is also elaborated on in the study by Orderud and Naustdalslid (2018, p. 585), where they found out that several municipalities wished for clearer regulations and instructions from the national level.

5.2.5. Ecosystem-based adaptation

When the Norwegian informants talked about the adaptation measures that had been taken, they gave me examples of several recent adaptation practices where they have had to use more technological and modern adaptation approaches both due to the climate changes, but seemingly most due to societal and political impacts. That technological solutions are in use by the reindeer herders is no surprise, as this is the most common adaptation approaches (Mimura et al., 2014, p. 887). However, when the people are forced to use these measures due to climatic and other changes, instead of those based on practices using the nature, which have been transmitted through several generations, they can pose a threat to the preservation of the accumulated traditional knowledge (Karki et al., 2017, p. 1; Mazzocchi, 2006, p. 465). The informant from the Arctic and Environmental unit told me that she had heard that security equipment were more commonly used by the herders as the ice layers on water are getting thinner, and weather conditions are more unstable. This shows how the herders are taking reactive adaptation actions due to the changing climate (Fankhauser et al., 1999, p. 69). Both informants further told me that the reindeer herders have had to take several actions that can be defined as autonomous adaptation actions. The reason for this is likely due to the affection by external forces and societal development, as this is preventing them to use some of the old traditional practices (IPCC, 2001, p. 982; Risvoll & Hovelsrud, 2016, p. 103). One example is where herders have had to move their herd with trailers due to bad conditions at the pastures. This is an unpreferred action that can add stress to the animals, and thereby an action not to prefer. Additionally, the reindeer herder talked about adaptation actions that are in line with the ones presented in Risvoll and Hovelsrud (2016, p. 103), where harder feeding conditions have made it necessary for some herders to give additional food to the herds. Yet, another example of an autonomous type of adaptation. The fact that some of the technological adaptation actions taken by the herders is done due to societal changes and regulations is of concern, as seemingly these technological solutions would not been necessary without the societal pressure and governmental regulations. Thereby the external forces are making the herders to move away from their close relationship with the nature.

In Nepal, the focus on using EbA is seemingly more present. The informant from ICIMOD talked about different projects where EbA measures are implemented. Here two of the agricultural adaptation practices have been to introduce different crops to better withstand the unstable climate and to find better ways to conserve the watersheds against drought. This is practises that also are used in other parts of the country, showing that EbA approaches are in focus several places in Nepal (Selvaraju et al., 2014, p. 83). Reason, also highlighted in the literature, might be that these types of measures will help protect the ecosystems which can provide the inhabitants with provisioning services like food and water, and that they are low-cost solutions, making it an affordable adaptation approach, also available for poor and marginalised people. (Chong, 2014, p. 402; Jones et al., 2012, p. 507; Millennium Ecosystem Assessment, 2005, p. 1)

Although Nepal seemingly has more focus on implementing EbA options within the agriculture sector than what Norway has for the reindeer herding, new issues are also arising here in terms of using EbA approaches. The informant from ICIMOD told me that the in older generations, they used traditional knowledge inherited from their ancestors, where the nature was commonly used to adapt. While in the newer generations the value of nature and to use EbA is not there. This has led to less use of EbA measures by some new generations. The fact that the younger generations do not focus on traditional knowledge and EbA, and the value of this, might be a contributing reason to why technical and engineered solutions are more widespread (Mimura et al., 2014, p. 877). As the focus on EbA is lost in the newer generations, which seemingly also hold on to less traditional knowledge based on statements from the informants, shows what is highlighted in the study by Nalau, Becken, Schliephack, et al. (2018, p. 852), that traditional knowledge and EbA goes hand in hand, and how important it is to take care of this knowledge in order to find good EbA solutions.

However, even though the informant from ICIMOD talks about some cases where the EbA is not valued, there are several EbA measures suggested from the NAPA that are being implemented in Namobuddha, by help from the CEAPRED and ICIMOD. They are for instance using biofertilizers made from cow urine instead of chemicals. Further, they have made irrigation systems and ponds, based on traditional knowledge, by using sand and soil, which will be easily available for the inhabitants, instead of plastic. Here, we see some good examples of how they have implemented suggestions of EbA from the national strategy, and also included traditional knowledge in this process. As these measures are developed using

traditional knowledge, they are likely more sustainable, as they will be possible for the local inhabitants to keep on doing after the projects and funding have stopped (Makondo & Thomas, 2018, p. 89)

There are also some examples of EbA options used in the reindeer herding in Norwegian context. For instance, the usage of different pastures and different vegetation areas in hard times has been normal. According to the reindeer herder, one of the previous ways of handling the natural changes have been to use large areas. However, due to societal development and fragmentation of the land, this might not be possible anymore. To use larger land areas is a good example of an EbA approach that have been used by the herders before. Nowadays, this practice is hard to conduct. One can further say that even as the government are highlighting the importance of using the ecosystems to adapt, this is not possible for the reindeer herders due to societal development and political regulations, making the statements from the government counteractive, as they are some of the reasons for why this is not possible. Moreover, as presented in section 5.1.3, there is a section in the white paper regarding the importance of preserving the land areas for the reindeer herding. The information provided by the reindeer herder clearly shows that this statement is not considered at local levels, and further shows that local public authorities do not focus much on climate change adaptation within reindeer herder livelihoods. Yet, another example supporting the findings in previous studies, that herders needs are not considered in decision making, and seemingly, little have been done to change this (Risvoll et al., In press, p. 4).

Regarding the loss of land areas, the herder told me that the area, reindeers and humans are the basis for reindeer herding. He further stated that without any of those three, you no longer have reindeer herding. So, it is clear, that if you lose the area, then you cannot engage in reindeer herding. This statement supports the findings in the study by Risvoll et al. (In press, pp. 21-22), that the exclusion of the reindeer herder's knowledge has led to fragmentation of land areas, which further reduces the herder's possibility to use the nature to adapt. Moreover, this are leading the reindeer herding towards a tipping point, where not only their traditional knowledge is at stake, but also their livelihood.

5.3. Public authorities' facilitation of local climate change adaptation within communities with traditional livelihoods

Shown from the two past chapters and literature, until now many of the adaptation actions within the agriculture and reindeer herding have been reactive and autonomous as a response to the changes that have happened (Engle, 2011, p. 648). However, more knowledge and understanding have facilitated planned and anticipatory actions, like development of adaptation plans and suggested measures to cope with expected future changes (Engle, 2011, p. 648). Moreover, most actions taken so far have been incremental (Noble et al., 2014, p. 839). However, with all the pressure on the traditional livelihoods today, there is a danger of losing some of the components necessary to continue engaging in the traditional livelihoods which can further potentially lead to a transformational change (Kates et al., 2012, p. 7156). In the case of reindeer herding, the reindeer herder stated that if they lose their land areas, they will not be able to engage in reindeer herding anymore. For the agriculture in Nepal, access to water could be a dominant factor pressuring those engaged in this livelihood to find other ways, of either conducting agriculture or to change livelihood. This would lead to a transformational change for both the reindeer herders in Norway and the agricultural sector in Nepal, and possibly lead to loss of valuable traditional knowledge (Noble et al., 2014, p. 839). An outcome like this would therefore be undesirable, something the public authorities should work to prevent in order to protect the traditional livelihood and the knowledge these people have.

Several challenges exist in climate change adaptation in both Norway and Nepal, and the focus on preventing transformational changes which could lead to loss of traditional livelihoods differ between the two countries. In Norway, governmental regulations and societal development are apparently the greatest challenges for the reindeer herders and in terms of their ability to adapt, indicating that the reindeer herders were not on the top of the agenda in terms of facilitating for adaptation. While in Nepal, new governmental structure and lack of knowledge within inhabitants and governmental representatives is the most prominent factor constraining climate change adaptation.

To all the appearance, the public authorities in Norway have not put a huge effort into facilitating for climate change adaptation for reindeer herders. The white paper on climate change adaptation do mention the importance of preserving the Saami people's livelihood and do state that reindeer herding is

vulnerable to the climate changes. Beyond this, there is not done much. At least this the informants stated that is the common impression by the Saami people. Although the sections about Saami people and reindeer herding in the white paper show lack of knowledge and involvement from the people it concerns, one could assume that the points that were mentioned in the document were considered at local levels. However, this is seemingly not the case in Norway. The lack of focus on the reindeer herding in the municipal plans and prioritisation in other cases concerning this livelihood are good examples of that. Knowledge is a common barrier that limits adaptation, and whether this lack of focus is due to missing knowledge or just downgrading, is hard to say, but the impression from the informants showed that it probably could be a combination (Klein et al., 2014, p. 911).

In addition to this, it seems to be a mismatch between what the Saami people and the government consider to be sustainable reindeer herding. This is clearly showed by the regulations in the Reindeer Act (Reindriftsloven, 2007), where the white paper states that this act will facilitate more sustainable use of the land areas in a way that benefits the reindeer herders, while the reindeer herders claims that this act prevents them from herding in a sustainable way. The informants said that this act puts additional challenges to the reindeer herders' livelihood, showing that it does in fact not facilitate for traditional livelihoods even if that is the public authorities' opinion. Moreover, the fact that both the informants highlighted these regulations as a challenge for the herders to conduct their livelihood by traditional practises and knowledge, indicates that the Norwegian government do not understand the importance of traditional knowledge. This, even though the white paper has stated that this knowledge is important for the Saami people's culture and way of coping with a changing climate.

With that said, it is important to state that the informants did in fact say that there were some regional differences. Karasjok were for instance mentioned to facilitate reindeer herding better than average. The informants did also point out that even if there are several conflicts and challenges, the government have, although very slowly, improved and become more aware of the importance of listening to the traditional knowledge holders and their needs than they were some decades ago. Despite this improvement, as the reindeer herder stated, much of the old traditions are already lost, and the herders have adjusted to the modern management. This makes it hard to go back to some of the old traditions. In addition, much of the land use changes that have happened are irreversible, meaning that this land cannot be converted back to grazing land for the reindeers again. These land use changes further make it

hard for the herders to adapt using EbA measures, as the most applicable measure would be traditional usage of more land areas. The reindeer herder did also say that without land there will be no reindeer herding. A clear statement showing that if the societal development and fragmentation of land continues, this livelihood might reach their tipping point, such as Risvoll et al. (In press) have described. The fact that the herders have had to use multiple modern adaptation options, such as trailers and supplementary feeding to cope with the changes, show that the reindeer herders are already moving away from the traditional livelihood. This can be compared to similar cases in Nepal described by Karki et al. (2017, p. 14), where the traditional knowledge holders moved away from all their old practices to the advantage of modern technology. In cases like this it is important for the governments to work to prevent the loss of this knowledge, and rather focus on the possibilities of combine the knowledge systems to find new, better and more sustainable solutions. Finally, the reindeer herders have coped with climate changes for many centuries, and it is first now, with the combination of additional anthropogenic forces to the climate changes and societal changes that have made them move away from the traditional knowledge. This is another argument showing that until now, the government have not succeeded in facilitating traditional livelihoods in Norway.

In contrast to Norway, the public authorities in Nepal have seemingly taken the traditional livelihoods more into account when facilitating climate change adaptation. Here, all the informants expressed that there were several projects and measures implemented to decrease the vulnerability of the inhabitants with traditional livelihoods. All the informants did also mention that there was a priority in the adaptation planning to include the local inhabitants, to make them able to implement more successful adaptation measures. This did also lead to less conflict between the government and the inhabitants, as it is the inhabitants needs and wishes that are prioritised in climate change adaptation work. However, even though the informants did not highlight any direct conflicts, the informants said that it was often a representant from the different communities that spoke for all the others, which could potentially mean that lower classes and the most marginalised people's needs was left out such as described in the study by Nagoda and Nightingale (2017, p. 89). Another of the informant said, in some cases the peoples from higher classes wishes and needs could be more prioritised compared to the lower ones. This indicates that these power relations do in fact exist. First step towards preventing this would be for the public authorities to be aware of that such power relations. Although these issues might be existing, reasons for and solutions to this goes beyond the scope of this study. However, in terms of facilitation of climate

change adaptation for people with traditional livelihoods, all the informants indicated that at least the public authorities are doing a good job and that they try to facilitate local inclusion in planning and implementation.

One reason for why there are seemingly no big conflicts between the political authorities and local inhabitants in the implementation of climate change adaptation measures within the traditional livelihood, can be that agriculture is one of the most important economies for the country, and further that there is a high percentage of the inhabitants engaged in this sector. This makes it natural to prioritise the people in the agricultural sector's needs and wishes. Moreover, the country is defined as an LDC, meaning that the development of other industries and infrastructure might not have conflicted the agricultural sector to a high degree yet, such as we see with the land use conflicts in Norway. This, however, can possibly become a greater issue in the future. In addition to the seemingly better facilitation of the traditional livelihoods in Nepal than Norway, they have also implemented more EbA measures. As these are often low-cost solutions that are easily available for the inhabitants, such measures are a good way of facilitation sustainable local climate change adaptation (Chong, 2014, p. 402). The informants talked about how this is implemented in Namobuddha, and that they have focused on measures based on traditional knowledge where the resources needed for the implementation will be easily available in order for the communities to be able to continue with the adaptation after organisations and projects have pulled out. This approach is also what Makondo and Thomas (2018, p. 89) describe as important for sustainable implementation of adaptation, showing that the Namobuddha are taking many actions to increase the success of adaptation within the agricultural sector in the municipality.

However, even as the municipality of Namobuddha clearly has a focus on the inclusion of local inhabitants, and to use the resources provided by the ecosystems to adapt, this was seemingly not the case all over Nepal. All the informants pointed out that there were differences between the municipalities regarding the knowledge and thereby the focus on climate change adaptation. Without having studied other municipalities in depth, I argue that in the municipalities where the focus on climate change adaptation is missing, it is possible that facilitation from the political authorities is also missing in the agricultural sector, as the authorities would not know how to approach the adaptation (Klein et al., 2014, p. 911).

6. Conclusion

The comparative design of this study has helped me discover several aspects that might not have been noticed to the same degree without the investigation of these two countries. The study found that seemingly Nepal a bigger focus on taking the traditional knowledge into account and to use the nature when planning for climate change adaptation and implementation. This makes Nepal better at facilitating for climate change adaptation within communities with traditional livelihoods than Norway. A reason for this difference might be the high percentage of people engaged in the agriculture sector in Nepal compared to number reindeer herders within the population in Norway. Moreover, the focus on including local inhabitants and their needs and wishes in the planning, is something both Norway and other countries possibly can learn from, in order to decrease potential conflicts when facing the challenge of adapting to the changing climate. It must be said that there are several differences between the countries that are likely to affect how adaptation is approached, like political structure, economy, culture, livelihood and nature. However, moving past those differences, there could potentially be some lessons learned for the public authorities by looking outside one's own country when facilitating for climate change adaptation in traditional livelihoods.

With that being said, although both countries have, to a different degree, facilitated for climate change adaptation, I argue that there is room for improvement in both Norway and Nepal. In Nepal, the national government needs to take action to educate the elected representatives in municipalities where climate change adaptation is not on the agenda. Second, it is important to make the inhabitants aware of the risks climate changes can pose, and of the opportunities that good adaptation can give. This can enhance the willingness to cooperate, and thereby possibly make it easier for the public authorities to facilitate climate change adaptation solutions. Another thing that can be improved to facilitate more successful adaptation is to make the inhabitants understand the value of using nature and ecosystem-based adaptation options instead of technical solutions that might not be sustainable in the long term. The informants did state that the projects they were working on were trying to do this. However, they also mentioned that there were people wanting to use technology that were not suitable in those situations. This shows that the value of nature is yet not fully understood by the local inhabitants.

For Norway, the things to improve are apparently of a greater character than for Nepal. Here, the value of traditional livelihoods does not only need to be understood by the general population and the ones working with societal development, but it must also be considered equally with other livelihoods and interests. From the findings, seemingly, the reindeer herders' voices are almost never heard or at least not considered, even if societal development, adaptation, or regulations concerns them. Further, the traditional knowledge that the reindeer herders hold on to needs to get more prominent place in the society and higher acknowledgement within research and decision making. Today, traditional knowledge seems to be underestimated and downgraded, especially in opposition to scientific knowledge. In the municipalities there are also many opportunities to focus more on reindeer herding, and including this livelihood in the local plans would be a good start. However, as seen through research, to facilitate climate change adaptation locally can be hard for the municipalities. This indicates that the national governments might need to do more to facilitate good adaptation locally. For instance, by providing more examples of measures or approaches that can be taken by the municipalities.

6.1. Lessons learned

There are several lessons learned through this study that can be valuable for further studies within this theme. First, in some cases, there can be different opinions about the rate of success of adaptation measures between different actors involved. Reindeer herders and governments do for instance not share the same opinion about how the Reindeer act is working. Political authorities in Nepal might not know or recognize the potential power relations within the communities. This shows that climate change adaptation is, as literature say, a complex issue, and that there are multiple considerations to take to find the best adaptation approach that suits all inhabitants without leading to maladaptation in some communities. To be aware of the complexity and existing mismatches is important for the political authorities to find better approaches to the issue of climate change adaptation in future cases.

Second, this study confirms what literature say, that there are great variations in how adaptation is approached in different countries, and also how it is facilitated within the countries. This is illustrated by looking at the national policy documents, where Nepal have included several suggestions of how to adapt based on responses from the inhabitants, whereas the Norwegian white paper had more of a focus on addressing vulnerable sectors and the importance of knowledge when approaching adaptation.

Moreover, this study found that there was both a difference between the knowledge that the public authorities and the local inhabitants had about climate change adaptation. The focus on traditional livelihoods and on the approach to adaptation did also differ between the municipalities within both countries.

Finally, Nepal has seemingly facilitated climate change adaptation in traditional livelihoods to a higher degree than Norway has. This shows that a country's development status and economic and societal prerequisites does not necessarily reflect the success of adaptation facilitation within the country, at least not in terms of vulnerable traditional livelihoods.

6.2. Point of departure for future studies

Climate change adaptation and traditional livelihood are two broad topics that still need a lot more research to be fully understood. Based on this thesis, there are several aspects that can be interesting as a starting point for further research. As I was not able to conduct an interview with any employees in the municipality of Karasjok, it is possible that some dimensions and aspects of the relation between municipalities and traditional livelihoods have been missed. For future studies, this relation can be more thoroughly investigated. Including informants from several governmental levels and further inhabitants from different livelihoods and municipalities, might contribute to getting a better understanding of both the inhabitants and of the government's perceptions within this field.

To identify the possible conflict between the local inhabitants in Nepal could help the governments to understand how to deal with potential power relations. Additionally, to see if the agriculture will face some of the same challenges as the reindeer herders with increased societal development can be an interesting topic to investigate in the future.

Moreover, to study facilitation of adaptation within traditional livelihoods in more countries in the regions of Hindu Kush Himalaya and the Arctic might give some insight into differences and similarities depending on the country's characteristics. Such studies can also potentially discover different

approaches to climate change adaptation, where some can be found to be more appropriate and successful than others.

This study has discovered that there are seemingly differences in how climate change adaptation is facilitated in the two countries. To identify underlying reasons for this and to develop a further understanding of this phenomenon, more research on political structure, culture, economy and development would be of essential importance.

Finally, a change in The Sámi Act, regarding consultation, was approved by the Norwegian Parliament June 2021 (Stortinget, 2021). This change requires municipalities and counties to consult with representatives of affected Saami interests in matters concerning local regulations and other decisions or measures that may directly affect Saami interests (Lovvedtak 149, 2021). Whether this regulation leads to changed perceptions within the Saami communities regarding the inclusion of traditional knowledge and Saami livelihoods remains to see. To investigate how this affects the facilitation of climate change adaptation of traditional livelihoods like reindeer herding would also be interesting for future research.

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Appendix 1

Interview guide Nepal

1. Can you tell me about your occupation and what it involves?
 - a. Where do you work?
 - b. What district/municipality?
2. What do you think of when you hear/what is your understanding of the concept climate change adaptation?
3. What is your work with climate change adaptation?
 - a. Can you tell me about any projects/experiences you have worked with?
 - b. Who is taking initiative for the work you do? NGO, governments, international organizations etc.?
4. What is your experience of the national and local climate change adaptation strategy?
 - a. And what about the inclusion of local livelihoods needs?
5. How do you experience the work of local governments in regards of climate change adaptation planning and implementation?
6. Do you have any examples of where the local inhabitants have been included/involved in the planning for adaptation?
 - a. Can you tell me more about this?
7. Do you know of any examples where the government or other organizations have started any development projects that affected the local inhabitant badly? either because they were not included in the planning, or because the outcome became different from what was intended?
8. Do you have the impression that there is different focus on climate change adaptation at different locations/municipalities in Nepal? Explain
9. Do you have any knowledge or experience about challenges people with traditional livelihoods meet in terms of both natural and societal changes?
10. What is your understanding of the concept traditional knowledge?
11. In your experience, do you have the impression that the governmental institutions use the traditional knowledge in their planning?
 - a. Do they only use it in the planning or in the implementation as well?
 - b. Who are responsible for climate adaptation implementation in the country?
12. Have you examples of any approaches or measures where the nature is used to adopt to climate change?
13. The last decades, the focus on ecosystem-based approach has grown, and there has been a lot of focus on ecosystem-based management. In recent years, there has been more focus on a newer concept called ecosystem-based adaptation - have you heard anything about this concept or used this in your job?
 - a. a. If not, have you any experience with ecosystem-based management?
14. Do you have anything you want to add?

Interview guide Norway, English translation

1. Can you tell me about your occupation and what it involves?
2. What do you think of when you hear/what is your understanding of the concept climate change adaptation?
3. Do you know anything about how climate adaptation takes place / is planned / what guidelines are available in Troms and Finnmark and in Karasjok?
4. How do you experience that the local and communal governments facilitate climate change adaptation within traditional livelihoods, like reindeer herding in their planning?
 - a. if you do not have an experience, do you have a general perception?
5. Do you have any examples of where the Saami people interests have been heard or not heard by the government?
6. Do you notice any difference in the focus on preservation the Saami culture and lifestyle between different municipalities?
7. Do you know if there are any special challenges for those who engage in reindeer herding in terms of changes in nature and society?
 - a. What are the biggest challenges?
8. Do you have the impression that climate change is putting pressure on those have a traditional livelihood, such as reindeer herders, in Karasjok or Troms and Finnmark in general?
 - a. How?
9. What is your understanding of the concept traditional knowledge?
10. In your experience, do you have the impression that the governmental institutions use the traditional knowledge in the societal development and planning?
 - a. How
11. Do you have examples of places in the county where traditional knowledge is more or less heard than in others? Or is it the same everywhere?
12. Do you have any examples of climate adaptation measures that you know of?
 - a. Can you talk about this?
 - b. Do you know if any of these implemented measures have affected the reindeer herding?
 - i. How did this happen, and what?
 - ii. Are there any of the measures that were either meant to not affect reindeer herding or that should affect it positive, but which have had a negative outcome not predicted?
13. Have you examples of any approaches or measures where the nature is used to adopt to climate change?
14. The last decades, the focus on ecosystem-based approach has grown, and there has been a lot of focus on ecosystem-based management. In recent years, there has been more focus on a newer concept called ecosystem-based adaptation - have you heard anything about this concept or used this in your job?
 - a. a. If not, have you any experience with ecosystem-based management?
15. Do you have anything you want to add?

Interview guide Norway, original version

1. Kan du fortelle litt om det du jobber med?
2. Hva tenker du når du hører klimatilpasning?
3. Vet du noe om hvordan klimatilpasning foregår/blir planlagt/ hvilke retningslinjer som finnes i Troms og Finnmark og i Karasjok?
4. Hvordan opplever du at kommunal og regional klimatilpasning ivaretar/legger til rette eller ikke legger til rette for de som har en tradisjonell livsstil, som for eksempel reinsdyrs drift, i planleggingen? E
 - a. Hvis ikke egen opplevelse, har du en generell oppfatning?
5. Vet du om eksempler hvor samiske interesser med tanke på utvikling har blitt hørt eller ikke blitt hørt av myndighetene?
6. Merker du noe forskjell på fokuset på å ivareta den samiske kulturen og livsstilen mellom ulike kommuner
7. Vet du noe om det er noen spesielle utfordringer for de (som har en tradisjonell livsstil/tradisjonell næring) som driver med reindrift med tanke på endringer i natur og samfunn?
 - a. Hva er de største utfordringene?
8. Har du inntrykk av at klimaendringene legger press på de som lever etter en tradisjonell livsstil, da f eks reindriftseiere, i Karasjok eller Troms og Finnmark generelt?
 - a. Hvordan?
9. Hvordan forstår du begrepet tradisjonell kunnskap?
10. Opplever du at myndighetene tar i bruk tradisjonell kunnskap i samfunnsutviklingen?
 - a. På hvilken måte?
 - b. Hvorfor ikke?
11. Har du eksempler på steder i fylket hvor tradisjonell kunnskap blir mer eller mindre hørt enn i andre? Eller er det likt overalt?
12. Har du inntrykk av at det som står i planer og strategier om klimatilpasning faktisk blir gjort og implementert?
13. Har du noen eksempler på klimatilpasningstiltak som du vet om?
 - a. Kan du fortelle litt om dette?
 - b. Vet du om noen av disse implementerte tiltakene gått utover reindriften?
 - i. Hvordan skjedde dette, og hva?
 - ii. Er det noen av tiltakene som enten ikke skulle påvirke reindriften eller som skulle påvirke den positivt, men som har hatt et negativt utfall en ikke hadde sett for seg?
14. Vet du om det er gjort noen tiltak eller innsats hvor naturen blir brukt for å tilpasse seg klimaendringene?
15. Det er vokst frem et paradigme innenfor økosystembasert tilnærming, og har vært mye fokus på økoystsebasert forvaltning. De siste årene har det og blitt mer fokus på et nyere begrep kalt økosystembasert tilpasning- har du hørt noe om dette eller brukt dette i din jobb?
 - a. hvis ikke, vært fokus på økosystembasert forvaltning?
16. Har du noe annet du vil legge til?