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Nature Conservation in Hydropower Management

A discourse analysis comparing perceptions of natural environmental impacts of small-scale and large-scale hydropower

Master's thesis in Natural Resources Management

Trondheim, May 2017

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Abstract

Hydropower has been an important aspect of the modernisation of Norway over the last 100 years, and it is still the most important source of renewable energy we have. With increasing focus on climate change and the negative consequences of fossil fuels, combined with an increasing demand of energy, hydropower is expected to continue to play an important role in the Norwegian energy market. But at the same time there is a conflict between different interests on whether continued development should be at the expense of Norwegian nature.

Traditionally, large-scale hydropower has been the backbone of Norwegian electricity supply, but large-scale hydropower is generally considered to have severe impacts on the natural environment in which the development takes place. In recent years there has been an increase in the development of small-scale hydropower, and although these installations do not contribute as much to renewable energy production, they are often perceived as having less severe negative impacts on the natural environment. However, these perceptions are not grounded in knowledge, and how they are expressed by actors in hydropower management can have implications for the future management of freshwater resources.

This thesis aims to identify if there are differences in the perceptions key actors in hydropower management have of the effects large-scale hydropower has on the natural environment compared perceptions of small-scale hydropower. This is done through a discourse analysis of the licencing documents of eight hydropower projects. The analysis is focused on statements made by five different actors in hydropower management, representing energy development interest, local and regional interests, and nature conservational interest. Special emphasis is given to how these actors treat the environmental parameters of landscapes and outdoor recreation, encroachment-free areas, and biological diversity, in the licencing process of six small-scale hydropower projects and two large-scale hydropower projects.

The results from the analysis show that the different actors represent different interests, and thereby value nature in different ways. Whilst impact on landscape and recreational values are emphasised for the large-scale projects, there is a general concern regarding the lack of knowledge about small-scale hydropower’s impacts on natural environmental values, especially related to biological diversity and endangered species.

Acknowledgement

This thesis concludes a two-year master's programme in Natural Resources Management at NTNU in Trondheim. Working on this master thesis has been both educational and at times challenging. I am grateful for being given the opportunity to write a thesis on a subject that has been of interest for me over many years.

I want to thank my supervisor, Markus Steen from the Department of Geography at NTNU and SINTEF Technology and Society, for his guidance throughout the entire process of this thesis. I really appreciate the constructive feedback and quick responses to all my questions along the way.

I would also like to thank my family and friends for encouragement and support throughout the process. With a special thanks to Helene for proofreading and structural advice.

Trondheim, 10.05.2017

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Abbreviations

DN	Directorate for Nature Management
DNT	The Norwegian Trekking Association
EEA	European Economic Area
EIA	Environmental Impact Assessment
EPR	Energy Payback Ratio
EU	European Union
FK	County Council
FNF	Forum for Nature and Outdoor Life
INON	Encroachment-free areas in Norway
IUCN	International Union for Conservation of Nature
MD	Norwegian Environment Agency
NGO	Non-Governmental Organisation
NNV	Friends of the Earth Norway
NVE	Norwegian Water Resources and Energy Directorate
OED	Ministry of Petroleum and Energy
TKP	Tromsø Kraft Produksjon

1 Introduction

One of the more severe global challenges we face in the modern world is climate change. Making it an important political issue, especially in the developed countries who contribute to a large share of the emissions of greenhouse gases, which in turn contribute to climate change. One example of the role climate issues play on the global political agenda is the implementation of the Paris-agreement, COP 21, in November 2016. Through this agreement high emission-countries are committing to cut their emissions of greenhouse gases, and thereby limiting the projected increase in global temperature to a maximum of two degrees Celsius (FN-Sambandet, 2016). The conversion from a fossil fuel intensive economy to a society with a higher dependency on renewable energy sources is an important measure to mitigate the effects of climate change. Politics play an important role in this transition, and many countries, including Norway, have set ambitious renewable energy targets in order to limit their negative impacts on climate and environmental values (Thaulow, Skarbøvik, & Selvig, 2008).

In the perspective of renewable energy production, Norway is in a unique position. We have large access to natural resources. Today, over half of the energy consumption in Norway is covered by renewable energy sources (Bendiksen, 2014), and 98 percent of the electricity production is from renewable sources (Regjeringen, 2014a). An important reason for why Norway is in this position within the renewable energy sector is due to the way we have utilized our water resources and developed hydroelectric power since the beginning of the last century. Today, Norway is the largest producer of hydroelectric power in Europe, and the seventh largest producer globally (OED, 2016).

An example of a political instrument used in the aim for a more sustainable society, is the European Union's Renewable Energy Source (RES) Directive. The aim of the RES Directive is to increase the production and consumption of renewable energy in Europe to 20 percent by 2020 (OED, 2016). Due to the role hydropower plays in the Norwegian energy market, Norway is able to set the high RES directive target of 67.5 percent renewable energy by 2020 (OED, 2015).

A priority for the Norwegian government in climate politics has been to secure Norway's role as a supplier of renewable energy, both to the Norwegian, and increasingly also to the European power market (OED, 2016). At the same time as there is a focus on climate friendly and a sustainable energy supply there is also a general increase in the demand for energy from the

market. The economic and technological development during the last centuries has increased the welfare levels in the country, and has opened up for a range of new technological possibilities. As a society, we both use more, and are more dependent on electricity. Therefore, increased security of supply and profitable development of renewable energy are prioritised areas in energy policy towards 2030 (OED, 2016). And production is increasing. The share of renewable energy in Norway increased from 58 to 69 percent between 2004 and 2014, which meant reaching the RES directive goal six years ahead of schedule (OED, 2016; Stavanger Region European Office, 2016).

Hydropower is by far the largest contributor to the Norwegian energy market, and large-scale hydropower installations (>10 megawatt (MW)) have been the Norwegian 'battery' for a long time. With a high reservoir capacity and the ability to store energy for times when demands hare high, hydropower is a secure and profitable source of energy (OED, 2016). However, a large share of the water resources have already been exploited. The Norwegian Water Resources and Energy Directorate (NVE), has mapped the remaining potential and found that the possibilities for new large-scale installations are limited, and the value of the remaining resources are increasing. It is therefore important that the increased demand for energy is met in a way that sustains both socioeconomic needs, to set the foundation for continuous economic growth and welfare, at the same time as considerations regarding the natural environment are safeguarded (OED, 2016). We need to acknowledge that there are limits to how many new large-scale power plants that can be developed if we at the same time wish to reach national and international targets for environment and climate protection. This issue was addressed in the former Prime Minister, Jens Soltenberg's, new year's speech in 2001. In this speech, he announced that the era for new large-scale hydropower development has passed (DN, 2012). And since then there has been an increase in the development of small-scale hydropower (<10MW) (Bakken, Sundt, Ruud, & Harby, 2012), this is both a result of an aim for local value creation, but also due to the general perception that small-scale hydropower is more environmentally friendly than large-scale hydropower projects (DN, 2012). But lately, the value of large-scale hydropower is once again becoming an issue of public debate. In January 2017, the newly appointed Minister of Petroleum and Energy, Terje Søviknes, declared that the time for large-scale hydropower development has not passed, but that it will continue to play an important role as the backbone of the Norwegian energy system (Lie, 2017).

1.1 Research questions

The management of freshwater resources has been important in Norwegian policy making throughout the last hundred years, and it has historically led to conflicts and public engagement both on a local and regional level, as well as on a national level. A large part of the hydropower debate has been about the confrontations between different interest groups, and how these different interests have been integrated into management through planning and policy decisions (Angell & Brekke, 2011). The hydropower debate is still highly relevant today, especially considering the large-scale versus small-scale debate that is unfolding (Egré & Milewski, 2002). The impacts on the natural environmental caused by large-scale hydropower are well known, however the knowledge about impacts from small-scale hydropower is limited. According to Bakken, Sundt, and Ruud (2012), small-scale hydropower is generally seen as having a lesser impact on the natural environment than large-scale projects, which are considered to cause dramatic negative effects on the environment (Bakken, Sundt, Ruud, et al., 2012). But research is not clear on whether this is actually the case. The aim of the study is to assess whether these attitudes are reflected in the public management of hydropower in Norway.

The main research question for this thesis is as follows:

How are concerns regarding the natural environment expressed, and what is emphasised by key actors in the licencing process of small-scale hydropower compared to the licencing of large-scale hydropower projects?

In addition, two sub-research questions have been formulated to support the main issue:

1. What are the possibilities for different key actors to influence the outcome of the licencing process for hydropower?
2. Which discourses are present in hydropower management, and how do they govern the opinions of actors and stakeholders?

Hydropower is still the most reliable source of energy we have in Norway today, and there is still a potential for further development. But the debate on small-scale hydropower versus large-scale-hydropower, and between different interest groups like the energy industry, natural conservationists, and the tourism industry, can have significant impacts on policy outcomes and

the future of hydropower development in Norway (Egré & Milewski, 2002). The management therefore has a responsibility to secure a development that take into account the different interest's values, and at the same time facilitates a sustainable future development of hydropower (Thaulow et al., 2008). This study seeks to highlight these different opinions, and investigate how they may have an impact on policy outcomes.

1.2 Theoretical approach and methodology

The thesis is a qualitative study based on discourse analysis as part of both the theoretical framework and the method.

Discourse analysis is the study of language in use, and it is relevant in the study of environmental politics because it helps us to understand how society makes sense of a phenomenon (Hajer & Versteeg, 2005). In discourse theory, environmental problems are not seen as 'given', but they are something which is socially constructed through language, opening up for several definitions of nature (Feindt & Oels, 2005). At all times, different discourses compete to define what is considered as truth and knowledge in society, reflecting strategies of power and knowledge (Feindt & Oels, 2005; Tellmann, 2012). The struggles between different discourses affect the policy-making process. The environmental discourse behind an environmental problem defines the possible policy outcomes of that issue, and also defines which actors are considered to be legitimate in the process (Feindt & Oels, 2005; Sharp & Richardson, 2001).

In hydropower development, the legitimacy of a policy has been dependent on the different interest group's possibility for articulation and representation (Angell & Brekke, 2011). Because there are a lot of different actors in hydropower development, that through the licencing process get to voice their opinions, I find that a discourse analysis is a suitable method for this study. I aim to identify the possibilities different key actors have at influencing the licencing process of hydropower, and which discourses are prevailing in the field of renewable energy.

First, I will look at the formal organization of the public management of hydropower. This includes defining how the licencing process is structured, and influenced by legislations and political obligations. And I will also identify the possibilities different actors have at influencing the outcome of a project through public participation.

Next is a discourse analysis of the licencing documents for eight hydropower projects. The purpose of the licencing process is to secure that projects that have a large environmental impact or that constitute a poor use of recourses, do not get developed. According to the Water Resources Act §8, any measure in a watercourse that causes mentionable damage or inconvenience to the public interest in the watercourse is required to have a licence (Vannressursloven, 2001). In the licencing process, advantages and disadvantages for different interests in the watercourse are weighed against each other, and in order for a project to be granted a licence, the sum of benefits to society need to be larger than the disadvantages caused by the development (OED, 2016). Through good planning and management, the impacts that hydroelectric power development has on the natural environment and local communities can be reduced (May, Bevanger, van Dijk, Petrin, & Brende, 2012), and the licencing process plays an important role in this manner.

There are a range of different actors involved in the licencing process of hydropower. Through public hearings in the licencing procedure, all interested parties have the opportunity to voice their opinion, which makes it an interesting starting point for my analysis. In order to identify different actors' perceptions of hydropower I am analysing the statements made in the hearing rounds. But because any actor with an interest in the watercourse can participate in the hearings, It is necessary to limit the number of actors included in this study. The Norwegian Water Resources and Energy Directorate (NVE) is the licencing authority for small-scale hydropower, and they also play an important role in the licencing of large-scale projects. Thus, NVE is one of the actors that will be considered in this thesis. In addition to NVE I will be using the municipalities and county councils in the affected areas to represent local and regional interests, and the Forum for Nature and Outdoor Life (FNF) and Friends of the Earth Norway (NNV) as representatives for natural conservational values.

I will be analysing the licencing document for eight hydropower projects, including two large-scale projects and six small-scale projects. This includes three small-scale projects in the county of Hordaland that have been granted a development licence, and three projects in the county of Sogn og Fjordane that did not get a licence. These six small-scale projects are all located in areas with a high development pressure, and were chosen to try to include the aspect of cumulative effects in the analysis. I will compare the statements in the documents from the small-scale cases with the statements made about two large-scale cases. Sauland power plant in Telemark which got granted a licence, and three power plants making up the TKP-project in the county of Troms.

Hydropower development can come in conflict with both national environmental goals, as well as international environmental commitments. The purpose of the thesis is to assess perceptions about natural environmental impacts, and the impacts I have chosen to consider in this study are biological diversity and red-listed species, landscape and outdoor recreation, and encroachment-free areas (INON). Land-use change and physical encroachments are the main threat to both biological diversity and encroachment-free areas, as well as being a factor that can degrade landscape values and thereby come in conflict with recreational interests

1.3 Thesis structure

Chapter 2 gives an introduction into the background of the study, going into hydropower in Norway in general, giving a closer look into the difference between large-scale and small-scale hydropower projects, and a brief introduction into the conflicts between hydropower interests and nature conservation. The chapter is concluded with a look at the actors chosen to represent different interests in this thesis, and their role in hydropower management.

In chapter 3 the theoretical framework for the thesis is introduced. First, a consideration of discourse analysis theory, mainly by the French philosopher Michel Foucault, but with contributions from others. This chapter also addresses the issue of value judgement in natural resource management, as well as definitions of key elements in the thesis. Finally, the environmental impacts from hydropower development is considered, along with a definition of the parameters for assessment: landscape and outdoor recreation, encroachment-free areas, and biodiversity and endangered species.

Chapter 4 is connected to chapter 3 in that discourse analysis both functions as theory and method for the thesis. The purpose of the method chapter is to account for the methodology used in the thesis, including data collection and limitations, as well as the practical conduction of the discourse analysis.

In chapter 5 I will give an introduction into the framework for hydropower in Norway. This includes an overview of relevant legislation and the political framework that regulate the development of hydropower, from a national and an international perspective. The chapter also includes the specific licencing process for both small-scale and large-scale hydropower projects. The chapter is concluded with a look at different actors' possibility to influence the policy-outcome through public participation.

The discourse analysis of the licencing documents for the eight hydropower projects is presented in chapter 6. Here the licencing documents and the different actors' statements about the small-scale and large-scale projects are assessed systematically to identify the prevailing discourses, and to identify differences in perceptions about natural environmental impacts from small-scale and large-scale hydropower.

Chapter 7 is the last chapter. This chapter contains a discussion of the results from the analysis in relation to the research questions, as well as a review of the theoretical and methodological approach. The thesis is concluded with some reflections about the future of Norwegian hydropower management.

2 Background

This chapter starts off with an introduction into the general state of hydropower production in Norway, including a short view on historic influence, and the potential for future development. This is followed by an explanation of the division between small-scale hydropower and large-scale hydropower. The focus is then shifted to the way hydropower has become an area of conflict between different interests, especially highlighting the conflict between nature conservational interests and energy development. The chapter is concluded with a look at the actors chosen to represent different interests in this thesis, and their role in hydropower management.

2.1 Hydropower in Norway

Hydropower has been an important factor in the modernization of Norway since the beginning of the 20th century (Berntsen, Hågvar, & Bjørndalen, 2010). Norway was amongst the first countries in the world to transform into an electricity dependent society, largely due to the development of hydropower production (May et al., 2012). The ability to convert the energy from running water into power opened up for energy-intensive industries, and laid the foundation for modern day Norway (OED, 2016). And hydropower development has contributed to rising welfare levels through job creation, access to electricity, income, and infrastructure (Weir, 2015). The first development period started in the late 1880s, and a second development period with new industrialization followed the Second World War (Berntsen et al., 2010). A large share of Norwegian hydropower plants were built between 1950 and the 1980s (OED, 2016).

Today, hydropower is a technically advanced and flexible energy system, and Norway has the highest hydropower production per inhabitant in the world (OED, 2015; Weir, 2015). The combined installed capacity in the Norwegian hydropower system is around 31.000MW distributed across roughly 1550 hydropower plants (OED, 2016), and today, roughly 95 percent of the electricity production in Norway is generated by hydropower. Produced electricity is given in Terawatt-hours (TWh), and to put these numbers in perspective, 1Twh is roughly the amount of electricity consumed within one year in a city with 50 000 inhabitants (Thaulow et al., 2008). The Norwegian Water Resources and Energy Directorate (NVE), estimated that at

the start of 2015, Norway's hydropower potential was 214TWh per year, and at the start of 2016 the average annual production was approximately 132TWh (NVE, 2016q).

The energy production in Norway has continued to increase over the last 15 years. This is both due to increased development of energy projects, but also an effect of higher inflow to the water system. Since the beginning of the 21st century, new hydropower from 900 power plants with an annual potential production exceeding 10TWh has been developed. A lot of this new capacity comes from an increased development of small-scale hydropower projects (OED, 2016). In 2016, allowance was given to build hydropower plants which will contribute with 1.37TWh new electricity production (NVE, 2016g).

Hydropower is the most important source of renewable energy in Norway. The possibility to store large amounts of energy in reservoirs, contributing to supply safety throughout the year, makes hydropower a robust, versatile and reliable source of electricity. And compared to other sources of energy, hydropower has some clear advantages (Egré & Milewski, 2002; OED, 2016).

First of all, it is the renewable energy source with the lowest cost, with a production cost of circa 25 øre/KWh. In comparison, technologies such as wind power or nuclear power have a production cost of 40-45 øre/KWh (OED, 2016; Weir, 2015). Second, although there are some emissions during the construction of the power plants, for instance through transportation of materials and the use of concrete in construction, the actual energy production from hydropower does not generate any air pollution or emission of greenhouse gases, making it a good contributor to clean energy and a means for reaching political goals for reducing climate change (Bendiksen, 2014). In addition, hydropower generally has a very high efficiency. Energy Payback Ratio (EPR) is a measure of how much energy is delivered compared to each energy unit invested over the lifespan of a power plant. This includes all energy used in infrastructure, extraction of materials, transport, and operating the facility. A study conducted by CEDREN (Centre for Environmental Design of Renewable Energy) in collaboration with Østfoldforskning and Sintef, showed that for hydropower the returned energy is between 50 and 500 times as much as the invested energy. Making hydropower the most energy efficient technology for electricity production with regard to EPR compared to any other source of electricity (Abelsen, 2012; Raadal, Modahl, & Bakken, 2012).This is partly due to the fact that hydropower plants have very long life spans. In Norway, the economic lifespan for any hydropower plant is traditionally set to 40 years, independent of the infrastructure of the installation. However, large-scale plants can have a significantly longer economic lifetime, and

with good maintenance, the hydropower plants can run for a long time without significant operating costs (Weir, 2015).

One of the main problems with electricity production is that electricity cannot be stored, so changes in demand must be met by an equal change in power generation (Egré & Milewski, 2002). However, water can be stored in reservoirs, and saved for times with high demands, thereby in a way storing electricity. This is a huge advantage for the Norwegian power supply. Due to the capability to produce electricity at times with high demand through storing water in reservoirs, hydropower is compatible with other sources of primary power generation, adding to peak load generation (Egré & Milewski, 2002). Norway is part of a joint Nordic power market, and is already a net-exporter of electricity with an exchange capacity of 6200MW, approximately 20 percent of the domestic installed capacity. In addition, two new power cables to Germany and Great Britain will further increase this exchange capacity in the coming years (OED, 2016). And it is anticipated that the Norwegian power supply in the future will need to adapt to other power markets dominated by other energy sources lacking the capability to regulate the power supply. Norwegian reservoir capacity will therefore play a larger role in the power supply to the Northern European market. This development will increase the pressure on the country's hydropower resources, making sustainable management an important factor, both when it comes to technology and environmental issues (Thaulow et al., 2008). With regards to Norway's role as Europe's 'green battery' in the future, there are three issues worth considering when evaluating possible policy outcomes. These are: economic growth versus environmental protection; domestic versus international greenhouse gas emissions; and, renewable energy versus nature conservation (Gullberg, 2013, p. 617). In this thesis, it is mostly the last issue on renewable energy versus nature conservation that is considered.

The international energy trade does have some advantages. It contributes to increased income from Norwegian power exchange in years with high inflow, securing low cost import and increased supply safety in dryer periods. This is expected to secure more stable prices benefiting both industries and private households (Weir, 2015). Through this development, the value of hydropower plants with reservoir capacity will increase, and it is a political goal for the government that the licencing of new hydropower after 2020 should emphasize the ability for production that follows demand, and to conserve and develop hydropower plants that can do this in a sustainable matter (OED, 2016).

Geographically, Norway has had a large potential for hydropower development. This is due to high amounts of precipitation in many parts of the country, combined with large reservoir

possibilities in the mountainous areas with high vertical falls and thereby high energy capacity in many of the power plants (Weir, 2015). There is still some potential for further development, although many of the most beneficial projects have already been realised, especially for large-scale installations (OED, 2016). When we talk about new hydropower today, it is to a large extent an issue of small-scale hydropower development (Thaulow et al., 2008). In addition, upgrading and expanding existing plants can increase production from already developed installations by utilising a larger part of the inflow or transferring water from connecting plants, and extending the plant lifespan (Egré & Milewski, 2002).

Different types of hydropower installations contribute to different types of services, and have different socio-economic implications as well as different impacts on the natural environment (Egré & Milewski, 2002). I have already briefly mentioned the division between small-scale and large-scale hydropower. The size of a hydropower plant is measured by the installed capacity of that plant, usually given in megawatt (MW) (Thaulow et al., 2008), and the power production is dependent on the vertical drop of water and the amount of water available (Weir, 2015). Classifications of hydropower plants vary between different countries. In Norway, hydropower plants are divided into two main categories large-scale hydropower and small-scale hydropower, these will be further described in the coming sections.

2.1.1 Small-scale hydropower

In Norway, small-scale hydropower is defined as any hydropower plant with an installed capacity of 10MW or less. This is further divided into three categories depending on the installed capacity of the power plant. Table 2.2 lists the classification of small-scale hydropower as defined by the Norwegian government.

Table 2.1 Classification of small-scale hydropower. Source: NVE

Type	Installed capacity
Micro	<0,1 MW
Mini	0,1-1,0 MW
Small-scale	1,0-10 MW

For this thesis, only small-scale projects within the range of 1-10MW will be considered.

Throughout the last 15 years there has been a marked increase in the development of small-scale hydropower. This is partly due to the fact that small-scale hydropower has been given political priority, for instance through the joint Norwegian-Swedish market for tradable green certificates. The green certificate market is an important tool in the effort to reach the renewable energy goal set by the EU's Renewable Energy Source (RES) Directive. It is an agreement between Norway and Sweden that the annual power production shall increase with 28.4TWh by 2020, through new renewable energy. Energy producers are granted green certificates for each MWh new renewable energy they produce (OED, 2016). A large part of this new renewable energy on the Norwegian side, is to come from small-scale hydropower production. Since the market for green certificates opened in 2012, 6.6TWh production has been approved from Norwegian production, of which approximately half is included in the achievement goal of 28.4TWh (NVE, 2016g).

Small-scale hydropower can also contribute to local economies in rural areas, functioning as an extra income for farmers and other landowners, and it can also be a smart solution in remote areas without access to the central grid (Bakken, Sundt, Ruud, et al., 2012; L'Abée-Lund, 2005). Power companies are important actors in local business sectors, employing workers with varying expertise, and in addition stimulating the labour force in other businesses (Weir, 2015). The potential for new small-scale hydropower development is to a large extent located in coastal areas and fjords along the western coast of Norway (OED, 2007).

According to a study conducted by the Directorate for Nature Management (DN) in 2008, 70 percent of the hydropower plants in Norway were small-scale, with an installed capacity of less than 10MW, producing only about 5 percent of the total electricity from hydropower (DN, 2012). Showing that even though small-scale hydropower is an abundant technology it does not contribute much to the overall power production. As mentioned previously, the annual average production was 132TWh at the start of 2016, out of this, only 9,6TWh was produced by small-scale hydropower installations (NVE, 2016q). At the end of 2016, NVE had 320 applications for small-scale hydropower projects, with a combined capacity of 950MW in their system (NVE, 2016g).

Small-scale hydropower plants are often located in streams and smaller rivers, employing water within the natural range of the river (Egré & Milewski, 2002) and thereby usually do not contribute to new regulated capacity (OED, 2016). Non-regulated power production is power plants without any storage capacity (OED, 2015), and most small-scale hydropower plants fall under this category. Because small-scale plants do not have reservoir capacity, production

follows variations in inflow, depending on seasonal and daily variations in natural weather conditions, making it hard to adapt production to consumption (Weir, 2015). Inflow is the amount of water from a watercourse's catchment area that can be utilised by a hydropower plant. This varies throughout the year, from year to year, and from place to place (OED, 2015). Roughly half of the inflow to the river systems happens during the snow melting in spring, in times when electricity consumption is usually low (Bakken, Sundt, Ruud, et al., 2012; OED, 2015).

An example of a small-scale hydropower plant is given in Figure 2.1.

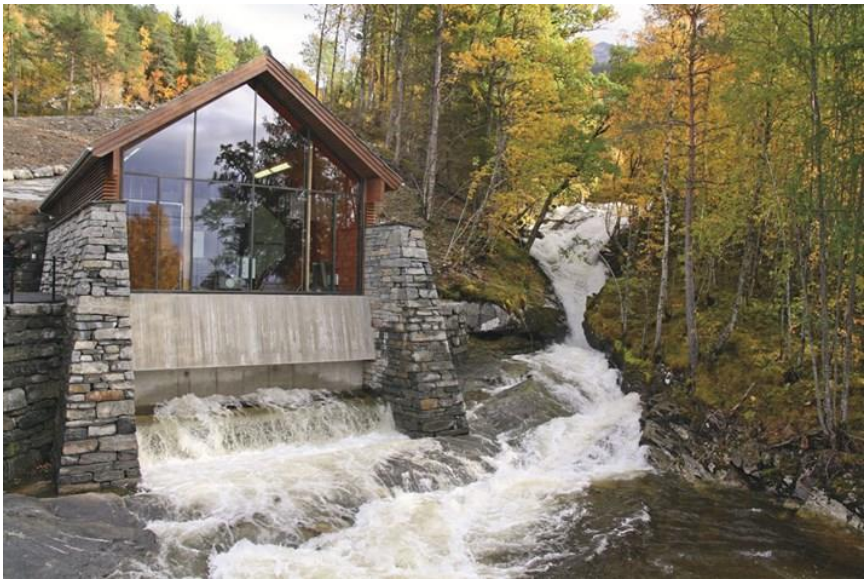

Figure 2.1 Ytre Alsåker power plant in Hordaland. Source: Statkraft (2015)

The size of the installation determines the licencing process and who is the licencing authority for each project. For installations smaller that 1MW (mini- and micro power plants), the county council is the licencing authority, whereas NVE is the licencing authority for small-scale projects (1-10MW) (OED, 2015). Projects with smaller installations than 10MW do not need to conduct an environmental impact assessment (EIA) following the Planning and Building act, however, impacts on environment, nature and society needs to be included in the licence application (Weir, 2015). The licencing process will be further examined in chapter 5.

2.1.2 Large-scale hydropower

Large-scale hydropower has been thought of as the "Norwegian battery" for a long time, due to the large reservoir capacity and high production rates, making it a secure source of energy.

Large-scale hydropower is defined as any project with an installed capacity over 10MW. To illustrate that a 10MW power plant is in fact not very large, a further classification into medium-sized and large-scale plants might be a better definition (Weir, 2015). But I will be using the official definition, and not go further into this discussion here.

Reservoirs are created in lakes or artificial pools by damming parts of the watercourse. In that way water is stored as potential energy during times of high inflow and low consumption, and can be used in periods with lower inflow and higher consumption (Egré & Milewski, 2002; OED, 2015). This creates the flexibility to adjust power production to match consumption, and thereby stabilizing the price of electricity (OED, 2016). Reservoirs can also contribute other socio-economic benefits, like withholding water in periods of high floods, actively reducing damages associated with flood situations (OED, 2016), and water can be released in periods of drought contributing to a secure water supply (Bakken, Sundt, Ruud, et al., 2012; OED, 2015).

Norway has half of the European reservoir capacity, with more than 1000 reservoirs in production today. These have a joint capacity of 84TWh, making up approximately three fourths of the annual Norwegian electricity production. Blåsjø, which is part of the Ulla-Førre power plants, is the largest reservoir in Norway, with a capacity of 7.8TWh (OED, 2016). The Blåsjø reservoir is shown in Figure 2.1.

Figure 2.2 Blåsjø. Source: (Statkraft, 2013)

A large part of the reservoir capacity is located in the mountainous areas of Southern Norway, especially the county of Telemark, and along the west coast, in addition to Nordland in Northern Norway (OED, 2016). Only seven percent of the hydropower plants in Norway have an installed capacity of more than 100MW, but they contributed over 60 percent of the total power production in 2008 (DN, 2012).

There has been a decrease in the amount of large-scale hydropower project licence applications over the last years. This is both a consequence of policy changes and the end of the "large-scale hydropower-era", and due to the fact that there is not a large potential for large-scale plants left that have not already been developed or that have been protected against development through conservations plans (Thaulow et al., 2008). It has been estimated that the potential for new large-scale hydropower development is 5.1TWh in addition to projects that are in the process of licence application (OED, 2016). In 2016, five large-scale projects (>10MW) with a combined capacity of 208MW (558MWh) was given a development licence (NVE, 2016g).

As already mentioned, the value of large-scale hydropower plants with reservoir capacity is increasing. Another factor influencing the value of reservoir capacity is climate change. Climate change is expected to cause both an increase in, and a larger variation of, temperatures and precipitation, and this will affect the potential for hydropower production. In Scandinavia, there is an anticipated increase of production of 15-30 percent. For Norway, the largest increase is expected to happen along the west coast and in northern parts of the country. Climate change may also contribute to the need for a more reliable energy supply, making non-regulated installations less sought after, and increasing the value of large-scale hydropower plants with reservoir capacity, not only for the Norwegian power market, but also for the international market (Thaulow et al., 2008).

The licencing process for large-scale hydropower projects is different, and a bit more complicated than for small-scale projects. For developments larger than 10MW, the applicant usually needs to include a proposal for implementation of an environmental impact assessment (EIA), this is especially required for projects with a capacity higher than 40MW. For large-scale projects the EIA is a significant part of the licencing process (Weir, 2015). The King in Council (Kongen i Statsråd) has the licencing authority for large-scale hydropower, however NVE is responsible for much of the work in the processing of licencing applications, giving their recommendations for each case to the Norwegian Ministry of Energy and Petroleum (OED) (OED, 2015). I will return to the issue of the licencing process in chapter 5.

2.2 Hydropower and nature conservation – an ongoing debate

At the same time as there is a focus on development of renewable energy with regards to climate change and sustainable use of resources, the development of hydropower does, like any other development, cause changes to the natural environment which can come in conflict with national environmental goals connected to biological diversity, landscapes, recreation, tourism, etc.

Across Norway we find a large variety of landscapes and habitat types, varying from high mountains and deep fjords, to large plains. And with approximately one fifth of the land area of Norway covered by freshwater, we find a rich and diverse freshwater nature, including some of the highest waterfalls in Europe, wild rivers, and about half a million lakes and waters (Miljøverndepartementet, 2011). Rivers are often considered as a vital part of nature because they bring life and nutrients to the surrounding environment, and rivers and lakes make up a remarkable ecosystem of living organisms. Freshwater nature is also important as landscape elements. Waterfall have long been considered as important tourist attractions, and water bodies are important parts of recreation and outdoor life (Miljøverndepartementet, 2011).

Any production and use of energy has environmental costs, and although hydropower has a lot of advantages compared to other sources of energy, it is no exception in this matter (May et al., 2012; Thaulow et al., 2008). Hydropower development is one of the most frequently occurring disturbances in Norwegian rivers, and it has caused significant impacts on Norwegian river ecosystems and aquatic environments (DN, 2012). The environmental politics are, amongst other issues, concerned with topics like landscapes, conservation of ecosystems, reducing the loss of biological diversity, and the preservation of a representative selection of Norwegian nature (OED, 2016). Close to half of the freshwater bodies in Norway are at risk of not reaching the goals of good ecological condition by 2021, and one of the main causes of this is hydropower development (Miljøverndepartementet, 2011).

Independent of the size of the project, hydropower development will have an influence on the natural environment in which the development takes place. This includes impacts on landscapes, habitats, biological conditions, and other resources in the affected areas through land-use change, physical encroachments, and hydromorphological changes (DN, 2012).

There are differences between individual projects when it comes to the scope of influences on the natural environment. The level of conflict is to a large extent determined by the environmental values in the area of influence. And the extent of influences varies with the

conditions for production, the state of the environment in the location, and the possibility for mitigation measures (DN, 2012).

2.2.1 History and conflicts

The effects hydropower development has had on the Norwegian freshwater nature has led to conflicts and debates, and issues concerning the conflicts between conservation and use are as old as power production politics itself (Angell & Brekke, 2011). As early as in the 1860s, the Norwegian Trekking Association (DNT) acknowledged the value of waterfalls like Rjukanfossen and Skjeggedalsfossen as some of the country's most important tourist attractions. And together with the Friends of the Earth Norway (Naturvernforbundet, NNV) they started the work for protection of certain rivers and waterfalls from hydropower development in the late 1890s (Berntsen et al., 2010; May et al., 2012). The work done by DNT and NNV was important as contributions to the establishment of the first Norwegian natural conservation act in 1910 (Angell & Brekke, 2011).

But this period was also the onset of the modernization of Norway, in which hydropower development played a major role. Many riverine systems were subject to hydropower development in the early 20th century, and the way in which the rivers were used changed along with the conversion into using water for electricity production. Previously, the available water was used to a smaller extent during parts of the year, whereas with the new industrialisation the use of the rivers, and the extent of the impacts, increased drastically. This change in use especially affected the larger rivers and waterfalls (L'Abée-Lund, 2005). Although conservationist and tourism interests managed to protect some watercourses in this period, the new industrialisation following the Second World War again led to an increased pressure on the available freshwater resources in Norway, and not a single watercourse was protected in the 1960s. With this development, there was also an increase in the level of conflict between hydropower interests and natural conservational values (Berntsen et al., 2010; May et al., 2012). There are especially two conflicts worth mentioning in this respect: The first is the demonstrations against the development of the Eikesdalen/Grytten power plant in Møre og Romsdal, the so-called *Mardøla-aksjonen*, in 1970. This was the first time civil disobedience was used in the name of nature conservation in Norway, and it marked a shift in the resistance against hydropower development on the cost of natural environmental values (Angell & Brekke, 2011; Berntsen et al., 2010). The second example is the perhaps most known conflict against hydropower development, the demonstrations against the regulation of the Alta-

Kautokeino river, in the period between 1979 and 1981. Both nature conservationists and the Sami people were strongly against the hydropower development, and the demonstrations extended to a national audience. Civil disobedience was once again used, and the demonstrations reached its peak in 1981 when 600 police officers were sent to the area to remove roughly 1000 protestors (Angell & Brekke, 2011). Although neither of these demonstrations resulted in conservation of the affected rivers, they have been left as symbols of the strong conservation mindset, and the strong involvement of the public when it comes to industrial development at the expense of nature.
Since then, nature and environmental concerns have been integrated as an important part of the management of hydropower development, and the conservation values of riverine ecosystems have been given more attention and political emphases from the 1960s and onwards (Angell & Brekke, 2011). Different laws and regulations, like for example the Conservation Plan for Watercourses (*Verneplan for vassdrag*), have been ratified in Norway since then. Out of the estimated power potential of 214TWh per year, approximately 50TWh have been protected against development, aiming to preserve a representative selection of Norwegian watercourses (OED, 2016). I will return to the topic of legislations and policies is chapter 5.

Yet there are still conflicts in energy policy today. In addition to the debate around local energy production versus nature conservation, the global dimension of climate change has become an increasingly discussed topic in the later years. Norway's role in the global battle against climate change was emphasized by Gro Harlem Brundtland in the 1980s, putting energy policies in an environmental and resource political context both regionally, nationally and globally (Angell & Brekke, 2011). The development of hydropower is considered to be an important tool in the road towards reduction of fossil fuels and greenhouse gas emissions. And the renewable energy versus nature conservation debate is still an ongoing source of conflict. Like they were in the 1900s, The Norwegian Trekking Association and Friends of the Earth Norway are still central actors in the conservation debate today. And they still oppose increased hydropower development and export to the Nordic and European market, bearing in mind the negative effects this development will have on natural conservational values (Gullberg, 2013).

In the latter years, there does however seem to have been a slight shift in attitudes towards a more positive opinion to hydropower development. This can, to a large extent, be explained by the increased emphasis on climate change and sustainable development, and the acknowledgement of hydropower as a clean source of energy in this matter (Thaulow et al., 2008).

2.3 Actors in the licencing process

Different interest and concerns are integrated into hydropower management through the participation of different actors that all play central roles in the licencing process of hydropower in Norway. The licencing authority are those governmental bodies responsible for the processing of licence applications, these are Stortinget (the Parliament), the government, the Ministry of Petroleum and Energy (OED), and the Norwegian Water Resources and Energy Directorate (NVE) (Stokker, 2010). However, representatives for other interest are organised into the licencing process, and have the possibility to influence the outcome through statements given in the public hearing of any hydropower project. These other actors include both individuals, local and regional authorities, and different Non-Governmental Organisations (NGOs). The hearing statements is what I will be using in order to answer the research question for this thesis, and I have therefore selected six different actors representing different interests, that all have made hearing statements in the eight licence cases I am using for the analysis. In this case, an actor is defined as someone, a person or an organisation, that purposefully acts in order to change the outcome of a process (Jansen, 1989). In this thesis, NVE, municipalities, county councils, and the Forum for Nature and Outdoor Life (FNF) and Friends of the Earth Norway (NNV), are used to represent different interests in the licencing process for hydropower. The different actors will emphasise different aspects of a case depending on the interests that actor represents. In the following I will give a brief introduction of the different actors and their role in hydropower management.

2.3.1 The Norwegian Water Resources and Energy Directorate (NVE)

NVE is directed by the Ministry of Petroleum and Energy (OED), and is responsible for "managing Norway's water resources; promoting an efficient energy market and cost-effective energy system; and promoting efficient energy use" (Knudsen & Ruud, 2011, p. 28). NVE is responsible for assessing licence applications for new electricity production, which includes both hydropower and other sources of energy, like wind power or bioenergy (Knudsen & Ruud, 2011)

For small-scale hydropower (<10MW), NVE is the licencing authority, meaning that they have the deciding power in the licencing process. For large-scale projects, the final decision is made by the King in Council, but NVE is responsible for the assessment of the projects, which is then forwarded to OED and the government (OED, 2015).

In addition to being responsible for the energy aspect, NVE also has an obligation to consider other aspects of hydropower developments through the licencing process, including impacts on the natural environment (Knudsen & Ruud, 2011).

2.3.2 Local and regional authorities

There are three administrative levels in Norway: the state, county councils and municipalities. In this thesis, the municipalities and county councils (FK) in the affected areas will be used as representatives for local and regional interests. The county councils and municipalities are central actors in the management and development of a sustainable, and climate and environmentally friendly society, responsible for developing holistic management plans combining local interests and considerations with important regional and national values (Kommunal- og moderniseringsdepartementet, 2015).

On a local level, hydropower development can imply economic benefits for the affected municipalities. Including revenue creation through the tax system, employment, and improved infrastructure. Therefore, municipalities can have an economic interest in realising hydropower development. But at the same time, there can be other values connected to the watercourse, which do not involve hydropower development. This includes tourism, and outdoor recreational activities like fishing, kayaking or swimming, to name a few (Knudsen & Ruud, 2011). The municipalities work to secure the local values, balancing economic benefits with social benefits and natural environmental values.

Regionally, the county councils are responsible for nature management and initiating measures to mitigate climate change. This is done through planning and land use strategies (Knudsen & Ruud, 2011). For example, Sogn og Fjordane FK, which is one of the affected counties in this thesis, have stated in their action plan for climate and the environment (*handlingsplan for klima og miljø*) that measures to mitigate climate change should not be on the expense of other natural environmental values such as biodiversity or outdoor recreation (Fylkesrådmann, 2016).

Directly related to hydropower management, the county councils are encouraged from a national level, to develop regional plans for the management of small-scale hydropower, in order to ensure the protection of natural environmental values connected to biological diversity, outdoor recreation, and landscape qualities (Hordaland Fylkeskommune, 2013). Both Hordaland FK and Sogn og Fjordane FK, which are the counties in which the small-scale

projects used in this thesis are located, have developed regional plans for the development of small-scale hydropower in the counties.

And starting in 2010, the county council was given the licencing authority for mini and micro hydropower plants, meaning that they can grant licences to power plants with an installed capacity of less than 1MW without consulting NVE. The exception is applications for power plants in protected rivers (OED, 2015).

2.3.3 Nature conservation organisations

As mentioned in the introduction, the two organisations chosen to represent nature conservation interests in the analysis for this thesis is Friends of the Earth Norway (*Norges Naturvernforbund*, NNV) and the Forum for Nature and Outdoor Life (*Forum for natur og friluftsliv*, FNF).

Friends of the Earth Norway (NNV) was established in 1914, and is the oldest organisation for nature and environmental conservation in Norway, and as we have seen, NNV has been an active participant in the debate around hydropower development since the beginning of the first development era roughly 100 years ago. Today, NNV still play an important role in voicing the need for nature conservation.

In 2013, NNV published their view on energy policies where they acknowledge that at the same time as there is a major loss of biodiversity at a high speed, climate change is becoming a global ecological crisis, and we should phase out the use of fossil fuels. Although NNV advocates the use of more sustainable sources of energy, the development of renewable energy sources like hydropower or wind power, is not considered to be straight forward. NNV is working towards a low energy consuming society and against the development of projects that cause harm to the natural environment, emphasising increased energy efficiency and restoration of already developed projects, and less focus on Norway as an energy exporting nation (Naturvernforbundet, 2013).

NNV also emphasises a need for knowledge-based and precautionary management of natural resources. The licencing process is criticised for not adequately securing values connected to natural heritage, for instance the limited requirement for environmental impact assessment for energy development, especially for small-scale hydropower, is seen to marginalize important

natural values. There is a need for a holistic, regional management that safeguards natural values, and includes cumulative effects in the consideration.

In addition, NNV criticises the market for tradable green certificates for putting an increased pressure on vulnerable nature resources, and lowering energy prices and thereby not encouraging a shift to a society with lower and more efficient use of energy. Reduced emissions of greenhouse gases cannot justify serious destruction of nature (Naturvernforbundet, 2013).

The Forum for Nature and Outdoor Life (FNF) comes from a similar standpoint as NNV. In 2011 FNF asked "if Norway should be Europe's green battery or Europe's green lung?" The background for this was an opinion that there is enough energy produced in Norway, and that it is not feasible for Norway to function as a green battery for Europe because the contribution that Norwegian hydropower brings to the European market will not replace fossil fuels and will therefore not contribute to a significant decrease of greenhouse gas emissions, and further development will only be at the expense of Norwegian nature (Gullberg, 2013; Lund, 2011).

FNF is a cooperative forum for nature and recreational organisations in Norway, organised on a county level. FNF has described some task the forum is working towards, including putting nature values and outdoor life on the public agenda; creating networks between organisations, politicians, and other relevant actors; and, have influence on relevant planning and case processes (Forum for natur og friluftsliv, n.d).

These actors do not have any licencing authority in the hydropower management, so the only opportunity they have at influencing the outcome of a licencing process is through the public hearing rounds. And they are active participants in the hearing rounds for many hydropower projects, representing nature conservational interests.

3 Theoretical Framework

In this chapter I will give an overview of the theoretical framework applied in this thesis. The theory and method for this thesis is mostly based on discourse analysis theory. Discourse can be defined in many various ways, this assignment is mostly based on the work on discourses by the French philosopher Michel Foucault (Waitt, 2010), but also including theories from other relevant contributors. In the first part of this chapter, I will give an introduction into discursive theory, how knowledge, power and discourses are connected, and show why discourse analysis is often applied in the studies of environmental politics and policy-making.

The discourse analysis in this thesis is based on the relation between hydropower development and impacts on the natural environment, the second part of this chapter is therefore focused on how hydropower affects the natural environment, with special emphasis on impacts on landscape and outdoor recreational values, encroachment-free areas, and biological diversity and endangered species. The chapter is concluded with a look at how these aspects of hydropower development may be perceived and how they might be valued differently by different actors.

3.1 Discourse

There is not one clear given definition of what discourse is and how to conduct a discourse analysis. It is an interdisciplinary approach that can be understood in many varying ways, and that can be used in the study of many different topics. But discourse is often associated with language, and a simple definition of discourse interprets it as the study of language in use, anything that is said or written that treats a subject systematically and at some length (Jones, 2003; Jørgensen & Phillips, 2002). Discourses apply to anything from written text and statements, to conversation and practices (Sharp & Richardson, 2001), as I will be using written documents as the basis for this analysis, I will mostly refer to discourses as text in the following chapter.

In the theory on discourse analysis, there are thought to be certain rules and restrictions that structure the way we use language and talk about certain themes (Jørgensen & Phillips, 2002). Theoretically we can use an unlimited range of sentences, but these rules operate so that we only speak within the constricted limits defined by the discourse (Mills, 2003). Through

discourse analysis we can reveal these structures that govern the way we talk about different subjects (Jørgensen & Phillips, 2002). It is a way of understanding and giving meaning to social and physical phenomena (Dryzek, 2013; Hajer & Versteeg, 2005), and the analysis can be used in order to understand how particular knowledge gets established as common sense and dominant in a society, while at the same time other opinions and views are silenced (Waitt, 2010).

As there is no clear definition of discourse, there are different approaches to discourse analysis that have different theoretical, ontological, and epistemological premises. These can also vary with regard to methodology (Feindt & Oels, 2005). One thing different approaches to discursive theory have in common is that they have a social constructionist starting point (Jørgensen & Phillips, 2002). According to Burr, referenced in Sharp and Richardson (2001), the social constructionist approach can be characterised by the fact that knowledge and truth is not something which is given, but that it is a result of social processes (Sharp & Richardson, 2001), meaning that there exist multiple different realities or truths, and that what we consider to be reality is just one interpretation among others (Jørgensen & Phillips, 2002). It is therefore important to consider and be aware of the way in which knowledge is produced, and the way social realities become recognized as common sense or truth. And also, to be aware of how different actors and institutions categorise and articulate different problems or subjects (Waitt, 2010). How a problem is represented can have implications for the possible solutions and policy outcomes for that problem.

The French philosopher Michel Foucault played an important role in the development of the discursive field through both theoretical work and empirical research in the 1960s and 1970s (Jørgensen & Phillips, 2002). Waitt (2010), establishes that "a Foucauldian discourse analysis seek to uncover the social mechanisms that maintain structures and rules of validity over statements about particular people, animals, plants, things, events and places" (Waitt, 2010, p. 218). Many other discursive approaches have a Foucauldian theory as their starting point, but rejects part of the methodology (Jørgensen & Phillips, 2002). I will use Foucault's work as a base for the analysis, but supplement with other theories of discourse to adapt the theory better to the study of environmental politics.

Most non-Foucauldian discourse theories have their main focus on language and linguistics, whilst a Foucauldian approach is more attentive to power and knowledge and how knowledge is produced (Feindt & Oels, 2005). According to Foucault, discourse is a subtle form of social control and power, where power relations are a part of any social interaction and all texts are

the outcome of a power-laden process (Feindt & Oels, 2005; Waitt, 2010). Power is seen as a strategy, something which is used in a specific context and that can generate certain opinions or events (Mills, 2003). Through power relations, rational and/or irrational statements can be perceived as truth, and it is through power the social reality in constructed and different subjects gain their characteristics (Jørgensen & Phillips, 2002; Sharp & Richardson, 2001). As power plays a major role in the construction of reality, it causes the privileging of certain social groups or institutions, leading to the favouring of certain views at the expense of others (Waitt, 2010). We should always ask 'why, how and by whom' truth is ascribed to certain statements and not to others (Sharp & Richardson, 2001). Discourse analysis gives an insight into how problems and solutions are defined and gain influence, not only through language, but also through the fact that they are embedded in power/knowledge relations (Tellmann, 2012). With a Foucauldian theory in mind, I will further explain the effects of discourses in the construction of knowledge.

3.1.1 Reality, knowledge and institutions

As previously mentioned, discourse analysis falls under the social constructionist traditions of social science. This means that reality is seen as something which is socially constructed, and therefore opens up for the existence of multiple realities (Hajer & Versteeg, 2005). An important aspect of discourse analysis is to analyse meaning as part of the social context in which those meanings are created, and the social framework through which ideas are converted into political realities (Neumann, 2001; Tellmann, 2012). Saying that reality is socially constructed is not the same as saying that something is not real, or that there does not exist a physical world outside discourse (Dryzek, 2013). But according to Foucault, discourses are what determine how we perceive the world. Discourses do not define a pre-existing reality, but shape reality in that they create a specific way of engaging with the world (Feindt & Oels, 2005; Jørgensen & Phillips, 2002). Our experiences of the world are categorised and interpreted in relation to the structures that are available to us through discourse, and we are thereby only able to see the world as it is represented to us through discourses (Mills, 2003). It is therefore important to be aware of the context in which a text is produced and how knowledge has come about (Waitt, 2010). Discourse analysis can be used to examine the rules that determine what can and cannot be said, and further what is considered to be true (Jørgensen & Phillips, 2002). It is a way of explaining the mechanisms that influence how an issue is articulated, and whether

or not that issue is considered a problem and thereby what the policy outcome will be (Hajer & Versteeg, 2005).

This is closely linked with the power of language, and how reality becomes available to us through language (Jørgensen & Phillips, 2002). In discourse analysis language is generally seen as a tool that shapes how we see the world and what we consider to be reality, as it is through language meanings are articulated (Hajer & Versteeg, 2005; Neumann, 2001). There lies great power within language. How issues like environmental problems are articulated and interpreted determine how those problems are dealt with (Dryzek, 2013). Through the way an issue is represented in what is said and written, that same issue can appear to be harmless or on the other hand generate political conflict, and can therefore be of great significance for the outcome of a policy process (Feindt & Oels, 2005; Hajer & Versteeg, 2005).

According to Hajer and Versteeg (2005), discourse analysis has some specific advantages when it comes to the relationship between language and reality; the analysis can be used to expose the role language plays in politics, as well as revealing the embeddedness of language in practice. And through studying discourse, we can clarify how particular definitions do or do not become considered to be true or valid at a particular time or place (Hajer & Versteeg, 2005). However, we must be aware that discourse in not the same as language. Discourses are simply something that structures the way in which we interpret the world around us (Mills, 2003).

I have established that discourse theory is focused on determining how certain social 'realities' become acknowledged as reality or truth (Waitt, 2010). As I briefly mentioned in the introduction to discourse, all text is a product of a power-laden process, and when doing discourse analysis, it is therefore important to be aware of the institutional dynamics and social context of a text (Waitt, 2010). Knowledge about a topic is established and maintained within social networks, and in order for something to be accepted as fact or knowledge it must go through a methodological process of ratification by those in position of authority (Mills, 2003; Waitt, 2010). In his book *The Archaeology of Knowledge*, Foucault states that we must find the laws operating behind diverse statements, and where these statements come from. This includes defining who the speaker is, who is qualified and entitled to use the language in this way; the context of the discourse, the institutional sites that gives this discourse its legitimacy and point of application (e.g. research institutions, government), and the position of the subject (Foucault, 2002, pp. 55-58). Struggles between different definitions of knowledge can be understood as a struggle between discourses (Jørgensen & Phillips, 2002). At all times, different discourses compete for influence in society, trying to define the structures that shape our reality, and define

what society perceives as truth or knowledge (Neumann, 2001). Structural changes in society can be attributed to shifts in the relative influence of different discourses. And the struggles between discourses influence how specific policy-making processes turn out (Sharp & Richardson, 2001).

An important part of discourse analysis is to be conscious about the way knowledge is produced and circulated, and to stay aware of how authorities define different aspects of the world, and thereby influence what is perceived as knowledge or truth (Waitt, 2010). This is important in environmental policy-making because what is thought of as truth or knowledge can have implications for the outcome of a policy-process (Sharp & Richardson, 2001). The difference in opinion and definition by different speakers or actors underline how fragile knowledge is, and how basic concepts are not a set reality or fact, but can easily be contested (Feindt & Oels, 2005).

In the field of environmental policies, problems are usually defined by actors with authority, like experts, institutions and government (Feindt & Oels, 2005). The legitimacy of a policy is dependent on the different actors' authority and possibility for articulation and representation (Angell & Brekke, 2011). If you speak with the support of an institution, you speak with more authority, and the more authority that institution has the greater are your possibilities for action and to influence the policy outcomes (Neumann, 2001). The history of hydropower management in Norway is to a large extent shaped by confrontations between different interests, between actors representing the energy and industry sector, and actors representing nature conservation values. The different interests have been integrated into management through planning and policies. But there has also been a division between interests within the political sector, between the Norwegian Environment Agency on one side, and the Ministry of Petroleum and Energy (OED) and NVE on the other (Angell & Brekke, 2011). Discourse analysis can help identify how different actors in different ways try to influence the definition of a problem (Hajer & Versteeg, 2005).

3.1.2 Discourse analysis in environmental politics

According to Foucault, discourse exerts some of its strongest powers in the discussion of sexuality and politics (Schaanning, 1999). And considering the emphasis Foucauldian discourse analysis has on revealing the structures of knowledge production and the power of actors and institutions, and on questioning how something has come to be considered as truth and common

sense understandings of reality (Jørgensen & Phillips, 2002), it seems like a suitable method for the study of hydropower management.

Discourses are important in that they structure how and why we interpret and deal with environmental issues, and one particular strength is that discourse analysis pays special attention to the ways in which policy problems and outcomes are created (Dryzek, 2013; Feindt & Oels, 2005). Through discourse analysis we acknowledge that basic concepts such as 'nature' and 'the environment' are socially constructed through structures of language and power in policy-making, planning and research, and that any basic concept can be contested (Feindt & Oels, 2005). By visualising different understandings of central themes and topics, discourse analysis can be used to initiate change (Jørgensen & Phillips, 2002).

According to Feindt and Oels (2005), there are three main challenges to environmental policy-making and management of natural resources: First, as we have seen, environmental policy problems are a consequence of social constructions, meaning that environmental problems can be defined and interpreted in many ways. Second, struggles between meanings, knowledge and truth, are important in environmental policy-making because how a problem is interpreted defines the possible solutions to that problem. And third, environmental discourse is interconnected with practices and institutional capacities as elements of power relations (Feindt & Oels, 2005). Discourses can cause specific policy outcomes by influencing the definition of truth, and thereby generating political ideas and hence actions (Hajer & Versteeg, 2005).

As previously mentioned, discourse analysis can be put in the social constructionist approach of social sciences. This approach is appealing to environmental policy research because it grasps the messy and complex interactions that the environmental policy process entails (Sharp & Richardson, 2001). In research on environmental policies it is not the environmental problem in itself that is important, but the way in which society makes sense of it (Hajer & Versteeg, 2005). How a problem is articulated lays the premises for how that problem is handled and perceived (Feindt & Oels, 2005). Discourse analysis can give insight into the mechanisms behind policy-making and therefore contribute to environmental politics in different ways: First, discursive theory goes away from the idea that the definition of nature is something constant, it acknowledges that nature is something which is socially constructed and therefore can be redefined (Hajer & Versteeg, 2005). With discourse analysis, environmental problems are not seen as objectively defined and given, but it opens up for multiple definitions of nature, considered to be a result of knowledge and power struggles. This implies that the actors in the policy-making process should make their value judgment transparent, instead of talking in the

terms of scientific ‘facts’ (Feindt & Oels, 2005). The second contribution is that discourses put limits on what can and cannot be said and they thereby constrict the range of policy options available (Keller & Poferl (1998); Liftin (1994) in Hajer & Versteeg, 2005) and influence the preference of solutions (Tellmann, 2012). Studies have shown that there are certain discourses that dominate environmental policy making, and these discourses create a bias both for the interpretation of the policy problem and the possible solutions that are formulated for that problem (Hajer & Versteeg, 2005). Examples of discourses are a climate change discourse, an energy discourse, or a nature conservation discourse, that all have different interpretations of environmental problems and what aspects of the problem that are most important, and thereby what the possible problem solutions are. Third, is the analysis of bias in the policy making process, how powerful actors can influence the outcome of a policy decision through the use of discourse (Dryzek (1997) in Hajer & Versteeg, 2005).

3.2 Hydropower and its effects on the natural environment

Like any other source of energy, hydropower development causes negative impacts and alters the environment in which the development takes place. This includes physical encroachments on the landscape as well as hydromorphological changes, and these impacts have led to conflicts between different interests since the beginning of the 20th century (Angell & Brekke, 2011). In order to understand these conflicts we also need to understand the way in which hydropower affects the natural environment.

When considering the influences hydropower development might have on the natural environment it can be feasible to divide the influenced areas into aquatic and terrestrial environments. Aquatic environments are defined as any environment directly connected to the water string and that will be directly affected by hydrological changes to the watercourse. Terrestrial environments are not directly connected to the water string, but they are still influenced by the development of hydropower plants (Størset, 2009).

Influences on the aquatic environment are often associated with physical- and hydromorphological changes. These changes include diversion of water to and from connected catchment areas, emission of processed water from the construction site or pollution from landfills, changes to the water flow, and damming and regulation of water levels in reservoirs. The effects of these alterations include changes in water temperature, changed ice conditions, changes in water covered area, physical barriers for fish migration, pollution, and erosion. Any

organism that lives in, or in habitats related to the river, will potentially be affected by such changes (Erikstad, Hagen, Evju, & Bakkestuen, 2009; Størset, 2009).

The impacts on the terrestrial environments are largely related to infrastructure development. It is natural to focus on those areas that are affected by permanent physical encroachments, like roads, landfills, power stations, artificially created reservoirs, pipelines and powerlines. These encroachments cause disturbances to the local environment like landscape change, reduction of vegetational coverage, and damming of areas leading to change in water covered area (Størset, 2009).

Another way of categorising the environmental impact of hydropower is dividing between direct and indirect impacts. A direct impact is something that directly causes a change in the biology of the watercourse, whilst indirect impacts changes the physical or chemical environment, and thereby changes the quality of the habitats in that river or lake. The indirect impacts are not necessarily negative in themselves, but they can potentially lead to the deterioration of the environmental conditions and biodiversity (Bakken, Sundt, & Ruud, 2012). Hydropower development causes both direct effects on biological diversity like mortality and behavioural changes, as well as indirect effects through altered habitats and land-use change (Langston, Pullan & Ugedal in May et al., 2012).

3.2.1 Large-scale versus small-scale hydropower

There are few studies comparing the environmental impacts from large-scale hydropower with the impacts from small-scale hydropower development (Bakken, Sundt, Ruud, et al., 2012). The effects of large-scale hydropower developments are well known, but with an increasing rate of development of small-scale hydropower projects, there is also an increasing awareness about the effects these projects may have on the natural environment (OED, 2007).

As I mentioned in the previous chapter, the categorisation of large-scale hydropower projects make room for large variations in size. A 10MW power plant is not a very large installation, especially when comparing it to Kvilldal power plant, which is part of the Ulla-Førre installation, and is the largest power plant in Norway with an installed capacity of 1240MW (Statkraft, n.d). Therefore, the environmental impacts from large-scale installations can be very varying depending on the size of the project. But large-scale hydropower plants with reservoir capacity will in most cases have significant impacts on the natural environment in the affected

area, including impacts on biodiversity and fish fauna, landscape qualities, recreation, and cultural heritage (DN, 2012).

In general, small-scale hydropower will have a lot of the same influences on the natural environment as large-scale hydropower has, but the scope of the influence will usually be smaller in each individual case because a single small-scale project only affects a limited area (Eie, 2013). The impacts include reduction of water flow, some impacts on fish fauna, fragmentation and reduction of encroachment-free areas (INON), loss and reduction of the quality of cultural heritage sites, and degradation and loss of biodiversity (Bakken, Sundt, Ruud, et al., 2012; DN, 2012). Because many small-scale hydropower projects only influence concentrated stretches of a river, impacts on biodiversity is generally focused on a few nature types, and a limited number of species. The nature types like creek ravines (*bekkekløft*) and waterfall spray-zones (*fossesprøytsone*) are often affected. These nature types often function as important habitats for multiple species, including vulnerable species (OED, 2007). I will get back to this later on in the chapter.

One thing that both small-scale and large-scale hydropower projects have in common, is that they all cause changes to the natural flow of water in the river (L'Abée-Lund, 2005). Large reservoirs will influence the flow of water both between the intake and the power station, and downstream of the power station. Downstream of the power station the flow of water will usually be higher than normal during periods of high production, typically winter months, and otherwise lower than normal because water is stored in the reservoir (DN, 2012). And small-scale hydropower installations will usually lead to a decreased flow of water downstream of the power plant (Størset, 2009). Changes of water flow will typically influence the temperature of the water in the downstream stretches of the river (DN, 2012).

The water temperature has large effects on the aquatic environment, and can be an important factor in determining the biological diversity in a watercourse. In rivers and streams, reduced flow of water causes larger variations in temperature throughout the year compared to natural conditions. Less water leads to higher temperatures in spring and summer because it takes less energy to heat the water, and consequently also lower temperatures during winter. Increased water flow has the opposite effect. When it comes to reservoirs, runoff usually takes place from the upper layers of the water column in naturally created reservoirs and lakes. This means that during the summer months, runoff to the rivers has higher temperatures because cold water sinks to the bottom of the lake, whilst winter runoff temperatures are comparably lower. However, these conditions change when the reservoir is subject to hydropower production. This

is because water is drained from the lower levels of the water column. The consequence of this is that summer temperatures in the downstream stretches of the affected rivers are lower than the natural conditions, whilst winter temperatures are somewhat higher, which may in turn influence the extent of ice coverage during winter in the downstream areas (Asvall in Eie, 2013).

Water temperature is of high significance for the living conditions in the water. Temperature variations can have implications on the survival rates of organisms, growth and development, behaviour, nutrient levels, and biological production in the river. For example, insects' eggs might hatch earlier than normal when subject to higher temperatures, and increased ice coverage in winter may function as migration barriers for fish. These are just a couple of examples to illustrate how temperature affects living organisms. Changes to water temperatures can especially be critical for species that have limited temperature tolerance. These are species that are adapted to a narrow span of temperatures, and are therefore vulnerable to changes (Eie, 2013).

3.2.2 Cumulative effects

There has, as previously mentioned, been an increase in the awareness about how small-scale hydropower may also influence the natural environment, and this is especially with regards to the cumulative effects of multiple small-scale hydropower plants located in the same geographical area (OED, 2007). Cumulative effects can be defined as the combined influences of multiple small-scale hydropower plants within a defined geographical area, or the systematic effects small-scale hydropower plants have on a specific subject, like a species or habitat, within a larger geographical area (OED, 2007, p. 33).

It is a general assumption that the environmental impacts generated from small-scale hydropower is smaller than from large-scale projects (Egré & Milewski, 2002). However, there are indications that the sum of combined environmental effects from a larger number of small-scale installations is generally more problematic than for large-scale power plants when the differences in the quality of energy produced are taken into consideration (DN, 2012). This is because there is a need for a much larger number of small-scale power plants in order to produce the same amount of energy as just one large-scale hydropower plant. It is not just the size of the projects that determines the sustainability and degree of environmental impacts caused by a project, but the specific characteristics and location of each project, and what is needed to produce a certain amount of energy (Egré & Milewski, 2002). In 2014, the ten largest

hydropower plants in Norway accounted for approximately one fifth of the energy production (OED, 2015). The difference in energy produced between small-scale and large-scale hydropower compared to number of hydropower installations is illustrated in Table 3.1.

Table 3.1 Distribution of production per size, 2014. Source: NVE in OED (2015)

Installed capacity, MW	Number of power plants	Average yearly production, TWh/year
<1 MW	554	0,8
1-10MW	587	8,3
>10MW	335	122,5
Total	1476	132

From this we see that there is a need for a much larger number of small-scale installations in order to meet the same level of energy production. It is therefore important to consider the cumulative effects of small-scale hydropower and not just look at one single project as an isolated event. So, when discussing the environmental impacts per unit of produced electricity, the advantages of small-scale projects with regards to environmental impacts does not seem to be as apparent (Egré & Milewski, 2002; OED, 2007). Studies done by Bakken et al. (2012) concluded that given a comparable volume of energy produced, large-scale hydropower seem to have fewer and slightly less severe environmental impacts than multiple small-scale hydropower installations (Bakken, Sundt, Ruud, et al., 2012).

3.3 Defined parameters of environmental influence

As previously mentioned, I will, for the purpose of this thesis focus on three main categories of environmental aspects that hydropower development may have an impact on. These are: landscape and outdoor recreation; encroachment-free areas; and, biological diversity and endangered species. Impacts on these categories can in many cases lead to conflicts between different interests, regarding both national environmental goals and international commitments for energy production and nature conservation. They are therefore central assessment topics in the licencing process, and important themes for sustainable management (DN, 2012; OED, 2007). An explanation of the categories will be given in the following section.

3.3.1 Landscape and outdoor recreation

Aesthetic qualities are often used as argumentation by environmentalist for the conservation of nature (Jamieson, 2008). Rivers, lakes and waterfalls are by many considered as important landscape elements, increasing the value of the nature experience and functioning as an important resource for outdoor recreational activities, and the presence of water tends to be an important factor in determining people's preference for landscapes (Eie, 2013; OED, 2007). Hydropower development, causing reduction in the flow of water or diversion of water, together with technical encroachments like dams, above ground pipelines, roads, power lines, and buildings, are generally considered to have negative impacts on the quality of the landscape (OED, 2007).

Many landscape types are vulnerable to encroachments. Small-scale hydropower installations often utilise concentrated rapids and falls, causing fragmentation of the river (OED, 2007). When multiple key landscape elements like these are affected or lost, it will contribute to a degradation of the landscape character, not just for the directly affected area, but also for the sum of a larger area (Eie, 2013). As I have mentioned previously, there is a large potential for new small-scale hydropower development in the fjords along the western coast of Norway. These areas are therefore experiencing a significant pressure on the natural resources (OED, 2007). These are areas that have traditionally been used for hiking by locals, as well as used in the commercialisation of the fjords as tourist attractions, and are both nationally and internationally valued as high quality landscapes.

Many large-scale hydropower reservoirs are located at high elevation mountainous areas. Mountainous areas are especially vulnerable to physical encroachments and technical installations because installations like dams, roads and powerlines are often visible over long distances (OED, 2007). An example is Sysendammen in Eidfjord, Hordaland, regulating the flow of water reaching Vøringsfossen, an important tourist attraction in the area. Today, more than 70 percent of the largest watercourses in Norway have been influenced by hydropower development, and this has especially affected the waterfalls. Out of the 20 highest waterfalls in the world, nine are located in Norway, and seven of these have been affected by hydropower development (Berntsen et al., 2010).

Landscape quality is closely linked to preferences for outdoor recreational activities. Numerous recreational activities are related to water, examples include fishing, kayaking, rafting and swimming (OED, 2007). Reservoirs created by large-scale hydropower development can come in conflict with other interest in the area like outdoor recreational activities, landscape quality,

fishing and the use of boats, due to large fluctuations in water levels (Eie, 2013). A study conducted by Vistad et al. (2009) concluded that running water has an overall high value for outdoor recreational activities, and that there are documented conflicts between hydropower and six activities in relation to outdoor recreation: walking along watercourses, river paddling/rafting, fly fishing, sailing, and during the winter months, frozen waterfall climbing and ice fishing (Eie, 2013).

An example of how hydropower development has influenced people's opinion of an area is the development of a hydropower plant in Aurlandsdalen in the county of Sogn og Fjordane. This used to be an area with relatively pristine nature and a popular destination for hiking and recreation. But examinations showed that after the construction of a hydropower plant, hikers no longer found this area to be as appealing, and the number of visitors decreased by as much as 60-65 percent. Although this is a local phenomenon, and cannot be used for generalisation, it does show the effects hydropower development and technical encroachments potentially may have on the general opinion of an area (Berntsen et al., 2010). The perceptions and experience value of an area may for example influence that area's attraction for tourism, and thereby influence the area's value for local revenue creation.

In order to minimise conflicts and prevent negative and unintentional impacts from hydropower development, it is important that considerations regarding landscape qualities are catered into the licencing process. Both single important elements like waterfalls, and sum impacts of many hydropower installations, may have large implications for the overall experience of the landscape (OED, 2007).

3.3.2 Encroachment-free areas (INON)

Encroachment-free nature areas (*Inngrepsfrie Naturområder i Norge* - INON) are areas located at least one kilometre away, in linear distance, from heavier technical encroachments. The areas are further categorized into three types of zones, depending on the distance to the heavier technical encroachment. The classification is represented in Table 3.2 (OED, 2007).

Table 3.2 Classification of encroachment-free areas. Source: OED (2007)

Classification	Distance from heavier technical encroachments
Wilderness areas	>5km
Encroachment-free areas zone 1	3-5km
Encroachment-free areas zone 2	1-3km

Areas that are closer than one kilometre from heavier technical installations are considered as encroachment-near areas (OED, 2007).

Heavier technical encroachments include (OED, 2007, p. 21):

- Public roads and railways longer than 50 meters, except from tunnels
- Forest roads longer than 50 meters
- Tractor roads, agricultural roads, construction roads, mountain roads, and other private roads longer than 50 meters
- Old roads that have been renovated for use of tractors and/or other rough terrain vehicles
- Approved bare ground courses (in the county of Finnmark)
- Power lines with a voltage of 33kV or more
- Power stations, above ground pipelines, canals, embankments and dikes
- Regulated rivers or streams where the flow of water has been altered (increased or decreased)
- Reservoirs where periodic regulations result in an increase or decrease of water levels of one meter or more

Norwegian nature is remarkable in that it is very varied and it is a common perception that large areas are generally free from encroachment and human influence. Areas that have not been heavily influenced by human activity are highly valued for recreation, outdoor experiences and quality of life, and are an important part of our identity as Norwegians (Berntsen et al., 2010; OED, 2007). But these areas are becoming less and less common, not only in Norway, but in Europe in general. During the last hundred years, technical encroachments have, to an increasing degree, influenced Norwegian nature. Approximately 44 percent of the total land area in Norway was classified as encroachment-free areas in 2013, that is, they are more than one kilometre away from heavier technical installations, and about 12 percent was within the wilderness area category.

In the period between 2008 and 2013, road construction and energy development were the two main causes for loss of encroachment-free areas (Berntsen et al., 2010; Miljødirektoratet, 2016). Hydropower development, especially multiple small-scale hydropower installations, leads to the fragmentation of areas, which in turn will lead to a decrease of encroachment-free areas. The reduction of encroachment-free areas is usually most significant in areas in classification zones 1 and 2. And the highest level of conflict is usually found in less impacted areas like wilderness areas (Bakken, Sundt, & Ruud, 2012; OED, 2007).

3.3.3 Biological diversity and endangered species

Biological diversity, or biodiversity, is defined as the species diversity, genetic diversity and ecosystem diversity in an area, including all living things (DN, 2012, p. 9). Norway has, through international agreements, committed to stopping the loss of biodiversity (DN, 2012; Miljøverndepartementet, 2011). It is a challenge to combine renewable energy goals regarding climate change with an aim to reduce biodiversity loss, and this is an issue that needs to be handled through thorough management procedures and licencing processes (May et al., 2012).

The species diversity in freshwater relies on different factors. Calcareous waters usually have a higher species diversity than waters with less limestone sediments, acidity of the water plays a role, the same goes for temperature, size of sediments grains and the flow of water (Miljøverndepartementet, 2011). Hydromorphological changes due to changes in the physical conditions in the watercourse, like changes in the flow of water, changes to water temperature, erosion and sedimentation, that alter the living conditions and habitats for species, are the main causes of biodiversity degradation caused by hydropower projects (DN, 2012; Eie, 2013).

There are roughly 2800 species of animals in Norwegian nature that live their whole life, or parts of their life, in freshwater. This includes fish, amphibians, insects, crustaceans, zooplankton and some mammals, like otters and beavers. Insects and crustaceans are the most abundant, but also, all the six species of amphibians that are endemic to Norway have parts of their habitat connected to freshwater. In addition, approximately 80 species of birds use freshwater for food supply and reproduction area, including the Norwegian national bird, the white-throated dipper (Fossekall/*Cinclus cinclus*). The withe-throated dipper is dependent on running water throughout the year, and thrives in habitats related to waterfalls and rapids. Its natural habitat is therefore likely to be in rivers suitable for hydropower development, and may be negatively affected by hydropower projects (Miljøverndepartementet, 2011; OED, 2007).

Habitat loss through land-use change and physical encroachments is overall the main threat to biodiversity today. And hydropower development, leading to changes in the quality of habitats and fragmentation of habitats, are considered to be one of the main causes of species reduction and loss of species, threatening biodiversity in Norway (DN, 2012; May et al., 2012). Loss of habitat can especially have negative effects on threatened and vulnerable species, as well as on keystone species in the watercourse. Keystone species are species that play an especially valuable role in the ecosystem in which they live (DN, 2012). The Norwegian Biodiversity Information Centre (*Artsdatabanken*) has published the Norwegian Red List of Species (*Norsk rødliste for arter 2015*). Based on methodology and criteria developed by the International

Union for Conservation of Nature (IUCN), they have assessed the risk of extinction of species, and published a list where these species are categorized according to their level of vulnerability. These categories include, amongst others: vulnerable species (VU), endangered (EN), and critically endangered (CR) species. A further explanation of these categories is not necessary for the purpose of this thesis (Artsdatabanken, n.d-a, n.d-b; OED, 2007). Approximately seven percent of the species categorised as endangered on the Norwegian Red List of Species have more than 20 percent of their populations in freshwater (Miljøverndepartementet, 2011). This includes a number of species of freshwater fish, like the Eel (*Anguilla anguilla*) (OED, 2007).

Fish and fishery has had a central role in the management of hydropower development throughout history, both due to the role of fish as a source of recreation and economic benefits, but also as a part of species diversity in the rivers and lakes (OED, 2007). One species of fish that has gained a lot of attention in the debate on hydropower management is the Atlantic Salmon (*Salmo salar)*. Norway is one of the main habitats for the Atlantic salmon, with about one third of the global population spawning in Norwegian waters. Because such a large share of the global population is found in Norway, we have a special responsibility to secure its habitats and sustain a viable population. Although the Atlantic salmon is not characterised as an endangered species, populations have decreased significantly, and one third of the 440 Norwegian populations are considered to be endangered today (Miljøverndepartementet, 2011). The Atlantic salmon is an anadromous species. This means that it is born in freshwater but spends most of its life in the sea, only returning to freshwater, migrating back up the river where it was once born, to spawn. These anadromous species, also including sea trout (*Salmo trutta),* cause problems for hydropower development because important spawning and living habitats, and migration routes, can be affected by encroachments in the river. Reduced flow of water, difficult passage through the turbines, and rapid changes in water levels are all threats to the fish, and issues that need to be considered in the licencing process of hydropower development (OED, 2007). For small-scale hydropower, the level of conflict with fish interests is generally lower. Small-scale hydropower usually utilises concentrated falls and rapids. In many cases these areas compose natural blockages for migration, and are generally not suitable habitats for fish, and therefore they have not been used for this purpose. It is the development of large-scale hydropower that contributes to most of the conflicts and problem areas related to fish and migration routes (OED, 2007).

Another issue in hydropower management is the influence on nature types. This is mentioned in most licencing procedures, and is therefore worth mentioning here as well. A nature type is

defined as a uniform environment, including all plant and animal life and the environmental factors that operate there, or specific types of natural features such as ponds, field islets, geological occurrences (Erikstad et al., 2009, p. 12). Seven freshwater nature types are found on the Red List for Ecosystem and Habitat Types, also published by the Norwegian Biodiversity Information Centre. These include calcareous lakes, rivers (*elveløp*) and lakes (Miljøverndepartementet, 2011). Hydropower development will often have an influence on specific nature types, like previously mentioned, creek ravines and waterfall spray zones are often affected by small-scale hydropower (DN, 2012). As an example, vegetation in the spray zone can be an important nature type with high species diversity, but will be negatively affected when water is diverted from the waterfall, through for instance pipes, or the flow of water is reduced (Størset, 2009).

In the licencing process, concerns regarding biodiversity are central elements when influenced from hydropower projects are considered. The Norwegian Red List for Species, and the Red List for Ecosystem and Habitat Types, are important tools in the assessment process (OED, 2016). The requirements for environmental impact assessments are, however, less comprehensive for small-scale hydropower compared to the requirements for large-scale hydropower. This lack of knowledge can lead to a higher risk of impacting vulnerable species (DN, 2012), and is a clear example of how small-scale hydropower is treated differently compared to large-scale hydropower when it comes to emphasis on natural environmental impacts.

The framework and procedures of the licencing process will be further explained in chapter 5.

3.4 Valuing nature

How theses aspects of nature are valued by different actors have implications for the management of natural resources. In discourse analysis, environmental problems are not objectively defined, and how different aspects of nature is valued depends on the perceptions the different actors have of what is important (Feindt & Oels, 2005). Hydropower development can be seen from a strictly scientific, technological, or economic standpoint, but also ethics and value judgements are an important part of any environmental issue and policy decision (Jamieson, 2008). Due to changes in discourse, the aspects of nature we value today might not be perceived as equally important in the future (Ariansen, 1992).

We can see nature from two main standpoints: One is acknowledging that nature has intrinsic value, meaning that it is a value in itself independent of human needs. On the other and, nature can be seen as having instrumental value, a resource that can be utilised for our benefit (Ariansen, 1992). The perception of nature has changed over time, the modern environmental movement can be traced back to John Muir and the Sierra Club's efforts to protect the Hetch Hetchy Valley in Yosemite National Park, USA, from being turned in to a reservoir for hydropower production in the early 1900s (Jamieson, 2008). Conflicts between hydropower development and conservational interest can also be seen as a turning point in the Norwegian environmentalist movement, especially emphasising the demonstrations against the Mardøla and Alta hydropower projects in the 1970s and 80s. (Berntsen et al., 2010). This increased focus on natural environmental values has influenced the management and led to policy change, through for instance legislations like the protection plan for watercourses (Berntsen et al., 2010).

Most consequences related to hydropower development are non-monetary values, meaning that there cannot be put a price on the affected values, and the assessments are often based on qualitative valuations (NVE, 2014). The previously defined impacts on the natural environment are all common sources of conflict between different interests, and how they are valued varies between different actors. The value of a waterfall can for instance be seen from a conservationist perspective, or from a development perspective. A waterfall can be viewed as aesthetically important by environmentalists and gain value in that sense, whilst hydropower developers will see the energy potential that lies within that waterfall as more valuable (Ariansen, 1992). Because these perceptions and the opinions of what is more important vary between different actors, the actors in hydropower management should make their value judgements transparent, instead of talking in terms of absolute facts (Feindt & Oels, 2005). One of the strengths of discourse analysis is the possibility to identify these perceptions, and clarify shifts in opinions over time, and thereby how different discourses become dominant in environmental policies (Hajer & Versteeg, 2005).

For the purpose of this thesis, I will look at how values are categorised in natural resource management in Norway. In relation to management and environmental impact assessment, value judgements have been structured and categorised, and natural values are often divided into three categories: Local values, regional values, and national values. National values are often associated with areas protected by the Nature Diversity Act, the protection plan for watercourses, or encroachment-free areas (INON). There is a general consensus that national

values are especially important and they are therefore often given special emphasis in the licencing assessment of hydropower projects, and they are often categorised has having high values (A-value). But hydropower developments influence local values to a larger extent than national values. Local values are generally only important for the local environment, and they are therefore often described as having low values (C-value) in the assessment of hydropower projects (Erikstad et al., 2009).

This structured way of valuing natural resources gives a common framework and starting point for evaluation, and is especially referred to by NVE in the licencing documents. However, values are not objective entities and this type of categorisation will not embrace the valuation from all actors, and can thereby lead to conflict.

4 Methodology

In order to identify the perceptions different actors have of hydropower management I have chosen a qualitative research approach. One of the strengths of qualitative methods is that they are aimed at identifying how the social reality is created through action, interaction, and the formation of opinions (Tjora, 2012). Specifically, the methodology for this thesis is based on discourse analysis. The rational for choosing discourse analysis to answer the research question is that hydropower management is characterised by conflicting opinions and different value judgements by different actors, and it is a process in which the different actors have different opportunities at influencing the outcome of the process. Discourse analysis can be used in determining the way in which different statements and opinions become acknowledged as truth or knowledge, and thereby how environmental problems are perceived, and the possible solutions and policy outcomes for environmental problems (Hajer & Versteeg, 2005). Discourse analysis is not meant to determine if statements or knowledge is right or wrong, but to identify why problems are perceived as they are through language and power relations (Jørgensen & Phillips, 2002).

But as there are many approaches to discourse analysis and many definitions of discourse, there is no clearly defined method for conducting an analysis. The discourse analysis in this thesis is based on the discourse theory introduced in chapter 3, as well as the method for conducting the analysis based on an order of discourse and indicators of discourse, which will be explained later in this chapter.

The chapter starts off with a review of the data collection for the thesis, including the method for data collection and what kind of data is used. This includes a representation of the eight chosen hydropower projects for the discourse analysis, and the preconditions used for choosing them. I then go on to explain the procedure for conducting the discourse analysis. Towards the end of the chapter I will review the quality of data based on the limitations I have set.

4.1 Data collection

4.1.1 Documents

All the data collected for this thesis consists of written documents. Written texts are an important part of discourse analysis because it is through language meanings are articulated and discourses are made.

Documents make up both the primary and secondary data for this analysis. Primarily I will be using the licencing documents for eight hydropower projects in the discourse analysis, but I will also be using documents like reports, governmental documents, and legislations to illustrate the framework for hydropower licencing.

Document analysis is an unobtrusive method, which means that we can access information about specific subjects or cases without intruding participants (Tjora, 2012). All of the documents included in this thesis are part of the public domain, meaning that they are accessible to anyone. Documents give us information about subjects at a specific time, often aimed at a specific audience (Tjora, 2012). The intended audience of a text does to some extent influence how that text is produced. An author will use particular discourses depending on the demands and backgrounds of the audience the text is written for. In discourse analysis it is therefore important to be aware of the context I which a text has been produced, what is the purpose of the text, who the producer of a text is, and who the text is produced for (Waitt, 2010).

In environmental policy-making, problems are often defined by actors with authority, like institutions, or experts within a specific field (Feindt & Oels, 2005). And the possibility to influence a process or discourse, and the legitimacy of a policy is greater if you speak with the support of an institution (Neumann, 2001). An important part of hydropower management and the licencing process is the application of knowledge and documentation (Knudsen & Ruud, 2011). A large part of the documents used in this thesis, reports, planning documents, legislations and regulations, and governmental documents, are published by institutions with authority in the relevant field. This includes governmental institutions like the Norwegian Water Resources and Energy Directorate (NVE) or the Ministry of Petroleum and Energy (OED), or other experts on relevant subjects.

In chapter 5, these documents will be used to become familiar with the mechanisms behind hydropower management, and the context in which the specific licencing documents have been written. This includes the political and juridical framework that govern hydropower management, through looking at relevant policy aims on both a national and international level

with regards to renewable energy production targets, as well as legislations that are decisive for what kind of projects can be developed. The structuring of the licencing process, and the possibilities different actors have at influencing the outcome of the process, is also part of the context in which the licence documents used for the discourse analysis have been written.

This makes up the context for the discourse analysis conducted in chapter 6. The discourse analysis will be based on the licencing documents of eight hydropower projects and will be used to identify the prevailing discourses in hydropower management, and reveal the perceptions the different actors have of the environmental impacts caused by small-scale and large-scale hydropower. The validity of research is a measure of whether the data can be used to answer the research questions it is meant to answer (Tjora, 2012). Considering that these documents have been produced with the sole purpose of assessing hydropower projects, and that they include statements from various actors, they are considered to be a suitable source of data for this thesis.

The Norwegian Water Resources and Energy Directorate (NVE) publish the documents from the licencing process for all hydropower cases in a database available on their website (nve.no/konsesjonssaker). This is public information available to anyone who may be interested. The documents published for the specific licencing cases contain various amount of information. But generally they consist of documentation from the entire licensing process, including the project application, hearing statements from various actors and interest groups, and NVE's considerations and conclusions.

Considering the scope of this thesis, it was necessary to set some limitations with regards to which documents, and which parts of the documents, that should be included in the analysis to avoid data overload.

For small-scale cases, NVE's recommendations are published in a document called '*bakgrunn for vedtak'*, translated here to 'grounds for decision'. In this document, the application with all facts about the case is presented, along with a summary of the hearing statements from different actors, and NVE's conclusion and licence decision. Although NVE is not the licencing authority for large-scale projects, they still have a responsibility to go through the licencing process and then give recommendations to the Ministry of Petroleum and Energy (OED) who makes the final decision. NVE's review of large-scale projects is published in a document called '*NVEs innstilling'*, which is the equivalent of the small-scale cases 'grounds for decision'. These are the documents that will constitute the basis for the discourse analysis.

As mentioned, these documents also contain a summary of hearing statements from different actors. Each case is presented for public hearing, and any actor with an interest in the watercourse thereby has the opportunity to make a statement about the case in question (OED, 2015). The summaries are written either by the actor in question or by NVE, and the summaries of the hearing statements will be used to analyse the different actor's opinions on hydropower and impacts on the natural environment.

Public hearings open up for multiple actors to voice their opinion, and the number of hearing statements can vary a lot from case to case depending on the level of interests for that project. The purpose of the thesis is to try to identify general opinions about hydropower, and in order to compare the statements given in the different cases on a similar level, I only included some chosen actors' statements in the analysis. I tried to find actors that were represented in all the eight cases and that, at the same time, were representative for various interests. NVE is a representative for the energy sector, working towards increased development of renewable energy, at the same time as they are responsible for assessing all aspects of a hydropower project through the licencing process. To represent the nature conservation interests Friends of the Earth Norway (*Naturvernforbundet,* NNV) and the Forum for Nature and Outdoor Life (*Forum for natur og friluftsliv,* FNF) were chosen. The reason for using two representatives for nature conservation is that both of these actors were not represented in all eight cases, but at least one of them have made a hearing statements in each case. And the municipalities and county councils work in the interface of industrial development and nature conservational interests to secure local and regional interests.

In addition to a limitation on the actors' statements included in the analysis, I also set a general limitation on the kind of environment impacts that would be included. These categories were introduced in chapter 3, and are landscapes and outdoor recreation, encroachment-free areas, and biological diversity and endangered species. These are quite broad themes, meaning that a lot of different information can be put under these categories. Although the thesis is mainly focused on natural environmental values, landscape qualities are often connected to outdoor recreation and tourism. This is part of the social aspects of nature where protection of nature is justified based on its value for human experiences and uses, and not just as an intrinsic value. The way these different aspects of nature are emphasised by the different actors in relation to hydropower development will give an indication of the different discourses in hydropower management.

4.1.2 Choice of cases

The discourse analysis will be done based on the licencing documents for six small-scale projects and two large-scale projects. As mentioned, the licencing document for all hydropower cases are available online, so I needed to be conscious of certain elements in the selection process. I wanted to use cases that had been the cause of some level of conflict around natural environmental interests, and thereby had hearing statements from various, appropriate actors. I also wanted to include examples of projects that had been granted a licence and projects that had been declined.

Another criterion was that I wanted to use relatively new cases, from the last couple of years. This was to give an impression of the management situation and opinions as close to the present situation as possible because discourses change over time. We can see that from the way the perceptions of hydropower development and natural conservational values have changed over the course of the last hundred years (Ariansen, 1992).

For small-scale cases, this time aspect did not cause any problems. As we know, the development of small-scale hydropower has increased over the last years, and the development potential is still significant (OED, 2016), so for small-scale hydropower there were a large number of cases to choose from. For large-scale projects the number of potential cases was significantly lower, especially regarding declined applications. Most of the licence applications for large-scale hydropower during the last years have been granted a licence. In fact, there was only one application that got declined in the period between 2006 and 2016. This was an application from Troms Kraft Produksjon (TKP) AS to build Skognesdalen, Steinnes and Stordalen power plants in Tromsø municipality in the county of Troms. Seeing as there were not a lot of options, this case was chosen as the declined large-scale project example for the analysis. This is technically three separate power plants, but they are all in the same watershed, and a part of the same licence application by TKP. The Stordalen power plant did get a licence appointed by OED, but because NVE recommended against the development, and because the projects were not handled individually but as part of the same process presented in the same document, I thought it best to include all of these three plants and treat them as one project in the analysis. There were a few more approved large-scale projects to choose from, but still not close to as many as for small-scale cases. I ended up choosing a project from 2016, a fairly large installation that had caused some conflicts, and included hearing statements from a number of actors. The chosen project is the Sauland power plant in Hjartdal municipality, Telemark.

The six small-scale cases include three projects that have been granted a licence for development, and three projects that have gotten their application declined. The reason I decided to use six small-scale cases in comparison to two large-scale cases is a combination of wanting to include the aspect of cumulative effects, which, especially with regards to landscape qualities and biodiversity, have gained increasing attention in the management of small-scale hydropower, and has become a central aspect of hydropower management in the later years (DN, 2012; OED, 2007). And in addition, the amount of data presented in the documents for the small-scale cases is considerably less comprehensive than for the large-scale cases. The three small-scale yes-cases are all located in Vaksdal municipality in Hordaland, and they were all treated in the same licencing process by NVE. The three cases that got declined are all located in Luster municipality in the county of Sogn og Fjordane, and these three were also handled in a joint process by NVE. NVE treated these cases together in order to create an overall impression of the consequences of the projects (NVE 2013, 2014, 2016 a-e), and it therefore seems like a good way of highlighting how cumulative effects are an important part of the management of hydropower today.

I did not predefine a geographical area in which the cases should be located, because the management is done based on national criteria, and large-scale hydropower and small-scale hydropower tend to be located in different landscapes and therefore also in different parts of the country. But even though I did not use geography as a criterion in the selection of cases, all the small-scale cases are located in the western coastal area of Norway. As mentioned in previous chapters, this is an area well suited for small-scale hydropower, with high precipitation and a high relief landscape, and is therefore experiencing high development pressures and increased development (OED, 2007). Cumulative effects are therefore expected to be more of an issue in this area compared with areas that are less affected, and the level of conflict around conservation values may therefore also be higher.

The locations of the hydropower projects are given in Figure 4.1.

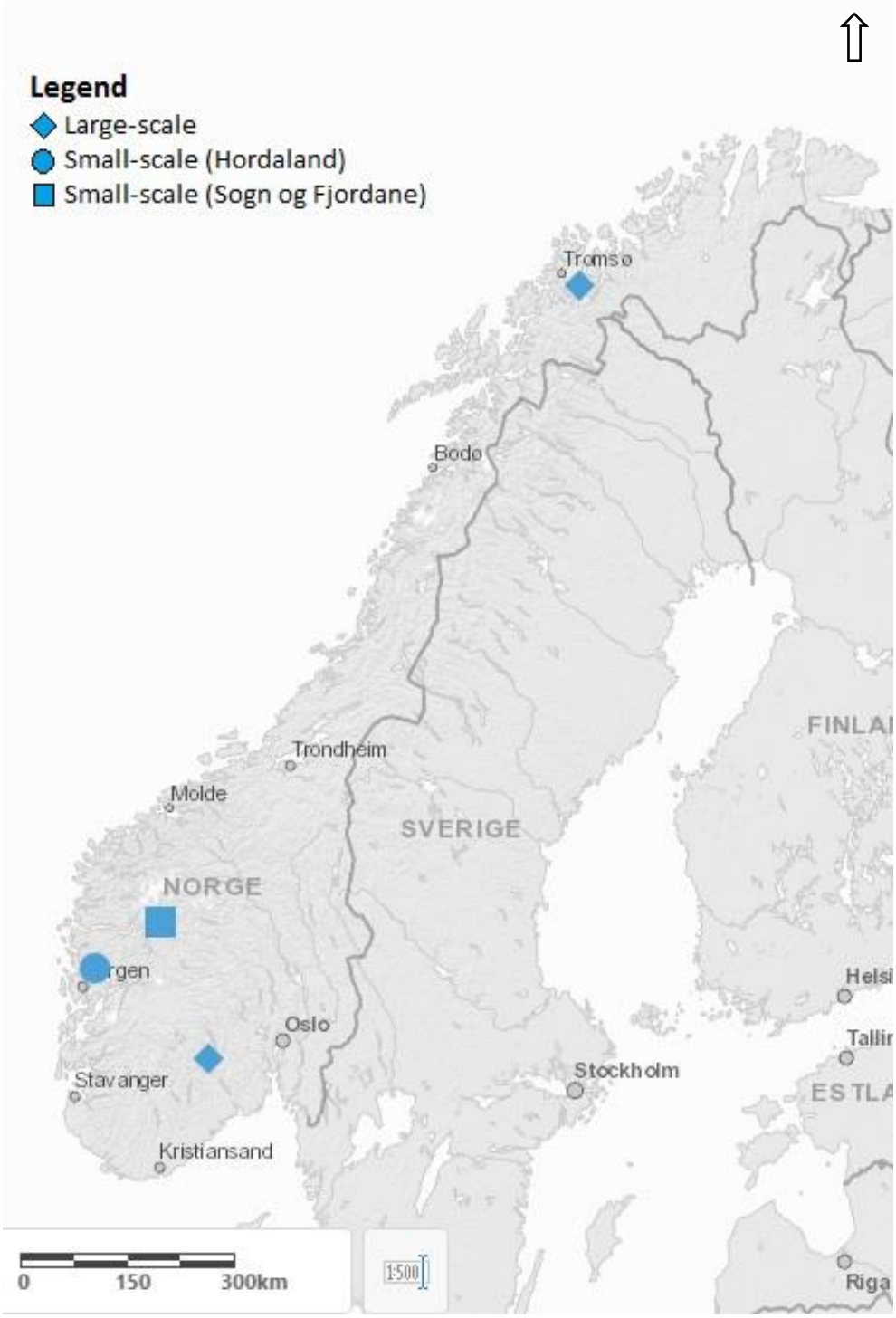

Figure 4.1 Location of the chosen hydropower projects. Source: NVE Atlas

Table 4.1 gives a general representation of the eight cases, including the size of each project, and the most emphasised topics discussed in the assessment and hearing rounds.

Table 4.1 Hydropower projects. Source: NVE licencing documents (2016, 2014, 2013)

**Combined Skognesdalen, Steinnes and Stordalen*

Project	**Granted licence**	**Size**	**Installed capacity**	**Average annual production**	**Main topics**
Moko	YES	Small-scale	2.9MW	7.2GWh/year	Sea trout
Markåni	YES	Small-scale	4.0MW	9.6GWh/year	Renewable energy, landscape
Sædalen	YES	Small-scale	4.4MW	10.2GWh/year	Renewable energy
Kinsedal	NO	Small-scale	6.83MW	15.45GWh/year	Biodiversity and endangered species
Kveken	NO	Small-scale	6.85MW	6.5GWh/year	Biodiversity and endangered species
Rydøla	NO	Small-scale	7.9MW	14.9GWh/year	Landscape and recreation
Sauland	YES	Large-scale	76MW	183GWh/year	Renewable energy, outdoor recreation, biodiversity and endangered species
Skognesdalen, Steinnes, Stordalen	NO	Large-scale	46.7MW*	162GWh/year*	Landscape, INON, freshwater pearl mussel

4.2 Discourse analysis

Discourse analysis is a theoretical and methodological whole, and cannot be used as a method separate from its theoretical and philosophical basis (Jørgensen & Phillips, 2002). The analysis in this thesis will be based on the theory presented in chapter 3.

As I mentioned at the start of chapter 3, there is no clearly defined methodology on how to conduct a discourse analysis. Depending on the purpose of the research and the theoretical background, discourse analysis can be structured in various ways (Jørgensen & Phillips, 2002). Foucault did not define a straight forward description on how to conduct a discourse analysis. For him, a clear methodological procedure would potentially put too many restrictions on the analysis. "The maxim is learning by doing", discourse analysis is considered to be intuitive, and therefore the methodology is generally left implicit rather than made explicit (Waitt, 2010, p. 219).

A discourse is a group of statements that treat a topic in a similar way and that thereby give similar meanings to concepts (Mills, 2003). Discourse analysis is not meant to determine a final truth, distinguishing between right and wrong. The purpose is rather to identify patterns in what is said and written, and the social consequences different representations of reality might lead to (Jørgensen & Phillips, 2002). The assumption is that there are different discourses competing to gain influence and define what is perceived as knowledge and truth, that there is a constant struggle between discourses in any field of study at any given time (Neumann, 2001). This does not only apply to different topics, but also within each discourse: An order of discourse refers to the struggle of meanings within the same field of study. An order of discourse can be seen as containing multiple discourses that in some way covers the same subject, and that compete to give meaning to key concepts within the discourse. Meaning that, within a discursive order, the same subjects are considered to be important, but the way they are defined and interpreted depends on the different discourses (Jørgensen & Phillips, 2002).

The point of departure for the analysis in this thesis is that there is a hydropower discourse that defines the order of discourse, and that each of the actors aim to influence the definition of hydropower, and which aspects of hydropower should be considered as important.

4.2.1 Conducting the analysis

I did not have any previous experience with conducting a discourse analysis, I therefore looked to other studies to see how they used discourse analysis as methodology. I found that the method

used by Silje Maria Tellmann in her article *"The constrained influence of discourses: the case of Norwegian climate policy*" (2012) was adaptable to the purpose of my thesis. She used indicators of discourse in her study. These indicators of discourse determine how different discourses are developed and applied (Tellmann, 2012, p. 736).

The indicators of discourse are given in Table 4.2, and will be further explained in the following paragraph.

Table 4.2 Discursive indicators. Source: Tellmann (2012) p.736

Indicators of discourse:	*Problem definition*	*Contextual framing of the problem*	*Problem solution*	*Legitimating arguments/key concepts*	*Knowledge-base*

As we know from the theory on discourse presented in the previous chapter, we are only able to see the world as it is presented to us through different discourses and different discourses compete to give meaning to the world (Mills, 2003). The *definition of a problem* therefore varies with how that problem is interpreted and defined within different discourses. The *contextual framing of a problem* describes how that problem is linked to a bigger context, like policies. The possible *solutions* to a problem is dependent on how that problem is interpreted and defined. Different discourses will result in different strategies and policy outcomes because they define a problem in different ways and therefore have different solutions to that problem. *Legitimating arguments* are used to give authority to the problem solution and the *key concepts* are what characterises the discourse. The *knowledge base* grounds the discourse in knowledge presented by experts in the relevant field (Tellmann, 2012).

4.3 Data quality

The limitations I set with regards to which documents, which actors, and which environmental impacts to include in the analysis can potentially have implications on the final results of the analysis.

The parameters of natural environmental impacts I used are rather broad, and therefore include most aspects of the impact hydropower cause on the natural environment. But only looking at the natural environment will exclude other aspects of hydropower development, like most economic and social aspects of hydropower development. Examples of arguments that are not

included are the value of local economic development and employment, the use of damming as flood protection, and the impacts on cultural heritage sites. We can assume that the municipalities, for instance, are interested in the benefits a hydropower project could bring to the local community through employment and revenue creation. And because the licence decisions are not solely made on the basis of natural environmental concerns, this analysis will give an incomplete description of the licence decision by excluding other aspects.

The reason I will be using the summary of the statements given in the licencing documents and not the complete hearing statements is that the complete statements are not available for all the cases in question and I want to secure a similar level of data quality for all the analysed cases. Only using the summaries of the hearing statements could potentially also exclude nuances of the decisions. These summaries only include the aspects of a project that has been emphasised in the hearing statement. But because the most important aspects should be included in the summaries, I do not expect this to have any significant implication on the result.

Not setting a geographical limitation to where the chosen projects should be situated means that it is not the same actors that make statements about the different projects. There are for example five different affected municipalities making statements about the various cases. They all have different backgrounds and reasoning for their decisions. In addition, this is a qualitative study, meaning that there is a restricted number of cases being studied. And the licence documents and hearing statements are all case specific, meaning that the statements made in the licence documents are only relevant for that specific project in that specific location. The combination of these limitations can to some degree affect the ability to compare the statements between the different projects. So rather than talking about generalisation as in quantitative research, we can talk about analytical generalisation or transferability (Baxter, 2010). Because the licencing process for hydropower follows the same criteria in all regions, the perceptions about hydropower in one case could be transferable to other projects.

5 Hydropower Management

Hydropower has played a major role in the industrialisation of Norway over the last 100 years, and hydropower is still the most important source of renewable energy in Norway today (OED, 2016). Continued development calls for a structural and comprehensive management of freshwater resources, to secure both natural environmental interests as well as energy development interests.

There are a range of different instruments used to promote the development of renewable energy, energy efficiency, and climate-friendly energy use. This includes taxes, support schemes, laws and regulations, and information and guidance (OED, 2016). Hydropower development specifically, is subject to a range of regulations that govern how these resources are utilised. The licencing process is the main subject for this thesis, but in order to analyse the licencing documents, we need to be aware of the context in which these documents have been written, as it is an important aspect of discourse analysis is to become familiarised with the institutional dynamics and the social context in which the discourse is situated (Waitt, 2010).

This chapter starts off with a look at the legal framework and policy framework governing hydropower management, as political obligations and legal frameworks are decisive for how different interests and concerns are integrated into the licencing process.

Another aim of the chapter is to illustrate the possibilities different actors have on influencing the outcome of the licencing process. The public management of Norwegian freshwater resources is to a large extent handled through the licencing process, providing the possibility to assess a project's impacts on public or private interests, specifically based on the influences caused by each individual project (Falkanger & Haagensen, 2002). Different actors' possibility to influence policy-outcomes is determined by how the licencing process is organised, and I will therefore give an overview of the structural organisation of the licencing process for both small-scale and large-scale hydropower.

Towards the end of the chapter, the focus is shifted more directly on to how different actors are able to influence the outcome of an individual licencing process through stakeholder participation in the public hearing round.

5.1 Framework for hydropower management

5.1.1 Political framework

An important aspect of hydropower management is that hydropower is renewable source of energy without emissions of greenhouse gases. And as we have seen, climate change is high on the political agenda, and the development of renewable energy is an important means in reaching environmental goals. This includes strategic management of hydropower resources, governed by both national and regional policies, as well as international obligations (Faugli, 2012).

In the white paper "*Kraft til endring – energipolitikken mot 2030*" (Meld.St.25), the government published the desired direction for Norwegian energy policies towards 2030, combing the issues of energy supply, climate change, and industrial development. In this white paper it is stated that efficient and environmentally friendly energy production should lay the foundation for continuous societal growth and welfare (OED, 2016). The government has defined four main areas of focus in energy politics towards 2030: Increased supply safety; profitable development of renewable energy; efficient and climate friendly use of energy; and, industrial development and value creation through efficient utilisation of profitable renewable resources (OED, 2016, p. 7). In this, hydropower will continue to play an important role as the backbone of the Norwegian energy system, both as a contributor to the Norwegian energy market, and also in a larger climate perspective as a supplier of clean energy to the Norwegian and the European market.

In addition to energy supply and security, concerns regarding the natural environment are also included in policies. The Norwegian environmental goals (*Norske miljømål)* state that ecosystems should have 'good ecological condition', no species should go extinct, and a representative selection of Norwegian nature should be protected. Through the licencing process, NVE is responsible for assessing all aspects of a hydropower project, including concerns regarding biological diversity and the natural environment. This is because hydropower installations affect these aspects through altering habitats and changing the living conditions for species, and knowledge-based management is important in order to limit the negative consequences of hydropower development. Some important tools in this regard are the regional master plans, and the Norwegian Red List for Species and the Red List for Ecosystems and Habitats published by the Norwegian Biodiversity Information Centre (OED, 2016).

As I mentioned in chapter 2, the various regional master plans each county develops for topics like climate and environmental issues, are important policy tools on a regional level. The county councils are for instance encouraged from a national level, to develop a plan regarding small-scale hydropower (Hordaland Fylkeskommune, 2013). In addition, each county can have plans concerning climate goals, energy development, nature conservation, etc. Within these plans, each county defines their own policies for the county's future development.

In addition to national and regional aims, there are various international conventions and directives that influence the management of freshwater resources and energy production in Norway (DN, 2012). This includes the EU's Renewable Energy Sources Directive (RES) and the Paris agreement (COP 21). These are part of a larger climate related political scheme, where a climate change discourse is prevailing, and hydropower and renewable energy is seen as a measure to decrease climate change. The aim is to reduce the emissions of greenhouse gases and increase the use of renewable energy, and this also affects Norwegian energy policies. The RES Directive aims to increase the production and consumption of renewable energy in Europe to 20 percent by 2020, whilst Norway set a renewable energy target of 67,7 percent by 2020. This was to be reached through development of new renewable energy, and thereby mainly through the development of small-scale hydropower and wind energy. The goal was reached in 2014 (OED, 2015). These kinds of obligations have implications for the increased focus and investment in renewable energy development and thereby also hydropower development, as it is a clean and flexible source of energy (Weir, 2015).

The management of Norwegian water resources is also connected to a joint management scheme with the European Union through the EEA (European Economic Area) and the European Union's Water Framework Directive, implemented in Norway through '*vannforskriften'* (Angell & Brekke, 2011). The purpose of this directive is to create a framework for determining environmental goals in order to ensure a comprehensive protection and sustainable use of the water resources (Vannforskriften, 2006). The intention is for all water bodies to reach a level of 'good ecological condition' through an ecosystem based management approach (Thaulow et al., 2008).

Following the Water Framework Directive Norway has been divided into eleven water regions. For each of these regions there should be a management plan that should work as a guideline for municipal and regional planning in that region, securing a sustainable and holistic management of water resources "from mountain to fjord" (*fra fjell til fjord*), utilising the resources and developing those hydropower projects that are the most cost efficient

(Miljøverndepartementet, 2011). In each region one county council is responsible for the coordination of the implementation of the directive (Stokker, 2010).

5.1.2 Juridical framework

The laws and legislations governing the energy sector and hydropower management are in place to safeguard public and private interests, and secure a socially rational management of these resources (OED, 2016). The legal framework consists of legislations specifically regarding energy and hydropower development, as well as wider legislations regarding natural conservation, like the Nature Diversity Act (Angell & Brekke, 2011). These legislations create the framework for what kind of projects that are possible and what kind of environmental impacts are acceptable in the development of hydropower. In the following I will therefore give a brief introduction to some central legislations and plans that influence hydropower management.

Norwegian freshwater resources belong to the general public and are resources with large economic potential, and the Industrial Licencing Act (*industrikonsesjonsloven/vannfallskonsesjonsloven*) is there to secure that hydropower resources are managed in a way that benefits the general public in the best possible way (Falkanger & Haagensen, 2002; Knudsen & Ruud, 2011). This is to be done through public ownership of hydropower resources on a national, regional or local level. The Act imposes requirements for a production licence if someone other than the state wants to acquire ownership of a watercourse that will produce more than 4000 natural horsepower when regulated (OED, 2016). Natural horsepower is a measure of the gross power production a project provides, and 4000 natural horsepower constitutes approximately a production of 2,9MW (Falkanger & Haagensen, 2002; Regjeringen, 2014b). From 2008 and onwards there has had to be a minimum of two thirds public ownership in order for a new project to be granted a licence, meaning that new licences can only be given to state-owned enterprises like Statkraft, to county councils, or to municipalities (OED, 2015; Stokker, 2010). Today, over 90 percent of the production capacity from hydropower is publicly owned (OED, 2015).

Whilst the Industrial Licencing Act regulates ownership, there is a need for a licence in order to utilize the energy potential of a watercourse. The purpose of the Water Resources Act (*vannressursloven*) is to secure a socially acceptable use and management of watercourses and groundwater resources, and it generally applies to all measures in a watercourse, including

hydropower developments (Stokker, 2010; Vannressursloven, 2001). Within the phrasing 'socially acceptable' lies the assessment of both environmental concerns like nature and cultural values, as well as concerns with socioeconomics implications (Vannressursloven, 2001). According to §8 of the Act, no measures that could cause a significant negative impact or disadvantage to the public interests in the watercourse should be implemented without the proper licence (OED, 2015; Vannressursloven, 2001). A project's potential 'significant negative impacts' must be considered based on an overall assessment of the project's potential consequences, and the probability of them happening (Falkanger & Haagensen, 2002).

Following the Water Resources Act, there can also be set specific requirements to counteract negative impacts to public or private interests following a hydropower development. This includes mitigating measures such as minimum flow of water in a river, or lowest regulated water level in reservoirs, to protect both landscape values as well as habitats for different species (Falkanger & Haagensen, 2002). These kinds of mitigating measures are often required or implemented for both small-scale and large-scale hydropower projects.

The Water Resources Act regulates the licence requirements for most small-scale projects, whilst large-scale installations also need a licence following the Act Relating to Regulations of Watercourses (*vassdragsreguleringsloven*) (Knudsen & Ruud, 2011). This Act gives licence requirements for reservoirs or rivers over a certain size (OED, 2016), and is applicable for all watercourse regulations creating reservoirs for hydropower production or transferring water between different watercourses to increase the flow of water (Stokker, 2010). The purpose of this act is to secure public and private interests related to the watercourse, meaning that a licence should only be permitted if the benefits from the projects exceeds the disadvantages (OED, 2015).

The previous legislations are aimed at management of water resources, but there are also other legislations that are not directly aimed at water resource management, but that still influence the field in some way. Based on the problem statement and subject of this thesis with a focus on natural environmental impacts, I will also include the Planning and Building Act, the Nature Diversity Act, and the Protection Plan for Norwegian Watercourses, which all have implications for the way natural environmental interests are handled in the licencing of hydropower.

According to the Planning and Building Act (*plan- og bygningsloven*), the government should be noted of any measure that may lead to significant consequences for society or the natural environment, and for these measures an Environmental Impact Assessment (EIA) should be

conducted (Eie, 2013). The Regulation on Environmental Impact Assessment (*Forskrift om konsekvensutredninger*) was adopted by the Parliament in 2005 (May et al., 2012). The requirement for EIAs divides projects into two categories: category I includes those projects that always require an EIA, including all hydropower developments with a production larger than 40GWh/year. In category II are those projects that should be assessed if they can cause significant impacts to society or the environment. This can include projects that are located in, or come in conflict with, areas with particularly valuable landscapes, environments, or cultural heritage, or projects that come in conflict with important encroachment-free areas, or constitute a threat to endangered species or nature types, or their habitats (Stokker, 2010). The purpose of the regulation is to secure that considerations regarding environment and the society are included in the planning process (Forskrift om konsekvensutredninger etter pbl, 2014).

For small-scale hydropower there is no requirement to conduct a full EIA. For these projects there should be conducted an environmental survey, which is a simplified EIA to assess the installation's expected impacts on the natural environment, especially connected to landscape encroachments and impacts on endangered species (Erikstad et al., 2009).

There are also legislations specially dedicated to protecting the natural environment. Perhaps the most important one in this respect is the Nature Diversity Act (*naturmangfoldloven*). A prerequisite in this act is that the natural environment is a national value that should be protected (Falkanger & Haagensen, 2002).

The Nature Diversity Act affects any sector that has to do with the management of nature, or that make decisions that affects nature in some way. The purpose of the Act is to preserve the diversity of biology, landscapes, and geology, as well as the ecological processes in nature, through sustainable management. This should be done through a combination of conservation and sustainable use (Stokker, 2010, p. 10). This Act is in accordance with international obligations to protect the natural environment, like for example the Convention on Biological Diversity (Knudsen & Ruud, 2011).

All hydropower projects need to be evaluated in relation to the Nature Diversity Act, and regulations and management objectives regarding prioritised species, selected nature types and ecosystems, and area preservation need to be implemented in the licencing process and can have implication for the development of hydropower (OED, 2016).

There are some central principles in the Nature Diversity Act that are given special emphasis in many hydropower licencing assessments, these include §§8-10: The principle of knowledge-

based management, the precautionary principle, and the principle of an ecosystem based approach and cumulative effects. These paragraphs state that decisions that affect the natural environment should only be made based on thorough scientific knowledge of species and habitats, and the possible consequences an encroachment might entail. And management should always aim at minimising damage to the natural environment, including a comprehensive assessment of cumulative effects (May et al., 2012; Naturmangfoldloven, 2009).

Another measure implemented specifically to secure the natural environment related to freshwater resources is the Protection Plan for Norwegian Watercourses (*verneplan for vassdrag*). The Protection Plan sets out to preserve a representative part of Norwegian freshwater nature, which entails that the protected watercourses cannot be used for hydropower production. Watercourses are rather meant to be used for recreation and outdoor life, or for science and educational purposes (Stokker, 2010). A range of watercourses have been protected against encroachments through four protection plans and two additions between 1973 and 2009. The first Protection Plan was ratified in 1973 as a result of the increased development of hydropower, and increased awareness of environmental impacts. After the lack of conservation in the 1960s and the Mardøla demonstration in 1970, there was an acknowledged need for a management tool to secure the protection of Norwegian freshwater nature (Berntsen et al., 2010). In the first protection plan, 95 watercourses were granted a status as permanently protected, and today 388 watercourses are protected through the protection plan, meaning that a production potential estimated to 47TWh is protected from hydropower development (Berntsen et al., 2010; Faugli, 2012).

5.2 The licencing process of hydropower

The need for a democratic and sustainable management of Norwegian freshwater resources resulted in the establishment of the licencing policies for hydropower projects in the early 1900s (Angell & Brekke, 2011). The licencing process is the most important measure the state has for combining different interests' concerns and conditions for energy production. The execution of the licencing process is determining for the future development of hydropower, including how severe the impacts on the natural environment will be (DN, 2012).

As we have seen, hydropower development has its advantages and its disadvantages. On the one hand, development of hydropower will contribute to energy supply security, local development, and reaching energy political goals. But on the other hand, hydropower can have

significant impacts on natural environmental conditions like biodiversity, landscape qualities, outdoor recreation, tourism, and cultural heritage (OED, 2016). Through the licencing process these impacts are weighed against the socioeconomic benefits a project brings about (Eie, 2013). In the assessment of benefits, there should be made considerations with regards to the amount of energy produced, how flexible the production will be in relation to energy demands, when will the production take place, etc. (DN, 2012). In the end, all advantages and disadvantages of a measure should be weighed against each other, and in order for a project to be granted a licence, the benefits to society should outweigh the disadvantages (OED, 2016).

Whilst NVE is responsible for the licencing of small-scale hydropower (<10MW), OED is responsible for the handling of licence applications for large-scale projects. Although they are not the licencing authority, NVE still goes through the licencing process for large-scale projects, presenting their assessment and recommendations to OED, who then presents this to the government for a final decision by King in Council (Stokker, 2010). NVE's assessment is what is relevant in this thesis.

As the licencing varies a bit between small-scale and large-scale hydropower, I will systematically go through the two processes individually in the following sections.

5.2.1 Licencing of small-scale hydropower

The licencing of small-scale hydropower is done by NVE following the regulations in the Water Resources Act. This does not include projects with an installed capacity of less than 1MW (mini and micro installations) as the county council is the licencing authority for these cases (OED, 2016). The first thing the applicant needs to consider is if the project requires a licence. As we know, any project that may cause significant damage to, or inconvenience for, the public interests in a watercourse, needs a licence (OED, 2015). In general, all projects with an installed capacity above 1MW requires a licence to proceed. If the applicant is in doubt of whether a project requires a licence, a notification can be sent to NVE for assessment (NVE, 2016h). The next step is the project application containing all the relevant information about the project. The applicant should also fill out a hydrological form, and include a report with descriptions of the natural environmental conditions relating to the affected watercourse. A form regarding the classification of the power plant also needs to be included (NVE, 2016k). This is a classification based on the risk of damage the project may have on people, the natural environment, or property in case of a dysfunction (NVE, 2016f). The application is then sent to NVE for

assessment. A case manager will then go through the application, before it is sent out for public hearing where all actors with an interest in the watercourse can voice their opinion about the case. After the hearing round, there is an inspection conducted by NVE together with representatives for the affected interests, before NVE reaches a final conclusion (NVE, 2016l). As NVE is the licencing authority for small-scale hydropower, they have the deciding power for whether a project should be granted a licence or not. The decision can be appealed within three weeks. If the case of an appeal, the appeal is first assessed by NVE, and if necessary it is forwarded to the Ministry of Petroleum and Energy (OED) for a final decision (NVE, 2016o).

A summary of the licencing process for small-scale hydropower is given in Figure 5.1.

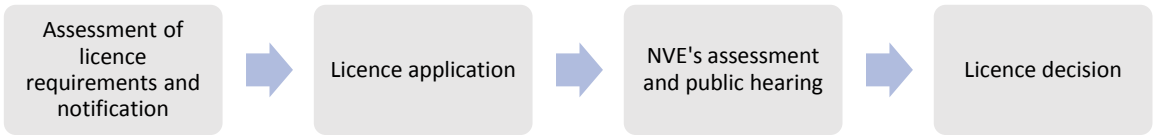

Figure 5.1 The licencing process for small-scale hydropower. Source: NVE (2016)

5.2.2 Licencing of large-scale hydropower

The requirements and licencing process for the development of large-scale hydropower projects is a bit more extensive than for small-scale projects. There is also a division between projects above and below a production of 40GWh/year. Projects with a production higher than 40GWh/year have extra requirement with regards to environmental impact assessment (EIA) following the *Regulation on Environmental Impact Assessment* in the Planning and Building Act. For projects that require an EIA, a notification and the EIA program should be sent to NVE. The notification and EIA program is then sent out for public hearing (NVE, 2016i). A final EIA program is determined by NVE after the public hearing, and the applicant is responsible for conducting the EIA according to the program (NVE, 2016j). After the EIA has been conducted, the licence application is sent to NVE, and then opened for public hearing again. There is also an open meeting arranged by NVE in relation to the hearing process. After the hearing, which is open for at least three months, NVE arranges an inspection, where representatives from affected interests are allowed to join in. For smaller projects that do not require an EIA there is still a need for an assessment of the project's potential impacts on social and natural conditions. In addition to this an application needs to include the reasoning for, and description of, the project (NVE, 2016m). As the Ministry for Oil and Petroleum (OED) is the

licencing authority for large-scale projects, NVE writes a recommendation which they forward to OED. OED then sends the recommendation out on another hearing round to affected departments and municipalities (NVE, 2016n). After OED has assessed the case, they present it to the Government, and the final licencing decision is made by the King in Council (NVE, 2016p).

The licencing process for large-scale hydropower projects is summarized in Figure 5.2.

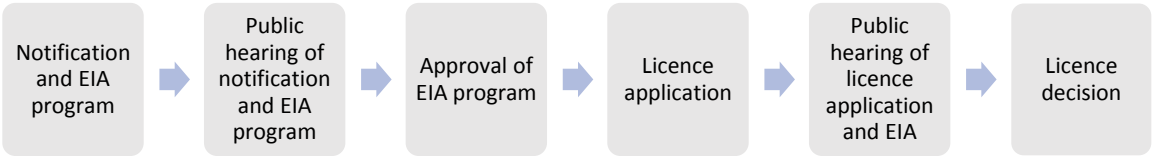

Figure 5.2 The licencing process of large-scale hydropower. Source: NVE (2016)

5.3 Public participation

As we have seen in the previous sections, hydropower management is subject to a number of legislations and political obligations, and a range of governmental agencies are responsible for managing these resources in a sustainable and beneficial manner. These include the Ministry of Petroleum and Energy (OED), the Norwegian Water Resources and Energy Directorate (NVE), the Norwegian Environment Agency, and local and regional authorities, to name a few. OED and NVE are the licencing authorities for hydropower projects, and are central actors in the management of freshwater resources, responsible for processing applications for projects that affect the physical conditions in a watercourse, like hydropower installations (Falkanger & Haagensen, 2002). The Norwegian Environment Agency is responsible for nature management, as well as reducing greenhouse gas emissions and preventing pollution (Miljødirektoratet, n.d). The role of the municipalities and regional authorities is to preserve local interests and manage resources following the Planning and Building Act (Falkanger & Haagensen, 2002). In addition, other organisations and actors can contribute and influence the outcome of policy-processes based on the mechanisms in the management process.

In discourse theory, reality is seen as socially constructed through discourses, and at all time there is a struggle between different discourses to shape our perceptions of truth and knowledge (Neumann, 2001). There is a need for a transparent decision-making process, to account for the complexities of environmental issues, including changing circumstances due to shifts in the influence of different discourses, as well as different opinions, knowledges, and values (Sharp

& Richardson, 2001). A measure to secure this, is stakeholder participation. Participation is a process in which individuals, groups, or organisations with an interest in an issue, take an active role in the decision-making process (Reed, 2008). Participation is an important part of both the management of natural resources, and also as part of the knowledge production that govern how issues are perceived, and in turn how resources are exploited (Johnson, Lilja, Ashby, & Garcia, 2004). The legitimacy of a policy in hydropower management is dependent on the possibilities different actors have at articulating their interest and concerns, and thereby participating in the policy-process (Angell & Brekke, 2011). Stakeholder participation ensures that different values and concerns are integrated into the management process, and through participation the quality and validity of policy-making is expected to increase (Reed, 2008).

Pressure from various actors and interest groups have led to changes to the management of hydropower throughout the last century, leading to both procedural changes, implementation of legal frameworks, and impacts on the outcome of specific licencing cases through participation. In the early 1900s, the work done by the Norwegian Trekking Association (DNT) and Friends of the Earth Norway (NNV) contributed to the first natural conservation act in Norway in 1910 (Angell & Brekke, 2011), and the massive demonstrations against the Mardøla and Alta projects in the 1970s and 80s also increased awareness about nature conservation values and the negative impacts from technical encroachments like hydropower installations (Falkanger & Haagensen, 2002). The increased focus on the issue of nature conservation and the negative impacts hydropower development has on natural conservation values, helped increase public awareness, leading to policy change increasing the licencing conditions to protect economic, ecological, and recreational values, through for instance the initiation of the protection plan for watercourses in the late 1960s (Berntsen et al., 2010; Falkanger & Haagensen, 2002).

More directly, stakeholder participation is organised into hydropower management through the public hearing rounds in the licencing process for both small-scale and large-scale hydropower. This is where the different actors have the possibility to challenge the dominating discourse in the management field, and to influence policy outcomes.

NVE, as a state representative and part of the licencing authority, is the actor that holds the most power in hydropower management, out of the actors considered in this thesis. The other actors do not have any formal licencing authority, and therefore limited possibilities to affect the licencing outcome of a specific case.

Whilst NVE is responsible for assessing all the various impacts a hydropower project may have, both socioeconomic and with regards to the natural environment, the other actors participating in the hearing rounds only need to address issues that they are concerned with. In this thesis it is assumed that the different actors represent different discourses within hydropower, and that the licencing process is their opportunity to influence which discourses are dominant and prevailing in the field of hydropower management, how hydropower is perceived and what the possible outcomes of the licencing process are. This will be further assessed in the following chapter.

6 Discourse Analysis of the Licencing Documents

This chapter includes the discourse analysis of the licencing documents for the eight chosen hydropower projects. There has been an increase in development of small-scale hydropower in the later years, and this is generally perceived as having less impacts on the natural environment compared to large-scale hydropower. But the knowledge-base is insufficient, and research has shown that a large number of small-scale hydropower might actually have more significant impacts on the natural environment than a few large-scale installations (Bakken, Sundt, & Ruud, 2012). The aim of this thesis is to identify if these perceptions are reflected in the licencing process of hydropower projects. This will be done by assessing the statements made by actors representing different interests in the hydropower licencing process: the Norwegian Water Resources and Energy Directorate (NVE), local and regional authorities, and nature conservation organisations.

The analysis of statements is important in discourse analysis because it is through language meaning is articulated and our perceptions of reality are made (Hajer & Versteeg, 2005; Neumann, 2001). In discourse analysis, environmental problems are not seen as given, they are rather a result of power struggles between different discourses trying to influence the meaning of a problem, leading to many different definitions and interpretations of any environmental problem (Hajer & Versteeg, 2005).

How a problem is defined and interpreted by different actors determines how that problem is dealt with and the possible solutions articulated for that problem (Dryzek, 2013). I will therefore be using indicators of discourse to identify which discourses are present in hydropower management and if these discourses vary between the different actors, and how these actors try to influence the definition of hydropower development in relation to the natural environment (Tellmann, 2012).

NVE is, as we have seen, responsible for assessing all potential impacts a hydropower project could entail, not only from the perspective of energy production, but also societal influences and influences on the natural environment. The other actors, such as the municipalities, county councils, and environmental organisations, only need to include the aspects of the projects that they find to be important. These actors are representatives of different interests within hydropower management, and we can therefore assume that they will try to influence the

perception of hydropower in different ways, and thereby influence the outcomes of licence process.

The first part of the chapter is a review of the licencing material, introducing the statements the various actors made in the process. I will first go through how the projects are seen in relation to renewable energy, and then move on to the opinions and aspects of natural environmental impacts emphasised by each of the chosen actors, including the assessment of impacts on landscapes and outdoor recreation, encroachment-free areas, and biodiversity and endangered species. I will first go through the small-scale cases, and then move on to the large-scale cases.

Following this, I go into identifying the different discourses the different actors represent based on the indicators of discourse and the concept of an order of discourse presented in chapter 4.

The chapter is concluded with a look at the possibilities different actors have at influencing the dominating discourse, and thereby the outcome of the licencing process, and finally a comparison of the actors' opinions of small-scale and large-scale hydropower projects.

6.1 Assessment of the licencing documents

The extent of data presented in licencing documents is considerably more substantial for large-scale cases compared to small-scale cases, but in general, the documents consist of the same type of information, a summary of the whole process from application to decision, generally assessing the same types of themes.

The licencing documents, previously referred to as 'grounds for decision', generally starts with a short summary of the whole case from application to decision. After this comes an introduction of the project including production capacity and technical information along with the licence application. Next is a summary of the hearing statements from the actors that participated in the public hearing round for that project. These are not necessarily the complete hearing statements, but either a summary produced by the actor in question or by NVE. Then NVE's full assessment of the project follows, which is further divided into sections, usually including a section on landscape, outdoor recreation and user interests, and on biodiversity. For the large-scale projects, there is a systematic review of each theme assessed in the environmental impact assessment (EIA). Next is NVE's conclusion and licence decision, and concluding the documents is a section on relation to other legislations, like the Planning and

Building Act, the Nature Diversity Act, and the EU's Water Framework Directive (NVE 2013;2014;2016a-e).

The sections of the document of relevance for this thesis are the public hearing statements from the chosen actors, the municipalities, the county councils, and the nature conservation organisations Friends of the Earth Norway (NNV) and Forum for Nature and Outdoor Life (FNF), in addition to NVE's assessment. This is particularly with regards to the aspects of landscape and outdoor recreation, encroachment-free areas, and biodiversity and endangered species.

6.1.1 Assessment of the small-scale projects

The licencing documents for the six small-scale cases consist of five documents. This is because the Kinsedal and Kveken power plants are handled in the same licencing document.

6.1.1.1 Renewable energy

Through all the licencing documents analysed it is clearly highlighted by NVE that small-scale hydropower is an important contribution to a political commitment to increase the production capacity of renewable energy.

NVE acknowledges that although each individual project does not add a considerable amount of energy to the energy market, increased development of small-scale hydropower in the later years has been an important factor in reaching the political aim of increased production of renewable energy. NVE has licenced 2TWh new energy from small-scale installations in the two-year period between 2013 and 2015 (NVE, 2016a, 2016d).

In the reasoning for the granted licences it is stated that the projects will be a contribution to the production of renewable energy with limited impacts on the natural environment. The three projects that got granted a licence, Moko, Markåni and Sædalen, will function as a contribution to the joint Norwegian-Swedish market for tradable green certificates. This combines small-scale hydropower with a larger political scheme as the market for tradable green certificates is one of the main measures initiated to reach the Norwegian renewable energy production goals set in the EU's RES directive (NVE, 2016b, 2016c, 2016e; OED, 2016).

The focus on the energy aspect of small-scale hydropower was not very significant for the other actors. In fact it was only mentioned for two of the projects. Hordaland county council connected the development of the Sædalen power plant to Hordaland's Climate Plan, and the

goal to increase the development of renewable energy with the smallest possible areal conflicts. Seeing hydropower as a positive measure in this respect (NVE, 2016e). Whilst NNV Sogn og Fjordane stated that "a little extra power cannot justify an interference with the ecological integrity of Kinsedalen." (NVE, 2016a, pp. 14, translated from Norwegian by the author), putting ecological values ahead of energy production in the Kveken project.

6.1.1.2 NVE's assessment of natural environmental impacts

Encroachment-free areas (INON) are not specifically mentioned in any of the cases, but areas that seem encroachment-free have to some extent been emphasized in the consideration of Sædalen power plant, as this might have an impact on the recreational values in the area (NVE, 2016e). The values of seemingly encroachment-free areas have also been considered in the cases Rydøla and Markåni (NVE, 2016b, 2016d).

Impacts on landscape qualities have to some extent been evaluated for all the projects except from Kinsedal and Kveken. And landscape qualities have been considered as an important element in the projects assessment for Sædalen, Markåni and Rydøla. A common component in these three cases is the visibility of the encroachment. Although NVE recognises the intrinsic value of landscape (NVE, 2016e), it is clear that an installation that is visible from roads, trails or settlements, are considered to have a larger negative impact than installations that are not visible (NVE, 2016b, 2016d, 2016e).

From the licencing documents and the section on valuing nature in chapter 3.4, we see that landscape qualities are categorised depending on if they are considered to be of national, regional or local value. In the assessment of the Rydøla project, the main concern is the impact the development would have on the waterfall Ryfossen as a landscape element. The landscape surrounding this waterfall is categorised as a unique Norwegian landscape, and NVE refers to the Ministry of Petroleum and Energy's (OED) 'guidelines for small-scale hydropower' (*retningslinjer for små vannkraftverk*), stating that the loss of valuable landscape elements of national, regional, or local importance should be avoided. The negative impacts on the waterfall and the landscape qualities were decisive for the licence decision in this case (NVE, 2016d).

Landscape qualities are linked with the recreational value of the areas, in addition to the value of the different areas as tourist destinations. Recreational values have been considered for all the six cases, but have only to a certain degree been influential for the outcome of the licence decision.

Hydropower development is seen to influence the overall experience of an area, for example, NVE describes the presence of running water as a main characteristic of the natural landscape in the Sædalen area (NVE, 2016e). Although some of the areas are considered to have special landscapes that could potentially experience increased use for outdoor recreation, the development of hydropower in the given rivers are not considered to have a significant impact on these values (NVE, 2016b, 2016e).

The location of the Rydøla power plant was to be set in the valley of Jostedalen, which is a popular recreational area as it is connected to two national parks. It is estimated that 50 000 tourists travel through Jostedalen every year, and Ryfossen is a clearly visible landscape element for anyone travelling up the valley. The waterfall is considered by NVE to be an important landscape element, and it is pointed out that Ryfossen has been given increased value due to its location in an area with importance for outdoor recreation and tourism (NVE, 2016d).

Impacts on biodiversity and endangered species have been assessed for all the small-scale projects. Considerations with regards to species on the Norwegian Red List of Species, and nature types on the Red List for Ecosystem and Habitat Types are mentioned in all the cases, and impacts on biodiversity and endangered species have been considered as important, and have to some extent had implications on the outcome of the licence process in all the cases except from for Rydøla (NVE, 2016a, 2016b, 2016c, 2016d, 2016e).

Nature types are, like landscapes, categorised according to if they are of local, regional or national value. Nature types of local value seem to be less decisive for the licencing question compared to nature types of national value. For example, in the case of the Kveken power plant, impacts on the nature types creek ravines (*bekkekløft*) and waterfall spray zones (*fossesprøytesoner*) are emphasised, and NVE highlights that any project that can come in conflict with nature types that Norway has a particular international responsibility to protect, should not expect to be granted a licence (NVE, 2016a).

NVE considers the issue of cumulative effects of small-scale hydropower encroachments with regards to both impacts on nature types and biodiversity and landscape encroachments. Mentioning that over 77 percent of the freshwater resources in Luster municipality have already been utilised for hydropower production. Expressing a concern for how this may already have affected important nature types because so many rivers in the affected areas have already been subject to hydropower development (NVE, 2016a).

NVE considers thorough planning and management to reduce the negative consequences caused by hydropower development. Mitigating measures, especially increased minimum flow of water, is considered to, to some extent, make up for negative impacts to both landscape qualities as well as on biodiversity. For example, a big concern for the Moko project is the potential impacts the development will have on sea trout populations in the river. NVE is concerned with how hydropower development in the river may come in conflict with national goals for the conservation of viable populations of anadromous salmonid fish, but by implementing mitigating measures, NVE considered these impacts to be acceptable (NVE, 2016b, 2016c).

6.1.1.3 Hearing statements from the municipalities

The two affected municipalities, Luster municipality (responsible for Rydøla, Kinsedal and Kveken power plants) and Vaksdal municipality (responsible for Sædalen, Moko and Markåni power plants), are representatives for local values. The municipalities make specific recommendations for whether the projects should be granted a licence or not, based on assessments of the advantages and disadvantages of each project.

The relevant municipalities are in favour of granting a licence to five out of the six projects, the exception is the Moko power plant. Vaksdal municipality is against the development of this project due to the potential negative impacts the project will have on the local sea trout population in the river (NVE, 2016c). In the other cases the municipalities are positive to development, but for all the six cases the affected municipality forward a requirement for mitigating measures. Concerns regarding biological diversity in the relevant areas have been addressed by Vaksdal municipality with regards to the Markåni and Moko projects, and by Luster municipality for Kinsedal and Kveken power plants. Concerns in Markåni and Moko are both related to changes to sea trout habitats, whilst general biodiversity and endangered species on the Red List of Species are mentioned in three of the cases (NVE, 2016a, 2016b). But the impacts on biodiversity are not considered to be too severe for any of the projects, except from the sea trout in Moko, and are thought to be mitigated by increasing the minimum flow of water in the affected rivers (NVE, 2016a, 2016c, 2016d).

Recreational values and landscape qualities are only considered in some of the cases. Vaksdal municipality acknowledges that the areas surrounding Markåni and Rydøla are regionally important for outdoor recreation, emphasising the value of Ryfossen as an important landscape

element, and voicing a concern that the diversion of water will decrease the experience value of the area both for the local community and for visitors (NVE, 2016b, 2016d).

6.1.1.4 Hearing statements from the county councils (FK)

The small-scale projects are located in the counties of Sogn og Fjordane and Hordaland.

Impacts on landscape qualities are given some emphasis by the county councils for most of the projects. And Sogn og Fjordane county council is to some extent concerned with the cumulative effects of hydropower development in the affected area, and how this may influence the overall impression of the landscape (NVE, 2016a).

For Rydøla, the negative impacts the regulation of the waterfall will have on Ryfossen as a landscape element is considered to be too severe to be allowed, emphasising the importance of the waterfall as a landscape element in a popular tourist destination (NVE, 2016d). Hordaland FK also remarks the impacts the different projects may have on the landscape, connecting this to the County Plan for Small-Scale Hydropower (*Fylkesdelplan for småkraftverk*). For instance, the fjord landscape in Bolstadfjorden (Markåni power plant) is given a high value in the county plan and should therefore be assessed properly in the licencing process (NVE, 2016b). This county plan is also mentioned, along with the Climate Plan for Hordaland, with regards to impacts on sea trout populations in relation to the development of Moko power plant. These impacts are seen as so severe that the county council does not recommend a development of Moko power plant (NVE, 2016c).

Hordaland FK does to some extent mention concerns regarding biological diversity in the other cases. They emphasise the need for mitigating measures in order to preserve habitats for species connected to aquatic habitats, for example nesting boxes for the withe-throated dipper in Sædalen (NVE, 2016e). Sogn og Fjordane FK does not mention concerns regarding impacts on the natural environment in any other way than impacts on landscape qualities for any of the three cases in the county. Concerns for biodiversity is not decisive for the licencing recommendation from the county councils in any of the cases except from the Moko power plant in Hordaland (NVE, 2016a, 2016b, 2016c, 2016d, 2016e).

6.1.1.5 Hearing statements from the nature conservation organisations

Friends of the Earth (NNV) Sogn og Fjordane made hearing statements for the three cases in Sogn og Fjordane (Kveken, Kinsedal and Rydøla), and Friends of the Earth Hordaland commented on the Moko and Sædalen projects, whilst the Forum for Nature and Outdoor Life (FNF) Hordaland made statements for all the projects in Hordaland county (Moko, Markåni

and Sædalen). These organisations were against, or not satisfied with the quality of the presented knowledge, for all the six small-scale projects.

In four of the six cases there is a concern that the natural conservational values have been underestimated in the application. NNV Hordaland connects this to the precautionary principle and the demand for knowledge-based management given in the Nature Diversity Act (NVE, 2016a, 2016b, 2016e). The value of biodiversity, endangered species on the Red List for Species, and special nature types like creek ravines, are clearly emphasised in most of these statements, and the preservation of these qualities are accentuated by both NNV and FNF (NVE, 2016a, 2016c, 2016e).

Landscape qualities and outdoor recreation are also somewhat brought into the considerations. It is mostly the Forum for Nature and Outdoor Life that mention these concerns. For Rydøla, Sædalen and Markåni, FNF considers the impacts the hydropower developments will have on the landscape and outdoor recreational values to be negative, seeing this in relation to cumulative effects, and remarking the value of an overall encroachment-free impression of an area (NVE, 2016b, 2016d, 2016e).

6.1.2 Assessment of the large-scale projects

The analysed documents for the large-scale projects consist of two licencing documents. Although Skognesdalen, Steinnes and Stordalen are three separate power plants they are not handled separately in the licencing document. This makes it difficult to separate the statements made for each of the different installations, and I will therefore treat them as one unit, referring to them as the TKP-projects.

For most large-scale hydropower projects, there is a requirement for an Environmental Impact Assessment (EIA) following the Planning and Building Act, and in the licencing documents the project's potential impacts on the natural environment are discussed with regards to the results from the EIA.

6.1.2.1 Renewable energy

The potential for access to new renewable energy is considered as the most important social benefit by NVE for both of the large-scale projects. Both of these projects have a rather large production capacity. The joint production from Skognesdalen, Steinnes and Stordalen (TKP) is estimated to 161,9GWh, and Sauland will contribute 218GWh new energy, which is the

equivalent of the power consumption of roughly 10 900 households for one year. NVE compares this production to a typical small-scale hydropower plant, which produces on average around 10GWh per year. A positive aspect that is mentioned is the fact that both these projects have reservoir capacity and contribute to regulated power, and thereby function as a source of energy in times of low production and high demands, like during winter months. This is highlighted as a very valuable and important trait for these projects, especially considering the fact that most new hydropower production does not have a large reservoir capacity (NVE, 2013, 2014).

The production of renewable energy from these plants is also connected to a wider policy aspect of energy production. The commitment to the EU's RES Directive, and the Norwegian-Swedish market for green certificates are mentioned. NVE points out that in order to reach political climate and production goals, NVE is responsible for facilitating the development of good profitable hydropower projects through the licencing process (NVE, 2013, 2014). And in the overall assessment of the Sauland project, NVE puts particular emphasis on the project's contribution to meet Norway's commitments to increased production of renewable energy (NVE, 2014).

Hjartdal municipality mentions the need for sustainable management that will benefit future generations, and in this respect they also briefly mention the need to assess society's need for renewable energy (NVE, 2014).

6.1.2.2 NVE's assessment

Both of these projects will have some impact on encroachment-free areas (INON), but for the Sauland project this impact is minimal. However, the TKP installations are partly located in a high mountainous area classified with landscape value A, meaning landscapes of national value. Some of the applied regulated lakes are located at high elevations in close proximity to large glaciers, and wilderness areas without heavier technical encroachments. A consequence of the TKP-project will be the loss of wilderness areas, reducing 19.1 square kilometres from wilderness areas to encroachment-free areas zone 1 (3-5km from heavier technical encroachments, see Table 3.2). NVE acknowledges that the development of hydropower in the area will change the quality of the landscape, and NVE concludes that the overall negative impacts to areas with high landscape values is decisive for the licencing question of this project (NVE, 2013, 2014).

Although INON areas are not a big issue in the Sauland case, other landscape qualities are given emphasis in the licencing decision. The project will cause scattered impacts on the landscape, and is considered to be of medium negative impact in the environmental impact assessment (EIA). The parts of the landscape that have been given special attention are the upper parts of the watercourse, and the Omness waterfall, a waterfall that will be affected by the development. The upper parts of the river are considered to have the highest qualities and to be most accessible to users, and the Omness waterfall is considered to be an important element in the landscape and a significant part of the landscape experience, functioning as a recreational attraction for tourists as well as for the local population (NVE, 2014). The affected area's value for recreational activities is considered to be an important aspect for both of the projects influences. In Troms, there is also a waterfall that is given special emphasis as a unique element in the landscape, and important for recreational purposes. In relation to the TKP development, NVE recognises that the area's proximity to the city of Tromsø makes it an attractive location for outdoor recreational activities and nature-based tourism, and that hydropower development and the influences it entails, will decrease the recreational experience value of the area (NVE, 2013).

In addition to the negative impact on the Omness waterfall, a development of the Sauland power plant will have a negative impact on the possibilities for river rafting in the Skogsåa river, a river that is considered to be one of the top ten best rivers for rafting in Norway, attracting both domestic and international crowds. For NVE, considerations of the negative consequences a development may have on the rafting possibilities, is viewed as an essential factor in the question of licencing (NVE, 2014).

The projects' influences on biodiversity have been thoroughly assessed through the EIA for each of the projects. And both endangered species on the Red List for Species, and nature types on the Red List for Ecosystems and Habitat Types are evaluated and given emphasis in the licencing decision. In Sauland, it is especially the population of freshwater pearl mussel (*Margaritifera margaritifera*) and sea trout that is given attention. The freshwater pearl mussel is categorised as vulnerable on the Norwegian Red List for Species, but it is critically endangered on the IUCN global Red List (2010). Seeing as half the European population is found in Norway, Norway has a special responsibility for securing viable populations and sustainable management of their habitats.

NVE refers to technical reports in the EIA and previously developed reports as knowledge base for biodiversity, for instance a report[1] on the effects hydropower development may have on freshwater pearl mussels is referred to with regards to the population of mussels in Hjartdøla, Sauland. As a prerequisite for a development licence, NVE requests that a sufficient flow of water is sustained in the river, to secure habitats for both the freshwater pearl mussel and sea trout, as the mussel's use the trout as a host in its larval state (NVE, 2014).

In general, mitigating measures have been given considerable importance, and is seen to safeguard values connected to both biodiversity and landscape qualities. Another critically endangered species that will be affected by the development of the Sauland power plant is eel, but NVE considers mitigating measures to be satisfactory to secure the population. Increasing the minimum flow of water in the rivers is especially considered by NVE to reduce the negative impacts on both landscape qualities and biodiversity to some extent, by both securing the experience of freshwater nature, as well as securing habitats for species in both the aquatic and terrestrial environments. There does however not seem to be a mitigating measure that can sustain the full experience value of the two affected waterfalls (NVE, 2013, 2014).

6.1.2.3 Hearing statements from the municipalities

There are three municipalities affected by these projects, the Sauland projects is located in the municipalities of Hjartdal and Notodden, whilst the TKP-project is located in Tromsø municipality.

In both of the cases, the municipalities are mostly concerned with the way the power plants may impact the area's value for outdoor recreation. Tromsø municipality highlights the value the affected area has for outdoor recreation because of the close proximity to the city of Tromsø, and it is their opinion that the hydropower development's impact on the landscape and reduction of wilderness areas will decrease the area's value for outdoor recreation and tourism. In addition, the projects are located in an area that is intended for agriculture, nature, and outdoor life (*LNF-område*) in the municipality master plan, and hydropower development in the area is not in accordance with this (NVE, 2013). Notodden and Hjartdal municipality are both in favour of a development of the Sauland hydropower plant, but voice concern with how a development may affect activities like swimming and hiking, giving special emphasis to the effects decreased waterflow in the Omness waterfall might have on tourism (NVE, 2014).

[1] "Elvemusling og konsekvenser av vassdragsreguleringer – en kunnskapsoppsummering" (NVE rapport 8/2012, Bjørn Medell Larsen)

In addition to concerns for landscape and outdoor recreation, Hjartdal municipality advises that the extent of red listed species in the area, and the possible negative impacts hydropower development may have on these species, should be further surveyed, and that mitigating measures should be implemented to reduce the possible negative consequences. They also give special emphasis to the conservation of the freshwater pearl mussels, and fish populations in the watercourse (NVE, 2014).

6.1.2.4 Hearing statements from the county councils

The two affected county councils for these projects are Troms FK for the TKP-project, and Telemark FK for the Sauland project.

The statements from the county councils in both the cases are limited to concerns with landscape and recreational values. Telemark FK is positive to the development of Sauland, but advises that measures are initiated in order to secure the value of the area for outdoor recreation (NVE, 2014). Troms FK is against a development of the TKP-project, emphasising the negative impacts the development may have on landscape qualities, including reduction of encroachment-free areas (INON), and recreational activities and experiences. In the hearing statement, they refer to a survey of important areas for recreational activities in Troms county, and highlight the significance of water and watercourses as landscape elements (NVE, 2013).

Biological diversity and endangered species are not mentioned by either of the county councils.

6.1.2.5 Hearing statements from the nature conservation organisations

In both of the cases, the nature conservation organisations are concerned with the hydropower projects' negative impact on landscape and outdoor recreation. FNF Troms is concerned with the consequences a development of the TKP-project will have on outdoor recreation and nature-based tourism, emphasising the importance of outdoor recreation and that the location of the project is in an area that is easily accessible for the local population (NVE, 2013). For Sauland, NNV Telemark remarks that the area surrounding the Omness waterfall is both visually and culturally important for Hjartdal (NVE, 2014).

Both FNF Troms and NNV Telemark is concerned with cumulative effects due to previous hydropower development in the affected areas. NNV Telemark is strongly against a development of the Sauland hydropower plant, and emphasises that the nature in Hjartdal municipality has already been highly influenced by hydropower developments, and that the remaining natural values should be safeguarded (NVE, 2013, 2014).

With regards to biodiversity, NNV Telemark mentions the significant population of freshwater pearl mussels, and that there are too many insecurities around what effects the development may have on the mussels (NVE, 2014). FNF Troms does not specifically mention biodiversity, but they note that natural landscapes that are not affected by human influence is an undervalued concept in nature management (NVE, 2013).

This first part of the chapter has been a summary of the statements each of the actors have made about impacts on the natural environment caused by the small-scale and the large-scale projects. In the following part, these statements will be used to identify which discourses the different actors represent, and if there are any detectable differences in perceptions of natural environmental impacts between small-scale and large-scale hydropower.

6.2 Discourse analysis

As we know from the theory on discourse presented in chapter 3, discourses create the framework for how we perceive the world, and what we consider to be knowledge, truth, and reality is all shaped by discourses. And there is a constant struggle between different discourses to define and give meaning to reality (Jørgensen & Phillips, 2002; Neumann, 2001).

One aim of this thesis is to determine which discourses are present in the field of hydropower management, and how this governs the opinions of the different actors. This is done based on the assumption that there is a hydropower discourse that defines the order of discourse. Order of discourse means that there are different discourses that in some way overlap and cover the same field, and that compete within the same field to give meaning to the same concepts (Jørgensen & Phillips, 2002). In the licencing process the different actors represent different discourses within the hydropower discourse, and thereby have different perceptions about what should be emphasised, and work to influence the outcome of the licence process in different ways (Jørgensen & Phillips, 2002).

In order to identify the different discourses the different actors in hydropower management represent, I will be using the theory on indicators of discourse by Tellmann (2012), presented in chapter 4. I will be analysing each of the actors' statements systematically, and identifying how they define impacts on the natural environment within the context of hydropower development. In this part I will be assessing the small-scale and large-scale cases collectively.

6.2.1 The Norwegian Water Resources and Energy Directorate (NVE)

The purpose of the licencing process is to determine which hydropower projects should be granted a licence and which projects should not. NVE is, as we know, the licencing authority for small-scale projects, and an important actor in the assessment of large-scale projects. In this perspective, NVE is a representative for energy interests, working towards developing new projects to increase the production of renewable energy. And in this respect hydropower management is seen in a broader framework within energy and climate policy.

But as we have seen, a project can only be granted a licence if the benefits outweigh the disadvantages to public and private interests. NVE is therefore responsible for conducting a comprehensive assessment of each project, seeing hydropower development in relation to other aspects, like societal benefits or impacts on the natural environment. And in the licencing documents, each relevant topic is considered, and NVE gives indications to how the different topics influence the process and if they have been decisive of the licence decision or not.

Hydropower development can be seen in two perspectives, one is hydropower as a means for reaching climate commitments by reducing the use of fossil fuels through development of renewable energy, and the other is hydropower as a measure to secure power supply. But because NVE is responsible for assessing all aspects of each hydropower project, this larger framework is connected to the impacts each hydropower project has on the local environment in which the development takes place.

For NVE, as a representative for energy interests we can define the *problem definition*: how can hydropower, as a means for reducing climate change and meeting energy demands, be combined with natural conservation values like protection of biodiversity and landscape qualities. Hydropower development is both seen as a solution in order to reduce climate change, as it is a source of clean energy that can replace the use of fossil fuels and thereby reduce emissions of greenhouse gases, and hydropower is also a contributor to the energy market, meeting the needs for supply safety and power balance.

Hydropower is seen in the *context* of climate change and environmental policies, as well as energy supply and demand. NVE gives clear indications for how each project is a contribution to the energy market, both for the large-scale and the small-scale projects. Through, for instance, mentioning how many household's electricity needs the large-scale projects will cover, NVE clarifies that there is a need for the energy produced. In addition, it is emphasised

how the different projects are seen in relation to climate politics and obligations like the EU's RES directive and the joint Norwegian-Swedish market for green certificates.

NVE also has a responsibility to combine different interests, making sure that only those projects with acceptable impacts on public or private interests are granted a licence. This means that other factors than just energy production needs to be taken into consideration in the licencing process. But for NVE, the development of hydropower projects is not contradictory to nature preservation. It is NVE's opinion that different concerns can be combined, and natural environmental values can be protected along with hydropower development. A *solution* to the problem of combining interests is mitigating measures. In many of the cases mitigating measures are used to justify encroachments. One measure that is used in a lot of cases is increasing the minimum flow of water, this is seen to some extent secure the scenic value of a river or waterfall, and it is used to secure biological values like habitats and migratory routes for different species.

The *legitimating arguments* emphasise the societal benefits hydropower development entails. Focusing on both the importance of renewable energy with regards to climate change and clean energy, and also the aspect of an increasing necessity for energy. In this regard, it is emphasised that hydropower is a secure source of energy, and that especially large-scale installations can supply energy at times where demands are high and supply is limited.

The *knowledge base* is a combination of expert knowledge, both produced within the organisation of NVE itself and knowledge presented by other institutions, and policies and knowledge gained from political goals and obligations. Expert knowledge is both present through reports and guidelines concerning hydropower and the natural environment in general, acquired by both NVE and by other institutions and researchers, and specifically for each case through assessment of the project. The Environmental Impact Assessments are specific for each project, and are conducted by a third party with expert knowledge on for instance species and biodiversity. The implications on these environmental factors are rated by the EIA agencies. NVE uses the knowledge presented in the EIAs as a base for the assessment of a project's impacts on the natural environment, and the different actors have the opportunity to request further assessment of issues they see as lacking in information. And as we know, there are local, regional, national, and international policies influencing hydropower management. Policy goals are not only mentioned concerning climate and renewable energy, there are also policy guidelines for the management and preservation of nature. For instance, NVE brings up

responsibilities to preserve certain nature types like creek ravines, or vulnerable species like sea trout or the freshwater pearl mussel.

6.2.2 Local and regional authorities

The local and regional authorities, including the county councils and municipalities, are representatives for local and regional interests in management issues.

Although the county councils have defined goals for reducing their emissions of fossil fuels, and initiating measures for becoming energy efficient, contributing to a low-emission sustainable society, these ambitions, related to climate and renewable energy production, are only to a limited degree brought up in the hearing statements for theses eight hydropower plants. Hordaland FK only connects one of the small-scale project to the Climate Plan for Hordaland, and defined goals of increasing the local production of renewable energy, whilst Hjartdal municipality briefly mentions the need for renewable energy in relation to Sauland.

In several of the cases, the focus for the local and regional authorities is on how hydropower development affects the experience value of the affected areas. Much of the concerns are related to how the projects may come in conflict with landscape values and influence the area's value for outdoor recreation and tourism. For them, the *problem statement* is that there is a conflict between hydropower development and environmental values. But we know that the different regional authorities are not against hydropower development in general, in fact the municipalities were in favour of most of the projects, and the county councils have their own goals and plans connected to renewable energy development and climate goals for the regions. So, both the affected county councils and the municipalities seem to be interested in combining hydropower development with the conservation values. The *context* is both regional and local policies and interests, as well as it is connected to national policy aims.

The local and regional authorities are positive to finding *solutions* to the problem, they believe that by undertaking some measures, hydropower development can be combined with preservation of other values connected to the watercourse. Mitigating measures are requested for most of the projects, another measure that is mentioned is to allocate areas for certain usages. Intended area usage is defined in the municipality master plans for each municipality, and Tromsø municipality is concerned that the TKP-project will come in conflict with the intended areal usage defined in their municipality master plan.

The *legitimating arguments* are connected to how hydropower development will decrease the experience value of the landscape in which it is located, and how this will affect how attractive the area is for outdoor recreation and tourism. It is therefore important to find the most suitable options for each project, to secure the conservational values. The *knowledge base* is connected to the different master plans on both a municipal level and a regional level, formulated for different topics. In the hearing documents it is referred to both county plans related to small-scale hydropower and climate objectives, as well as to municipality master plans related to area usage, and the regional authorities use the knowledge and assessments from these plans when they give their recommendations to NVE.

6.2.3 Nature conservation organisations

The Forum for Nature and Outdoor Life (FNF) and Friends of the Earth Norway (NNV) are representatives for nature conservational interests in this analysis. Although we have previously seen that these actors are concerned with reducing the use of fossil fuels, and are not against hydropower as a climate measure, hydropower was only mentioned in relation to energy production at one occasion in these documents. And at that occasion, nature conservational values were seen as more important than the production of energy. Through these statements, it becomes clear that these organisations represent a different perspective of hydropower development than NVE and the energy sector does.

These organisations use a strong language voicing concerns about impacts on the natural environment, and hydropower development is generally described as having negative impacts on nature. The *problem definition* can therefore be seen as hydropower leading to negative consequences on the natural environment. This is seen in a *context* where the intrinsic value of nature is acknowledged, and hydropower development will diminish these values.

Both NNV and FNF are against all of the eight chosen projects used for this analysis, or in the cases where a strong statement was not made, the concerns are focused on insufficient knowledge of the project's impacts on the natural environment. In the *problem solution* emphasis is put on knowledge-based management and the precautionary principle, stated in the Nature Diversity Act. NNV makes it clear that unless a project's influences have been thoroughly investigated, and the outcome of a development with regards to impacts on the natural environment are not known, the project should not be granted a licence. This puts nature values ahead of values like energy production.

The *legitimating arguments* and the *knowledge base* is linked to knowledge as presented in for instance the Nature Diversity Act, as well as commitments to protect endangered species and landscapes following the Norwegian Red List for Species and the Red List for Ecosystems and Habitat Types. The nature conservationist organisation also put emphasis on expert knowledge as represented in the environmental impact assessments, and state that the concerns presented there should be thoroughly handled in the licencing process.

6.2.4 Summary of discourses in hydropower management

A summary of the presented findings is given in Table 6.1

Table 6.1 Discourses for the different actors

Actor	Problem definition	Contextual framing of the problem	Problem solution	Legitimating arguments/key concepts	Knowledge-base
NVE	Combining hydropower development and nature conservation	Environmental politics, energy demand	Mitigating measures	Hydropower is an important measure in both securing energy supply, as well as replacing fossil fuels	Energy politics, environmental politics
Local and regional authorities	Combining hydropower development and nature conservation	Regional political aims, local interests	Mitigating measures, defined areal use	The value of nature, experience value	Municipal master plan, county master plan
Nature conservation org	Conflict between hydropower and nature conservation	Intrinsic value of nature, conservation and sustainable management	Precaution and knowledge-based management, protection	Nature's intrinsic value	Nature expertise knowledge, environmental politics

NVE is working within in an energy discourse, where hydropower is established as an important measure in energy and climate politics. The development of hydropower as a source of renewable energy, securing supply of energy as well as mitigating climate change, is seen as the most important aspect of hydropower development. And hydropower development and nature conservation is not considered to be contradictory, but rather something that can be combined through planning and mitigating measures.

Whilst NVE is clearly interested in hydropower from an energy perspective, the other actors have their focus on other aspects of the projects. Neither the regional authorities, nor the nature conservation organisations put emphasis on the energy and climate aspect of hydropower development in these hearing statements, they rather focus on other sides of the projects, they can both be said to represent nature values, but with a bit of a different approach.

For the local and regional authorities, an important factor is how hydropower development influences interests connected to outdoor recreation and tourism values. The natural environment is depicted as an important conservation value, but from a user perspective. Hydropower development is considered to cause negative effect on these values, but it is still considered possible to combine hydropower with nature conservation.

Whilst the regional authorities consider nature conservation from a user perspective, the nature conservation organisations consider it from a strictly conservationist perspective, where nature has intrinsic value. The nature conservation organisations put the non-utility value of nature first. Although they are not against hydropower as a measure in mitigating climate change, they do not see a need for increased energy development, but rather a need for a more efficient use of the energy sources we already have. Emphasis is put on knowledge-based management, and the precautionary principle, and new hydropower projects should therefore be thoroughly assessed, and only be developed if they cause minimal impacts on the natural environment.

6.3 Possibility to influence the dominating discourse

As we have seen, environmental and nature conservational interests have come in conflict with concerns regarding energy supply and industrial development ever since the onset of the first hydropower era at the beginning of the 20th century. And hydropower management is still an ongoing conflict between different actors and interest groups, it is a battle between use and conservation; between science-based knowledge and politics; between local, regional and national interests; between national and international political ambitions; and between public and private actors (Angell & Brekke, 2011). An important aspect of this is which actors are considered as having authority and thereby being able to influence the management process.

From the theory on discourse analysis, we know that there are different discourses that dominate the field of environmental policy-making, and that there at any time is a struggle between different discourses to define how different topics are defined and perceived (Neumann, 2001). The basic assumption for this thesis is that hydropower constitutes the order of discourse, where

different discourses compete to influence the meanings and perceptions of hydropower (Jørgensen & Phillips, 2002). Because the various actors represent different interests, it is assumed that they also represent different discourses and work within this order of discourse, to influence its meaning (Jørgensen & Phillips, 2002). As we have seen from the analysis of the licencing documents for the eight projects, NVE represents an energy-discourse, whilst the other actors represent a varying approach to a nature conservation discourse.

Table 6.2 gives a summary of the different actors' licence recommendations for each of the eight hydropower projects considered in this thesis.

Table 6.2 Actors' recommendations. Source: NVE (2016, 2014, 2013)

**No data*

***Wanted a different alternative*

Project	**NVE**	**Municipality**	**FK**	**FNF/ NNV**
Kinsedal	NO	YES	YES	N.D*/NO
Kveken	NO	YES	YES	N.D*/NO
Rydøla	NO	YES	NO	N.D*/NO
Markåni	YES	YES	YES	Insufficient knowledge/N.D*
Moko	YES	NO	NO	NO/NO
Sædalen	YES	YES	NO**	Insufficient knowledge/NO
Sauland	YES	YES	YES	N.D*/NO
Skognesdalen, Steinnes and Stordalen	NO	N.D*	NO	N.D*/NO

In environmental policy-making, the legitimacy of a policy is dependent on the actor's authority and possibility for articulation, and it is usually actors with authority that define environmental problems (Angell & Brekke, 2011; Feindt & Oels, 2005). In the licencing of hydropower, any actor with an interest in the case may utter their opinion through public hearing, but we can assume that a private individual will not have the same legitimacy as for example NVE when it comes to issues regarding for instance impacts on biological diversity. Based on the licencing decisions for the eight assessed hydropower cases (see Table 6.2), we see that there are

inconsistencies between the licence decisions made by NVE and the opinions voiced by the various actors in the hearing statements. This could be an indicator of the power balances in hydropower management. In Foucauldian discourse analysis, power is seen as an important part of any social interaction, where groups or organisations with authority or power have a greater opportunity to define problems and influence policy-outcomes (Mills, 2003).

NVE represents energy interests, working towards developing renewable energy projects, and as the licencing authority, NVE is the actor with most power in the licencing process out of the chosen actors in this analysis. Other interests are organised into hydropower management through policies and legal frameworks, and specifically through the licencing process. But these other actors have no actual decisive authority.

As NVE is the actor with most authority and power, we can say that the discourse they represent is the dominating discourse within hydropower management. This is the energy discourse, where hydropower development is legitimised through the contribution it brings to the energy market, and as a mitigating measure to climate change in a bigger perspective. As these arguments are not used by the other actors, we can say that they represent different discourses. Because the other actors have less authority, and limited possibilities to influence the licencing process, it is harder for these actors to get their discourses legitimised, and although NVE takes the different actors' opinion into consideration, they can only to a certain degree influence the outcome of the licencing process.

But the licencing process is organised in such a way that NVE is responsible for assessing all aspects of a project, including consequences to the natural environment, and we can therefore say that the discourse of nature conservation is implemented into the dominating discourse through the licencing process. At more than one occasion, NVE states in the licencing documents that because many of the participants in the hearing round have emphasised specific influences, NVE will also consider these influences as significant, giving authority to other actors.

And although NVE represents an energy discourse, we can see from Table 6.2 that the difference between NVE's licence decision and the other actors' recommendations goes both ways, not only in favour of energy development but also towards nature conservation. NVE declined the application for Rydøla, Kinsedal, and Kveken power plant, based on impacts on biodiversity and endangered species and habitats, and recreational values, even though the local and regional authorities were mostly positive towards the development of these projects.

6.4 Comparing small-scale and large-scale hydropower

The main purpose of this thesis is to compare the opinions different actors have of hydropower management with regards to impacts on the natural environment, and to see if these opinions vary between large-scale and small-scale hydropower projects. The background for this is the increased development of small-scale hydropower in the recent years. Traditionally, large-scale hydropower has been the most important source of renewable energy in Norway, but because a large share of the production potential has already been developed (OED, 2016), it is small-scale hydropower that stands for the most extensive development of new hydropower today (Thaulow et al., 2008). The impacts large-scale hydropower installations have on natural environmental conditions are well known, and although research is lacking on consequences caused by small-scale hydropower, there seems to be a general perception that these projects have lesser impacts on the natural environment (Bakken, Sundt, Ruud, et al., 2012). I want to identify if these perceptions are reflected in the statements made by various actors in the licencing process.

Based on the way the licencing process is organised, there are structural differences regarding how natural environmental impacts are handled in small-scale hydropower compared to large-scale hydropower projects. The most significant difference is the need for Environmental Impact Assessments for large-scale projects, which is, as we have seen, usually not required for small-scale projects. This leads to different management processes for the two types of hydropower installations, giving natural environmental impacts less emphasis from the beginning.

In the following section I will use the statements and identified discourses from the previous part to see if there are any significant differences in perceptions between small-scale and large-scale hydropower for the chosen actors in this thesis.

6.4.1 Renewable energy

The first issue is how the projects are seen in relation to energy production. NVE, as a representative for energy interests, is working towards increased development of renewable energy and assesses the production potential of both the small-scale and the large-scale cases. NVE connects both small-scale and large-scale production to a policy-framework where hydropower development is a contribution to renewable energy both on a national level and in an international climate perspective.

Whereas small-scale projects are acknowledged as an increasingly important contribution to renewable energy in the later years, it is pointed out that the individual power plants do not contribute significantly to the energy market. Whilst an emphasis for the large-scale projects is that they can serve as supply safety in periods with high demand and otherwise low production, through reservoir capacity. NVE compared the production of energy from the large-scale installations to the average production from a small-scale installation, and emphasise that reservoir capacity is an increasingly important resource in a time where most new hydropower does not have this quality.

In the licence document for the large-scale projects Sauland, the contribution to renewable energy supply is highlighted and decisive for the licence recommendation. Even though NVE acknowledges that there are potential conflicts in relation to all parts of the watercourse, they still recommended that the project should be given a licence. This indicates that energy production is the most important aspect of hydropower development for NVE, and is a clear benefit that is weighed over other concerns.

Even though the energy discourse is still prevailing in the small-scale cases, seeing that the energy production benefits are less prominent, it might open up for a nature conservation discourse to gain more influence in these cases.

The energy discourse is not given much emphasis by the other actors. Hordaland FK sees one of the small-scale cases as a positive contribution to climate obligations, and for the large-scale projects, Hjartdal municipality briefly mentions the need for renewable energy production in the future in relation to the Sauland project. Friends of the Earth Norway is the only actor who sees the energy production in relation to the impacts on the natural environment, and questions whether a limited energy production can justify negative impacts on the natural environment.

This is does not give any clear indication of the other actors' perception of hydropower in an energy or climate perspective.

6.4.2 Biodiversity and endangered species

As we have seen in the licencing documents, the nature conservation organisations, Friends of the Earth Norway and the Forum for Nature and Outdoor Life, are concerned that values connected to the natural environment are underestimated in many of the small-scale cases. They are focused on knowledge-based management and the precautionary principle for both small-

scale and large-scale hydropower. In the hearing round for the small-scale project, Sædalen power plant, NNV criticised the assessment of biodiversity for being insufficient, especially when it came to the assessment of benthic fauna, to which NVE replied that assessments of benthos are rarely conducted in connection to small-scale hydropower evaluations (NVE, 2016e). This illustrates the different approach to management for the different sized installations. We can interpret the statements from the nature conservation organisations in the direction that these actors view small-scale hydropower development as having more severe consequences on the natural environment than they are given credit for in the official management, and there is a concern that these values are being underestimated.

From the hearing statements, it seems as though the municipalities give more emphasis to biological concerns in the small-scale cases than they do in the large-scale cases. But the impacts were not considered to be so severe that they could not be adequately sustained by the implementation of mitigating measures. The municipalities did request a further assessment of the potential consequences the small-scale cases could have on biodiversity, indicating that they are focused on a knowledge-based management, and are also concerned that natural environmental values are being underestimated.

As we know, the discourse for the county councils puts hydropower as a negative impact on nature, both for small-scale and large-scale projects, but this is connected to a use-value. And the county councils have only to some extent included impacts on biodiversity and endangered species in the small-scale cases, but the impacts are generally not considered to be so severe that they are decisive for the licencing decision. These concerns are not included at all for the large-scale projects, but because biodiversity is not really emphasised in any of the cases it is farfetched to draw any kind of conclusion comparing the county council perceptions of impacts on biodiversity between large-scale and small-scale hydropower.

NVE is responsible for assessing all aspects of a project, and therefore need to include impacts on biodiversity and endangered species for both small-scale and large-scale cases. Given the structural differences in the licencing process, impacts on biodiversity is automatically given more emphasis in the large-scale project assessments. But endangered species and habitats on the Red Lists have been given emphasis in both the large-scale and the small-scale cases, and concerns regarding biodiversity was decisive for the licence decision for two of the small-scale cases. This shows that NVE acknowledges that small-scale cases can also cause irreversible damage to biological conditions and habitats. As previously mentioned, this might be ascribed to the fact that small-scale hydropower has a lesser energy production benefit than large-scale

projects, so the energy discourse might not be as dominant. In large-scale cases with large energy potential, more severe impacts can be accepted because the societal benefits from renewable energy production outweigh the negative consequences on the local environment. Small-scale hydropower does not necessarily have these clear social benefits, and this opens up for other aspects of hydropower to be given more emphasis in the licencing process.

6.4.3 Landscape and outdoor recreation

Encroachment-free areas (INON) are defined as areas located more than one kilometre in linear distance away from any heavier technical encroachments, like for example public roads or powerlines (OED, 2007). Because the small-scale cases do not directly affect INON-areas, these are not taken into the discussion.

Impacts on landscape and outdoor recreation have been addressed by all the actors for the small-scale and the large-scale cases. For the small-scale cases, most of the actors recognise that the presence of running water is an important part of the experience value of an area, and hydropower installations can diminish these qualities, but with mitigating measures, small-scale hydropower is not considered to impact these values in any major way, and are therefore not given much emphasis by any of the actors for the small-scale projects. The exception is the Ryfossen waterfall in Rydøla, but this waterfall is located in a particularly important area for outdoor recreation and tourism, and is a clearly visible landscape element in the area. This project it therefore not representative for an average small-scale installation, however, it does show that small-scale hydropower is considered to have negative impacts on the landscape and experience value in the area which it is located. But again: it is an issue of visibility.

The landscape and recreational values are given considerably more emphasis in the large-scale cases. These projects are considered by all the actors to have negative impacts on the landscape and recreational values in the affected areas. The installations will decrease the area's value for outdoor recreational activities, and can influence of attractive the area is for nature-based. It is clear that the large-scale installations are perceived as a more negative landscape element than the small-scale installations are. This is likely due to the visibility in the landscape. Whereas small-scale hydropower is generally located in smaller rivers and streams, and utilise the water within the natural range of the river (Egré & Milewski, 2002), large-scale installations usually alter the flow of water in a much more severe way, through for instance reservoir creation, and are often located in high elevation areas where technical encroachments are visible from large

distances (OED, 2007). When it comes to impacts on landscape and outdoor recreation, the visibility of a project seems to be the determining factor, it is therefore natural that landscape values are given more emphasis in the large-scale cases.

6.4.4 Cumulative effects

The choice of small-scale cases was partly based on integrating the aspect of cumulative effects into the analysis. All the small-scale cases are located in areas connected to the fjords along the western coast of Norway, areas that are suited for small-scale hydropower development, and are therefore experiencing a significant development pressure (OED, 2007). Because there is a need for a larger number of small-scale installation to produce the same amount of energy as from one large-scale installation (see Table 3.1), the combined environmental effects from multiple small-scale projects may be more severe than for large-scale hydropower if the energy benefits are considered (DN, 2012).

NVE conducted an overall assessment of the small-scale projects that were located in the same area in order to include the aspect of cumulative effects where this was relevant. By including the aspect of cumulative effects into the management process it shows that they are concerned with the combined influences of multiple installations in the same geographical area, and it has to some degree been addressed in the licencing document. Both NVE, the nature conservation organisations, and to some extent the county councils, have uttered concerns regarding cumulative effects for some of the cases. There is an acknowledgment that the combined influence of multiple technical encroachment is an aspect that should be included in the licencing process, but this does not seem to be decisive in any of the licence decisions.

7 Discussion and Conclusion

In this final chapter I will discuss the central findings of the analysis in relation to the problem statement for the thesis. After this there will be a review of the theoretical and methodological approach, including a discussion of how the limitations with regards to data collection has influenced the final result of the analysis. The chapter is concluded with a look at the results' implications for further studies, and reflections around the future of Norwegian hydropower management.

7.1 Discussion of results

The research question I aimed at answering in this thesis was as follows:

How are concerns regarding the natural environment expressed, and what is emphasised by key actors in the licencing process of small-scale hydropower compared to the licencing of large-scale hydropower projects?

Supporting this main research questions, I also aimed at identifying different key actors in hydropower management's possibilities to influence the outcome of the licencing process, and which discourses these actors represent.

The basis for formulating this research question was the important role hydropower plays in the Norwegian energy market, and the increased development of small-scale hydropower in the recent years (OED, 2016). Impacts on the natural environment caused by large-scale hydropower are well known, but there has been less focus on the potential consequences of small-scale hydropower development. And whilst large-scale installations are generally perceived as causing dramatic impacts on the natural environment, small-scale hydropower seems to be perceived as more environmentally friendly (Bakken, Sundt, Ruud, et al., 2012). But there is not enough research on small-scale hydropower to support this perception. And how hydropower is perceived by different actors in hydropower management can have significant implications for the future of Norwegian hydropower.

In order to identify the prevailing perceptions of the relationship between hydropower and the natural environment, and give an answer to the problem statement, I conducted a discourse analysis of the licencing documents for eight hydropower projects: Two large-scale projects and six small-scale projects. The discourse analysis was seen in the context of hydropower

management, based on the political and legal framework that governs the investments in renewable energy development including both energy production aims, climate change obligations, and responsibilities for protection of the natural environment.

Hydropower is a subject where various actors representing different interests can participate. These actors can potentially all have different perceptions about hydropower and different ways of valuing nature, and for that reason there needs to be a transparent value judgement in the management process on which aspects of hydropower should be given the most emphasis in the licence decision. We can say that there is a struggle between discourses to influence the definition and perception of hydropower.

Based on the statements the chosen actors made in the hearing rounds for the eight projects, the study has revealed that the different actors represent different discourses within the discursive order of hydropower. NVE represents an energy discourse, where the main focus is on how hydropower development contributes to increased production of renewable energy. But, as part of the licencing authority, NVE is responsible for assessing all aspects of any hydropower project, making sure that the combined benefits outweigh the disadvantages. NVE does not consider hydropower development and nature conservation to be contradictory, but rather something that can be combined through planning and management.

A nature conservation discourse is thereby organised into the licencing process through NVE's responsibility to assess all aspects of a project, as well as the possibility for other actors to contribute to the licencing process. Other actors and interests are organised into the management of hydropower through stakeholder participation and specifically through the public hearing rounds in the licencing process for each project. These actors only need to include the aspects of hydropower that influences their interests.

Even though hydropower is one of the most important measures for climate change mitigation we have in Norway today, it has been revealed through the analysis that NVE is the only actor that puts any significant emphasis on the energy and climate perspective of hydropower development. For NVE, the development of hydropower is legitimised through the need for a reliable energy supply, and renewable energy as a measure to reduce greenhouse gas emissions and thereby mitigate climate change. This connects hydropower development to both an energy discourse and a larger climate change discourse.

The other actors have far less focus on the energy aspect of hydropower, but are rather focused on how the developments might influence natural environmental values. The local and regional

authorities represent a nature conservation discourse from a user perspective, where hydropower installations are considered to diminish an area's experience value and value for outdoor recreation. But these interests can be combined through mitigating measures. The nature conservation organisations also represent a nature conservation discourse but through a perspective of nature as a value in itself, where hydropower development to a large extent cannot be combined with natural conservational values.

The requirements for environmental impact assessments are not as significant for small-scale hydropower as it is for large-scale hydropower. In the licencing documents, there is a request for a more thorough assessment of small-scale hydropower's impacts on biodiversity and endangered species. In particular, the nature conservation organisations, and to some extent the municipalities, have a focus on knowledge-based management and the precautionary principle. Showing that they are unsatisfied with the way in which these concerns are integrated into the management of freshwater resources.

It can seem as though biodiversity and endangered species is not as emphasised by the various actors in relation to the large-scale projects. But because natural conservational values are thoroughly assessed in large-scale hydropower through environmental impact assessments, the knowledge-base is not as much of an issue, these results might be an outcome of the different approaches to management. Because these issues have already been properly assessed in the licencing process, they might not be as emphasised by other actors than NVE for large-scale hydropower.

The most significant difference in perception between small-scale and large-scale hydropower, is with regards to landscape and recreational values. The impacts from the small-scale projects are generally not considered to be so severe that they cannot be preserved through mitigating measures. Landscape influences are given significantly more emphasis in the large-scale cases, and the main issue is the visibility: a hydropower installation will decrease the experience value of an area. This can be related to the use-value of an area, where the benefits from outdoor recreational activities and tourism can outweigh the benefits from energy production.

7.2 Review of theoretical and methodological approach

The theoretical framework and methodological approach for this thesis was discourse analysis. The choice of discourse analysis was based on the presence of multiple actors and conflicting views in hydropower management.

An important aspect of hydropower is that it is a subject of conflicting interests. Norway is committed to both reducing climate change through increased production of renewable energy, and at the same time reducing the loss of species and habitats, through various national and international obligations. Hydropower can be seen from both an energy perspective as a secure and renewable source of energy and the most important contributor to the Norwegian energy market today (Thaulow et al., 2008). And from a nature conservation perspective, leading to negative impacts on the natural environment in which the development takes place.

Discourses are suitable in the study of environmental problems because they structure how we interpret and define a problem, and thereby also govern the possible solutions to that problem (Dryzek, 2013; Feindt & Oels, 2005). The main theory used in this thesis is based on a Foucauldian approach to discourse analysis. This approach is particularly focused on revealing knowledge and power relations (Jørgensen & Phillips, 2002). Other theoretical contributions was used as a support to this, to adapt the theory to the purpose of the thesis.

There is no clearly defined approach to conducting a discourse analysis. In this thesis, I used an order of discourse, as presented by Jørgensen and Phillips (2002), where hydropower created the discursive framework for the analysis. And combined this with Tellmann's (2012) use of indicators of discourse, this was chosen as a methodological approach. For someone who has not previously conducted a discourse analysis, this turned out to be a comprehensible and appropriate approach to discourse analysis. Through the analysis I have been able to identify the perceptions different actors have of hydropower.

The data for this thesis was solely based on documents. In order to increase the data quality, I could potentially have supplemented this with other sources of data. I could, for example, have included interviews of representatives for the different actors. This could have given a clearer perception of the different actors' opinions about hydropower. Or I could have used a broader perspective than just the licencing process and the hearing statements, like for example analysing how hydropower is portrayed in the media.

7.2.1 Data quality and limitations

In order to avoid data overload and get an appropriate starting point for the scope of the thesis, I set limitations on both the actors included in the analysis, which documents I used, and which parameters of environmental impacts I considered. In addition to what I discussed in chapter 4, I will reflect on the way these limitations have influenced the result of the analysis.

I used three parameters of environmental impacts in the analysis. These include landscape and outdoor recreation, encroachment-free areas (INON), and biodiversity and endangered species. These parameters where chosen because they are issues that often generate conflict in natural resource management, and are generally included in environmental impacts assessments. Landscape and recreational values, and biodiversity and endangered species, where discussed by most of the actors in all of the eight cases, and were therefore a good source of data. The only aspect that was just to a limited degree included in the documents were INON-areas. The reason for this could be a combination of the reduction of INON-areas in general, and the geographical location of the chosen projects. Because I wanted to include cumulative effects, I chose small-scale projects in regions that are experiencing high development pressure. This limited the probability for these projects to also be located in close proximity of areas classified as INON. Because of lack of data, INON-areas were not included in the analysis, and might be considered an outdated aspect of small-scale hydropower management.

The limited options for choice of large-scale projects could also have had some implications on the results. The TKP-projects in Troms were the only large-scale projects within a ten-year timeframe that had not been granted a licence, and was therefore the only viable option for this thesis. But the data quality for these projects was not as good as it was for the rest of the projects used in the analysis. First of all, the projects were not discussed individually in the licence document. These three large-scale projects were handled together with six small-scale installations in the same document. And secondly, unlike the other projects, the hearing statements were not systematically given, but rather mentioned in the text as part of the larger assessment of the projects. Each of the actors' statements were therefore harder to assess in this project compared to the others, and the extent of the statements was also limited because they were only mentioned in relation to specific issues. Because there was no clear distinction between the three projects in the licencing documents, I chose to handle them all as one project in the analysis. This can have resulted in an incomplete representation of the reasoning for the final licence decision, especially with regards to the emphasis that was given to energy production, and how this aspect factored into the licence decision. In the licencing decision for the Sauland project, NVE put special emphasis on the significant contribution to new renewable energy production. And in that case, they recommended a development despite the conflict with other interests in the watercourse, showing that energy production benefits are an important part of hydropower development for NVE. The combined production capacity of the TKP-projects is quite substantial (162GWh/year, see Table 4.1), but individually the three projects are not

very big. Skognesdalen would have an installed capacity of only 10,4MW, which is just above the limit for small-scale hydropower. So, the energy production benefit from each of the three projects is not as significant as it is in Sauland. This might have had implications for the outcome of the licencing decision. As we have seen, when the energy production benefits are less prominent, it gives more room for other concerns. For example, more room for a nature conservation discourse to influence the outcome of the licencing process. In the end, OED decided to grant a licence to the Stordalen power plant, which is the TKP-project with the highest production capacity out of the three plants. Which, again, could indicate the importance of energy production. But I have not read the reasoning for the licence decision, and can therefore not make any assumptions.

Ideally, the data quality for the large-scale projects should have been better, to allow for a more accurate description of the background for the licence decision and hearing statements.

7.3 Further research

The results from this analysis have shown that there is a request for a more thorough assessment of the consequences of small-scale hydropower with regards to the natural environment. A study comparing small-scale and large-scale hydropower, conducted by Bakken, Sundt and Ruud (2012), gives a slight indication that the impacts from many small-scale hydropower plants might cause more severe impacts on the natural environment compared to a few large-scale projects. But because hydropower projects are case specific it is not feasible to draw any conclusions based on this one study (Bakken, Sundt, & Ruud, 2012). There is a need for further studies on the environmental impacts of small-scale hydropower, especially with regards to cumulative effects and a comparison to large-scale hydropower. An increased knowledge-base is crucial for making sustainable licence decisions. The licencing process should also be restructured to incorporate stricter requirements for environmental impact assessment of small-scale hydropower.

Another important aspect of hydropower management, and natural resource management in general, is that decisions, to a large degree, are made based on value judgements. And today there is a conflict between the value of pristine nature versus the value of renewable energy as a measure to reduce climate change. Should we continue to develop hydropower at the expense of Norwegian nature when such a large share of Norwegian freshwater nature has already been influenced by hydropower development? What role should Norway play in the European energy

market? Should we produce renewable energy at the expense of Norwegian nature to reduce the use of fossil fuels in Europe? The answers to these questions will determine the future of hydropower management. Different actors will have different answers to these questions, and a transparent decision-making process is essential to account for different value judgements and discourses in hydropower management. The perceptions those actors with the power to make decisions have of hydropower will be decisive for the future of the Norwegian energy market and the future of Norwegian freshwater nature.

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