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Local support for biodiversity conservation in community-based protected area governance

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Content

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Summary

Worldwide there have been many attempts to implement community-based conservation to gain a more inclusive protection of biological diversity. Reducing human pressures on ecosystems is necessary for favorable ecological outcomes of protected areas, but conservation initiatives that rely on strict enforcement without local support are vulnerable to rule-violations, public protests and a reduced political commitment. The Norwegian government decided in 2009 to employ a community-based conservation strategy for protected areas in Norway, and in this thesis I explore whether the reform has led to less local resistance towards conservation and reduced threats to biodiversity. Included are four studies that shed light on this main research question.

In this thesis, I investigate the strictness level of the current conservation policy (paper 4) and the local acceptance of spatially restricting resource use (paper 2). I evaluate the impact of the Norwegian community-based conservation reform on the local decisions to regulate use (paper 1), and analyze the views of conservation among local stakeholders (paper 3).

This thesis shows that community-based conservation has accommodated local needs through a less strict conservation practice on private land (paper 1). The local residents living near the protected areas seemed to accept the idea of restricting residential and industrial development inside protected areas (paper 2), whereas a large proportion of key local stakeholders were less supportive of prioritizing conservation over economic development (paper 3). The reform includes two governance bodies that are trusted by stakeholders holding different views of conservation, which suggests that local protected area boards along with stakeholder advisory councils could be in a good position to reconcile contrasting views of conservation (paper 3).

The overall liberal conservation policy and practice (papers 1 & 4) makes it reasonable to question the impact protected areas have on reducing threats to biodiversity. The pressure for human activities is high in mountain areas (chapter 3) and combined with a more lenient conservation practice this could reduce protected area effectiveness. Therefore I suggest that more attention should be devoted to the impact protected areas have on reducing human activities that pose a threat to biodiversity, compared with a situation without protection.

In this thesis, I have presented analytical approaches that can be of value for impact evaluations of conservation. In paper 1, I showed how the impact of governance could be evaluated at an early stage by looking at changes in conservation practice before and after a reform. In paper 2, I demonstrated how mapped preferences for land development could be a useful tool for conservation practitioners and researchers because they add the spatial dimension to social acceptability assessments of conservation. Better measures of strictness are needed for impact evaluations, and in paper 4 I presented a method for comparing conservation rules in multiple protected areas.

Keywords: conservation impact, conservation frames, Norway, PADDD, PPGIS, preferences, public participation, relational values, social acceptability

List of papers

Paper 1

Engen, S. and Hausner, V. “Impact of local empowerment on conservation practices in a highly developed country”. Conservation letters, in press. doi: 10.1111/conl.12369

Paper 2

Engen, S., Runge, C., Brown, G., Fauchald, P., Nilsen, L. and Hausner, V. “Assessing local acceptance of protected area management using public participation GIS (PPGIS)”.Journal for Nature Conservation, in press. doi: 10.1016/j.jnc.2017.12.002

Paper 3

Engen, S., Fauchald, P. and Hausner, V. “Conservation frames and the attitudes of stakeholders towards downgrading protected areas for economic development”. Manuscript submitted.

Paper 4

Hausner, V., Engen, S., Bludd, EK. and Yoccoz, NG. 2017. “Policy indicators for use in protected area networks”. Ecological indicators 75, 192-202.

List of papers and contributions (co-author statements)

Name of candidate:

Sigrid Engen

Papers

The following papers are included in my PhD thesis:

I: Impact of local empowerment on conservation practices in a highly developed country

II: Assessing local acceptance of protected area management using public participation GIS (PPGIS)

III: Conservation frames and the attitudes of stakeholders towards downgrading protected areas for economic development

IV: Policy indicators for use in impact evaluations of protected area networks

Contributions

	Paper I	**Paper II**	**Paper III**	**Paper IV**
Concept and idea	SE, VH,	SE, CR, PF, GB, VH	SE, PF, VH	VH, EKB
Study design and methods	SE, VH,	SE, CR, PF, GB, VH	SE, PF, VH,	VH, EKB, NY
Data gathering and interpretation	SE, VH	SE, CR, PF, LN, GB, VH	SE, PF, VH	VH, EKB, SE, NY
Manuscript preparation	SE, VH,	SE, CR, PF, LN, GB, VH	SE, PF, VH	VH, SE, EKB, NY

With my signature I consent that the above listed articles where I am a co-author can be a part of the PhD thesis of the PhD candidate.

Signatures from all authors must be provided.

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Outline of thesis

Community-based conservation has been proposed as a solution to environmental problems based on the idea that "if conservation and development can be simultaneously achieved then, the interests of both can be served" (Berkes 2004). This thesis aims at understanding how community-based conservation works in a Norwegian context. In the first chapter, I define and explain community-based conservation, its promises and premises, successes and failures. I also look at some of the challenges facing biodiversity conservation through protected areas. In the following chapter (Chapter 2) I provide a theoretical background to the methods and topics addressed in this thesis. These include conservation impact assessments, social acceptability assessment through web-based participatory mapping (web-PPGIS) and conservation framing. In chapter 3, I present the case of Norwegian area protection. I provide a short overview of the status of biodiversity and protected areas in Norway and the institutional changes that have taken place as a consequence of the community-based conservation reform.

Chapter 4 consists of four papers – three published and one manuscript. Paper 1 examines the permit practice carried out before and after the Norwegian community-based conservation reform in 2009, to understand whether the introduction of community-based conservation has changed environmental decision-making in practice. Paper 2 explores the local acceptability of the current conservation policy in Norway using local people's mapped preferences for the development of human activities inside and outside protected areas. Paper 3 assesses how local stakeholders perceive conservation and how these perceptions are related with how they personally would approach conservation when given the choice among four policy frames. Paper 4 compares the level of strictness of the conservation regulations in protected areas in Norway with a similar context internationally, British Columbia, Canada.

In the final chapter (Chapter 5), I give a short summary of the studies, I explain some of the limitations of the work and provide recommendations for future research.

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Chapter 1. Introduction

Community-based conservation is defined as ‘‘natural resources or biodiversity protection by, for, and with the local community’’(citation in Berkes 2007). It proposes that conservation incentives and a good understanding of people, communities, institutions and how they interrelate could overcome collective action problems and create beneficial conservation outcomes (Berkes 2004). It includes cases where the government grants decision making power to local governing bodies (i.e., democratic decentralization), the local communities own or have usage rights in the conserved area due to collective land tenures, and the "local residents exercise *de facto* control in the absence of formal rights" (Agrawal & Ribot 1999; Poteete & Ostrom 2004; Hausner et al. 2012). It is characterized by a bottom-up process where decision making starts at the local level and involves interactions at multiple levels (Berkes 2006; Baral 2012). The conservation outcome is a result of these interactions (Berkes 2007).

Reducing human pressures on ecosystems is necessary for favorable ecological outcomes of protected areas, but conservation initiatives that rely on strict enforcement without local support are vulnerable to a reduced political commitment, rule-violations and public protests (Stern 2008; Lindenmayer et al. 2017). In 2009, the Norwegian government decided to implement a nation-wide community-based conservation strategy for protected areas, and this governance "experiment" provides an ideal opportunity to examine community-based conservation in the context of a highly developed country. My focus in this thesis is on the community-based conservation reform and its main goals: to reduce local resistance towards conservation and ameliorate threats to biodiversity.

1.1 Democratic decentralization and public participation

Decision-making power placed with lower level authorities and involving local stakeholders is thought to reduce resistance and improve conservation outcomes by, for example, tailoring policy and practice to local conditions, increasing community capacity, mobilizing local knowledge and innovation, and fostering local ownership (Ribot 2002; Reed 2008; Ban et al. 2014; Cetas & Yasué 2017). In many cases, higher level authorities are needed in order to, for instance, re-distribute the costs of conservation, build institutions, provide funding, recognition and support of conservation efforts, link rural and urban areas, generate new income opportunities for rural communities, coordination, and technical and scientific expertize (Lemos & Agrawal 2006; Berkes 2007; Cudney-Bueno & Basurto 2009; Tracy 2014; Eckerberg et al. 2015).

Decentralization is "any act in which a central government formally cedes power to actors and institutions at lower levels in a political-administrative and territorial hierarchy" (Ribot 2002). At its core is the democratic principle that those most affected by a decision should have a greater say (Reed 2008; Berkes 2010).

"The underlying logic of decentralization is that democratic local institutions can better discern and are more likely to respond to local needs and aspirations because they have better access to information due to their close proximity and are more easily held accountable to local populations" (Ribot 2002).

Two forms of decentralization, democratic and administrative have been used to describe the Norwegian reform (Skjeggedal et al. 2016; Hongslo et al. 2016a). These two forms differ with respect to accountability, which is considered a central mechanism to ensure responsiveness to local needs and aspirations (Agrawal & Ribot 1999). Administrative decentralization entails granting new powers to local or regional offices of the central government agencies, who are mainly upwardly accountable. In democratic decentralization new powers are granted to democratically elected bodies that are downwardly accountable to the local residents. Downward accountability is what makes democratic decentralization most appealing and more likely to provide the benefits associated with decentralization, according to Agrawal & Ribot (1999).

Including non-elected actors in decision making is thought to further enhance the quality of environmental decisions (Dietz & Stern 2008). In some ways, the public can be thought of as participating in every decision in a democracy, for example through lobbying, voting, demonstrations, public statements etc. In more narrow terms, public participation refers to “an organized process adopted by elected officials, government agencies, or other public- or private-sector organizations to engage the public in environmental assessment, planning, decision making, management, monitoring, and evaluation” (Dietz & Stern 2008). There is some evidence that processes that are more participatory in terms of inclusiveness, intensity (e.g., level of investment, commitment and knowledge required) and influence have more successful outcomes (Dietz & Stern 2008; Reed 2008). However, inherent tension exists between the ideals of representative democracy and involving non-elected actors in decision-making (Klijn & Skelcher 2007).

Two conservation strategies to motivate conservation behavior are often emphasized in relation with community-based conservation (Salafsky & Wollenberg 2000; Nilsson et al. 2016). The first one aims to address threats arising from local resource users by indirectly linking conservation and development. This entails providing alternative ways of making a living (e.g., the provisioning of alternative fuel to prevent forest-degradation; Nilsson et al. 2016) or economic compensation to outweigh the costs of changing to a less environmentally harmful behavior. Economic compensation for voluntary forest conservation has, for instance, been a successful conservation strategy in Norway in later years (Skjeggedal et al. 2010; Auld & Gulbrandsen 2015).

A second way is directly linking (coupling) conservation with local needs by, for example, granting access to or allowing small-scale resource utilization in protected areas such as hunting (Gibson & Marks 1995), or placing value on wildlife for communities by paying for the number of bird species seen by tourists (Clement & Cheng 2011). This way protected areas benefit local users by safeguarding traditional land use practices and recreation from external threats such as land development. Such a coupled conservation and development strategy could address threats from local resource use and external threats, because people potentially show restraint with regards to resource use due to resource dependence and could mobilize against external developmental pressures. For direct links to work it is likely necessary that local stakeholders understand the link between conservation and local benefits, and that they have the capacity to take action (Salafsky & Wollenberg 2000; Nilsson et al. 2016).

1.2 Successes and failures of local involvement

There are numerous examples in the literature of the success stories concerning local involvement. Oldekop et al. (2015) showed through a global review that shared governance, empowered local people, lowered economic inequalities and cultural and livelihood benefits were associated with conservation success in protected areas. Similarly, a meta-study of 20 cases of protected area management in Europe also found that conservation success was related with local involvement and local benefits (Hirschnitz-Garbers & Stoll-Kleemann 2011). Andrade and Rhodes, (2012) found that participation by local communities in park management was crucial for compliance with protected area policies after analyzing 55 case studies from developing countries. Brooks et al. (2013) reviewed community-based conservation projects and found that successful projects engaged with local communities, their traditions and institutions, provided communities with relevant skills and institutional capacity, emphasized intangible, non-economic benefits and ensured that they were equitably distributed. Sterling et al. (2017) reviewed stakeholder participation in biodiversity conservation and found that identifying stakeholders, the timing of engagement, recognizing and respecting stakeholder values and institutions, stakeholders' motivation for engagement, effective leadership and –partnerships, local and traditional ecological knowledge, the social and political context and management strategies were related with success.

However, local involvement does not always live up to expectations and success can also be a matter of perspective (Dietz & Stern 2008; Brooks et al. 2013; Bennett 2016; Sterling et al. 2017). For instance, Brooks et al. (2013) found more successful community-based conservation projects than failed ones, but the number of failures was still large. Some claim that community-based conservation initiatives have struggled because expectations have been too high and protected areas have failed to generate enough benefits for local communities to create incentives for conservation (McShane & Newby 2004), whereas others find highly successful projects in terms of conservation outcomes that failed to provide economic benefits, and attribute success to noncash benefits like enhanced community confidence (Salafsky et al. 2001). Engaging stakeholders can be expensive and time consuming, increasing the range of perspectives can increase conflict, participants may develop diverging views after considering the viewpoints of others, they may lack the knowledge and capacity to make quality decisions, a lack of commitment from the initiating agency can reduce support, and if dominant actors are awarded too much leverage this can reduce equity (Dietz & Stern 2008; Ward et al. 2017).

1.3 Addressing the biodiversity crisis by protecting areas

Area protection is the main tool to mitigate the effect of socioeconomic pressures on ecosystems (Oldekop et al. 2015). Protected area restrictions prevent, reduce or alter the human use of an area for the preservation of natural and cultural values, on behalf of the general public as well as future generations. If goals are conflicting then the precautionary principle mandates that conservation should take precedence (Dudley 2008), though this is not always reflected in practice (Garnett & Parsons 2017).

"A protected area is a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values" (IUCN Definition 2008).

Halting biodiversity loss is a global priority. It is a focus of the Convention on Biological Diversity's 20 Aichi Targets, and it has been incorporated into the United Nations' 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals. Land-use change, overexploitation of biological resources, pollution, climate change and alien species are the major global drivers of biodiversity loss, all of which are increasing (Sala et al. 2000; Secretariat of the Convention on Biological Diversity 2014). Protected areas are generally efficient in maintaining natural land cover (Beresford et al. 2013; Geldmann et al. 2013; Ament & Cumming 2016; Bowker et al. 2017) and studies have also shown that protected areas retain higher biodiversity values than alternative land uses (Coetzee et al. 2014; Gray et al. 2016) and can reduce extinction risk of threatened species (Butchart et al. 2012), although the evidence is conflicting (Geldmann et al. 2013). The coverage of terrestrial protected areas has reached 15.4% (Juffe-Bignoli et al. 2014) and is making good progress towards fulfilling the Aichi target set out in the strategic plan of the Convention of Biological Diversity from 2010 of protecting 17% of terrestrial and inland water areas by 2020. Regardless, protected area efficiency is highly variable and context specific (Coetzee 2017). Representation of the world's ecoregions is skewed (Watson et al. 2014), threatened species' habitats lack protection (Venter et al. 2014), as do migratory birds (Runge et al. 2015) and the situation shows little signs of improving (Venter et al. 2017).

Ecological and social objectives are interlinked, and protected area management may have synergistic or conflicting outcomes for both. Protected area restrictions on resource use negatively affect human welfare on the one hand and positively affect welfare by enhancing ecosystem services on the other (Ferraro & Hanauer 2015). Protected area restrictions can lead to negative spillover effects where human activity is not reduced but merely displaced to areas outside. Isolation by intense human activity outside protected areas also threatens their effectiveness (Laurance et al. 2012; Palomo et al. 2013, 2014) by, for instance, changing ecological flows into and out of the protected area or reducing crucial habitat outside the conservation area (DeFries et al. 2007; Hansen & DeFries 2007). Further, the pressure for access to- and use of natural resources results in the loss of protected areas or the relaxation of restrictions (i.e., protected area downgrading, downsizing and degazettment PADDD; Mascia & Pailler 2011; Mascia et al. 2014; Symes et al. 2016; Cook et al. 2017), and to their biased placement in inaccessible areas with low productivity, marginal economic worth and low density of humans (Watson et al. 2014; Venter et al. 2017).

In this chapter, we have seen that there are different pathways to governing conservation projects from the local level and that these can be beneficial for biodiversity conservation, however the path to success is not clear-cut (sections 1.1-1.2). Biodiversity conservation is a pressing issue globally, one that involves the human dimensions as well as the natural sciences (section 1.3). In the next chapter, I provide an outline of the main methodologies and approaches used in this thesis to evaluate local governance of protected areas in a Norwegian context.

Chapter 2. Methodology

2.1 Conservation impact

Protected area effectiveness is often measured in terms of inputs such as staff, time, money, as outputs (e.g., the amount of land surface under protection, representativeness) or as outcomes (levels of threats to biodiversity, or state of biodiversity), but achieving such targets does not necessarily mean that protected areas are effective at reducing threats to biodiversity or averting biodiversity loss (Geldmann et al. 2013; Pressey et al. 2015, 2017; Coetzee 2017). By focusing on inputs, outputs and outcomes but not impact when communicating protected area effectiveness, conservation practitioners and policy makers risk overstating progress (Pressey et al. 2017). To assess what would have happened if the protected area had not been designated (i.e., conservation impact), a benchmark, also known as a counterfactual, is required. According to Baylis et al. (2016) "few studies meet the basic standards of an impact evaluation such as considering before and after conditions, including control groups, accounting for confounding factors, or systematically ruling out rival hypotheses".

Impact evaluations of conservation assess the degree to which changes in outcomes such as the level of human use can be attributed to an intervention as opposed to other factors (Andersson & Gibson 2007; Ferraro 2009). For instance, what would have happened if the area had not been protected or if the governance reform had not been carried out? If, for example, the counterfactual situation of no protection, no stakeholder involvement or no reform is much worse for biodiversity, then the intervention has had a large impact (Pressey et al. 2015). In order to answer such questions comparisons of outcomes in areas with and without the conservation policy instrument or before and after its implementation can be made (Miteva et al. 2012). Because other factors apart from the intervention affect the outcome of interest such variables should be accounted for (Pressey et al. 2015). Estimates comparing outcomes before and after are vulnerable to other temporal trends that might cause the observed effect other than the intervention. For instance, if land cover clearing has increased in general in the world then we would assume that rates of change increase even inside protected areas (Nagendra 2008). Comparisons of areas with and without can be biased if there are unobserved reasons why some areas received the treatment (e.g., are protected) and others did not. For instance, if protected areas are located in remote locations where human activity is low then a protected area has little impact on avoiding biodiversity loss because of few threats to biodiversity in the first place.

Experimental studies can break the connection between confounders and the intervention. When the intervention is randomized across communities or regions this ensures that differences in outcomes between experimental and control units can be attributed to the intervention and not to other factors (Ferraro & Pattanayak 2006). However, randomization may be unfeasible due to practical, ethical or political reasons. Instead, quasi-experimental approaches such as matching have been used. Matching can control for confounders by comparing experimental units (i.e., with protection) with control units (i.e., without protection) that are similar with regards to potential confounding variables (Gray et al. 2016). Another way to estimate impact is using a before-after-control-intervention design (BACI). This design measures outcomes (e.g., deforestation rates, threat levels) both before and after the intervention (e.g., protected are establishment) in areas with and without the intervention (e.g., both protected and similar unprotected areas). For the impact estimate to be valid the control groups must accurately represent the change in outcome in the absence of the intervention (the treatment and controls do not necessarily have to have the same pre-intervention conditions; Gertler et al. 2010). The before-after difference controls for factors that are constant over time, whereas the with.-and-without controls for temporal trends and assumes parallel trends in both control and intervention groups in the absence of the intervention (Gertler et al. 2010). Alternatively, confounders can be included as covariates in regression models (Chomitz & Gray 1996; Ferraro & Hanauer 2014; Heagney et al. 2015; Gray et al. 2016). Either way, studies that lack randomization always face the risk of unidentified confounders (Mahajan 2015).

Impact assessments of community-based conservation have to a large part focused on the impact on deforestation in developing countries (Geldmann et al. 2013; Macura et al. 2015; Yin et al. 2016), where deforestation is assessed using remote sensing data. The advantage of this setup is that data is readily available at large temporal and spatial scales (Geldmann et al. 2013), which gives the possibility to evaluate impact nationwide. For example, by using variance matching Nolte et al. (2013) assessed 292 protected areas in the Brazilian Amazon and showed that strictly protected areas avoided deforestation more than sustainable use protected areas regardless of whether the location was remote or in high deforestation pressure zones.

Quantitative analysis of satellite data could be combined with qualitative insights to untangle the reasons behind deforestation. For example, Lund et al. (2014) applied a mixed-methods approach to assess the impact of decentralization on forest condition in two villages in Tanzania. Their approach entailed using remote sensing to compare changes in forest disturbance before and after decentralization. They did not include control sites or confounders in their analysis of changes in forest disturbance, but used qualitative data from numerous sources to analyze what changes had taken place in forest management and forest use. The village facing greater difficulties in controlling forest disturbance had the lowest deforestation rates due to stricter regulations and enforcement, and the authors conclude that the difference in conservation impact between the two villages was due to differences in priorities rather than capacity constraints. Andersson & Gibson (2007) looked at the impact of decentralization on deforestation among 30 randomly selected municipalities in Bolivia. They included three dependent variables, namely the total, permitted and unauthorized deforestation rate over a 13 year period from the start of the reform, where permitted deforestation occurred in areas where the government allowed conversion, whereas unauthorized occurred in protected areas. They used multiple regression and controlled for municipalities' governance, national policy, central government monitoring, socioeconomic conditions and biophysical conditions. Results showed that decentralization had a positive effect on unauthorized deforestation, but did not change permitted or total deforestation. Field observations suggested that the reduction in unauthorized deforestation was likely largely caused by efforts of securing property rights (municipal governance), which caused people to be more engaged in forest management and less likely to convert the area to agriculture and pastures.

Permits are the main and most immediate way that decision-makers in Norway can affect the level of use, and so this became the most natural choice of indicator in order to detect changes in threats to conservation values due to community-based conservation. Much of the protected area in Norway is mountainous and assessing the effect of community-based conservation on deforestation on a large scale, like in the two studies reviewed, is not feasible in Norway. Ecological outcomes such as avoided biodiversity loss generally takes time to materialize and I therefore focused on the effect of the reform on permits for human activities that potentially could affect biodiversity loss.

In paper 1, we analyzed the actual decisions regarding which activities (e.g., motorized vehicle use, land development) to restrict, made by central and local decision-makers. This variable potentially carries less risk of unidentified confounders as it assesses actual decision-making compared with studies seeking to attribute deforestation to decentralized governance. Our study could have benefitted from control groups, namely similar areas with continued centralized governance, but as this was a nationwide reform it was not possible. Instead we included confounding variables such as 1) the type of activity that was applied for because some activities are more strictly regulated and contested than others, 2) the IUCN classification of the protected area(s) because activities in protected landscape is generally less strictly regulated than in national parks and nature reserves, and 3) property ownership because this can affect the decision-makers perception of the room to maneuver. We included the different protected area boards as a random factor to account for area-specific differences in permit practice.

In paper 2, we assessed if protected areas mattered for local residents' perceptions of the landscape. In this study we wanted to know if local preferences for different human activities conform to protected areas being more restrictive than the surrounding landscapes. To assess this we compared local resident's mapped preferences inside and outside protected areas. However, because protected areas are not randomly located in the landscape, simply comparing preferences inside with outside could lead to a biased estimate. We included in this study 101 protected areas which were established at various times. Using a BACI was not a feasible strategy as this would have required mapping people's preferences before the establishment of the protected areas. Instead we used regression and accounted for 1) landscape characteristics and 2) accessibility. Landscape characteristics and accessibility are factors that could affect people's preferences for carrying out certain activities. For instance, preferences for building houses or other infrastructure could be higher close to roads or towns. We accounted for 3) land tenure as other studies have shown that property ownership affect people's perceptions of the landscape (Brown, Weber, & Bie, 2014; Hausner et al., 2015; Jarvis, Breen, Krägeloh, & Billington, 2016; Raymond & Brown, 2006) and finally we accounted for 4) participant demographics, as gender and age can affect the type of activity preferred. We also included a random factor to account for individual variability in mapping effort and the hierarchical structure of the data as individuals were nested within region (people in the northern region could only map preferences in the north. The same applied for people in the south). In retrospect, other factors that could have been relevant are time since establishment of the protected areas and proximity to the participants' residency.

2.2 Evidence-informed conservation

Impact assessments represent an evidence-based approach to conservation, where the focus is on determining which interventions cause particular outcomes and then policy can be adjusted to maximize effectiveness. This approach is challenged by Adams & Sandbrook (2013), who point out that such an evidence-based approach can work when the system is small and problems can be clearly specified, but is not sufficient in a world where the reality is "messy" and policy-making involves a struggle over competing values. Biodiversity conservation is a so-called wicked problem (Rittel & Webber 1973). Differences in objectives, values and trust among stakeholders and highly dynamic, unpredictable and complex social-ecological systems (DeFries et al. 2017) create challenges that defy clear definition of the problem, where there is no apparent solution, where every action has consequences, where the solution is not right or wrong (it all depends on where you stand) and where no two problems are the same (Concklin 2005; DeFries et al. 2017). In such situations, evidence from a variety of sources is needed, because the solution to these problems is not just applying "objective" knowledge to predetermined problems, but also entails a political struggle among actors who seek to influence outcomes through negotiation and deliberation (Adams & Sandbrook 2013). The experience of individuals is an underutilized source of information for understanding conservation issues, according to Adams & Sandbrook (2013) and examining people's perceptions can be valuable for assessing whether conservation initiatives work as intended (Bennett 2016).

"The in-depth study and analysis of perceptions can help determine the underlying causes of lack of support and identify relevant interventions to ensure long-term support and the success of conservation" (Bennett 2016).

2.2.1 Conservation frames and attitudes

Public acceptance or support for protecting land is more likely if the way conservation is framed resonates with people (e.g., makes conservation seem natural and familiar; Gamson & Modigliani 1989; Benford & Snow 2000). The way conservation is framed also has implications for how we understand the conservation problem and envision its solution, what knowledge and evidence we perceive as legitimate for taking conservation actions, and whom we trust to undertake such actions (Buijs et al. 2011; Mace 2014). Framing entails selecting and thus highlighting pieces of information about an issue (Entman 1993). Such filters form the basis for how people understand information and frame issues (Jacobs & Buijs 2011). Frames form beliefs about the consequences of conservation initiatives, which in turn inform attitudes (Jacobs & Buijs 2011).

Attitudes reflect a pre-disposition to respond favorably or unfavorably to an idea, person, object or a management situation (Kenter et al. 2015). Attitudes depend on how we believe actions will affect things we value (Stern & Dietz 1994; Steg & de Groot 2012; Dietz 2013) Attitudes are also underpinned by beliefs (i.e., propositions regarded as true) and emotions (Heberlein 2012; Kenter et al. 2015). Pro-environmental behavior is influenced by our attitudes (Gifford & Sussman 2012; Heberlein 2013; Bennett 2016), but also by other factors (Steg & Vlek 2009), such as individual experiences and the social context. Thus, favorable attitudes towards conservation is considered important, but not necessarily sufficient for pro-conservation behavior (Heberlein 2012).

There is an ongoing debate among conservation practitioners about whether conservation should be framed as nature- or human-centered (Kareiva & Marvier 2012; Soulé 2013). Nature-centered conservation frames emphasize nature's intrinsic value, focus on the irreversibility of extinctions, the fragility of nature and the severity of the current ecological crisis (Soulé 2013; Tilman et al. 2014; Doak et al. 2015; Batavia & Nelson 2017). Nature-centered conservation advocates wilderness conservation through strictly protected areas (Minteer & Miller 2011). Human-centered conservation focuses more on instrumental reasons for biodiversity conservation, places weight on nature's ability to rebound from human pressures and places more emphasis on conservation in working landscapes and extractive reserves (Minteer & Miller 2011; Kareiva & Marvier 2012; Marvier 2014). Both these frames seek to engage people in conservation behaviors by making different values, beliefs, and understandings about the consequences of human action more salient through public outreach, planning and by initiating conservation actions.

Frames could either be regarded as existing in the minds of people (cognitive frames). In those cases research focus is on the variation in the private understanding and thought processes between individuals (Dewulf et al. 2009). The term framing refers to the intersubjective process in which the frames are constructed (i.e., interactional framing; Dewulf et al. 2009; van Hulst & Yanow 2016). Framing thus represent agreed upon ways to make sense of a situation (Gray 2003a) and in such cases research focus is devoted to communication. Frames are not necessarily permanent but change through reframing activity (Gray 2003a). Reframing entails gaining a new way of interpreting or understanding the issue, which requires some perspective taking (acknowledgement that one's own view is not the only way to approach the issue; Gray 2003b) and unlearning of existing beliefs (Nygren et al. 2017).

Framing studies often use a qualitative approaches such as focus groups, interviews or content analysis of media or other written material (Gray 2004; Buijs et al. 2011; Jacobs & Buijs 2011) to inductively explore how issues are framed by experts, lay people or the media. In this study we chose a quantitative approach using pre-defined frames similar to Marvier and

Wong (2012) to deductively assess how different policy frames resonates with stakeholders' private understanding of conservation, where policy frame is defined as "an organizing principle that transforms fragmentary or incidental information into a structured and meaningful policy problem, in which a solution is implicitly or explicitly enclosed." (Apostolopoulou and Paloniemi, 2012 and citations therein).

In paper 3, we developed a questionnaire to elicit which conservation policy frame among four frames developed from Mace (2014) resonate the most with stakeholders' perception of the best way to approach conservation. We also inquired about their perception of threats to conservation values from human activity, perception of appropriate management actions and favored (i.e., trusted) governance actors (Figure 1). Other studies have found these dimensions (why protect an area, what to protect and how to protect it) to be important for people's attitudes towards protected areas (Gray 2004; Daugstad et al. 2006b; Buijs et al. 2011). Finally, we included a question about their acceptance of protected area downgrading for the sake of public or economic interests.

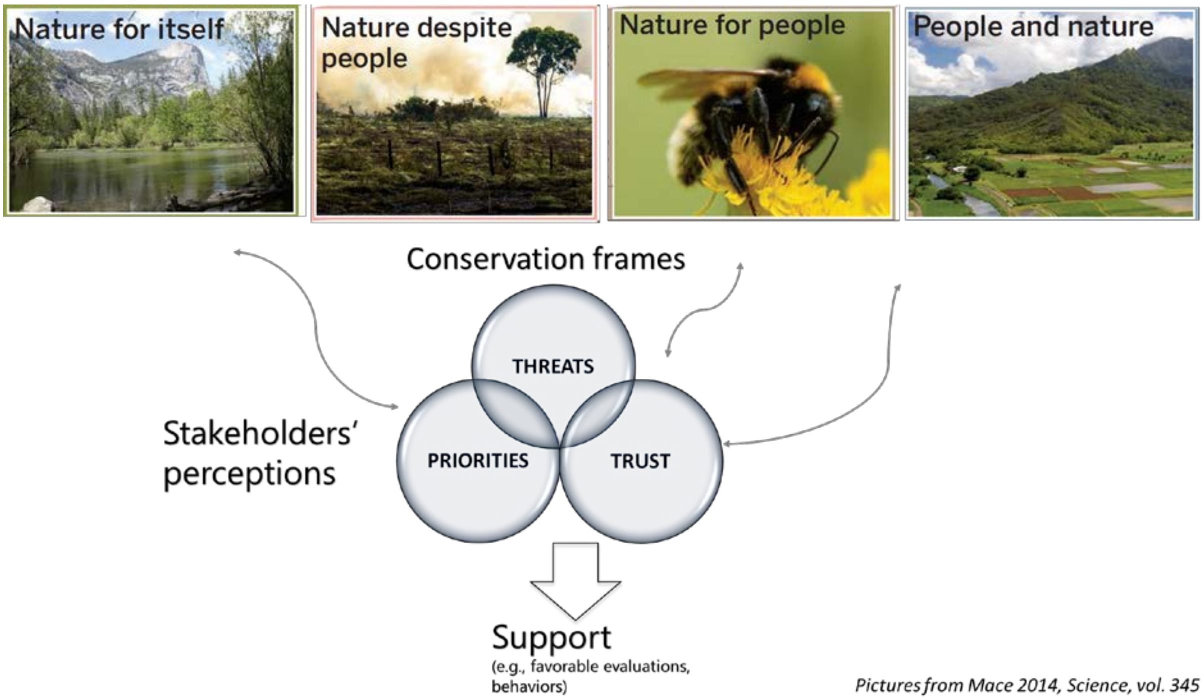

Figure 1. Conservation frames and support. If conservation frames resonate with people's perceptions of i) threats to conservation values, ii) relevant conservation actions and iii) trusted governing bodies, the efforts are more likely to result in local support.

2.2.2 Social acceptability and support

Halting biodiversity loss requires the commitment of actors operating on multiple scales from the local to the global and from individual households to people in power. Thus, focusing on gaining and maintaining societal acceptance and support for conservation initiatives has become a widespread practice (Heinen 2010; Bennett & Dearden 2014; Bennett 2016; Paloniemi et al. 2017). Assessing acceptability can be valuable for a number of reasons. For instance, in the planning stages of conservation initiatives, assessing acceptability can help environmental authorities determine whether specific management practices are likely to cause conflict or be readily accepted by the society (Thomassin et al. 2010; Brown & Raymond 2014). Once conservation actions are underway, assessing acceptability can provide indicators of conservation longevity, and warning signs of potential compliance issues (Shindler et al. 2002).

The terms social acceptability and support are used in different ways in the literature (Brunson 1996; Stern et al. 1999; Thomassin et al. 2010). Brunson (1996) relate *acceptability* to judgements that “1) compare the perceived reality with its known alternatives; and 2) decide whether the “real” condition is superior, or sufficiently similar, to the most favorable alternative condition. If the existing condition is not judged to be sufficient, the individual will initiate behavior […] that is believed likely to shift conditions toward a more favorable alternative.” These individual judgements should coalesce into shared judgements by a group of people to arrive at ***<u>social</u>*** *acceptability* (Shindler et al. 2002). This implies some form of aggregation of individual assessments (Stankey & Shindler 2006). The term judgment means an assessment, estimation, and inference about the occurrence of events and the relation of outcomes to these events (Hastie 2001) and preferences reflect a desirable course of action (Dietz 2013). Thus, the acceptability judgment formation process should culminate into preferred courses of action (paper 2).

The terms support and acceptance have also been operationalized as a survey question, independent of any reference to behavior (Thomassin et al. 2010; Batel et al. 2013). In Batel et al. (2013) they show how people clearly distinguish between the terms support and acceptance, where support suggests an active favorable position and acceptance points to more passive tolerance. This study also found that acceptance is a prerequisite for support (Batel et al. 2013). Thus, when people say that they support conservation it follows that they also accept it, but those who accept conservation do not necessarily support it. This likely applies for unacceptable conditions also, meaning that judgements of unacceptability are a prerequisite for local opposition to conservation.

In paper 2 we operationalized acceptability as the consistency between the collective (mapped) preferences of local residents and the legal restrictions inside and outside protected areas. In the survey, the participants were asked to place markers on a map indicating their preferred changes to the current land management using web-based PPGIS (further details in section 2.2.3). For each of 13 different types of activities, they could identify a spatial preference to *accept/wish to increase* the activity, or a parallel spatial preference to *don't accept/wish to decrease* the activity. For simplicity, we propose that these reflect a favorable and an unfavorable attitude towards these activities and refer to them as favor and oppose. Following Brunson's definition of acceptability we asked them to compare the current situation with the alternatives and decide whether they want changes in land management or not. If they wanted changes they could signal this by placing a preference on the map suggesting the type of change they wanted among the options available. We arrived at *social* acceptability through the statistical aggregation of preferences.

In our study, participants were not explicitly asked to report whether they support, accept, are indifferent, do not accept or actively oppose conservation (Thomassin et al. 2010). Instead we make inferences about social acceptability based on the type of activity, whether it demonstrates a favorable or unfavorable attitude towards the activity in the location where it is placed, and whether it is located inside or outside a protected area. For instance, if many people favor rather than oppose activities in areas where these are strictly regulated, this would suggest that the social acceptability of restrictions is low. If many people oppose rather than favor activities in areas where they are not strictly regulated, this also means that the social acceptability of restrictions (or lack of restrictions) is low. In paper 2, social acceptance of conservation policy is revealed if there is greater opposition than acceptance towards land development and motorized vehicle use inside protected areas than outside (as these are activities that are more strictly regulated inside protected areas than outside). Social acceptance for the conservation policy is also revealed when there is no difference in the preferences inside and outside protected areas for activities that are regulated in the same way in these areas.

In paper 3, I consider support for conservation demonstrated by those participants who found protected area downgrading for the sake of public or economic interests unacceptable.

2.2.3 Assessing acceptability using web based public participation GIS

Web-based Public Participation GIS (PPGIS) is a valuable approach because people's preferences can be collected in a rapid and cost-efficient way on a landscape scale (Brown et al. 2015). The method allows the people participating to use spatial markers to identify areas on a map that are important to them and why they are important (Figure 2; Brown & Fagerholm 2015). The resulting spatial layer can be combined with other types of spatial data to perform a range of analyses like exploring the concurrence between land uses such as conservation and people's values and preferences (paper 2; Brown et al. 2002; Brown 2006; Jarvis et al. 2016), conservation opportunities on unprotected land (Raymond & Brown 2006; Alessa et al. 2008) and the potential for land-use conflict (Brown & Raymond 2014).

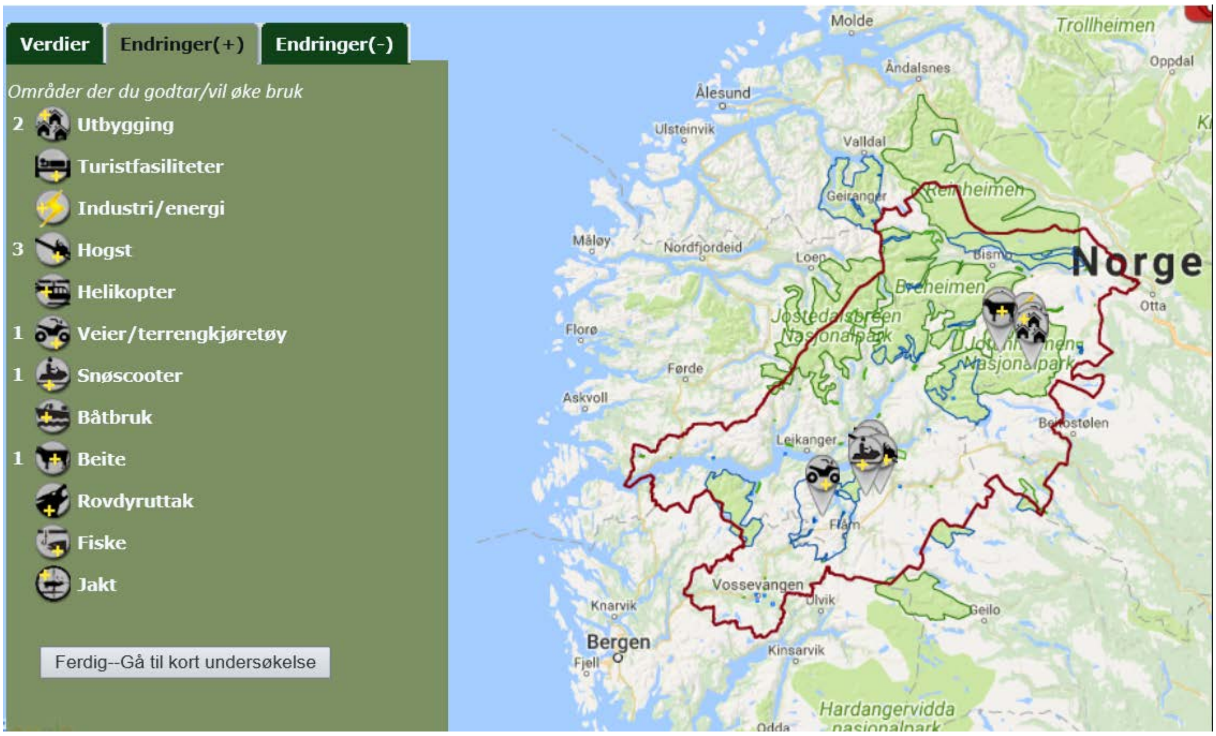

Figure 2. The google maps interface of the online participatory mapping survey.

In PPGIS, representation is usually acquired through random selection of citizens, and then a statistical aggregation of people's preferences forms the basis for what is in the best interest of the community (Raymond et al. 2014). The number of points placed, where they are placed, if they co-occur or are spatially segregated reflect importance and the potential trade-offs and synergies (Brown & Fagerholm 2015; Brown 2017). This instrumental approach relies on the ability to quantify values and preferences using standardized instruments and measures. A deliberative method is an alternative approach which relies on communication and emphasizes political representation, negotiation, reasoning and social learning. (Raymond et al. 2014). It assumes that knowledge of acceptability requires social exchange so that different perspectives can be brought to the table and that acceptance can be built around collaborative solutions, shared understandings and mutual trust (Raymond et al. 2014).

The two approaches have their own separate strengths and weaknesses and can be applied separately or in combination, depending on the context (Raymond et al. 2014). Large-scale community mapping can be useful for assessing how the results from small stakeholder groups align with the general population (deliberation followed by community mapping; Kaltenborn et al. 2012). It can also act as a reference for stakeholders engaged in participatory processes where they are appointed to represent local interests, such as those serving as members of protected area advisory councils (community mapping followed by deliberation). A deliberative strategy could also provide an in depth understanding of the context and interpretation of the preferences from the web-PPGIS.

Studies have shown that participatory mapping performed in a deliberative manner or in an instrumental manner can have consequences for the spatial output. Participatory mapping that involves individual interviews or group deliberation generally includes fewer people, but provide more in-depth knowledge and thus higher internal validity (i.e., knowledge of causal relationships or insights into the participatory processes that can explain conservation attitudes or behavior), the strength of random sampling is external validity (i.e., results are generalizable to the surveyed population; Brown et al. (2017)). There seems to be a varying degree of overlap between the spatial output produced by web-based PPGIS and qualitative approaches using inductively derived markers (i.e., coded from interviews) such as interviews (Brown et al. 2017) and workshops (Brown et al. 2014a). For instance, Brown et al. (2017) found that quantitative (web-PPGIS) and qualitative (interviews) approaches yielded similar types and ranks (frequencies) of place values, however the spatial overlap between place-values was higher for commonly mapped compared to the less frequently mapped values. Who participates is important for the results. This was demonstrated by Brown et al. (2014b) and Brown (2017) who found that random household participants mapped different sets of values and preferences compared with volunteers. The use of paper maps does not seem to affect the spatial distribution of data (Pocewicz et al. 2012) and points vs polygon data are compatible, depending on the attribute type (e.g., preference) and the amount of data (Brown & Pullar 2012).

2.3 Positioning the research in conservation science

Bennett (2016) defines conservation science as "the systematic study of ecological, social, and integrated social–ecological phenomena to document empirical information for the purposes of conservation". My thesis is positioned in the science-policy interface to evaluate the impact of a governance reform. I therefore did not formulate research questions and hypotheses based on disciplinary theory purely for advancing knowledge in that field. Conservation science is a value laden discipline as its main aim is to avert the accelerating global biodiversity loss (Soulé 1985). This overarching goal demands policy-relevant sciences that grapple with real world problems. My thesis is therefore interdisciplinary and takes a pragmatic approach to how disciplinary sciences is combined to evaluate the impact of the governance reform focusing on governance, conservation impact assessment, and public participatory GIS. The approaches included are all quantitative. The plan was also to carry out a qualitative study with advisory council members, to, among other things receive feedback on the results papers 2 and 3, however this turned out not to be feasible due to time constraints. To strengthen the interpretation of the results, I have reviewed qualitative studies pertaining to the Norwegian community-based conservation reform (Chapter 3).

Governance has been awarded more attention relatively recently (IUCN 2004). It implies “a set of processes, procedures, resources, institutions and actors that determine how decisions are made and implemented” (Macura et al. 2015). Because of the global trend towards more decentralized and participatory modes of governance (Dearden et al. 2005) it is of relevance to assess the consequences of this shift for biodiversity conservation and for local people. The papers included address governance issues pertaining to different governance arrangements, namely community-based, centralized, and participatory governance and conservation policy (conservation regulations and policy framing). These are all key factors in mitigating threats to biodiversity (Barnes et al. 2017) and affecting people’s perception of conservation (Bennett 2016).

In paper 1, we assess the effect of different governance arrangements (community-based vs centralized) on mitigating threats to biodiversity and on the acceptance of conservation decisions. This paper draws on theory from the impact assessment literature and from community-based conservation. Paper 4 assesses the strictness level of conservation policy in order to provide a strictness measure that reflects actual management, for the benefit of future impact evaluations. Both papers seek to provide objective knowledge to fill knowledge gaps (Crouzat et al. 2018).

Ceding the same powers to actors in governance networks with different interests and community positions (e.g., politicians, commons representatives, NGOs or village associations) will likely result in different policy outcomes (Agrawal & Ribot 1999; Alexander et al. 2016). Communities are heterogeneous entities, where people and institutions have diverging interests (Ojha et al. 2016). It is therefore of relevance to identify the values and interests among actors in community-based conservation (Alexander et al. 2016), both to gain knowledge on how to devise conservation initiatives that resonate with people and also to assess the interests of influential actors to determine which policy options likely will be favored (Newig & Fritsch 2009; Bennett 2016).

In paper 2, I utilized people's mapped preferences for assessing the social acceptability of conservation policy. This paper draws on impact assessment theory along with recent field of research, namely Public Participatory GIS (Brown & Kyttä 2014). This is a method that connects perception-based data with spatially explicit biophysical data or socioeconomic conditions for the study of human and nature interactions (Garcia-Martin et al. 2017). This approach builds on the idea that values and preferences can be empirically measured and quantified, albeit recognizing that all observations could be fallible and affected by our scientific theories (Raymond et al. 2014; Tadaki et al. 2017). In contrast, a deliberative paradigm assumes that reason is context dependent and what is socially acceptable is constructed through interactions among, for instance, stakeholders and decision-makers (Raymond et al. 2014).

In paper 3 we assessed the perceptions and attitudes towards conservation among local stakeholders involved in protected area governance. This study draws on research into how core human thought process can be mapped across individuals and populations (Tadaki et al. 2017). Knowledge of this kind is useful for exploring how people's interests are represented by decision-makers (Tadaki et al. 2017) and their support for conservation (Bennett 2016). This paper assumes that reality is in people's personal understanding of conservation (Dewulf et al. 2009; Moon & Blackman 2014). Paper 3 focuses on how the way people understand and perceive (frame) conservation reflects how they personally would approach the issue when given the choice among four conservation policy frames. Framing on the other hand is the social construction of frames, which would entail assessing how frames (ways of understanding) develop and change through communication.

In this chapter we have looked at the merits of assessing conservation impact to ensure that the efforts made by conservation practitioners, public officials, local stakeholders and communities make a difference for biodiversity conservation (Pressey et al. 2017; section 2.1). We have explored a new method for assessing social acceptability using people's mapped preferences (section 2.2.2 & 2.2.3) and we have seen how conservation frames are relevant for the support or acceptance of conservation (section 2.2.1). In the next chapter, we will get more familiar with community-based conservation in Norway. The Norwegian government has recently granted decision-making responsibility to local politicians where local stakeholders are consulted through advisory councils. This real-world experiment presents an opportunity to evaluate whether local governance is beneficial for conservation in a Scandinavian context.

Chapter 3. Norwegian area protection

In this chapter, I focus on protected area governance in Norway. I start with an overview of the status and threats to biodiversity and a status of biological conservation through protected areas (section 3.1). I continue with an outline of the Norwegian conservation policy and provide some insight into the reasons why there has been local resistance towards protected areas among property owners (section 3.2). I focus on this group because I found property ownership to be relevant for changes in conservation practice following the reform (paper 1 & section 5.1.1). I further explain the roles of the different actors involved in protected area governance in Norway and review other studies that have assessed the reform (section 3.3).

3.1 Status and threats to biodiversity & conservation through protected areas

Currently, 2 355 species and 40 habitat types are considered threatened in Norway (Lindgaard & Henriksen 2011; Henriksen & Hilmo 2015). Forests, wetlands and cultural landscapes harbor a large number of these species and habitat types (Ministry of Climate and Environment 2014), but there are gaps in knowledge (Ministry of Climate and Environment 2014; Henriksen & Hilmo 2015).

Land use change such as housing and infrastructure development, forestry, changed farm practices and land abandonment are the greatest threats to species and nature types (Ministry of Climate and Environment 2014). Wilderness areas with more than 5 km to the nearest permanent human installation, a metric known to be positively associated with biological diversity (Skjeggedal et al. 2005) has declined by 36% since around 1900 and is still declining (Norwegian Environmental Agency 2014a; Watson et al. 2016). Changed agricultural practices have led to a regrowth of cultural landscapes, to the detriment of species associated with low-impact land use like rough-grazing (Auditor General 2006; Daugstad et al. 2006a;

Natlandsmyr & Hjelle 2016; Austrheim et al. 2016). Motorized use is also affecting biodiversity (Kleven et al. 2006; Ministry of Climate and Environment 2015). Harvesting is assumed to pose limited threat to red-listed species, with the exception of large predators (Kålås et al. 2010; Ministry of Climate and Environment 2014). Norway's four large carnivores (wolves *Canis lupus*, wolverines *Gulo gulo*, lynx *Lynx lynx* and brown bear *Ursus arctos*) are all considered threatened (Henriksen & Hilmo 2015), but are kept at fixed population levels through hunting to accommodate local concerns (Skogen 2015).

Norway has protected 17.1% of the mainland (Environment.no), fulfilling the area-specific part of Aichi target no. 11 (Woodley et al. 2012) set out in the Strategic plan of the Convention on Biological Diversity (CBD 2010). National parks make up 9.7% of the protected terrestrial land surface, protected landscapes 5.4% nature reserves 1.9% and other categories 0.1%. In 2013, 11% of wilderness remained on the Norwegian mainland and 47% of this area was protected (calculated from publicly available wilderness maps), showing that protected areas play a large role in securing these areas. Protected area placement is biased towards alpine areas. Especially coastal areas, areas in the lowlands, areas with high pressure for land-use and rare nature types are insufficiently protected (Framstad et al. 2010; Barton et al. 2013). Four recently established coastal national parks (Ytre Hvaler , Færder, Jomfruland and Raet) point to a change in practice.

A recent study by Strand & Bentzen (2017) assessed the occurrence of human encroachments (buildings, antennas, roads, trails, ditches etc.) inside Norwegian protected areas using aerial photographs. In the study, a representative selection of 232 one square kilometer sites from Norwegian protected areas (national parks, nature reserves and protected landscapes) were analyzed, along with 100 such areas in wetland reserves. Encroachments were found in 37% of these sites in protected areas and 58% in wetland reserves (Strand & Bentzen 2017). However, it is not known if these encroachments were present prior to protected area establishment, or whether the level of disturbance is different from unprotected areas. Other reports suggest that protected waterways are being developed at the same rate as unprotected ones (Auditor General 2007) and that cabins built within and around the borders of protected areas in Norway are widespread (Haagensen 2014). Relatively little is known about the protected area impact on biodiversity in Norway because of a lack of systematic data on species distribution and abundance (Framstad et al. 2016).

3.2 Norwegian conservation policy in protected areas

Norwegian protected areas are put in place to maintain natural variation of habitat types and landscapes, biodiversity, areas for small-scale outdoor recreation, natural and cultural history, ecological connectivity and reference areas (Nature Diversity Act § 33). They are established and managed pursuant to the Nature Diversity Act (Act No. 100 of June 19, 2009 relating to the Management of Biological, Geological and Landscape Diversity). Each protected area has a set of rules (protection regulations) tailored to the local conditions of individual protected areas during the process of establishment. Amendments can also be made through public hearings (Norwegian Environmental Agency 2007). Because the goals of protected areas are general, efforts are being made to establish more concrete and measurable objectives for each protected area (Eide et al. 2011).

Non-motorized, low-impact access, small-scale harvesting and grazing are allowed in most protected areas (Heiberg et al. 2006a; Fauchald & Gulbrandsen 2012; paper 4). Recently, the government also decided to loosen the restrictions on cycling (Ministry of Climate and Environment 2016). Motorized use inside protected areas is mainly regulated through permits (paper 4), but regulations can vary between protected areas, the types of motorized vehicles and the reason for the motorized use. The conservation policy is generally most strict when it comes to land development. Development inside protected areas is generally either not allowed or regulated through permits (Norwegian Environmental Agency 2014b). Norwegian national parks and nature reserves deviate from the IUCN definitions by allowing hunting and fishing (Norwegian Official Report 2004).

Property owners should be informed and involved throughout the process of establishing a protected area (Nature Diversity Act §§ 41-46) and they receive financial compensation for the restrictions on use after the protected area has been designated (Nature Diversity Act §51). They also retain hunting and fishing rights. However, property owners frequently question the appropriateness of restricting sustainable commercial development and at the same time allowing other types of use that could be equally damaging (Heiberg et al. 2006a). Management restrictions are seen as barriers for innovation and tourism development (Haukeland et al. 2011) for instance by limiting the ability for transportation to and from areas of activity like hunting grounds, transportation of equipment and big game, and the ability to build tourist facilities like accommodation, toilets and campgrounds (Heiberg et al. 2006b). Selling sites for cabin building, finished cabins and cabin letting are important sources of income for property owners (Heiberg et al. 2006b), which is restricted inside protected areas. The additional bureaucracy in connection with permit applications adds to the frustration (Heiberg et al. 2006b), but sometimes the perceived scope of action is more limited than what is actually permitted (Heiberg et al. 2006a; Fedreheim 2013). For instance, studies have shown that protected landscapes have had little effect on farm development and farm income (Mittenzwei et al. 2010) and that the level of commercial development is similar inside compared to outside protected areas (Aas et al. 2003).

3.3 The community-based conservation reform

A nationwide reform in 2009 made the governance of Norwegian protected areas community-based. The government granted local and regional politicians, along with representatives appointed by the Sami Parliament in areas with Sami interests, the responsibility for protected areas, a responsibility previously held by the state bureaucracy at the regional level (the

County Governor; Figure 3). Local protected area boards now manage single or clusters of protected areas, aided by park managers with conservation expertise. They are in charge of decisions regarding permit-applications, budgets, management plans, plans for management measures and other current issues (Nasjonalparkstyre.no). Currently, approximately 500 local politicians distributed across 44 local protected area boards are involved in protected area management, along with app. 54 park managers. In total, 36 out of 39 Norwegian national parks as well as a substantial portion of protected landscapes and other protected areas are governed locally.

One reason for employing a strategy of community-based conservation was to mitigate local conflict (Fedreheim 2013), which has and continues to challenge conservation efforts (Reitan 2004; Daugstad et al. 2006b; Bay-Larsen 2010; Ministry of Climate and Environment 2015; Overvåg et al. 2016). Another reason was to enhance conservation outcomes (Auditor General 2006, 2014). The reform also answered international trends towards decentralized environmental management (ILO 1989; CBD 1992; Dearden et al. 2005; Dudley 2008; Hongslo et al. 2016b) and a general trend in the national strategy of delegating responsibilities from the central to the local level (Hovik & Reitan 2004).

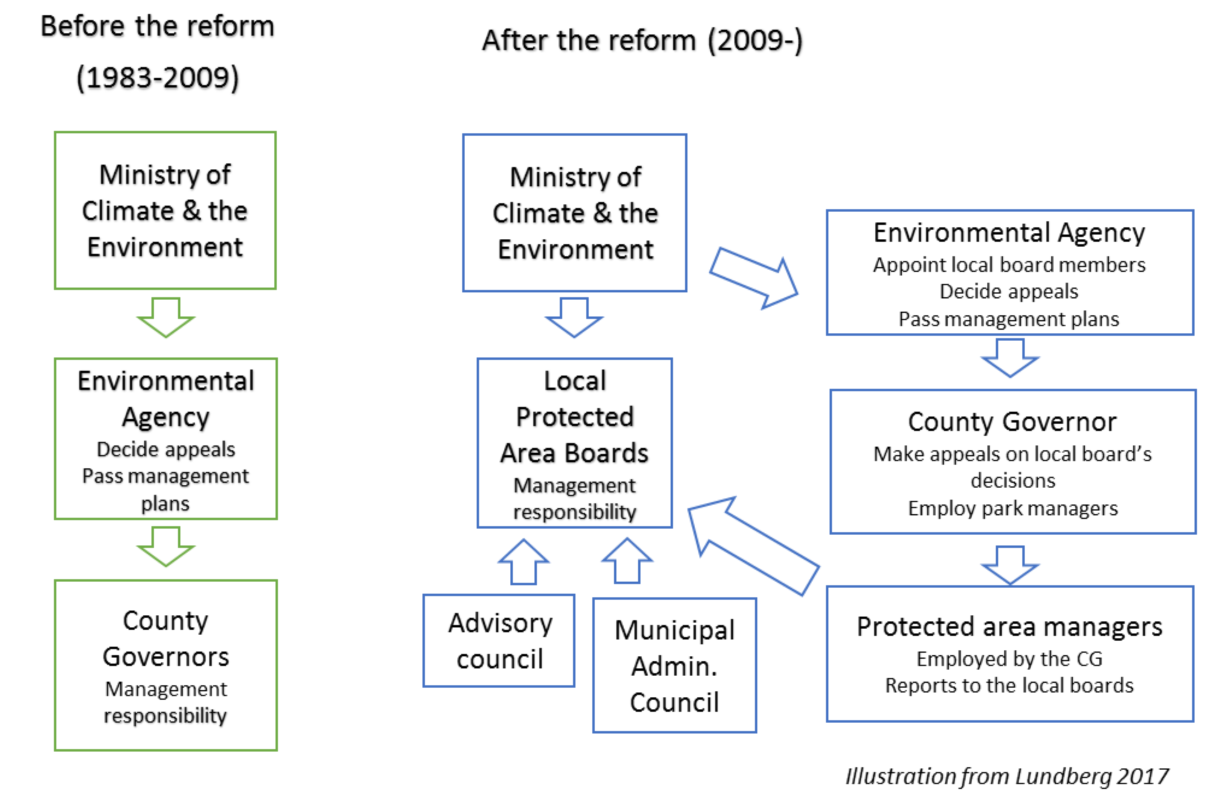

Figure 3. The main actors in Norwegian protected area governance before and after the reform. The local protected area boards are currently the main governing body. They appoint local stakeholders to serve on advisory councils, which have a consulting function. Administrative municipal councils can be established to formalize the contact with the municipalities. The County Governor is the state's regional representative and held management before the reform. The park managers act as the local board's secretariat, but are employed by the County Governor. The Environmental Agency is the professional agency at the national level, whereas the Ministry of Climate and Environment is the supreme political authority.

3.3.1 Historic background for the reform

The conservation movement in Norway was initiated in the late 19th century by an urban elite (including natural scientists) who were interested in preserving pristine nature and Norwegian mountain landscapes (Reitan 2004). In 1954, new legislation opened up for the possibility to establish national parks, and the first protected area in Norway, Rondane national park, was established in 1962 (Lundberg 2017). From the 1960s the environmental bureaucracy grew with the establishment of the Ministry of Environment in 1972, the state's regional environmental office at the County Governor's office in 1982 and the professional authority at the national level, the Directorate for Nature management (today called the Environmental Agency) in 1985 (Reitan 2004). In 1983, the management authority for protected areas was delegated from the Ministry to the County Governors (i.e., administrative decentralization, section 1.1; Lundberg 2017).

During the discussions leading up to the Parliament approval of a new National Park Plan in 1992, claims for local management were made in the hearing responses from landowner organizations at the local and municipal levels (Fedreheim 2013). This National Park Plan proposed the establishment of 40 new protected areas and the increase in size of 10 national parks, much of which was on more productive land and private land. Municipalities all over Norway were affected by this plan, which reinforced already existing lines of conflict between national environmental authorities on one side and local authorities and property owners on the other (Lundberg 2017). In 1996, the Parliament instructed the Ministry to initiate trials of alternative governance arrangements (Lundberg 2017), which led to different forms of local management being tested in four protected areas (Falleth & Hovik 2009).

These trials of local management had varied results (Vistad et al. 2006; Asplan Viak 2008; Falleth & Hovik 2009). The overall conclusion was that these local boards, with some exceptions, complied with the conservation regulations, but that despite high local political commitment, the trials did not manage to increase local support for conservation in the local communities (Falleth & Hovik 2008). Other shortcomings were: limited inter-municipal coordination, few means of sanctioning municipalities that violated conservation regulations, lack of natural science competence in the municipal administrations, few opportunities for real participation of stakeholders and other governmental agencies, and few arenas for conflict resolution (Falleth & Hovik 2008). Thus, the criticism of centralized governance can be extended to these four trials with local management (Falleth & Hovik 2008; Lundberg 2017).

Based on the local management trials, the Directorate for Nature Management opposed decentralization out of concern that local decision-making power would give precedence to local developmental interests at the expense of conservation. They also questioned whether decentralization would increase local interest and a sense of ownership, and thus a willingness to protect the areas. They proposed instead to maintain responsibility for protected areas at the regional level and, in addition, employ protected area managers responsible for the day-to-day follow up of protected areas, establish advisory councils with broad participation to provide advice and to increase administrative and economic resources significantly (Norwegian Directorate for Nature Management 2008). Despite these recommendations, the government initiated the reform in 2009 through a budgetary proposal (St. prp. 1 2009-2010).

An explanation for why the international trend of local involvement in protected area governance resulted in nationwide democratic decentralization in Norway can be attributed to local mobilization and the institutional context (Hongslo et al. 2016a). Norway and Sweden originally had very similar, hierarchical, top down systems of governance, however close ties between central agencies, interest groups and private actors in Sweden and no tradition of placing responsibility for natural resources with local governments made it natural to adopt a co-management strategy here. In Norway, local governments have extensive responsibilities for natural resource management and local development through, for instance, the Planning and Building Act. Here considerable mobilization from local political actors placed decentralization on the political agenda at the national level, resulting in nationwide decentralization to local governments (Hongslo et al. 2016a).

3.3.2 Decision-making powers and accountability

Whether or not the reform has established sufficient downward accountability to be considered democratic decentralization has been debated (Skjeggedal et al. 2016; Hongslo et al. 2016a). Locally elected decision makers are now the central governing body for protected areas, however the effect of establishing accountable representation is also affected by the powers the management body holds (Ribot 2002), and a recurring issue has been whether or not the room to maneuver for local boards is too small in order for the local boards to properly balance local community needs with conservation (Andersen et al. 2013; Auditor General 2014; Overvåg et al. 2015, 2016; Skjeggedal et al. 2016; Lundberg & Hovik 2017; Skjeggedal & Clemetsen 2017; Hovik & Hongslo 2017).

"Transferring power without accountable representation is dangerous. Establishing accountable representation without powers is empty (Ribot 2002)."

Agrawal & Ribot (1999) distinguish between four types of powers; i) power to create rules or modify existing ones, ii) power to make decisions about resource use, iii) power over rule-enforcement and monitoring, and iv) power to adjudicate disputes. Following the reform, national authorities have retained the power to create new rules (e.g., establish protected areas and devise protected area regulations and stipulate the mandate for local boards) and the power to adjudicate disputes (Hongslo et al. 2016a). Local boards have the daily decision-making responsibility (e.g., issue permits, devise management plans and plans for management measures), they maintain contact with local interests and report rule- violations. The State Nature Inspectorate is responsible for monitoring and conducting controls (Hongslo et al. 2016a).

The local boards' daily decision-making is also a result of interactions between them and national authorities. Local boards are obligated to forward all their decisions to regional authorities and the Environmental Agency, and to report to the regional authorities (County Governor) annually. Regional authorities should oversee local boards' decisions and can make appeals on behalf of the state. The Ministry of Climate and Environment is the supreme political authority for protected areas and can change the local board's mandate and retract the delegated authority should they fail to comply with the overall goals of management (St. prp.

1 2009 -2010). Management plans and plans for management measures need approval from the Environmental Agency. The management plan must stay within the boundaries set by the Nature Diversity Act and the protection regulations (St. prp. 1 2009-2010). The Environmental Agency and the Ministry can overturn local boards' decisions if they consider them invalid (Public Administration Act § 35).

In Norway the elected politicians on local protected area boards the can be considered both downwardly accountable to their constituency and upwardly accountable to the national authorities that appointed them, according to Hongslo et al. (2016). The dual accountability is a way of adjusting the institutional setup to fit the multi-level character of conservation (Hovik & Hongslo 2017). Skjeggedal et al. (2016) propose that the local boards are mainly upwardly accountable because they lack power to make decisions about local development. Overvåg et al. (2016) conclude that local actors have experienced an increase in state's power and a reduction of local autonomy in later years, due to the limited powers decentralized to local boards, the expansions of protected areas (which has transferred powers from the local to the national government), and the strengthening of national policies on protection and use.

In 2014, the Norwegian Auditor General assessed the reform. In their report 65% of the local board members surveyed found the room to maneuver sufficiently large whereas 35% disagreed (Auditor General 2014). Local board members regularly bring up this issue in interviews and workshops (Andersen et al. 2013; Skjeggedal et al. 2016; Overvåg et al. 2016; Lundberg & Hovik 2017; Hovik & Hongslo 2017).

To improve integration between local and regional land use and conservation, and to reduce conflicts, scholars have proposed to transfer responsibility for protected areas to the land use planning sections where the municipalities are in charge, to include local development as an explicit goal for protected areas and occasionally open up for revision of the protection regulations (Overvåg et al. 2015; Skjeggedal et al. 2016; Skjeggedal & Clemetsen 2017). These studies highlight the need for local development among mountain municipalities that are struggling with depopulation and a tight local economy (Statistics Norway 2014; Skjeggedal et al. 2016; Overvåg et al. 2016).

"If the objective is to develop the mountain municipalities as rural societies, it is necessary to make changes in the present planning and management of mountain areas" (Overvåg et al. 2015; Skjeggedal et al. 2016).

They maintain that transferring protected areas from the Nature Diversity Act to the Planning and Building Act would not entail such a big change, it would simply be to revert back to the situation before the protection and that the challenge of securing protected area status and facilitate inter-municipal coordination:

"[…] may be ensured by participation in the planning processes and, if necessary, by authorities on regional or national level using their right to make objections owing to major regional or national interests. Moreover, when national considerations so require, the King may decide that certain specified parts of the land-use element shall not be subject to alteration or revocation within a specified time frame (PBA section 11-18)" (Skjeggedal & Clemetsen 2017).

Their proposition is, as mentioned, debated (Fauchald & Gulbrandsen 2012; Hongslo et al. 2016a; Lundberg 2017).

3.3.3 Public participation

Stakeholder participation was a challenge during the initial local management trials (section 3.3.1) and is still a challenge with the new management model (Auditor General 2014; Lundberg & Hovik 2017). Stakeholder participation is currently carried out through advisory councils, where lay stakeholders are appointed by the local protected area boards. These councils have a consulting role and should meet at least once a year (St. prp. 1 2009-2010).

Attention to stakeholder participation in the policy documents that laid the foundation for the reform was relatively low (St. prp. 1 2009-2010; Lundberg & Hovik 2017), despite ambitious goals aiming at creating local ownership and including local knowledge. According to the Auditor General (2014), establishing well-functioning advisory councils has been a challenge. The direct contact between stakeholders and local board members is modest and instead, stakeholders contribute with local knowledge in a more informal way through contact with protected area managers on a case-to-case basis (Lundberg & Hovik 2017). Such access to local knowledge is beneficial, however, informal meeting do little in terms of developing shared understanding and collaboration (Lundberg & Hovik 2017). Currently, local board members have a much more favorable evaluation of how well stakeholder participation functions compared with the stakeholders themselves (Lundberg & Hovik 2017).

Compared with other European protected area management models Overvåg et al. (2015) found that the Norwegian model does not include stakeholders to any substantial degree, as stakeholders merely hold a consulting role and do not have decision-making power, which is the case in Sweden, Austria and Scotland. In a few cases in Norway today (Breheimen and Reinheimen national parks) local stakeholders have been assigned seats on local protected area boards where they have decision making power in the same way as the local politicians (i.e., co-management). The scope of including interest groups in the decision-making could increase in Norway also in coming years. By request of the government, trials are currently held in three protected areas (Jomfruland and Raet national parks and Trollheimen protected landscape) where appointing local stakeholders to protected area boards is being assessed (Lundberg 2017).

3.3.4 Representation

The local board members are proposed by the Municipal Councils, County Parliament and the Sami Parliament, and officially approved by the Environmental Agency, on behalf of the Ministry of Climate and Environment. Municipality members should primarily be high ranking political representatives, mainly mayors.

The current public policy is to ensure that each gender is represented by at least 40% on government appointed councils (The Gender Equality Act §13, 2013). Local protected area board members are relatively equally divided between men and women, however, most local board leaders (72.5%) and municipal representatives (63.2%) are men whereas women dominate among county representatives (71.2%; Aasen-Lundberg 2017). Only 25.6% of advisory council members are female (Lundberg 2017). These figures apply for the 2015-2019 period. The lack of women on advisory councils has also been pointed out by Svarstad et al. (2006), who found that the reason for the low proportion females was because few women were asked to participate (Svarstad et al. 2006). This was partly explained by a desire for political representation on a high level, meaning mayors, and there were few female mayors. Another factor was the absence of any mention of gender equality from the Ministry or the Environmental Agency (Svarstad et al. 2006). Attention to gender representation on advisory councils has not improved much after the reform, because in the mandate that stipulates what local boards should consider when it comes to representation there is no mention of gender, only that the representatives should be a mix of the different interest groups in the areas. Through interviews Aasen-Lundberg (2017) finds that "actors at the local and national level do not regard gender issues as relevant and male dominance is taken for granted". I will get back to this issue in chapter 5, as representation became an important part of the results in both papers 2 and 3.

3.3.5 Conservation outcomes

The reform also aspired to enhance conservation outcomes (Auditor General 2006, 2014). In 1995 the County Governors, who held management responsibility at the time, reported to the Environmental Agency that 18% of protected areas were threatened or needed additional management measures to maintain conservation values. The main reason for the inadequate management was a lack of manpower at the County Governor's office. In 2004 and 2006 this percentage had increased to 31% and 30%, respectively (Auditor General 2006) and in 2008 it reached 38% (St. prp. 1 2009-2010). Increased knowledge was reported as a part of the explanation for the increase in threatened protected areas from the initial survey in 1995. A protected area was considered threatened if there was at least one activity inside or outside the protected area that threatened the conservation goals and values.

The Norwegian Auditor General's assessment in 2014 was that local protected area boards adequately safeguard conservation objectives, but the report concluded that it was too soon to say anything for certain (Auditor General 2014). Fauchald & Gulbrandsen (2012) have raised concerns about the ability of the current model to ensure the attainment of conservation goals. They emphasize the need for more specific conservation goals, utilizing and updating management plans to a greater extent, ensuring representation of scientific and conservation expertise on advisory councils and greater collaboration between managers and regional and national environmental authorities. Hovik & Hongslo (2017) surveyed local board members and found that the concern that the local boards will prioritize local interests over protection may not be warranted as the great majority believed that it is important to both take care of national rules and protection regulations as well as local interests and viewpoints. The board members also largely agreed that local management contributes to a good balance between use and protection and an integrated management of the areas inside and outside the protected areas.

“In their capacity as board members, local politicians adjust to the norms and rules embodied in the institutional settings of the boards as executors of central government authority. At the same time, the data suggest that the double accountability lines function. As representatives of the local and regional communities, the politicians bring in local perspectives. They search for decisions informed by local knowledge and the interests of local actors, and aim to find a balance between national policy concerns and local interests” (Hovik & Hongslo 2017).

Explicit attention to conservation impact (that conservation initiatives should make a difference relative to the situation of no initiative; addressed in section 2.1) of the protected areas and the reform in Norway seems to be lacking in these discussions.

In this chapter, we have seen that great many species and habitat types are threatened in Norway, and that there is a need for protecting areas where the pressure for human use is high (section 3.1). We have seen how the amount of wilderness (areas > 5km from roads or encroachment) is declining and that protected areas play an important role in maintaining the remaining areas of wilderness (section 3.1). The current conservation policy is restrictive when it comes to land development but allows traditional consumptive uses (section 3.2), and it remains to be seen whether those policies are effective at averting biodiversity loss. We have explored some of the reasons why protected area restrictions cause resistance among private landowners, and found that the resistance does not necessarily always reflect material constraints, but is also rooted in the right to self-determination and perceptions of an equal distribution of costs (section 3.2). The community-based conservation reform was an attempt to address the local resistance and at the same time improve biodiversity conservation, but scholars disagree on whether the amount of influence awarded the different levels of governance is optimal for accomplishing the task of balancing local needs with conservation (section 3.3.2). Stakeholder involvement requires greater attention (section 3.3.3) and adequate representation of both genders is a part of this issue (section 3.3.4). Preliminary qualitative assessments of conservation outcomes suggest that the current management model safeguards conservation values (section 3.3.5).

Chapter 4. The papers

Paper 1

Paper 2

Paper 3

Paper 4

Chapter 5. Synthesis and discussion

Mainstreaming conservation is necessary to address the mounting pressure for utilization of natural resources. Greater support or acceptance of conservation could improve the design, ease the implementation and secure the persistence of conservation initiatives such as protected areas (Hirschnitz-Garbers & Stoll-Kleemann 2011; Andrade & Rhodes 2012; Oldekop et al. 2015; Bennett 2016; Cetas & Yasué 2017; Lindenmayer et al. 2017). Supported conservation initiatives are also less likely to be accompanied by negative social impacts (Ward et al. 2017). Lack of support could undermine conservation efforts through, for instance, a continued biased placement of protected areas, rule violations by locals or outsiders, or the abandonment of conservation initiatives by governments (Holmes 2007, 2013; Joppa & Pfaff 2009; Mascia & Pailler 2011; Pfaff et al. 2014; Venter et al. 2017; Lindenmayer et al. 2017).

The overarching research question of this thesis was whether the Norwegian community-based conservation reform has reduced threats to conservation values and lowered local resistance. In this final chapter, I briefly summarize the papers 1-4 (section 5.1), I outline assumptions and limitations of the thesis and the main findings relevant for answering the research question, and suggest areas for future research (section 5.2), before making a final conclusion (section 5.3)

5.1 Summary and discussion of the papers

5.1.1 Paper 1 – Impact of local empowerment

Governance reforms are often initiated in order to improve conservation, but the effect of different governance regimes on conservation remains uncertain (Macura et al. 2015). Since the primary mechanism that protected area governance can attain favorable ecological outcomes is through its effect on human activity (Ferraro & Hanauer 2015), we assessed in paper 1 whether the Norwegian community-based conservation reform has had an effect on decisions to regulate use. We focused on whether local empowerment has led to a more lenient conservation practice and an increased acceptance of conservation decisions.

Our results showed that conservation practices were liberal both before and after the reform (i.e., most applications were granted), but that the reform has led to a slightly more lenient conservation practice on private land. Our results are similar to Multiconsult (2014) who assessed a selection of permit applications (applications treated according to the Nature Diversity Act §48). They found that local boards and regional authorities granted 89-90% of the permit applications. In our study, regional authorities (the County Governor) granted 92% on both private and public land, whereas the local boards granted 92% on public land but 97% on private. In the assessment of the local trials before the reform Falleth & Hovik (2008) noted that "many local councils give priority to landowners, resource users and tourist businesses", which also seems the most likely explanation for the effect of land tenure in paper 1.

Property owners and other rights holders (usufruct right holders, hunters, fishers, farmers, and reindeer herders) were responsible for a large portion of the applications (53%). These results underline their position as a key stakeholder group that carries out much of the activities that are restricted thorough permits. It also suggests that they could collectively be experiencing the additional restrictions from the protection the most.

The majority of the permits concerned motorized vehicle use, especially on snow-covered ground. Different categories of use were stricter than others. Applications for buildings, industry development, and motorized vehicle use on bare ground were the most contested cases (most often rejected and appealed). Multiconsult (2014) also reported that motorized vehicle use dominated the permits.

Variation in user interests seemed to account for much of the variation in the number of permit applications between local boards (Multiconsult 2014). A large portion of the permit applications in paper 1 involved activity in protected landscapes, suggesting that the level of activity is highest here.

National authorities only appealed or overturned local boards' decisions on five occasions and stakeholders appealed a slightly lower portion of the permit decisions after the reform (2.50%) compared with before (3.95%). The small decline in appeals is likely caused by the lower rejection rate, because a high proportion of the appealed cases had been rejected, giving grounds for appeal. It could also have been the consequence of other changes in governance, such as an increased communication with park officer and stakeholders before submitting applications. Multiconsult (2014) reported that 4.7% of the local board's decisions were appealed in their study, compared with a slightly lower proportion for the regional authorities before the reform (3.4%) and that, similar to paper 1, buildings and other technical installations were the cases most frequently appealed. That local boards' decisions are rarely appealed has also been reported by Auditor General (2014) and Hovik & Hongslo (2017), who concluded that there is a strong acceptance of local decision-making. However, filing appeals is resource and labor intensive, and the low number of appeals can also be partly explained by low capacity among conservation organizations (Ministry of Local Government and Modernisation 2014).

5.1.2 Paper 2 – Assessing local acceptance of protected area management

Because conservation is believed to be more effective and longer lasting with the support of local people, knowing people's preferences and how they align with conservation initiatives can be helpful for crafting new conservation policies and for assessing the outcomes of those already in place (Bennett 2016). In paper 2, we assessed the social acceptability of the current conservation policy using mapped preferences in both protected and unprotected areas. We recruited local residents through a random household survey and asked the participants to place markers on a map, indicating whether and where they favor or oppose consumptive use (i.e., grazing, hunting and fishing), land development, motorized use and predator control. Using these data we assessed whether the priorities of local people residing near protected areas in Norway harmonized with the spatial restrictions imposed by conservation policies.

Local residents strongly favored consumptive resource use and predator control regardless of protected area status, and were more likely to oppose than favor residential and industrial development inside protected areas (the effect was marginally significant). These results showing social acceptance for the current conservation policy are supported by Skjeggedal et al. (2016) who carried out interviews and workshops with key actors in six mountain municipalities, and concluded that most conflicts were in the buffer zone of protected areas and that there was overall broad agreement or acceptance for restricting activities inside protected areas.

The results also show how the local communities did not take into account the protected status when it came to their motor use preferences. They were even more likely to favor rather than oppose snowmobile use inside protected areas than outside (although the effect was not statistically significant). Nevertheless, snowmobiles and other forms of motorized vehicle use were highly contested in all areas.

The idea that allowing consumptive uses in protected areas could foster support for conservation against external threats (section 1.1) such as industry and residential development finds some traction in the data. However, there is a trade-off with large predator conservation, because our study participants widely preferred predator control alongside consumptive uses. These results are backed by studies that show how large predator conflicts center around threats to traditional land use practice such as big game hunting, sheep farming, and a rural culture, more than actual material losses and the presence of predators (Gangaas et al. 2013; Skogen 2015).

Another point that became evident was that gender affected preferences for land management. Public surveys have found that Norwegian men are generally more involved in hunting, fishing, off-road cycling and snowmobiling than women (Vaage 2015). These preferences were reflected in our data, as the male participants mapped on average more preferences that favored hunting, predator control and snowmobile use.

5.1.3 Paper 3 – Conservation frames and stakeholder's attitudes

There are multiple ways to understand and frame conservation (section 2.2.1) rooted in different views of the relationship between people and nature (Mace 2014). The way conservation is framed has implications for how it resonates with people, and subsequently their level of support (Jacobs & Buijs 2011; Bennett 2016). In paper 3, we used survey data from members of 11 advisory councils to evaluate how different conservation policy frames resonated among local stakeholders. We asked the stakeholders about their concerns with respect to different human activities as threats to conservation values, their prioritized management actions and their trust in protected area governance actors, and questioned about their acceptance for protected area downgrading for the sake of public or economic interests.

We found that conservation frames resonated differently among the stakeholders. A human-centered frame resonated with half of our study participants and a nature-centered frame with the other half. The participants who found that a human-centered frame resonated the most with their view of conservation had a high acceptability towards protected area downgrading. They perceived woodland expansion as the main threat to conservation values and prioritized management actions that encourage resource use. They were likely to represent property owners, hunting and fishing and livestock grazing, and to place most faith in local governments. The participants who found that a nature-centered frame resonated the most with their view had a lower acceptability towards downgrading protected areas. They saw nature as threatened by human activities such as motorized vehicle use and land development, and proposed actions to increase biological diversity and to reduce threats from land use changes. They were largely represented by conservation interests who placed most faith in higher level environmental authorities.

Our results point to relatively large differences in the reasoning behind nature conservation among the members of advisory councils. Qualitative studies have also found how different views of the relationship between humans and nature are central to tensions between stakeholders and environmental authorities. For instance, people living in or next to protected areas in three other European countries differed in their views of nature, such as whether nature and culture are related or opposites, whether nature is fragile or resilient, stable or dynamic (Buijs et al. 2008; Buijs 2009). Viewing nature as pristine was associated with preferences for stricter regulations and exclusion (Buijs et al. 2008). Through case studies involving key actors in municipalities with protected areas in Norway Overvåg et al. (2016) found that:

"In explaining the tensions between local and national government power relations respondents […] pointed to what they experienced as a fundamental difference between themselves and environmental governmental bodies in terms of their perspectives on the relationship between humans and nature. While the respondents focused on finding solutions that combine human use and protection, environmental government bodies typically desire "purely natural" ecosystems. […] one mayor said: "They define humans as separate from nature, which is an understanding that is contradictory to history and human ecology, and should never be accepted."

They also found that lack of trust was an issue:

“Five respondents […], two politicians, two municipal administrators, and one landowner – also reported that they consider themselves to be “viewed with suspicion” on environmental management issues by the national government, with regard to both their skills and their values. They consider this suspicion to be unjustified, because they claim to largely support the general goals of the national environmental policies. They also believe that, in some instances, this disagreement creates distrust and reduces the national policies’ legitimacy.”

In our study we saw how stakeholders differed with regards to trust in the local government and higher-level authorities, but they nevertheless had similar and relatively high levels of trust in the local protected area boards established after the reform and in the other advisory council members. Having similar views of appropriate forums for management and dispute resolution is valuable for conflict management (Gray 2003b) and therefore we conclude that these institutions could provide a good point of departure for reconciling contrasting views of conservation. However, as seen in section 3.3.3, local stakeholders and local board members have widely different perceptions of the way stakeholder involvement currently functions (Lundberg & Hovik 2017), which suggests that greater attention to the participatory process is required.

Based on the findings in paper 2 and in this paper we also propose that attention to representation on advisory councils is needed if the goal is to represent the opinions of the general public and create a balance between conservation and local interests. In paper 2 we saw how gender affected land management preferences and this study confirms the current underrepresentation of women in natural resource management reported elsewhere (Svarstad et al. 2006; Lundberg 2017). This study also showed how participants on advisory councils in general have a higher acceptance towards downgrading protected areas (i.e., unfavorable attitudes) than the general public in the European Union (European Commission 2013) and among Norwegians (although attitudes were assessed somewhat differently in this latter study than in paper 3; Seippel et al. 2012). Our study revealed that acceptance towards downgrading was highest among property owners, hunting and fishing interests and livestock grazing and that these interest groups made up a high proportion of the representatives on the advisory councils. Other studies have shown that less favorable attitudes among Norwegians towards biodiversity conservation are related with resource dependency, preferences for local management, and also demographics (younger people, females and more educated respondents are more supportive; Fedreheim and Blanco, 2017; Kaltenborn et al., 2016; Kvernenes, 2017; Listhaug and Jakobsen, 2007; Seippel et al., 2012; Seippel and Strandbu, 2011).

5.1.4 Paper 4 – Policy indicators for use in impact evaluations

To assess the impact of protected areas it is necessary to know the strictness level that accompanies the protection. Impact assessments frequently use IUCN categories for this purpose, but these do not necessarily reflect the actual management (e.g., Muñoz & Hausner 2013). In paper 4, we investigated the conservation rules and objectives of alpine protected areas in Norway and British Columbia (BC), Canada (Figure 4), to assess whether the Norwegian conservation policy can be considered strict or liberal compared with a biogeographically similar North American protected area network.

The results in paper 4 showed that Norway has a more liberal conservation policy than British Columbia. Conservation rules reflected the public right of access and the subsistence harvest culture in Norway whereas wilderness norms dominated in British Columbia, e.g., fishing, trapping, hunting, berry, plant and mushroom picking, grazing, campfires, tenting, and collecting camp wood is allowed in Norway, but much more regulated in British Columbia. We also found that IUCN categories did not reflect the actual strictness level of protected areas.

The Norwegian conservation policy is also liberal in comparison with neighboring country, Sweden, which also follows a stricter and more wilderness oriented practice (Fauchald et al.

2014). Norway has used more less strict, multiple use designations compared with Sweden who has adopted the stricter categories IUCN Ia and Ib more frequently (paper 4; Fauchald et al. 2014). Multiple use designations make it easier to protect areas of high developmental pressure because they can accommodate existing uses (Pfaff et al. 2014), which could explain why Norway has managed to protect a larger area than Sweden (Fauchald et al. 2014). In terms of international conservation commitments, Norway has chosen the more normative pathway, whereas Sweden has followed a stricter, legally-binding approach to a greater extent. The reason being that it is arguably simpler to adopt stricter regulations when the conservation norms favor wilderness ideals like in Sweden (Fauchald et al. 2014).

5.1.5 Geographical scope, data material and analyses

Papers 1-3 all center around two study regions, one in the northern and one in the southern part of Norway (Figure 4a). The study areas in paper 4 include protected areas in Norway and in the Canadian provinces British Columbia and Alberta, all located in the alpine areas (Figure 4b & c).

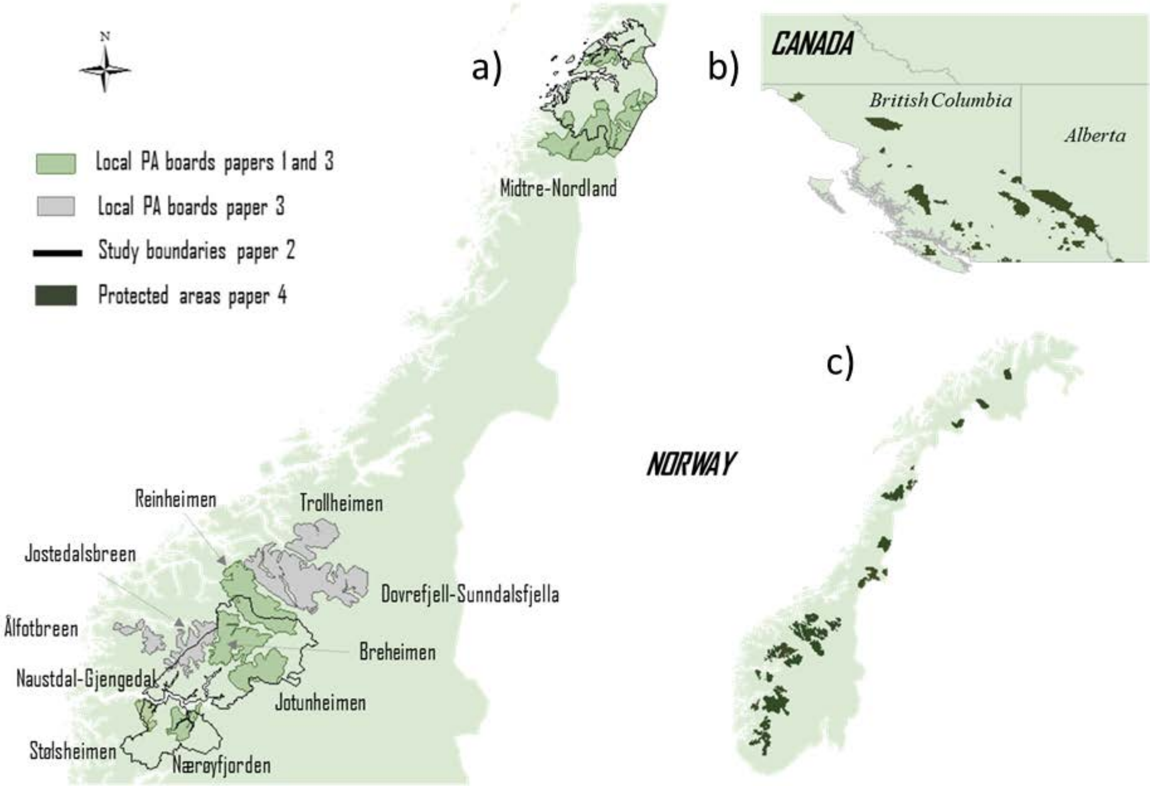

Figure 4. Map of the study areas. a) Study areas for papers 1-3 and b & c) the protected areas included in paper 4.

In paper 1, we assessed the conservation practice before and after the reform from 1,466 permit applications filed in 31 protected areas from 2006-2014 (Table 1). In the study we investigated the conservation practice of the local protected area boards Midtre-Nordland in the north and Breheimen, Jotunheimen, Nærøyfjorden, Reinheimen, Stølsheimen in the south (Figure 4a). We used mixed logistic regression to investigate the probability of a granted application.

The web-based public participation mapping employed in paper 2 covered the six municipalities Bodø, Fauske, Saltdal,Beiarn, Gildeskål and Sørfold in the north and the five municipalities Sogndal, Luster, Vågå, Skjåk and Aurland in the south (Figure 4a). These municipalities cover 101 protected areas. The data material for this study consisted of the mapping efforts of 197 people in the north and 189 people in the south (Table 1). We used mixed logistic regression to investigate the probability of a favor rather than an oppose preference.

In paper 3, we assessed survey responses of members of 11 advisory councils (Table 1). We included the advisory councils of all the local protected area boards from paper 1, in addition to the advisory councils in Dovrefjell, Jostedalsbreen, Naustdal-Gjengedal, Trollheimen, and Aalfotbreen (Figure 4a). We used multivariate statistics (multiple factor analysis - MFA) to assess the interrelationship and reduce dimensionality among stakeholder's threat assessments, preferred management actions, trust in governance actors and interest group. We used ordinal and multinomial regression to assess the relationship between the resulting MFA dimensions and attitudes towards protected areas and conservation policy frames.

In paper 4, we investigated the conservation rules of individual protected areas. We included 48 protected areas in Norway and 51 in the Canadian provinces British Columbia and Alberta, all located in the alpine zone (Figure 4b & c). We used multivariate statistics (optimal scaling) to capture the main variation in strictness level among 99 protected areas based on information about conservation objectives and rules regarding consumptive resource use, motorized vehicle use and recreational use (Table 1).

Table 1. Overview over the main data material and statistical analyses utilized in this thesis.

Paper no.	**Unit of analysis**	**Type of response variable**	**Independent variables**	**Sample size**	**Statistical methods**
1	Permit applications	Binary (granted or rejected)	IUCN category Land tenure Type of activity Local protected area board (random)	1466 applications	Mixed logistic regression
2	Spatial preferences for human activities	Binary (favor or oppose)	Landscape (3 variables) Governance (2 variables) Accessibility (2 variables) Demography (4 variables) Type of activity Participant/region (random)	386 respondents/ 3324 mapped preferences	Mixed logistic regression
3	Attitudes towards downgrading	Ordinal (accept, partly acceptable, not acceptable)	1st multiple factor dimension 2nd multiple factor dimension Age Gender	93 respondents	Multiple factor analysis, Ordinal regression, Multinomial regression
	Conservation frames	Nominal (nature despite people, nature for people, nature and people)			
4	Conservation rules	Ordinal (not allowed, permits, space or time limitation, allowed)	IUCN category Age of protected area Country Size of protected area	99 protected areas	Ordinal scaling
	Conservation objectives	Binary (present or absent)			

5.2 Limitations and future directions

In paper 1, qualitative investigations (e.g., interviews with decision-makers, permit applicants, or central government officials, or a qualitative content analysis of the permits) could have helped explain the observed pattern and reveal why there was a change in decision-making as a result of the reform, as demonstrated by the studies reviewed in section 2.1.1. We do not know, for instance, if the higher chance of a granted permit is due to local boards prioritizing local use and commercial activities on private land, or whether the central government could have signaled such a change in practice. After all, most applications were also granted before the reform so this change does not represent a dramatic shift in conservation practice. A future avenue for research could be to assess the research question using a qualitative investigation of the permits, because permits also stipulate the reasoning behind the decision. Rejected applications and appealed decisions are especially interesting as these represent the cases where there is potentially the greatest disagreement between stakeholders, local and national authorities.

Because of the liberal conservation policy and practice and the relatively similar conservation practice before and after the reform future impact studies of protected areas could focus on the level of human use relative to the counterfactual of no protection (Figure 5). Protected area restrictions can affect activity in different ways. For instance, through a more restrictive or lenient permit practice (assessed in paper 1), by deterring people from applying for permits due to frustration over the added bureaucracy or belief that their request will be turned down, using time and space restrictions, and people can restrict their activity due to support for conservation or alternatively violate rules. Other aspects such as physical access, costs and benefits of the activities and societal trends also influence activity patterns. The level of use that would have occurred if it were not for protection can be measured from the level of human activity in similar unprotected areas, but finding suitable control sites can be challenging, as we saw in paper 1. For example, the study of Strand & Bentzen (2017) reviewed in chapter 3 could be extended to include the degree to which matched unprotected areas contain infrastructure or motorized vehicle tracks.

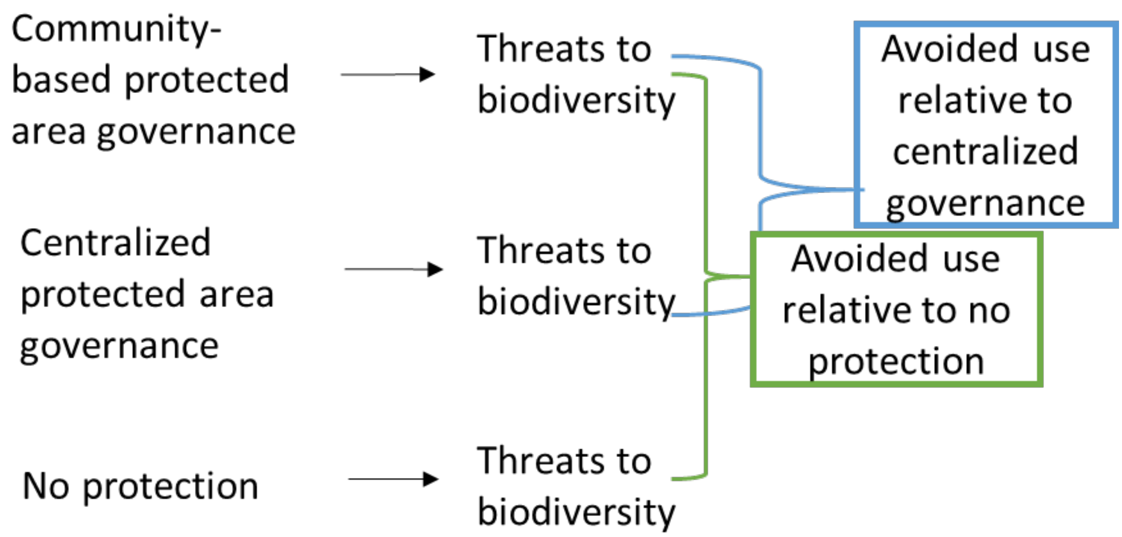

Figure 5. The impact of community-based conservation on threats to biodiversity can be measured as the difference between the counterfactual scenarios of centralized governance and no protection.

To further aid future impact assessments information about regulations and the level of human activity in protected areas could be recorded and made readily available. For instance, information about regulations and strictness level was more easily available in BC than in Norway (paper 4), because the management plans usually included a table with an overview over the strictness level for the different human activities. Adopting this practice in Norway could ease research efforts and make the rules more accessible to park visitors. Similarly, finding ways to measure/record the level of human activity (e.g. the spatial location, type, amount and justification for the activity) deemed threatening to conservation would be beneficial. For example, environmental authorities already upload all their permit-decisions to an online database. This database could be adjusted to include a section where it is possible to enter spatial coordinates and the extent of the activity in standard format.

In paper 2, we looked at presence-only data (the probability that a participant preferred favor or oppose the activity, given that the participant already placed it). Areas where people did not map preferences are also relevant, because this could imply that people are happy with the way things are and want to maintain status quo, or are unfamiliar with those areas and issues surrounding their use and management. Moreover, a statistical aggregation of preferences can overlook contentious location-specific issues. Future work could therefore focus on giving community members the opportunity to comment on the results in order to add nuance.

Because the preferences in paper 2 were not designed especially to illuminate how cognizant people are about conservation policy (whether they actively support, accept, are indifferent, do not accept or actively oppose; section 2.2.2), we were not able to distinguish clearly between these terms. For instance, one possibility is even that some participants map different preferences inside and outside protected areas without being conscious about the protected area status. Future studies could consider developing spatial markers and web pages that are explicit about context and reveal the thought processes of the participant in relation to perceptions of activity levels and restrictions in the areas in question.

Our results in paper 3 showed little agreement among key stakeholders on how to frame and approach conservation. The question of whether conservation practitioners should rely on a human- or nature-centered framing has no straightforward answer and ties to another unresolved debate concerning whether conservation efforts are best placed trying to induce a widespread, deliberate shift in human values (cognitive fix) or if it is more effective to work within existing value system and focus on specific behavioral changes (structural fix; Manfredo et al. 2017a, 2017b; Ives & Fischer 2017). Recently, attention has been devoted to relational values for a more inclusive way of framing conservation compared with the dichotomy of protecting nature for its own sake (nature-centered) or for humans' sake (instrumental value). "Whereas intrinsic and instrumental values are often presented as stark alternatives, many important concerns may be better understood as relationships with both aspects" (Chan et al. 2016). Klain et al., (2017) demonstrated that a relational value framing that emphasized kinship with plants and animals, stewardship and responsibility to nature as well as to other humans resonated broadly across different populations. Thus, relational values represent a promising avenue for engaging both proponents and opponents of new conservation "in rethinking conservation in the context of local narratives and what it means to lead a good life" (Klain et al. 2017).

With these studies, I have presented methods which can be of value to impact evaluations of conservation. Ecological outcomes arising from governance reforms generally need time to materialize, but behavioral changes related to conservation practices can act as a precursor to changes in ecological outcomes. In paper 1, I showed how the impact of governance can be evaluated at an early stage by looking at changes in conservation practice before and after a reform. Better measures of strictness are needed (Ferraro et al. 2013) and in paper 4, I presented a method for empirically assessing conservation rules. Spatial data is one of the most important tools for work related to biodiversity conservation in the local communities (Andersen et al. 2013) as well as on the global scale (Nagendra et al. 2013) and in paper 2 I demonstrated how mapped preferences for the development of human activities can be a valuable tool for conservation practitioners and researchers because they add the spatial dimension to social acceptability assessments, an aspect highlighted by Brunson (1996). Developmental preferences also provide indications of the pressure for human use and can point to issues of rule-compliance. Web-PPGIS can as such be useful for monitoring and assessing perceptions of conservation initiatives in relation with spatial information on governance, land use management and the social and ecological context on a range of spatial scales.

5.3 Conclusion

The overarching research question of this thesis was whether the reform has achieved what was intended: to reduce threats to conservation values and to lower local opposition to conservation. This community-based conservation reform is unique because of its nationwide scope and Scandinavian context, as much attention has been devoted to community-based conservation in developing countries. This thesis shows that community-based conservation has had a relatively little effect in terms of reducing (or considerably increasing) human activities deemed threatening to conservation objectives (i.e., regulated through permits; paper 1 & section 5.1.1). Qualitative assessments show that local protected area boards generally stay within the boundaries of conservation regulations and strive to balance local use and conservation (section 3.3.5). The slight increase in leniency on private land could, over time, contribute to increased anthropogenic disturbance, and further assessments of the extent to which protected areas avoid use deemed threatening to biodiversity could illuminate this issue.

Land-use change is one of the most important threats to biodiversity (sections 1.3 & 3.1). The local communities seemed to accept restricting residential and industrial development inside protected areas (paper 2 & section 5.1.2), whereas a large proportion of key local stakeholders were less supportive of the idea of prioritizing conservation over economic development (paper 3). In the event of increased stakeholder influence (section 3.3.3) this lack of support among stakeholders could have consequences for conservation outcomes (Newig & Fritsch 2009). If the goal is to reflect the general population and maintain a balanced representation of conservation and local interests, attention to representation seems warranted (papers 2, 3 & section 5.1). The lack of support among stakeholders could partly be due to the participatory process, which has been awarded relatively little attention compared with the reform's ambitious goals of creating local ownership (section 3.3.3).

Key stakeholders have different perspectives on what constitutes conservation, which causes resistance (paper 3 & section 5.1.3). From the local perspective, development is considered important in order to maintain vital communities (section 3.3.2), whereas seen from the national and international perspective, it is important to restrict human use to reduce the continuing reduction in wilderness areas (section 3.1; Watson et al. 2016). Both claims have merit, and when people frame an issue very differently, cooperation becomes difficult. Despite the differences in opinion among local stakeholders regarding the substance of conservation, they displayed similar levels of trust in advisory council members and in the local protected area boards (paper 3), suggesting that these arenas could be a good place to deepen the conservation conversation.

At present it is difficult to see how the community-based conservation reform has substantially improved biodiversity conservation compared with, for example, the initial recommendations from the Environmental Agency (section 3.3.1), which were to maintain responsibility at the regional level, employ park managers positioned in the local communities, establish advisory councils with broad participation and increase financial and administrative resources (Norwegian Directorate for Nature Management 2008). Considering that a lack of resources was a key factor for poor conservation outcomes before the reform (section 3.3.5) and that the initial trials of local management also showed little improvement in the local perception of conservation (Falleth & Hovik 2008), their advice seems pertinent. On the other hand, institution building at the local level takes time (Berkes 2004). Locally elected politicians appear good at tailoring decisions to local needs while simultaneously adhering to conservation regulations (section 3.3.5), and so the way forward now points to greater attention to the participatory processes and to conservation impact assessments.

There are great many factors that determine the ability of protected areas to prevent biodiversity loss (Barnes et al. 2017). Conservation is complicated, and providing a definitive answer to which mode of governance should be considered most favorable, given the myriad of factors involved (e.g., the decision-makers' resources, capacity, degree of empowerment and their level of stakeholder involvement) is not straightforward. According to Berkes (2007) it is necessary to move away from thinking whether community-based conservation work or not and acknowledge that "there are legitimate community perspectives for what conservation is or could be, and it is an important task for conservation practitioners to understand these perspectives and deal with them". Because there are no blueprint solutions to what kind of governance best serves biodiversity conservation, conservation science must develop innovative ways of evaluating progress towards this goal. Such evaluations should preferably start early in the process, apply counterfactual thinking and include people's perceptions as part of the analysis.

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Appendix

Glossary

Administrative decentralization	When powers are transferred to lower-level actors who are accountable to their superiors in an hierarchy (Agrawal & Ribot 1999)
Co-management	Representatives of various interests or constituencies sit on a governance body with decision-making authority and responsibility, and make decisions together (Borrini-Feyerabend et al. 2013)
Community	Heterogeneous entities, where people and institutions have diverging interests, different capacities and are affected by processes operating on a range of scales (Ojha et al. 2016). Multidimensional, cross-scale, sociopolitical units changing through time (Carlsson & Berkes 2005)
Community-based conservation	Natural resources or biodiversity protection by, for, and with the local community (Western and Wright 1994 citation in Berkes 2007)
Conservation impact	The difference between what we see in a protected area and what we would see there if it had not been established (Pressey et al. 2015).
Decentralization	Any act in which a central government formally cedes power to actors and institutions at lower levels in a political-administrative and territorial hierarchy (Ribot 2002).
Democratic decentralization	When powers are transferred to lower-level actors who are downwardly accountable (Agrawal & Ribot 1999)
Empowerment	Expectations that cooperation with environmental authorities should be based on equality where both parties should perceive that they are equal actors (Paloniemi & Vainio 2011). A person’s inner motivation increases and strengthens one’s perceptions of self-efficacy and a belief in performing well (Paloniemi & Vainio 2011).

Framing	Framing entails selecting and thus highlighting pieces of information about an issue (Entman 1993), leading individuals to form opinions based on certain considerations while disregarding others (Druckman 2001).
Governance	A set of processes, procedures, resources, institutions and actors that determine how decisions are made and implemented (Macura et al. 2015)
Institutions	The formal (rules, laws, constitutions, organizational entities) and informal (norms of behavior, conventions, codes of conduct) practices that structure human interaction (Armitage et al. 2009).
Management	The means and actions utilized to achieve specific objectives (Borrini-Feyerabend et al. 2013)
Perceptions	The way an individual observes, understands, interprets, and evaluates a referent object, action, experience, individual, policy, or outcome (Bennett 2016).
Policy frame	An organizing principle that transforms fragmentary or incidental information into a structured and meaningful policy problem, in which a solution is implicitly or explicitly enclosed (Apostolopoulou and Paloniemi, 2012 and citations therein).
Public participation	An organized process adopted by elected officials, government agencies, or other public- or private-sector organizations to engage the public in environmental assessment, planning, decision making, management, monitoring, and evaluation (Dietz & Stern 2008).
Social acceptability	Aggregation of individual judgements that compare the perceived reality with known alternatives to determine whether the existing condition is superior or sufficiently similar to the most favorable alternative condition (Brunson 1996; Shindler et al. 2002). A position of tolerance (Batel et al. 2013) Overt acceptance (i.e., public action), covert acceptance (verbal expression sin the private domain) (Thomassin et al. 2010)

Support	An active favorable position (Batel et al. 2013) or supportive behavior(s) (Bennett 2016)