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

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Abstract

New conservation has spurred a vivid debate about the purpose and framing of nature conservation. In particular, the traditional nature-based conservation frame that emphasizes nature's intrinsic value has been challenged by more human centered frames where the purpose of conservation is primarily to serve human interests. In this study we investigated how these conservation frames resonated with stakeholders from protected areas in Norway, and how they corresponded with their perception of conservation threats, their favored management actions and who they trust to manage protected areas.

Property owners, industry representatives and livestock farmers favored a human-centered frame for conservation, whereas a nature-centered frame was preferred by public administration and conservation interests. The stakeholders who favored a human-centered frame had a higher accept for downgrading protected areas than participants who favored a nature-centered frame. They saw woodland expansion as the greatest threat to conservation objectives, prioritized grazing, modern farming, cultural heritage and the interests of landowners, and assigned higher trust in the local government compared to higher level authorities. Proponents of a nature-centered frame identified threats such as motorized use and land development, prioritized management actions associated with protection against land use and trusted higher level authorities and park managers.

These results point to large differences in the reasoning behind nature conservation. Nevertheless, the participants' shared trust in the stakeholder council and in the local decision-makers regardless of conservation frame, which suggests that these institutions have a potential as collaborative arenas that can solve emerging conflicts.

Keywords: protected area governance, biological diversity, public participation, PADDD, ecosystem services, socio-ecological systems

1. Introduction

Since its emergence in the 60's the ultimate goal of conservation science has been to protect nature and to halt the accelerating loss of biological diversity. During the course of time, multiple frames of conservation have emerged, rooted in different views of the relationship between people and nature (Mace, 2014). The way conservation is framed 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). This is well illustrated by the recent debate about "new conservation" promoting more human-centered conservation frames where nature's contribution to people has been given a more prominent role than protection of nature for its own sake (Doak et al., 2015; Kareiva and Marvier, 2012; Soulé, 2013).

People use frames to organize and make sense of knowledge and experience, to reduce complexity, to guide and justify actions and to mobilize others (Gray, 2003a; van Gorp, 2007). Framing entails selecting and thus highlighting pieces of information about an issue (Entman, 1993), leading individuals to form their opinions based on certain considerations while disregarding others (Druckman, 2001). For instance, framing a conservation initiative as a means to improve ecological quality is likely to result in different considerations than if the conservation initiative is framed as enhancing landscape aesthetics (Buijs, 2009; Buijs et al., 2011). A frame has a central organizing idea, asserts what facts, events and experiences are relevant for understanding the situation and proposes the solution to the problem (Buijs et al., 2011). A policy frame is thus 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).

Traditional (nature-centered) conservation practitioners seek the "long term viability of natural communities, which implies persistence of diversity with little or no help from humans" (Soulé, 1985). Traditional conservation underscore the importance of species diversity to secure ecosystem functioning over time, e.g. its productivity, stability, invasibility and nutrient dynamics (Soulé, 2013; Tilman et al., 2014). They argue that species extinction is virtually irreparable (i.e., nature is fragile; Doak et al., 2015) and that non-human nature should be respected and protected because it is the right thing to do (Batavia and Nelson, 2017; Cafaro and Primack, 2014). Traditional conservation focuses on strict protection of wilderness and species through for instance, establishing protected areas that regulate peoples' access to the area (Minteer and Miller, 2011). Mace (2014) further separate nature-centered conservation into distinct frames, namely, "nature for itself" focusing on wilderness and preservation of ecosystems separate from people and "nature despite people" which aims to reverse or reduce threats to species and habitats from humans through population monitoring and management.

New (human-centered) conservation practitioners argue that new, innovative approaches must be adopted because conventional conservation has not been sufficient for halting biodiversity loss (Marvier, 2014). New conservation focuses on nature's ability to rebound from perturbations such as overharvesting, oil spills and deforestation (Kareiva and Marvier, 2012; Marvier, 2014), that species loss also is a part of evolution and can be compensated for by the rise in non-native species and through hybridization between native and non-native species (Thomas, 2013). Exclusionary conservation has failed to attain widespread societal support and therefore conservation practitioners should adopt human-centered arguments, such as focusing on improving human welfare by maximizing the benefits provided by nature through ecosystem services (Kareiva and Marvier, 2012; Marvier and Wong, 2012; Palomo et al.,

133 2014), seeking solutions that have community support (Cudney-Bueno and Basurto, 2009;
134 Game et al., 2011) and enhancing biodiversity and livelihoods simultaneously (Ball and
135 Brancalion, 2016; Caputo et al., 2005; Scanlon and Kull, 2009). New conservation as such
136 entails conservation in working landscapes, engaging with markets and corporations, and
137 integrating conservation with development (Igoe and Brockington, 2007; Kareiva et al., 2007;
138 Kareiva and Marvier, 2012; Salafsky et al., 2001). Mace (2014) divides human-centered
139 conservation frames into "nature for people" which recognizes how ecosystems are important
140 for human welfare through the goods and services provided by nature, and the "nature and
141 people" conservation frame that conceptualizes people and nature as socio-ecological systems
142 where people, culture and institutions are an integrated part through their use, modification
143 and care for nature (Fischer et al., 2015).

144 Protecting land is among the primary tools used to halt biodiversity declines globally, but
145 concurrently with the exponential increase in protected areas (Watson et al., 2014), there are
146 also examples of loss and downgrading of protected land (Mascia and Pailler, 2011; Symes et
147 al., 2016). The threat of PADDD – protected area downgrading (the relaxing of restrictions of
148 human activities), downsizing (loss of protection for part of the area through legal boundary
149 change) and degazettment (loss of protection for the entire area) has come to the attention of
150 the conservation community in later years (Mascia and Pailler, 2011). Research shows that
151 access to and use of natural resources like industrial-scale resource extraction and
152 development, local land pressure and land claims and conservation planning are the main
153 reasons for PADDD (Cook et al., 2017; Mascia et al., 2014; Mascia and Pailler, 2011).

154 When people frame issues very differently, cooperation to reach conservation goals can be
155 difficult (Gray, 2004; Shriver and Peaden, 2009). Mace's conservation frames describe how

conservation is framed by science and policy, but these frames may diverge from local actor's understandings, and thus fail to resonate with actors that are affected by conservation initiatives. Framing protection through the lens of "nature for itself", for example, where people are kept out of protected areas, may not resonate well with local residents who have used the designated sites for activities such as small-scale harvest through generations. This may incite people to mobilize to loosen protected area restrictions or revoke the protection status (Gray, 2003b).

Public acceptance or support for protecting land is more likely if the way conservation is communicated resonates with the target audience (i.e., makes conservation seem natural and familiar; Benford and Snow, 2000; Gamson and Modigliani, 1989). The resonance of a frame is improved when there is consistency between the claims made and the actions proposed, it aligns with real-world events and its advocates are trusted, knowledgeable and persuasive (Benford and Snow, 2000; Hanke et al., 2002). Also relevant is how important the beliefs, values and ideas of the frame are to people and whether the frame is congruent with people's everyday lives and the cultural context (Benford and Snow, 2000; Jacobs and Buijs, 2011). For example, Buijs et al., (2011) found that a local protest group was more effective at mobilizing support for their frame of a conflict over national park management than a national nature conservancy agency. The protest group was more in tune with local views of nature, focusing on scenic beauty, personal attachment and the vitality of healthy trees and animals, whereas the agency framed the conflict as a dispute over the best means to achieve pre-determined goals based on ecological knowledge, which, among other things, meant removing an invasive tree species. Because the goals had been set, the agency maintained that residents only needed to be informed, whereas the local protest group asserted that residents should be involved the decision-making process because of the diverging views of the plan.

In this study we asked how the four frames of nature conservation proposed by Georgina Mace (2014) (i.e.; i) nature for itself, ii) nature despite people, iii) nature for people and iv) people and nature) resonated with the views held by the participants on local stakeholder councils appointed by protected area management authorities in Norway. Furthermore, 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. Finally, we included a question about their acceptance for protected area downgrading for the sake of public or economic interests. We used multivariate statistics to identify coherent patterns between the different stakeholder groups' concerns, priorities and trust, and investigated how this pattern was related with their conservation frame and their acceptance of protected area downgrading.

The study participants were members of advisory councils involved in community-based conservation of protected areas. Local protected area boards composed of elected politicians currently hold decision-making authority following a nation-wide decentralization reform in 2009 (Engen and Hausner, 2017; Hovik and Hongslo, 2017; Aasen-Lundberg, 2017) and the task of the advisory councils is to inform these local boards. The reform was the result of decades of conflicts between national conservation agencies and local stakeholders (Fauchald and Gulbrandsen, 2012; Fedreheim, 2013; Overvåg et al., 2016; Aasen-Lundberg, 2017) and the rationale behind it was to reduce tension by creating a sense of ownership to the protected areas and incorporate local knowledge in decision-making to a greater extent (St. prp. 1 2009-2010).

2. Research Design and Method

We developed a questionnaire to elicit which conservation frame, among the four frames developed from Mace, stakeholders perceive as the best way to approach environmental problems, and i) stakeholders' concerns with respect to the impacts from various human activities, ii) their management priorities, iii) their trust in management authorities and iv) their acceptance for downgrading of the protected area. We included members of 11 different Norwegian protected area advisory councils; one large advisory council covering 14 protected areas in Northern Norway and ten councils covering 42 protected areas in the south (Table A1). The protected area managers in the study areas gave feedback on the questionnaire and provided contact information to council members. The survey took place from mid-March to June 2016. The 201 participants received an e-mail with instructions and a link to access the survey online and had three weeks for completion. The survey initially included a mapping section, which made it too comprehensive. To increase the response rate we decided to send the survey a second time only with the questionnaire. Participants could request a paper copy, which we sent per mail with prepaid postage. After the second three-week deadline passed, we telephoned those who had not completed the questionnaire as a reminder and sent a text message to those that we did not reach by telephone.

To assess participant characteristics, we asked participants to report their gender, year of birth, the duration of their membership and whether they had any other experience from protected area management. We then asked the participants to select the interest groups they primarily represent (Table 1). They could choose between nine different stakeholder groups and one open category that allowed them to specify the interest group themselves. They could check all the groups that applied to them. Next, we asked them to rate nine different potential threats to conservation goals developed from Auditor General (2006), plus an open category

on a five point Likert scale from very low to very high threat and also including a "no opinion" option (*To what degree do you believe that the conservation values are threatened by the categories listed?;* Table 1). Further, we asked them to indicate their acceptance of the damage or destruction of protected areas for economic development (which we termed downgrading) as either forbid, partly accept or accept (*Economic development sometimes causes the damage or destruction of protected areas. Which of the following statements are closest to your opinion?*; Table 1), and to select one of four conservation frames (developed from Mace 2014) that mostly agreed with their own view of conservation (*There are different ways to address environmental problems. How do you think environmental problems are approached most efficiently*?; Table 1). Then, we asked if they, out of 16 management actions and an open category, could select those management actions they would prioritize if they held decision-making power (*What would be your main priorities if you were granted decision-making power over protected areas?*; Table 1). They could check all the groups that applied to them. Finally, we asked them to rate their trust in seven actors involved in protected area governance on a five point Likert scale from very low trust to very high trust, including a "no opinion" category (*How would you rate your level of trust in these protected area governance actors?*; Table 1).

246 Table 1. Variables from questionnaire responses used in the multiple factor analysis.

Variable group	Type	Variables
Stakeholder group	Categorical (yes, no)	Property owners, Hunting and fishing, Livestock, Tourism, Recreation, Industry/forestry, Public authority, Cultural heritage, Nature conservation
Threats to conservation objectives	Continuous (Very low Low Neither/nor High Very high)	Disturbance in buffer zone Woodland expansion Alien species Climate-change Overharvesting Pollution Land development Motorized vehicle use Traffic
Protected area downgrading	Ordinal:	
	Forbid (1)	This is not acceptable because these are our most important nature protection areas
	Party acceptable (2)	This is only acceptable when it is in the public's interest and if the damage is fully compensated for
	Acceptable (3)	This is acceptable because economic development takes precedence
Conservation frames	Categorical:	
Nature-centered	Nature for itself	Human activity should be kept outside the protected areas
	Nature despite people	Environmental condition and threats should be monitored and wildlife populations managed in order to avoid negative effects of human activity
Human-centered	Nature for people	The great diversity of benefits provided by nature which humans depend on should be mapped and the costs to society if we lose these benefits should be measured
	People and nature	Nature should, to a greater extent, be viewed as shaped by human use and focus should be placed on the interrelationships between nature and culture
Management priorities	Categorical (yes, no)	Reduce land development (e.g., houses, roads, power lines) Prevent further land development Reduce traffic in sensitive areas

		Increase biodiversity by protecting wilderness Prevent further loss of biodiversity Facilitate traditional recreation Facilitate nature-based environmentally friendly tourism Protect cultural heritage and -landscapes Facilitate modern recreation (e.g., kiting, alpine, rafting) Maintain traditional grazing and hay-making Facilitate modern, economically sustainable farming Facilitate commercial tourism Facilitate access for disabled people Improve conditions for reindeer herding Balance economic development and environmental protection Secure the interests of land owners and other stakeholders
Trust in protected area governance actors	Continuous (Very low Low Neither/nor High Very high)	Municipality, Local protected area board, Park managers, County administration, Environmental Agency, Ministry of Climate and Environment, Advisory Council members

Statistical analyses

Here, we assessed the interrelationship between stakeholder groups' perceptions of protected area management using four groups of variables; namely stakeholder group (9 variables), management priorities (16 variables), perceived conservation threats (9 variables) and trust in management authorities (7 variables). To reduce the dimensionality and to explicitly assess these relationships, we performed a Multiple Factor Analysis (MFA). Our approach was exploratory and we did not have any a priori expectations about results.

Multiple factor analysis (MFA) can be used with groups of variables, continuous or categorical that are collected on the same unit of analysis (e.g., individuals). The aim is to discover the main underlying structure in the data that is grouped into sets of variables (Abdi and Valentin, 2007). In other words, by using MFA we can include multiple indicators/items for each of the four groups of variables (e.g., stakeholder representation, trust, perceived threats and priorities) to discover how they are interrelated. The analysis allows us to identify

the major patterns among stakeholders with respect to who they represent, what they perceive as threats to conservation objectives, how they would prioritize management and which protected area authority they trust the most to represent their views. To visualize how acceptance of downgrading and conservation frames were related to the axes, we included them as supplementary variables. Supplementary variables are projected on the axes, but are not involved in the construction of the dimensions. There are two main steps to a MFA. First, a Principle Component Analysis (PCA) or a Correspondence Analysis (CA) is performed on the distinct groups of variables. These tables are normalized by dividing their content by the square root of the first eigenvalue obtained in the PCA/CA. In the second step, the normalized data sets are combined into one, and a global PCA is then performed on this data (Abdi et al., 2013; Abdi and Valentin, 2007). The result is multiple factors that each explain a decreasing proportion of the total variation (Pocock et al., 2017; Schmidt et al., 2015).

Our four groups of variables correspond with the questions posed in the questionnaire (see Table 1). For the few participants who reported stakeholder groups other than the ones specified, we were able to merge them with existing categories. The open category related to management actions did not reveal actions that were not captured by the specified items. We removed ten participants whose answers we consider too incomplete for the statistical analysis. The remaining dataset comprised of 83 respondents. Recognizing that threat and trust are ordinal variables we treated them as continuous and not categorical in this study, which was also done by Young et al., (2013), as this almost doubled the variation explained in the first two dimensions while providing approximately the same results. Imputed values were inserted for missing observations in the threat and trust categories (either because the participant chose the “no opinion” category or they did not to respond to the question). We used the median response as the imputed value. For the threat category we imputed 51 out of

747 answers. For the trust category we imputed 25 out of 581 answers. In an MFA, the distance from the origin reflects the contribution of the variable to the dimension, i.e. increasing distance increases the contribution. Using the median as the imputed value will accordingly have little effect on the end results.

There are several ways of selecting the number of dimensions that adequately reflects the variability in the data. We chose the conservative number of two dimensions, which adhered to the rule of thumb that suggests selecting the dimensions with eigenvalues larger than 1 (Pocock et al., 2017), as there is a risk that dimensions with eigenvalues less than 1 account for less variability than a single variable. An element (individual or variable) with a cos^2 close to 1 signifies that the element is well projected on the axis, which means that the distances between these elements can be interpreted. Le et al. (2008) suggests removing elements with a cos^2 of zero, however to aid interpretation we plotted variables where the sum of cos^2 of the two dimensions were larger than 0.5. The MFA was performed using the package FactoMineR ver. 1.36 (Husson et al., 2016) using the statistical software R (R Development Core Team, 2016).

We tested the relationship between downgrading and the resulting MFA dimensions, and the relationship between downgrading and conservation frames, using ordinal regression models from the package ordinal in R (Christensen, 2015; R Development Core Team, 2016). Downgrading was an ordinal variable from 1-3, where 1 is forbid, 2 is partly accept and 3 is acceptable. We tested the relationship between conservation frames and the two MFA dimensions using multinomial regression models from the package nnet (Ripley and Venables, 2016). In all the models we controlled for participant demographics (age and gender). Because only two participants supported the “nature for itself” frame, these were

removed from the analyses along with those who did not have an opinion. Model selection was performed by minimizing the AICc, which is a model selection criteria that balances model complexity with a goodness of fit measure. AICc is an extension of AIC, which includes an extra penalty for the number of variables to reduces the risk of overfitting with small sample sizes (less than 40 data points per parameter; Burnham and Anderson, 2004).

Prior to the MFA, we performed exploratory analyses of the data focusing on differences among interest groups, threat assessments, and priorities depending on conservation frames and downgrading attitudes. We used the chi-squared test and the Fisher's Exact test (when cell counts were lower than 5) to assess whether conservation frame was related to attitudes towards downgrading, and whether conservation frames and attitudes were related to priorities, threat assessments, trust and participant demographics (age, gender and education).The chi-squared test assesses if there is a significant difference between the expected frequencies (i.e., equal proportions) and observed frequencies, where expected frequencies are the row total times the column total and divided by the grand total. The chi-square statistic sums the squared differences between the observed and expected counts divided by the expected count for all table cells. The larger the chi-square statistic, the greater the probability that there is a significant association (Crawley, 2007, p. 303). Low expected values inflate the chi-squared test statistic and in such cases Fisher's test is recommended (Crawley, 2007, p. 308) .

3. Results

3.1.1 Response rate and participant characteristics

We received 93 questionnaires and attained a response rate of approximately 46 %. Seven participants chose the paper version. Over half of the participants had higher education (67%),

the average age was 55 years and most participants were men (71%). The high portion of male participants reflected the highly gender-biased representation on the advisory councils (see table A1). The participant's average length of advisory council membership was 3.5 years (max. 17 years). Half (51%) had prior experience from protected area management. The interests of property owners were represented by most participants (42%), followed by hunting/fishing and recreation (both 26%), livestock grazing (22%), tourism and conservation (both 18%), public authority and cultural heritage (both 10%) and industrial development (8%). This distribution of interest groups was relatively similar to the distribution of interest groups among all the members of the advisory councils included in the study (Table A2).

3.1.2 Conservation frames

Most participants chose the "nature and people" (44%) or the "nature despite people" (47.6%) as the frame for conservation practice and science. "Nature for people" and "nature by itself" was selected by very few (6.1% and 2.4%, respectively). These were merged into human-centered (nature and people, nature for people) and nature-centered (nature by itself, nature despite people) frames which were thus chosen by 50% each.

3.1.3 Protected area downgrading

According to 31% of the participants, downgrading was acceptable because economic development takes precedence, whereas 42% found downgrading acceptable only when it is in the public's interest and if the damage is fully compensated for. Downgrading was not acceptable to 25%.

3.1.4 Conservation frame and downgrading

Among the participants who favored a human-centered frame, 12% wanted to forbid downgrading, 44% found it partly acceptable and 44% found it acceptable. In contrast, among the participants who favored a nature-centered frame, 17% accepted downgrading, 41% found

it partly acceptable and 41% preferred to forbid downgrading (Figure 1; $\chi^2 = 11.414$, df = 2, P = 0.0033).

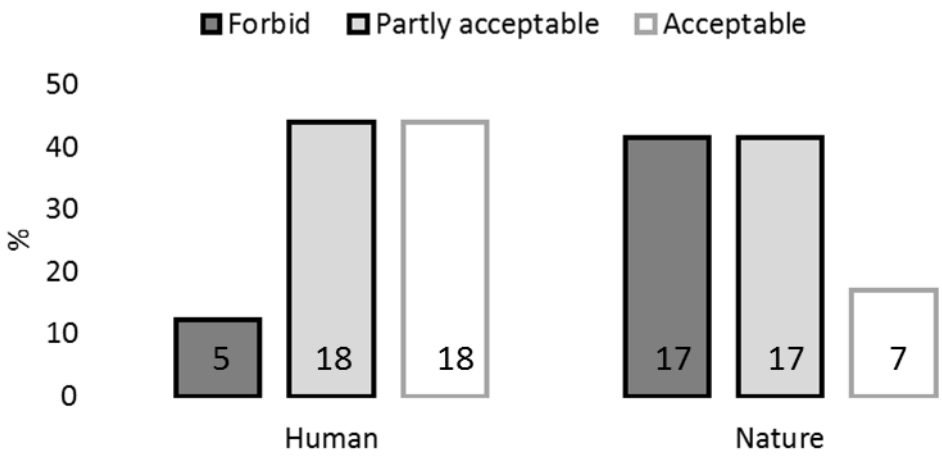

Figure 1. Conservation frames and attitudes towards protected area downgrading (sample size is written on the columns, n = 82).

3.1.5 Descriptive statistics

The majority of the participants who represented conservation interest (75%), public administration (73%), cultural heritage (67%), tourism (57%) and recreation (57%) favored a nature-centered frame (Figure A1a). A human-centered frame was favored by the majority of the participants who represented industry (71%), property owners (71%) and livestock grazing (65%; Figure A1a). Downgrading was not acceptable to the majority of the participants from conservation (69%) and public administration (55%; Figure A1b). Property owners, followed by livestock and hunting were the interest groups with the highest proportion of participants who accepted downgrading (50%, 47% and 41% respectively; Figure A1b).

373 Woodland expansion was viewed as a high to very high threat, and overharvesting, alien
374 species and pollution was viewed as a very low to low threat by a large proportion of the
375 participants, irrespective of their conservation frame (Table A4). A high proportion of the
376 participants remained neutral with regards to climate change (Tables A4, A5). The main
377 differences in threat assessments among participants with diverging conservation frames and
378 downgrading attitudes, revolved around the degree to which human activity on site was
379 considered a threat or not, namely land development, motorized use, traffic in vulnerable
380 areas and disturbance in the buffer zone (Tables A4 and A5).

381 Maintaining grazing and hay-making was prioritized by the highest number of participants (n
382 = 39), followed by traditional recreation (n = 30), reduce traffic in vulnerable areas (n = 28),
383 and maintain biodiversity (n = 27, Figure A2). The main differences in management priorities
384 among participants with diverging conservation frames and downgrading attitudes revolved
385 around restricting land development, increasing biodiversity, reducing traffic, modern farming
386 and securing local stakeholder's interests (Figure A2, Tables A6, and A7).

387 The participants reported different levels of trust in governance actors depending on their
388 conservation frame and downgrading attitudes. Trust in managers and higher-level
389 environmental authorities were higher among those who favored a nature-centered frame and
390 wanted to forbid downgrading (Tables A8, A9). Those who wanted to forbid downgrading
391 also had a lower level of trust in the municipality (Table A9). There were no significant
392 differences between the groups concerning trust in local boards and advisory councils (Tables
393 A8 and A9).

394 The participants' demographics were not associated with conservation frame or downgrading
395 attitudes (Table A10).

3.2.1 Multiple factor analysis

The first and second dimensions of the MFA analysis explained 15.4% and 8.5% of the total variation in the dataset comprising 4 groups and 66 variables. The four groups of variables contributed a similar proportion to dimension one (21-29%). High values of dimension one reflected: the stakeholders representing nature conservation (Figure 2a), the management priorities associated with reducing land development and increasing biodiversity (Figure 2b), a range of conservation threats, but especially land development, motorized vehicle use and disturbance in the buffer zone (Figure 2c), and trust in regional and national environmental authorities along with the park managers (Figure 2d). Low values of dimension one reflected: the stakeholder group property owners (Figure 2a), the management priorities maintaining traditional grazing and hay-making, securing the interests of land owners and facilitating modern farming (Figure 2b), the conservation threat woodland expansion (Figure 2c) and trust in the municipality (Figure 2d).

Stakeholder group contributed 60% to the second dimension, followed by priorities (22%), threats (16%) and trust (11%). The stakeholder groups hunting and fishing and livestock grazing contributed to this dimension (Figure 2a), they prioritized cultural heritage (Figure 2b), and had low trust in environmental agencies as indicated by low values along this axis (Figure 2d). Also worth noting is that property owners were the stakeholders that overall rated threats the lowest (Figures 2a and d).

To visualize how conservation frames (human- versus nature-centered) and downgrading (forbid, partly acceptable, and acceptable) were related to the two dimensions, they were included as supplementary variables (blue squares in Figure 2a and b). The two variables were mainly explained by dimension 1, in which a high value was associated with a nature-centered

421 frame and an attitude to forbid downgrading, while a low value was associated with
422 acceptance of downgrading and a human-centered frame.

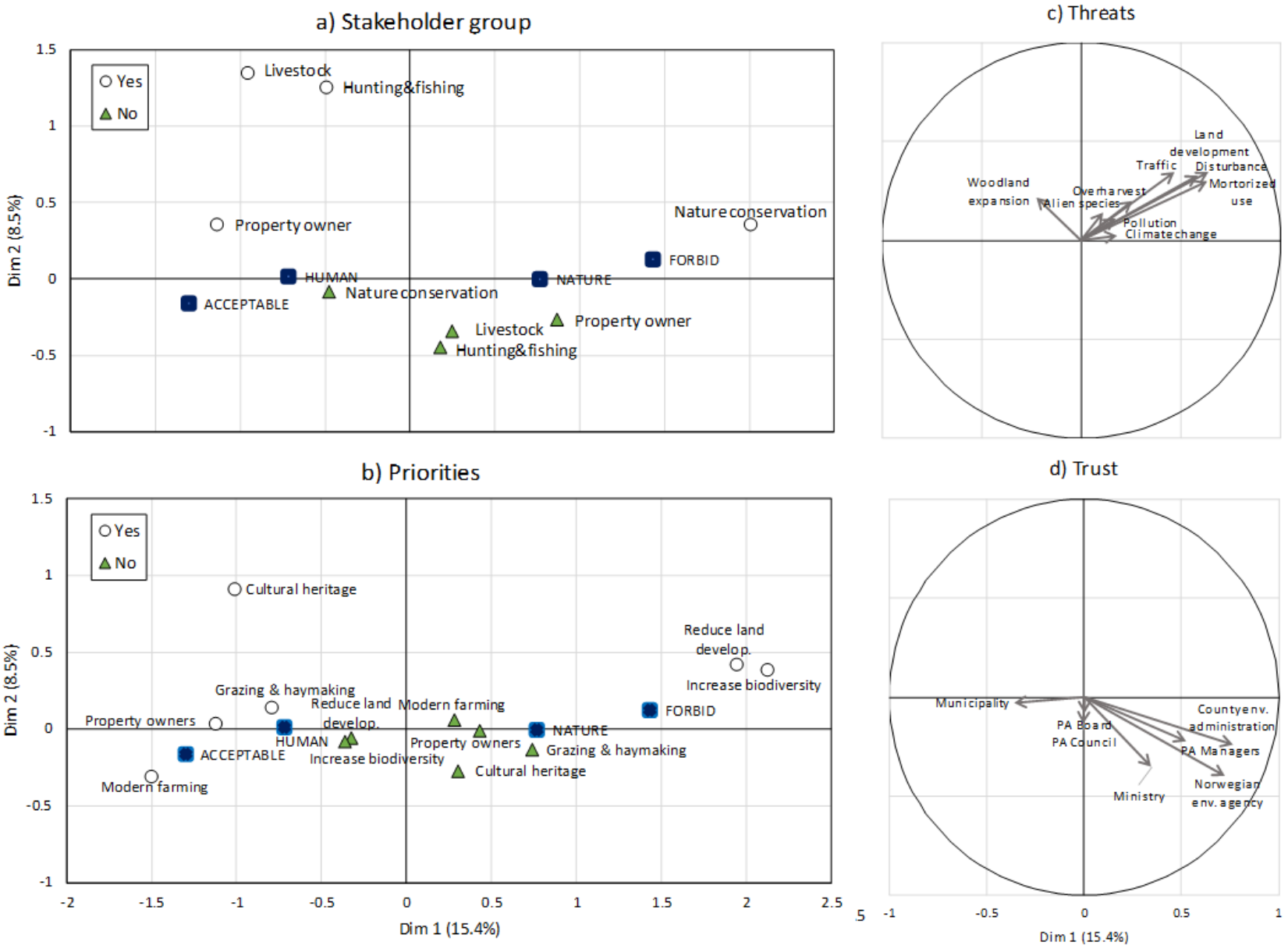
a) Stakeholder group
Yes
No
Livestock
Hunting&fishing
Property owner
Nature conservation
FORBID
HUMAN
NATURE
ACCEPTABLE
Nature conservation
Livestock
Property owner
Hunting&fishing
Dim 2 (8.5%)
c) Threats
Land development
Traffic
Disturbance
Mortorized use
Woodland expansion
Overharvest
Alien species
Pollution
Climate change
b) Priorities
Yes
No
Cultural heritage
Reduce land develop.
Increase biodiversity
Grazing & haymaking
Reduce land develop.
Modern farming
Property owners
FORBID
Property owners
HUMAN
NATURE
ACCEPTABLE
Increase biodiversity
Grazing & haymaking
Modern farming
Cultural heritage
Dim 2 (8.5%)
Dim 1 (15.4%)
d) Trust
Municipality
County env. administration
PA Board
PA Council
PA Managers
Ministry
Norwegian env. agency
Dim 1 (15.4%)

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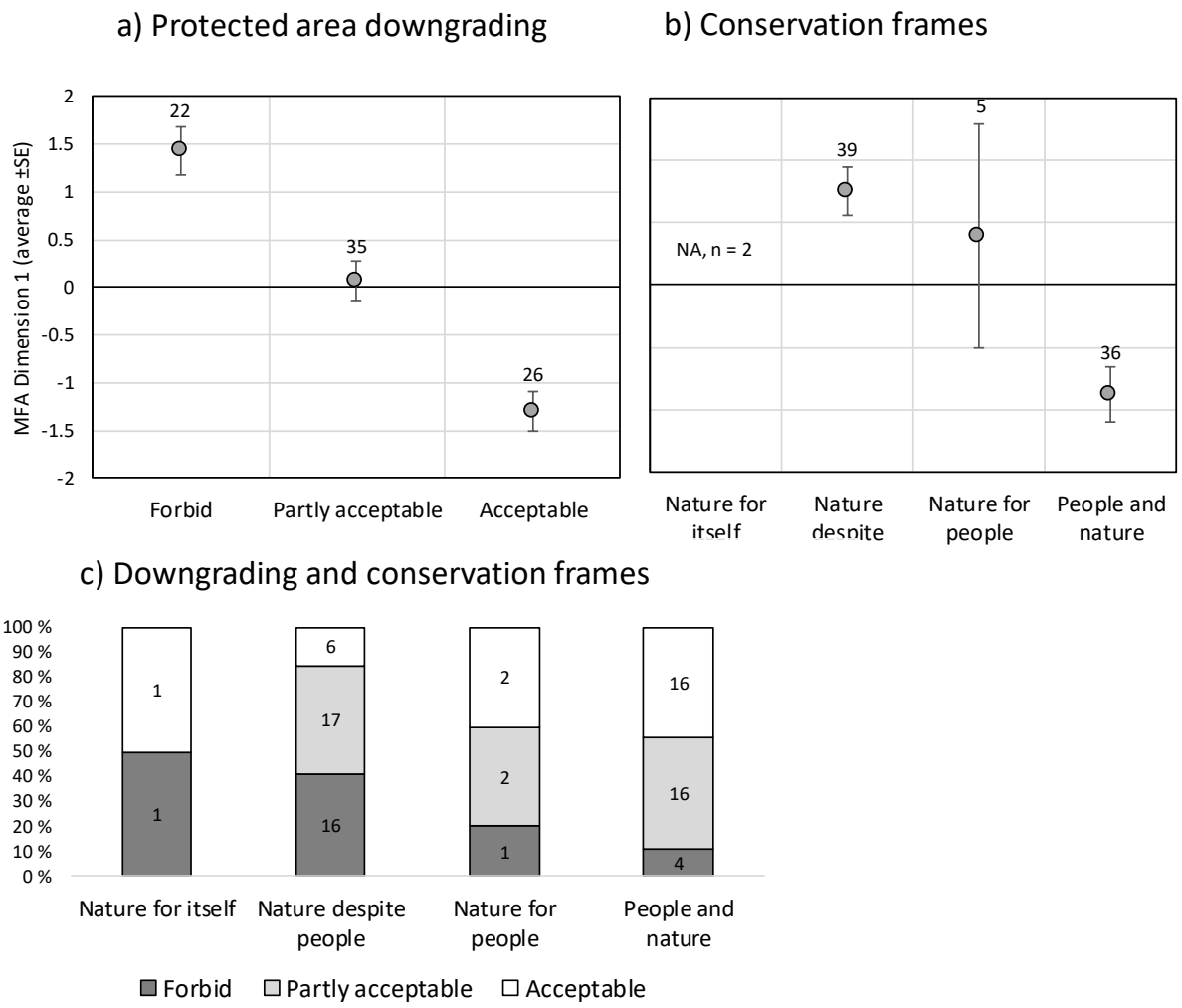
Figure 2. Multiple factor analysis showing the two first dimensions and the contribution of the variable groups a) stakeholders, b) management priorities, c) conservation threats and d) trust in protected area governance actors. The supplementary variables conservation frame (human versus nature centered) and downgrading (forbid, partly acceptable, and acceptable) are represented by blue squares. Only elements with a cos^2 larger than 0.5 are plotted in figures a and b to aid interpretation of the plot. Few elements in the variable groups threat and trust had a cos^2 higher than 0.5 (however all were higher than zero) so figures c and d show all elements in these groups.

3.2.2. Regression models

The most parsimonious model for the relationship between downgrading and MFA dimensions was DOWNGRADING ~ MFA.DIM1 + MFA.DIM2. Age and gender were removed. There was a highly significant negative relationship between dimension one and acceptability towards downgrading (-1.26, SE = 0.22, P < 0.000), i.e., participants who accepted downgrading had low scores of dimension one. Dimension two was not significant (-0.29, SE = 0.20, P = 0.151). The most parsimonious model for the relationship between downgrading and conservation frame was DOWNGRADING ~ FRAME. Age and gender were removed. The acceptance of downgrading was significantly higher for participants who preferred the people and nature conservation frame (1.57, SE = 0.469, P = 0.008) compared with the reference level nature despite people. The difference between the reference level and nature for people was not significant (1.242, SE = 0.92, P = 0.179). The most parsimonious model for the relationship between conservation frame and MFA was FRAME ~ MFA.DIM1. Age, gender and MFA.DIM2 were removed (see tables A11 and A12 for model selection and model output for the three models). The log odds that the participants preferred the people and nature conservation frame decreased with increasing values of MFA.DIM1 (-0.924, SE = 0.28, P <0.000).



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450 Figure 3. Average values (SE) of the first dimension of the multiple factor analysis by a)
451 attitudes towards downgrading, b) opinions about the best way to frame conservation , and
452 c) the proportion of the participants who accept, partly accept and reject downgrading by
453 conservation frame. The number of participants is written on the figures.

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These results are visualized in Figure 3. Participants who wanted to forbid downgrading had a much higher average of the first MFA dimension than those who accepted downgrading (Figure 3a). Participants who preferred a nature despite people frame of conservation had on average high values of dimension one, whereas participants who preferred a people and nature frame of conservation had low values of the same dimension (Figure 3b). Few people who wanted to forbid downgrading preferred the people and nature frame and vice versa, few people who accepted downgrading preferred the nature despite people frame (Figure 3c).

4. Discussion

Conservation frames resonated differently among our stakeholders. A human-centered frame resonated with half of our study participants while a nature-centered frame resonated with the other half. Participants also had diverging perceptions of human threats to conservation values, conservation priorities and trust in management authorities, and these views were related with both their opinions about the best way to frame conservation and their attitudes towards protected area downgrading for economic development.

Participants who preferred a human-centered frame had a high acceptability towards protected area downgrading. They prioritized management actions related to human use, namely facilitating traditional grazing and haymaking to address the threat of woodland expansion, and securing local interests and modern farming. They were likely to represent property owners and to place most faith in local governments who are generally viewed as proponents of local development (Daugstad et al., 2006). Participants who preferred a nature-centered frame had a lower acceptability towards downgrading protected areas. They saw nature as threatened *by* human activities, such as land development, motorized use and disturbance, and

484 proposed actions to increase biological diversity and to reduce threats from land use changes.
485 They were mainly represented by conservation interests and placed most faith in higher level
486 environmental authorities whose main concern is nature conservation. These results suggests
487 relatively large differences in the reasoning behind nature conservation among the members
488 of advisory councils.

489 Our results also point to areas of agreement. Woodland expansion was viewed as a threat to
490 conservation objectives by the majority of the participants, albeit slightly more so by
491 proponents of a human-centered frame, and maintaining traditional hay-making and grazing
492 was prioritized by a large proportion of the participants (roughly half) irrespective of frame
493 views. Livestock grazing is relevant due to its role in maintaining certain types of biodiversity
494 and ecosystem services (Austrheim et al., 2016). Studies have found that the local people
495 residing next to protected areas in Norway also have favorable attitudes towards livestock
496 grazing (Engen et al., 2017) and that Norwegians have an affinity towards cultural landscapes
497 (Steen Jacobsen and Tømmervik, 2016).

498 Similar results to our study were found by Marvier and Wong (2012). They asked US
499 residents to choose between a human-centered frame (nature's benefits to people) and a
500 nature-centered frame (nature's intrinsic value) as reasons to conserve nature. The results
501 showed that nature's intrinsic value resonated with participants who perceived themselves as
502 strong environmentalist, while non-environmentalists preferred "nature's benefit to people".
503 The authors concluded that conservation should focus on a human-centered frame rather than
504 a nature-centered in order to gain additional supporters. However, as witnessed, different
505 conservation frames entail different sets of expectations for what conservation should be,
506 what should be prioritized, and who should undertake such actions and following a human-
507 centered trajectory harbors some risks. The main ones are summarized by Kareiva (2014) and

include "[…] approaches that treat protected areas as something other than walled-off fortresses may be less effective at biodiversity conservation; working with corporations and resource extractors may increase environmental degradation relative to hard-line efforts to halt development altogether; and emphasizing nature for the self-interest of people may weaken support for conservation.".

Out of the four frames, our study participants only responded to two – nature despite people and nature for people. The nature for itself frame resonated with very few of our respondents. Keeping people out of protected areas is a difficult task to accomplish in practice, as Norwegians enjoy a strong public right of access and are generally free to roam on uncultivated fields both inside and outside protected areas (Kaltenborn et al., 2001). This is a practice which is deeply rooted in Norwegian identity (Ween and Abram, 2012). The nature despite people frame could resonate more with participants who are comfortable with a strong reliance in a professional bureaucracy and natural science-based policy and practice, which despite widespread decentralization efforts remains to this day (Overvåg et al., 2016). Very few chose the nature for people frame. Since the majority of Norwegians are familiar with ecosystem services (Kaltenborn et al., 2016), a lack of understanding does not seem to be the issue. The reason is more likely that the participants favored an approach where their own activities have a natural place in the system, as proponents of a nature for people frame were dominated by property owners and people representing livestock grazing, who likely have strong cultural ties to the areas.

There are many factors that can explain skeptical attitudes towards biodiversity conservation and protected areas. Previous studies have found significant differences relating to Norwegians' views of nature as resilient rather than fragile, a lack of trust in science, favorable attitudes towards local-decision making, dependency on natural resources, gender,

age and education (women, young and educated people more in favor; Fedreheim and Blanco, 2017; Kaltenborn et al., 2016; Kvernenes, 2017; Listhaug and Jakobsen, 2007; Seippel et al., 2012; Seippel and Strandbu, 2011). People also tend to believe that biodiversity loss is a greater problem further away than locally and faces greater threat in the future than at present (European Commission, 2013; Listhaug and Jakobsen, 2007). We confirm some of these results as property owners, livestock farmers, hunters and fishers, were most skeptical to protection and were the ones with lowest trust in higher-level environmental authorities, and were well represented among our study participants. The proportion who accepted downgrading was much higher among our study participants than among European citizens. In a survey from 2013, which included 25 573 respondents from various social and demographic groups in 28 European countries downgrading was only acceptable to 9%, partly acceptable to 42% whereas 45% thought downgrading should be forbidden (European Commission, 2013). Similarly, Seippel et al., (2012) found that 8.8% of Norwegians were opposed biodiversity protection, 50% were neutral and 40.7% supportive. We did not find an effect of gender and age on downgrading attitudes in study. This could be caused by the low number of women and young participants in our sample.

The relatively high proportion that accepted protected area downgrading for the sake of public or economic development might suggest that local resistance towards conservation remains despite the nationwide community-based conservation reform. Because we did not measure the participants' attitudes before the reform we cannot say if attitudes were more unfavorable and have improved as a result of the reform. Trust plays an important role in cooperation (Henry and Dietz, 2011) and the reform does seem to have established local decision-making boards and stakeholder councils that are deemed appropriated among stakeholders with contrasting views of conservation.

Limitations

We applied a descriptive, polling approach to our attitude measure (Manfredo, 2008) and our study only included one item for assessing participant's attitudes towards protected areas. This item was adopted from European Commission (2013) and was included in order to be comparable with this standardized European survey. The question concerns protected areas in general, and it could also have been relevant to assess more context specific attitudes (e.g., explicitly asking about attitudes towards the protected areas that they are involved in governing), as the more specific attitudes are considered more related with behavior (Heberlein, 2012). Other more theoretical approaches could provide more in-depth knowledge of the thought processes that affect actual behavior (Ajzen, 1991; de Leeuw et al., 2015).

Another limitation is the use of pre-selected survey items which restricts the responses that the participants can make compared with a situation with more open-ended prompts (Gould et al., 2015; Tadaki et al., 2017). Our survey items were constructed from literature (reports, scientific publications), own experience and by consulting park mangers. Another, perhaps more comprehensive way would be to draw out perspectives by analyzing discourses (Asah et al., 2012). We tried to mitigate these limitations by providing the participants with the possibility to add categories to the survey items for the stakeholder group, perceived threats and management priorities, which did not reveal perspectives that could not be incorporated into the already existing categories.

Management implications

We found large differences among local stakeholders with respect to how want to frame conservation and their attitudes towards protected areas. Those in favor of a human-centered conservation frame and protected area downgrading were largely represented by property owners and stakeholder engaged in livestock farming, hunting and fishing. These interest groups made up a large proportion of the advisory council members, while conservation

interests, women and younger people were proportionally fewer. A broader representation on advisory councils might be necessary if the goal is to reflect the concerns of the wider public and balance conservation with local interests. Having similar views of appropriate forums for management and dispute resolution is valuable for conflict management (Gray, 2003b). As a large proportion of the participants rated their trust in local protected area boards and advisory council members relatively high, and there was no significant difference between frame views and trust in these governance actors, they seem to have the potential to become important collaborative arenas. However, at the moment local decision-makers rate the functioning of stakeholder advisory councils as much higher than the stakeholders themselves (Aasen-Lundberg and Hovik, 2017) and this discrepancy warrants greater attention.

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7. Appendix

Table A.1. The number of members on each advisory council, the proportion of men and women or representation by an organization, in which case gender is not specified. Also shown is the number of survey respondents and the percentage of replies.

Council	Members	% women	% men	% organization (no person specified)	Replies	% replies
Breheimen	21[1]	48	48	5	8	38
Dovrefjell	28[2]	11	89	0	12	43
Jostedalsbreen	10	30	70	0	4	40
Jotunheimen	20	25	50	25	8	40
Midtre-Nordland	28[3]	18	82	0	15	54
Naustdal-Gjengedal	10	20	80	0	4	40
Nærøyfjorden	18[4]	33	56	11	4	22
Reinheimen	31	19	81	0	12	39
Stølsheimen	13	15	85	0	9	69
Trollheimen	14	21	79	0	7	50
Aalfotbreen	8[5]	13	75	13	3	38
Other					7	
Total	201	23 (n=46)	73 (n=146)	4 (n=9)	93	46

[1]Originally 22 members out of which 10 people are deputy board members. One informed that he was not a member anymore.
[2]Originally 30 members, but two informed that they were not involved anymore.
[3]Originally 29 members where 5 were deputy board members, but one informed that she was not involved anymore.
[4]Originally 20 members but two informed that they were not involved anymore.
[5]Originally 10 members but two informed that they were not involved anymore.

Table A.2. Representation by stakeholder group on the advisory councils.

	Property owners	Hunting and fishing	Livestock grazing	Recreation	Tourism	Nature conservation	Cultural heritage	Public authority and education	Industry and forestry
Breheimen	4	1	3	1		3			
Dovrefjell	12	5	4	6		1			2
Jostedalsbreen			2	1	1	3	1	2	
Jotunheimen[1]	NA	NA	NA	NA	NA	NA	NA	NA	NA
Midtre-Nordland	3		6	2	2	1		10	
Naustdal-Gjengedal	5	1		1	1	1			1
Nærøyfjorden	10			3	2	2		3	
Reinheimen	14		2	5	2		3		5
Stølsheimen	5	1		1		1		4	1
Trollheimen	2	1	6	4					1
Aalfotbreen	3			1	2	1		1	2
Sum	58	9	23	25	10	13	4	20	12
% of total	33	5	13	14	6	7	2	11	7
% representation by total number of study participants[2]	42	26	22	26	18	18	10	10	8
% representation by total number of interest groups selected by participants[3]	23	14	12	14	9	9	5	7	5

[1] The municipalities were in charge of appointing some of the representatives in Jotunheimen, and details about the interest groups of these members in are not known. [2]These percentages do not add up to 100% because one participant could select more than one interest group. [3]These percentages sum to app. 100% because it is the total number of times the interest group was selected divided by the total number of interests groups selected.

Table A.3. Participant demographics and membership characteristics.

Gender		**Education**		**Age (years)**		**Membership length (months)**		**Prior experience from PA management**	
Female	29 %	Higher	67 %	28-30	1 %	0	1%	Yes	51%
Male	71 %	Secondary	26 %	31-40	8 %	1-6	3%	No	49%
		Primary	7 %	41-50	19 %	7-12	7%		
				51-60	23 %	13-24	15%		
				61-70	26 %	25-36	27%		
				71-76	6 %	37-48	24%		
						49-100	16%		
						101-204	5%		
N =	86	N =	86	N =	83	N =	91	N =	90

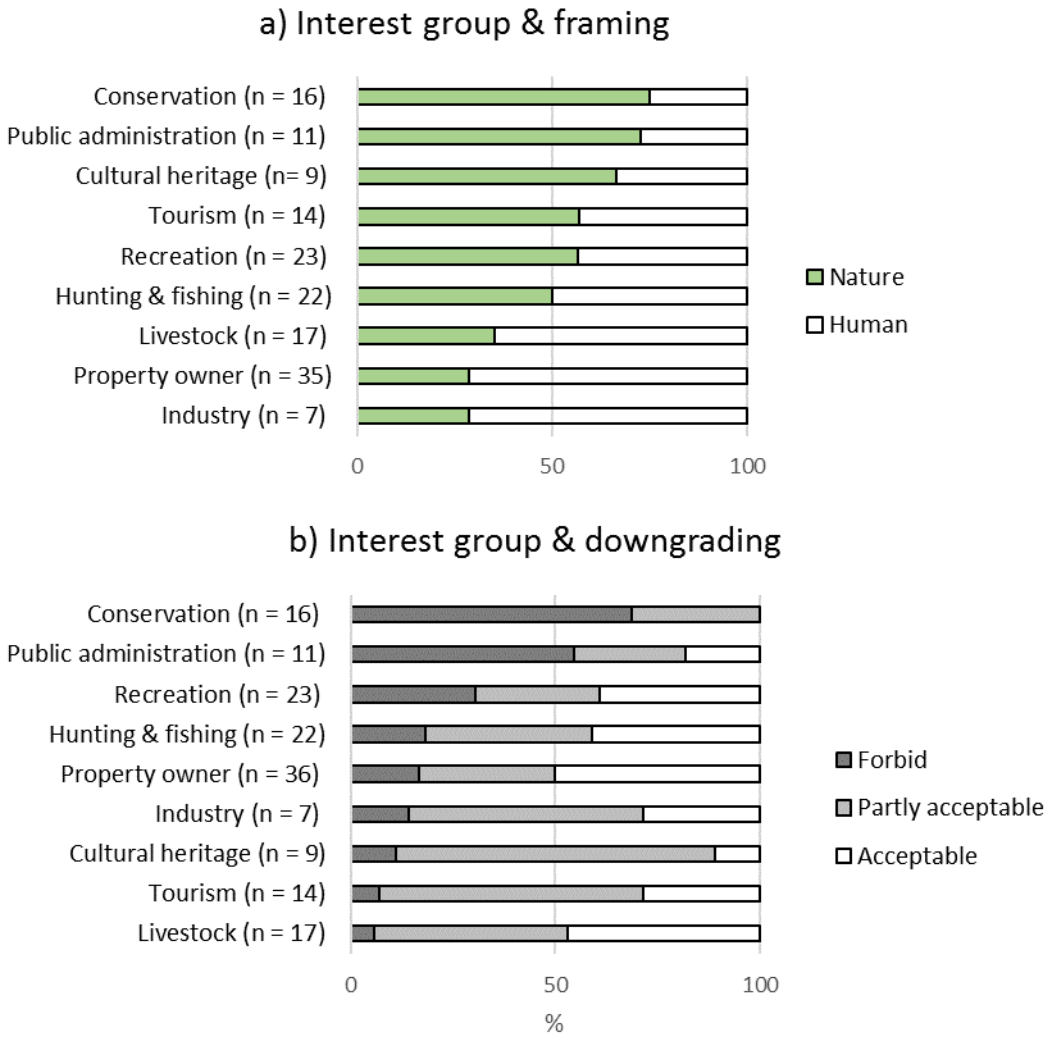

Figure A.1. a) The proportion of participants who chose a nature-centered or human-centered conservation frame by interest group. b) The proportion of participants who found downgrading unacceptable, partly acceptable or acceptable by interest group. The number of representatives for each interest group is noted in parenthesis.

Table A.4. Participants' threat assessments separated by conservation frame (human centered n = 41, nature-centered n = 41). Numbers are percentages. Statistically significant differences are estimated using Fisher's exact test.

		Very low	Low	Neutral	High	Very high	Significance
Disturbance buffer zone	Human	14.6	36.6	31.7	7.3	9.8	0.1208
	Nature	4.9	24.4	43.9	22.0	4.9	
Woodland expansion	Human	0.0	9.8	24.4	36.6	29.3	0.2457
	Nature	4.9	9.8	34.1	39.0	12.2	
Alien species	Human	7.3	61.0	19.5	7.3	4.9	0.2657
	Nature	2.4	63.4	29.3	4.9	0.0	
Climate change	Human	4.9	14.6	58.5	19.5	2.4	0.8169
	Nature	2.4	9.8	58.5	22.0	7.3	
Over harvesting	Human	26.8	63.4	7.3	2.4	0.0	0.2431
	Nature	14.6	65.9	14.6	0.0	4.9	
Pollution	Human	9.8	70.7	19.5	0.0	0.0	0.0643.
	Nature	0.0	65.9	29.3	4.9	0.0	
Land development	Human	4.9	43.9	43.9	0.0	7.3	0.0000***
	Nature	0.0	26.8	36.6	29.3	7.3	
Traffic	Human	4.9	43.9	36.6	14.6	0.0	0.6403
	Nature	2.4	34.1	36.6	24.4	2.4	
Motorized vehicle use	Human	12.2	46.3	26.8	12.2	2.4	0.0166*
	Nature	0.0	29.3	36.6	31.7	2.4	

Table A.5. Participants' threat assessments separated by attitudes towards downgrading (forbid = 22, partly acceptable n = 35, acceptable n = 26). Numbers are percentages. Statistically significant differences are estimated using Fisher's exact test. Significance: *** P< 0.001, ** P < 0.01, * P < 0.05, . P < 0.1

		Very low	**Low**	**Neutral**	**High**	**Very high**	**Significance**
Disturbance buffer zone	Forbid	0.0	18.2	36.4	31.8	13.6	0.0030**
	Partly acceptable	5.7	34.3	37.1	14.3	8.6	
	Acceptable	26.9	34.6	38.5	0.0	0.0	
Woodland expansion	Forbid	4.5	9.1	45.5	27.3	13.6	0.6198
	Partly acceptable	2.9	8.6	20.0	42.9	25.7	
	Acceptable	0.0	11.5	26.9	38.5	23.1	
Alien species	Forbid	0.0	68.2	31.8	0.0	0.0	0.3799
	Partly acceptable	2.9	62.9	22.9	5.7	5.7	
	Acceptable	11.5	57.7	19.2	11.5	0.0	
Climate change	Forbid	4.5	4.5	54.5	22.7	13.6	0.1004
	Partly acceptable	0.0	8.6	68.6	22.9	0.0	
	Acceptable	7.7	23.1	50.0	15.4	3.8	
Overharvesting	Forbid	22.7	50.0	13.6	4.5	9.1	0.2243
	Partly acceptable	17.1	68.6	14.3	0.0	0.0	
	Acceptable	26.9	69.2	3.8	0.0	0.0	
Pollution	Forbid	4.5	54.5	36.4	4.5	0.0	0.1490
	Partly acceptable	0.0	74.3	22.9	2.9	0.0	
	Acceptable	11.5	73.1	15.4	0.0	0.0	
Land development	Forbid	0.0	4.5	50.0	31.8	13.6	0.0000***
	Partly acceptable	0.0	40.0	37.1	14.3	8.6	
	Acceptable	11.5	53.8	34.6	0.0	0.0	

Motorized vehicle use	Forbid	0.0	9.1	36.4	50.0	4.5	0.0000***
	Partly acceptable	0.0	42.9	34.3	20.0	2.9	
	Acceptable	19.2	57.7	23.1	0.0	0.0	
Traffic	Forbid	0.0	13.6	45.5	36.4	4.5	0.0016**
	Partly acceptable	2.9	42.9	31.4	22.9	0.0	
	Acceptable	7.7	53.8	38.5	0.0	0.0	

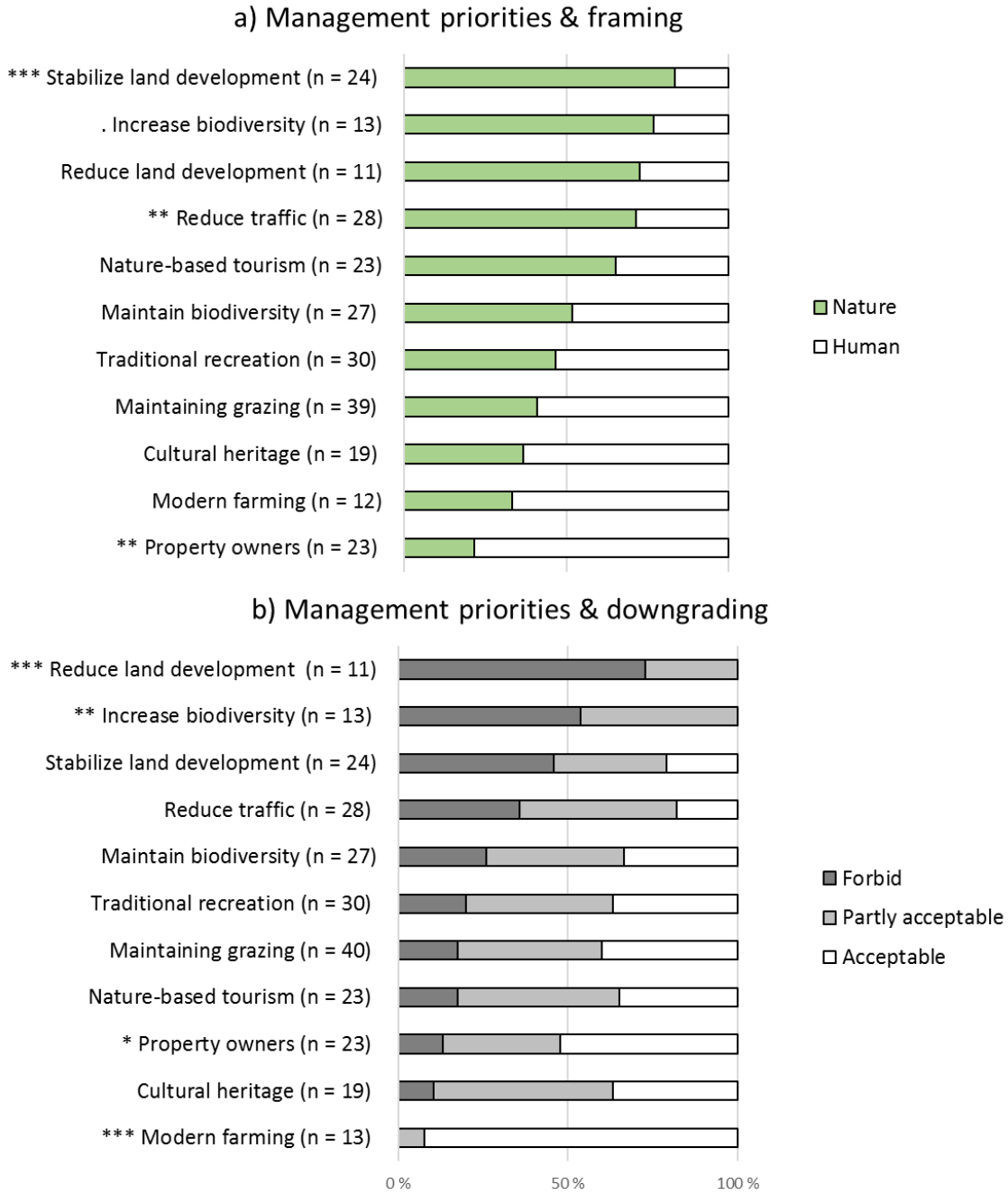
a) Management priorities & framing
*** Stabilize land development (n = 24)
. Increase biodiversity (n = 13)
Reduce land development (n = 11)
** Reduce traffic (n = 28)
Nature-based tourism (n = 23)
Maintain biodiversity (n = 27)
Traditional recreation (n = 30)
Maintaining grazing (n = 39)
Cultural heritage (n = 19)
Modern farming (n = 12)
** Property owners (n = 23)
Nature
Human
b) Management priorities & downgrading
*** Reduce land development (n = 11)
** Increase biodiversity (n = 13)
Stabilize land development (n = 24)
Reduce traffic (n = 28)
Maintain biodiversity (n = 27)
Traditional recreation (n = 30)
Maintaining grazing (n = 40)
Nature-based tourism (n = 23)
* Property owners (n = 23)
Cultural heritage (n = 19)
*** Modern farming (n = 13)
0 %
50 %
100 %
Forbid
Partly acceptable
Acceptable

Figure A.2. The proportion of selected management priorities by a) the participants' conservation frame and b) by the participants' attitudes towards downgrading. The number of participants who prioritized the different management actions is noted in parenthesis. Priorities selected by fewer than 10 participants were removed to aid visual interpretation. Fisher's test if cell numbers are < 5 and chi square test if cell numbers >5. Significance: *** P< 0.001, ** P < 0.01, * P < 0.05, P < 0.1

Table A.6. Participants' priorities separated by downgrading attitudes (human-centered n = 41, nature-centered n = 41). Numbers are counts. Statistically significant differences are estimated using Fisher's exact test in cell counts <5 and chi squared if not. Significance: *** P< 0.001, ** P < 0.01, * P < 0.05, . P < 0.1

	Human	Nature	Test	Significance
Access for disabled	5	1	Fisher's	0.2012
	36	40		
Property owners	18	5	Chi sq	0.0032**
	23	36		
Reindeer herding	3	1	Fisher's	0.6156
	38	40		
Modern farming	8	4	Fisher's	0.3493
	33	37		
Cultural heritage	12	7	Chi sq	0.2951
	29	34		
Maintaining grazing	23	16	Chi sq	0.1846
	18	25		
Traditional recreation	16	14	Chi sq	0.8187
	25	27		
Commercial tourism	1	1	Fisher's	1
	40	40		
Modern recreation	2	2	Fisher's	1
	39	39		
Industry & conservation	2	2	Fisher's	1
	39	39		
Maintain biodiversity	13	14	Chi sq	1
	28	27		
Nature-based tourism	8	15	Chi sq	0.1394
	33	26		
Reduce traffic	8	20	Chi sq	0.0104*
	33	21		
Reduce encroachments	3	8	Fisher's	0.1935
	38	33		
Increase biodiversity	3	10	Fisher's	0.0667.
	38	31		
Stabilize encroachments	4	20	Fisher's	0.0002***
	37	21		

Table A.7. Participants' priorities separated by downgrading attitudes (forbid n = 22, partly acceptable n = 35, acceptable n = 26). Numbers are counts. Statistically significant differences are estimated using Fisher's exact test in cell counts <5 and chi squared if not. Significance: *** P< 0.001, ** P < 0.01, * P < 0.05, . P < 0.1

		Forbid	Partly acceptable	Acceptable	Test	Significance
Modern recreation	Yes	0	0	4	Fisher's	0.0121*
	No	22	35	22		
Modern farming	Yes	0	1	12	Fisher's	0.0000***
	No	22	34	14		
Access for disabled	Yes	0	2	4	Fisher's	0.192
	No	22	33	22		
Industry & conservation	Yes	0	2	2	Fisher's	0.5642
	No	22	33	24		
Commercial tourism	Yes	0	1	1	Fisher's	1
	No	22	34	25		
Reindeer herding	Yes	0	3	1	Fisher's	0.3588
	No	22	32	25		
Cultural heritage	Yes	2	10	7	Fisher's	0.1811
	No	20	25	19		
Property owners	Yes	3	8	12	Fisher's	0.0357*
	No	19	27	14		
Nature-based tourism	Yes	4	11	8	Fisher's	0.5252
	No	18	24	18		
Maintaining grazing	Yes	7	17	16	Chi sq.	0.12131
	No	15	18	10		
Traditional recreation	Yes	6	13	11	Chi sq.	0.6926
	No	16	22	15		
Maintain biodiversity	Yes	7	11	9	Chi sq.	0.9627
	No	15	24	17		
Reduce traffic	Yes	10	13	5	Chi sq.	0.1367
	No	12	22	21		
Stabilize encroachments	Yes	11	8	5	Chi sq.	0.0375*
	No	11	27	21		
Increase biodiversity	Yes	7	6	0	Fisher's	0.0038**
	No	15	29	26		
Reduce encroachments	Yes	8	3	0	Fisher's	0.0005***
	No	14	32	26		

Table A.8. Participants' trust in governance actors separated by conservation frame (human centered n = 41, nature-centered n = 41). Numbers are percentages. Statistically significant differences are estimated using Fisher's exact test.

		Very low	Low	Neutral	High	Very high	Significance
Municipality	Human	0.0	4.9	39.0	51.2	4.9	0.1249
	Nature	7.3	17.1	26.8	46.3	2.4	
Managers	Human	0.0	24.4	22.0	41.5	12.2	0.0138*
	Nature	0.0	2.4	17.1	56.1	24.4	
Board	Human	2.4	7.3	34.1	56.1	0.0	0.8546
	Nature	2.4	7.3	34.1	51.2	4.9	
Council	Human	0.0	2.4	41.5	51.2	4.9	0.714
	Nature	0.0	4.9	43.9	51.2	0.0	
County	Human	9.8	24.4	29.3	24.4	12.2	0.0036**
	Nature	2.4	2.4	22.0	53.7	19.5	
Environmental agency	Human	17.1	26.8	24.4	26.8	4.9	0.0037**
	Nature	2.4	4.9	41.5	36.6	14.6	
Ministry	Human	14.6	24.4	39.0	19.5	2.4	0.0086**
	Nature	0.0	9.8	68.3	19.5	2.4	

Table A.9. Participants' trust in governance actors separated by attitudes towards downgrading (forbid = 22, partly acceptable n = 35, acceptable n = 26). Numbers are percentages. Statistically significant differences are estimated using Fisher's exact test.

		Very low	**Low**	**Neutral**	**High**	**Very high**	**Significance**
Municipality	Forbid	13.6	27.3	31.8	27.3	0.0	0.012*
	Partly acceptable	0.0	5.7	34.3	54.3	5.7	
	Acceptable	0.0	3.8	34.6	57.7	3.8	
Local board	Forbid	4.5	9.1	36.4	45.5	4.5	0.1361
	Partly acceptable	2.9	2.9	22.9	68.6	2.9	
	Acceptable	0.0	11.5	50.0	38.5	0.0	
Managers	Forbid	0.0	0.0	9.1	68.2	22.7	0.0222*
	Partly acceptable	0.0	11.4	20.0	45.7	22.9	
	Acceptable	0.0	26.9	30.8	34.6	7.7	
County Governor	Forbid	0.0	4.5	9.1	63.6	22.7	0.0014**
	Partly acceptable	8.6	8.6	28.6	31.4	22.9	
	Acceptable	7.7	30.8	34.6	26.9	0.0	
Environmental Agency	Forbid	4.5	13.6	18.2	50.0	13.6	0.0402*
	Partly acceptable	8.6	20.0	25.7	31.4	14.3	
	Acceptable	15.4	15.4	53.8	15.4	0.0	
The Ministry	Forbid	4.5	18.2	54.5	22.7	0.0	0.087.
	Partly acceptable	11.4	14.3	48.6	20.0	5.7	
	Acceptable	3.8	23.1	57.7	15.4	0.0	
Advisory council	Forbid	0.0	4.5	54.5	36.4	4.5	0.3564
	Partly acceptable	0.0	2.9	31.4	62.9	2.9	
	Acceptable	0.0	3.8	50.0	46.2	0.0	

Table A.10. Participants' demographics by frame preferences and attitudes towards downgrading. Numbers are counts. Statistically significant differences are estimated using [1]Fisher's exact test and [2]Chi. Square test.

		Frame			Downgrading			
		Human	**Nature**	**P-value**	**Forbid**	**Partly acceptable**	**Acceptable**	**P-value**
Gender	Female	11	13	0.8082[2]	6	9	9	0.7355[2]
	Male	30	28		16	26	17	
Age	28 to 40	3	6	0.5187[1]	2	3	4	0.713[1]
	41 to 50	12	8		6	7	7	
	51 to 60	10	13		6	9	9	
	61 to 76	16	14		8	16	6	
Education	Higher	25	32	0.2187[2]	15	16	22	0.3123[2]
	Primary& secondary	17	11		11	6	7	

Table A.11. Model selection using backwards elimination.

	Model	AICc	Removed variable
Downgrading and MFA	DOWNGRADING ~ AGE + GENDER + MFA.DIM1 + MFA.DIM2	140.59	Full model
	DOWNGRADING ~ GENDER + MFA.DIM1 + MFA.DIM2	138.26	AGE
	DOWNGRADING ~ MFA.DIM1 + MFA.DIM2	136.25	GENDER
Downgrading and conservation frame	DOWNGRADING ~ AGE + GENDER + FRAME	171.69	Full model
	DOWNGRADING ~ AGE + FRAME	169.49	GENDER
	DOWNGRADING ~ FRAME	167.97	AGE
Conservation frame and MFA	FRAME ~ AGE + GENDER + MFA.DIM1 + MFA.DIM2	135.87	Full model
	FRAME ~ GENDER + MFA.DIM1 + MFA.DIM2	131.21	AGE
	FRAME ~ MFA.DIM1 + MFA.DIM2	126.76	GENDER
	FRAME ~ MFA.DIM1	125.11	MFA.DIM2

Table A.12. Model output showing estimates of the log odds of the most parsimonious models following backwards elimination minimizing the AICc criterion.

	Type	Model term	Estimate	Std. Error	Z-value	P-value	
Downgrading and MFA	Ordinal regression	MFA.DIM1	-1.2566	0.2201	-5.71	0.0000	***
		MFA.DIM2	-0.293	0.204	-1.436	0.151	
Downgrading and Frame	Ordinal regression	FRAME (Nature for people)	1.242	0.924	1.344	0.1788	
		FRAME (People and nature)	1.57	0.469	3.347	0.0008	***
Frame and MFA	Multinomial regression	Intercept: FRAME (Nature for people)	-1.942	0.501	-3.881	0.0001	***
		MFA.DIM1: FRAME (Nature for people)	-0.195	0.351	-0.556	0.5758	
		Intercept: FRAME (People and nature)	-0.158	0.276	-0.574	0.5662	
		MFA.DIM1: FRAME (People and nature)	-0.924	0.227	-4.068	0.0000	***