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## Forest owners' perspectives on forest protection in Norway

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### ABSTRACT

Forest protection in nature reserves in Norway relies on the voluntary participation of forest owners. While the national forest protection program has been a success since its start in early 1990s, by 2020 the national forest protection authorities were only halfway to reaching their goal of protecting 10% all forest area. We examined attitudes towards forest protection in general and towards different protection modes using surveys of forest owners between 2003 and 2010. Our analysis is based on a comprehensive comparison between a random sample of forest owners ( $n = 647$ ), forest owners who participated in voluntary conservation ( $n = 126$ ) and forest owners involved in the government-led coniferous forest protection program ( $n = 142$ ). Only about 10% of forest owners involved in voluntary protection processes are either quite or very unhappy with the process, while 75% of forest owners involved in government-led protection were either quite or very unhappy with the process. Moreover, forest owners who had experience with the voluntary protection program were largely satisfied with the results. We discuss forest owners' attitudes to forest protection in general, and possible reasons for the differences in attitudes between compulsory protection and voluntary protection. We conclude that voluntary protection has great potential to fulfill the last 5% area goal for forest protection in Norway, with some improvements in the process.

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Biodiversity conservation;  
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## Introduction

Attempts to conserve Norwegian coniferous forests through government-led protection programs in the late 1980s and during 1990s resulted in frequent, and often heated, disputes between forest owners and environmental authorities. These conflicts were generally more prominent in Norway than in either Sweden or Finland (Vatn et al. 2005). High conflict levels in government programs in the 1990s created an incentive for pursuing voluntary ways to protect forests in Fennoscandia (Gulbrandsen 2008; Mäntymaa et al. 2009; Korhonen et al. 2013; Hiedanpää and Borgström 2014; Angelstam et al. 2011; Mäntymaa et al. 2018). Both the Norwegian Forest Owners' Federation (NFO) and environmental authorities viewed the situation as untenable. The NFO launched a program involving voluntary conservation in 2000 and has since enjoyed broad political support. Since 2003, almost all of the new processes for conserving forest on private land have been voluntary (Lindhjem and Mitani 2012; Hiedanpää and Borgström 2014). The voluntary processes starts formally when a forest owner submits a suggestion to create a conservation easement on his/her property, which is done in close cooperation with the NFO or other non-governmental organizations. This initiates an inventory inspection by the environmental authorities to assess the ecological value of the forest land. The County Governor and forest owner agree on

boundaries of the area, regulations by law in the forest reserve and compensation for lost income. To explore the possibilities of forest protection of the suggested area, there is a close cooperation in this early planning phase between the NFO, the County Governor's environmental department and the Norwegian Environment Agency. When the County Governor and a forest owner reach an agreement, the County Governor publicizes the protection planning process through official news channels to reach other stakeholders. The last phase takes part when the proposal is accepted by the environmental authorities, and the area becomes a nature reserve under the Nature Diversity Act. All nature reserves have the same legal status independent of protection processes. Both the government-led protection program that was in place until 2003 and the voluntary protection program that has been in place since 2003 follow the same processes.

Norwegian voluntary forest conservation reached a milestone in January 2020, when the total area of nature reserves in Norway passed five percent of all forest land. During the last 20 years, 610 forest areas have been designated as nature reserve through voluntary processes. The voluntary forest protection program is regarded as a success, with a considerable reduction in the level of conflict (Hiedanpää and Borgström 2014). The government's long-term goal is

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to protect 10% of all forest land in Norway as nature reserves. Reaching the half-way point provides an opportunity to reflect on how voluntary protection program can continue to identify ecologically high-quality forest areas for protection status. It also remains unclear whether voluntary conservation can fully replace or simply complement former traditional conservation strategies. Compared to available forest nature types in Norway, nature reserves created through the voluntary protection program generally include smaller, marginally productive areas. High mountainous forest in particular are overrepresented (Framstad et al. 2002, 2017). It is crucial to have more knowledge about what motivates forest owners to offer their land for voluntary protection, especially those who own productive forest in lowlands. It is important to know more about forest owners' experiences and views of both the voluntary and traditional conservation strategies, and how voluntary conservation approach can be more broadly and effectively utilized.

Several studies have explored Norwegian forest owners' attitudes towards biodiversity and forest protection in general (Aasetre 2000), as well as their attitudes concerning government-led forest protection programs (Haslestad and Leirset 1995; Hagen 1997; Haugen 1999; Kjellevoid 1999; Berdahl 2006), voluntary protection (Aannerud 2006; Paulsrud 2008) and surveys including both government-led and voluntary processes (Næss 2003; Eriksen 2004; Sines 2004). Results from most of these surveys have not been published in the scientific literature. Skjeggedal et al. (2010) did a comprehensive evaluation of the voluntary protection process and concluded that "... the results of voluntary protection are so far so good that the process should be continued and further developed". More than 10 years later, the voluntary conservation program is still regarded by both the NFO and the Norwegian government as a success (The Norwegian Environment Agency 2020). The aim of this paper is to explore how forest owners' attitudes towards both forest protection in general and the different modes of protection may have changed as a result of the transition from government-led processes (before 2003) to voluntary processes (after 2003). Our research questions are:

1. What are the forest owners' general attitudes concerning protection and biodiversity?
2. How did forest owners who have participated in protection both voluntary and compulsory programs experience the protection process?
3. How can the forest protection process be improved?

## Materials and methods

### Study area

Forests in Norway cover 122,000 km<sup>2</sup>, or 38% of the country's land area. Roughly 86,600 km<sup>2</sup> are considered productive forest (defined as timber growth >1 m<sup>3</sup>/ha/year), and these areas are located primarily in southern Norway (Framstad et al. 2017). The percentage of privately owned productive forest (84%) is greater in Norway than in any other country in Europe. Private individuals own 76%, with co-owners and

companies own an additional 7.5%. The National Forestry Commission (Statskog) is the largest single forest owner in Norway, although its forests only comprise 6% of Norway's productive forest areas. Municipalities and Common Property ownership structures (*almenninger*, in Norwegian) own the remainder of Norway's productive forests.

Norway's productive forest area is comprised of 125,566 distinct parcels containing at least 2.5 ha of productive forest. These parcels are owned – either individually or together with others – by 157,000 individuals, 34% of whom are women. The voluntary forest protection program is designed to recruit both private individuals and companies/co-owners, although forest properties owned by public entities have also been put into protection through this program.

Protection measures are used similarly in countries with all types of ownerships. Most of the forests in Norway consist of conifers within the boreal zone. The most common species are Norway spruce (*Picea abies* Karst.), Scots pine (*Pinus sylvestris* L.) and birch (*Betula pubescens* Ehrh., *Betula pendula* Roth.). Regarding forest types protected there are very limited areas in the most southern nemoral and boreone-moral vegetation zone that consist of oak (*Quercus petraea* L., *Quercus robur* L.) and beech (*Fagus sylvatica* L.). There is also a smaller proportion of protected forests in the lowlands, however, the proportion of protected forest is rather similar for forest of various dominating tree species as Norway spruce and Scots pine (Framstad et al. 2017).

## Survey design, samples and representativeness

### Survey design

Our study sought responses from representative samples of three groups of forests owners (Table 1): forest owners who participated in government-led compulsory protection programs (hereafter FOc), forest owners who participated in voluntary protection program (FOv) and the general population of forest owners who may not have had experience with either program (FO<sub>G</sub>). Data were collected with quantitative surveys (Næss 2003; Eriksen 2004; Sines 2004), distributed by mail, that included questions on several demographic attributes (age, gender, educational) and background information that might explain variation in forest owners' attitudes towards their property and its protection status (how was property acquired, whether owner grew up on the property and continue to live there, or if the property was used for hunting). We then presented 17 statements about general biodiversity conservation and forest protection, asking survey participants to rate their agreement using a 5-point Likert scale (1 = totally disagree and 5 = totally agree). We also asked participants about the extent of forest protection areas in Norway ("What is your opinion on forest protection in Norway as the situation is now?") and provided five answer alternatives ranging from "the amount should increase substantially" to "the amount should decrease substantially". We asked forest owners who had participated in protection programs about their satisfaction with the process, the role they played, how the process affected

**Table 1.** The representational dimension and methodologies of the three samples in the study.

Sample	Source	Target population	Geographical scope	Sample	Number of respondents	Response rate	Mode
FO <sub>G</sub>	Survey 2009–2010	All forest owners in Norway	County of N-Trøndelag/S-Trøndelag Buskerud/Telemark	Probability sample of 1400 selected forest owners with forest property >25 ha productive forest. Stratified in area classes	<i>N</i> = 610	48%	Mail-survey. Two reminders on mail.
FO <sub>v</sub>	Survey 2009–2010	All ( <i>n</i> = 269) forest owners that have completed a voluntary protection on their property in Norway per 2010	Norway	Probability	<i>n</i> = 122	53%	Mail-survey. Two reminders on mail. One reminder on telephone.
FO <sub>c</sub>	Sines (2004) Eriksen (2004) Næss (2003)	All ( <i>n</i> = 221) forest owners that were part of a government-led protection in period of 2000–2004	County of Østfold, Oppland, Aust-Agder, Telemark, Buskerud		<i>N</i> = 142	64%	Mail-survey. Reminder on telephone (Sines 2004) or interview by telephone in advance (Eriksen 2004; Næss 2003)

their view of nature conservation, and their satisfaction with the economic compensation they received.

We collected information that could be used to improve future forest protection by asking program participants (FO<sub>v</sub> and FO<sub>c</sub>) about which organizations they had contact with during the process and how they would rate organizations in terms of trustworthiness. We asked forest owners who had not participated in either program (FO<sub>G</sub>) whether they were familiar with the voluntary protection program, and whether they would consider it for their own property. Finally, we asked all three groups which mode of forest protection they thought was best.

We collected data for the FO<sub>G</sub> and FO<sub>v</sub> groups with questionnaires mailed to targeted recipients in November–December 2010. Survey packets contained a letter describing the purpose of the survey, the questionnaire itself and a prepaid return envelope. We sent recipients a postcard one week after we mailed the survey packets, and a second

reminder 3 weeks later. We use data for the FO<sub>c</sub> group collected from largely identical surveys that had been mailed to recipients in 2003 and reported in Næss (2003), Sines (2004) and Eriksen (2004).

We generated a list of survey recipients for FO<sub>G</sub> with a stratified random sample from the 14 132 forest owners with properties >25 ha from two pairs of neighboring counties: Buskerud and Telemark in southeastern and Nord- and Sør-Trøndelag in middle Norway (Table 1). We excluded the 19,895 individuals whose properties were <25 ha, because parcels this small were unlikely to have an important role in the future development of voluntary forest protection policy. We stratified our sample selection so that our targeted survey recipients (*N* = 1400) were representative of both the relative distribution of all forest owners among the four counties, and the relative distribution of forest property sizes among five pre-defined categories (as recorded in the Norwegian national agricultural registry, 2009). We mailed our survey questionnaire to 1400 individuals and received 610 completed questionnaires (48% response rate, once 136 unopened envelopes we received in return are excluded).

We collected data for the FO<sub>v</sub> group by mailing survey questionnaires to all 269 forest owners who were registered as having completed a voluntary protection process before July 10th, 2010. If recipients did not return completed questionnaires after two reminders, we contacted them directly by telephone. We received 122 completed questionnaires. This corresponds with a 53% response rate, once questionnaire recipients who we deemed irrelevant for our survey purposes (e.g. sold or transferred property, deceased, forest owned by public entity) are excluded.

Data for the FO<sub>c</sub> group comes from the questionnaires that had been mailed to all 221 forest owners who had been involved in the government-led protection program between 2000 and 2004 (Næss 2003; Eriksen 2004; Sines 2004). This survey received 142 responses (64% response rate).

### Processing and analysis of data

We present survey response data mainly as descriptive statistics including figures (histograms, lines) and tables of response distributions and average values. We used ANOVA

**Table 2.** Demographic attributes of (% of survey participants for each group) of three groups of forest owners.

Forest owner attribute	Category	FO <sub>G</sub>	FO <sub>v</sub>	FO <sub>c</sub>
Gender	Women	13	18	23
	Men	87	82	77
Age	16–19	0	0	0
	20–34	4	1	0
	35–54	45	50	27
	55+	51	49	73
Education	Primary school	13	7	22
	High school	40	32	42
	College/university <4 years	21	31	35 <sup>1</sup>
	College/university >4 years	17	18	
Growing up	Other	9	10	1
	On the property	66	53	42
Reside	Not on the property	34	47	58
	On the property	84	65	38
Acquired the property <sup>2</sup>	Not on the property	16	35	62
	Bought	50	46	49
	Inherited	61	68	42
Hunting on the property?	Gift	2	1	1
	Yes	61	64	– <sup>3</sup>
	No	39	36	– <sup>3</sup>

<sup>1</sup>Just asked for college/university without specifying the duration.

<sup>2</sup>Multiple possibilities, sum larger than 100.

<sup>3</sup>Question not included in survey for this group.

**Table 3.** Distribution of survey respondents' property sizes (% of respondents in each group) for three forest owner groups. Numbers in parentheses describe the reported distribution of all property sizes >25 ha for each group (Statistics Norway 2008). FOv and FOc have same target population, all forest owners >25 ha in Norway.

	25.0–74.9 ha <sup>1</sup>	75.0–124.9 ha	125.0–174.9 ha	175.0–224.9 ha	>225.0 ha	Total
FO <sub>G</sub>	44 (54)	20 (20)	12 (9)	6 (6)	18 (11)	(100)
FOv	29 (56)	14 (19)	10 (8)	7 (5)	40 (12)	(100)
FOc	69 (56)	8 (19)	8 (8)	4 (5)	11 (12)	(100)

<sup>1</sup>Forest owners with properties <25 ha were not included in the survey.

to test for statistical significant differences in responses among forest owner groups, and Bonferroni *post hoc* multiple comparisons to test for pair-wise differences between group means. We used SPSS (version 27) for all statistical tests.

## Results

### Demographic attributes of forest owner group samples

All three forest owner groups were almost exclusively over 35 years old, and predominantly men (Table 2). The proportion of women respondents in FO<sub>G</sub> was lower than the other two groups. Forest owners' education level is conspicuously higher in FOv than in both FO<sub>G</sub> and FOc. A majority of individuals in FOv and FO<sub>G</sub> groups both grew up and still reside on the property. The percentage of individuals who still live on properties in the FOc group is conspicuously lower. A large proportion of the FO<sub>G</sub> (61%) and FOv (64%) hunt on their own property, which indicate strong bonds to their land. This question was not included in the survey of the FOc group.

The size of survey respondents' forest properties varies considerably. Our sampling design restricted the lower property size to 25 ha, and some respondents' properties were several thousand ha (Table 3). Participants in our study included a higher proportion of large property owners than the forest owner groups they were intended to represent. Survey participants in the FO<sub>G</sub> group included a higher proportion of individuals who owned forest properties in the largest category than the corresponding proportion of the target population. Survey participants in the FOv group included a far higher proportion of individuals who own large properties than the corresponding proportion of all Norwegian forest owners.

Income from forestry did not constitute a large percentage of survey participants' income for either FO<sub>G</sub> or FOc groups. Income from forestry was <20% of the total household income for 72% of participants in the FO<sub>G</sub> group and 87% of the FOc group. A smaller percentage (55%) of the FOv group, which contained a higher percentage of large forest property owners, had a similarly low proportion of forestry-generated household income. Roughly half of forest owners in all three groups reported that either they themselves or their family members perform less than 20% of the work carried out on their property.

### Forest owners' attitudes towards protection related questions

Significant differences have been identified between the three samples for a total of 11 out of 17 attitude statements

(Table 4). Most differences were identified between FO<sub>G</sub> and FOc for 8 of the statements. For a total of 7 statements, there were identified differences in attitude between FOv and FOc. All three groups expressed similar levels of agreement with statements addressing biodiversity and protection in general (Figure 1, statements B–E and I). FOv and FOc groups expressed significantly less agreement with statement A: "Biodiversity must be protected because it can have a future economic value" than the FOc group. As many as two-thirds (67%) of the respondents in, fully or partially disagree with statement A, and similar figures for FOv and FO<sub>G</sub> were 38% and 39%, respectively.

However, for attitudes towards other forest values (statements F to H and J to N), significant differences were identified between FOv and FOc for all statements, with the exception of question F, "It is more important to preserve forests to promote outdoor recreation than for to preserve biodiversity" and H, "Instead of working on species conservation in Norway, we should rather use resources in countries where the impact on biodiversity may be greater". Significant differences were identified for only 5 of 17 statements for the two samples FO<sub>G</sub> and FOv.

The data for the sub-questions F to N, which deal with production and economic values in the forests, shows that generally, FOc clearly agrees more with the statements than FOv (significant differences for G, J, K, L, M, N, see Table 4), while FO<sub>G</sub> takes an intermediate position. Forest owners largely agree (fully and partially) with the claims in questions K, L and M that concern forests being important for employment, timber production and the source of income for society.

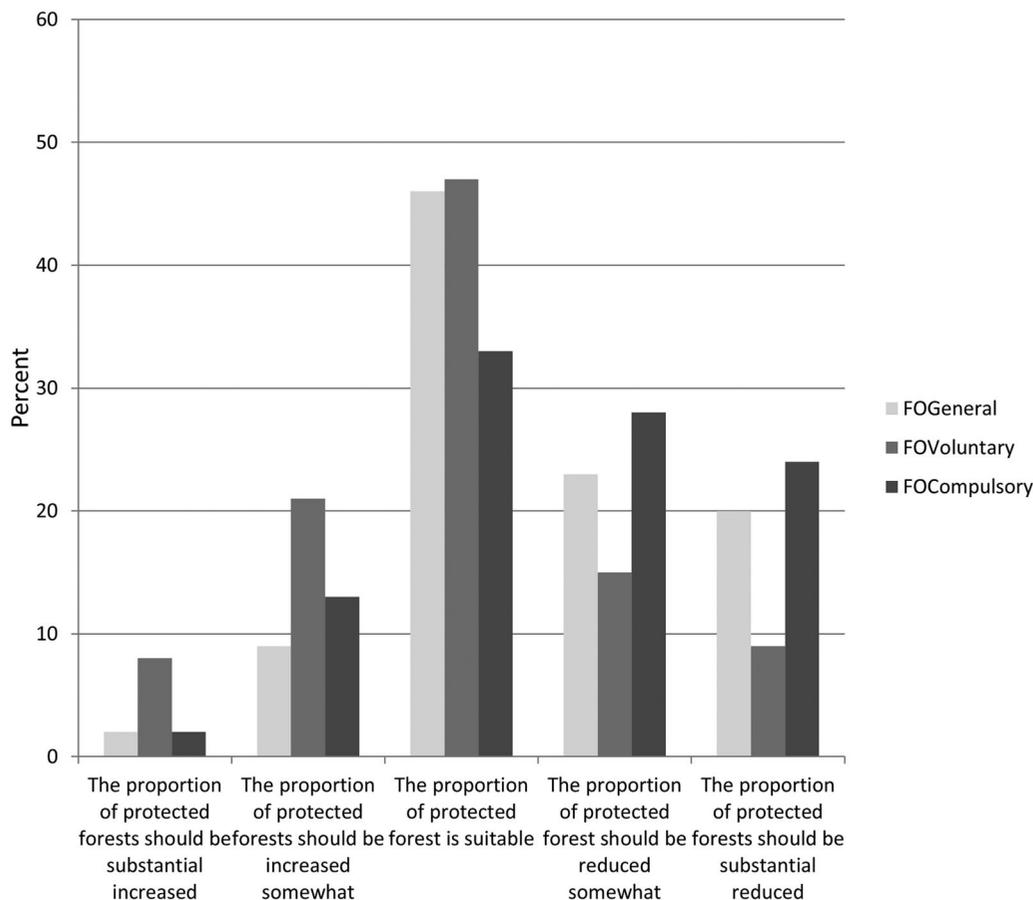
The analysis has so far concerned forest owners' general attitudes towards protection and biodiversity, as well as attitudes to different aspects of forest use. For the statements that deal with protection of own forest (statements O, P and Q), we only find differences for questions P, where FOc more agrees with the statement "I oppose protection of my property because the value for future generations is decreasing", than do FO<sub>G</sub>.

All three forest owner groups generally believe that the proportion of protected forest in Norway is appropriate (increased by 84 areas and 505 km<sup>2</sup> between 2003 and 2010); the middle alternative "the proportion of protected forest is suitable" received 47% among both FOv and FO<sub>G</sub>, while FOc had a lower score (33%). FOv is more positive than both FO<sub>G</sub> and FOc to increase the amount of forest protection in Norway. A total of 24% and 20% among the respondents in FOc and FO<sub>G</sub> have ticked off the option "decrease the amount", while the corresponding figure for FOv is 9%.

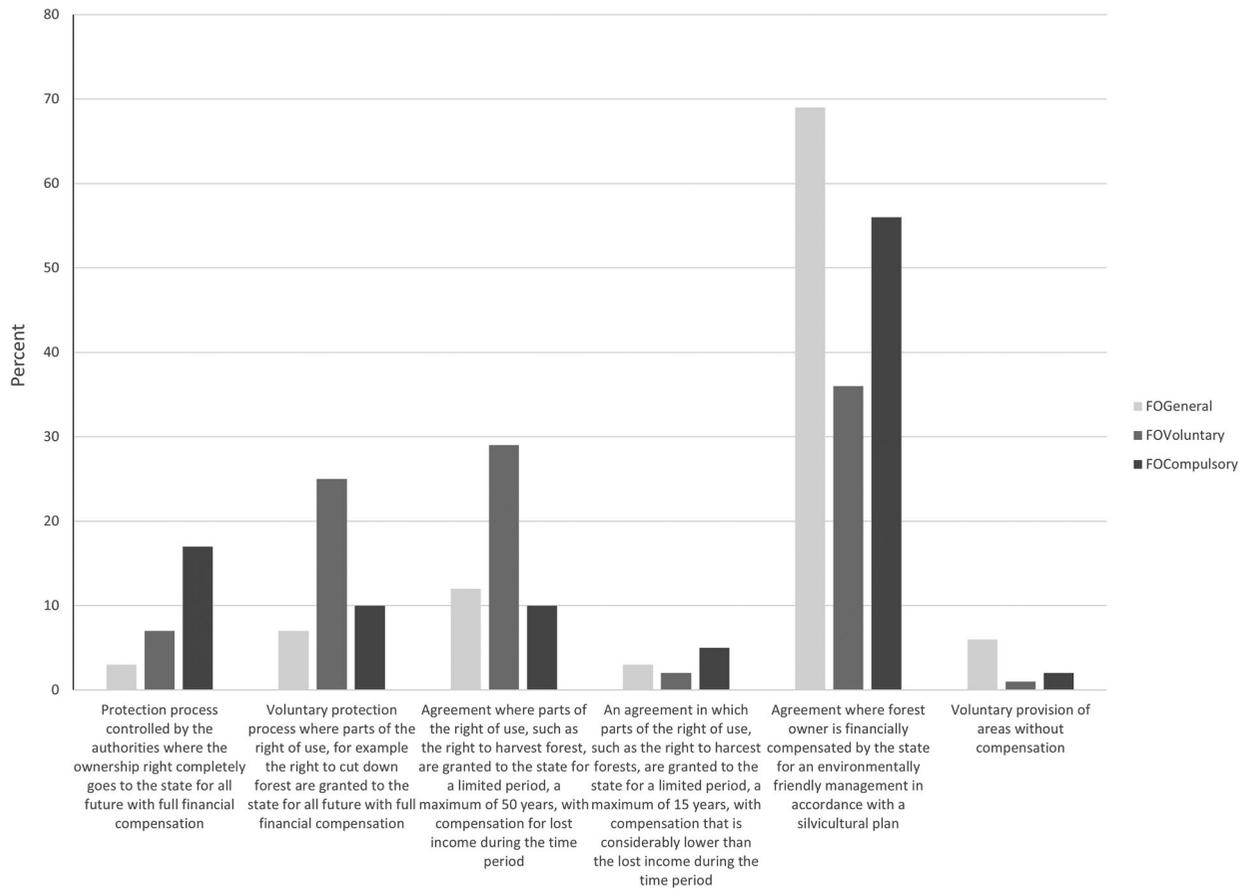
**Table 4.** Forest owner's agreement with statements addressing biodiversity and protection in general (statements A to E and I), other forest values (statements F to H and J to N), and the biodiversity protection status of their own property (statements O to Q). Column values represent mean  $\pm$  SE for scores along a 5-point Likert scale where 1 is "totally disagree" and 5 is "totally agree". ANOVA F-statistics ( $\pm$  SD) indicates the result of the analysis of variance and Bonferroni "multiple comparison" is used to identify the differences between the samples. Significance level is indicated by \* at 0.05 level, \*\* at 0.01 level and \*\*\* at <0.001 level.

Statement	FO <sub>G</sub> (n = 618)	FO <sub>V</sub> (n = 122)	FO <sub>C</sub> (n = 142)	ANOVA (F-statistic)	Diff.
<b>A</b> Biodiversity must be protected because it can have a future economic value	2.78 $\pm$ 0.052	2.68 $\pm$ 0.105	2.06 $\pm$ 0.119	12.96***	1,2; 1,3; 2,3
<b>B</b> It is unethical that species get extinct due to human activities	3.44 $\pm$ 0.048	3.55 $\pm$ 0.108	3.42 $\pm$ 0.148	0.46	
<b>C</b> All species have the right to exist only for their own sake	3.01 $\pm$ 0.051	3.37 $\pm$ 0.104	3.50 $\pm$ 0.151	8.74***	1,3; 1,2
<b>D</b> Extinct species are not a major environmental problem	2.85 $\pm$ 0.051	2.82 $\pm$ 0.105	3.21 $\pm$ 0.146	3.43*	1,3
<b>E</b> It is important to preserve biological diversity for future generations	3.92 $\pm$ 0.044	4.08 $\pm$ 0.091	4.10 $\pm$ 0.094	2.31	
<b>I</b> It is important to preserve the biodiversity of the forest	3.77 $\pm$ 0.043	3.95 $\pm$ 0.093	3.85 $\pm$ 0.126	1.40	
<b>F</b> It is more important to preserve forests to promote outdoor life than to preserve biodiversity	2.37 $\pm$ 0.047	2.55 $\pm$ 0.106	2.66 $\pm$ 0.137	3.11*	
<b>G</b> Preserving biodiversity means that the countryside is depopulated	2.59 $\pm$ 0.052	2.36 $\pm$ 0.108	3.14 $\pm$ 0.137	9.87***	1,3; 2,3
<b>H</b> Instead of working on species conservation in Norway, we should rather use resources in countries where the effect on biodiversity may be greater	2.47 $\pm$ 0.051	2.40 $\pm$ 0.109	2.50 $\pm$ 0.135	0.19	
It is better to harvest the forest at a sustainable level than to preserve biodiversity	3.39 $\pm$ 0.044	3.07 $\pm$ 0.102	3.63 $\pm$ 0.122	7.15**	2,3; 1,2
<b>K</b> As long as the forest owner mainly manage their forests due to the principles of forest certification, no more restrictions are needed	4.13 $\pm$ 0.041	3.81 $\pm$ 0.112	4.28 $\pm$ 0.094	6.76**	2,3; 1,2
<b>L</b> Forestry is an important source of employment in society	3.93 $\pm$ 0.042	3.79 $\pm$ 0.103	4.44 $\pm$ 0.109	11.14***	1,3; 2,3
<b>M</b> The forest is a renewable resource that will primarily be used for timber production	3.93 $\pm$ 0.040	3.75 $\pm$ 0.098	4.41 $\pm$ 0.075	17.03***	1,3; 2,3
<b>N</b> The forest is most important as a source of income for society	3.47 $\pm$ 0.045	3.16 $\pm$ 0.108	3.69 $\pm$ 0.113	6.79**	2,3; 1,2
<b>O</b> I accept protection in my forest if I get full financial compensation	3.05 $\pm$ 0.061	NR <sup>1</sup>	3.02 $\pm$ 0.139	0.03	
<b>P</b> I am against protecting my property because the value for future generations is declining	3.34 $\pm$ 0.056	NR <sup>1</sup>	3.82 $\pm$ 0.117	13.75***	1,3
<b>Q</b> I am against protecting my property because it is not a good way to utilize a renewable resource	3.64 $\pm$ 0.052	NR <sup>1</sup>	3.78 $\pm$ 0.115	1.46	

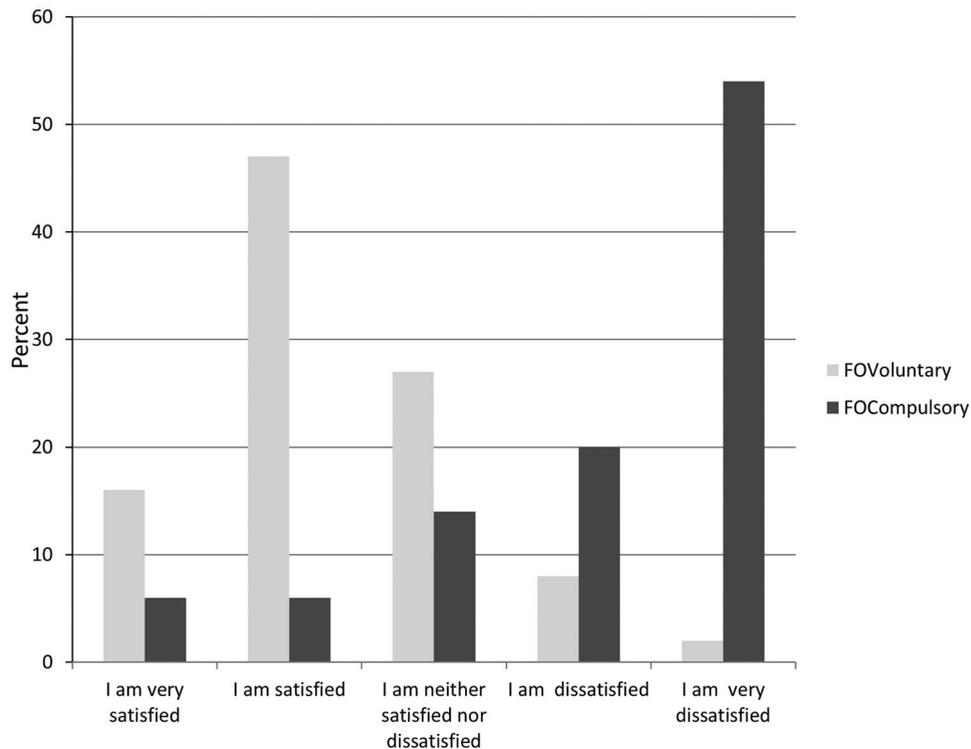
<sup>1</sup>NR – not relevant question, because these respondents have already accepted voluntary protection on their property.



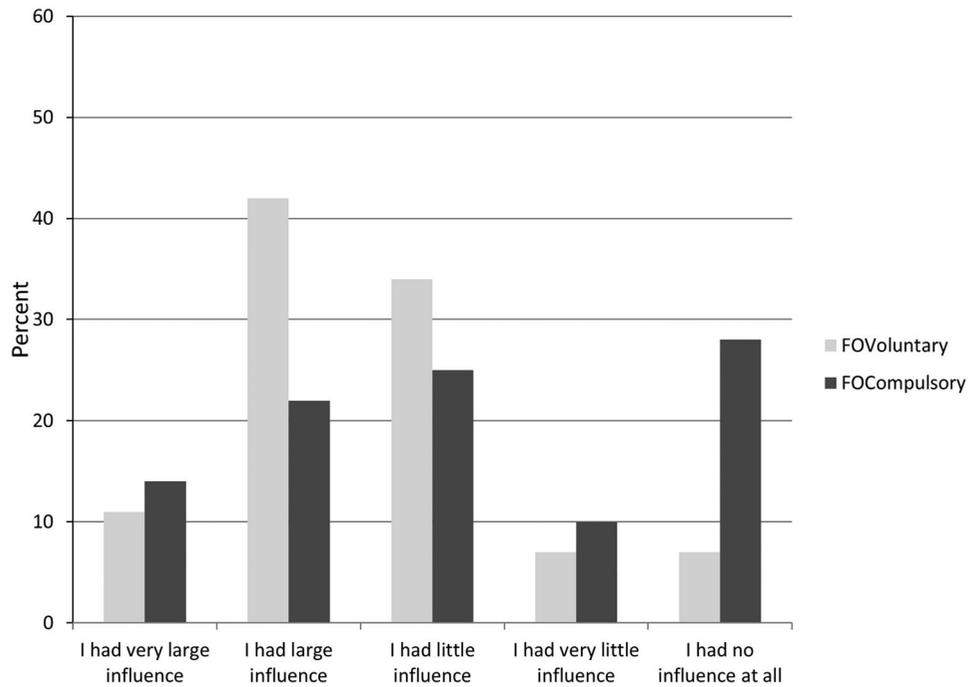
**Figure 1.** The distribution (in percent) on the question "What is your opinion on forest protection in Norway as the situation is now?" for the samples FO<sub>G</sub>, FO<sub>V</sub> and FO<sub>C</sub>.



**Figure 2.** The distribution (in percent) for what three groups of forest owners consider to “... to be the best mode of forest protection and conservation of biodiversity?”.



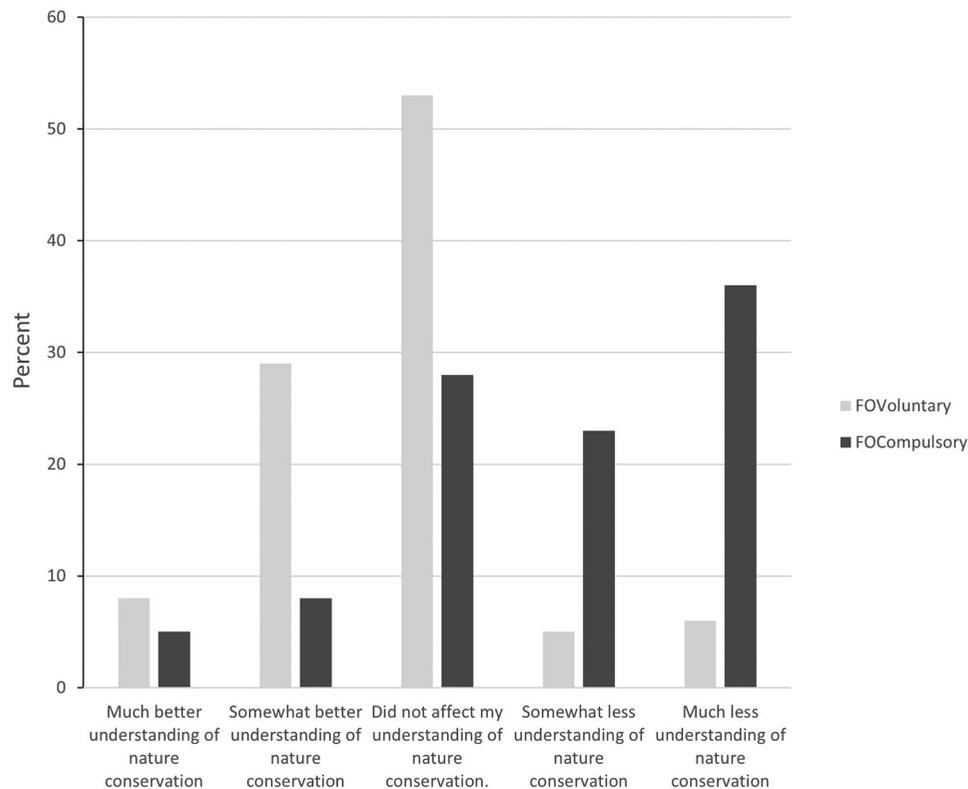
**Figure 3.** The distribution (in percent) on the question “How satisfied are you with the protection process?” for the samples FOv and FOc. Sum = 100%.



**Figure 4.** The distribution (%) on the question “To which extend have you had influence during the protection process?” for FOv and FOc.

The largest proportion of forest owners in all three groups expressed support for protection programs that provided compensation for lost income as a result of a customized “... environmentally friendly forest management in accordance with a silvicultural plan” (Figure 2). Respondents also expressed support for agreements

where parts of the right of land use are given to the state with full compensation for lost income. Voluntary protection mode is a better mode in accordance with forest owners in the group FOv and FO<sub>G</sub>, except for FOc that to a larger extent wants government-led processes.



**Figure 5.** The distribution (in percent) on the question “How do you think the protection process affected your understanding of nature conservation?” for the samples FOv and FOc. Sum = 100%.

### Attitudes towards forest protection of own property

Respondents in FOv and FOc groups expressed dramatically different degrees of satisfaction with the protection program they had participated in (Figure 3) and their role in the process (Figure 4). In response to the question, “how satisfied are you with the protection process?” 47% of respondents in FOv were quite satisfied and 13% were very satisfied with the protection process. FOv respondents felt they had a greater influence in the process. In response to the question “how do you think the protection process affected your understanding of nature conservation?”, respondents in the FOv sample answered that they had gained a much greater understanding of nature conservation during the protection process compared to FOc (Figure 5).

### How do the landowners experience the protection processes?

Most of the participants in FOv protection program answered that the duration the protection process, from initial contact to finalized agreement, lasted about as long as they expected it would. There were more program participants who thought that progress during the process was either somewhat slow or too slow (39%), compared to those who thought the process has been fast or very fast (13%). The duration of the protection process was not asked for the FOc (Næss 2003; Eriksen 2004; Sines 2004), but many respondents express during interviews that the protection process has taken a too long time (Berdahl 2006). FOv participants (76%) had been in contact with the NFO, which forest owners viewed as highly trustworthy (mean score = 4.08 out of 5). Many FOv participants (roughly 50%) had also been in contact with both Norwegian Environment Agency (national) and County Governor (regional), and respondents viewed both of these government entities as less trustworthy (mean score = 2.82).

Almost half (49%) of the FO<sub>G</sub> respondents were not aware of the voluntary protection program. The questionnaire provided a small explanation of what voluntary protection is for those who had not heard of it, so that all survey participants would be able to answer subsequent questions about the program. All three groups of forest owner’s answers believe that voluntary agreements will reduce the level of conflict (Hiedanpää and Borgström 2014). FO<sub>G</sub> and FOv consider this and the other questions equally, with the exception that FOv has a greater belief that “more forest owners will enter into agreements so that the extent of protection in Norway could increase in the years ahead” than FO<sub>G</sub> (mean score, FOv = 3.54, FO<sub>G</sub> = 2.98,  $p < 0.05$ ).

FOv respondents were generally content with the level of economic compensation for lost forest revenue. As many as 43% of FO<sub>G</sub> replied that voluntary protection of their own property may be relevant, and the main motivation is that the protection process is voluntary and that they receive good economical compensation for their offer of forest land (Mitani and Lindhjem 2015). Most of the respondents in FOv (58%) were either satisfied or very satisfied with the

economical compensation. Only 9% of the respondents of FOv are dissatisfied or very dissatisfied.

### Discussion and conclusion

The significant conflicts associated with government-led forest protection suggest that Norwegian forest owners might harbor considerable skepticism about such forest protection. However, the results of our surveys provide a much more nuanced picture of the situation. While many forest owners do not see the meaning of forest protection, a clear majority of the Norwegian forest owners considered protection of biodiversity in forests important. Historically, the forests’ foremost importance has been linked to the use of timber as a raw material and the basis for economic activity (Gundersen et al. 2005). Our survey of forest owners in general confirms that the forest is still viewed as a source of employment, income and a renewable resource with utilitarian value for not only individual forest owners, but their local communities and society as a whole.

A large majority of Norwegian forest owners are of the opinion that voluntary sustainable forestry silviculture systems and certifications programs, such as Programme for the Endorsement of Forest Certification (PEFC) and Forest Stewardship Council (FSC), sufficiently safeguard the protection of forest biodiversity (Table 4, statement K). The scientific literature contains considerable disagreement among both experts and stakeholders on the effectiveness of voluntary forest certification as a means of safeguarding biodiversity (Jensen 1993; Hoen and Winther 1993; Gundersen and Frivold 2008; Kangas et al. 2010). Unfortunately, our survey questions do not provide the information necessary to determine why some respondents did not view forestry certification as sufficient. These respondents might view timber harvest and forest biodiversity protection within the same areas as mutually incompatible forest management goals, that the degree of protection offered by forest certification and its voluntary basis as insufficient for biodiversity protection. Forest owners who participated in voluntary forest protection did express less agreement with this statement, and to protect mature forest for biodiversity was an important motivation for participating in the protection process (Mitani and Lindhjem 2015).

From our results, we can conclude that there is no fundamental value conflict associated with the protection of biodiversity in forests. Biodiversity protection is meaningful to the majority of forest owners. At the same time, a sizable proportion of forest owners see less value in biodiversity and its protection and thus clearly represent a value conflict. The majority of forest owners believe that timber harvest and protection are compatible, which creates a potential for conflict if government officials impose absolute harvesting restrictions on forest owners’ properties. This is confirmed by the attitudes regarding protection on own property. Even under the conditions of full compensation for lost revenue, about 57% of the forest owners in the FO<sub>G</sub> group were negative to the placing forest stands on their own property into a protection program, regardless of the terms of a hypothetical agreement. However, one should cautious

when interpreting these answers. Forest owners may have varying perceptions of what constituted “full compensation” in a forest protection agreement (Lindhjem and Mitani 2012). Some participants’ answers may reflect skepticism of whether protection agreements offered by authorities provide adequate compensation, based on familiarity with individuals who had negative experiences with protection programs. If FOc owners have a bad experience with the compensation provided, many of those who respond negatively to protection do so for reasons other than that the protection of biodiversity itself. Negative experiences with the process, lack of trust and other factors can be just as important as the degree of conflict with biodiversity interests.

Our surveys explored the degree of involvement of the forest owners, how the forest owners perceive the process and which organizations or agencies the forest owners had contact with. Most of owners in both the FOc and FOv groups were involved in the respective protection programs’ process. Only about 10% of forest owners involved in voluntary protection are quite or very unhappy with the process, while as many as 75% of forest owners involved in government-led protection were quite or very unhappy with the process and with the public authority which has been their main contact for this program. Forest owners expressed the importance of being regarded as a legitimate stakeholder in the protection process, and forest owners’ perception of their role in the protection process appears to be a very central point in understanding the conflict. Respondents in the FOc group expressed experiencing coercion, powerlessness and low level of involvement during the different stages in the process (Hiedanpää and Borgström 2014). Forest owners who participated in the government-led program felt strongly overlooked and did not have possibilities to give input and express arguments that could influence the process’ outcome – despite the contact with, information from and meetings with public authorities (Hiedanpää and Borgström 2014).

Both the mode and level of communication from public authorities are generally the most important factors for forest owners’ attitudes to forest protection (Bergseng and Vatn 2009). First, we see that the more environmental authorities are involved in the protection process, the more negative the forest owners are towards the process. The environmental authority at county level was the most important contact with the forest owners in Norway during the government-led process, and they have very little trust among the forest owners. Studies suggest that it is very important who initiates contact with forest owners; authorities’ representatives are most effective when they have forest owners’ trust and are to a greater extent part of forest owners’ culture (Vatn et al. 2005; Korhonen et al. 2013; Hiedanpää and Borgström 2014). The Norwegian Forest Owners’ Federation (NFO) has a long tradition of supporting forest owners’ interest. The NFO’s role in the development and implementation of the voluntary protection program almost certainly contributed to its success among forest owners.

Forest owners contend that, as property owners of the areas in question, national legislation makes them entitled to compensation for any harvesting restrictions placed on

their forests (Lindhjem and Mitani 2012) and that the financial responsibility for forest protection lies with the government. There is seldom a clear boundary between private property owners and the broader society’s responsibility for the protection of biodiversity (Gulbrandsen 2008). Forest owners’ opinions of whether they receive satisfactory economical compensation will clearly determine their perceptions of a forest protection program (Lindhjem and Mitani 2012). Forest owners who participated in the voluntary protection program were very satisfied with the compensation they received, and surveys of participants in similar programs in Sweden and Finland reported the same (Vatn et al. 2005; Bergseng and Vatn 2009). Participants in Norway’s government-led protection program expressed a greater degree of dissatisfaction with the compensation they received. Many owners in this program were also unhappy with how much time the process took from initial contact to final results. Respondents may answer questions about compensation strategically, and expressed dissatisfaction with their compensation as a means to increase the amount the government might offer for future protection programs.

Dissatisfaction with the participation in the process among those who had carried out voluntary and compulsory protection, and familiarity with others’ negative experiences appears to be the most prominent factor influencing how willing owners in general are to protect forests on their own property. Neither demographic attributes nor the size or relative economic importance of forest property appeared to explain variation in forest owners’ willingness to participate in future protection of their property (Hiedanpää and Borgström 2014). This result further underscores the importance of forest owners’ experiences with participation in the process of making continued progress in protecting Norway’s forests. Forest owners who had participated in the voluntary protection program expressed more support for biodiversity protection, indicating a higher overall tendency towards ecocentric values and behavior among this group (Vatn et al. 2005; Bergseng and Vatn 2009). However, respondents in the group also expressed high levels of agreement with statements in support of biodiversity (e.g. “It is important to preserve biological diversity for future generations”). The greater degree of skepticism towards forest protection of their own property among individuals in the FO<sub>G</sub> group may reflect a result of a NIMBY (“not in my backyard”) phenomenon and greater importance of self-serving interests (Salwasser 1990).

The Norwegian government decided in 2003 that all forest protection in the future shall be based on voluntary protection processes (Hiedanpää and Borgström 2014). It is important to identify the most important challenges and constraints in its implementation if Norway is going to achieve its goal of protecting 10% protection of all forest land. Our results provide additional confirmation that the voluntary program is a considerable improvement over the government-led program that preceded it. However, our results also provide insight into potential improvements in the voluntary program. First, approximately half of the forest owners in the FO<sub>G</sub> group were not aware of the voluntary protection program – indicating a clear need for different

outreach strategies to reach more potential participants. Many forest owners expressed willingness to offer their property for voluntary conservation. The challenge will be ensuring that the parcels landowners propose for protection contain biological qualities and sufficient sizes that make meaningful contributions to biodiversity conservation. Information strategies about advantages of voluntary forest protection should be directed to forest owners who own highly productive forests, e.g. in lowland and southern ecosystem. Areas of high productivity within nemoral and boreo-nemoral vegetation zones are more likely to contain red-listed (threatened) species or unique habitat types. Such areas are presently underrepresented in the forest protection portfolio (The Norwegian Environment Agency 2020).

Forest owners who participated in voluntary protection are both more positive to forest conservation and are largely satisfied with their experience in the protection process (Vatn et al. 2005; Bergsens and Vatn 2009). However, the parcels protected through the voluntary program have a tendency to be less productive and mostly remote and “inaccessible” parts of their property where timber harvest can be expected to be less profitable. More can be done to stimulate owners to offer more biologically important areas without challenging the limits of volunteering. For example, there should be greater opportunity for nature conservation organizations to participate more actively in the identification and evaluation of that which parcels are granted protection. The voluntary conservation processes have helped develop modes of cooperation and built mutual trust between involved organizations, especially towards the NFO. This cooperation is not formalized in the program’s process, but is based on experience and personal connections. Cooperation works best in counties with high levels of forestry activities and contacts, and worst in counties with little forestry activities (Hiedanpää and Borgström 2014). Voluntary protection necessitates a shift in administrative practices with more networking and negotiating.

The time difference between the government-led and voluntary protection process complicates a comparison, because there are several other factors in society in general and attitudes to biological diversity and forest protection in particular, that have changed during the 10-year period from 2000 to 2010. However, other studies have shown that people’s attitudes and preferences are quite stable over time (Lindhagen and Hörnsten 2000). The advantage of asking just when a forest owner has gone through a protection process is that they have their experiences clearly in mind.

There is a need to systematize documentation of voluntary conservation areas (e.g. geographic location, number of properties, biological data and indicator for compensation rate) and make the information more widely available. As more areas are conserved, there will be a greater need to compile inventories and conduct more specified and systematic planning (Hiedanpää and Borgström 2014). We may consider the program as a promising and inspiring example of potential improvements in land use planning in conflicting areas by establishing common arenas as trading zones for coordinated public and private planning, combining instrumental and

communicative practices with agonistic approaches in a multilevel governance network (Skjeggedal et al. 2021).

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## Author contributions

V.G. conceived the idea, designed and completed the survey, and wrote the first draft. O.I.V. and T.S. contribute to the design of the survey, analyses and editing draft manuscript.

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