

Diverging Attitudes Towards Predators: Do Environmental Beliefs Play a Part?

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Abstract

Human ecology is concerned with how humans adapt to a changing environment. Environmental change is often manifested as conflicts over the meaning and use of natural resources. Successful resource management is becoming increasingly dependent upon knowledge about how conflicts are constructed, and this entails identifying attitudes and beliefs held by various interest groups. This paper describes results from a study of environmental beliefs and attitudes towards large carnivores among sheep farmers, wildlife managers, and research biologists in Norway. The New Ecological Paradigm scale was tested, and environmental beliefs were found to be relatively stable across the three groups comprising two distinct dimensions. For the overall sample, positive attitudes toward large carnivores generally correlated with pro-environmental beliefs, while negative attitudes towards carnivores correlated with the general belief that humans are exceptional in relation to nature. While there are smaller differences among the three groups of respondents, sheep farmers endorse pro-ecological beliefs less than wildlife managers and research biologists. Information about the environmental beliefs of different cultures involved in disputes over resources can help explain the nature of resource conflicts. Improved knowledge of the 'meaning' of resources can be salient in terms of understanding how different interest groups adapt to environmental change.

Keywords: resource conflicts, environmental beliefs, new environmental paradigm scale, attitudes toward large carnivores

Introduction

The use and management of natural resources is frequently associated with conflicts over the benefits provided by resources. In fact, resource management can in many respects be defined as how to mediate conflicts by regulating access through planned allocation of resources. This entails

the very essence of human ecology; that is, managing the interaction of population, social organisation and technology in response to the environment (Catton 1987). Human ecology focuses on the ability of humans to cope and adapt to a changing environment. One central issue in resource management is how the various interest groups perceive the environment, which values and beliefs do they attach to the environment, and how do diverse environmental beliefs affect the position different actors take in conflict situations?

In conflicts over the use of natural resources we often find substantive and value-laden disagreements among groups of people about how the relationship between human beings and the natural environment is constituted. One natural resource category which generates especially strong emotions is wildlife. The belief about human dominion over other creatures and the human right to utilise animal resources collide with widespread concern over the negative effects of human activity on ecological processes. One ever-increasing debate in Norway is the conflict between sheep farmers who often speak for a reduction or extermination of large carnivores and various other groups that support protective measures towards these species (Bjerke, Reitan and Kellert 1998; Kaczensky 1996).

In previous analyses, attitudes toward large carnivores among three groups involved in the livestock versus large carnivore conflict in Norway have been presented (Kellert 1991, 1996). Based on Kellert's typology of attitudes toward wildlife, attitudes towards large carnivores in Norway (bear, wolf, lynx, and wolverine) were measured among sheep farmers, wildlife managers, and research biologists (Kaltenborn, Bjerke and Vittersø 1997). This typology can be divided conceptually into a domain of positive attitudes toward wildlife (ecologistic, naturalistic, moralistic), and a negative attitude domain (dominionistic, negativistic, utilitarian). The study showed that wildlife managers and research biologists reported quite similar attitude profiles compared to the attitudes of sheep farmers. Wildlife managers and research biologists endorsed ecologistic and naturalistic attitudes, while they scored low on the dominionistic, negativistic, and utilitarian attitude scales. Sheep farmers expressed

almost the opposite attitude profile through high scores on the dominionistic, negativistic, and utilitarian scales, and low scores on the ecologicistic, moralistic, and naturalistic scales.

Literature Review

On the basis of these results, it seems pertinent to ask whether the differences in attitude profiles among groups involved may be related to more fundamental differences in values or beliefs the groups hold regarding the relationship between humans and the rest of the natural world. One widely used measure of such values or beliefs is the New Environmental (or Ecological) Paradigm (NEP) Scale (Dunlap and Van Liere 1978; Dunlap et al. 1992). This scale consists of items that reflect a new ecological world view that represents an alternative to the established "dominant social paradigm" (DSP), which emphasizes progress, faith in technology, and growth-oriented utilization of the environment (Dunlap and Van Liere 1984). The established values to which the NEP contrasts have also been called the "Human Exemptionalism Paradigm," according to which humans are exempt from the laws of nature and rule over the physical world (Pirages 1977; Dunlap et al. 1992).

Dunlap and Van Liere (1978) administered the scale to a sample of the general public and to members of an environmental organization in the state of Washington (USA). Results indicated an acceptable internal consistency, and the scale appeared to be uni-dimensional. The study also revealed that both groups of respondents showed greater acceptance of the NEP-statements (mean scores 3.0 for the general public and 3.7 for the environmentalists, scale range 1-4). Acceptable psychometric properties of the New Ecological Paradigm scale were confirmed in a study by Albrecht et al. (1982). They drew samples from a population of farm operators and city residents in Iowa. The first group exhibited a mean NEP score of 2.9, and the score of the second group was 3.2. Both Albrecht et al. (1982) and Geller and Lashley (1985) obtained evidence for the existence of three distinct factors: *balance of nature*, *limits to growth*, and *humanity over nature*. In a Canadian study by Edgell and Nowell (1989), both the general public (mean score 3.3) and environmentalists (mean score 3.7) supported the NEP statements, while a sample of commercial fishers displayed a rejection of all aspects of the NEP scale (mean score 2.1). Factor analysis showed three factors for both public and the environmentalist samples (similar to results from previous studies, see above), and one factor for the fishermen.

One criticism of the NEP scale is uncertainty about its multi- or uni-dimensionality. Dunlap et al. (1992) assumed this uncertainty stemmed from a response set bias in the original NEP scale: Only 4 of the 12 items were worded as anti-

NEP formulations, and all four focused on anthropocentrism. Dunlap et al. (1992) presented an improved version of the instrument (including 15 items instead of 12), labelled "The New Ecological Paradigm Scale." The revised scale was designed to tap five potential facets of an ecological world view: *limits to growth*, *anti-anthropocentrism*, *the fragility of nature's balance*, *rejection of exemptionalism*, and *the possibility of an ecological catastrophe*.

The new NEP scale was used in a survey of a representative sample of residents in the state of Washington. Results showed an overall tendency among respondents to endorse pro-ecological beliefs. The new scale also exhibited acceptable internal consistency, and the evidence indicated that the items did not form distinct dimensions. The authors emphasized, however, that research on differing samples is needed to confirm the uni-dimensionality of the new NEP scale.

The purpose of the present study was to measure the degree of endorsement of the ecological world view using the revised NEP scale for the three Norwegian groups (see above, Kaltenborn et al. 1997). Further, we investigated whether the environmental beliefs as expressed through the NEP scale were related to the attitudes toward large carnivores. The following research questions were examined:

- What are the main dimensions of the revised NEP scale as expressed by the sample of sheep farmers, wildlife managers, and research biologists?
- How do sheep farmers, wildlife managers, and research biologists score and compare on the revised NEP scale in terms of NEP item ratings?
- To what extent are the environmental beliefs as expressed by the NEP scale ratings related to attitudes toward large carnivores?

Method

Sampling and Data Collection

The target populations for the present study were: 1) all sheep farmers in eight municipalities in the county of Hedmark (eastern Norway) and all sheep farmers in three municipalities in the county of Rogaland (southwestern Norway), 2) all research biologists at Norwegian universities, colleges, and research institutes, and 3) all wildlife managers in Norway working at the municipal and county level. The sampling frame was constructed from different sources. Research biologists were pooled from the directories of all universities, colleges and relevant research institutions in Norway. A sample of wildlife managers was compiled by contacting the environmental authorities on the municipal, county and state levels. The sheep farmer subsample was provided by a national farmers association where virtually all sheep farmers are registered. Since we sampled from differ-

ent parts of the country, regional variation could be an issue. We consider this a relative question, depending on the issues examined and type of analysis. Norway is a relatively small country, with fairly transparent networks in many professions, and we feel confident in saying that on a certain level, farming, management and research represent work cultures people identify with. Furthermore, the Kellert wildlife attitude scales have commonly been used on large samples from nations to regions. Had our intent been to analyse the importance of region, this would of course have been a different issue. Basic demographic characteristics of the respondents are shown in Table 1.

The questionnaire was sent by mail to 853 sheep farmers, 379 research biologists, and 551 wildlife managers for a total of 1783 recipients. Follow-up procedures included a reminder, sent 14 days after the initial mailing and another reminder including the questionnaire 30 days after the initial mailing. The response rates were 57.6% for sheep farmers, 70.4% for the research biologists, and 77.7% for wildlife managers (total average response rate 66.5%). To insure an acceptable number of female respondents among the sheep farmers, one third of the farmers were urged to let the female in the household complete the questionnaire.

Survey Instruments

The questionnaire asked for general background information, such as age, gender, education, occupation, size of the local community, whether respondents had pets in their homes currently and while growing up, and whether the family had been engaged in livestock production during the respondent's childhood years. Sheep farmers were also asked questions about the number of sheep they had, the proportion of total income coming from sheep farming, and how many sheep they had lost during the last five years. The questionnaire also tapped the respondent's estimates of the number of bears, wolves, lynx, and wolverines in Norway, and asked for opinions on whether large carnivore species should be extirpated, reduced, maintained, or increased.

Attitudes toward large carnivores were measured by means of 35 statements (items), with five response options (from strongly agree to strongly disagree). The items were translated from English to Norwegian after Kellert (1991), with some adaptations due to differences in species which exist in the USA and Norway. They were identical to the items used in the study by Bjerke et al. (1998), with the exception that *wolves* were replaced by *large carnivores* (defined in the questionnaire as wolves, bear, wolverine, and lynx). The 35 items can be classified into the six scales briefly defined by Kellert (1991):

Positive traits:

Ecologistic: Interest in the ecological value of the species, and its relationship to the environment

Moralistic: Opposition to cruelty and harm toward the species.

Naturalistic: Interest in direct outdoor recreational contact with the species.

Negative traits:

Dominionistic: Interest in the mastery, control and dominance of the animals

Utilitarian: Interest in utilisation of the species or subordination of their habitat for the practical benefit of humans

Negativistic: Fear, dislike or indifference toward the species.

The 15-item revised NEP-scale (Dunlap et al. 1992) was translated into Norwegian in an earlier study (Strumse and Aasetre 1994) and the response options for each item ranged from *completely disagree* (1) to *completely agree* (5).

Analysis

The data set was analyzed by first examining the ratings of the overall sample of individual NEP items (mean scores). One-way analysis of variance was used to test differences in ratings across the three sub-groups of the sample. Pairwise correlations were then examined before a series of exploratory factor analyses were performed to identify the underlying dimensionality of the NEP scale. Sum scores were calculated for the six wildlife attitude scales (for details, see Kaltenborn et al. 1997; Kellert 1991). Relationships between environmental beliefs and wildlife attitudes were explored through bivariate correlations between the scores on the factors of the NEP scale and the sum scores of the attitude scales.

Results

Environmental Beliefs

NEP-item ratings. The eight items expressing core assumptions of the "New Ecological Paradigm" (odd-numbered items) were also given the eight highest mean ratings (see Table 2). In contrast, all seven items expressing anti-NEP or "Human Exemptionalism Paradigm" views (even-numbered items), received the weakest support among participants in this study. However, breaking the sample down into subgroups of sheep farmers, wildlife managers, and research biologists, the picture is somewhat altered. Results show that for 11 of the items, sheep farmers rate these items either significantly higher or significantly lower than wildlife managers and research biologists. Thus, sheep farmers agreed more to

five of the Human Exemptionalism items (items 6, 8, 10, 12, 14) than did the other groups, whereas they disagreed more to six of the revised New Ecological Paradigm items (items 1, 5, 7, 9, 11, 15) than did wildlife managers and research biologists. For only one item, "When humans interfere with nature, it often produces disastrous consequences" no significant group differences were found. All groups moderately agreed with this assertion. On four items research biologists disagreed significantly more than the other groups, namely on item 4, 10, 12, and 13. Wildlife managers disagreed significantly on three items, 2, 10, and 12. On two items, all groups rated significantly different from each other. For item 10 ("The so-called "ecological crisis" facing humankind has been greatly exaggerated"), wildlife managers disagreed

more (mean = 2.09) than research biologists (mean = 2.32), who in turn disagreed more than sheep farmers (mean = 2.93). Second, on item 12 ("Humans were meant to rule over the rest of nature," research biologists disagreed significantly more (mean = 1.83) than wildlife managers (mean = 2.07), who agreed clearly less than sheep farmers (mean = 2.94). Finally, on item 2 ("Humans have the right to modify the natural environment to suit their needs") wildlife managers disagreed significantly more than the two other groups.

NEP-item intercorrelations. For the purpose of testing underlying dimensionality and data reduction, the NEP-ratings were subjected to factor analyses (see below). Before this data reduction procedure, pairwise correlations among items were examined. As already described, single item rat-

Table 1. Characteristics of respondents (n=1129)

	Mean age	Gender		Education – Completed levels (in per cent)					n
		Male	Female	Primary (grade. 1 – 9)	Primary and 1 – 2 yrs. secondary	Secondary	Beyond secondary (university/ college)	Other	
Total sample	44.7	80.3	19.7	10.4	20.0	5.3	61.3	2.9	1129
Sheep farmers	48.5	83.8	16.2	25.1	46.0	10.6	15.1	3.2	489
Wildlife managers	41.6	76.6	23.4	0.5	2.2	2.2	91.6	3.6	416
Research biologists	42.4	79.9	20.1	0.0	2.2	0.9	95.5	1.3	224

Table 2. Mean ratings of the 15 NEP – items for sheep farmers, wildlife managers, research biologists and entire sample: One-way ANOVA with multiple range test (LSD)

Rank	Group means			Group SD's			Group n			Entire sample				N
	Sheep	Wildl.	Res.	Sheep	Wildl.	Res.	Sheep	Wildl.	Res.	Biol.	Mean	SD		
1. We are approaching the limit of the number of people the earth can support	3.66*	4.08	4.16	1.15	1.01	1.06	459	413	222	3.92	1.10	1094		4
2. Humans have the right to modify the natural environment to suit their needs	2.68	2.30*	2.81	1.24	1.14	1.25	459	412	223	2.56	1.22	1094		10
3. When humans interfere with nature it often produces disastrous consequences	3.79	3.67	3.77	1.12	1.07	1.01	456	411	221	3.74	1.08	1088		6
4. Human ingenuity will insure that we do NOT make the earth unliveable	2.89	2.24	2.00*	1.23	1.15	1.12	457	412	221	2.46	1.23	1090		12
5. Humans are severely abusing the environment	3.79*	4.29	4.30	1.08	.95	1.08	459	413	223	4.08	1.06	1095		3
6. The earth has plenty of natural resources if we only learn how to develop them	3.61*	2.79	2.61	1.26	1.32	1.35	459	412	223	3.09	1.38	1094		9
7. Plants and animals have as much right as humans to exist	3.48*	3.91	3.74	1.30	1.22	1.32	459	412	221	3.70	1.29	1092		8
8. The balance of nature is strong enough to cope with the impact of modern industrial nations	2.02*	1.41	1.51	1.10	.72	.88	455	413	222	1.69	.97	1090		15
9. Despite our special abilities humans are still subject to the laws of nature	4.35*	4.69	4.65	.86	.68	.70	459	413	223	4.54	.78	1095		1
10. The so-called "ecological crisis" facing humankind has been greatly exaggerated	2.93*	2.09*	2.32*	1.21	1.11	1.25	458	411	223	2.49	1.24	1092		11
11. The earth is like a spaceship with very limited room and resources	3.42*	3.89	3.95	1.12	1.12	1.09	456	411	223	3.71	1.14	1090		7
12. Humans were meant to rule over the rest of nature	2.94*	2.07*	1.83*	1.29	1.24	1.17	456	410	219	2.39	1.34	1085		13
13. The balance of nature is very delicate and easily upset	4.17	4.23	3.87*	.94	.96	1.14	458	411	222	4.13	1.00	1091		2
14. Humans will eventually learn enough about how nature works to be able to control it	2.60*	1.88	1.80	1.24	1.02	.95	455	410	222	2.16	1.16	108		14
15. If things continue on their present course, we will soon experience a major ecological catastrophe	3.55*	4.04	4.05	1.10	.92	1.02	458	411	223	3.84	1.04	1092		5

*: Significantly different from other groups at $p < .05$

Table 3. Inter-correlations among the 15 NEP items (n=1127-1145)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2	-.03													
3	.16**	-.15**												
4	-.15**	.19**	-.10**											
5	.16**	-.14**	.31**	-.18**										
6	-.26**	.15**	-.04	.29**	-.12**									
7	.14**	-.34**	.19**	-.09**	.19**	-.05								
8	-.17**	.21**	-.10**	.39**	-.26**	.30**	-.09**							
9	.16**	-.11**	.10**	-.13**	.19**	-.08**	.12**	-.16**						
10	-.27**	.27**	-.14**	.37**	-.29**	.30**	-.23**	.42**	-.15**					
11	.35**	-.03	.16**	-.14**	.22**	-.29**	.13**	-.17**	.24**	-.26**				
12	-.11**	.31**	-.08**	.27**	-.16**	.30**	-.35**	.25**	-.12**	.34**	-.10**			
13	.12**	-.20**	.25**	-.04	.15**	-.03	.20**	-.16**	.18**	-.17**	.17**	-.03		
14	-.13**	.18**	-.05	.44**	-.17**	.33**	-.11**	.30**	-.16**	.30**	-.13**	.31**	.02	
15	.24**	-.21**	.23**	-.28**	.32*	-.19**	.18**	-.28**	.19**	-.46**	.30**	-.22**	.26**	-.14**

*: $p < .05$ **: $p < .01$

ings indicate either one or two dimensions, reflected in the high ratings of the pro-NEP items and the clearly lower anti-NEP ratings.

Visual inspection revealed a number of statistically significant intercorrelations among the NEP- items (see Table 3), together with signs of bipolarity, i.e., a systematic pattern of negative and positive correlations throughout the matrix was observed, thus confirming the descriptive results. Moreover, Bartlett's test of sphericity yielded a significant result (3084.22, $p < .0001$), thus rejecting the null hypothesis, and the Kayser-Meyer-Olkin measure of sampling adequacy gave a coefficient of .82, which is considered quite satisfactory. These tests provide a first indication of a structure in the data, and a check that the sample is sufficiently normally distributed.

Exploratory factor analyses. A series of exploratory factor analyses, in all cases principal components analyses with Direct Oblimin rotation, were run (Table 4). Starting

from an initial five factor solution, the best solution appeared to be found in a secondary analysis limiting the analysis to two factors, omitting items 2 and 10. Here, no double loadings were present, and the loadings on the two resulting factors were satisfactory, ranging on the first factor from .44 to .63 and on the second factor from .58 to .73 (Table 4.)

In the unrotated secondary two-factor solution (eigenvalues and explained variance should be derived from unrotated solutions), the first dimension, labelled *New Ecological Paradigm*, obtained an eigenvalue of 3.26, and explained 25% of the total variance. Moreover, the second dimension, labelled *Human Exemptionalism Paradigm* reached an eigenvalue of 1.53 before rotation, and explained 11.8% of the variance. In Table 4, the rotated factor loadings from the secondary analysis are presented. In addition, both factors exhibited reliability, the Alpha coefficient was .66, and for the HEP factor .69. The two factors were moderately and negatively correlated ($r = -.30$).

Table 4. Exploratory secondary factor analysis of the NEP scale: A two-factor solution using principal components analysis with Direct Oblimin rotation (n=1093), and Chronbach's alpha (n=1116 – 1118).

	NEP	HEP	Alpha if item deleted	Scale alpha
1. We are approaching the limit of the number46937	-.30258	.6371	
3. When humans interfere with nature it often58447	-.01980	.6330	
5. Humans are severely abusing the environment56824	-.27453	.6241	
7. Plants and animals have as much right as46444	-.16625	.6544	
9. Despite our special abilities humans are44162	-.20521	.6473	
11. The earth is like a spaceship with very55134	-.31475	.6205	
13. The balance of nature is very delicate and59714	.06276	.6372	
15. If things continue on their present course,63821	-.34014	.6108	.6638 (n=1118)
4. Human ingenuity will insure that we do NOT ...	-.21746	.71117	.6218	
6. The earth has plenty of natural resources if ...	-.21205	.66133	.6488	
8. The balance of nature is strong enough to ...	-.35914	.59818	.6512	
12. Humans were meant to rule over the rest of ...	-.24785	.58095	.6630	
14. Humans will eventually learn enough about ...	-.12379	.73631	.6145	.6897 (n=1116)

Table 5. Mean ratings for the two sum scores NEP and HEP for sheep farmers, wildlife managers, research biologists and entire sample. One-way ANOVA with multiple range test (LSD).

	Group means			Group SD's			Group n			Entire sample		
	Sheep Farm.	Wildl. Manag.	Res. Biol.	Sheep Farm.	Wildl. Manag.	Res. Biol.	Sheep Farm.	Wildl. Manag.	Res. Biol.	Mean	SD	N
Human Exemptionalism Paradigm	2.78*	2.07*	1.94*	.74	.66	.69	445	405	217	2.34	.79	1067
New Ecological Paradigm	3.79*	4.11	4.08	.56	.50	.56	447	404	217	3.97	.56	1068

*: Significantly different from other groups at $p < .05$

Between groups comparisons. The sheep farmers, wildlife managers and research biologists rated clearly different on the sum scores, which agrees well with the initial findings (see Table 5). In particular, the three groups differed significantly on support/rejection of the Human Exemptionalism Paradigm. Here research biologists showed the clearest rejection, rating this dimension as low as mean = 1.94, which is clear disagreement. Close to this, i.e., clear disagreement, but still significantly higher, were wildlife managers (mean = 2.07). Close to neither agree nor disagree (mean 2.78) were sheep farmers, i.e., significantly less disagreement than the two other groups. For the NEP-sum score, no significant difference was found between wildlife managers and research biologists. These two groups clearly agreed with this view of nature. Sheep farmers, however, rated significantly lower here. They tended to agree, but with more ambiguity (mean = 3.79).

Relationships Between Environmental Beliefs and Attitudes Toward Large Carnivores

The two NEP dimensions obtained through the factor analysis were correlated with the summated scores on the six

wildlife attitude scales to explore relationships between environmental beliefs and attitudes toward large carnivores. As Table 6 shows, there are distinct relationships between these two sets of questions for the sample as a whole and also when broken down to the three subgroups.

For the overall sample there are correlations between the "New Ecological Paradigm" factor (NEP), and the "Human Exemptionalism" factor (HEP) and all six attitude scales. NEP correlates positively with the positive attitude domain; ecologicistic, moralistic, and naturalistic subscales. Conversely, the NEP factor correlates negatively with the negative attitude domain, dominionistic, negativistic, and utilitarian subscales. The "Human Exemptionalism" factor shows the opposite pattern: HEP correlates positively with the dominionistic, negativistic, and utilitarian attitudes, and negatively with the ecologicistic, moralistic, and naturalistic attitudes. All of the correlations are significant and lie in the range 0.17 – 0.5 (Table 6). The picture becomes a little more complex when we consider the different responses of the three groups.

For *sheep farmers*, significant positive correlations are found between NEP and the ecologicistic, moralistic, and nat-

Table 6. Correlations between NEP factors and attitudes towards large carnivores

	Negative attitudes			Positive attitudes		
	Dominionistic	Negativistic	Utilitarian	Ecologicistic	Moralistic	Naturalistic
Total sample						
NEP	-0.190**	-0.168**	-0.237**	0.356**	0.277**	0.384**
HEP	0.470**	0.475**	0.500**	-0.488**	-0.267**	0.441**
Sheep farmers (N=436 – 447)						
NEP	-0.022	0.072	-0.033	0.170**	0.165**	0.224**
HEP	0.318**	0.300**	0.312**	-0.238**	0.058	-0.098*
Wildlife managers (N=396-405)						
NEP	-0.060	-0.139**	-0.204**	0.313**	0.214**	0.379**
HEP	0.178**	0.170**	0.246**	-0.256**	-0.096	-0.251**
Research biologists (N=212-217)						
NEP	0.020	0.062	-0.036	0.303**	0.288**	0.289**
HEP	0.188**	0.231**	0.272**	-0.337**	-0.311**	-0.295**

NEP: "New Ecological Paradigm" factor, HEP: "Human Exemptionalism" factor

*Correlation is significant at the 0.05 level (2 tailed)

**Correlation is significant at the 0.01 level (2 tailed)

uralistic attitudes. Correlations between NEP and the negative attitude scales are not significant. Significant positive correlations are found between HEP and the dominionistic, negativistic, and utilitarian attitudes. HEP also correlates negatively with the ecologicistic and naturalistic attitudes.

For *wildlife managers*, significant positive correlations are also found between NEP and the positive attitude domain (ecologicistic, moralistic, naturalistic). Significant negative correlations are found between NEP and the negativistic and utilitarian attitudes. HEP correlates positively with the negative attitude domain (negativistic, dominionistic, utilitarian) and negatively with the ecologicistic and naturalistic attitudes.

Research biologists report a comparable pattern. NEP correlates positively with the ecologicistic, moralistic, and naturalistic attitudes, but no significant correlations are found between NEP and the negative attitude domain. Significant positive correlations are found between HEP and the dominionistic, negativistic, and utilitarian attitudes. Significant negative correlations exist between HEP and the positive attitude domain (ecologicistic, moralistic, naturalistic attitudes).

Discussion

Similar to respondents in previous studies, this research also showed a tendency for the respondents to endorse pro-ecological beliefs and to express relative neutrality (neither agree nor disagree) regarding the Human Exemptionalism items (reviewed by Dunlap et al. 1992). Respondents agreed that humans are subject to the laws of nature, that the balance of nature is easily upset, and that humans are severely abusing the environment. They also disagreed that the balance of nature is strong enough to cope with industrialization and that humans will learn to control nature. Similar results were also found by Strumse (1996) in a survey among Norwegian students.

The results of Dunlap et al. (1992) indicated that the revised set of 15 items did not form empirically distinct dimensions, judged on the basis of the coefficient alpha and the corrected item-total correlations for each item. However, their own factor analysis gave evidence of several factors (Dunlap et al. 1992, 8). The two main factors of their analysis corresponds well with the two factors which emerged in the present analysis (Table 4).

The main objective of the present study was to compare the NEP response pattern of the three occupational groups (sheep farmers, wildlife managers, research biologists) and to relate the environmental beliefs, as measured by the NEP scale, to attitudes toward large carnivores. This objective was based on a need to reach a better understanding of the relatively intense conflict regarding the management of large carnivores in Norway. The resolution of this conflict depends

upon what type of conflict it is. If the conflict is centered around economic interests, its intensity should be reduced if acceptable systems of compensation for lost livestock were instituted. Negative attitudes toward large carnivores are most typically found in groups whose economic interests are threatened by these animals. The number of sheep released into forest and mountain pastures amounted to 2.5 million in 1995, and the number of sheep which were reported killed by predators was 1.2% of this number. The regional variation in depredation rate is large, however. In some areas more than 50% of lost sheep may have been killed by large carnivores, as shown by the use of radio-mortality collars on the sheep (Mysterud and Warren 1994).

As reviewed by Kaczynsky (1996), systems of compensation for livestock lost to large predators exist in several European countries. In spite of this, the livestock versus large carnivore conflict continues to exist, and seems to intensify in some areas. Consequently, the conflict may reflect more than diverging economic interests. The possibility exists that the groups involved in the conflict also differ in more fundamental beliefs or values regarding the relationship between humans and the rest of nature. For instance, Wilson (1997) hypothesized that the American debate about the reintroduction of wolves reflects divergent beliefs about how humans relate to nature. Results of the present study have relevance to this hypothesis. The single-item summary (Table 2) and the sum scores for the two main factors (Table 5) show that wildlife managers and research biologists disagreed to the Human Exemptionalism Paradigm (HEP), while sheep farmers on average expressed a neutral position on these HEP items. All three groups in general agreed to the NEP items, but the support of sheep farmers was significantly weaker than that of the two other groups. In contrast, Canadian fishermen surveyed by Edgell and Nowell (1989) rejected all aspects of the NEP scale. Our interpretation of the present results is that the three groups involved in the livestock versus large carnivore conflict in Norway express a similar structure of environmental beliefs, but that there is a difference of degrees. Sheep farmers seem to endorse pro-ecological beliefs less than the other two groups. Thus, the large differences among the groups in attitudes toward large carnivores cannot be taken to reflect qualitatively different environmental beliefs (Kaltenborn et al. 1997).

The relatively stable structure of environmental beliefs seem to correspond to findings from another part of this study. In an analysis of the basic life values of sheep farmers, wildlife managers, and research biologists, we found the same general structure across the groups. That is, they all expressed six identical factors or values, but there were some differences in their relative importance among the groups (Kaltenborn and Bjerke 1998). Although we have not sub-

jected this assumption to statistical testing, conceptually it seems plausible that environmental beliefs and basic life values are related. Hence, value and belief complexes may in fact have comparable structures among the three groups, while there are some differences in the relative importance of factors across groups.

In any case, the results also show that attitudes toward large carnivores are statistically associated with environmental beliefs. The general tendency for the combined sample (Table 6) is that the NEP factor correlates positively with the positive attitudes toward large carnivores (ecologicistic, naturalistic, and moralistic sub-scales), and negatively with the negative attitudes (dominionistic, negativistic, and utilitarian sub-scales). The HEP-belief factor and the attitude sub-scales are statistically related in the opposite direction. As expected, pro-ecological beliefs are associated with positive interest in large carnivores, while human exemptionalism is associated with dislike of large carnivores and a wish to control and dominate them. Sheep farmers and research biologists somewhat unexpectedly reported no significant negative correlations between NEP scores and negative attitudes toward large carnivores. For sheep farmers this lack of correlation could indicate that the strain imposed by depredation possibly leads the large carnivores into a position as an out-group, which becomes cognitively dissociated from other animals and from the ecosystem (Plous 1993; Opatow 1993). As a consequence, one could express pro-ecological general beliefs while at the same time express negative or neutral attitudes toward predators. It is more difficult, however, to explain why NEP beliefs are not correlated with negative attitudes toward carnivores among research biologists. Although we find no apparent explanation for this, we suspect it may be that NEP beliefs and negative attitudes toward carnivores represent conceptually unrelated dimensions.

From the perspective of human ecology, understanding environmental beliefs and their relationships to attitudes toward large carnivores, may be quite salient. Since human ecology is particularly concerned with how humans cope with environmental change, a key question is what conditions give rise to adaptive change (Machlis 1989). One aspect of this is understanding what value systems and cultures are involved in the conflicts. Controversies over large carnivores represent disputes over the conditions of the environment, or more specifically over what extent and level of naturalness of the environment we should try to maintain. Ecosystems free from large predators are generally thought to be more modified and less intact than ecosystems with sustainable carnivore populations. In this context, large predators are important indicators or symbols of ecosystems with low levels of impact and disturbance. Conflicts over large carnivores are

certainly real in the sense that they involve functional and economic aspects such as access to grazing lands, security of investments in livestock, prospects for future farming, etc. However, the conflicts are quite complex in the sense that they also involve disputes over the meaning of resources and ecosystems.

To the farmer, the immediate natural surroundings represent working grounds as well as the everyday living environment which he or she frequents. Place identity is developed through a close relationship with specific environments which often includes the importance of family attachment and resource use through several generations (see for example, Low and Altman 1992; Proshansky 1983). To the farmer grazing areas in the surroundings of local communities or even further away in less accessible areas are well known environments where personal relationships with places are developed over time. To a local person, these environments may signify a range of values related to sociocultural conditions, work practices, and resource harvesting. As such, the nature of the surroundings, and the practices performed there can play a part in shaping an individual's identity and sense of community.

Research biologists, managers, recreational interests and other non-local groups develop a different type of relationship with the same areas, and this relationship does not contain the same type of identification with place that local farmers develop. Professional managers and scientists develop careers through contract based responsibilities and achieve merits and rewards through external recognition. Places like natural environments tend to be functional arenas for exercising careers, and identity is not so much associated with specific places as it is with the regulations, processes and general characteristics of environments. Also a scientist or manager will typically visit many such settings or arenas through a career, while a sheep farmer may develop bonds with one or a few places through a lifetime.

Anthropologists have shown that all major cultures have their distinct world views. The actors in a resource conflict like the large carnivore issue in Norway involve persons from very different professions which represent shared but contrasting cultures (rural farming, university-science, etc.). The albeit relatively modest differences we identify in environmental beliefs may be salient elements in understanding the broader and more complex world views and concepts of environmental meaning held by different interest groups.

Reduction of conflict levels in the large carnivore issue in Norway will probably require considerable adaptive change on behalf of all interests involved. Change must include the ability to understand and accept strategic positions, alternative solutions and bargaining processes. This

again will require improved communication about environmental values, beliefs, and attitudes among the actors and cultures involved.

Endnotes

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References

- Albrecht, D., G. Bultena, E. Hoiberg and P. Nowak, P. 1982. The New Environmental Paradigm Scale. *Journal of Environmental Education* 13, 39-43.
- Bjerke, T., O. Reitan and S. R. Kellert. 1998. Attitudes toward wolves in Southeastern Norway. *Society and Natural Resources* 11, 169-178.
- Catton, W. R. 1987. The world's most polymorphic species. *Bioscience* 37, 413-419.
- Dunlap, R. E. and K. D. Van Liere. 1978. "The New Environmental Paradigm": A proposed measuring instrument and preliminary results. *Journal of Environmental Education* 9, 10-19.
- Dunlap, R. E. and K. D. Van Liere. 1984. Commitment to the dominant social paradigm and concern for environmental quality. *Social Science Quarterly* 65, 1013-1028.
- Dunlap, R. E., K. D. Van Liere, A. D. Mertig, W. R. Catton Jr. and R. E. Howell. 1992. *Measuring endorsement of an ecological world-view: A revised NEP scale*. Paper presented at the 1992 Meeting of the Rural Sociological Society, State College, Pennsylvania.
- Edgell, M. C. R. and D. E. Nowell. 1989. The New Environmental Paradigm Scale: Wildlife and environmental beliefs in British Columbia. *Society & Natural Resources* 2, 285-296.
- Geller, J. M. and P. Lashley. 1985. The New Environmental Paradigm: A re-examination. *Journal of Environmental Education* 17, 9-12.
- Kaczynsky, P. 1996. *Carnivores and sheep farming in Norway. 3. Large carnivore - livestock conflicts in Europe*. Trondheim, Norway: Norwegian Institute for Nature research and Wildbiologische Gesellschaft Munchen.
- Kaltenborn, B. P. and T. Bjerke. 1998. Values and attitudes toward large carnivores – A study among sheep farmers, wildlife managers and research biologists in Norway. Eastern Norway Research Institute, Lillehammer, Norway.
- Kaltenborn, B. P., T. Bjerke and J. Vittersø. 1997. Attitudes toward large carnivores among sheep farmers, wildlife managers, and research biologists in Norway. *Human Dimensions of Wildlife* (In Press).
- Kellert, S. R. 1991. Public views of wolf restoration in Michigan. *Transactions of the North American Wildlife and Natural Resources Conference* 56, 152-161.
- Kellert, S. R. 1996. *The value of life. Biological diversity and human society*. Washington, D.C.: Island Press.
- Low, S. M. and I. Altman. (1992). Place attachment - A conceptual inquiry. In I. Altman and S. M. Low. (eds.), *Place Attachment, Human Behavior and Environment*., *Advances in Theory and Research*, Vol. 12, 1-12. New York: Plenum.
- Machlis, G. E. 1989. Managing parks as human ecosystems. In I. Altman and E. H. Zube (eds.), *Public Places and Spaces*, 255-275. New York: Plenum.
- Mysterud, I. and J. T. Warren. 1994. Morketap i seks norske beiteområder. (In Norwegian). *Sau og Geit* 2, 130-132.
- Opotow, S. 1993. Animals and the scope of justice. *Journal of Social Issues* 49, 71-85.
- Pirages, D. C. 1977. Introduction: A social design for sustainable growth. In D.C. Pirages (ed.), *The Sustainable Society*, 1-13. New York: Praeger.
- Plous, S. 1993. Psychological mechanisms in the human use of animals. *Journal of Social Issues* 49, 11-52.
- Proshansky, H. M., A. K. Fabian and R. Kaminoff. 1983. Place-identity: Physical world socialization of the self. *Journal of Environmental Psychology* 3, 57-83.
- Strumse, E. 1996. The psychology of aesthetics: Explaining visual preferences for agrarian landscapes in Western Norway. Ph.D. Thesis, Research Center for Health
- Promotion, Faculty of Psychology, University of Bergen, Norway.
- Strumse, E. and J. Aasetre. 1994. Preferanser for jord- og skogbrukslandskaper (In Norwegian) I: Friluftsliv: Effekter og goder. Referat fra forskningskonferanse. Trondheim: DN-notat 1994-7.
- Wilson, M. A. 1997. The wolf in Yellowstone: Science, symbol or politics? Deconstructing the conflict between environmentalism and wise use. *Society and Natural Resources* 10, 453-468.