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Conflicts and compromises in lynx *Lynx lynx* conservation and management in Finland

Tuija Liukkonen, Sakari Mykrä, Jukka Bisi & Sami Kurki

Contradictory attitudes towards lynx *Lynx lynx* management in Finland have emerged as a consequence of rapid growth of the lynx population together with the strict protection and conservation objectives determined by the European Union. In this study, conducted during 2004–2005, we examined local people's and stakeholders' opinions about lynx management through a nationwide survey. We also assessed local people's opinions through comments expressed at public meetings, which were recorded, transcribed and analysed. In general, lynx were seen as an important part of Finnish nature and its biodiversity, but it was also seen as a detriment to sustaining game populations. Hunters who manage roe deer *Capreolus capreolus* or white-tailed deer *Odocoileus virginianus* or hare *Lepus* spp. populations were especially negative. Hunting and improved public awareness were considered the most effective methods to increase people's tolerance towards lynx and the damage they might cause. Stakeholders were interested in development of the existing damage compensation system and clear rules concerning management of problem individuals. In contrast to hunters, conservationists emphasised the conservation status of lynx and rejected the idea of population regulation through hunting. Many aspects of management were accepted by all stakeholders; other aspects were more controversial. To resolve the conflict between stakeholders regarding lynx management, compromise and cooperation will be required from stakeholders holding conflicting views. This may aid lynx management and also the conservation of the species in Finland in the future.

Key words: attitudes, conservation, Finland, lynx, *Lynx lynx*, population management, public meetings, questionnaire, social sustainability

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Human-wildlife conflicts are common worldwide. Conflicts concerning large carnivores can be classified into five main categories: livestock depredation, competition for game animals, killing and/or mauling of humans, predation on pets and social attitudes such as fear and dislike (Kellert et al. 1996, Linnell

et al. 2005). The conflicts between humans and predators may become critical if the predator is dangerous to humans but at the same time legally protected (Linnell et al. 2005). People and predators have a long history of competition for resources, but the conflicts have become more frequent in the last few

decades due to the rapid growth and expansion of large carnivore populations as well as of the human population, settlements and activities.

Of the large carnivore species in Europe and North America, the wolf *Canis lupus* causes the majority of conflicts. North American wolf reintroductions in the 1980s were followed by research surveys on public attitudes towards the species (e.g. Bath & Buchanan 1989, Kellert et al. 1996, Nie 2001, 2002). When carnivore populations in Europe started to increase in numbers and the first signs of conflicts were seen, attitude surveys were initiated in Europe (Bjerke et al. 1998, Kaltenborn et al. 1998, Lumiaro 1998, Karlsson et al. 1999) and have been continued throughout Europe since then (e.g. Kaltenborn & Bjerke 2002, Ericsson & Heberlein 2003, Skogen 2003, Kleiven et al. 2004, Bisi et al. 2007, Røskoft et al. 2007, Sjölander-Lindqvist 2008).

Before Finland became a member of the EU in 1995, the lynx *Lynx lynx* was considered a game species and the population was controlled by hunting. However, after Finland joined the EU, the lynx became strictly protected according to the EC Habitats Directive, Appendix IV (Directive 92/43/EEC). At the national level, management and protection of lynx is controlled by the Ministry of Agriculture and Forestry, and at the regional level by Game Management Districts (hereafter GMDs). The Ministry of Agriculture and Forestry has tried to find a sustainable solution to conflicts between legislation and the demands of local people, partly by allowing a restricted number of licences resulting in the harvest of 40-80 lynx annually between 1999 and 2005 (Liukkonen & Salo 2007).

By the 1930s, the Finnish lynx population had been hunted to the brink of extinction. However, during recent decades the population has recovered and, since 1996, has increased by ca 40% to the present population size of 1,350-1,500 individuals (I. Kojola, pers. comm.). This increase in the lynx population has stimulated widespread public debate about possible means to regulate the population and how to deal with individual problem animals. Discussion has been especially vigorous in those regions where people coexist with a dense lynx population.

The main aim of our study was to find and compare expectations and objectives related to the lynx population and its management at local, regional and national levels, and to explore both the opportunities and drawbacks that exist in the Finnish lynx policy. Our preliminary assumption was that in order to achieve widespread acceptance of the na-

tional management plan and of lynx management and conservation, it was essential to study the attitudes of local people, i.e. those who coexist with lynx in their daily life.

Material and methods

We collected the qualitative data for this study in every GMD in Finland (Fig. 1) during 2004-2005.

Survey techniques

Questionnaires

We sent a semi-structured questionnaire (i.e. a questionnaire containing both closed and open-ended questions) to regional stakeholders. The stakeholders involved were hunting and kennel associations, the hunters' legal organisation, conservationists (together with environmental NGOs and authorities), top organisations for agriculture and forestry,

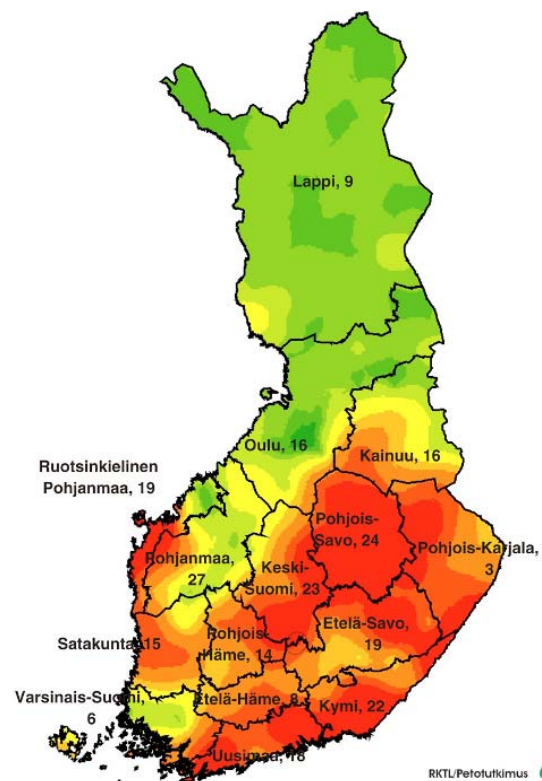


Figure 1. The 15 Finnish Game Management Districts (GMDs) and the number of questionnaires received (N=239) from each GMD. All responses were pooled for the analyses of content. The map shows the abundance of lynx observations in Finland; the darker the area the more observations. © Finnish Game and Fisheries Research Institute/Large Carnivore Research.

Table 1. Proportion of stakeholders (in %) supporting different scenarios for the lynx population in Finland.

Stakeholders	N	Significant increase	Slight increase	Present suitable	Reduction	No lynx at all	Cannot say
Conservationists	20	10.0	45.0	25.0	5.0	0.0	15.0
Kennel and hunting associations	14	0.0	55.2	20.7	20.7	0.0	3.4
Hunters' legal organisation	125	0.8	12.3	35.3	45.1	0.8	5.7
Law enforcement	17	0.0	15.8	42.1	26.3	5.3	10.5
Municipalities	34	2.9	35.3	32.4	26.5	0.0	2.9
Agriculture and forestry	15	0.0	5.9	29.4	35.3	11.8	17.6
Others	14	0.0	30.8	30.8	15.4	7.7	15.3
All regional together	239	1.5	23.1	32.5	33.6	1.9	7.4
National	9	33.4	22.2	22.2	22.2	0.0	0.0

law enforcement (police and border-control officers), municipalities and their federations, and other regional stakeholders. In addition to the regional-level replies, we received completed questionnaires from nine stakeholders at the national level. Respondents at the regional level were asked to consider the questions from the regional point of view, whereas the national respondents were expected to take a national approach. Altogether 239 questionnaires were received at the regional level (Table 1) and nine at the national level. Because our sample is not random, our results are descriptive only.

Questionnaires were sent out in March 2004 and respondents had three months to reply. We sent a reminder after three months and gave respondents one more month to reply if they had not already done so. The organisations receiving a questionnaire were determined independently for each GMD and reflected the existence of different stakeholders and organisations in each region (e.g. reindeer herders are found only in the reindeer herding area, and border-control officers only in GMDs on the border). We then classified all respondents into seven stakeholders' groups for analysis of their answers (see Table 1).

Questions

We developed nine questions to identify key issues in lynx management. These questions were designed to provide baseline information for consideration in the preparation of the national lynx management plan. In this paper we discuss responses to three selected questions.

First, we asked stakeholders to identify the most important positive and negative characteristics of the lynx which influence their attitudes towards the species. Respondents were also asked to rank each of these characteristics according to its importance on the Likert Scale (1 = almost insignificant, 2 = slightly

significant, 3 = fairly significant, 4 = significant, and 5 = very significant). For each characteristic, we summed all values to create a composite score for the scale. Thus, the percentage value shows the relative importance of each positive and negative characteristic found within stakeholder groups.

Wildlife population preference has been used as an indicator of public tolerance or acceptance capacity for wildlife species (Decker & Purdy 1988). Therefore, secondly, we asked stakeholders to report their preferred scenario for the Finnish lynx population among the following six alternatives: significant growth, slight growth, present suitable, reduction, no lynx at all, or no opinion.

Thirdly, we asked stakeholders to identify methods which they considered might improve lynx-human coexistence issues. Respondents were not offered any pre-determined options and were allowed to present multiple alternatives. We then analysed and classified the answers according to their content, based on the judgements of the reviewers.

Public meetings

In August 2005 we arranged seven open public meetings in the seven focal GMDs of Etelä-Savo, Kainuu, Keski-Suomi, Yymi, Pohjois-Savo, Ruotsinkielinen Pohjanmaa and Uusimaa (see Fig. 1). The need for a public meeting was determined in each GMD separately and each GMD announced and arranged their meeting independently. Our main aim was to study the discussion that occurred among local people.

The public meetings started with an overview of the local, large carnivore situation and a summary of stakeholders' opinions as analysed from the questionnaires. People at the public meetings were then invited to answer the same questions or speak freely. We recorded their statements, transcribed the recordings, and subsequently analysed the content of

each statement, classifying it into four main categories: criticism, problem descriptions, requirements and other statements.

Results

Positive and negative characteristics

The most important, positive beliefs (Fig. 2) held about the lynx concerned its role as part of the Finnish natural environment and in increasing biodiversity. Respondents also expressed the important ecological role of the lynx in regulating hares *Lepus timidus* and *L. europaeus*, small ungulate (mostly roe deer *Capreolus capreolus*) and small carnivore (red fox *Vulpes vulpes* and raccoon dog *Nyctereutes procyonoides*) populations. Respondents also felt that an increase in lynx numbers would not increase problems or damage notably. The lynx was con-

sidered a valuable game species and respondents assumed that some areas might benefit from its presence (the wilderness 'label').

Negative beliefs held by stakeholders (Fig. 3) emphasised the damage that lynx might cause. Surprisingly, the respondents were primarily concerned about the damage lynx may cause to game animals (hare, deer) and only secondly about damage to livestock (including cattle, sheep, fur bearers and reindeer *Rangifer tarandus tarandus*). Respondents were also worried about the impacts of increasing lynx numbers with respect to potential damage to pets and hunting dogs.

Opinions on population size

A slight increase in lynx numbers was widely accepted among stakeholders but significant increase was mostly supported by conservationists (see Table 1) who stated that the lynx population is still vulnerable

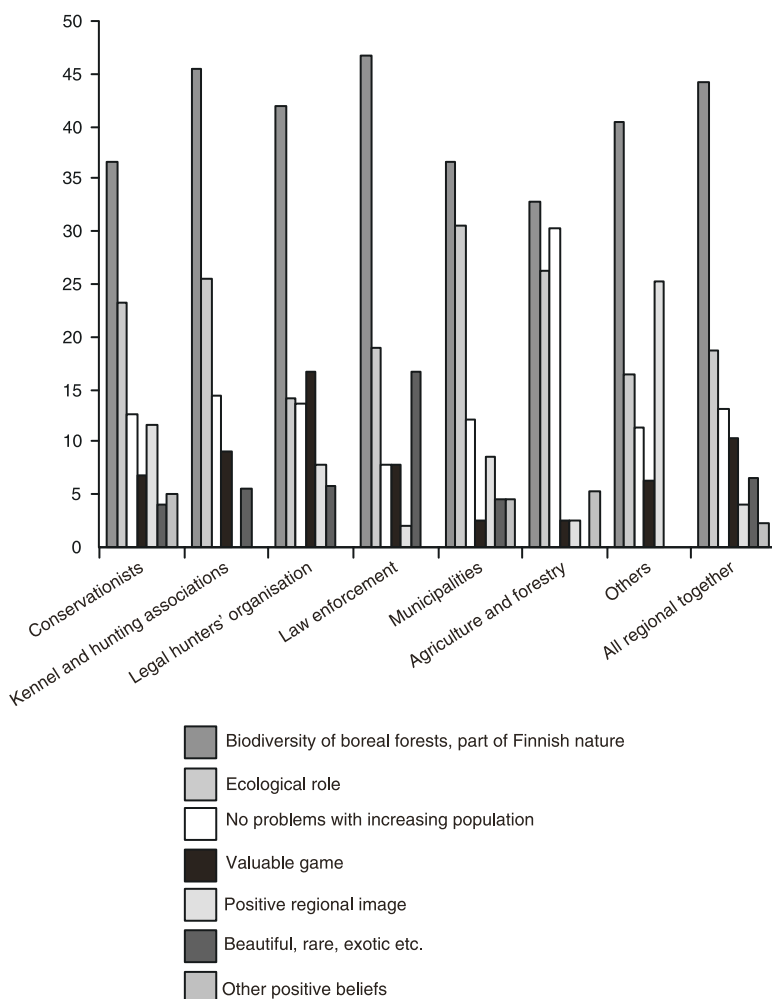


Figure 2. Positive beliefs about lynx and their importance according to stakeholder groups in Finland.

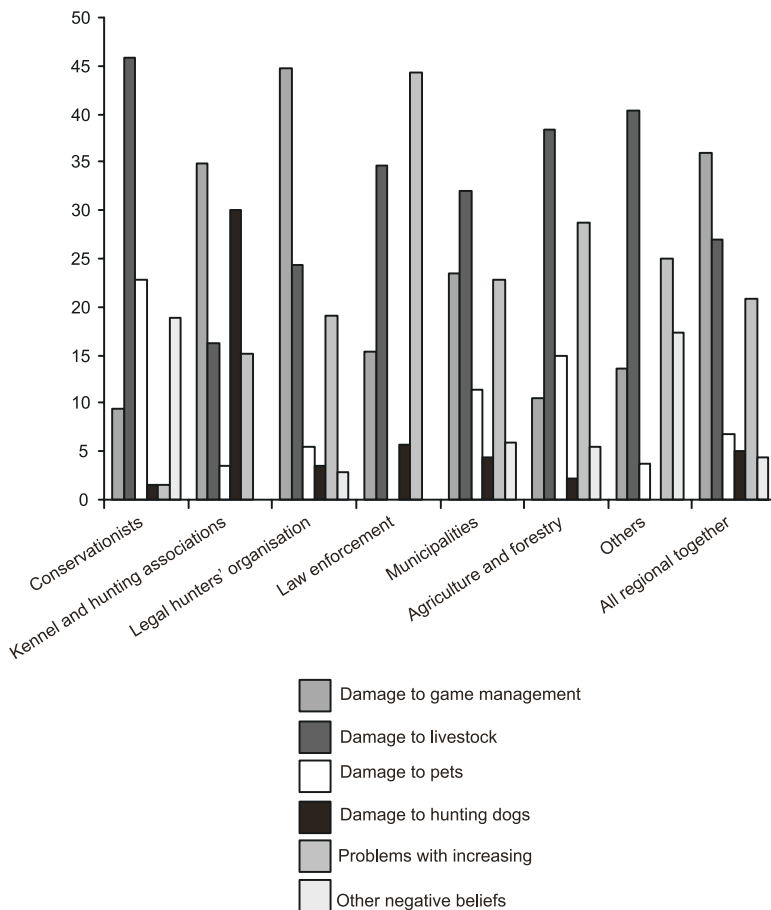


Figure 3. Negative beliefs about lynx and their importance according to stakeholder groups in Finland.

and has not yet reached a favourable conservation status. Overall, ca 55% of the national respondents accepted an increase in the Finnish lynx population, whereas only ca 25% of regional respondents shared this opinion (see Table 1). The respondents who were most keen on decreasing the lynx population were hunters (hunters' legal organisation), and the most common explanation given was the impact that lynx have on the management of white-tailed deer *Odocoileus virginianus*, roe deer and hares *Lepus* spp. However, hunters (legal organisation together with kennel and hunting associations) preferred to maintain the population at the current level (56%).

Coexistence with people

Methods addressing improved coexistence with lynx were classified into five categories (Table 2): 1) population management by hunting (population regulation and reduction, and maintaining lynx shyness through hunting); 2) supplying more information about the lynx (education and increased public

awareness); 3) flexible and rapid elimination of problem individuals; 4) justified compensation system and resources for damage prevention; and 5) 'other', such as co-operation and more resources for research and monitoring.

All stakeholders except conservationists preferred regulation of the lynx population by hunting as a method to promote coexistence, whereas conservationists preferred giving education and information (see Table 2). At the national level, many respondents were representing conservation-oriented stakeholders, thus support for regulation by hunting was weaker among national than among regional stakeholders.

Public meetings and the nature of comments

We obtained about 488 comments from the 176 people who attended the seven public meetings. Only ca 5% of the comments were in favour of lynx. However, approximately 50% of the comments concerned an issue other than lynx, namely wolves,

Table 2. Proportion (in %) of stakeholders supporting different methods for successful coexistence between lynx and people in Finland.

Stakeholders	N	Population regulation by hunting	Education, information	Flexible elimination of problem individuals	Damage compensation and prevention	Other methods
Conservationists	20	7.1	35.8	7.1	21.4	28.6
Kennel and hunting associations	14	50.0	33.3	16.7	0.0	0.0
Hunters' legal organisation	125	54.7	26.7	9.3	4.7	4.6
Law enforcement	17	38.5	38.5	0.0	7.7	15.3
Municipalities	34	41.7	50.0	0.0	8.3	0.0
Agriculture and forestry	15	40.0	6.6	26.7	26.7	0.0
Others	14	50.0	18.8	0.0	18.8	12.4
All regional together	239	45.4	28.2	9.2	10.3	6.9
National	9	30.0	20.0	30.0	15.0	5.0

brown bears *Ursus arctos*, white-backed woodpeckers *Dendrocopos leucotos*, Siberian flying squirrels *Pteromys volans*, hunting, conservation, the EU and the Natura 2000 network.

A little less than 50% of the comments put forward at the public meetings could be classified as criticism, problem descriptions or requirements for acceptance. Criticism was mostly pointed at: 1) lynx numbers; 2) lynx which visit gardens and/or cause damage, or hunt at the feeding sites for deer and hares; 3) the present licence-based hunting system, as well as the slowness of the bureaucracy in dealing with problem individuals; and 4) the present damage compensation system (mostly in excess of 250 €).

Description of the problems which might emerge with an increasing lynx population included: 1) threats and damage to livelihoods (e.g. livestock, fur bearers and reindeer); 2) threats with regard to small game management, feeding of roe deer, white-tailed deer and hares; and 3) threats to multiple use of the forests such as picking berries and mushrooms, hiking, dog trials (diminishing the quality of life) and threats to hunting dogs (mauling).

Respondents identified several elements which they believed were necessary requirements for lynx management policy to ensure successful coexistence between lynx and people. Elements mentioned repeatedly as necessities included: 1) using hunting to manage the lynx population; 2) improving the damage compensation system; 3) developing a flexible and rapid system for responding to individual problem animals; 4) ensuring that the public receive high quality (i.e. neutral, relevant and truthful) information; and 5) 'other' (such as following the subsidiarity principle of the EU and making decisions on large carnivores at the national/regional level).

Discussion

In this study we focused on the beliefs of a wide range of regional and local stakeholders, i.e. those people who's daily lives are affected by the presence of the lynx, by the management and conservation of the species and by official lynx policy. The descriptive nature of our study resulted from the sampling approach, i.e. the hearing process among stakeholders. However, a survey with structured questions and quantitative variables could give a deeper insight into the opinions of people in Finland on large carnivores.

The main finding of our study was that many people accepted lynx as an important part of the Finnish natural environment. However, they wanted decision-making about lynx management to occur at the regional or local level. This is an interesting finding, given that local/regional stakeholders held more negative beliefs.

Ericsson & Heberlein (2003) highlighted the importance of studying the beliefs of local people because they are usually only a minority in general population surveys and their attitudes may differ considerably from those of the general public. As stated by Ericsson & Heberlein (2003) and Svarstad (2003), people who interact with wolves have more negative attitudes than the general public. In addition, Skogen (2003) pointed out that even if a variety of stakeholders were involved, some significant groups may still be excluded. We believe that in our study all focal stakeholder groups were given a chance to respond.

The statements which are included in this Discussion were made at the public meetings, and were chosen to exemplify statements made at the various meetings. All citations are translated from Finnish to English by the primary author.

Lynx awake irritation instead of fear

In Finland, attitudes towards lynx were in general more positive than were attitudes towards wolves and bears, and people did not express the same fear of lynx as they do of wolves or bears (Vikström 2000, Bisi et al. 2007, Mykrä et al. 2006). Similar results were also obtained in Norway (Røskoft et al. 2003, 2007). The number of people present at our public meetings (in comparison to public meetings about the wolf) probably reflected this less fearful or concerned attitude towards lynx, as did the statements that people gave at the meetings ("It's not that often that people are afraid of the lynx"; "I'm an ordinary man who likes to walk in the forests. I think it's nice to hear that there are lynx there. My own experiences of lynx have been few so far, but I wouldn't mind if there were more lynx"). However, people felt irritation in areas where lynx are abundant ("The population is too numerous. They sit on your stairs. They look in through your window while you drink your morning coffee", "Female lynx take their kittens into gardens to teach them how to catch prey and that's how they learn").

At our seven lynx meetings, < 200 people were present and the need for such hearings was considered less important than for similarly arranged wolf hearings at which > 1,600 local people made > 1,900 statements about the wolf and its management (Bisi et al. 2007). Almost half of the statements at our meetings were about issues other than lynx. Of the large carnivores present in Finland, the lynx might be characterised as the 'easiest' management challenge, both because of its relatively small body size and its image as a big 'pussycat'. In addition, the lynx has no historical man-eating background such as the wolf has (Löe & Røskoft 2004) and in general is not considered dangerous to people. It is the most accepted predator among Scandinavian large carnivores (Vikström 2000, Røskoft et al. 2003, 2007, Kleiven et al. 2004), although when lynx repeatedly visited gardens, fear for the safety of pets and children emerged, mainly in western Finland.

People held conflicting opinions about the damage lynx have caused during recent years and the damage that they might cause in the future ("Lynx damages are marginal. It is a species of the forests which preys on hares, grouse and others. It's difficult to see anything negative in that"; "No one compensates for the trouble lynx cause the people who feed white-tailed deer and roe deer. Such damage cannot be compensated by money because no one owns the deer. It simply spoils your work").

In some areas, speculation and 'horror scenarios' predicting huge increases in damages were common, especially amongst sheep and fur farmers and reindeer herders who considered lynx to pose a real threat to their livelihoods (similar to Norway; Røskoft et al. 2007). However, although the amount of money given in compensation for lynx damage has increased during the last few years, the annual amounts are still relatively small, i.e. < 10,000 €, which is clearly less than is paid for damages caused by wolves or bears (Liukkonen et al. 2007). To a lesser extent, people are also concerned about opportunities for traditional and multiple use of the forests; the concern in this regard being what the lynx may preclude people from doing, rather than what the lynx itself may do.

Conflicts between lynx and people

One very important negative characteristic of the lynx, pointed out both in our questionnaires and at the public meetings, was the way it hunts at feeding sites set up for hares, roe deer or white-tailed deer. Hunters feel that the lynx interferes with their work and efforts as it learns to hunt close to feeders. Hunters also pointed out the problems caused by lynx during traditional hunting with dogs (i.e. mauling and killing), although annually only a couple of dogs are killed by lynx (Liukkonen et al. 2007) and most accidents occur during lynx hunting. In contrast, wolves kill 20-40 dogs in Finland every year (Kojola & Kuittinen 2002). It is possible, that respondents were thinking collectively about all large predators when attributing this negative characteristic to the lynx.

The damage-compensation scheme in Finland has been a post-compensation system, i.e. compensation is paid after the damage is done. However, a scheme whereby compensation is paid in advance based on an estimation of expected damages (Schwerdtner & Gruber 2006) was supported, especially by conservationists. In the reindeer herding area in Finland, compensation is paid based on golden eagle *Aquila chrysaetos* territories, i.e. registered reproductive pairs of eagles. This scheme has not been adapted for use in the large carnivore policy because the exact territories of large carnivores may be impossible to determine due to their mobility. Hunters pointed out that the compensation paid for a lost hunting dog is not enough to compensate for the emotional loss and that, since a good hunting dog may be the product of years of breeding and training, this work is thereby also in vain.

Conflicts between stakeholders

Our study identified some conflicts between stakeholders. Because lynx in Finland now frequent densely populated settlements such as cities, as well as rural environments, the conflict was not simply between rural and urban people. The main conflict identified was between locals and 'others', classified as conservationists or authorities at the national or EU level ("We live in a totally different world to other Europeans. Their hunting and wildlife is different to ours here in the north. You can't treat the whole of the EU as if it is the same, that's stupid"). According to local people's attitudes, those who protect lynx most eagerly live mainly in areas where no lynx occur and their positive opinions about the species are based on lack of experience.

Many of the conflicts may be rooted in people's basic values (Kaltenborn et al. 1998, Kaltenborn & Bjerke 2002). The most negative attitudes towards large carnivores are positively correlated with the general belief that humans are exceptional in relation to nature, whereas positive attitudes correlate with pro-environmental beliefs (Kaltenborn et al. 1998). The value 'nature' is the most important value among wildlife biologists and researchers, whereas 'security' is the most important value among sheep farmers. Negative attitudes are positively associated with the values 'security' or 'tradition' and positive attitudes are associated with 'openness to change' or 'nature' (Kaltenborn & Bjerke 2002). People's opinions about nature in general can affect their opinions about a particular species, in this case the lynx. Those with more materialistic values may hold the most negative opinions about the species (Hunziker et al. 1998).

It appears that it is the difference in basic life-values which is at the root of the conflicting attitudes towards lynx, and which threatens the possibility of reaching consensus regarding lynx management in Finland. Nature conservation, here focused on the question of lynx management, may be considered a threat by local people. The values found among members of conservation organisations are not familiar to local people and they do not understand or accept them (Kaltenborn et al. 1998, Kaltenborn & Bjerke 2002). Conservationists' values may give lynx equal rights to humans, whereas local people feel that their lifestyle and life quality should not be determined by the goals of conservationists. To some extent, people living in areas where lynx occur in greater numbers feel that they can no longer influence decision-making concerning their own

life ("We should remember the principle of subsidiarity").

One basic element in conflicts was the damage that lynx were expected to cause to human livelihoods (e.g. sheep, cattle farming, reindeer herding and fur farming). Many stakeholders suggested that an improved lynx-damage compensation system should be introduced. Almost all respondents preferred an evenly distributed lynx population across the country, but they also recognised the difficulties of combining reindeer herding and lynx management. Respondents representing hunters with dogs, fur farmers or reindeer herders were mostly keen to reduce the lynx population and were responsible for the most negative statements and opinions (see also Lumiaro 1998, Bisi et al. 2007, Røskoft et al. 2007).

Stakeholders differed with respect to their support for hunting as a method to improve tolerance. ("No mass hunting is needed. Just take away some extra animals. The population has not spread everywhere in Finland, yet, there are still areas where no lynx exist. In the areas where reindeer or deer are killed, it's OK that the population is regulated"). Others said: "You can't say that humans are natural predators who regulate populations. Humans hunt for fun, not for food. There are lots of examples of how species have been hunted to extinction or close to extinction. The stupidity of man has been seen in many cases, also in hunting".

Conservationists suggested that the lynx population could increase and expand. They supported information, education and research, which are widely accepted tools in promoting acceptance of large carnivores and their management (Hunziker et al. 1998, Andersen et al. 2003, Røskoft et al. 2003). Ericsson & Heberlein (2003) discussed the difficulty of educating the public when the majority of people are neutral in their opinions. Neutrality may indicate disinterest, which may prevent people from processing information, whilst giving hunters more information about the lynx and its biology may increase knowledge, but it may not change their values or attitudes.

Information on large carnivores should be realistic, relevant, up-to-date, factual and research-based to increase mutual trust between stakeholders (Wölfl 1998). All fundamental action, whether for or against lynx and their management, increases conflict and decreases confidence amongst stakeholders. According to Brainerd & Bjerke (2002), Norwegians do not trust politicians, environmental activists or the media, whereas almost half of the

people surveyed trust researchers. Information and education does not always solve problems because the recipient may be sceptical or suspicious and totally ignore the information provided (Hunziker et al. 1998, Brainerd & Bjerke 2002). It is also possible that people do not care enough to seek out new information or to change their attitudes (Ericsson & Heberlein 2003).

How to deal with contradictory expectations?

Some practical suggestions

Large carnivore populations have mainly been managed through the use of three primary strategies: elimination, regulated harvest and preservation. Elimination of lynx is no longer pursued as a management policy in Finland. The degree to which regulated harvest or preservation of lynx are suitable, useful or acceptable policies in Finland is under debate. At the moment, regulated harvest is used but some stakeholders support total preservation. Demands have been placed on the legislation and its interpretation, including revision of the damage-compensation system and clear formulation of what constitutes a favourable conservation status of lynx. At the present time, the concepts of social sustainability and favourable conservation status are interpreted by each interest group according to their own interests. Conservationists emphasise the importance of ecological more than social sustainability. In cases where elimination of problem-causing lynx is required, they suggest termination by the authorities (i.e. the police), not by local hunters.

Some practical solutions can be used to mitigate the conflicts in lynx management and to improve social acceptance and tolerance. Our data suggest that the following objectives are accepted by each stakeholder group: 1) improving the damage-compensation and prevention system; 2) creating a flexible system to eliminate problem lynx; 3) improving scientific research and monitoring (e.g. using radio-collared lynx and research on nutrition); and 4) increasing public awareness of lynx through dissemination of reliable information. Adaptive management (i.e. conducting practical population management, such as population censuses, with the help of local hunters) may help to avoid some conflicts (Skogen 2003).

During our study, major conflicts pertaining to lynx management were identified and the status of management was found to be a sociological rather than a biological issue. We also learned that open

meetings arranged for local people offered a range of different stakeholders the opportunity to define their interests, and may also promote the initiation of interaction and cooperation. Some statements made were uncompromising and could be considered an obstacle to lynx conservation and management. However, in order to understand and mitigate the conflicts, we have to appreciate the fact that lynx have an impact on the lives of people living amongst them. On the other hand, we also have to respect the legislation and status of the lynx in the EC Habitats Directive. We may conclude that to solve or at least to alleviate conflict, an active dialogue among stakeholders is needed. This will determine, in part, the success or failure of lynx conservation and management in Finland.

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References

- Andersen, R., Linnell, J.D.C., Hustad, H. & Brainerd, S.M. (Eds.) 2003: Large predators and human communities in Norway. A guide to coexistence for the 21st century. - Norwegian Institute for Nature Research, Temahefte 25, 48 pp.
- Bath, A.J. & Buchanan, T. 1989: Attitudes of interest groups in Wyoming toward wolf restoration in Yellowstone National Park. - *Wildlife Society Bulletin* 17: 519-525.
- Bisi, J., Kurki, S., Svensberg, M. & Liukkonen, T. 2007: Human dimensions on wolf (*Canis lupus*) policy in Finland. - *European Journal of Wildlife Research* 53: 304-314.
- Bjerke, T., Reitan, O. & Kellert, R. 1998: Attitudes towards wolves in southeastern Norway. - *Society and Natural Resources* 11: 169-178.
- Brainerd, S.M. & Bjerke, T. 2002: Reports for the large predator policy statement. Information measures relative to large carnivores in Norway. - Norwegian Institute for Nature Research. Fagrapport 69, 71 pp.

- Decker, D.J. & Purdy, K.G. 1988: Toward a concept of wildlife acceptance capacity in wildlife management. - *Wildlife Society Bulletin* 16: 53-57.
- Directive 92/43/EEC: Available at: <http://eur-lex.europa.eu/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML>
- Ericsson, G. & Heberlein, T.A. 2003: Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. - *Biological Conservation* 111: 149-159.
- Hunziker, M., Egli, E. & Wallner, A. 1998: Return of Predators: reasons for existence or lack of public acceptance. - In: Strahm, D. (Ed.); Workshop on human dimension in large carnivore conservation. KORA Bericht 3: 25-30.
- Kaltenborn, B.P. & Bjerke, T. 2002: The relationship of general life values to attitudes toward large carnivores. - *Human Ecology Review* 9: 55-61.
- Kaltenborn, B.P., Bjerke, T. & Strumse, E. 1998: Diverging attitudes towards predators: do environmental beliefs play a part? - *Human Ecology Review* 5: 1-9.
- Karlsson, J., Bjärvall, A. & Lundvall, A. 1999: Svenskarnas inställning till varg. - Naturvårdsverket, Stockholm, Sweden, Rapport 4933, 74 pp. (In Swedish).
- Kellert, S., Black, M., Rush, C. & Bath, A. 1996: Human culture and large carnivore conservation in North America. - *Conservation Biology* 10: 977-990.
- Kleiven, J., Bjerke, T. & Kaltenborn, B.P. 2004: Factors influencing the social acceptability of large carnivore behaviours. - *Biodiversity and Conservation* 13: 1647-1658.
- Kojola, I. & Kuittinen, J. 2002: Wolf attacks on dogs in Finland. - *Wildlife Society Bulletin* 30: 498-501.
- Linnell, J., Nilsen, E.B., Lande, U.S., Herfindal, I., Odden, J., Skogen, K., Andersen, R. & Breitenmoser, U. 2005: Zoning as a means of mitigating conflicts with large carnivores: principles and reality. - In: Woodroffe, R., Thirgood, S. & Rabinowitz, A. (Eds.); *People and wildlife. Conflict or coexistence?* Cambridge University press, Cambridge, pp. 162-175.
- Liukkonen, T., Härkönen, S. & Salo, P. 2007: Financial losses caused by lynx. - In: Management plan for the lynx population in Finland. Ministry of Agriculture and Forestry 1b/2007: 24-26.
- Liukkonen, T. & Salo, P. 2007: Status and development of the lynx population in Finland. - In: Management plan for the lynx population in Finland. Ministry of Agriculture and Forestry 1b/2007: 20-23.
- Lumiäro, R. 1998: Suomalaisten suhtautuminen suteen. (In Finnish with an English summary: Attitudes of Finns towards the wolf). - *Suomen Riista* 44: 43-55.
- Löe, J. & Röskaft, E. 2004: Large carnivores and human safety: a review. - *Ambio* 33: 283-288.
- Mykrä, S., Liukkonen, T., Bisi, J. & Kurki, S. 2006: Kansalaisten karhukannat. (In Finnish with an English summary: Bear management and public attitudes in Finland). - University of Helsinki, Ruralia Institute, 148 pp.
- Nie, M. 2001: The sociopolitical dimensions of wolf management and restoration in the United States. - *Human Ecological Review* 8: 1-12.
- Nie, M. 2002: Wolf recovery and management as value-based political conflict. - *Ethics, Place and Environment* 5: 65-71.
- Röskaft, E., Bjerke, T., Kaltenborn, B., Linnell, J.D.C. & Andersen, R. 2003: Patterns of self-reported fear towards large carnivores among the Norwegian public. - *Evolution and Human Behavior* 24: 184-198.
- Röskaft, E., Händel, B., Bjerke, T. & Kaltenborn, B.P. 2007: Human attitudes towards large carnivores in Norway. - *Wildlife Biology* 13(2): 172-185.
- Schwerdtner, K. & Gruber, B. 2006: A conceptual framework for damage compensation schemes. - *Biological Conservation* 134: 354-360.
- Sjölander-Lindquist, A. 2008: Local identity, science and politics invisible: The Swedish wolf controversy deconstructed. - *Journal of Environmental Policy and Planning* 10(1): 71-94.
- Skogen, K. 2003: Adapting adaptive management to a cultural understanding of land use conflicts. - *Society and Natural Resources* 16: 435-450.
- Svarstad, H. 2003: Rovviltkonflikter i noen europeiske land. Utredningar i forbindelse med ny rovviltmelding. - Norwegian Institute for Nature Research, Fagrapport 68, 29 pp.
- Vikström, S. 2000: Suurpetoasenteet poronhoitoalueen eteläpuolisessa Suomessa vuonna 1999. - Unpubl. M.Sc. thesis, University of Oulu, Oulu, Finland, 99 pp. (In Finnish).
- Wölfl, M. 1998: Mutual trust as the key for successful large carnivore conservation. - In: Strahm, D. (Ed.); Workshop on human dimension in large carnivore conservation. - KORA Bericht 3: 21-23.