Lynx UK Trust Consultation Brief: Kielder[1]

Date Issued: 24 October 2016
Contact Details:
Ian.convery@cumbria.ac.uk

---

[1] **Suggested citation:** Convery I, Smith D, Brady D, Hawkins S, Iversen S, Mayhew M, & Eagle A (2016) *Lynx UK Trust Consultation Brief: Kielder*. Prepared for the Lynx UK Trust. University of Cumbria, UK.

Background

The University of Cumbria (UoC) has been asked to develop a community engagement programme for the Lynx UK Trust (Trust) as part of the Trust's site selection process for the trial reintroduction of Eurasian lynx (*lynx lynx*) to the UK.

Public consultation is a key element of any (trial) reintroduction proposal. The International Union for Conservation of Nature (IUCN) Reintroduction Guidelines and Directive 92/43/EEC Conservation of Natural Habitats, Wild Flora and Fauna (the Habitats Directive) Article 22 and The Scottish Code for Conservation Translocations (2014) state that reintroduction should only take place after proper consultation with the public concerned. Community support is fundamentally important to this project and it is essential that the local community is given the necessary information and support to enable them to make an informed decision regarding the desirability of the trial. The National Stakeholder Consultation exercise identified Aberdeenshire and Kielder as appropriate sites for further investigation, and subsequent work by AECOM narrowed this down further to the Kielder area.

Approach

We have adopted a zoned approach to consultation work, comprising a primary and a secondary zone. The primary zone (Figure 1) includes communities or individuals that are most likely to be affected by the trial lynx reintroduction; the secondary zone (Figure 2) comprise communities less likely to be affected but who will nevertheless be engaged with and who will have the opportunity to respond to the consultation process. A detailed zone-based consultation plan is presented in Appendix I.

Primary zone

Those areas within the wider habitat area that are likely to be most affected, either directly or indirectly, by the presence of lynx. There is currently one primary zone identified[2], which covers an area of approximately 300km^2 and this will include the release sites for all project lynx. In terms of human settlements this area incorporates:

1. **Kielder village** and surrounding farmsteads and isolated houses up to the Scottish border.
2. **Kielder dam** - Falstone village and surrounding hamlets such as Stannersburn and the two roads down to Donkleywood/Lanehead and Greystead area.

---

[2] The location of the primary zone is contingent on eventual release sites, and the consultation approach will respond accordingly to subsequent release site decisions.

The consultation process in the primary zone will be as follows:

- Initial Parish Council/community meeting
- Drop in sessions in local centres (e.g. pubs, cafes, libraries)
- Door to door communication and initial questionnaire (Appendix II)
- Farming community engagement (see Appendix III for UoC/AECOM farm business questionnaire)
- Business community engagement
- Q methods exercise (see Appendix IV for overview and exemplar paper)
- Validation/feedback community event
- Establishment of a local advisory group, to include appropriate channels for ongoing consultation with community

Secondary zone

The remaining villages, hamlets and farms within the red border on the Kielder habitat map (Figure 2 below). In addition, if a population self-identifies as being a relevant stakeholder then engagement can be increased to meet such need. The two areas that have been identified as this possibly occurring in are Newcastleton in Scotland and the Lanehead to Bellingham area in England.

The consultation process in the secondary zone will be as follows:

- Initial Parish Council/community meeting
- Provision of project information (leaflets, reports, etc.)
- Follow up community meeting where relevant/requested
- Opportunity to remain involved with the project via advisory group, project website, twitter feeds, etc.

Much of the above will take place between August 2016 – February 2017, however this timescale is not fixed and can be extended if required; we see meaningful, genuine, community engagement as 'process rather than product' driven.
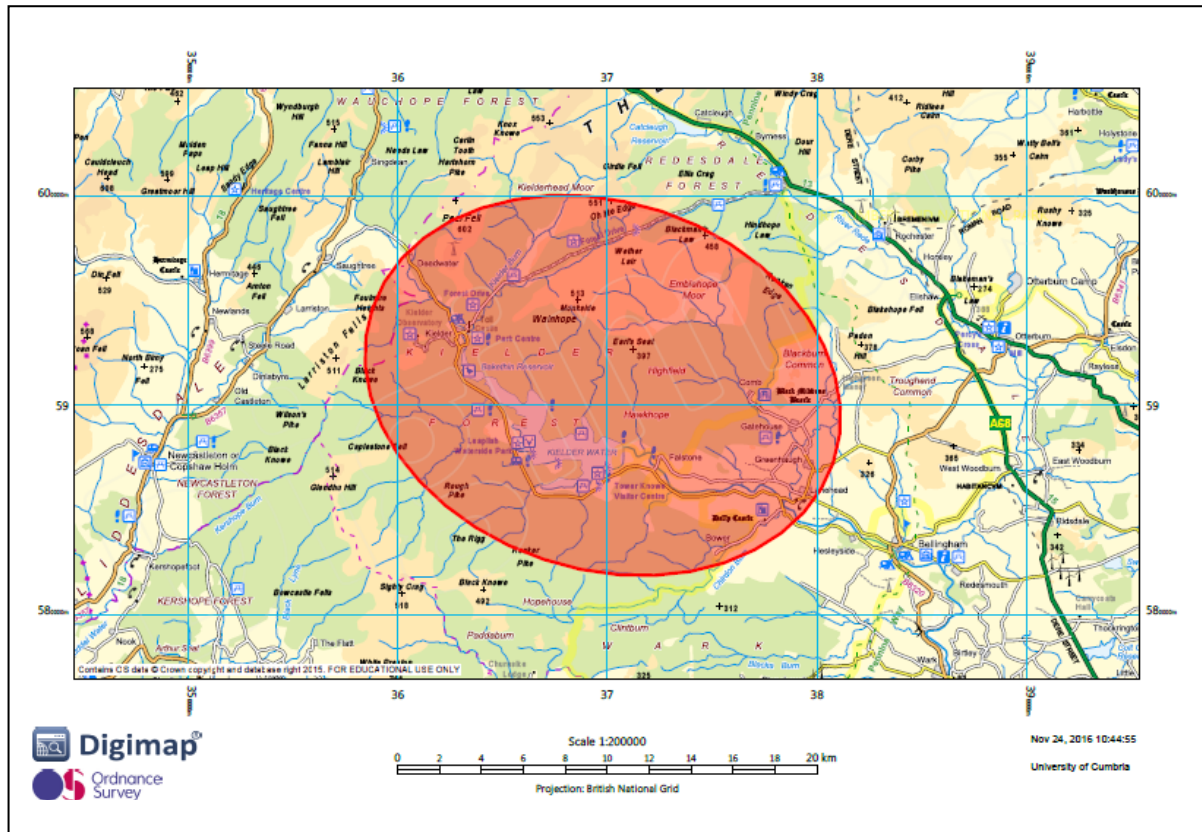
Figure 1. Zoned Approach to community engagement, indicting primary zone (o

Figure 2 Zoned Approach to community engagement, indicating primary zone (orange shading) and secondary zone within red project boundary.

Figure 3. Gantt Chart indicating consultation activity
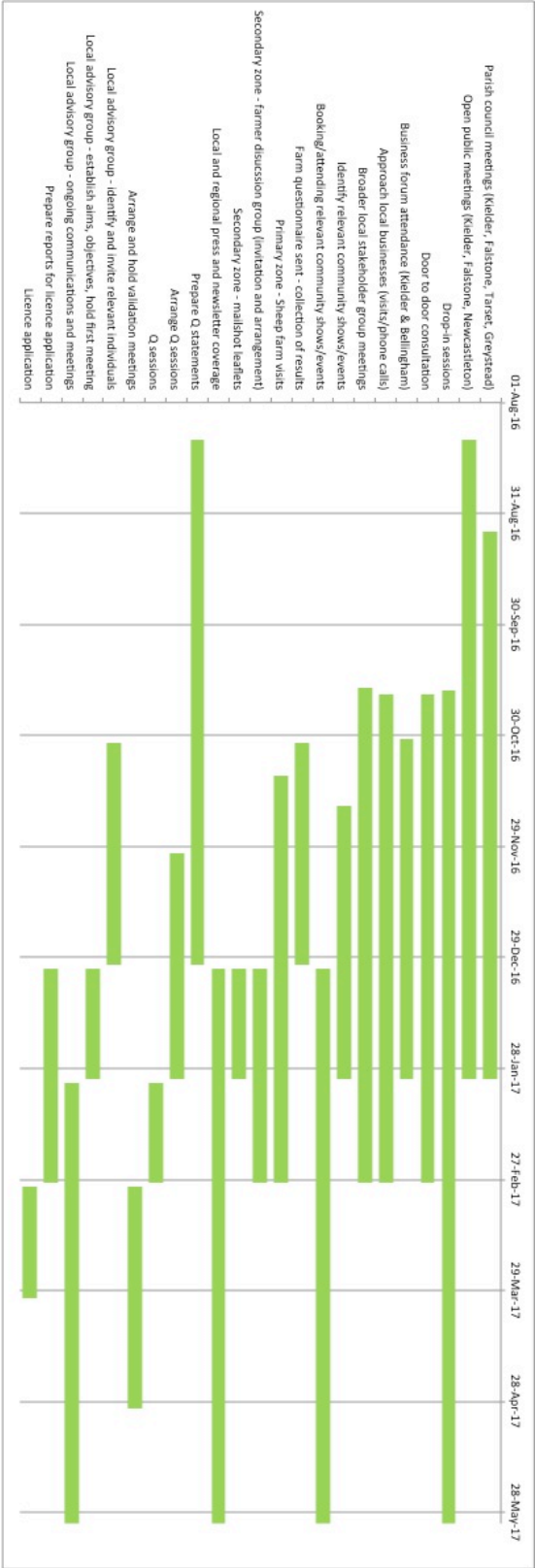
Much of the consultation for both primary and secondary zones will take place between August 2016 – March 2017 (Figure 3), however this timescale is not fixed and can be extended if required; we see meaningful, genuine, community engagement as fundamentally important to the project. Indeed, as Figure 3 indicates, much of the consultation activity will continue post-licence application, and the work of the advisory group, together with targeted community events and drop in sessions, will ensure that communities are regularly updated concerning regarding project progress.

Appendix I: Detailed Consultation Plan

Primary zone *Kielder village area* engagement plan:

Stakeholder	Engagement plan	Purpose	Status
Kielder Parish Council	Attend PC meeting/s	Fully explain the project aims to councillors and record/address any initial concerns Explain consultation process Community liaison - use of local knowledge for focal areas and groups to approach for further discussions Future event/meeting publicity Use contact through PC for resident sample Q methods Regular updates via parish/community newsletters	Completed 05/09/16 Kielder PC (15 attendees)
Electoral wards	Meeting with MP – Guy Opperman	Fully explain the project aims Explain consultation process	To be confirmed (TBC)
Local residents	Open public meeting, Kielder	Fully explain the project aims and record/address any initial concerns Explain consultation process	Completed August 2016
	Door to door verbal consultations with households which fall within the identified area	provide information and opportunity for the Trust to 'get to know the community' complete an exploratory questionnaire to highlight key areas of concern/issues (Appendix I). inform Q Methods statements and Trust information materials	Completed 19/10/16 Kielder village visited by 7 Trust members (approx. 30 households) 23/10/16 Lanehead hamlet (6 households)
	Visit Kielder First School	opportunity for school pupils to learn about lynx and to develop a relationship with the Trust (to be managed by qualified teacher)	18/10/16 Kielder First School. Presentation (1.5 hours) to 15 children and several staff members.
	Pubs – drop in event at Anglers Arms, Kielder	Opportunity for longer personal discussions of benefits and risks of project.	18/10/16 Anglers Arms, Kielder. Attended by 10 people, mainly farming community.
	Community shows/events	Opportunity for longer personal discussions of benefits and risks of project.	Spring/summer 2017
	Complete Q Methodology exercise	analysis of community understanding of project benefits and risks	Dec/Jan 2016
	Open feedback/validation meeting	provide community with a summary of findings from the questionnaire (Appendix I) and	Feb 2016

		Q methods work (Appendix III), respond to concerns/issues	
Business Community	Attend Kielder business forum	Fully explain the project aims Opportunity for longer discussions of benefits and risks of project.	Completed 31/10/16 Kielder Business Forum. Drop in session after main meeting (12 attendees)
	Approach local businesses individually – visits and phone calls	Opportunity for longer discussions of benefits and risks of project, particularly the impact of increased visitor numbers and spend.	The Bike Place Falstone Barns The Anglers Arms Albion Outdoors Kielder Observatory Hawkhirst Scout Camp And on going
Farming community	Meet with local NFU representative	Fully explain the project aims to representative and record/address any initial concerns Explain consultation process Community representation – a communication point for farmers	Dec/Jan 2016
	Sheep Farmer Visits – door to door, in area identified	Fully explain the project aims and record/address any initial concerns Explain consultation process and on going communication Explain focus group representation	Started 10/11/16
	UoC/AECOM farm questionnaire (Appendix II), in area identified	to quantify the total sheep population in the Kielder area and the proportion close to the forest edge to inform the design of compensation/conservation payment schemes and the location of 'low risk' release sites	Questionnaire sent October 2016
Representatives from all local stakeholder groups	Establish local advisory group	to work with the Trust on a range of project protocols, including livestock mortality compensation scheme, monitoring and evaluation, measures of success, exit strategy.	Conversation with interested individuals have started – complete Feb 2016

Primary zone *Kielder Dam area* engagement plan:

Stakeholder	Engagement plan	Purpose	Status
Falstone Parish Council	Attend PC meeting/s	Fully explain the project aims to councillors and record/address any initial concerns Explain consultation process Community liaison - use of local knowledge for focal areas and groups to approach for further discussions Future event/meeting publicity Use contact through PC for resident sample Q methods Regular updates via parish/community newsletters	Completed 01/11/16 Falstone PC (ended up as public open meeting with 35 attendees, a large contingent from the farming community)
Tarset and Greystead Parish Council	Attend PC meeting/s	As above	Approach for meeting 21.12.16, or following one in Jan 2017.
Electoral wards	Meeting with MP – Guy Opperman	Fully explain the project aims Explain consultation process	TBC
Local residents	Open public meeting, Falstone	Fully explain the project aims and record/address any initial concerns Explain consultation process	Completed 01/11/16
	Door to door verbal consultations with households which fall within the identified area	provide information and opportunity for the Trust to 'get to know the community' complete an exploratory questionnaire to highlight key areas of concern/issues (Appendix I). inform Q Methods statements and Trust information materials	Completed 19/10/16 Falstone village visited by 7 Trust members (approx. 20 households)
	Visit Greenhaugh First School	opportunity for school pupils to learn about lynx and to develop a relationship with the Trust (to be managed by qualified teacher)	18/10/16 Greenhaugh First School. Arranged and then cancelled by school due to concerns from farming community.
	Visit Bellingham Middle School	As above	Nov 2016 school approached
	Pub – drop in event	Opportunity for longer personal discussions of benefits and risks of project.	Approach Holybush Inn, Greenhaugh as follow-up after Tarset and Greystead Parish Council meeting
	Provide talk at Border Natural History Society	Fully explain the project aims, and focus on ecological benefits/risks, opportunity for detailed discussions with local natural historians	07/12/16
	Community	Opportunity for longer	TBC

	shows/events	personal discussions of benefits and risks of project.	
	Complete Q Methodology exercise	analysis of community understanding of project benefits and risks	Dec/Feb 2016
	Open feedback/validation meeting	provide community with a summary of findings from the questionnaire (Appendix I) and Q methods work (Appendix III), respond to concerns/issues	Feb 2016
Business Community	Attend Bellingham business forum	Fully explain the project aims Opportunity for longer discussions of benefits and risks of project.	Completed 07/11/16 Bellingham Business Forum. Presentation and discussion (2.5 hours) to 16 attendees
	Approach local businesses individually – visits and phone calls	Opportunity for longer discussions of benefits and risks of project, particularly the impact of increased visitor numbers and spend.	Hesleyside Hall and Huts (including Hesleyside Estate) Wild Northumbrian Tarset Tor And ongoing
Farming community	Meet with local NFU representative	Fully explain the project aims to representative and record/address any initial concerns Explain consultation process Community representation – a communication point for farmers	Approach NFU representative to arrange meeting Dec 2016
	Sheep Farmer Visits – door to door, in area identified	Fully explain the project aims and record/address any initial concerns Explain consultation process and ongoing communication Explain focus group representation	Started 10/11/16
	UoC/AECOM farm questionnaire (Appendix II), in area identified	to quantify the total sheep population in the Kielder area and the proportion close to the forest edge to inform the design of compensation/conservation payment schemes and the location of 'low risk' release sites	Questionnaire sent October 2016
Representatives from all local stakeholder groups	Establish local advisory group	to work with the Trust on a range of project protocols, including livestock mortality compensation scheme, monitoring and evaluation, measures of success, exit strategy.	Jan-Feb 2016

Secondary Zone engagement plan:

Stakeholder	Engagement plan	Purpose	Status
Local residents and Community Councils in Scotland	Local public consultation meeting: Newcastleton	Fully explain the project aims Explain consultation process Offer a clear line of communication	30/12/16
Local residents and Community Councils in Scotland	Local public consultation meeting: Langholm	Fully explain the project aims Explain consultation process Offer a clear line of communication	Jan 2017
Local residents and Community Councils in Scotland	Local public consultation meeting: Ettrick	Fully explain the project aims Explain consultation process Offer a clear line of communication	Jan 2017
Local residents	Local and regional press and newsletter coverage	General information about the project Updates of progress and activity	Throughout consultation process
Local residents, businesses and visitors	Trifold leaflet left in prominent local locations – visitor centres, cafes, etc	Fully explain the project aims Explain consultation process Offer a clear line of communication	Dec/Jan 2016
Farming community	UoC/AECOM farm questionnaire (Appendix II) within identified area and all farms in a buffer of 10km outside of area	to quantify the total sheep population in the Kielder area and the proportion close to the forest edge to inform the design of compensation/conservation payment schemes and the location of 'low risk' release sites	Questionnaire send October 2016
	Farmers within the identified area will receive the trifold leaflet and covering letter	Fully explain the project aims Explain consultation process Offer a clear line of communication	Dec/Jan 2016
	smaller local discussion groups, invitation through either: letter following on from UoC/AECOM farm questionnaire OR through NFU representative following discussion	Small scale discussion group meetings in response to requests from farmers	Jan 2016
Business Community	Trifold leaflet to businesses within identified area	Personal visits with leaflets to be left for distribution to patrons	Dec/Jan 2016
Broader local stakeholder	Kielder water and forest park development Trust	Fully explain the project aims Explain consultation process	Attend board meeting 07/12/16

meetings	board meeting	Offer a clear line of communication	
	Northumberland Wildlife Trust	Fully explain the project aims Explain consultation process Offer a clear line of communication	Meeting scheduled 18/10/16
	Northumberland National Park Authority	Fully explain the project aims Explain consultation process Offer a clear line of communication	In communication with park staff to arrange a meeting
	Forestry Commission	Fully explain the project aims Explain consultation process Offer a clear line of communication	Meeting scheduled 17/10/16
	local forestry companies	Fully explain the project aims Explain consultation process Offer a clear line of communication	Dec/Jan 2016
	Identify interest groups such as cyclists, fishing, walkers		TBC

Appendix II: Exploratory Community Questionnaire

Community Questionnaire

Have you heard about the Lynx UK Trust's proposal for a trial reintroduction of lynx?
Please circle: YES / NO

Please list below what you believe to be the key risks and benefits of a trial reintroduction of lynx.

Benefit	Risk
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

To help ensure that the information we collect is representative of your community please complete the following:

Gender (please circle):   Age group (please circle):

     Male   Female   Under 16:   16-24;   25-34;   35-44;   45-54;   55-64;   65+

Post Code: Occupation:

We are currently at the early stages of collecting the thoughts and opinions of your community and would appreciate it if we could contact you again as the project develops, this could be in the form of interviews, questionnaires, emails or phone calls. Would you be willing for us to contact you?

Please circle: YES / NO

If yes, please provide your contact details. Please note that your contact information will only be used by the Lynx UK Trust and their partners for the purposes of contacting you in regards to the proposed trial lynx reintroduction in your area. We will not share this information with any third parties.

Name & Address:

Email: Preferred phone no.:

If you have any further comments please use the space below:

Appendix III: UoC/AECOM Farm Questionnaire

Dear sir/madam

As you may be aware, the Lynx UK Trust is investigating the potential for a 5 year trial reintroduction of Eurasian lynx in the Kielder Forest area. AECOM have been asked to undertake an independent and impartial assessment of the potential costs and benefits of the proposed trial, including on farming practices in the Kielder area.

A review of the evidence identified 3 potential impacts on farming:

• Predation on sheep within forested areas and areas close to the forest edge.
• Predation on foxes which may reduce the loss of lambs and poultry to foxes.
• Predation on deer which may reduce deer damage to crops near the forest edge.

In order to develop a more detailed understanding of the potential risks and possible benefits to farming practices in the Kielder area, I would like to ask if you would be willing to complete the questionnaire included within this letter and return it within the stamped addressed envelope enclosed.

The questionnaire consists of 12 questions and is divided into 4 sections:

• Sheep farming practices.
• Fox predation on lambs and poultry.
• Deer damage to agricultural crops.
• Any other issues.

The results of this survey will be used in AECOM's assessment of the costs and benefits of the proposed trial. All of the results will be shared publically to ensure that the assessment is transparent although all responses will remain anonymous.

If you have any questions on the questionnaire or the use of the results please contact me using the contact details provided below.

I look forward to hearing from you,

Chris White, Senior Environmental Economist, AECOM
Address: AECOM, Aldgate Tower, 2 Leman Street, London, E1 8FA
Phone: 0207-798-5246
Email: chris.x.white@aecom.com

Section 1. Sheep farming practices

Q1. How would you describe your farm? If you do not have sheep please skip to Section 2.

☐ LFA grazing livestock	☐ Specialist pigs	☐ Cereals
☐ Mixed	☐ Specialist poultry	☐ Horticulture
☐ Lowland grazing livestock	☐ Dairy	☐ General cropping

Other (please specify):

Q2. Approximately how many sheep are on your farm in a typical year? If there are any specialist sheep such as pedigree rams please indicate these separately.

No. of rams:	No. of breeding ewes:	No. of gimmers:
No. of store lambs:	No. of fat lambs:	No. of replacements:

Other (please specify):

Q3. What is the approximate market value of your sheep in a typical year? If there are any specialist sheep please indicate their values separately.

£ per ram:	£ per breeding ewe:	£ per gimmer:
£ per store lamb:	£ per fat lamb:	£ per replacement:

Other (please specify):

Q4. Could you indicate the approximate number of your sheep grazing in forests within the Kielder area in a typical year? The Kielder area is defined by the red boundary on the enclosed map, forested areas are coloured green.

No. of sheep:

Q5. Could you indicate the approximate number of your sheep grazing within 250 metres of these forests in a typical year?

No. of sheep:

Section 2. Fox predation on lambs and poultry

Q6. Could you indicate the approximate number of lambs or poultry (if any) that are lost to fox predation in a typical year? If you do not have lambs or poultry please skip to Section 3.

No. of lambs:	No. of poultry:

Q7. Do you undertake any of the following measures to control fox predation?

☐ Fencing	☐ Trapping
☐ Indoor lambing	☐ Guardian animals
☐ Shooting	☐ None
Other (please specify):	

Q8. If yes, approximately how much do you spend on fox control in a typical year?

£ spent on fencing:
£ spent on indoor lambing:
£ spent on trapping:
£ spent on guardian animals:
£ spent on shooting:
Other (please specify):

Section 3. Deer damage to crops

Q9. Could you indicate the approximate damage to agricultural crops (if any) caused by deer in a typical year? If you do not have any crops please skip to Section 4.

£ crop damage:

Q10. Do you undertake any of the following measures to control deer damage?

☐ Fencing	☐ Guardian animals
☐ Shooting	☐ None
Other (please specify):	

Q11. If yes, approximately how much do you spend on deer control in a typical year?

£ spent on fencing:
£ spent on shooting:
£ spent on guardian animals:
☐ Other (please specify):

Section 4. Any other issues

Q12. Do you think a trial reintroduction of lynx in the Kielder area could create any costs or benefits to your operations?

Thank you for completing the questionnaire, if you have any questions or would like to receive updates about the status of the research please contact: chris.x.white@aecom.com.

Appendix IV: Q Methods

Q methodology (QM) is a research tool designed to explore individual values, opinions and beliefs regarding a specific subject area. It is particularly useful in community engagement with smaller groups (approximately up to 60 people) and has proven particularly useful in identifying 'common ground' in conflict management situations. In environmental/conservation research QM has been used in a wide range of contexts, including wind farm development, public opinion on shale gas, afforestation schemes, wildlife management and landscape restoration. QM typically involves a 1-1.5 hour interview where the participant ranks a set of statements relevant to the topic depending on how strongly they feel about each. All statements are derived from previous interviews, questionnaires and conversations, using the participants' own voices, concerning the topic to ensure that statements have relevance and authenticity. Factor analysis is then used to interrogate the data set. Exemplar statements are given below. Two recent examples of the use of Q in conservation-related research have been provided below.

1. The presence of Lynx is crucial for the health of forest's ecosystem
2. The British Countryside is no longer a suitable place for a sustainable lynx population
3. I feel the resources spent on the trial could be better directed to those species already present in the UK
4. Lynx should be introduced as a natural control of deer
5. Lynx should be introduced to the UK and any uncertainties can and must be dealt with
6. I am concerned that Lynx will pose a threat to our native wildlife during the trial
7. It is a joy to know that there could be lynx living in the Kielder Forests
8. I am concerned that Lynx will be a threat to livestock during the trial
9. I am concerned that Lynx will cause economic suffering to farmers and countryside managers
10. I am hesitant to trust the conservationists and scientists behind this trial proposal
11. It is important that adequate compensation agreements are seen to be put in place should the lynx cause any destruction.
12. It is important that the trial has a well-defined exit program in place, which guarantees reversibility
13. Lynx could beneficially add to the rural economy through eco-tourism
14. Having Lynx in the countryside would make it more interesting
15. The trial proposal is lacking in detail and much clarification is needed
16. I am happy and excited for the trial to go ahead
17. Lynx are not compatible with our society today
18. A well-designed and regulated trial could help inform decisions on whether Lynx should be introduced or not in the future
19. There is too much uncertainty about control measurements during the trial

20. All aspects of the trial must be transparent and open for all
21. The trial's plan of introducing 6 Lynx for 5 years is too low to be scientifically sustainable.
22. Public education and outreach programs for the public should have high priority
23. I am concerned that Lynx will be a threat to people and pets during the trial
24. I feel the resources spent on this trial would be best directed to those species already present in the UK
25. The trial must engage, consult and involve local communities and stakeholders
26. We have an intrinsic obligation to try and restore our natural ecosystems as much as possible. The trial is one step towards that
27. The welfare of the Lynx is of highest importance, both during and at the end of the trial
28. There is not enough funding within the trial to implement what needs to be done
29. A clear vision on what the long-term management plans beyond the trial are vital
30. I am supportive of the trial, but do not think this area is suitable for the Lynx
31. The trial would have negative impacts on my personal situation
32. I believe the trial will have a positive impact on the local community
33. To experience seeing a lynx in the wild is a positive experience
34. It is critical to use biological data and sound science in this trial of introducing Lynx

Methodological and Ideological Options

Mapping value plurality towards ecosystem services in the case of Norwegian wildlife management: A Q analysis

Yennie K. Bredin *, Henrik Lindhjem, Jiska van Dijk, John D.C. Linnell

Norwegian Institute for Nature Research, P.O. Box 5685 Sluppen, NO-7485 Trondheim, Norway

ARTICLE INFO

ABSTRACT

For many deep-rooted resource conflicts where the cultural component of ecosystem services (ES) is strong, standard monetary valuation may be methodologically difficult and not always meaningful. A deeper understanding of the value plurality of key stakeholders may be called for to develop acceptable policies. We use the Q method to analyse the perceived and actual trade-offs related to Norwegian wildlife management, a source of prominent conflict in Norway. We identify and classify distinct arguments in the wildlife management debate following the ES framework, and use the Q method to explore extant/prominent narratives characterising stakeholders' perceptions of the importance of arguments about biodiversity and ES. Finally, we reflect on whether and to what extent the Q method can contribute to our understanding of resource conflicts, underlying values, and ES trade-offs. Three clear narratives appeared: Pro-sheep grazing (cultural), pro-carnivore conservation (intrinsic) and a middle position emphasising recreational hunting (utilitarian). Despite considerable disagreement among narratives, the Q analysis also revealed areas of common ground useful for developing acceptable policies. Given the inherent complexity of socio-ecological systems, it is useful to draw from a diverse toolbox of methods, including the Q method for ES analysis.

© 2015 Elsevier B.V. All rights reserved.

1. Introduction

There is currently great interest among academics and policy-makers in assessing the diverse values of biodiversity and ecosystem services (ES). The Millennium Ecosystem Assessment (MEA) (2005) and the Economics of Biodiversity and Ecosystem Services (TEEB) initiative, started a process of "recognizing and demonstrating" the potential (economic) value of ecosystem service benefits (Kumar, 2010). The next step was seen to be the design of policies that can "capture" such values in decision-making (TEEB, 2010). However, for many ES conflicts this process may not be straightforward. Firstly, there are often deep-rooted conflicts over rights and resources, a situation that does not lend itself to standard monetary valuation of costs and benefits (Spash, 2013). In such situations, there is a need for a deeper understanding of the value plurality underlying the different positions of various stakeholders (Martin-Lopez et al., 2014). Secondly, while economists may be good at defining an environmental conflict and analysing it theoretically, relatively less emphasis is traditionally put on investigating how implementation of policies among affected stakeholders may succeed (Barry and Proops, 1999). For this, a much better understanding of stakeholder positions, the values underpinning these, and their relation to ES is required.

One of the most prominent conflicts in ES and biodiversity management in Norway (and Scandinavia) is the conflict over the way wildlife and wildlands should be managed. In Norway, only a small part of the land area (5%) has been converted to agricultural land. The remaining area is about equally divided into forest and alpine tundra. The forests are intensively exploited for timber production and exploited for hunting. The main game species in forested areas are moose (*Alces alces*), red deer (*Cervus elaphus*) and roe deer (*Capreolus capreolus*). Most forest areas are also used for free-grazing (without fencing or shepherding) of domestic sheep. Conflicts exist between these activities, with wild ungulates involved in vehicle collisions, as well as damaging forests and crops (Kjøstvedt et al., 1998; Olaussen and Skonhoft, 2011). A higher degree of controversy still has emerged in the last 25–30 years as large carnivores have been allowed to begin a recovery (e.g. Linnell et al., 2010). The return of the wolf (*Canis lupus*), Eurasian lynx (*Lynx lynx*), wolverine (*Gulo gulo*) and brown bear (*Ursus arctos*) to this multi-use ecosystem has sparked a wide range of conflicts. These include renewed depredation on livestock (Kaczensky, 1999), real and perceived competition with hunters for shared prey (Melis et al., 2010), and a diversity of social conflicts where large carnivores have become symbols for a diversity of wider conflicts (Skogen and Krange, 2003). Discussions over large carnivore management involve a wide range of stakeholders at local, national and even international levels. Additionally, the institutions to govern decision making with large carnivores are highly political in nature and have undergone constant evolution from being centralised to being de-centralised in recent years.

* Corresponding author.
E-mail address: yennie.bredin@nina.no (Y.K. Bredin).

Ex post facto compensation is paid for livestock killed by carnivores and both lethal control and hunting are heavily used to limit the numbers and distribution of large carnivores, which is regulated through a strict zoning policy (Linnell et al., 2005b). The different species groups combined (sheep, wild ungulates, large carnivores) are important components of a wide range of diverse ES that are valued and experienced in very different ways by stakeholders at different scales. The conflicts run much deeper than just a matter of distribution of market-based costs and benefits. It is more based on normative issues, touching on the extent to which the Norwegian landscape is viewed primarily as an arena for recreation, the production of timber or meat (both domestic and wild), or for the conservation of wildlife and biodiversity (Skogen et al., 2006). Hence, numerous arguments (economic, social, ethical and philosophical) are used to form and support opinions among stakeholders.

Classic environmental valuation studies, for example using stated preference methods such as contingent valuation, to value the public benefits of wildlife conservation often run into methodological problems, since conservation is often seen as a public good or service for some (typically urban populations) and "bad" or a disservice for others (typically rural populations) (Bohara et al., 2001; Bostedt, 1999). Furthermore, a more fundamental problem is that the trade-offs people are asked to make in stated preference surveys, for example, may not be meaningful in situations where ecosystem complexity is high and a plurality of values and underlying motives are involved (i.e. incommensurability, multiple dimensions) (Frame and O'Connor, 2011; Iniesta-Arandia et al., 2014). For ES with a strong cultural component, standard economic valuation may be particularly challenging (Barrena et al., 2014; Chan et al., 2012; Daniel et al., 2012).

In this study we take up the challenge raised by ecological economists such as Barry and Proops (1999) and Swedeen (2006) to analyse resource conflicts more in depth using the Q method, a tool for discourse analysis (Addams and Proops, 2000; Brown, 1980; Webler et al., 2009). Although the topic of wildlife management and ES lends itself well to the use of the Q method, such applications are still rare and the study is the first of its kind in Norway (Chamberlain et al., 2012; Mattson et al., 2006; Rastogi et al., 2013). Thus, in this Q study, we make the links between the different arguments used in the Norwegian wildlife management debate, and the underlying values (monetary and non-monetary) and the full range of ES categories using the Common International Classification of Ecosystem Services (CICES).[1] Specifically, we address two main questions: (1) What are the positions (narratives) that characterise stakeholders' perceptions of the importance of arguments about biodiversity and ES associated with wildlife management?; and (2) To what extent can applying the Q methodology contribute to our understanding of the resource conflict, the underlying values, and ES trade-offs?

2. Method, Data Collection and Analysis

2.1. Q Methodology

Q methodology is a form of discourse analysis that originates from the field of psychology and which has been adopted in a range of fields (Baker et al., 2006; Barry and Proops, 1999; Curry et al., 2013; Davies and Hodge, 2007, 2012; Swedeen, 2006). It combines both quantitative and qualitative data through statistical analysis to explore different opinions that exist about a topic. Q methodology does not allow for generalisations about the representativeness of different opinions within a larger population (which is an aim of general population surveys). It does however, give insights into the range of opinions that exist about some topic within a sample population, and how those opinions differ and converge. As such, the Q method lends itself well to the study of

the importance of ES and associated values across stakeholder groups within the Norwegian wildlife management debate and to capture the nuances in opinions. This may be valuable when searching for common ground for the implementation of acceptable and feasible policy options, and as a basis for stakeholder (Cuppen et al., 2010) and deliberative processes (Walton, 2013), or the use of decision-support tools such as multi-criteria decision analysis (Swedeen, 2006).

A Q study typically involves several steps. The two most critical steps to secure a good quality in study design include the selection of Q statements (Q-set) and participants (P-set). The Q-set commonly derives from a so-called concourse of statements and a good Q-set is broad in scope to cover all the different aspects, both positive and negative, of the topic under review. In addition, the Q statements should be intelligible and allow for differing interpretations by the participants. Similarly, while it is a prerequisite in Q methodology that the participants must be knowledgeable about the topic of the study, the P-set should aim to be inclusive of different stakeholders.

2.2. Identification of Stakeholders

Relying on 25 years of experience of working within the field of wildlife management in Norway, including the organisation of multiple stakeholder participation processes and supported by decades of social science research we deliberately selected the most relevant stakeholder organisations considering their relative importance and interests in the management of sheep, moose, roe deer, wolf, lynx and bears.[2] The criteria we used for including interest groups was that the stakeholders should be influential or have a pronounced interest in the topic of our study, that they should be organised (e.g. we did not go after individuals), and that the different interest groups should represent the diversity in views that existed about the topic in south-eastern Norway. To verify that all possible stakeholders had been considered for the analysis, and that no key stakeholder groups had been overlooked, we searched for additional groups through various printed and internet sources. Additionally, we consulted wildlife experts and social scientists working within the field to ensure capturing any potentially missing stakeholders. The identified key organisations represented the interests of farmers, hunters, forest owners, nature and carnivore management, animal welfare and nature conservation, tourism, and sheep farming. We selected informants based on their functions and relative importance within the organisations, thus reflecting their knowledge about the topics and the area of this study. We contacted informants primarily through e-mail, and when they were willing to participate in the study, we performed interviews personally.[3] We limited our study to representatives from the organisations' national level bodies and from regional divisions from South-eastern Norway. South-eastern Norway is the only part of Norway where wolves, bears and lynx occur together, and the area of most intensive forestry and game management (roe deer and moose) with widespread sheep farming, and contains sharp gradients from urban to rural areas, thus providing the widest diversity of stakeholder views within a shared ecosystem.

2.3. Statements That Reflect Ecosystem Services and Underlying Values

Aiming to cover the extant range of positive and negative opinions, facts, and assumptions about the management of sheep, moose, roe deer, wolf, lynx and bear, in south-eastern Norway we first sampled a range of arguments and value statements that we found on our focus species. We searched printed and online scientific- and popular publications, blogs, information sites and newspapers for arguments/

---

[1] http://cices.eu/.

[2] We deliberately excluded red deer, wolverine and semi-domestic reindeer management issues to reduce the complexity of the study and keep it more focused on the prevailing conditions within the south-eastern boreal forest area of Norway.

[3] Due to our confidentiality agreements we will not further specify who the informants were or where they came from.

Table 1

Q statements about sheep, moose, roe deer, lynx, wolf and bear, that represent key arguments in the Norwegian carnivore debate, organised in accordance with the CICES categories.[a]

Main ES categories	Main output or process types	Biological or material outputs and biophysical and cultural processes	Statement number	Q statement
Provisioning	Nutrition	Reared animals and their outputs	9	Norwegian lamb meat is an ecological product
			13	Traditional Norwegian sheep farming incurs larger costs than benefits for Norwegian society
			26	Wolf and bear conservation is a threat to traditional farming and a living countryside
			28	Bears kill more sheep than they eat, and they often kill in a brutal way
			33	Even without carnivores an unacceptably high number of sheep die as a consequence of the traditional Norwegian sheep grazing practices
		Wild animals and their outputs	19	Moose meat is an ecological product
	Materials	Fibres and other materials	40	A large moose population causes great problems and economic losses for forest owners through their selective grazing of the forest
Regulation/maintenance	Maintenance of physical, chemical, biological conditions	Pest control	7	Roe deer is a plague to many gardeners and therefore the populations must be diminished
		Maintaining nursery populations and habitats	8	Lynx mostly predate on sick and weak roe deer
			15	The wolf is central to restoring the ecological balance in Norwegian nature
			18	The Norwegian population targets for lynx, wolf and bear are too low to secure viable populations in the long-term and must therefore be increased
			20	Sheep farming and viable carnivore populations cannot coexist
			21	Lynx fill an ecologically important function by keeping the roe deer populations down
			23	Norwegian wolf will be able to contribute to a stronger and healthier moose population, with larger and healthier animals
			25	The lynx population ought to be kept low so as not to compete with hunters for roe deer
			38	The roe deer is an important prey for Norwegian carnivores
		Disease control	24	Large roe deer populations increase the risks of contracting tick-borne diseases
Cultural	Physical and intellectual interactions with biota, ecosystems, and land-/seascapes.	Experiential use of plants, animals and in different environmental settings	1	Large carnivores in the Norwegian wild-lands may enable/provide the basis for profitable ecotourism
			11	To see a wild, Norwegian bear in nature is a positive experience for life
			22	The chance of being attacked by a bear, when one is out in the forest, is so low that it can be ignored
			29	The large Norwegian moose population causes many traffic collisions, which result in substantial personal- and material damages every year
			30	Knowledge about wolf, bear and lynx give people security and enables them to avoid unwanted encounters with large carnivores
			37	Increased bear hunting will generate greater safety for people and domestic animals that live in areas with carnivores
		Physical use in different environmental settings	2	Roe deer hunting provides many positive experiences
			16	Moose hunting is economically important to Norwegian landowners
			34	A larger Norwegian wolf population, than the one we have today, would have large negative consequences for Norwegian moose hunting
		Bequest	6	Norway must ensure that Norwegian populations of wolf, lynx and bear be conserved for the future, because Norway has committed to do this through numerous international agreements
			14	To eradicate free-living, large carnivores in Norway means that we deprive all future generations of the opportunity to experience these animals in Norwegian nature
			17	It is important to facilitate traditional sheep grazing so that future generations may experience Norwegian sheep farming the way it is today
		Heritage, cultural	4	Sheep have long been a natural element in the Norwegian wild-lands
			31	Today's sheep farming practices contribute to securing rare species and valuable cultural landscapes
			35	Moose hunting is an important constituent of our Norwegian cultural heritage
		Educational	36	That there are wolves in Norway contributes to human development towards a better understanding of nature, self-understanding, and an increased quality of life
	Spiritual, symbolic and other interactions	Existence	3	It is a joy to know that there is lynx in Norwegian forests
			5	Bear, wolf and lynx have a right to live in Norwegian nature
			32	The wolf is more of a burden to Norwegian society than it is of value
		Symbolic	12	Norwegian moose management is so intensive that the king of the forest has become like a domesticated animal
Other			10	Wolves can kill people, even if that rarely happens
			27	Conflicting political guidance creates unnecessary tensions between sheep farming and carnivore management
			39	Illegal hunting of lynx, wolf and bear are a threat to the government's current management of population trends for these animals

[a] Note that a Q statement could be about more than one species and be associated with more than one ES category. We have assigned statements to what we considered their primary ES category after consulting colleagues working within the ES field.

statements mentioning the species of our interest. Through informal conversations we asked people from key stakeholder groups (i.e. 1 ES expert/hunter, 1 forest owner/farmer/hunter, 1 carnivore expert, 1 social science researcher, and 1 animal rights supporter) about their views on the focus species. Additionally, we took radio and TV reports into account (although we did not systematically examine these). Next, we condensed the body of statements by grouping statements according to the six focus species and merging variations of similar arguments. Thereafter, we deliberately chose existing or created hybrid statements to cover as diverse values as 40 Q statements allow while ensuring a balance in aspects for and against each species, and maintaining a balance in the number of statements per species. Using expert judgement, each statement was classified as primarily belonging to the different ES categories of provisioning, regulation/maintenance, or cultural, according to the CICES classification system (see Table 1). CICES system is the currently most developed continuation from MEA (2005). Not all our statements fitted easily into service categories, so we added an "other" category. Classifying the statements allowed us to examine the relationships between biodiversity and ES within the wildlife debate, and showed that arguments referring to cultural services were relatively more common (N = 20). Of these, 16 statements referred to arguments about the "physical and intellectual interactions with biota, ecosystems, and land-/seascapes", and four statements referred to arguments about the "spiritual, symbolic and other interactions with biota, ecosystems, and land-/seascapes". Under the remaining service categories 10 Q statements represented arguments about regulation/maintenance services ("maintenance of physical, chemical, biological conditions"), seven Q statements represented arguments for provisioning services ("nutrition" or "materials"), and three Q statements did not exactly fit within any CICES category.

Observations can also be made in relation to the number of statements regarding the different types of species and ES classification in Table 1:

- Sheep were mostly associated with statements categorised under provisioning (4 of 9 statements) and cultural (3 of 9 statements) services.
- Moose were associated with statements under all ES categories, but most were related to cultural services (5 of 8 statements).
- Roe deer were mostly associated with statements within regulatory/maintenance services (6 of 7 statements).
- The statements about lynx were evenly divided between regulatory/maintenance (4 of 9 statements) and cultural services (4 of 9 statements).
- Wolves were mostly mentioned under cultural services (6 of 12 statements), but were also associated with the other service categories (and "other").
- Statements about bears were classified mostly under cultural services (6 of 10 statements).
- "Carnivores" in general were mentioned in seven statements divided among all categories.

Hence, there is a great diversity of values and services underlying the conflict, and the cultural value component is strong.

2.4. Study Design and Data Analysis

To secure a statistically sound analysis we adhered to Webler et al. (2009) who recommend that the ratio of the P-set to the Q-set should not exceed 2/3. We interviewed 26 informants selected from the eight key stakeholder groups, with 2–4 informants from each.[4] We conducted the interviews in person between May and July 2013. First, we asked informants to sort the 40 Q statements according to how well they

represented their own thoughts within a pyramid-shaped matrix (i.e. perform a Q sort; ordering of statements). The matrix conformed to a quasi-normal distribution and a scale running from disagree most (−5) to agree most (+5). Informants had to accommodate all 40 Q statement cards within the matrix. Thus, informants had to weight all statements relative to each other, according to their own opinions. After the sorting exercise, informants were encouraged to explain their reasons, thus revealing their subjective opinions on these topics. This information was later qualitatively analysed and combined with a quantitative Q sort analysis to describe the range of extant opinions (narratives).[5]

To analyse the Q sort data from the interviews we used the PQmethod software.[6] This software allows for two alternative methods of analysis, either through a principal components analysis (PCA) or a centroid factor analysis (CENT). We performed a PCA since this option considers both commonality and specificity among Q sorts (Webler et al., 2009). We rotated the factors using the Varimax algorithm and an automatic flagging of sorts, to minimise subjective interference in the analysis. After the quantitative Q sort analysis was completed, we combined the statistical analyses with the follow-up discussions to explore the interpretability of narratives across possible solutions (e.g. for two, three, four, and five factors). Thus, we found that three factors worked best to coherently describe as much as possible of the variation in opinions across the Q sorts. During the subsequent description of narratives, we combined the statistical analysis with the qualitative data through a constant comparison. At this stage, we went back to correct for the flagging of Q sort 8,[7] which was highly associated both with factors 1 and 3, placing it within narrative 3 where it fit best. Once verified, we compared the narratives to identify more important value arguments (i.e. arguments that attracted stronger agreements/disagreements) within each narrative as well as similarities and differences among narratives. To complete the narrative analysis and to uncover patterns in affiliations among stakeholders we explored the assemblages of different key stakeholders that grouped into the different narratives.

3. Results and Analysis

3.1. Statements, Ecosystem Services and Main Narratives

Based on the 40 Q statements in Table 1, three narratives emerged from the Q analysis. We typified these as N1 "Intrinsic", N2 "Cultural", and N3 "Utilitarian". Together they explained 64% of the total variance among the 25 Q sorts and comprised the opinions of 23 individuals. Two individuals did not agree with any narrative. There was relatively low correlation between narratives N1 and N2 (0.0155), and between N1 and N3 (−0.1697), indicating that they were distinctly different. The correlation between narratives N2 and N3 was higher (0.6295). Table 2 summarises, in brief, the main value and policy orientations of the three narratives. Whereas the policy orientations of the three narratives reflect the stakeholders' views as expressed though the Q-sorts (c.f. narratives), the value orientation for each of the narratives was derived from examining the associations between the rankings of Q-statements within each narrative (Fig. 1) and the ES that these statements represented (c.f. Table 1). Whereas N1 emphasises intrinsic or existence values connected with the cultural service of carnivore conservation, N2 is more focused on the cultural heritage values related to continued sheep grazing practices and food production. Finally, N3 advocates a more extractive use/utilitarian value perspective.

---

[4] From the 26 interviews, one Q sort was removed as the informant decided to withdraw from the study, thus 25 Q sorts were included in the analysis.

[5] The informants were thereafter contacted again, through email, and given the opportunity to comment on the resulting narratives. Their feedback was subsequently considered for the final presentation of the narratives.

[6] Freely available from: http://schmolck.userweb.mwn.de/qmethod/index.htm.

[7] The stakeholder verified this during the feedback stage. Appendix A shows the defining sorts for factors 1, 2, and 3.
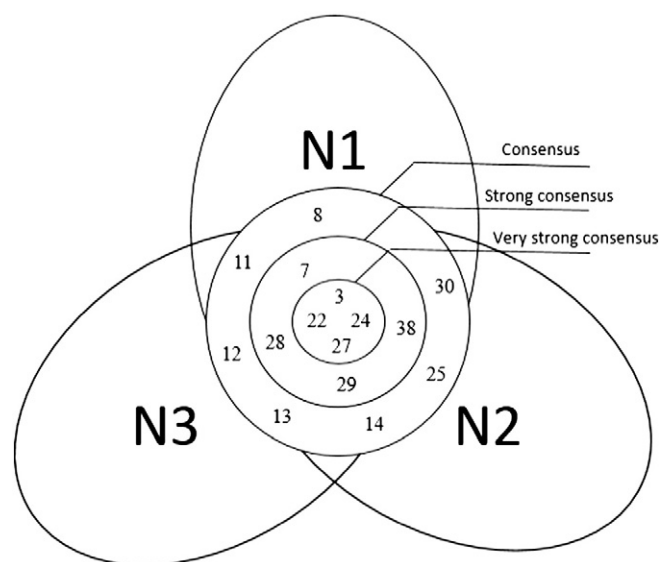
Table 2
Summary of value and policy orientations among the three narratives identified in south-eastern Norway in 2013.
Source: adapted from Davies and Hodge (2012).

Narrative groups	Value orientation	Policy orientation
Intrinsic (N1)	Intrinsic/existence values, carnivore focused (Humans as a disturbance in nature)	Favour increased carnivore populations with larger distributions and strict nature conservation, i.e. limited human influence
Cultural (N2)	Focus on cultural heritage values associated with cultural landscapes and food security (humans as ecosystem engineers)	Favour strict limitations on carnivore distribution to separate sheep and carnivores, with farms inside carnivore zones being bought out and strict control of carnivores outside their zones
Utilitarian (N3)	Utilitarian values/extractive use focused (humans as stewards)	Favour status quo except for wolves, i.e. stay at existing population targets for lynx and bear, and highly managed populations for moose and roe deer (hunted species).

Fig. 2. Venn diagram showing the 15 Q statements, for which there was agreement (consensus) across the narratives N1 Intrinsic, N2 Cultural, and N3 Utilitarian. The 15 Q statements are represented by their statement numbers (Table 1). The Q statements for which the agreement across narratives was significant (i.e. "non-significant difference") are labelled "Strong consensus" for $p < .01$, and "Very strong consensus" for $p < .05$.

Fig. 1 represents the idealised Q sorts, i.e. the orderings of the 40 value statements (represented by the respective statement numbers 1–40, Table 1) as they would appear for persons who fully agree with narratives N1, N2 or N3. Negative Q sort values (Q-SV) indicate disagreement with value statements and positive Q-SV indicate agreement with value statements. The stronger the agreement or disagreement with a particular statement, the more important the value statements was to the particular stakeholder group. In total, 25 Q statements were relatively more important within one, or more, of the three narratives (i.e. Q statements with Q-SV of −5, −4, +4, or +5, Fig. 1). Across narratives, stakeholders disagreed on 16 of the 25 relatively more important Q statements while they agreed on nine of the relatively more important Q statements. The Venn diagram in Fig. 2 shows that the

three stakeholder groups, to a varying degree, agreed on totally 15 of the 40 Q statements (c.f. Table A in Appendix A). Although six of these consensus statements were not first priority within any narrative (Figs. 1, 2) they still provide common ground across narratives. Figs. 1 and 2 hence illustrate that the stakeholder groups agreed on some issues, potentially providing a solid basis for conflict resolution with regard to incompatible issues across stakeholder groups.

We now provide a more detailed analysis of the narratives. Numbers in square brackets refer to the specific Q statements (Table 1). Direct citations from the interviews are within quotation marks.

3.2. Intrinsic Narrative

Narrative N1 favoured carnivore conservation, focused on intrinsic or existence values, and comprised the opinions of nine people coming from organisations that worked with animal welfare and nature conservation, tourism, or nature and carnivore management. More important Q statements within N1 (i.e. Q statements with Q-SV of −5, −4, +4, or +5) were mostly associated with pest control, existence, and bequest services (Fig. 1; Table 1). Thus, the right of bears, wolves and lynx to live in Norwegian nature [5] and "their intrinsic values" were fundamental and these stakeholders favoured increased carnivore populations [18] with larger distributions and strict nature conservation.

The stakeholders behind N1 felt that eradicating free-living, large carnivores would deprive all future generations of the opportunity to experience these animals in nature [14], i.e. clear reference to existence and bequest value. Norway's commitment to numerous international agreements [6] was considered important: "to achieve improvements, all countries must take their part of the responsibility and Norway cannot sneak away."

In general, stakeholders behind N1 did not regard hunting (especially moose) as important for cultural heritage [35]. Instead, they valued large carnivores for the maintenance and regulatory services they provide. Thus, lynx were considered as ecologically important for controlling the roe deer populations [21] and stakeholders strongly opposed keeping the lynx population low to reduce the competition with hunters [25] or reducing roe deer because they were a problem for gardeners [7]. Similarly, stakeholders did not consider wolves as

				Q sort values (Q-SV)						
-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
				N1 Intrinsic						
25	**7^**	4	9	19	**24^^**	23	**38^**	21	15	18
26	34	17	**13**	**8**	10	40	**29^**	33	**14**	5
32	37	20	31	16	**22^^**	1	**30**	**3^^**	**11**	6
			12	**28^**	35	**27^^**	39			
					2					
					36					
				N2 Cultural						
13	**25**	15	8	10	**14**	6	9	19	**5**	4
7^	33	21	23	**22^^**	**28^**	16	**38^**	**27^**	**29^**	17
18	**12**	36	**24^^**	37	34	26	40	35	**30**	31
			1	20	39	**3^^**	**11**			
					2					
					32					
				N3 Utilitarian						
8	**7^**	21	**13**	**25**	9	19	**27^^**	**38^**	4	35
15	39	23	**24^^**	26	40	**5**	**29^**	10	34	2
18	36	6	1	**28^**	17	**14**	**3^^**	16	**11**	32
			12	33	**30**	**22^^**	20			
					31					
					37					

Fig. 1. Relative importance and sorting of the 40 Q statements for narratives N1 Intrinsic, N2 Cultural, and N3 Utilitarian. The 40 Q statements are represented by their respective statement numbers, 1–40 (Table 1). The 12 most important value statements within each narrative (Q-SV of −5, −4, +4, or +5), are highlighted in grey. There was agreement across narratives on 15 Q statements, marked in bold. Q statements for which the agreement across narratives was significant (i.e. "non-significant difference") are marked ^ for $p < .01$, and ^^ for $p < .05$.

more burdensome than valuable to society [32], but as central for restoring the ecological balance [15]. They did not think that a larger wolf population would have large negative consequences for moose hunting [34]. In particular, stakeholders were sceptical that increased bear hunting would lead to greater safety for people and domestic animals that lived in areas with carnivores [37]. On the contrary, increased bear hunting "could lead to more wounded bears" and associated "risky encounters". Furthermore, "the bear density in Norway is low" and "mostly it is about transient animals" so allowing for "more hunting might not really help".

Although "it could be discussed what is natural", and they realised that "many people probably would experience sheep as a natural element in Norwegian nature", the stakeholders behind N1 opposed the idea that sheep provided important cultural (heritage) services [4]. Instead they argued that sheep husbandry practices "had changed over time", and that "Norwegian sheep keeping had never been more intense than during the last 60 years". They did not think it important to facilitate traditional sheep grazing to enable future generations to experience sheep farming [17]. Instead, they requested both more reflection about sheep keeping practices, which they viewed as problematic [33], and they reflected over the "loaded label" of traditional practices. "I believe this has to do with something that isn't discussed much at all, namely whether or not it is OK to let sheep loose in the wildlands [with little supervision or protection]", one informant said.

Contrary to the other narratives, the stakeholders behind N1 did not think, "predators were the problem". Disagreeing that sheep farming, and viable carnivore populations could not coexist [20], they strongly opposed the idea that wolf and bear conservation was a threat to traditional farming and a living countryside, i.e. the cultural heritage aspect strongly associated with the provisioning service of farming under N2 [26]. "Mostly there are economic reasons for people to quit sheep farming but, for many, the depredation by large carnivores is the last straw. I believe that the sheep farmers need to change their husbandry, for which they get much too little help or support." Thus, "carnivore conservation per se" was not considered a threat, but "bad sheep husbandry" was, and the "wider society" was considered "obliged to care for the local society and farmers".

3.3. Cultural Narrative

Narrative N2 (cultural) focused on cultural landscape values and food security, i.e. the cultural and provisioning aspects of traditional farming are closely related within this group. The seven stakeholders that fell within this narrative came from organisations that worked with farmers, tourism, and nature and carnivore management. The more important statements within narrative N2 (Fig. 1; Table 1) were mostly associated with pest control, symbolic, physical use of land-/seascapes in different environmental settings, and cultural heritage services. The stakeholders behind narrative N2 viewed humans as ecosystem engineers and favoured strict carnivore or sheep grazing zones. They also wanted compensation for sheep farmers who must abandon their livelihood because of the strict carnivore zone-policy, as well as to give permission to sheep farmers within carnivore-free zones to kill carnivores that entered those zones.

To the stakeholders behind N2, sheep had long been a natural element in Norwegian wildlands [4]. They saw today's sheep farming practices as an important cultural service, which was "crucial for keeping the cultural landscapes [grazing dependent] open" and important for hundreds of species that "depend on grazing animals" as well keeping the treeline below its climatic limit [31]. Thus, they considered it important to facilitate traditional sheep grazing [17] "with regard to future generations and the cultural landscapes" although "some interventions or changes [might be needed]". Stakeholders behind N2 did not think that traditional sheep farming incurred larger costs than benefits for the wider society [13]. Instead, many talked about the significance of provisioning services, the "importance of food security" and of how

"letting sheep graze in the wildlands [was] a good way of producing food". Because, even if many sheep were lost while grazing in the wildlands, unrelated to carnivores, this was acceptable [33] since "part of all populations […] die through the course of a season/a year […] from sickness, accidents, drowning, etc. […]. However, losses caused by bad husbandry and bad animal welfare are not acceptable".

While statement [27] (about conflicting political priorities and political signals) was difficult to accommodate within the CICES framework, "the political targets" [for the size and distribution of carnivore populations] was an issue of great concern and frustration within N2, which "no doubt creates conflicts." "Politicians want livestock in all of Norway and lynx, bear and wolves in some areas. It is cowardly of them to say 'Yes please, we want both'. They should have learned and said that 'in those areas where we should have carnivores, sheep farming will not be continued' and remove the subsidies for meat production." Furthermore, current carnivore policy has left room for diverse interpretations, which has led to "tensions between sheep farming and carnivore managers and different management practices in different counties. […] It is demanding for us that work with management to interpret the carnivore policy […and] this creates frustration both for managers, sheep farmers, and those that work for animal welfare." Thus, the people behind N2 demanded clearer policies and greater political decisiveness.

Yet, they thought that the population target for lynx was "large enough" and that the population targets for wolf and bear were an "acceptable compromise" since Norway would have to cooperate with Sweden to successfully secure viable wolf-, and bear populations in the long term [18]. Stakeholders also agreed that people should tolerate bear, wolf and lynx [5] and that knowledge about wolves, bears and lynx would give people security and make them more likely to avoid unwanted encounters with large carnivores, or to encounter them if desired [30]. Most stakeholders appreciated the experiential value of large carnivores and thought that it would be a positive experience for life to see a wild bear in nature [11] even if it obviously would depend on the nature of the encounter.

Under N2 moose hunting was viewed as an important constituent of cultural heritage [35]. Whereas stakeholders agreed that moose caused many traffic collisions [29], they disagreed that moose management was too intensive [12] and advocated increased and reformed hunting quotas to reduce moose numbers. They disagreed with keeping lynx populations low to favour roe deer hunters [25] or gardeners [7]. They did not see roe deer as a pest.

3.4. Utilitarian Narrative

Narrative N3 focused on utilitarian values and extractive uses of the Norwegian wildlands. The seven stakeholders that fell within the utilitarian narrative worked within organisations for hunters, political reform regarding carnivore management, or forest owners. The N3 stakeholders viewed humans as stewards of nature and they favoured the present population targets for lynx and bear, and the present closely managed populations for moose and roe deer. They did not favour Norwegian wolf populations. The more important statements within narrative N3 (Fig. 1; Table 1) were mostly associated with pest control, education, physical use of land-/seascapes in different environmental settings, and cultural services.

Hunting was considered as both an important (positive) cultural and provisioning service. Also for this group, the two ES were closely intertwined. "Regardless of what you hunt, hunting is a positive experience. It is incredibly social…" Thus, the stakeholders valued roe deer hunting for the many positive experiences that it provided [2]. They also showed a keen interest in moose hunting, which was economically important to some Norwegian landowners [16] and important for cultural heritage [35] and Norwegian rural life.

Despite their enthusiasm for hunting stakeholders thought "We should not open up for roe deer hunting because of some gardeners".

In fact, they thought that many gardeners actually experienced roe deer positively [7]. In addition to the cultural services of observing roe deer, roe deer were considered an important prey for carnivores, i.e. providing maintenance services [38], in particular for lynx. Although lynx were understood to kill healthy roe deer [8], stakeholders disagreed that lynx were ecologically important for roe deer population control [21] since "climate has more to say for how the roe deer populations fluctuate" than lynx. Similarly, wolves were not deemed central for restoring the ecological balance [15]. Instead, stakeholders saw wolves as a disservice provider, a burden to society [32], a competitor for provisioning services, and a threat to hunting dogs and cultural services associated with hunting. They thought that a larger wolf population would have large negative consequences for moose hunting [34]. They disagreed that wolves could improve human development towards a better understanding of nature, self-understanding, or an increased quality of life [36]. Instead, one stakeholder noted, "The wolf issue easily becomes very stigmatising and is easily used to categorise people. [Therefore] it probably doesn't contribute so much to a more holistic understanding of nature."

In general, the stakeholders agreed with the population targets for lynx, wolves and bears, which they deemed sufficient to secure viable populations in the long term [18]. However, they wanted "to establish population target[s] for the Nordic countries". Moreover, most of the stakeholders thought that it would have been a positive life experience to see a wild, Norwegian bear [11]. "For us hunters, who many perceive of as being anti-carnivores, it would be an even greater experience to see a wild bear. I see nothing contradictory in the fact that some people can be against the carnivore policies and still have a positive experience from seeing large carnivores", one of them said. However, the origin of the wolf was highly problematic (Linnell et al., 2005a). Because "the wolf is of Russian/Finnish origin and at the edge of its range", the stakeholders disagreed that Norway had "an obligation to conserve wolves" [6].

Another issue that was touched upon was social responsibility. The general feeling was that illegal hunting existed but was not a threat to the population targets in general [39]. "The great threat is that people do not respect the laws but take liberties, which degrades social morals. When large carnivores become symbols of hegemony the alarm should sound. We have plenty of biologists but we lack psychologists. Illegal hunting is a threat to the management but not for the population's development." To N3, sheep were a natural element in Norwegian wildlands and a cultural service provider [4].

3.5. Overlap Across Narratives (Fig. 2)

Across narratives, the stakeholders agreed that it was positive to know that lynx existed in Norwegian forests. Many stakeholders also expressed a wish to encounter lynx, or spoke enthusiastically about encounters that they had experienced. Stakeholders agreed that while the chance of bear attacks was low, the risk should not be ignored. Similarly, stakeholders agreed that bears could not be held responsible for killing more sheep than they eat, or for killing sheep in a brutal way because "nature in general is brutal" and the "bears are not at fault". Rather some stakeholders would hold policy responsible for livestock losses due to carnivore depredation (e.g. due to an ineffective zoning policy c.f. N2). Indeed, stakeholders regarded the policy as inconsistent and wished for clearer directives and more resolute decision-making. Hence, all parties considered clarifying policy directives and making them more predictable, beneficial (even if some would disagree with the policy itself).

Stakeholders did not believe that large roe deer populations increased the risks of contracting tick-borne diseases. They agreed not to diminish roe deer populations because these were a pest to many gardeners and agreed that roe deer were an important prey, in particular for the lynx. The stakeholders furthermore agreed that the large moose population caused many traffic collisions, and high personal

and material damages. Hence, moose and roe deer management is an area where ES trade-offs do not cause critical discord among the stakeholders.

4. Discussion and Conclusions

The conflict over the Norwegian wildlife management is deep-rooted. Knowing the areas of agreement and disagreement between the values (and not just the monetary values) of different stakeholder groups may be important for the development of acceptable management policies and for successful implementation of these policies (Raymond et al., 2013). Therefore, we used Q methodology to explore how key stakeholders' values, associated with ES and biodiversity within the Norwegian wildlife management debate, differed and converged. From the stakeholder responses, it became clear that the three groups associated with the main narratives N1 ("Intrinsic"), N2 ("Cultural"), and N3 ("Utilitarian") favoured different management regimes and resulting wildland types, providing different services. The stakeholder views on the roles of humans in these landscapes differed. Within N1, humans were a disturbance that negatively affected the wilderness, its intrinsic value and the cultural services associated with wilderness conservation. On the other hand, within N2 and N3, human influence was positive and necessary. Within N2, humans were ecosystem engineers that have evolved together with the landscapes that they shape, thus creating niches and habitats that promote higher biodiversity, and cultural and provisioning ES, especially as represented by traditional sheep husbandry and life styles. Within N3, humans were stewards that provided the necessary management of wildlife populations, through hunting, to secure the delivery of utilitarian and provisioning ES. The stakeholders' views on appropriate management policy thus differed accordingly. Notably stakeholders disagreed on the issues that related to wolf and sheep management. Yet they agreed that today's policy regarding wolf and sheep management practices were unsatisfactory. They also agreed that government wavering is negative, i.e. a clearer direction and spatial prioritisation is better than muddling through to try to please everyone.

Whereas previous sociological research has identified the symbolism attached to the wolf by various stakeholders (Skogen et al., 2006), our study indicates that sheep, and especially sheep husbandry, may also be emerging as a highly symbolic issue. From the way people explained their choices it was clear from the application of the Q method that many statements, even those that primarily were about provisioning services (for example traditional farming), were seen to have an important cultural service component, especially related to heritage and tradition. Hence, it is not easy to categorise and delineate ES categories, and associated monetary and non-monetary values, in practice in a resource conflict like this. In addition, some ES (especially associated with wolves and sheep) were clearly considered a positive service to some and a negative service (disservice) to others. In contrast, issues related to the management of large ungulates and even lynx management did not appear to be associated with critical disagreements. This indicates that there are areas of agreement between the diverse stakeholders where it should be possible to find room for engagement as a precursor to moving onto more complex and divisive issues. Applying the Q method can provide a more in-depth understanding of the resource conflict and the diversity of arguments and values underlying the ES and biodiversity management problem. In addition, it can, as we have attempted to demonstrate, provide a better basis for sorting out which services and values are in (strong) conflict, and where trade-offs are critical and difficult to navigate in designing polices. In such cases, standard economic policies that for example rely on compensation or incentives may not work because they do not address the underlying, deep-rooted value conflicts and equity issues (Madden and McQuinn, 2014; Pascual et al., 2010). Furthermore, areas of common ground or relatively less disagreement may be identified, were service trade-offs are either non-existent or possibly less important (than

perceived a priori) to stakeholders. Such areas may be more suitable for monetary instruments.

Although the Q method may be useful to analyse ES and biodiversity conservation it does not, by design, allow for generalisations within larger populations. However, if the arguments in the debate are well covered and represented, as we think we achieved, the Q method will provide a good overview of the range of narratives within the debate. In our study, we could possibly have tried to cover additional stakeholder groups (e.g. researchers, tourism professionals) and arguments, additionally, followed up the Q analysis with more questions to understand the sources of disagreements in depth. However, it is always a consideration where to draw the line in terms of scope and depth. Through a thorough preparation phase, we believe we managed to cover the most important issues in the Q analysis. To explore further how to bridge the gaps between the stakeholders' positions identified in this study, it may be useful to draw on interesting parallels to conflict avoidance practices in the USA and other European countries where carnivores are returning. In conclusion, given the inherent complexity of socio-ecological systems such as this, it is useful to draw from a diverse toolbox of methods, including applications of the Q method for ES analysis, to move towards better ES management outcomes.

Appendix A

Table A

Q statements organised in accordance with CICES. Narrative Q-sort values (Q-SV), z-scores, distinguishing statements and consensus (agreement) are shown for the three narratives. The Q-SV and z-scores describe the statements' relative importance within the narratives. Q-SV run from "disagree most" (−5) to "agree most" (5). Z-scores have standardised mean and standard deviation values and allow for direct comparisons of scores for the same statements across narratives. More important topics within the narratives are indicated by higher or lower Q-SV and z-scores. Distinguishing statements, unique views, are indicated next to the particular z-scores for each of the narratives. Topics for which there were high levels of agreement among the narratives are shown in the right most column; agreement (non- significant differences).

Main category of ES	Main types of output or process	Statement #	Narrative Q-sort values and z-scores						Agreement
			N1		N2		N3		
Provisioning	Nutrition	9	−2	−0.859**	2	0.735**	0	−0.098**	
		13	−2	−0.517	−5	−2.100**	−2	−0.877	
		26	−5	−1.613**	1	0.349	−1	−0.150	
		28	−1	−0.169	0	0.303	−1	−0.180	^^
		33	3	1.081**	−4	−1.472**	−1	−0.200**	
		19	−1	−0.237**	3	0.907	1	0.549	
	Materials	40	1	0.449	2	0.783	0	−0.065*	
Regulation/maintenance	Maintenance of physical, chemical, biological conditions	7	−4	−1.511	−5	−1.538	−4	−1.460	^^
		8	−1	−0.418	−2	−0.833	−5	−1.558**	
		15	4	1.107**	−3	−1.269**	−5	−2.090**	
		18	5	1.673**	−5	−1.691	−5	−1.591	
		20	−3	−1.130**	−1	−0.219**	2	0.727**	
		21	3	0.818**	−3	−0.912	−3	−0.993	
		23	1	0.358**	−2	−0.562**	−3	−1.381**	
		25	−5	−1.740	−4	−1.336	−1	−0.220**	
		38	2	0.731	2	0.509	3	0.864	^^
		24	0	−0.025	−2	−0.634	−2	−0.347	^
Cultural	Physical and intellectual interactions	1	1	0.475**	−2	−0.399	−2	−0.677	
		11	4	1.351	2	0.607**	4	1.347	
		22	0	0.264	−1	−0.096	1	0.482	^
		29	2	0.714	4	1.095	2	0.746	^^
		30	2	0.699	4	1.108	0	0.217	
		37	−4	−1.432	−1	−0.155	0	0.256	
		2	0	0.037	0	−0.064	5	1.486**	
		16	−1	−0.096*	1	0.400	3	0.829	
		34	−4	−1.563**	0	0.156**	4	1.012**	
		6	5	1.672**	1	0.458**	−3	−1.209**	
		14	4	1.214**	0	0.270	1	0.569	
		17	−3	−1.005**	5	1.641**	0	0.248**	
		4	−3	−0.927**	5	1.425	4	1.193	
		31	−2	−0.713**	5	2.061**	0	0.387**	
		35	0	−0.004**	3	0.941	5	1.432	
		36	0	0.189**	−3	−1.263	−4	−1.427	
	Spiritual, symbolic and other interactions	3	3	0.905	1	0.399	2	0.687	^
		5	5	1.569*	4	0.969	1	0.676	
		32	−5	−1.837**	0	−0.051**	5	1.454**	
		12	−2	−0.567	−4	−1.447	−2	−0.976	
Other		10	0	0.036	−1	−0.158	3	0.957**	
		27	1	0.412	3	0.959	2	0.768	^
		39	2	0.606	0	0.125	−4	−1.387**	

Notes: Asterisks indicate distinguishing statements for narratives: * indicates statements that were significantly different at p < .05, and ** indicates statements that were significantly different at p < .01. Circumflexes indicate agreement among the narratives: ^ indicates statements for which there was non-significant difference at p < .01, and ^^ indicates statements for which there was non-significant difference at p < .05.

References

Addams, H., Proops, J., 2000. Social discourse and environmental policy: an application of Q methodology. Edward Elgar, Cheltenham.

Baker, R., et al., 2006. Q methodology in health economics. J. Health Serv. Res. Policy 11, 38–45.

Barrena, J., Nahuelhual, L., Baez, A., Schiappacasse, I., Cerda, C., 2014. Valuing cultural ecosystem services: agricultural heritage in Chiloé island, southern Chile. Ecosyst. Serv. 7, 66–75.

Barry, J., Proops, J., 1999. Seeking sustainability discourses with Q methodology. Ecol. Econ. 28, 337–345.

Bohara, A.K., Kerkvliet, J., Berrens, R.P., 2001. Addressing negative willingness to pay in dichotomous choice contingent valuation. Environ. Resour. Econ. 20, 173–195.

Bostedt, G., 1999. Threatened species as public goods and public bads — an application to wild predators in Sweden. Environ. Resour. Econ. 13, 59–73.

Brown, S., 1980. Political Subjectivity: Applications of Q Methodology in Political Science. Yale University Press.

Chamberlain, E.C., Rutherford, M.B., Gibeau, M.L., 2012. Human perspectives and conservation of grizzly bears in Banff National Park, Canada. Conserv. Biol. 26, 420–431.

Chan, K.M.A., Guerry, A.D., Balvanera, P., Klain, S., Satterfield, T., Basurto, X., Bostrom, A., Chuenpagdee, R., Gould, R., Halpern, B.S., Hannahs, N., Levine, J., Norton, B., Ruckelshaus, M., Russell, R., Tam, J., Woodside, U., 2012. Where are cultural and social in ecosystem services? A framework for constructive engagement. Bioscience 62, 744–756.

Cuppen, E., Breukers, S., Hisschemoller, M., Bergsma, E., 2010. Q methodology to select participants for a stakeholder dialogue on energy options from biomass in the Netherlands. Ecol. Econ. 69, 579–591.

Curry, R., Barry, J., McClenaghan, A., 2013. Northern visions? Applying Q methodology to understand stakeholder views on the environmental and resource dimensions of sustainability. J. Environ. Plan. Manag. 56, 624–649.

Daniel, T.C., Muhar, A., Arnberger, A., Aznar, O., Boyd, J.W., Chan, K.M.A., Costanza, R., Elmqvist, T., Flint, C.G., Gobster, P.H., Gret-Regamey, A., Lave, R., Muhar, S., Penker, M., Ribe, R.G., Schauppenlehner, T., Sikor, T., Soloviy, I., Spierenburg, M., Taczanowska, K., Tam, J., von der Dunk, A., 2012. Contributions of cultural services to the ecosystem services agenda. Proc. Natl. Acad. Sci. U. S. A. 109, 8812–8819.

Davies, B.B., Hodge, I.D., 2007. Exploring environmental perspectives in lowland agriculture: a Q methodology study in East Anglia, UK. Ecol. Econ. 61, 323–333.

Davies, B., Hodge, I.D., 2012. Shifting environmental perspectives in agriculture: repeated Q analysis and the stability of preference structures. Ecol. Econ. 83, 51–57.

Frame, B., O'Connor, M., 2011. Integrating valuation and deliberation: the purposes of sustainability assessment. Environ. Sci. Pol. 14, 1–10.

Iniesta-Arandia, I., GArcia-Llorente, M., Aguilera, P.A., Monte, C., Martin-Lopez, B., 2014. Socio-cultural valuation of ecosystem services: uncovering the links between values, drivers of change and human well-being. Ecol. Econ. 108, 36–48.

Kaczensky, P., 1999. Large carnivore depredation on livestock in Europe. Ursus 11, 59–72.

Kjøstvedt, J.H., Mysterud, A., Østbye, E., 1998. Roe deer Capreolus capreolus use of agricultural crops during winter in the Lier valley, Norway. Wildl. Biol. 4, 23–31.

Kumar, P., 2010. The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations. Earthscan.

Linnell, J.D.C., Brøseth, H., Solberg, E.J., Brainerd, S., 2005a. The origins of the southern Scandinavian wolf Canis lupus population: potential for natural immigration in relation to dispersal distances, geography and Baltic ice. Wildl. Biol. 11, 383–391.

Linnell, J.D.C., Nilsen, E.B., Lande, U.S., Herfindal, I., Odden, J., Skogen, K., Andersen, R., Breitenmoser, U., 2005b. Zoning as a means of mitigating conflicts with large carnivores: principles and reality. In: Woodroffe, R., Thirgood, S., Rabinowitz, A. (Eds.), People & Wildlife: Conflict or Co-existence. Cambridge University Press, Cambridge, pp. 163–174.

Linnell, J.D.C., Broseth, H., Odden, J., Nilsen, E.B., 2010. Sustainably harvesting a large carnivore? Development of Eurasian lynx populations in Norway during 160 years of shifting policy. Environ. Manag. 45, 1142–1154.

Madden, F., McQuinn, B., 2014. Conservation's blind spot: the case for conflict transformation in wildlife conservation. Biol. Conserv. 178, 97–106.

Martin-Lopez, B., Gomez-Baggethun, E., Garcia-Llorente, M., Montes, C., 2014. Trade-offs across value-domains in ecosystem services assessment. Ecol. Indic. 37, 220–228.

Mattson, D.J., Byrd, K.L., Rutherford, M.B., Brown, S.R., Clark, T.W., 2006. Finding common ground in large carnivore conservation: mapping contending perspectives. Environ. Sci. Pol. 9, 392–405.

Melis, C., Basille, M., Herfindal, I., Linnell, J.D.C., Odden, J., Gaillard, J.-M., Høgda, K., Andersen, R., 2010. Roe deer population growth and lynx predation along a gradient of environmental productivity and climate in Norway. Ecoscience 17, 166–174.

Millennium Ecosystem Assessment, 2005. Synthesis Report. Island Press, Washington DC.

Olaussen, J.O., Skonhoft, A., 2011. A cost-benefit analysis of moose harvesting in Scandinavia: a stage structured modelling approach. Resour. Energy Econ. 33, 589–611.

Pascual, U., Muradian, R., Rodriguez, L.C., Duraiappah, A., 2010. Exploring the links between equity and efficiency in payments for environmental services: a conceptual approach. Ecol. Econ. 69, 1237–1244.

Rastogi, A., Hickey, G.M., Badola, R., Hussain, S.A., 2013. Diverging viewpoints on tiger conservation: a Q-method study and survey of conservation professionals in India. Biol. Conserv. 161, 182–192.

Raymond, C.M., Singh, G.G., Benessaiah, K., Bernhardt, J.R., Levine, J., Nelson, H., Turner, N.J., Norton, B., Tam, J., Chan, K.M.A., 2013. Ecosystem services and beyond: using multiple metaphors to understand human–environment relationships. Bioscience 63, 536–546.

Skogen, K., Krange, O., 2003. A wolf at the gate: the anti-carnivore alliance and the symbolic construction of community. Sociol. Rural. 43, 309–325.

Skogen, K., Mauz, I., Krange, O., 2006. Wolves and eco-power. a French–Norwegian analysis of the narratives of the return of large carnivores. J. Alp. Res. 94, 78–87.

Spash, C.L., 2013. The shallow or the deep ecological economics movement? Ecol. Econ. 93, 351–362.

Swedeen, P., 2006. Post-normal science in practice: a Q study of the potential for sustainable forestry in Washington State, USA. Ecol. Econ. 57, 190–208.

TEEB, 2010. The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature:. A synthesis of the approach, conclusions and recommendations of TEEB.

Walton, M.L., 2013. A case study investigating the influence of deliberative discussion on environmental preferences. Soc. Nat. Resour. 26, 303–324.

Webler, T., Danielson, S., Tuler, S., 2009. Using Q method to reveal social perspectives in environmental research.