

Caught between personal and collective values: biodiversity conservation in European decision-making

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Keywords: value; dissonance; decision-making; biodiversity conservation; ecosystem services; Q-methodology

Abstract

Individual decision-makers at different governance levels operate in social contexts, which means that they sometimes need to compromise their personal values. Yet, this dissonance is rarely the direct target of empirical analyses of environmental decision-making. We undertake a Q-analysis of decision-makers' personal perspectives and the perspectives they perceive to dominate in their decision-making contexts. Our empirical analysis addresses biodiversity conservation, which has traditionally been justified with intrinsic value and science-based arguments. The arguments have recently been broadened with the concept of ecosystem services, highlighting human benefits and values. This evolving context is interesting because of the new rise of anthropocentric values, which can lead to decision-makers experiencing dissonance. Our analysis of interviews with 43 biodiversity conservation decision-makers from nine European countries reveals four personally held perspectives that highlight different, yet partly overlapping, values: Intrinsic, Human benefit, Conservation and Connection, as well as three perspectives perceived to dominate in decision-making: Utilitarian, Insurance and Knowledge values. The comparison of personally held and perceived dominant perspectives points to one major conflict: those decision-makers who personally associate with intrinsic values and perceive utilitarian values to dominate in decision-making experience dissonance. On the other hand, personally held human benefit values are accommodated well in decision-making contexts and decision-makers who perceive insurance values to dominate experience the least conflict with personally held values. These findings demonstrate the potential of arguments stressing long-term benefits for easing tension and conflicts in conservation decision-making, and the usefulness of empirically testing of the coincidence of individual and social values.

Keywords: value; dissonance; decision-making; biodiversity conservation; ecosystem services; Q-methodology; policy

1. Introduction

Environmental decision-making portrays both individual and social rationalities that in some cases might be in conflict (Vatn, 2005; Kinzig et al., 2013). Indeed, decision-makers at different governance levels encounter collective views in their operational and social contexts. These collective views might influence individual decision-makers so that they could end up compromising their personally held values. This dissonance has rarely been the direct target of empirical analyses of environmental decision-making, as the focus has been on either individual preferences or socio-political processes.

The potential for dissonance in environmental decision-making is particularly high in settings where new framings and goals are integrated to pre-existing policy agenda, as has happened for example when biodiversity conservation has been integrated with sustainable use (Primmer and Karppinen, 2010) or when a holistic ecosystem approach has been introduced to conservation projects (Waylen et al., 2015). Biodiversity conservation decision-making has recently been challenged with yet a new framing, in which human benefits and values are used as new central justifications for conservation. This framing has embraced the concept of ecosystem services (MEA, 2005; De Groot et al., 2002; Potschin and Haines-Young, 2011; Martín-López et al., 2014).

For decades, biodiversity conservation policies have been driven by arguments on species' right to exist and the intrinsic value of all living forms (Mace, 2014). Other arguments have appealed to symbolic and sacred values, as well as to the role of biodiversity in maintaining essential ecological functions or in producing food, fibres or medicines (Montgomery, 2002; Mace, 2014). These arguments are increasingly supplemented by the new ecosystem service arguments, building on an intensive inter-disciplinary effort to generate new scientific knowledge about ecosystem functions, interdependencies, benefits and values, which are sometimes framed as anthropocentric (Chaudhary et al., 2015).

The ecosystem service concept is promoted with an idea that decision-making and governance systems will be able to absorb and apply the accumulating knowledge on ecosystem services and their values, to secure sustainable provision of ecosystem services (De Groot et al., 2010; Potschin and Haines-Young, 2011). This assumption has been challenged on the grounds that decision-making already applies a legacy of ecosystem and ecosystem service knowledge, and continuously defines and debates values in every-day decision-making situations (Primmer et al., 2015). Indeed, different analytical approaches using value knowledge address ecosystem complexity and goals in diverging ways (Norgaard, 2010), and knowledge supporting decision-making rests on assumptions that tie with the decision-makers' goals (Bateman et al., 2013). Knowledge and value articulation are not neutral (Vatn, 2005; Gómez-Baggethun et al., 2010). The different value dimensions identified in empirical research demonstrate that there are distinct, even conflicting, ways in which biodiversity and ecosystem services can be framed and knowledge about them applied in decision-making (Martín-López et al., 2014; Fisher and Brown, 2014; Kenter et al., 2015; Chan et al., 2016). These analyses focusing on value dimensions have not, however, considered the ways in which the personally supported value dimensions and rationalities might differ from those dominating in collective decision-making.

Despite the increasingly solid knowledge base and robust arguments, biodiversity conservation decision-making has been shown to not rely on the new information on ecosystem services in a systematic fashion (Cook et al., 2012; Primmer and Furman, 2012; Bryan and Plant, 2013; Hauck et al., 2013; Albert et al., 2014; Rinne and Primmer, 2015). These observations are in line with seminal psychological, administrative and political science research, which has characterised decision-making to make use of, not only knowledge, but also of intuition, previous experience, appropriateness and compromise (Simon, 1979, Tversky and Kahneman, 1983, March and Olsen, 1984; Berejikian and Dryzek, 2000). Following rules of thumb about appropriateness and compromises prevail also in environmental and conservation decision-making, in which interests are conflicting, budgets are shrinking and public attention to conservation issues is fluctuating (Hukkinen, 1998; Rantala and Primmer, 2003; Young et al., 2012; Kinzig et al., 2013). As in any social decision-making situation, the degree to which biodiversity conservation decision-makers rely on their personal values will depend on the collective values in their social and normative context. Against this backdrop, we should aim to understand how personal values align with collective values.

Values are stable, culturally shared general constructs that guide decision-making and are portrayed in more specific attitudes and behaviours, particularly when a decision or a choice is hard to make (Schwartz, 1994). Environmental values rest on a general value-basis, and vary across cultures (Dunlap and York, 2008). Although the relationship between personally held values and professional, organizational or national decision-making cultures or norms have been a target of significant empirical research (Hofstede, 1980; Treviño et al., 2006; Peterson and Søndergaard, 2011), empirical analyses of environmental values have instead focused on the range of values, value dimensions and the relationship between environmental values and behaviours (Dietz et al., 2005; Schultz et al., 2005; Dunlap and York, 2008; Kollmuss and Agyeman, 2010). Although the relationship between values and behaviour is a major point of interest, its empirical survey-based analysis can suffer from the sub-conscious influence of social norms and a tendency to align responses, to avoid cognitive dissonance (Thøgersen, 2004). To complement the analyses of environmental and conservation values, we focus our analytical attention on the relationship between personal values and collective values. We have

designed an analysis that concentrates on how individuals position themselves in decision-making contexts and makes use of the expanding range of arguments for biodiversity conservation.

The aim of our study is to distinguish and compare biodiversity conservation decision-makers' personally held values and the collective values they perceive to dominate in the context where they operate. We use Q-methodology (Webler et al., 2009) to explore the personal views of decision-makers representing different decision-making levels in nine European countries, as well as the collective views they perceive to dominate with a range of arguments for protecting biodiversity. We use statements about biodiversity and ecosystem services derived from the biodiversity conservation literature, covering a range of value arguments (Howard et al., 2013). Q-methodology has been previously used to identify the patterns in the arguments that represent perceived biodiversity and ecosystem service values among different conservation professionals (Sandbrook et al., 2011; Berry et al., 2016) and practitioners and organizations (Fisher and Brown, 2014) as well as in other natural resource and environmental decision-making contexts (Nijnik and Mather, 2008; Albizua and Zografos, 2014; Eyvindson et al., 2015). Here, we extend this work by undertaking a comparison of personal and collective values. After identifying personal perspectives and perceived collective perspectives, we analyse the coincidence and level of agreement and dissonance between the two perspectives.

In the following, we describe our research design and methods in detail. Then we report our findings on the structure and patterns of identified perspectives, as well as their relationships. Finally, we discuss how decision-makers position themselves relative to the biodiversity conservation decision-making context in which they operate, and the ways in which personal values relate to collective values.

2. Methods

2.1. Data collection

The Q methodology is a semi-qualitative method to identify different perspectives on complex issues. It follows a systematic and well established procedure for analysis (Stephenson, 1953; Brown, 1980). The Q study was conducted in nine European countries involving 43 decision-makers working on biodiversity conservation in government agencies at a national, regional or local level, in Austria, Denmark, Finland, Hungary, Norway, Poland, Romania, Spain and the UK. The interviewees were chosen based on their formal position working in the implementation of biodiversity policy, with a focus on decision-makers who would deal with ecosystem services in some way. When formal responsibilities did not reveal this type of focus, we carried out inquiries among those who were responsible for biodiversity conservation policy. In cases where biodiversity policy was largely designed and implemented at a regional level, we interviewed regional level decision-makers. The distribution of responses is portrayed in Table 1. We conducted the interviews in person between May and November 2013, based on a set of 42 Q statements (listed in Table 2). Where needed, the Q statements were translated into the language of the respondents and in case the respondent wanted to return to the original English language statement a bilingual version of the Q statements was provided for the interviews.

After presenting the question "Why invest in biodiversity conservation", the respondents were asked to rank the statements by placing them in a quasi-normal forced distribution with a scale from -4 to +4 (Fig. 1). The respondents were asked to rank the statements twice; once according to their personal views and once according to their perception of the dominating collective view in the decision-making context where they operated. In the personal perspectives sort, -4 represented least like how the respondent thought and +4 represented most like how the respondent thought, and in the collective perspectives sort -4 represented least like the collective way of thinking and +4 represented most like the collective way of thinking.

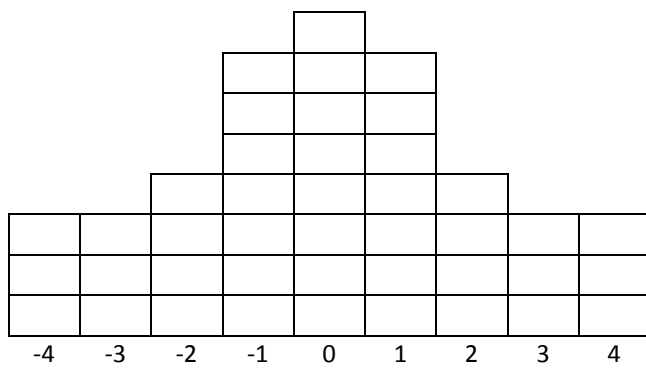


Figure 1. Sorting distribution for 42 arguments.

2.2. Q-study design and analysis

The Q statements were extracted from documents, collated in a database covering 529 scientific and policy documents, on biodiversity and ecosystem service values (Howard et al. 2013). This body of literature defined the “concourse” and a review of the individual documents was made to identify different arguments. We identified 180 statements from the concourse and sorted them roughly into the following broad categories to ensure that the final list of statements would represent the diversity of arguments in the literature, i.e., biodiversity is valuable because it is valuable in itself, biodiversity is useful because it underpins human well-being in direct and indirect ways, biodiversity underpins the functioning of important ecological processes, or, biodiversity has aesthetic and spiritual value.

The identified value categories were partly overlapping, and some categories were narrower than others, which meant that the diversity of statements within each category varied. Although it is recommended that the final selection of statements should include an equal number of statements from each category used for the selection (Webler et al. 2009), we included more statements representing the broader and more varied categories in order to cover the entire range of aspects in the set of statements, yet maintaining a reasonable total number of statements. A range of both positively and negatively worded statements from the different categories was included. The final list of statements was refined in a workshop including researchers from across the EU countries participating in the analysis to ensure that all statements were salient (i.e. something that people were likely to have an opinion on) and understandable (i.e. meaningful to the people doing the sorts) in the studied decision-making contexts. In this process, two additional statements (no 10 and no 26) were included, as they represented views that were hypothesized to be prominent in some EU countries, even though they were not picked up in the review of the database. Finally, each value category was reviewed and reduced to sets of statements representing the different aspects accommodated within each category. The final numbers of statements varied between categories from five (aesthetic and spiritual) to sixteen (underpinning human well-being). In total, 42 statements were selected (Table 2).

Table 1: Factor matrix with shaded cells indicating defining sorts for each factor (representing a perspective). P1-P4 factors are personal perspectives, C1-C3 factors are collective perspectives and DI is the distance indicator.

Respondent	Decision-maker: role (decision-making level)	P1	P2	P3	P4	C1	C2	C3	DI
UK	Ecosystem approach (national)	-0.0995	0.4566	-0.0031	0.2157	0.4413	0.1489	-0.0474	0.38
UK	Ecosystems in policy (national)	-0.1186	0.3466	0.6747	0.3502	0.6739	0.2578	-0.0401	0.42
UK	Environmental adviser (national)	0.1036	0.4051	0.0031	0.4899	0.5946	-0.0458	0.2361	0.74
UK	Biodiversity. ecosystem services (national)	-0.2206	0.6298	0.0375	0.4509	0.1363	0.7201	0.0656	0.49
UK	Ecosystems. climate change (national)	-0.0343	0.0434	0.1816	0.7782	0.2524	0.3688	0.4620	0.47
UK	Biodiversity policy (national)	0.2735	-0.0161	0.2232	0.7503	0.1829	0.5703	0.2029	0.57
UK	Sustainable development (national)	0.1537	0.1754	0.5236	0.2130	0.4792	0.3433	-0.0650	0.60
UK	Ecosystem approach (national)	0.5450	0.2821	0.3805	0.1653	-0.2080	0.6007	0.2888	0.33
UK	Biodiversity conservation (national)	0.2944	0.6303	0.2686	0.0254	0.6423	0.4365	0.1263	0.44
P	Nature conservation authority (regional)	0.4582	-0.2225	-0.0272	0.0951	0.7845	0.1445	-0.0446	0.88
P	Nature conservation authority (regional)	0.2578	0.6738	0.2295	0.1018	0.7163	0.1811	-0.1011	0.53
P	Nature conservation authority (national)	0.6724	-0.1438	0.3300	0.0169	0.0931	0.5863	-0.1397	0.32
P	Nature conservation authority (national)	0.1875	-0.1786	0.7871	0.0049	0.3837	0.2956	-0.2226	0.50
H	Political decision-maker (European)	0.5210	0.3219	0.2323	0.4792	0.6527	0.0603	0.2185	0.75
H	Conservation authority (national / international)	0.5395	0.1501	0.2212	0.4956	0.3113	0.6327	0.0857	0.49
H	Nature conservation authority (national)	0.4612	0.4480	0.0111	0.2780	-0.0149	0.7224	0.0853	-*
H	Nature conservation advisor (national)	0.4262	0.2980	0.3497	-0.1717	0.2495	0.5436	-0.0029	0.43
N	Economist. Ecosystem services (national)	0.0205	0.6751	0.0588	0.0084	0.6362	-0.0346	-0.0227	0.67
N	Environmental economist (national)	0.2954	0.5821	0.1019	0.0617	0.6687	0.3138	0.0483	0.76
N	Natural resources. climate (national)	0.1077	0.4766	0.6847	0.1154	0.7233	-0.2151	0.1685	0.42
S	Nature conservation authority (regional)	0.7029	0.0277	-0.0161	0.4520	0.6002	-0.1145	0.1373	0.76
S	Nature conservation authority (regional)	0.8439	0.1012	0.1432	0.0773	0.1203	0.6519	-0.0313	0.42
R	Nature conservation authority (national)	0.4890	-0.2059	0.3662	0.5152	0.4488	0.2146	0.0517	0.82
R	Nature conservation authority (national)	0.6614	0.1094	0.2621	0.2231	0.4394	-0.0661	0.3673	0.82
R	Nature conservation authority (national)	0.6023	0.1421	-0.1073	0.0411	0.2590	0.0256	0.3333	0.68
R	National Waters Administration (national)	0.4555	0.0989	0.2733	0.1850	-0.1158	0.5238	0.2823	0.57
R	Nature conservation authority (regional)	0.6685	0.2252	0.1965	0.1376	0.0021	-0.7075	-0.0339	0.97
R	Water Administration authority (regional)	0.1441	0.5229	0.3380	-0.0240	0.1486	0.4392	0.0363	0.65
R	National Waters Administration (national)	0.4237	0.1607	0.1873	0.0764	0.3267	-0.1788	0.5347	0.26
R	Nature conservation authority (local)	0.2820	0.0776	0.3325	0.3449	-0.0804	0.1803	0.8101	1.00
R	Nature conservation authority (local)	0.4992	0.3828	0.2197	0.4042	0.1991	-0.7474	-0.0670	0.54
R	Nature conservation authority (local)	0.5511	0.0407	0.4837	0.4024	-0.0656	0.1903	0.8163	0.85
R	Nature conservation authority (local)	0.2174	0.4618	-0.1114	0.5598	0.4817	-0.4334	0.3313	0.82
F	Biodiversity conservation authority (national)	0.4488	0.4392	0.0579	0.5267	0.4722	-0.1706	-0.0046	0.78
F	Natural resource and biodiversity advisor (national)	0.5035	0.5951	0.0821	0.0851	0.4114	0.6031	-0.2311	0.43
F	Marine protection authority (national)	0.4317	0.1323	0.3114	0.1393	0.3868	0.5360	0.0172	0.53
F	Land use planning authority (national)	0.6034	0.3073	-0.1304	-0.0211	0.6535	0.2439	0.1092	0.68
D	Nature agency (national)	-0.4168	0.4988	0.3443	-0.1642	-0.3299	0.5648	0.2417	0.75
Sp	Nature conservation authority (national)	0.7307	0.2584	0.0796	0.0212	0.5628	0.3548	0.1017	0.69
Sp	Nature conservation authority (national)	0.3184	0.5933	0.3302	0.0355	0.3611	0.6554	-0.3028	0.36
Sp	Nature conservation authority (national)	0.4264	0.2676	0.4416	0.3406	0.3037	0.6417	-0.0042	0.57
Sp	Nature conservation authority (national)	0.4786	0.2362	0.3322	0.1255	0.4548	0.3461	-0.0452	0.64
Sp	Nature conservation authority (national)	0.1967	0.5952	-0.0967	0.1495	0.3263	0.2569	0.2065	0.54
Explains % of variation		20	14	10	10	19	19	7	

* The respondent sorted only once.

We analysed the stakeholder Q sorts with the PQmethod software (<http://schmolck.userweb.mwn.de/gmethod/>). We analysed separately the two sorts reflecting the decision-makers' personal and perceived collective views as follows. First, we ran the Q sorts through a principal components analysis (PCA). Then we performed a varimax rotation for factors with Eigenvalues greater than 1. We used the automatic pre-flagging option to identify sorts that loaded significantly onto factors, i.e. the ideal sorts (Brown, 1980; Barry and Proops, 1999; O'Leary et al., 2013). Our choice of the number of factors was motivated by interpretability.

Finally, to generate perspectives around each factor, we interpreted the ideal sorts through so called constant comparison, using the comments made by the respondents who loaded significantly onto the ideal sorts (c.f. Webler et al., 2009; Van Exel and de Graaf, 2005; Barry and Proops, 1999; Mattson et al., 2006). At this interpretation stage, we also manually corrected the flagging where a respondent's comments did not reflect the particular perspective or we could not confirm the respondent's position.

2.3 Comparison of own and others' perspectives

To uncover potential patterns of differences between decision-makers' personal and perceived collective values, we cross-tabulated personal and collective perspectives.

We calculated a simple correlation coefficient, ρ , between the z-scores for the personal (z^1) and collective (z^2) perspectives to identify the degree of similarity between perspectives (eq 1). The z-scores measure how far a statement, i , lies away from the middle of the distribution in the chart in standard deviation (Webler et al., 2009).

$$\rho = \frac{\sum_i (z_i^1 - \bar{z}^1)(z_i^2 - \bar{z}^2)}{\sqrt{\sum_i ((z_i^1 - \bar{z}^1)^2)((z_i^2 - \bar{z}^2)^2)}} \quad \text{eq. 1}$$

To analyse the difference and similarity between each individual respondent's personal and perceived collective sorts we used a quantitative measure of the differences between the two sorts; a difference indicator (DI). The DI specification was inspired by Zabala (2015) who developed a bootstrapping procedure to measure the consistency of the perspectives derived from a sample of sorts (Zabala and Pascual, 2016). The DI is normalised against the maximum possible difference between two sorts. The maximum difference is given by equation (2) (Zabala, 2015):

$$\max \left(\sum_{i=1}^{42} S_i^1 - S_i^2 \right) = 4t \quad \text{eq. 2}$$

S^1 and S^2 are two sorts and S_i^1 is the score of the i^{th} statement in the sort representing the personal view, whereas S_i^2 represents the collective view. The maximum distance is given by the design of the sorting distribution. In this application the sorting distribution is given by three "-4", three "4", three "-3", three "3", four "-2", four "2", seven "-1", seven "1", and eight "0" (Fig. 1). Under this scoring protocol, the value of t is the addition of the array of possible factor scores on the positive side of the distribution, i.e. $t = 4*3 + 3*3 + 2*4 + 1*7 = 36$, and the maximum distance is therefore 144 (see Zabala (2015) for additional details).

The DI is then defined as the normalised distance between the personal and perceived collective sorts. We calculated the difference between each pair of sorts and present it as a fraction of the maximum possible distance (derived from Zabala, 2015), i.e.,

$$DI = \frac{\sum_{i=1}^{42} |S_i^1 - S_i^2|}{4t}, \quad \text{eq. 3}$$

3. Results

3.1 Identification of perspectives

Based on Eigenvalues, the correlations between factors, factor reliabilities, and an evaluation of the interpretability of factors, we found four perspectives: Intrinsic, Human benefits, Conservation and connection, to best describe the range of the respondents' personal views about biodiversity and ecosystem services (Table 3) Three perspectives best described the perceived collective views in decision-making: Utilitarian, Insurance and Knowledge (Table 3). The resulting factor matrix is presented in Table 1, with defining sorts highlighted.

Table 2. The 42 Q statements used for the interviews. Q sort values (Q-SV) and distinguishing statements (shaded cells) are indicated for each of the perspectives. Negative Q-SVs indicate disagreement (“most unlike I/decision-makers think”) and positive Q-SVs indicate agreement (“most like I/decision-makers think”).

The 42 Q statements	Q sort values (Q-SV)						
	P1	P2	P3	P4	C1	C2	C3
	Intrinsic value	Human benefits	Conservation	Connection	Utilitarian	Insurance	Knowledge
1. We do not know how ecosystems will be affected by the loss of species, therefore we better preserve them.	1	2	0	2	0	1	-1
2. Protecting ecosystem service providers is important because they are a source of economic value.	0	4	0	-2	3	4	0
3. The ecosystem service approach has potential to improve species conservation in Europe.	3	0	4	-1	1	3	-1
4. Biodiversity conservation is not a moral matter.	0	-3	-3	-4	-1	-1	-4
5. Some species are important symbols of human values, such as freedom.	-2	-2	-2	-1	0	-3	-1
6. Species are priceless.	4	-2	-3	1	-4	1	-2
7. The reason biodiversity matters is because it confers on us an imprecise, immeasurable well-being that is located in the spirit rather than in the wallet.	0	0	0	3	-1	0	-1
8. The extinction of a species is like the destruction of a great work of art	1	-3	-4	-1	-4	-1	0
9. It is not clear why all species that environmentalists campaign to conserve ought to be saved.	-4	0	0	-3	2	-1	0
10. Protecting biodiversity and ecosystem services is particularly important for poverty alleviation in developing countries.	2	4	-1	1	0	2	-4
11. Conserving genetic diversity is important to feed future human populations.	1	4	1	2	2	4	3
12. Countries can benefit from their conservation efforts through tourism.	1	3	1	1	3	3	2
13. Nature provides us with many valuable experiences. We hunt, fish, hike, mountain climb, and engage in numerous activities in which we interact with nature.	0	1	4	0	4	1	1
14. Losing its biological richness and diversity, the world loses its magic.	-1	-4	2	3	-2	-1	0
15. It is important to conserve the genetic reservoir in a region, in case we need to breed disease-resistant plants or produce food adapted to local conditions.	1	2	0	0	2	4	-1
16. We want to experience areas where humans are merely visitors and not inhabitants.	-1	-1	-1	0	-2	-2	0
17. Most species are superfluous.	-4	-4	-4	-4	-1	-4	-1
18. We value some species for their beauty, but this is only relevant for a very small number of species. Therefore, beauty is not a particularly important basis for conservation.	1	1	1	-3	1	1	-2
19. We do not need to recognize other beings as our moral equals to realize that we should not kill that which is not a threat.	-1	-2	1	1	-3	-3	-2
20. All species have a right to exist, regardless of their ability to benefit humans.	4	-1	4	-1	-3	1	4
21. Nature is a laboratory for the pursuit of science through which society gains knowledge, and understanding of the world.	1	1	-3	0	0	0	4
22. The diversity of life is something like the rivets on an airplane, with each species playing a small but significant role in the working of the whole. The loss of each rivet weakens the plane by a small but noticeable amount – until it loses airworthiness and crashes.	3	2	0	4	0	1	4
23. Nature provides a place to take calculated risks, to learn the luck of the weather, to lose and find one’s way, to reflect on success and failure.	-2	-1	0	3	0	-2	1
24. Even if only a few species are needed for our world to be productive we have to conserve more species as a back-up. Otherwise a pest or climate change could wipe out the few species we have saved, and we would have nothing in reserve.	0	3	-1	1	0	2	-1
25. Pristine nature is valuable in itself.	4	1	3	0	-2	0	3
26. Ecosystems have co-evolved with humans creating landscapes of important cultural value.	-1	2	2	-2	1	2	1
27. Any effort to conserve biodiversity must be limited by considerations of other values such as freedom, equality, health, and justice.	-2	0	2	1	4	0	1
28. Destroying nature is like burning unread books.	-1	0	-2	0	-2	-2	-2
29. Valuing species in economic terms implies a justification for the destruction of the biosphere.	-3	-4	-1	-4	-1	-4	-4
30. Nature produces works of grace which please the eye.	-1	0	1	1	1	-1	-3
31. Species survival ultimately depends on large numbers of other species.	2	1	3	2	0	0	-3
32. Nature provides the profoundest historical museum of all.	0	-1	-2	-1	-1	-2	0
33. Species extinction reduces possibilities for future generations.	3	1	2	4	1	2	1
34. The knowledge of the mere existence of species is valuable, even if it is certain that I will never experience them <i>in situ</i> .	2	1	-2	2	-1	0	-3
35. Genetic diversity is good because each particular species represents the success of generations of evolutionary trial and error.	0	0	-1	-1	-3	-1	1

36. Biodiversity is an unqualified good, i.e. biodiversity is good no matter what.	2	-1	1	-2	-4	0	2
37. Humans are morally permitted to extinguish any species harmful to human survival.	-4	-3	-4	-2	1	-4	2
38. We can't aim to conserve biodiversity in all its aspects. Instead, we have to make choices about increasing, maintaining, or even diminishing biodiversity in particular circumstances.	-3	0	1	0	4	1	3
39. As nature is always changing there is no point in conserving a fixed ecosystem state.	-2	-1	0	1	2	0	2
40. Species extinctions are not necessarily bad.	-3	-2	-1	-3	1	-3	0
41. Nature and its diversity make our lives meaningful.	-1	-1	3	4	-1	-1	1
42. The earth's biodiversity should be conserved because genetic diversity may be valuable in the development of new drugs against disease	0	3	-1	0	3	3	0

Table 3. The identified personal and collective perspectives.

Perspective		Variance explained, %	Number of respondents	Countries of the respondents
<i>Personal</i>				
Intrinsic value	P1	20	14	UK, Poland, Austria, Romania, Finland, Spain
Human benefits	P2	14	10	UK, Poland, Norway, Romania, Finland, Spain
Conservation	P3	10	4	UK, Norway Poland
Connection	P4	10	4	UK, Romania
<i>Collective</i>				
Utilitarian	C1	19	15	UK, Poland, Hungary, Norway, Austria, Finland and Spain
Insurance	C2	19	13	UK, Hungary, Austria, Romania, Finland, and Spain
Knowledge	C3	7	4	UK, Romania

3.2 Decision-makers' personal perspectives on biodiversity conservation in Europe

Intrinsic value

The distinguishing statements in P1, which we labelled *Intrinsic value*, focused on the rights of species and intrinsic values, but also considered ecosystem services (Table 2). In the interviews, the respondents said that “intrinsic value [was] essential.” Pristine nature, as well as “nature that [was] not pristine” was considered to be valuable in itself. Species were considered “invaluable” or “irreplaceable” and they had a “right to exist”. Species were not considered superfluous; rather, the respondents considered that “every species [had] its well-defined role” and the comparison of the diversity of life with the rivets of a plane was considered “a suitable example”. The respondents associated with P1 tended to regard species extinctions as bad and disagree with the argument that humans would be morally permitted to extinguish any species harmful to human survival. They considered that the ecosystem service approach could be “a very important concept in the context of nature-society” and a “useful tool for arguing, in some situations”.

Human benefits

Distinguishing statements in the *Human benefits* perspective, i.e. P2, addressed benefits from biodiversity, ranging from economic to health, and beneficiaries, ranging from the poor in developing countries to future populations (Table 2). The P2 respondents thought it was “super important” to conserve genetic diversity to feed future generations as the “food situation most probably will change because of climate change”. Conserving genetic biodiversity would also be “valuable for new pharmaceutical products development” as well as for “poverty alleviation” and as an insurance “for future populations”. In addition, the respondents associated with P2 saw the “economic factor” as “an argument that gets through” but warned that we would “have to think about the supplied ecosystem services for socio-economic development [...] with certain, well-reasoned, limits”. They said, “We shouldn’t reduce the meaning of biodiversity to economic aspects only.”

Conservation

P3 addressed issues related to biodiversity conservation and species conservation in particular, as well as intrinsic value and ecosystem services (Table 2). Hence, we labelled the perspective *Conservation*. The P3 respondents saw the “ecosystem service approach [as] a new tool in the armoury to help persuade people [...] that we should look after nature”. This perspective differed from the Human benefits perspective in that species were considered to have a right to exist regardless of whether they would “provide a service” and humans had “a moral responsibility towards them”. All species were considered “interconnected” and to argue that most species were superfluous was deemed “arrogant”. Pristine

nature was valuable in itself and nature in general was valuable because of the “feel good factor” and the opportunities for “outdoor recreation” that it provided.

Connection

The distinguishing statements in P4 had metaphorical language and referred to spirit, meaning and systemic connection with nature (Table 2), which is why we labelled the perspective *Connection*. The argument that nature and its diversity make our lives meaningful appealed to the P4 respondents because “if we want a healthy environment, we need to stress the inter-connectedness of it all, we need to think about [nature] as a whole rather than thinking about individual species all the time.” Thus, species extinctions would reduce possibilities for future generations since “future generations of species are at the heart of sustainable development.” Accordingly, the metaphor of rivets of a plane was considered “quite a good analogy” and “a helpful way of explaining the concept of ecosystem services”. To say that species survival ultimately depends on a large number of species was considered “quite a good argument [like] the umbrella species argument and keystone species, which [are] quite good arguments sometimes.”

3.3 Collective views within decision-making about biodiversity conservation in Europe

Utilitarian

We labelled C1 “Utilitarian” because the distinguishing statements addressed direct use or benefit and loaded negatively on statements related to species rights and intrinsic value (Table 2). Generally, the C1 respondents perceived the collective views in conservation decision-making to be pragmatic, for example saying that “economic value provides an important argument”. They also said that “because [ecosystem services] are a source of economic value, [decision-makers] are becoming more aware [of them]”. In some cases, the respondents felt that decision-makers “really promoted” the argument that countries can benefit from their conservation efforts through tourism. Most C1 respondents perceived tourism as an “important driver of biodiversity conservation.” Also the potential value of genetic diversity for the development of new drugs was identified as an argument. Describing the reality of collective decision-making, the respondents felt that arguments such as all species have a right to exist, would be “too unconditional to be potent” because “you cannot really do politics if you think that”. The respondents also said, “hard choices need to be made in politics” and that decision-makers “have to be considerate of all sectors”.

Insurance

We labelled the C2 perspective *Insurance* because respondents defining this collective perspective considered decision-makers to generally focus on bequest values and genetic diversity (Table 2), saying they were “very important in policy and decision-making”. Conserving genetic diversity to feed future human populations, and breeding resistant plants were “at the heart of sustainable development”. Arguments about genetic diversity were considered to resonate “because of our strong links to the Convention on Biological Diversity”. Correspondingly, decision-makers were assumed to identify species extinctions as reducing possibilities for future generations, and to view most species as needed. Hence the respondents thought that decision-makers would “suggest [that] species extinctions are bad because we see the loss of more species that are potentially beneficial than those that are harmful”. The respondents thought that decision-makers would argue that it is important to protect ecosystem service providers, and viewed “the ecosystem service approach [as] a promising approach for communication”.

Knowledge

The respondents who identified the C3 perspective considered decision-makers to focus on intrinsic values as well as scientific knowledge (Table 2), so we labelled the perspective *Knowledge*. The two arguments about nature as a laboratory for the pursuit of science and all species’ right to exist ranked highly but the respondents remained ambivalent about the extent to which decision-makers would actually consider these arguments. Although the respondents thought that decision-makers would agree

that we cannot aim to conserve biodiversity in all its aspects, they thought that decision-makers would view the comparison between the diversity of life with the rivets of a plane as “quite a good ecological argument”. The decision-makers would use this argument “e.g. as a basis of our ecosystem health arguments.” The respondents thought that decision-makers would view valuing species in economic terms as “a justification for conservation”.

3.4 Comparison between personal and perceived collective perspectives

When we cross-tabulated the perspectives based on the distinguishing statements, we found that the personal perspectives did not particularly match the perceived collective perspectives (Table 4). The clearest finding was that all P3 respondents who highlighted general conservation arguments, perceived the collective decision-making to rest on a utilitarian perspective (C1). Those personally highlighting conservation arguments (P3) did not identify insurance value arguments in decision-making (C2). Only three respondents who personally associated with either intrinsic (P1) or connection (P4) arguments identified the collective knowledge perspective (C3). Apart from the two P1 respondents identifying C3, the P1 responses were split between C1 and C2, and P2 was also split between these two, i.e. viewing the collective decision-making to be dominated either by utilitarian or insurance values.

Table 4. Cross tabulation of ideal sorts. The numbers in the left hand columns, indicate the number of respondents associated with the personal perspectives P1, P2, P3, or P4, and perceived C1, C2, or C3 to dominate within biodiversity decision-making. In the right hand columns (in brackets), the correlation coefficient (ρ) indicates the difference/similarity between the personal and collective perspectives.

	C1 Utilitarian		C2 Insurance		C3 Knowledge		Sum
	# respondents	ρ					
P1 Intrinsic value	5	(-0,33)	5	(0,39)	2	(0,10)	12
P2 Human benefits	3	(0,47)	3	(0,29)	0	(0,15)	6
P3 Conservation	4	(0,28)	0	(0,33)	0	(0,29)	4
P4 Connection	1	(-0,03)	2	(0,35)	1	(0,12)	4
Sum	12		10		3		

The correlations between the z-scores (reported in brackets in Table 4) show that the differences between personal and collective perspectives was the greatest between the personal perspectives highlighting intrinsic value arguments (P1) and the perceived collective perspective that emphasized utilitarian values (C1). The personal perspective associated with human benefits (P2) was the closest to the perceived utilitarian collective perspective (C1). The utilitarian collective perspective (C1) had very different correlations with each of the the four personal perspectives. On the other hand, the collective perspective highlighting insurance values (C2) was consistently positively correlated with all personal perspectives.

3.5 Comparison between personal and collective perspectives in individual sorts

Finally, we analysed the distance between each respondents’ personal sort and the sort representing what (s)he perceived to dominate in decision-making to explore the possible dissonance that the decision-makers would experience personally.

For each respondent, the distance indicator (DI) is reported in Table 1. Similar to the comparison between perspectives based on the distinguishing statements, the greatest difference in views was found among respondents who personally cherished intrinsic values (P1) but perceived utilitarian values to dominate in collective decisions (C1). The differences between these respondents’ two sorts ranged between DI = 0,64 and DI = 0,88 (when maximum DI = 1). The interview transcripts confirmed these

substantial differences in personal and collective values. The respondents with a large DI represented both national and regional decision-making.

Those respondents who cherished intrinsic value arguments (P1) and perceived insurance (C2) or knowledge based arguments (C3) to dominate, had lower DI-values and hence presumably experienced less dissonance between personally held and perceived collective values. These respondents mostly operated at the national level. The respondents who associated with P2, cherishing human benefits, and who perceived insurance arguments to dominate collective decisions about biodiversity conservation (C2) had overall the lowest DI-values ranging between 0,36 and 0,49. In other words, those who personally cherished human benefits and perceived dominant collective decision-making to represent insurance values were in most agreement with their decision-making context.

4. Discussion

4.1 Personal values

Our analysis of perspectives representing biodiversity conservation decision-makers' personal values points to a distinction between an intrinsic value orientation and a human-centred benefit orientation, corresponding with the well-established division between altruistic and self-interested value dimensions (Dietz et al., 2005). Representations of these value dimensions have been found also in other Q-analyses addressing biodiversity conservation and natural resource management (e.g. Nijnik and Mather, 2008; Sandbrook et al., 2011; Berry et al., 2016). Our analysis shows, however, that the distinction is not very sharp; rather, there is also overlap in decision-makers highlighting intrinsic and human benefit arguments.

The identified *Conservation* and *Connection* perspectives are even less uniform and fall between the more contrasting *Intrinsic* and *Human benefits* perspectives. The *Conservation* perspective combines arguments for the ecosystem service approach with arguments emphasising species, pristine nature and diversity. Thus, it resembles the supporting, active or enthusiastic perspectives to biodiversity and ecosystem services identified elsewhere, e.g., Environmentalists in Nijnik and Mather (2008), Factor 2 in Sandbrook et al. (2011) or Enthusiasts in Fisher and Brown (2014).

The *Connection* perspective emphasises meaning, and human-environment connection, which is often introduced as an important basis for environmental values (Shultz and Zelezny, 1999; Dietz et al., 2005). This perspective has not been identified in other biodiversity conservation, ecosystem service or natural resource analyses applying Q-methodology. This might be because the research settings have been designed to capture public or user views on particular services, or concerned with a particular policy or approach, rather than biodiversity and ecosystem service arguments in general. However, the connection perspective fits well with the conceptual understanding of human-ecosystem interactions in so-called social-ecological systems (Potschin and Haines-Young, 2011), and of the recently emphasised relational values (Chan et al., 2016).

4.3 Collective values

The identified collective *Utilitarian* perspective highlights those aspects of nature and biodiversity that can be enjoyed or used instantly or in the future. Notably, many intrinsic value type arguments are ranked clearly negatively in this collective perspective. Although other Q-method applications have not aimed to analyse a perceived collective view, the utilitarian approach is familiar from analyses of a defined policy setting (Nijnik and Mather, 2008) and ecosystem services as an approach to conservation (Fisher and Brown, 2014). Conceptually, environmental and nature value analyses take the utilitarian

approach as the starting point, against which other value dimensions are compared (Sagoff, 1996; Dietz et al., 2005). Against this backdrop, the comments of the respondents identifying the utilitarian perspective that point to adapting to existing standard practice, make sense. They are in line with the well-known theories of norms and appropriateness shaping decision-making (Simon, 1979, March and Olsen, 1984), which have been identified also in the area of ecosystem services (Chan et al., 2016).

The identified collective *Insurance* perspective captures long-term benefits for future generations. Future generations and consideration of long-term consequences are at the heart of sustainable development (Daly, 1990). Sustained long-term delivery of public goods has been argued to depend on the capacity of diverse ecosystems to buffer against risks (Quaas and Baumgärtner, 2008). A long time-scale has also been identified as a core ecological argument that ties biodiversity conservation with ecosystem services (Isbell et al., 2011).

The collective *Knowledge* perspective also emphasises long-term sustainability, however with more emphasis on research. This perspective relates to the core ideas coined in ecosystem service literature; that an improved knowledge-base would feed to better decision-making (De Groot et al., 2010; Potschin and Haines-Young, 2011). Additionally, the *Knowledge* perspective includes intrinsic value and altruistic arguments, extending to other humans, which signals a high level of environmental and social awareness coupled with a moral attachment to nature (Dietz et al., 2005; Chan et al., 2013).

4.4 Positioning personal values in relation to collective values

The identified personal and collective perspectives are in contrast to some degree. In particular, the analysis of the distinguishing statements shows that those associating with intrinsic values consider collective decision-making to be dominated by utilitarian or insurance value arguments. Yet, their personal views align only with the insurance perspective. The difference between the personal *Intrinsic* perspective and the collective *Utilitarian* perspective is the largest shown both by the negative correlation between these two ideal sorts and among individual sorts. This finding echoes an often identified environmental decision-making challenge of conservation professionals finding that they are in a minority defending the ecological cause against the use of natural resources or areas (Hukkinen, 1998; Rantala and Primmer, 2003). At least decision-makers experience constraints and demands from their operational environment, which limit their conservation practice (Primmer and Karppinen, 2010; Rekola et al., 2010; Young et al., 2012). The dissonance between personally held intrinsic values and perceived collectively held utilitarian values also adds to nuance our theoretical understanding of the different rationales applied in environmental decision-making and the ways in which these are institutionalized (Vatn, 2005).

4.5 Ecosystem services and decision-making

The ecosystem service approach places emphasis on benefits and values (MEA, 2005; De Groot et al., 2002). We find that the personally held perspective highlighting benefits is largely in agreement with the perceived collective perspectives. It is likely that the optimistic messages about benefits adding to conservation motivations in the ecosystem services literature intuitively build on this match (De Groot et al., 2010; Potschin and Haines-Young, 2011; Harrison et al., 2014). The research community has also identified risks with the benefit and value orientation and the anthropocentric utilitarian value basis that it rests on, including monetization and commodification (Spash, 2008; Gómez-Baggethun et al., 2010). Despite this, previous Q-methodology applications addressing biodiversity and ecosystem services have not identified an emphasis on utility (Sandbrook et al., 2011; Fisher and Brown, 2014). Instead, these analyses have rather revealed plurality in values, like many other empirical and conceptual analyses of ecosystem service values (e.g., Chan et al., 2012; Martín-López et al., 2014). Our findings point to an explanation for the missing empirical evidence for this utilitarian emphasis: cognitively conservation decision-makers – and perhaps other target groups for empirical research – are likely to be oriented towards more altruistic causes and hence do not reveal a clearly utilitarian

emphasis. But, as our analysis shows, they identify the utilitarian tendency in the collective decision-making context where they operate.

Our analysis has implications for decision-making; the results could support identifying and solving conflicts and polarisation. As we find that those whose personal values centre on intrinsic values experience dissonance or conflict in contexts where utilitarian values dominate, we identify the central target group for explicit deliberation to address these tensions. In ecosystem services research and decision-making, the tensions have been handled rather technically as tradeoffs, even in situations where value-conflicts are difficult to address and polarizations hard to overcome (Martín-López et al., 2014; Daw et al., 2015; Jax et al., 2013). At the same time, biodiversity conservation is typically found to be in conflict with other societal goals and seen as a constraint (Rantala and Primmer, 2003; Young et al., 2012; Redpath et al., 2014). The lessons from biodiversity conservation and ecosystem services can perhaps be joined in a meaningful way by focusing on the mismatch between intrinsic and utilitarian values in decision-making and by tackling the utilitarian tendencies as systemic rather than personal. This deliberation would ideally be carried out in a collaborative fashion, allowing the different actors' knowledge and views to inform decision-making (Young et al., 2012; Jax et al., 2013; Primmer et al., 2015).

In addressing the conflict between intrinsic values and utilitarian values, insurance value arguments could function as bridging arguments, as our analysis shows them to align with personal values across different perspectives. Insurance values can capture long-term concerns in decision-making environments that function on a short-term return basis (Kinzig et al., 2013). The long-term (and large scale) insurance value and resilience aspects are potentially among the strong arguments underlying the connections between biodiversity conservation and ecosystem services both ecologically (Isbell, 2011) and economically (Quaas and Baumgärtner, 2008). In this sense, insurance value might provide the much needed common ground for advancing the cause of biodiversity conservation through argumentation.

5. Conclusions

Environmental governance is about matching conservation and sustainable use in real world decision-making. The challenge of conflicting goals is particularly apparent in biodiversity conservation, which has given rise to the concept of ecosystem services, anticipated to capture and integrate processes and values from ecosystems to societies. As individual decision-makers deploy their personal values and associate with a set of value arguments, they operate in a collective decision-making context, where they identify another set of values and arguments. Our analysis addresses this interface between personal and collective values in biodiversity conservation.

Our Q-method analysis of biodiversity conservation arguments with decision-makers in Europe shows that those who personally place emphasis on intrinsic values experience conflict and dissonance with utilitarian values, which they perceive to dominate in collective decision-making. Based on our analysis, opportunities for easing these tensions lie in long-term benefit arguments that capture the insurance value of nature.

Our analysis provides empirical evidence for the conceptually identified difference between individual and social rationalities in environmental decision-making, and bridges the often segregated analyses of individual preferences and socio-political decision-making processes.

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