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Public perceptions of biodiversity change – results from a (pilot) survey in 8 European countries

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Summary

For land use and conservation policies to be sustainable there is an urgent need to better understand people's views on biodiversity, perceptions of biodiversity change and their attitudes towards biodiversity management. As part of the EU FP6 Network of Excellence ALTER-Net we developed a flexible but standardised survey instrument that could be used across a range of European countries. Our main research objective was to better understand how members of the public in different sites perceived biodiversity change, and how they evaluated these changes. In particular, we wanted to explore if the discourse of biodiversity loss – which appears rather dominant in the media and environmental policies – was shared by the general public.

In a multidisciplinary team, we developed and tested a survey design, which we then implemented in eight sites across Europe. Each site had to include urban, semi-urban and rural areas, and interviewees were randomly selected through common sampling procedures. Overall, we collected 2378 completed questionnaires (approximately 300 per site).
While the majority of respondents seemed to perceive the number of animal and plant species to be decreasing and were worried about this, in almost all sites these concerns were stronger with regard to global than with regard to local changes. In an open-ended question, we also asked for changes that the respondents had noticed themselves in their own environment. Here, not only species loss, but also increasing diversity was reported. This implies that for many people, biodiversity loss at the global level was a shared concern, whilst local changes were seen as more complex, including the re-appearance of species that had previously been under pressure.

Our study also investigated the context of such perceptions and evaluations, and elicited attitudes towards changes in six different habitats and eight animal and plant species, including iconic, problematic and non-native species. These attitudes were found to be embedded in the respondents' perceptions of the species, as well as in their value orientations with regard to the natural environment. Other aspects of the questionnaire addressed trust in political actors, perceived effectiveness of management approaches, the relationships between people's own experience gained through outdoor activities and engagement in nature-related NGOs, and their views on biodiversity change.

Our findings have important implications for biodiversity management policies. Our results suggest that public perceptions of changes in the natural environment are much more differentiated than often assumed, and are thus likely to clash with simplified messages of either "biodiversity loss" or "alien invasions". These perceptions are well-embedded in social representations of biodiversity issues and broader worldviews, hence unlikely to be easily manipu-

lated through simple awareness campaigns. Communication and negotiation of biodiversity policies need to take these complex representations and their social patterns into account.

In addition to elucidating these patterns, our survey instrument can serve as a basis for the development of more sophisticated indicators of public awareness and opinion than those currently applied, and could also be used for long-term studies.

1 Introduction

There is an urgent need to better understand people's views on biodiversity, their perceptions of biodiversity change and attitudes towards biodiversity management if land use and conservation policies are to be sustainable. As part of the EU FP6 Network of Excellence ALTER-Net, we developed and tested a survey design which we then implemented in eight sites across Europe. Each site had to include urban, semi-urban and rural areas, and interviewees were randomly selected through common sampling procedures.

Our main research objective was to better understand how members of the public in different sites perceived biodiversity change, and how they evaluated these changes. In particular, we wanted to explore if the discourse of biodiversity loss – which appears rather dominant in the media and environmental policies – was shared by the general public. Our survey aimed not only to monitor public views on biodiversity change, but also to improve our understanding of the relationships between people's beliefs, their attitudes towards species, habitats and management options, and their more general value orientations and worldviews. The survey thus went beyond the usual content of opinion polls.

In this report we give a short, descriptive account of the main results, presenting findings from all eight sites, which were characterised by a wide range of different ecological and social features. Following the structure of the survey, we summarise results on three topics: (i) perceptions of biodiversity change in general and also regarding specific species and habitats, (ii) attitudes towards relevant actors and management approaches, and (iii) value orientations with regard to wildlife and conservation issues, as well as preferences for outdoor activities and involvement in conservation and land management NGOs. More in-depth analyses of the results for all sites can be found in Mauz et al. (forth.) and Fischer et al. (forth.).

2 Previous research on public perceptions of and attitudes towards biodiversity change

When we started to work together on public attitudes to biodiversity in 2004, most research on laypeople's views on biodiversity issues focused on the differences between public and scientific understandings, concluding that the public was insufficiently informed and needed to be educated. This was not only the case for opinion-poll style large-scale surveys (DEFRA, 2002), but also for qualitative research (Hunter & Brehm, 2003).

We thus decided to take a less judgmental approach to try and better understand what biological diversity meant to people. Using deliberative techniques such as focus-group discussions with a wide range of members of the general public including tourists, local residents, foresters and farmers, we explored people's views on biological diversity in six different sites across Europe. We found that participants expressed rich concepts of biodiversity, whether they were aware of the scientific terminology or not, embedded in the context of notions such as food chains and balance in nature. The participants' statements not only revealed how individuals linked different concepts together, but also what aspects they valued (Buijs et al., 2006; Buijs, Fischer, Rink & Young, 2008; Fischer & Young, 2007).

New research questions emerged from this, and we decided to develop a quantitative survey instrument that would allow us to explore links between views on biodiversity change, attitudes towards management, and people's general ideas of nature and society, across a wide range of different cultural and environmental contexts. We also intended to use this survey instrument to develop our thinking on social biodiversity indicators in the context of the SEBI (Streamlining European Biodiversity Indicators; EEA 2007) initiative. As the design of a survey applicable to a wide range of cultural and environmental contexts is rather challenging, we consider our work as exploratory; and although our findings will certainly provide us with very valuable insights, the survey also has a piloting function for future work at larger scales.

The idea that the publics across Europe might not actually share the – in conservation, but also other land management policies very dominant – notion of biodiversity loss was the

starting point for the development of our survey. We aimed to address the following questions:

- How do the different publics across Europe perceive biodiversity change? What exactly is changing in their view, and what are the reasons for such changes?
- How are changes evaluated? What informs people's concerns and attitudes towards changes – does concern vary with the species and habitats affected?
- What are public attitudes towards different policy options?
- How is all of this related to people's value orientations and their wider social context?

In the remainder of this report, we will give an overview of our findings with regard to these questions.

3 Study design

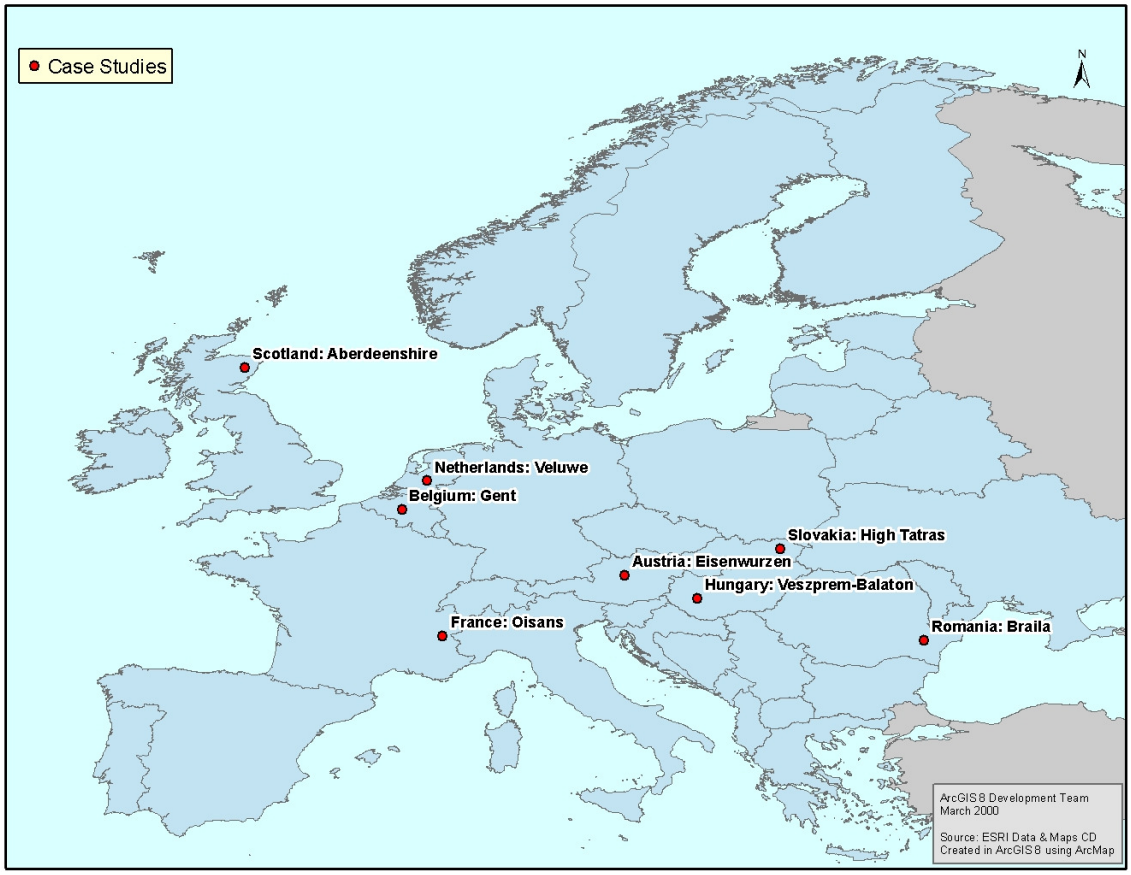
3.1 Study sites and sampling

The survey was jointly developed by a multidisciplinary team and conducted in eight European countries (Fig. 1, Table 1). In each of these countries, we selected study sites that were in the direct vicinity of a significant protected area and included a medium-sized city (50,000 to 250,000 inhabitants). Where they existed, we chose (candidate) Long-Term Social and Ecological Research (LTSER) platforms and adapted their delineations to jointly agreed guidelines. Target size for each site sample was n=300, with about one third from each of the following categories; urban (i.e., a place with more than 50,000 inhabitants), semi-urban (3000-50,000 inhabitants) and rural (up to 3000 inhabitants) stratum. We thus used a stratified random sampling procedure. We will now briefly describe each of the study sites.

The ***Austrian*** study site was defined by 5 regional districts of the province of Upper Austria, namely Linz, Linz-Land, Steyr, Steyr-Land and Kirchdorf. It covers approximately 2795 km^2 with about 465,000 inhabitants, and includes protected areas such as the Kalkalpen (Limestone) National Park and several NATURA 2000 sites. The LTSER Platform Eisenwurzen, situated in the borderland of the federal provinces of Upper Austria, Lower Austria and Styria

and extending from the Northern Limestone Alps down to the Northern Alpine Foothills, was partly included in the study site.

Fig. 1: Location of the study sites



The ***Belgian*** study site stretches from the city of Ghent, the capital of the province of East Flanders, northwest-wards to the rural Meetjesland. It covers approximately 284 km^2 and includes 230,000 inhabitants, of which 190,000 live in the harbour and university city Ghent. The landscape is characterised by agriculture. The site contains the nature reserve Bourgoyen Ossemeersen (215 ha), a Pleistocene river valley eroded by the river Leie, characterised by floodplains, meadows and marshes. The reserve is an important wintering area for ducks and waders in Flanders. As it is located close to the city borders of Ghent, the visitor centre and the footpath attract thousands of visitors each year.

The Dutch study site, the Veluwe, a large lowland nature area, is located in the centre of the ***Netherlands***. It features many different landscapes, including forest and heath land, several natural lakes and Europe's largest drift sands. The appearance is hilly although the altitude is

low. The study site contains the southern part of the Veluwe. Its size is about 1100 km^2 and it has 320,000 inhabitants. The main city is Arnhem, the capital of the province of Gelderland. The area also includes 13 villages, all scattered on the borders of the study site. Two national parks are located within the study site. Next to biodiversity conservation, tourism is an important focus of the Veluwe, as it is one of the most popular Dutch destinations for a short holiday.

In ***France***, the pear-shaped study site stretched from the city of Grenoble to the Écrins National Park (created in 1973, pastoralism and fishing is allowed; hunting, forest exploitation, and plant picking is forbidden in the core zone). It covers 444km^2 and includes 223,000 inhabitants (153,000 in Grenoble, 40,000 in other urban municipalities, and 30,000 in rural municipalities). It belongs to the Alpine range, with a high altitude gradient from 300m in Grenoble to more than 4000m in the Écrins National Park. Biodiversity conservation policies (especially in protected areas) and economic activities (electronics, nanotechnologies) are both particularly important for the region.

The survey site in ***Hungary*** included the Balaton Upland National Park (BUNP) and its vicinity, which is located in the central part of the country. The BUNP covers about 80% of the study site. The study area is approximately 1200km^2 with 87,000 inhabitants in total, of which most live in Veszprém. The BUNP consists of different landscape protection areas from wetlands to upland regions (highest elevation 680m). Agricultural areas, primarily vineyards and pastures dominate the landscape. Viticulture and tourism are the two main income sources of the study site.

In ***Romania***, in the Lower Danube River Wetland System, the study site was represented by the Small Islands of Brăila which became a Natural Park in 2000 and received international recognition as a Ramsar Site in 2001. The area is inhabited by approximately 250,000 people (70% of whom live in the city of Brăila and 30% in rural areas) and covers 1218km^2 (Small Island of Brăila Natural Park: 211km^2). The study area characterised by agriculture,

with industry being almost entirely concentrated in Brăila (food processing, textile and manufacturing, wood processing, large shipyards).

Table 1: Study sites

Site	***Sample size***	***City*** *(inhabitants)*	***Major protected area***
Austria (AT): Eisenwurzen	281	Linz (183,140)	Oberösterreichische Kalkalpen National Park
Belgium (B): Gent	306	Gent (226,000)	Bourgoyen-Ossemeersen Nature Reserve
France (F): Oisans	278	Grenoble (153,000)	Écrins National Park
Hungary (HU): Veszprém-Balaton	300	Veszprém (62,000)	Balaton Uplands National Park
Netherlands (NL): Southern Veluwe	302	Arnhem (142,250)	Hoge Veluwe & Veluwezoom National Parks
Romania (RO): Islands of Brăila	300	Brăila (216,300)	Small Island of Braila Natural Park
Slovakia (SK): High Tatras	306	Poprad (55,200)	Tatras National Park/ Biosphere Reserve
Scotland (SCO): Aberdeenshire	305	Aberdeen (202,370)	Cairngorms National Park

In ***Scotland***, we conducted our survey in Aberdeen and Aberdeenshire (altogether 437,000 inhabitants). The study site stretched from the North Sea coast up into the Cairngorm mountains (highest elevation: 1400m), and is characterised by a mix of agricultural area near the coast, and woodlands and heather moorland further inland. The Cairngorms National Park covers the western part of the study site. Culturally important industries include tourism (inland), agriculture, offshore oil, and fisheries.

In ***Slovakia,*** the study took place in the High Tatras, which are situated in the north of Slovakia. The site (overall 1127km^2) includes a basin and high mountains, with altitudes ranging from 580m up to 2655m, and has about 151,300 inhabitants. Forty-five percent of the area is covered by forests, situated mostly in the mountainous part, and 39% by agricultural land, mainly located in the basin. The northern part of the study site is designated as the Tatras National Park and Biosphere Reserve. The main economic activities in the urban (Poprad)

and semi-urban areas are food processing, machine, chemical and textile industries, and in the mountainous part of the site, tourism plays a major role.

The survey was generally administered by mail and followed up by a drop-and-collect procedure where the target sample size of 300 per site had not been achieved through postal administration. However, in Hungary, Romania and the Slovak Republic, where the pre-test (and common interview practices) suggested that postal administration would lead to very low response rates and potentially a strong educational bias, we decided to conduct face-to-face administration instead. However, in all sites we followed strict and jointly agreed instructions that ensured that the sampling procedure and survey administration were compatible across all sites. We thus obtained a sample of n=2378 completed questionnaires (Table 1). Not surprisingly, respondents were socially unevenly distributed, with an under-representation of lower educated people, women, foreigners, and young people. We tried to counterbalance this bias by distributing questionnaires in particular parts of the study area (e.g. poorer parts of the cities) by means of the drop-and-collect procedure.

3.2 Questionnaire design

The questionnaire was designed by a multidisciplinary team of researchers from 10 different European countries. Our aim was to contribute to a better understanding of public perceptions of biodiversity change in different sites across the continent, and to explore how these views relate to the discourses in science, politics and the media. To this end, we tried to capture not only the respondents' views on changes in their natural environment, but also their views on how nature should be managed. We also obtained a selection of socio-demographic background variables.

The questionnaire was organised in four major parts: (i) questions on perceptions of recent changes in species numbers and habitats at different spatial scales, (ii) attitudes towards relevant actors and management approaches, (iii) questions eliciting value orientations with regard to wildlife and conservation issues generally, and (iv) socio-demographic questions.

Many questions followed the Likert format and asked the participants to choose the response option on a 5-point scale that reflected their view best. For instance, in the first question the respondents were asked (a) what changes, in their view, had occurred during the last 20 years at different spatial scales (global and local), and (b) how they felt about this on a scale from -2 (very worried) to +2 (very satisfied). This was followed by an open-ended question, asking respondents: “Have you personally noticed changes in animal and plant numbers in your local environment? If so, what are these changes? Please describe them here.” An overview of a selection of questions is given in Table 2.

A master version of the questionnaire was produced in English language, translated and qualitatively pre-tested in 10 countries (including Norway and Germany) with a wide range of members of the public. Difficulties and inconsistencies, for example with regard to translations, were jointly discussed and addressed.

3.3 Data analysis

All collected data was compiled in one shared dataset, carefully checked, and analysed in smaller teams that concentrated on different research questions. This report includes a summary of more descriptive, exploratory analyses with the objective to give an overview of the type of data we collected and some general findings. In-depth analyses will be published separately. Additionally, responses to open-ended questions were compiled in a separate file, translated, and coded according to the main ideas of our research questions.

All statistical analyses reported here were carried out with SPSS and Excel.

Table 2: Selected components of the questionnaire "Your views on changes in animals, plants and their habitats". Order of questions in the table does not reflect their order in the questionnaire. Wording of items partly shortened.

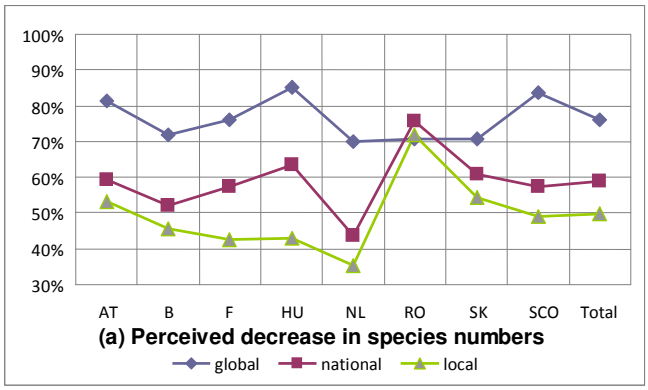
TOPIC	ITEMS IN QUESTIONNAIRE
Perceptions of and concern about biodiversity change in general	1. "In your view, what change has occurred during the last 20 years on (i) the entire planet, (ii) in your country and (iii) in your local environment?" *Response options*: (a) decline, (b) increase, (c) move of species, (d) no change 2. "How do you feel about this?" *Response options:* very worried (-2) to very satisfied (+2) 3. Have you personally noticed changes in animal and plant numbers in your local environment? *Response options*: yes/no; plus open-ended question to describe own observations 4. How do feel about potential changes in habitats, plants and animals due to climate change? *Response options*: not at all worried (0) to extremely worried (5)
Perception of and concern about changes in species and habitats	5. "In your view, has the number of these animals and plants/the extent of these habitats changed in the last 20 years"? *Response options*: decreased (-2) to increased (+2), plus 'don't know' 6. How desirable is a moderate increase of these species/in these habitats? *Response options*: very undesirable (-2) to very desirable (+2) ▪ species: tiger, African elephant, large herbivore, house sparrow, garden spider, native problematic bird, non-native plant and native symbolic tree (see Table 3) ▪ habitats: forests, city parks, undisturbed lakes and wetlands, open land, plantations and farmland (see Table 4)
Attributes associated to selected species	7. "How would you describe the following species?" (a) roe deer/red deer or wolf, (b) garden spider, (c) non-native plant (see Table 3) *Response options: Semantic differential* ▪ extremely attractive (-2) to extremely unattractive (+2) ▪ extremely strong (-2) to extremely vulnerable (+2) ▪ extremely valuable (-2) to extremely worthless (+2) ▪ extremely common (-2) to extremely rare (+2) ▪ extremely harmful (-2) to extremely harmless (+2) ▪ extremely foreign (-2) to extremely native (+2)
Views on political actors	8. "In your view, who among the following has got a strong positive or negative influence on animals, plants and their habitats?" *Response options*: not at all (1) to very much (5) 9. "To which degree are they actually assuming their responsibility and act accordingly?" *Response options*: not at all (1) to entirely (5) ▪ actors for Question 8 and 9: everybody in their everyday life, local population, farmers, foresters, tourists, hunters, conservationists, industry, local governments, national governments, European Union 10. "In your view, who should make decisions about the management of wild animals, plants and habitats?" *Response options*: not at all (1) to to a large degree (5); list of actors see Table 7

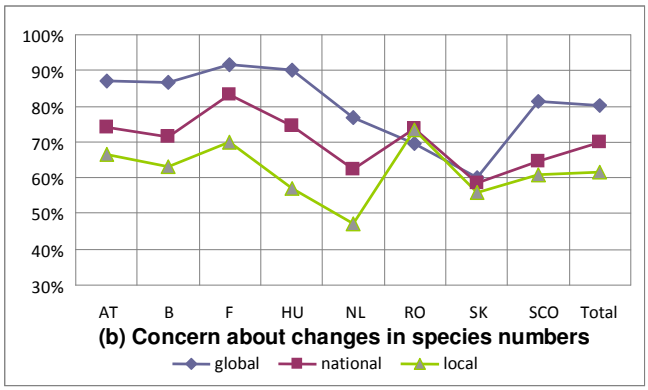
	11. “How much do you feel you can trust the following when they talk about land management and the management of wild animals?” *Response options*: trust not at all (1) to trust entirely (5); list of actors see Table 8
Effectiveness of policies	12. “How effective are each of the following measures, in your view, to fight potentially unfavourable changes in our natural environment?” *Response options*: not at all effective (1) to extremely effective (5), list of policies see Section 7
Familiarity with terminology: biodiversity and protected area categories	13. “Many of the following terms are often used by scientists and policy makers. How useful are these terms for you?” a) ‘National parks’, b) ‘Nature reserves’, c) ‘NATURA 2000’, d) ‘Biodiversity’ *Response options:* ▪ I use the word myself quite often ▪ I know what it means, but rarely use it ▪ I have heard about it, but wouldn’t be able to explain it ▪ I have never heard about it.
Conservation scepticism (adapted from Thompson & Barton 1994, Bjerke & Kaltenborn 1999)	14. “Some people think that ‘too much fuss’ is being made about environmental issues and nature conservation. What do you think?” *Response options:* strongly disagree (1) to strongly agree (5) a. It seems to me that most conservationists exaggerate and are very pessimistic b. Most nature conservation projects are too expensive and don’t work c. Too much emphasis has been placed on conservation.
Wildlife-related value orientations (adapted from Teel et al. 2005)	15. Selected items from Wildlife Value Orientation scale (Teel et al., 2005) *Response options:* strongly disagree (1) to strongly agree (5) a. Hunting does not respect the lives of animals. b. I care about animals as I do about other people. c. Humans should manage wildlife populations so that humans benefit. d. I feel a strong emotional bond with animals. e. Animals should have rights similar to the rights of humans. f. In [country], people who want to hunt should be provided the opportunity to do so. g. In [country], it should be acceptable for people to kill wildlife if they think it poses a threat to their property. h. I view all living things as part of one big family.
Interest in outdoor activities	16. “How interested are you in the following activities?” *Response options:* not at all interested (1) to very interested (5), list of activities see Table 12
Engagement in environmental organisations	17. “Are you a member of a nature conservation organisation or another organisation involved in management of nature” (a) “If so, of which organisation(s)?” (b) “If so, how often do you participate in meetings and activities of these organisations?” *Response options:* never (1) to every week (5)
Socio-demographic variables	▪ Gender ▪ Age ▪ Highest educational attainment ▪ Occupation ▪ Household’s monthly total net income ▪ Stratum (rural, semi-urban, urban)

4 Perceptions of and concern about biodiversity change at different spatial scales

A majority of our respondents perceived a decrease in the numbers of animal and plant species: 76% at a global scale, 59% at a national scale, and 50% at the local scale (Fig. 2a, 'total' refers to all 8 sites). Thus, respondents perceived greater species loss at the global level than at the local level in all sites except for the small island of Brăila, where perceptions of species decrease did not differ across spatial scales. This implies that for many people, biodiversity loss at the global level was a shared concern, whilst locally, processes of change were seen as more complex: At the local scale, 8% of the respondents thought species were increasing, 21% perceived a shifting of species (without clear incidence of increase or decrease), and 22% perceived no change at all (see also Table A in Appendix).

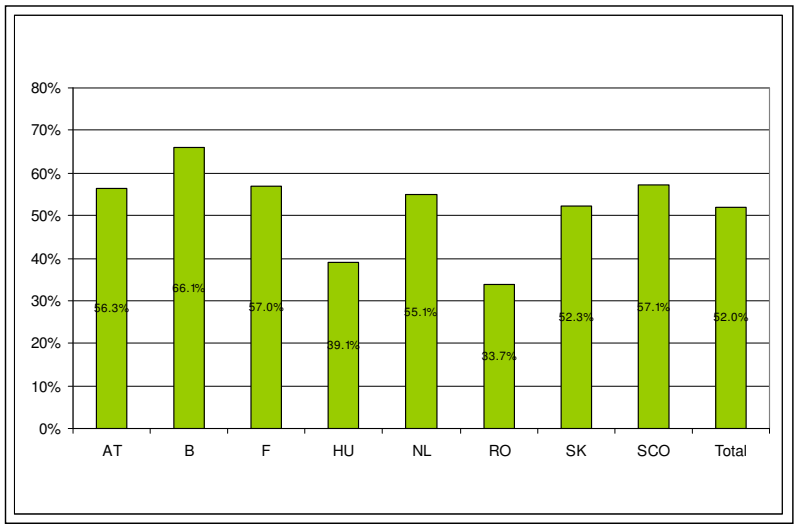
Fig. 2: (a) Perceived decrease in species numbers (percent of respondents stating there was a decrease, as opposed to an increase, move of species but no clear decrease of increase, or no change at all) and **(b) concern about changes in species numbers** (percent of respondents stating to be very or somewhat worried about recent changes) **at global, national and local levels**





Eighty percent of all respondents worried ‘somewhat’ or ‘strongly’ about the changes they perceived at a global level, 70% at the national level and 62% at the local level (Fig. 2b). Again, in most sites, concern about global species change was stronger than concern about changes at the national and local levels. As expected, respondents who thought species numbers had globally decreased were significantly more likely to be worried about these changes than those who thought species were shifting, increasing or not changing at all (ANOVA, $p<0.001$). This relationship also held at the local level.

Fig. 3: Percentage of respondents who had personally noticed changes in animal and plant numbers in their local environment



Fifty-two percent of all respondents had personally noticed changes in species numbers in their local environment, ranging from 34% in Romania to 66% in Belgium (Fig. 3), and described these in a response to an open-ended question in their own words. Respondents who had noticed changes themselves were more likely to be worried about local changes (mean score -1.0, SD=0.98) than those who had not noticed any changes themselves (mean score -0.4, SD=1.0, T-test, $p<0.001$). Interestingly, the same held for changes at the global level: those who had noticed changes locally tended to be more worried about global changes than those who had not, although the difference was somewhat smaller. It thus seems that local observations can also affect opinions at the global scale – or, that concern about global change sensitises people for changes in their own local environment.

A qualitative analysis of our respondents' own observations supported the findings from the close-ended question: At the local level, not only decreasing populations and disappearing species had been observed by the respondents, but also rising numbers of previously rare animals and plants, as well as new species coming into the area. In particular, our exploration of these observations showed that (for more information see Mauz et al., forth):

- The frequency with which species were mentioned varied across taxonomic groups. Changes in bird species were most frequently reported, but respondents also paid a lot of attention to certain types of plants (especially colourful flowers).
- In all study sites, certain animals and plants were said to be increasing or even proliferating and, in cases, returning: respondents drew a mixed picture of changes in animal and plant numbers. Many of them stated an increase in certain species and a decrease in others, a typical answer being "more crows, fewer sparrows".
- Population increases or the (re-)appearance of species was not always seen as a positive trend. Many species perceived as increasing were also perceived to be out of place, the 'wrong' species in the 'wrong' place, or as simply too abundant.
- Many of our respondents' observations implied a sensory engagement with nature. They relied on changes in what they could see, hear, smell, or taste, to express their opinions about changes in nature. These sensory activities appeared to take place primarily in the garden, and to a lesser extent, in public parks, but not necessarily while directly engaging with nature. They could also take place while walking one's dog, or driving.

According to the IPCC Fourth Assessment Report (IPCC 2007), ecosystems and species are very vulnerable to climate change. Approximately 20% to 30% of all plant and animal species are threatened by a high risk of extinction if the temperature rises by 2 or 3 °C above pre-industrial levels. During the pre-test of our survey instrument, we noticed that potential impacts of climate change on animal and plant species were a widespread concern. We thus included an item in our questionnaire to capture these worries (Table 2, Question 4). On av-

erage, scores ranged between ‘somewhat worried’ and ‘very worried’, with particularly strong concerns in the Belgian site (mean=2.92, SD=0.96), and least concern in the Slovak site (mean=2.3, SD=0.93). No clear patterns of variation across sites could be discerned.

As aforementioned, such concerns seemed to form part of people’s broader pictures of the future of our environment. Respondents concerned about biodiversity in relation to climate change (Question 4) also tended to be more concerned about biodiversity change in general (Question 2). We found significant correlations between the two variables for (a) the global ($r=-0.38$, $p<0.001$), (b) the national ($r=-0.34$, $p<0.001$), and also (c) the local level ($r=-0.30$, $p<0.001$).

5 Perceptions of and concern about changes in species and habitats

A second objective of the survey was to assess perceptions of population changes and related concerns at the species level. We chose two non-European species of global interest that had been used as flagships for conservation in previous decades, namely the tiger and the African elephant, and six sets of species that were present in the study sites, relatively widely known, and that fulfilled certain set-specific criteria. For each site we selected (a) a large herbivore, charismatic, but potentially seen as problematic, (b) a small and unspectacular bird, namely the house sparrow *Passer domesticus*, (c) the garden spider *Araneus diadematus* as an invertebrate that potentially evokes ambivalent feelings, (d) a bigger, native bird species that was seen as a ‘pest’ by some parts of the population, (e) a non-native plant and (f) a charismatic, native tree species (Table 3).

By using these attributes to select the species for inclusion in our questionnaire, we did not imply that our respondents would necessarily perceive them in a similar way. For example, we did not assume a priori that respondents would know that ecologists classified the plant species selected under (e) as ‘non-native’. Instead, we asked which attributes *they* associated with the plant (see Section 6).

Table 3: Perceived decrease and desirability of a moderate increase in species' populations

Percentages for decrease include 'somewhat' and 'strongly decreased', percentages for 'increase desirable' include 'somewhat' and 'very desirable'. For total values see Fig. 4.

	AT	B	F	HU	NL	RO	SK	SCO
Tiger								
decreased	93%	95%	95%	91%	94%	77%	81%	94%
increase desirable	76%	78%	66%	79%	66%	39%	51%	81%
African elephant								
decreased	74%	86%	84%	85%	75%	74%	83%	84%
increase desirable	66%	75%	65%	75%	62%	45%	60%	75%
Large herbivore	***roe deer***	***roe deer***	***ibex***	***red deer***	***red deer***	***red deer***	***roe deer***	***red deer***
decreased	27%	62%	42%	55%	22%	82%	56%	26%
increase desirable	35%	73%	63%	65%	39%	73%	62%	38%
House sparrow								
decreased	39%	86%	47%	31%	72%	22%	47%	63%
increase desirable	46%	83%	39%	29%	63%	27%	28%	56%
Garden spider								
decreased	37%	20%	53%	21%	21%	20%	17%	32%
increase desirable	27%	30%	30%	24%	26%	11%	21%	34%
Native problematic bird	***grey heron***	***magpie***	***magpie***	***magpie***	***greylag goose***	***magpie***	***starling***	***herring gull***
decreased	56%	29%	25%	44%	21%	37%	38%	16%
increase desirable	53%	37%	18%	50%	27%	27%	31%	12%
Non-native plant	***golden rod***	***locust tree***	***locust tree***	***rhodo-dendron***	***giant hogweed***	***Bidens sp.***	***locust tree***	***rhodo-dendron***
decreased	28%	41%	37%	56%	24%	24%	36%	31%
increase desirable	38%	62%	39%	53%	16%	21%	33%	40%
Native symbolic tree	***yew***	***common oak***	***common oak***	***Scots pine***	***common oak***	***white willow***	***common beech***	***Scots pine***
decreased	51%	57%	56%	73%	45%	54%	64%	66%
increase desirable	54%	76%	62%	80%	64%	71%	68%	76%

While perceptions of and concern about change varied across sites and species, an overall tendency seemed to emerge, suggesting that some types of species (tiger, African elephant, herbivore, house sparrow, native tree) were more likely to be seen as declining whereas others tended to be seen as increasing (non-native plant, garden spider, problematic bird; Table 3; see Table B in Appendix for site-specific results). For most of the species a moderate

population increase was seen as desirable, especially for the tiger, the African elephant and the native symbolic tree. This clearly merits a more in-depth analysis, as it is essential to understand how these species are seen by our respondents (see Section 6).

With regard to habitat types, respondents across all eight sites tended to state that the extent of semi-natural habitats (old growth forests, undisturbed lakes, open land) had decreased more strongly than human-influenced habitats (parks, plantations, farmland), but that an increase in all habitat types was, on average, seen as desirable (Table 4).

Table 4: Perceived decrease and desirability of a moderate increase in extent of habitats

Percentages for decrease include 'somewhat' and strongly decreased', percentages for 'increase desirable' include 'somewhat' and 'very desirable'.

	AT	B	F	HU	NL	RO	SK	SCO
Forests								
decrease	55%	86%	57%	81%	79%	87%	75%	78%
increase desirable	89%	91%	49%	85%	85%	86%	79%	83%
City parks								
decrease	29%	23%	30%	47%	34%	58%	59%	47%
increase desirable	87%	86%	83%	89%	73%	70%	78%	74%
Undisturbed lakes and wetlands								
decrease	30%	72%	n/a	76%	64%	61%	52%	60%
increase desirable	65%	81%	n/a	87%	81%	76%	41%	77%
Open land	***lowland hay meadow***	***heath***	***alpine meadow***	***moorland***	***heather moorland***	***lowland hay meadow***	***abandoned grassland***	***heather moorland***
decrease	74%	71%	63%	77%	64%	69%	33%	56%
increase desirable	90%	81%	59%	57%	76%	81%	39%	66%
Plantations	***forest***	***forest***	***forest***	***forest***	***forest***	***forest***	***orchards, vineyards***	***forest***
decrease	21%	38%	21%	36%	35%	44%	68%	27%
increase desirable	41%	64%	51%	46%	46%	69%	66%	59%
Farmland								
decrease	43%	20%	8%	44%	14%	55%	68%	59%
increase desirable	50%	34%	7%	54%	22%	81%	60%	57%

We found strong positive relationships between the perceived previous decrease and the desirability of a moderate population increase of a species (Table 5). Also, perceived decreases in habitat types were correlated with desirability of increase, ranging from a some-

what weak correlation for city parks (r=-0.131, p<0.001) to a stronger correlation for farmland (r=-0.521, p<0.001).

In summary, our respondents were generally more likely to think that a population or a habitat should increase in the future, if that population or habitat had been seen to decrease in the recent past.

Table 5: Perceived decrease in relation to desirability of moderate increase in species and habitats, total sample.

Percentages for decrease include 'somewhat' and 'strongly decreased', percentages for 'increase desirable' include 'somewhat' and 'very desirable'. Correlations are between perceptions of change from decrease (-2) to increase (+2) and desirability of a moderate population increase from very undesirable (-2) to very desirable (+2). Significance level: *** p<0.001

	Decrease	Increase desirable	Correlation
Species from other continents			
Tiger	90%	67%	-.273***
African elephant	81%	65%	-.323***
Animals and plants			
Large mammal	46%	56%	-.457***
House sparrow	52%	46%	-.451***
Garden spider	26%	25%	-.389***
Native problematic bird	33%	32%	-.561***
Non-native plant	34%	38%	-.540***
Native symbolic tree	58%	69%	-.245***
Habitats			
Forests	75%	81%	-.289***
City parks	41%	80%	-.131***
Undisturbed lakes and wetlands	61%	72%	-.310***
Open land	63%	68%	-.363***
Plantations	37%	56%	-.290***
Farmland	39%	46%	-.521***

6 Attributes associated to species

To find out more about how species were seen, and how such mental representations of species were related to people's views on their future development, we used a semantic differential (Table 6, see also Table 2, Question 7). We elicited more detailed views on three of the six species that had been covered by the previous questions, namely (a) the deer spe-

cies (in France, the wolf was chosen instead); (b) the garden spider and (c) the non-native plant species (see Table 3 for species). For each pair of attributes (e.g. attractive – unattractive), respondents were asked to mark the point on the scale that came closest to their opinion.

Table 6: Example from the questionnaire: Attributes associated to species

In my opinion, roe deer are:

	extremely	somewhat	neutral	somewhat	extremely	
attractive	-2	-1	0	+1	+2	unattractive
strong	-2	-1	0	+1	+2	vulnerable

For many attributes, associations with the deer species/wolf tended to concentrate on one side of the spectrum. Respondents expressed on average much more 'neutral' associations with garden spiders and the respective non-native plant species, as the bulk of the scores tended to concentrate in the middle of the spectrum (Fig. 4). This might be an indication that for well-known and visible species such as deer or the wolf, many members of the public might hold much clearer representations than for less visible species – at least with regard to the attributes used in our semantic differential.

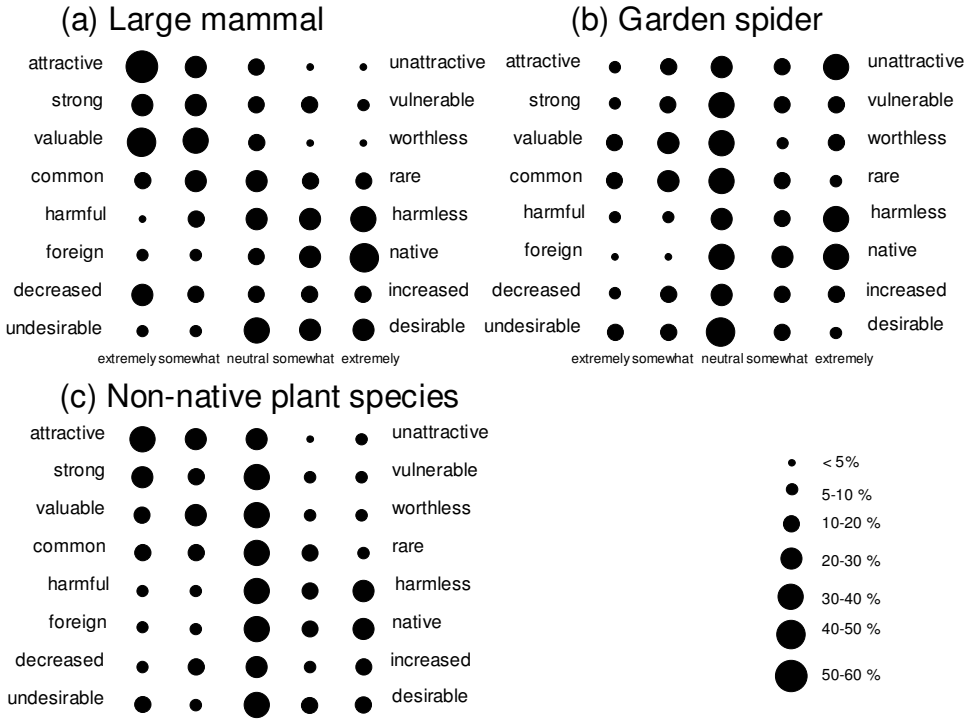
Interestingly, the non-native plant species were seen as native or neutral by 81% of the total sample. This was most striking in the Romanian and the Slovak sample, where only about 10% rated *Bidens* and the locust tree *Robinia* as 'somewhat' or 'extremely foreign', whereas in Scotland *Rhododendron* was considered foreign by 34% of the sample. This implies that even for those species that we selected for their non-nativeness from an ecological viewpoint, this attribute does not seem to be distinctive for these species in the eyes of the general public (Table C in Appendix).

For many attributes, scores were surprisingly homogenous across study sites. For example, in each of the sub-samples, at least 80% rated the mammal species as somewhat or extremely attractive. Perceptions of other attributes were more ambivalent, because of the different cultural and natural contexts in the different sites, but also due to the fact that for the mammal and non-native plant questions, site-specific species were chosen. This was most

striking in the case of the attribute pair “strong –vulnerable” associated to the mammal. Seventy-three percent of the respondents in the sites where views on red deer were elicited considered this animal as ‘extremely’ or ‘somewhat strong’. In contrast, only 37% in the areas where we asked about roe deer thought so of this smaller species. In the French sample, 63% considered the wolf as strong.

Fig. 4: Attributes associated to selected species.

The size of the circles is proportional to the percentage of respondents selecting the respective response option. For the attribute pair “decreased-increased”, a “don’t know” response option was given (deer: 10%; spider: 27%; plant: 28%, not included in diagram).



However, representations could also differ substantially even where we referred to the same species across all sites. In the case of the garden spider, 67% of the Romanian sample considered the animal as ‘extremely’ or ‘somewhat harmful’. This compares to 10% across the rest of the sample. And indeed, even the views among the researchers in the team diverged and followed the same pattern – an indication of the social genesis of such representations. A similar pattern emerged with regard to the attribute pair “valuable – worthless”, while only 7% of the Romanian sample considered garden spiders as valuable, 48% of the remaining total sample thought so. Forty-eight percent of the Romanian sample felt an increase in spiders was undesirable, while only 23% of the rest of the sample thought the same.

The respondents' perceptions of these attributes were by no means unconnected from each other, but showed particular patterns that were also related to the respondents' social background. These patterns are analysed and discussed in detail in Fischer et al. (forth).

7 Views on political actors and biodiversity-related policies

Another element of the survey addressed the role of political actors in biodiversity management. We asked our respondents to evaluate (i) the influence (positive or negative) of a range of different actors on animals, plants and their habitats, (ii) the degree to which these actors took their responsibility seriously, and finally (iii) who should make decisions about wildlife and land management (Table 2, Questions 8, 9, 10).

Tourists, as well as "everybody" and local populations, were seen to have a relatively low, yet still considerable influence on local nature (Table 7, second column). In contrast, farmers, foresters, conservationists and industry were seen as more influential, while the influence of governments and the European Union was perceived to be somewhat weaker. Views on the influence of different actors on nature were relatively undifferentiated, however, there was much more variation with regard to the degree to which these actors were seen to act in a responsible way (Table 7, third column): Conservationists, foresters, and, to a slightly lower degree, farmers and hunters, were seen as taking their responsibility with regard to wildlife and land management relatively seriously. In contrast, tourists and "everybody in their everyday life", but also industry (which was regarded as very influential), were seen as acting in a less responsible way.

In line with this, support for decision-making on wildlife management was strongest for conservationists and lowest for industry (Table 7, last column). Both the "local population" and "local population with practical experience" (consisting of farmers, foresters and hunters) as well as local and national governments and the European Union fell in between.

Table 7: Perceptions of influence, degree to which political actors assume their responsibility, and support for decision-making (total sample). Response options: 'not at all' (1) to 'very much' (5). 'n.a.' refers to groups not considered in the question. Cells show mean scores (large font) and standard deviation (small font). For site-specific results see Tables D and E in Appendix.

	Have influence (positive or negative) on wildlife	**Take their responsibility seriously and act accordingly**	**Should make decisions in wildlife and land management**
	mean standard deviation	**mean** standard deviation	**mean** standard deviation
Everybody in their everyday life	3.5 1.14	2.4 0.96	n.a.
Local populations	3.6 1.07	2.6 0.93	3.2 1.23
Farmers	4.0 1.04	2.9 1.08	3.9 1.10
Foresters	4.0 1.04	3.4 1.05	
Hunters	3.8 1.12	2.9 1.17	
Conservationists	4.0 1.09	3.9 1.04	4.1 1.02
Scientists	n.a.	n.a.	3.9 1.08
Tourists	3.6 1.19	2.2 1.05	n.a.
Industry, companies	4.0 1.27	2.1 1.08	2.4 1.43
Local governments	3.7 1.10	2.7 1.00	3.7 1.14
National governments	3.8 1.17	2.6 1.04	3.7 1.21
The European Union	3.6 1.20	2.8 1.12	3.6 1.31

In addition, we examined respondents' trust in a selection of actors (Table 2, Question 11). The respondents trusted scientists/biologists the most, followed by representatives from conservation organisations and employees of the nature conservation agency (or other relevant management agencies). Rural dwellers were also trusted information sources, as were friends, relatives and people that the respondents personally knew well. Members of the parliament were overall seen as least trustworthy sources of information (Table 8).

Table 8: Trust in selected actors when they talk about land or wild animal management

Response options: 'trust not at all' (1) to 'trust entirely' (5). Large font shows mean scores, small font shows standard deviation.

	AT	B	F	HU	NL	RO	SK	SCO	Total
Newspapers and TV	2.44 1.08	2.63 0.85	2.18 0.90	2.54 1.06	2.52 0.73	2.91 1.17	2.80 1.08	2.19 0.88	**2.53** 1.01
Scientists, biologists	3.81 1.01	3.73 0.87	3.77 0,80	4.40 0.63	3.47 0.86	3.76 1.07	3.90 0.95	3.39 0.91	**3.78** 0.94
People who live in the rural area	3.82 0.95	2.97 0.92	3.29 0,89	3.54 0.94	3.03 0.89	3.17 1.13	3.40 1.06	3.56 0.85	**3.34** 1.00
Employees of the (relevant management agency)	3.15 1.06	3.72 0.89	3.01 0,91	3.30 0.98	3.72 0.89	3.46 1.12	3.57 1.08	3.72 0.88	**3.46** 1.01
Farmers	3.52 1.03	2.63 1.00	2.69 1,00	3.26 1.01	3.00 0.92	3.04 1.19	3.18 1.06	3.17 1.00	**3.06** 1.06
Representatives from conservation organisations (e.g., environmental protection agencies)	3.89 1.08	3.57 0.95	3.58 0,94	4.05 0.92	3.25 0.99	3.59 1.10	3.29 1.19	3.55 0.95	**3.59** 1.05
Hunters	3.41 1.16	2.33 0.99	2.47 1,06	3.34 1.08	2.50 0.93	2.72 1.23	3.33 1.10	2.11 0.99	**2.78** 1.17
Local politicians	2.27 1.01	1.83 0.71	2.61 0,83	2.22 1.12	2.10 0.80	2.56 1.47	2.17 0.99	1.88 0.88	**2.20** 1.04
Friends, relatives and other people that I personally know well	3.51 1.11	3.01 0.95	3.35 0,96	3.50 1.04	2.84 0.89	3.30 1.11	3.67 1.01	3.40 0.98	**3.32** 1.04
Members of the parliament	1.79 0.89	1.86 0.72	2.04 0,84	1.86 0.99	2.05 0.85	1.71 1.10	2.02 1.01	1.90 0.88	**1.90** 0.92

Finally, we explored the relationships between (i) influence and responsible action and (ii) responsible action and support for decision-making. Generally, the more influential actors were seen to be, the more they were perceived to take their responsibility seriously (e.g., for conservationists $r=0.4$, $p<0.001$). However, this relationship was very weak in the case of industry and tourists ($r=0.04$ and $r=0.03$, both $p<0.001$), emphasising that these actors were not seen as conscientious and responsible. Correlations between the degree to which responsibility was taken seriously and support for decision-making of the respective actor were more homogeneous, ranging from $r=0.2$ for local populations to 0.34 for the European Union (all $p<.001$). This implies that actors that are seen to behave in a responsible way tend to be those that should, in the eyes of the respondents, make the decisions (Table 9).

Table 9: Correlations between influence, responsibility and support for decision-making

All variables scaled from 'not at all' (1) to 'very much' (5). 'n.a.' refers to groups not considered in the question. Levels of significance: *** p<0.001, ** p<0.005, * p<0.01

	Influence * responsible action	Responsible action * support for decision-making
	correlation	correlation
Everybody in their everyday life	.077***	n.a.
Local populations	.158***	.199***
Farmers	.187***	.279***
Foresters	.247***	.240***
Hunters	.196***	.217***
Conservationists	.403***	.337***
Scientists	n.a.	n.a.
Tourists	.030***	n.a.
Industry, companies	.037***	.229***
Local governments	.223***	.241***
National governments	.212***	.218***
The European Union	.332***	.343***

Table 10: Principal Component Analysis based on scores for actors' (a) perceived influence on and (b) responsibility assumed for animals, plants and their habitats. Rotated Component Matrix, rotation method: Varimax with Kaiser Normalization.

	(a) perceived influence: component			(b) responsibility assumed: component		
	1	2	3	1	2	3
Everybody		*.850*			*.830*	
local populations		*.856*			*.825*	
farmers		*.582*	*.530*		*.644*	*.416*
Foresters			*.789*			*.766*
tourists		*.575*			*.529*	
hunters			*.657*			*.565*
conservationists			*.789*			*.780*
industry, companies	*.635*			*.642*	*.405*	
local governments	*.828*			*.788*		
national governments	*.889*			*.852*		
European Union	*.805*			*.790*		

Furthermore, we explored if some of the actors were seen as similar with respect to perceived influence (Table 10a) and the degree to which they assumed their responsibility (Table 10b). A principal component analysis (PCA) suggested that local governments, national governments and the European Union were seen as a coherent group. Another coherent

group was formed by “everybody” and “the local population”, and a third coherent group consisted of foresters, conservationists, and hunters.

We also elicited our respondents’ views on the effectiveness of different types of biodiversity-related policies (Table 2, Question 12). The policy instruments included ranged from regulations to support for collective action and market-based incentives (Table 11), and were evaluated on a scale from 1 (not at all effective) to 5 (extremely effective).

Table 11: Effectiveness of management measures

Response options: ‘not at all effective’ (1) to ‘extremely effective (5). Large font shows mean scores, smaller font shows standard deviations.

POLICY INSTRUMENT	AT	B	F	HU	NL	RO	SK	SCO	total
More protected areas in which animals and plants species are preserved	3.89 0.93	4.03 0.98	3.78 0.84	4.09 0.91	3.70 0.96	3.97 1.20	3.35 1.04	3.79 0.92	**3.82** 1.01
Stricter governmental regulations that guide everybody’s use of energy, land and other natural resources	3.75 1.13	3.74 1.09	3.41 1.08	4.04 0.98	3.56 1.12	3.72 1.34	3.28 1.13	3.28 1.14	**3.60** 1.16
Stricter regulations for the agricultural sector, e.g. limiting the use of fertilisers and pesticide	4.18 0.96	3.78 1.13	3.74 1.10	4.06 0.90	3.67 1.05	3.72 1.39	3.35 1.18	3.68 1.06	**3.77** 1.13
More financial support to those farmers who take care of wild animals and plant life in their land	3.67 1.17	3.61 1.14	3.40 1.08	3.85 1.07	3.66 1.14	4.01 1.28	3.62 1.08	3.69 0.99	**3.69** 1.13
Stricter regulations that limit the construction of new buildings in the countryside	3.90 1.07	3.82 1.14	3.35 1.01	3.54 1.18	3.64 1.14	3.45 1.39	3.20 1.13	3.37 1.31	**3.53** 1.20
Easier access to information and more educational campaigns to raise everybody’s ecological awareness	3.71 1.05	3.57 1.07	3.82 1.04	4.09 0.99	3.22 1.12	3.86 1.31	3.44 1.02	3.44 1.01	**3.64** 1.11
Stricter environmental regulations for the industrial sectors, e.g. limiting emissions	4.11 0.97	4.39 0.94	3.86 1.22	4.43 0.80	4.18 0.97	3.86 1.39	3.69 1.06	3.91 1.07	**4.06** 1.09
Cheaper prices for the environmentally friendly products, for example cheaper organic food	4.00 1.05	3.89 1.16	3.63 1.16	4.10 1.05	3.68 1.20	3.84 1.39	3.77 1.09	3.60 1.22	**3.82** 1.18
Promotion of voluntary activities of citizens and companies, e.g. maintenance of natural areas	3.41 1.13	3.48 1.02	3.48 0.99	3.72 0.98	3.19 1.14	3.48 1.47	3.37 1.07	3.37 1.00	**3.44** 1.12

Surprisingly, our respondents seemed to have no clear preferences. All measures were on average seen as “somewhat effective” or “quite effective” by the respondents. “*Stricter environmental regulations for the industrial sectors*”, were overall perceived as most effective (mean=4.06), while the “*Promotion of voluntary activities of citizens and companies*” was evaluated as least effective (mean=3.44). No clear patterns of perceived effectiveness could be found. Our respondents were either not able (or willing) to discriminate between the different measures with regard to their effectiveness – or the question was understood as a

general request for support for environmental policies. This might have been different had we included more controversial measures such as restrictions of individual behaviour or household taxes. It might also make sense to distinguish in the design of the questionnaire more clearly between effectiveness and desirability of policy options.

8 Knowing the terminology: 'biodiversity' and protected area categories

Understanding biodiversity is not the same as knowing the word 'biodiversity'. In previous, qualitative research, we explored what biological diversity meant to people, and argued that rather than focusing on people's knowledge of the scientific terminology and classifying it as 'correct' or 'incorrect', research should aim to understand the concepts people construct and use to make sense of their environment (Buijs, Fischer, Rink & Young 2009; Fischer & Young 2007).

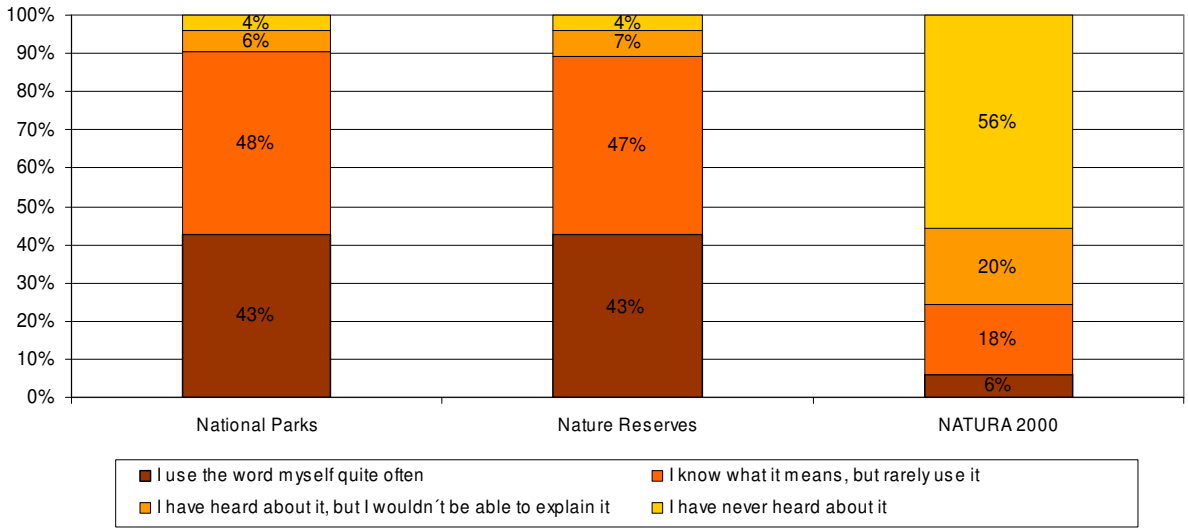
However, we decided to include a simple measure of public awareness of policy terms in this survey – not only because an overview of public familiarity with these terms can facilitate communication between policymakers, conservationists and the public. We also argue that people familiar with these terms might be participants (or at least aware) of the same discourse(s), namely those that are communicated by key actors in biodiversity conservation. We thus investigated familiarity with the terms 'biodiversity', 'national parks', 'nature reserves' and 'Natura 2000', asking "How useful is this term to you?" (Table 2, Question 13). Response options ranged from 'I use this word myself quite often' to 'I have never heard about it'. We found that the term biodiversity was 'known but rarely used' by more than 42%, but actively used by less than 10% of the respondents (see Table F in Appendix) – only slightly more than for the term Natura 2000 (Fig. 5).

A comparison of the three designation categories (national park, nature reserve and Natura 2000) revealed that 'national parks' and 'nature reserves' were widely known (by about 90%

of the total sample) – a consistent finding across all sites except the Braila islands where these terms were known by only about 50%.

This was in stark contrast to the category 'Natura 2000'. Fifty-six percent of our respondents had never come across the term (Fig. 5). This is probably on the one hand due to the relatively short existence of this ecological network of protected areas in the European Union. On the other hand, relevance and meaning of the two more familiar categories (and in the case of national parks, also their designation purpose) are much more closely related to people's everyday experience.

Fig. 5: Familiarity with the words 'National parks', 'Nature reserves' and 'NATURA 2000'



Who were the respondents expressing higher familiarity with these terms? Do our findings, as we hoped, tell us anything about our respondents' relationship with current conservation discourses? Across all sites, respondents with a university degree were much more likely to be familiar with the term 'biodiversity' than respondents without a degree (Mann-Whitney, $p<0.001$). However, this relationship held only to a limited degree when applied to the designation categories. There, university education was unambiguously related to higher familiarity with all designation categories only in the Romanian and Slovak samples, whereas the other samples showed no clear patterns in this respect. Familiarity with the term biodiversity was only weakly and ambiguously related to the more general environmental value orientations that will be described in the next sections.

9 Conservation scepticism

We included two constructs adopted from the literature that tapped more general value orientations. First, we translated the three 'environmental apathy' items suggested by Thompson and Barton (1994) and used by Bjerke and Kaltenborn (1999) into the context of nature conservation (Table 2, Question 14). While these authors used the term 'apathy', it might be misleading to believe that the items reflected only apathy towards conservation in general – the items focus on institutionalised conservation and thus only on one aspect of what conservation might mean to the respondents. These items provided us with a measure of sceptical, situation-transcendent views on (or even resistance to) institutionalised conservation – we thus refer in this report to 'conservation scepticism' rather than 'apathy'. They gave the respondents an opportunity to express anti-conservation attitudes in an explicit way, in a context which might otherwise be perceived as leading and as solely allowing pro-conservation views.

Across the whole sample, the three items together produced a Cronbach's alpha of 0.74 (ranging from 0.6 in the Hungarian sample to 0.76 in the Belgian sample) and thus showed an acceptable inter-item reliability. We thus used the three items scores together as an index for further analysis.

Overall, our respondents did not express a large degree of conservation scepticism, as the average score lay between 'somewhat disagree' (2) and 'neither agree nor disagree' (3). With a mean score of 3.3 (SD=1.0), the Slovak sample was most sceptical towards conservation, while the Austrian (mean=2.2, SD=0.85) and French samples (mean 2.3, SD=0.97) were the least sceptical according to this measure.

This index was then used to explore if (a) perceptions of biodiversity change were related to generally sceptical views on conservation and (b) we could identify groups among the public that were particularly sceptical towards conservation (see Sections 10, 11; Fischer et al., forth).

10 Wildlife value orientations

To investigate the respondents' value orientations with regard to the management of the natural environment in more detail, we included a short eight-item version of the Wildlife Value Orientation scale (WVO, Teel et al., 2005; see Table 2, Question 15). The WVO was developed in the USA and includes two subscales to capture (a) a utilitarian stance towards wildlife management that supports the use of wildlife for human needs through, for example, hunting, and (b) a more caring, mutualist stance that sees wildlife as part of an extended family. Main criterion for the selection of items for our survey was their applicability to the European context, which was tested in-depth, like all variables, in a qualitative pre-test of the questionnaire.

In the analysis, we used four items that reflected a mutualist value orientation (Cronbach's alpha= 0.76, indicating a good inter-item reliability) and two items that reflected a utilitarian value orientation (Cronbach's alpha= 0.53, indicating a relatively poor inter-item reliability), and formed indices out of these.

Based on these two dimensions, Teel and her co-authors (Teel et al., 2005) suggest constructing a typology of four different positions. In addition to a utilitarian and a mutualist wildlife value orientation, they distinguish a pluralist position (people holding both a mutualism as well as a utilitarian value orientation towards wildlife) and a distanced position (holding neither a mutualism nor a utilitarian value orientation) (Fig. 6).

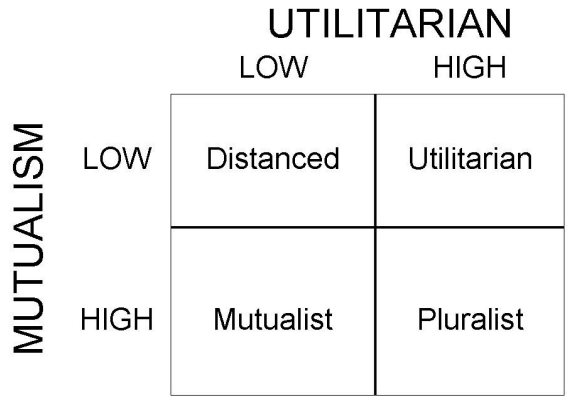


Fig. 6: Typology of wildlife value orientations (Teel et al. 2005)

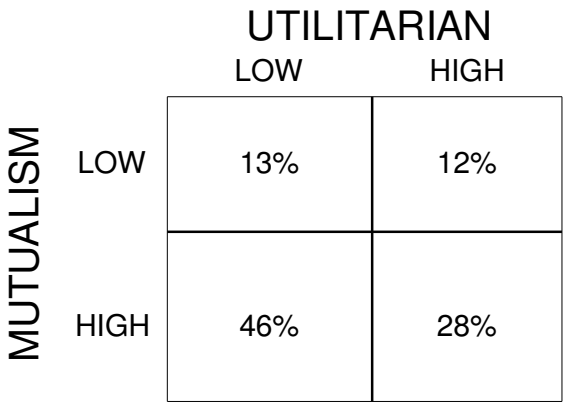


Fig. 7: Percentage of respondents expressing mutualist (bottom left), distanced (upper left), utilitarian (upper right) and pluralist (bottom right) value orientations.

Similar to Teel et al. (2005), we classified value orientations according to these two dimensions. Distributions were split at score 3.0 for either index, for example, respondents who scored lower than 3.0 in both the mutualism and the utilitarianism index were classified as distanced. We found that almost half of all respondents expressed a mutualist stance (Fig. 7). However, considerable differences existed between the eight sites (Fig. 8).

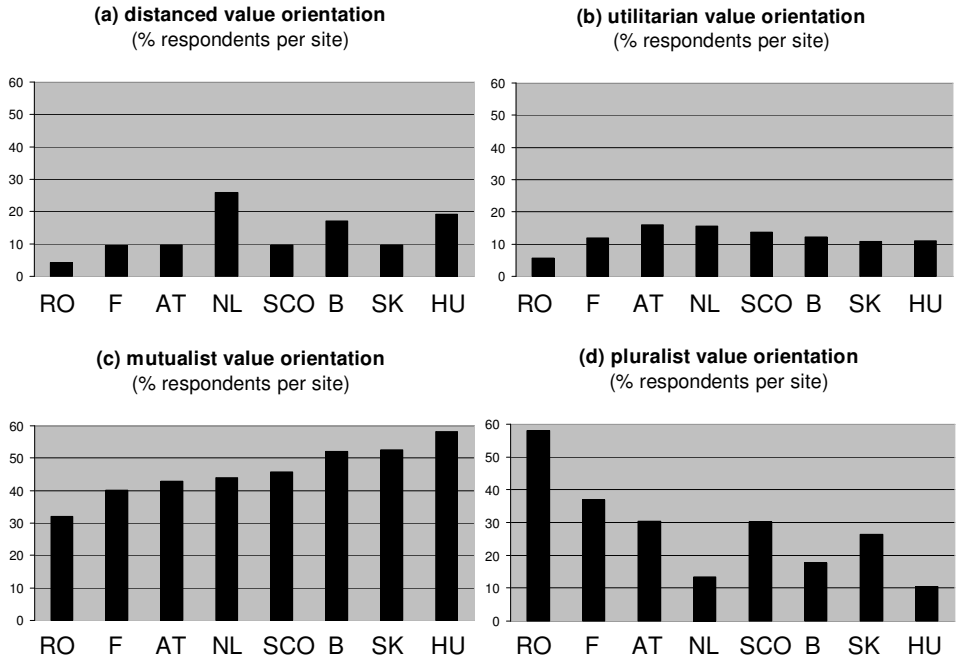


Fig. 8: Percentage of respondents per site expressing (a) distanced, (b) utilitarian, (c) mutualist and (d) pluralist value orientations.

Generally (except for the Romanian sample), the proportion of utilitarians in a site-sample was inversely related to the proportion of mutualists. In the Romanian sample we found an extremely high proportion of pluralists (almost 60%), whereas the Dutch sample included a relative high percentage of distanced views.

In our view, the rather unsatisfactory reliability of the utilitarianism sub-scale calls for further exploration of the applicability of this scale in a European context. As a first step, we thus explored how the two wildlife value orientation indices corresponded with other constructs in our questionnaire (see also Section 11; Fischer et al., forth.). For example, although there are no direct theoretical relationships between wildlife valuation orientations and conservation scepticism (Section 9), we might expect utilitarianism to correlate positively (or not at all) with conservation scepticism whereas mutualism should correlate negatively (or not at all). And indeed, in each site, utilitarianism correlated significantly with a sceptical stance towards conservation, with coefficients ranging from $r=0.15$ in the Romanian sample ($p<0.05$) to $r=0.4$ in the French sample ($p<0.001$). The picture was more mixed in the case of the mutualism sub-scale. Significant relationships did not emerge in the Hungarian, Romanian and Belgian samples, and coefficients were generally relatively low, ranging from -0.16 ($p<0.01$) in Slovakia ($p<0.01$) to -0.24 in France ($p<0.001$). Correspondence between these two different constructs was overall especially low in the Romanian sample. Further analyses of our data will elucidate the relevance of wildlife value orientations for understanding public views and perceptions in European contexts.

11 Interest in outdoor activities

Respondents were also asked to state their personal interest in 10 nature-based recreation activities. We focused here on interest as opposed to actual engagement ("How often do you participate in…?"), as we saw interest to reflect social identity better than actual engagement, which in people's everyday lives is often compromised by structural factors such as family commitments.

Table 12: Interest in outdoor activities

Response options: 'not at all interested' (1) to 'very interested' (5). Large font shows mean scores, small font shows standard deviation.

	AT	B	F	HU	NL	RO	SK	SCO	Total
Appreciative									
hiking, hill walking, mudflat walking	3.95 -1.10	n.a.	4.02 1.14	n.a.	2.50	n.a.	3.50 1.21	3.15 1.41	3.41 1.36
going for walks, exploring nature	4.40 0.77	4.36 0.80	4.24 0.98	3.46 1.25	4.46 0.76	3.21 1.65	3.76 1.18	4.08 1.03	3.99 1.18
observing nature, nature photography	n.a.	3.00 1.23	3.53 1.16	2.80 1.42	3.04 1.29	2.44 1.53	n.a.	n.a.	2.95 1.38
bird watching, wildlife watching	3.77 1.13	3.64 1.04	n.a.	n.a.	n.a.	2.95 1.50	2.96 1.32	3.43 1.37	3.34 1.33
cycling (mountain biking)	n.a.	4.05 1.03	n.a.	3.37 1.19	4.12 1,109	n.a.	n.a.	n.a.	3.36 1.41
sailing, boating	n.a.	n.a.	n.a.	2.80 1.42	n.a.	3.21 1.65	n.a.	n.a.	3.01 1.55
voluntary rubbish picking	n.a.	n.a.	n.a.	2.40 1.18	n.a.	n.a.	n.a.	n.a.	2.40 1.18
Harvesting									
gardening	3.80 1.17	3.69 1.14	3.41 1.24	3.31 1.27	3.92 1.13	3.63 1.41	3.28 1.42	3.76 1.12	3.60 1.26
picking berries, mushrooms	3.34 1.34	3.25 1.19	3.49 1.16	2.83 1.31	3.14 1.26	2.52 1.55	3.50 1.30	2.65 1.40	3.08 1.37
Consumptive									
hunting, shooting	1.45 0.96	1.37 0.88	1.48 1.02	1.64 0.98	1.31 0.80	1.77 1.24	1.72 1.17	1.41 0.96	1.52 1.02
Fishing, angling	1.98 1.22	1.99 1.27	2.26 1.32	2.25 1.37	1.60 1.09	2.89 1.65	1.82 1.25	1.94 1.31	2.09 1.37
Sensation-seeking									
water sports (e.g. windsurfing, white-water kayak, canoeing, caving)	1.52 0.97	2.44 1.40	n.a.	2.54 1.40	2.05 1.29	1.62 1.19	1.62 1.04	1.52 1.00	1.90 1.26
climbing, mountaineering	2.72 1.43	n.a.	2.49 1.40	n.a.	n.a.	1.72 1.30	1.47 1.05	1.90 1.28	2.04 1.37
snowboarding, downhill skiing	2.87 1.46	2.20 1.45	2.95 1.51	2.28 1.42	1.98 1.37	n.a.	2.50 1.59	1.75 1.27	2.35 1.49
mountain biking (cycling)	3.38 1.27	2.36 1.29	2.80 1.34	n.a.	2.01 1.28	n.a.	2.92 1.45	2.31 1.44	2.38 1.34
rough camping	n.a.	n.a.	n.a.	n.a.	n.a.	1.69 1.28	n.a.	n.a.	1.69 1.28
Motorised									
going for ride by car, motorbike, landrover	2.54 1.15	2.60 1.31	n.a.	n.a.	2.56 1.25	n.a.	2.21 1.47	3.14 1.26	2.61 1.33
motocross, quad-biking	1.21 0.67	1.47 0.99	1.58 1.05	1.96 1.29	n.a.	1.40 1.03	1.43 1.00	n.a.	1.51 1.05
off-road driving	n.a.	n.a.	1.35 0.86	n.a.	n.a.	n.a.	n.a.	n.a.	1.35 0.86
motorised water sports	n.a.	n.a.	n.a.	1.74 1.13	1.44 0.96	1.84 1.39	n.a.	1.43 0.90	1.61 1.12
snowmobiling	n.a.	n.a.	1.55 1.05	n.a.	n.a.	n.a.	n.a.	n.a.	1.55 1.05

For each site, we included four appreciative, three consumptive, three sensation-seeking and two motorised activities (Table 2, Question 16). These were selected by the local research

teams to reflect geographical and social factors. In addition, gardening was included as an activity common to every site (Table 12).

We conducted a principal component analysis (PCA) to test whether the a priori classification of an activity (motorised, sensation-seeking and so forth) reflected actual commonalities between the different activities. For most activities, this was indeed the case. Exceptions were found only for some activities and some sites (e.g., cycling/mountain biking was most closely associated with other sensation-seeking activities in some sites while in others it fitted best into the 'appreciative' category). Based on the PCA, we formed indices to group the activities into five categories (Tables 12, 13).

Table 13: Interest in outdoor activity categories (mean index scores for appreciative, harvesting, consumptive, sensation-seeking, motorised)

Response options: 'not at all interested' (1) to 'very interested' (5), for all sites; mean is listed

	AT	B	F	HU	NL	RO	SK	SCO	Total
Appreciative	4.04	3.76	3.93	2.97	3.55	2.95	3.41	3.56	3.51
Harvesting	3.57	3.47	3.45	3.07	3.53	3.08	3.39	3.21	3.34
Consumptive	1.72	1.68	1.87	1.95	1.46	2.33	1.77	1.67	1.81
Sensation-seeking	2.63	2.33	2.75	2.41	2.02	1.68	2.13	1.87	2.21
Motorised	1.87	2.01	1.49	1.85	2.00	1.62	1.82	2.28	1.87

General interest in activity categories appeared to be relatively homogenous across sites (Table 13). Appreciative activities and harvesting (gardening; picking berries/mushrooms) are the most popular activities across all sites. Far fewer respondents were interested in sensation-seeking, consumptive and motorised activities. Moreover, the different activity indices were strongly correlated in the total sample. People who were interested in appreciative activities, such as going for walks and observing wildlife, tended to be also interested in gardening ($r=0.485$, $p<0.001$). Respondents interested in appreciative activities also tended to like sensation-seeking activities like water sports, skiing and mountaineering ($r=0.374$, $p<0.001$). And those who liked sensation-seeking activities tended to be also interested in motorised activities ($r=0.374$, $p<0.001$).

We also explored differences between sites (Tables 12, 13) and between rural and urban strata. Interestingly, while there were some differences between sites, which can be mostly

traced back to geographical factors (e.g., accessibility of sea, lakes, or mountains), there were no statistically significant differences between rural, semi-urban and urban sub-samples. This suggests that the direct environment of our respondents' dwelling place did not lead to different preferences for outdoor activities – not even for gardening, hunting or fishing.

Table 14: Outdoor activity indices grouped into two factors: factor 1 = appreciating nature as a dominant element (including harvesting), factor 2 ="action/fun" in nature as a dominant element

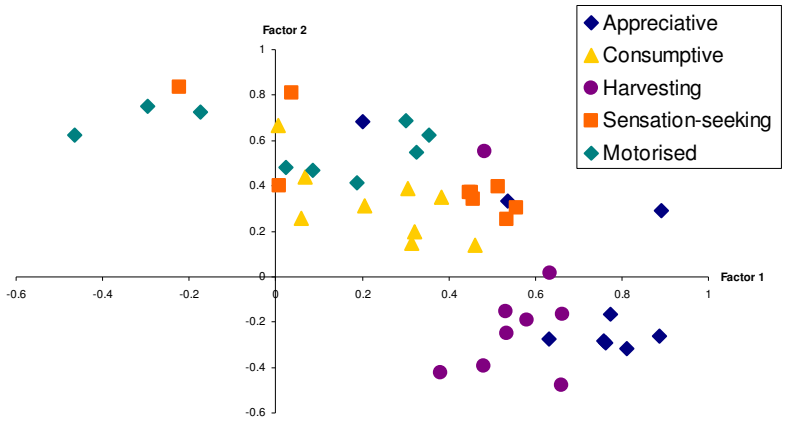
Factor loadings obtained from single site factor analysis (extraction method: Principal Axis Factoring). Mean factor scores = site-sample mean of factor scores obtained from factor analysis of total sample. Factor loadings >0.4 are displayed in bold letters.

	AT	B	F	HU	NL	RO	SK	SCO	Total
Factor 1 (mean factor scores)	0.406	0.186	0.323	-0.270	0.003	-0.452	-0.080	-0.103	0.000
Appreciative	**0.758**	**0.632**	**0.892**	**0.537**	**0.774**	0.201	**0.812**	**0.886**	**0.763**
Harvesting	**0.531**	**0.660**	**0.634**	**0.662**	**0.533**	**0.482**	0.381	**0.581**	**0.480**
Consumptive	0.306	**0.460**	0.059	0.067	0.206	0.006	0.315	0.383	0.321
Sensation-seeking	**0.452**	**0.514**	0.009	0.036	**0.456**	-0.222	**0.447**	**0.535**	**0.557**
Motorised	0.023	0.354	**-0.464**	-0.174	0.086	-0.297	0.301	0.187	0.325
Variance explained (in %)	23.08	28.71	28.32	15.25	22.84	8.19	23.86	31.82	26.61
Factor 2 (mean factor scores)	-.129	-0.421	-0.203	0.301	-0.077	0.0436	-0.323	0.100	0.000
Appreciative	-0.284	-0.276	0.291	0.332	-0.166	**0.685**	-0.317	-0.264	-0.290
Harvesting	-0.153	**-0.476**	0.017	-0.167	-0.249	**0.553**	**-0.423**	-0.192	-0.394
Consumptive	0.386	0.137	0.258	**0.439**	0.313	**0.665**	0.147	0.351	0.198
Sensation-seeking	0.371	0.397	0.399	**0.808**	0.342	**0.835**	0.369	0.252	0.304
Motorised	**0.479**	**0.625**	**0.624**	**0.726**	**0.470**	**0.750**	**0.689**	**0.413**	**0.547**
Variance explained (in %)	12.22	17.39	14.00	30.23	10.51	49.54	18.23	9.27	13.40

An additional factor analysis on these indices suggested that interest in both appreciative and harvesting activities represented a strong preference for appreciation of nature (factor 1) and a slight preference for tranquility as opposed to activity and fun (factor 2, Table 14, Fig. 9). Interest in motorised activities could be seen to express an orientation towards action and/or fun, and a neutral or for some countries even negative stance towards appreciation of nature. For these activities, nature might simply be a backdrop, providing the physical space where these activities can be carried out. A similar picture emerged in some sites for sensa-

tion-seeking activities. Interest in consumptive activities like hunting and fishing can be seen to express combined preferences for both appreciation and action. Thus, while the range of activities covered in this survey was quite broad, they can be seen to represent two very general types of preferences for outdoor activities.

Fig. 9: Factor plots for all outdoor activity indices: Each data point represents the factor loadings of a single country. Factor 1 = appreciating nature as a dominant element (including harvesting), factor 2 = "action/fun" in nature as a dominant element



To get a better understanding of these two preferences, we explored their relationships with conservation scepticism and the wildlife value orientation subscales (mutualism, utilitarianism, see Sections 9, 10). Factor 1 "appreciation" was negatively correlated with conservation scepticism ($r=-0.133$, $p<0.001$), positively correlated with mutualism ($r=0.095$, $p<0.001$) and not significantly correlated with utilitarianism. This implies that people not at all interested in activities that involve appreciation for nature were more likely to be conservation sceptics, and those who were very strongly interested in appreciative activities were more likely to express a mutualist stance. However, these correlations were very weak.

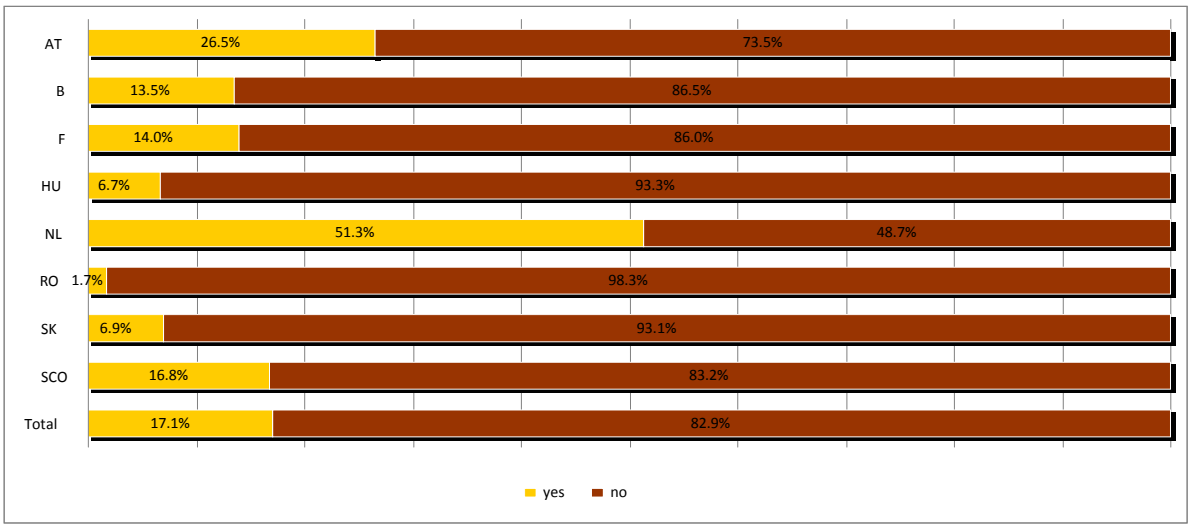
Factor 2 "action/fun" was negatively correlated with mutualism ($r=-0.159$, $p<0.001$) and positively correlated with both environmental apathy ($r=0.097$, $p<0.001$) and utilitarianism ($r=0.083$, $p<0.001$), but again, these relationships, while plausible, were rather weak.

We finally investigated how preferences for appreciation versus action/fun were related to concern about biodiversity change (Table 2, Question 2). People with a preference for nature appreciation were more likely to be worried about the changes they perceived at any level (global: $r=-0.18$, national: $r=-0.11$, local: $r=-0.11$, for all levels $p<0.001$), whereas respondents who preferred action and fun were slightly less likely to be worried about the changes they perceived at any levels (for each level $r=0.1$, $p<0.001$). Furthermore, there was a highly significant difference in the changes that respondents themselves had observed in their local environment. Those interested in activities that involved action and fun were more likely to state that they had not observed any changes. On the other hand those preferring nature appreciation were more likely to have personally observed such changes (both t-tests $p<0.001$).

12 Membership and participation in conservation and other relevant organisations

Overall, only a minority of the respondents (17%) were members of organisations engaged in conservation issues (or an organisation active in land management), but there were remarkable differences between the eight study sites. In the Dutch site, more than half of the respondents held memberships, whereas the Eastern European sites produced far lower membership rates, ranging from 2% in the Romanian to 7% in the Hungarian and Slovak sites (Fig. 10). Many respondents who stated to be members of a relevant organisation held more than one affiliation. On average, each member had 1.4 affiliations. This was most distinctive in the Dutch site (1.8 affiliations per member; Table 15 last row).

Fig. 10: Membership in conservation and land management organisations (%)



By means of a mix of multiple choice and open-ended questions ("other – please specify"), we collected information about the types of organisations our respondents were members of (Table 15). For the analysis, we grouped these according to their objectives and aims, for instance, all BirdLife International organisations (in Scotland, France, Hungary and Romania) were grouped into 'bird protection organisations'. In total, this provided us with eight types of organisations.

Table 15: Membership in conservation and land management organisations per type of organisation (in site columns: % of total number of members per site; in 'total' column: % of total number of members in total sample)

	AT	B	F	HU	NL	RO	SK	SCO	Total
WWF	15%	13%	10%	18%	24%	20%	0%	21%	19%
Greenpeace	14%	27%	7%	18%	20%	20%	0%	0%	15%
Bird protection organisations	0%	2%	10%	32%	3%	20%	0%	32%	8%
Nature conservation organisations	6%	42%	29%	0%	37%	20%	17%	31%	29%
Hiking organisations	52%	0%	5%	0%	0%	0%	0%	3%	9%
Hunting/fishing organisations	7%	6%	33%	14%	0%	20%	61%	7%	8%
Animal welfare organisations	2%	2%	2%	5%	1%	0%	0%	4%	2%
others	5%	8%	5%	14%	14%	0%	22%	1%	10%
Affiliations per person	1.21	1.20	1.11	1.10	1.77	1.00	1.10	1.36	1.42

Some types of memberships were more frequent than others. In general, nature conservation organisations (29%) were mentioned most frequently, followed by "WWF" and "Greenpeace".

For some types of organisations, affiliation rates varied substantially between the sites. In Austria for example, membership in hiking organisations was highly popular ("Alpenverein", 52%), as were hunting and fishing organisations in Slovakia (61%). Both types played only an inferior role in other sites – again, as with the outdoor activities probably to a large part due to geographical factors (vicinity to mountains etc.). Affiliations with WWF and Greenpeace were similarly frequent almost across all sites (with the exception of the Scottish site where Greenpeace was not mentioned).

Finally, we investigated how active members were in their organisations, for example, by participating in meetings. Regular participation in activities was rare. Memberships in WWF, Greenpeace and animal welfare organisations tended to be more passive (i.e., members participate in meetings rarely or not at all) than in other organisations. In contrast, members of hunting and fishing as well as hiking organisations were those with the highest active participation rate (Table 16).

Table 16: Participation in meetings and activities of relevant organisations (% of members)

	Never	once or twice per year	several times	once per month or more often
WWF	72.4%	17.1%	6.7%	3.8%
Greenpeace	75.0%	14.3%	8.3%	2.4%
Bird protection organisations	59.1%	25.0%	13.6%	2.3%
Nature conservation organisations	54.3%	26.5%	13.0%	6.2%
Hiking organisations	19.6%	29.4%	35.3%	15.7%
Hunting/fishing organisations	9.1%	13.6%	47.7%	29.5%
Animal welfare organisations	81.8%	0.0%	0.0%	18.2%

Is membership in organisations related to perceptions of and concern about biodiversity change? Members and non-members did not differ substantially in their perceptions of global, national or local changes. However, they differed in their concern about the biodiversity changes they perceived. With regard to global changes, members (mean=-1.34, SD=0.85) were on average more worried about changes than non-members (mean=-1.1, SD=0.87, T-test, $p<0.001$). However, no such difference was observed for concern about changes at the local or national level. Significantly more members of environmental organisa-

tions had personally noticed changes than non-members (χ^2, df=1, $p<0.001$). Again, this might either be due to a sensitising effect of memberships (through magazines and awareness campaigns by the organisations), or people became members because they had observed changes they were concerned about. Most likely, both variables have a mutually reinforcing effect on each other.

Perceptions of change differed also with regard to the six types of species that we included in the questionnaire (T-tests). Members were more likely to see herbivore populations (red deer, roe deer, ibex depending on site, Table 3), the non-native plant and the native, 'problematic' bird species as increasing ($p<0.001$). On average, house sparrows ($p<0.001$) and garden spiders ($p<0.01$) were seen by members to decrease more strongly than by non-members, whereas the opposite held for the native, symbolic tree species ($p<0.05$). Members and non-members did not differ significantly with regard to how desirable a moderate increase in the native symbolic tree, and also in the native problematic bird was seen. However, members found an increase in garden spiders and house sparrows significantly *more* desirable than non-members, and an increase in the herbivore and non-native plant populations significantly *less* desirable (all T-test $p<0.001$). These seem to correspond very well to the main messages of conservation organisations. Information on membership in relevant organisations thus provides us with important information on the social context of public perceptions of and concern about biodiversity change.

13 Socio-demographic variables

This section presents a selection of the socio-demographic variables included in our survey (Table 17).

Table 17: Socio-demographic data for all sites

	AT	B	F	HU	NL	RO	SK	SCO	Total
Gender									
male	57.4%	51.5%	60.3%	52.5%	52.7%	51.3%	49.7%	48.8%	52.9%
female	42.6%	48.5%	39.7%	47.5%	47.3%	48.7%	50.3%	51.2%	47.1%
n	265	299	267	299	292	300	306	287	2315
Age									
18-40	23.5%	41.2%	44.2%	61.7%	21.5%	42.7%	46.7%	20.3%	37.8%
40-60	38.1%	36.9%	26.3%	30.7%	37.7%	40.7%	35.9%	38.4%	35.7%
60+	38.4%	21.9%	29.5%	7.7%	40.7%	16.7%	17.3%	41.3%	26.6%
n	281	306	278	300	302	300	306	305	2378
Highest educational attainment									
primary, lower secondary	15.4%	27.5%	18.5%	0.7%	18.3%	29.3%	3.9%	13.3%	15.7%
upper secondary: academic	16.8%	23.7%	18.5%	13.8%	9.5%	27.0%	28.8%	19.4%	19.8%
upper secondary: vocational	48.4%	4.9%	18.1%	37.9%	19.0%	21.3%	41.2%	11.9%	25.4%
college/university for up to 4 years	9.5%	32.4%	10.0%	47.7%	48.2%	6.3%	4.6%	35.7%	24.3%
university for 4 years or more	9.9%	11.5%	35.1%	0.0%	4.9%	16.0%	21.6%	19.7%	14.7%
n	273	287	271	298	284	300	306	294	2313
Occupation									
employed full time	35.4%	48.3%	32.7%	47.1%	27.8%	44.0%	45.4%	32.3%	39.3%
Employed part time	10.0%	9.7%	6.9%	3.8%	15.8%	1.7%	7.8%	13.7%	8.6%
self employed full time	5.2%	6.9%	3.3%	11.7%	7.4%	5.3%	9.2%	5.3%	6.8%
self employed part time	0.0%	1.0%	0.7%	3.1%	3.2%	0.3%	0.7%	4.7%	1.7%
unemployed	1.8%	1.0%	1.1%	1.7%	1.8%	4.7%	3.6%	1.3%	2.2%
retired, pensioner (incl sick-pension)	38.0%	21.4%	26.9%	9.3%	26.8%	26.0%	21.2%	31.7%	25.0%
homemaker	5.5%	5.9%	2.2%	1.0%	9.2%	9.0%	3.9%	5.7%	5.3%
studying/ in vocational training	2.2%	3.1%	22.2%	21.6%	1.1%	2.3%	6.9%	1.3%	7.5%
others	1.8%	2.8%	4.0%	0.7%	7.0%	6.7%	1.3%	4.0%	3.5%
n	271	290	275	291	284	300	306	300	2317
Household's monthly total net income									
median	1500-2000€	2000-2500€	2000-2500€	1000-1500€	2500-3000€	100-500€	500-1000€	2000-2500€	1000-1500€
Stratum									
rural	33.5%	36.3%	33.8%	62.0%	33.8%	33.0%	32.7%	32.1%	37.1%
semi-urban	31.3%	31.0%	27.9%	27.6%	24.8%	44.7%	33.3%	35.1%	32.0%
urban	35.2%	32.7%	38.2%	10.4%	41.4%	22.3%	34.0%	32.8%	30.8%
n	281	306	272	297	302	300	306	305	2369

14 Conclusions

Overall, this survey produced a wealth of both substantive and methodological findings, centring on public perceptions of and concern about biodiversity change. We found that the general idea of a global decrease in animal and plant species and concern about these changes seemed to be widely shared. Perceptions of biodiversity change at the local scale, however, were much more ambivalent. Views on biodiversity change were often connected to respondents own observations, concern about impacts of climate change on biodiversity (Section 4) and also membership in conservation organisations (Section 12). These links often worked across scales, suggesting that these factors might be mutually reinforcing each other.

An increase in animal and plant populations and extent of habitats was more desirable, the more a population or habitat had been seen to be decreasing in the recent past (Section 5). We found that respondents' mental representations of species were essential to understand why they saw a population increase in some species as desirable, whereas increases were considered undesirable in other species (Section 6; Fischer et al., forth.).These representations were socially shared, and constructs such as Wildlife Value Orientations (Teel et al., 2005; Section 9) and Conservation Scepticism (Thompson & Barton, 1994; Section 10) can be useful instruments in elucidating such relationships. If we want to assess public attitudes towards species-related conservation policies, we thus need to go beyond simple opinion polls as such attitudes are best understood in their conceptual and social contexts.

We also tried to elicit views (here: perceived effectiveness) on a range of different policy options with regard to biodiversity governance. However, our respondents did not differentiate in their effectiveness scores between the nine policy instruments included. This component of the questionnaire thus needs to be developed further (Section 7).

Interestingly, we found that the wide range of outdoor activities that we included in the questionnaire could be reduced down to two basic factors. The first one capturing appreciative activities, while the second one represented fun- and action-oriented activities. Interest in

these two types of activities was again closely linked to perceptions of biodiversity change (Section 11).

We selected participants from eight sites across Europe for this survey to test its applicability to a wide variety of contexts, explore differences, and to obtain a wide spread response. The sites selected were not representative for their respective countries, and the sample overall was not representative for the European Union. Our survey however can be seen as a pilot phase for a larger scale study that might include samples representative for entire countries. We are planning to conduct and publish additional and more in-depth analyses on the data from this survey, and explore opportunities for future applications, therefore do not hesitate to contact us with any questions or suggestions you might have.

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Appendix: Additional tables and figures

Table A: Perceptions of change in numbers of animal and plant species at the global, national and local level: percentage of respondents per site stating a 'decline', 'move of species', 'increase' or 'no change'.

Global	**AT**	**B**	**F**	**HU**	**NL**	**RO**	**SK**	**SCO**	**Total**	**n total**
decline	81.5%	71.9%	75.9%	85.3%	70.1%	70.7%	70.7%	83.7%	76.2%	1765
move	12.5%	19.5%	19.2%	9.3%	21.5%	13.3%	12.2%	11.3%	14.8%	75
increase	2.6%	3.8%	2.3%	1.7%	3.8%	5.0%	4.9%	1.7%	3.2%	342
no change	3.3%	4.8%	2.7%	3.7%	4.5%	11.0%	12.2%	3.3%	5.8%	134
n	271	292	261	300	288	300	304	300	2316	100,0%
National	**AT**	**B**	**F**	**HU**	**NL**	**RO**	**SK**	**SCO**	**Total**	**n total**
decline	59.2%	51.9%	57.3%	63.4%	43.7%	75.7%	61.0%	57.5%	58.8%	1348
move	28.1%	24.9%	30.2%	20.8%	34.2%	11.7%	15.1%	24.1%	23.3%	156
increase	4.2%	9.4%	4.8%	2.3%	11.6%	5.7%	6.9%	9.0%	6.8%	534
no change	8.5%	13.8%	7.7%	13.4%	10.6%	7.0%	17.0%	9.4%	11.0%	253
n	260	297	248	298	284	300	305	299	2291	100,0%
Local	**AT**	**B**	**F**	**HU**	**NL**	**RO**	**SK**	**SCO**	**Total**	**n total**
decline	53.3%	45.7%	42.5%	42.8%	35.3%	72.0%	54.3%	49.0%	49.6%	1128
move	23.7%	21.0%	25.5%	20.9%	24.5%	12.3%	13.5%	25.5%	20.7%	177
increase	4.7%	9.3%	4.9%	6.4%	12.9%	5.0%	8.2%	10.2%	7.8%	470
no change	18.3%	24.1%	27.1%	30.0%	27.3%	10.7%	24.0%	15.3%	22.0%	501
n	257	291	247	297	286	300	304	294	2276	100,0%

Table B: Perceived changes in deer, house sparrow, garden spider, native problematic bird, non-native plant, and native-symbolic tree species

	AT	B	F	HU	NL	RO	SK	SCO	Total
Deer									
somewhat/strongly decreased	27.2%	62.1%	41.8%	54.9%	21.8%	81.9%	55.9%	26.3%	46.4%
no change	39.2%	21.1%	18.9%	25.0%	32.3%	13.1%	17.4%	13.9%	22.7%
somewhat/strongly increased	33.6%	16.8%	39.3%	20.1%	45.9%	5.0%	26.7%	59.8%	30.9%
House sparrow									
somewhat/strongly decreased	39.0%	86.0%	46.8%	31.1%	72.2%	21.6%	46.8%	63.3%	51.8%
no change	32.0%	6.7%	28.8%	25.5%	11.5%	36.7%	28.9%	24.3%	23.7%
somewhat/strongly increased	29.0%	7.4%	24.3%	43.4%	16.3%	41.7%	24.3%	12.4%	24.4%
Garden spider									
somewhat/strongly decreased	37.1%	19.5%	52.6%	21.3%	21.1%	19.6%	17.1%	31.7%	26.4%
no change	42.9%	42.0%	37.7%	41.3%	46.6%	39.2%	52.2%	36.2%	42.4%
somewhat/strongly increased	20.0%	38.5%	9.7%	37.4%	32.3%	41.2%	30.7%	32.1%	31.2%
Native problemativ bird									
somewhat/strongly decreased	55.5%	29.1%	24.7%	44.1%	21.1%	36.8%	37.7%	16.2%	33.1%
no change	18.8%	21.4%	22.1%	31.5%	19.8%	34.7%	32.1%	12.7%	23.9%
somewhat/strongly increase	25.7%	49.5%	53.2%	24.4%	59.0%	28.5%	30.2%	71.2%	43.0%
Non-native plant									
somewhat/strongly decreased	28.3%	40.8%	37.4%	55.5%	24.1%	23.9%	35.6%	30.5%	33.7%
no change	41.9%	45.6%	31.3%	34.1%	24.1%	19.9%	36.6%	29.3%	32.4%
somewhat/strongly increased	29.8%	13.6%	31.3%	10.4%	51.8%	56.2%	27.8%	40.2%	33.9%
Native symbolic tree									
somewhat/strongly decreased	50.9%	56.9%	55.7%	72.5%	45.4%	54.2%	64.0%	65.6%	58.4%
no change	38.8%	29.6%	29.2%	12.5%	36.6%	20.7%	22.0%	21.5%	25.9%
somewhat/strongly increased	10.3%	13.5%	15.1%	15.0%	17.9%	25.1%	14.0%	12.9%	15.7%

Table C: Attributes associated to (a) deer species (wolf in France), (b) garden spiders and (c) non-native plant species.

Scales range from 'extremely attractive' (-2) to 'extremely unattractive' (2); 'extremely strong' (-2) to 'extremely vulnerable' (2); 'extremely valuable' (-2) to 'extremely worthless' (2); 'extremely common' (-2) to 'extremely rare' (2); from 'extremely harmful' (-2) to 'extremely harmless' (2); 'extremely foreign' (-2) to 'extremely native' (2). Cells show mean and standard deviation (small font).

	AT	B	F	HU	NL	RO	SK	SCO	Total
Deer/ wolf									
attractive/unattractive	-1.25	-1.46	-1.27	-1.29	-1.47	-1.43	-1.39	-1.47	**-1.38**
	0.86	0.82	0.88	0.84	0.72	0.97	0.87	0.77	0.85
strong/vulnerable	0.08	-0.22	-0.65	-1.17	-1.03	-0.38	0.12	-0.99	**-0.53**
	1.17	1.16	1.35	1.07	1.00	1.46	1.41	1.14	1.32
valuable/worthless	-1.06	-1.21	-0.58	-1.52	-1.35	-1.49	-1.41	-1.06	**-1.22**
	0.87	0.91	1.17	0.71	0.78	1.05	0.87	0.84	0.95
common/rare	-0.83	0.49	0.87	0.27	-0.19	0.26	-0.64	-0.31	**-0.02**
	1.01	1.06	1.02	1.20	0.98	1.47	1.24	1.04	1.26
harmful/harmless	0.46	0.99	0.00	0.82	0.66	1.20	0.99	0.19	**0.68**
	1.03	0.98	1.27	1.04	1.01	1.17	1.12	1.08	1.16
foreign/native	1.56	0.39	0.29	1.34	0.98	0.80	1.58	1.25	**1.03**
	0.91	1.20	1.37	0.96	0.97	1.23	0.87	1.02	1.17
Garden spider									
attractive/unattractive	0.37	0.69	-0.05	0.67	0.35	1.15	0.62	0.34	**0.53**
	1.28	1.24	1.30	1.21	1.28	1.11	1.29	1.20	1.28
strong/vulnerable	0.18	0.02	0.57	0.86	-0.25	-0.76	0.66	0.30	**0.19**
	1.02	1.29	1.03	1.17	0.99	1.23	1.11	1.06	1.23
valuable/worthless	-0.43	-0.79	-0.35	-0.14	-0.73	1.05	0.01	-0.42	**-0.21**
	1.18	1.20	1.07	1.20	1.04	1.07	1.32	1.14	1.28
common/rare	-0.08	-0.76	0.25	-0.29	-0.51	-0.04	-0.62	-0.51	**-0.33**
	1.12	1.08	0.97	1.07	0.94	1.32	1.22	1.00	1.14
harmful/harmless	0.71	1.15	0.62	0.62	1.07	-0.95	0.64	1.09	**0.61**
	1.09	1.06	1.12	1.24	0.97	1.19	1.11	1.01	1.28
foreign/native	0.90	0.92	0.54	0.69	0.80	0.33	0.74	1.04	**0.74**
	1.06	1.01	1.13	1.17	1.06	1.17	1.22	0.98	1.13
Non-native plant									
attractive/unattractive	-0.72	-1.14	-1.14	-1.40	0.03	0.41	-0.67	-1.24	**-0.73**
	1.01	0.93	0.84	0.81	1.40	1.21	1.17	1.00	1.23
strong/vulnerable	-0.21	-0.42	-0.21	0.71	-0.96	-0.92	-0.25	-0.82	**-0.39**
	0.94	1.07	1.09	1.18	0.94	1.06	1.10	1.11	1.19
valuable/worthless	-0.26	-0.89	-0.68	-0.90	0.11	0.72	-0.67	-0.22	**-0.34**
	0.98	0.97	0.99	1.06	1.16	1.16	1.06	1.08	1.19
common/rare	-0.28	-0.04	-0.35	0.87	-0.53	-0.58	-0.13	-0.73	**-0.22**
	0.97	0.91	0.99	1.05	1.02	1.12	1.15	0.96	1.13
harmful/harmless	0.44	1.00	0.71	1.17	-0.28	-0.61	0.54	0.59	**0.44**
	1.09	1.10	1.00	1.04	1.10	1.20	1.16	1.30	1.27
foreign/native	0.38	-0.03	0.74	0.19	0.25	0.48	0.68	0.02	**0.34**
	1.14	1.14	1.10	1.18	1.13	1.11	1.15	1.44	1.21

Table D: Perceived degree of influence (positive or negative) of political actors on animals, plants and their habitats for all countries

Response options: 'not at all' (1) to 'very much' (5). Cells show mean and standard deviation (small font).

	AT	B	F	HU	NL	RO	SK	SCO	Total
Everybody in their everyday life	3.7	3.5	3.7	3.8	3.3	3.2	3.4	3.5	3.5
	1.09	1.08	1.01	1.08	1.14	1.33	1.05	1.19	1.14
Local populations	3.9	3.5	3.7	3.9	3.4	3.2	3.6	3.7	3.6
	0.95	0.98	0.93	1.01	1.06	1.32	0.99	1.09	1.07
Farmers	4.4	4.1	4.2	4.2	3.9	3.2	4.0	4.1	4.0
	0.79	0.98	0.97	0.92	0.93	1.30	0.94	0.96	1.04
Foresters	4.5	3.6	4.0	4.4	3.6	3.7	4.3	4.2	4.0
	0.77	1.16	0.91	0.85	1.13	1.19	0.81	0.90	1.04
Tourists	3.5	3.6	3.8	3.9	3.4	3.3	3.5	3.4	3.6
	1.28	1.22	1.09	0.97	1.19	1.37	1.08	1.18	1.19
Hunters	4.0	3.8	3.5	4.1	3.4	3.6	4.1	3.5	3.8
	1.00	1.11	1.11	0.93	1.07	1.24	0.86	1.32	1.12
Conservationists	4.2	3.9	3.6	4.3	3.7	3.5	4.2	4.1	4.0
	1.01	1.07	1.01	0.96	1.05	1.23	1.05	1.02	1.09
Industry companies	3.8	4.3	4.1	4.5	4.0	3.8	3.9	3.7	4.0
	1.41	1.05	1.26	1.03	1.16	1.32	1.31	1.33	1.27
Local governments	3.5	3.9	3.5	3.9	3.9	3.9	3.5	3.7	3.7
	1.27	1.05	0.92	0.98	0.96	1.25	1.03	1.19	1.10
National governments	3.5	3.8	3.4	4.1	4.0	3.9	3.6	3.6	3.8
	1.26	1.11	1.14	0.99	1.01	1.25	1.19	1.24	1.17
The European Union	3.4	3.7	3.4	4.2	3.5	3.7	3.7	3.4	3.6
	1.38	1.13	1.09	0.88	1.23	1.21	1.16	1.24	1.20

Table E: Degree to which political actors are seen to assume their responsibility

Response options: 'not at all' (1) to 'very much' (5). Cells show mean and standard deviation (small font).

	AT	B	F	HU	NL	RO	SK	SCO	Total
Everybody in their everyday life	2.4	2.4	2.1	2.4	2.5	2.5	2.4	2.3	2.4
	0.82	1.00	0.74	0.99	1.05	1.11	1.01	0.78	0.96
Local populations	2.9	2.5	2.5	2.5	2.6	2.6	2.6	2.4	2.6
	0.83	0.90	0.79	0.95	0.95	1.15	0.96	0.78	0.93
Farmers	3.2	2.7	2.5	2.9	3.1	2.8	2.9	3.0	2.9
	0.94	1.13	0.92	1.04	1.10	1.23	1.04	1.01	1.08
Foresters	3.8	3.7	3.3	3.2	3.8	3.0	3.5	3.3	3.4
	0.95	0.97	1.00	1.08	0.88	1.13	1.00	1.05	1.05
Tourists	2.0	2.0	1.8	2.6	2.2	2.2	2.6	2.2	2.2
	0.87	1.08	0.95	1.05	1.16	1.11	0.97	0.87	1.05
Hunters	3.4	2.6	2.6	3.2	3.0	2.8	3.4	2.2	2.9
	1.03	1.20	1.08	1.07	1.16	1.15	1.06	1.07	1.17
Conservationists	4.3	4.0	3.9	4.2	3.9	3.2	3.9	4.0	3.9
	0.83	0.96	1.01	0.93	0.99	1.13	1.08	0.96	1.04
Industry companies	2.0	2.0	1.8	2.0	2.3	2.4	2.3	2.1	2.1
	0.89	1.12	0.89	1.06	1.23	1.22	1.16	0.87	1.08
Local governments	2.3	2.6	2.8	2.6	2.9	2.9	2.8	2.5	2.7
	0.82	0.96	0.81	0.94	1.04	1.28	1.02	0.84	1.00
National governments	2.3	2.6	2.4	2.5	2.9	2.7	2.7	2.5	2.6
	0.85	0.99	0.88	1.07	1.09	1.26	1.10	0.89	1.04
The European Union	2.1	2.7	2.7	3.3	2.7	3.2	3.2	2.4	2.8
	0.93	1.03	0.98	1.07	1.11	1.23	1.05	0.94	1.12

Table F: Familiarity with the word 'Biodiversity' – percentages of respondents per site

	AT	B	F	HU	NL	RO	SK	SCO	Total
I use the word myself quite often	1.1%	7.4%	26.3%	12.0%	8.3%	7.0%	3.0%	7.6%	9.0%
I know what it means, but rarely use it	21.1%	64.5%	63.9%	30.3%	63.1%	27.0%	18.4%	47.8%	41.9%
I have heard about it, but I wouldn't be able to explain it	27.2%	12.5%	8.8%	28.3%	15.0%	16.0%	26.6%	29.6%	20.6%
I have never heard about it	50.5%	15.55	1.1%	29.3%	13.6%	50.0%	52.1%	15.0%	28.6%

Table G: Interest in outdoor activities (mean scores for indices for appreciative, harvesting, consumptive, sensation-seeking, motorised)

Response options: 'not at all interested' (1) to 'very interested' (5)

	rural	semi-urban	urban	total
Appreciative	3.59	3.41	3.52	3.51
Harvesting	3.43	3.22	3.36	3.34
Consumptive	1.90	1.82	1.69	1.81
Sensation-seeking	2.27	2.18	2.18	2.21
Motorised	1.92	1.82	1.87	1.87