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The effect of knowledge, species aesthetic appeal, familiarity and conservation need on willingness to donate

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Knowledge, aesthetic appeal and familiarity

Abstract

Environmental non-governmental organizations (ENGOs) largely select flagship species for conservation marketing based on their aesthetic appeal. However, little is known about the fundraising effectiveness of this approach or how it compares to ecosystem conservation campaigns that use habitat types as flagships. By performing a willingness to donate (WTD) survey of potential online donors from Finland, we identified which motivations and donor characteristics influence their preferences for a range of different flagship species and ecosystems. Using the contingent valuation method and the payment card approach, we found the combined funding for eight mammal flagship species was 29% higher funding than for eight bird flagship species. Furthermore, the aesthetically more appealing species, as well as the species and ecosystems that are native to Finland, attracted the most funding. We then used ordinal logistic regression to identify the factors influencing a donor's WTD, finding that knowledge of biodiversity conservation and familiarity with the flagship was associated with an increased WTD to birds and ecosystems, and people with higher education levels had an increased WTD to ecosystems. Surprisingly, species aesthetic appeal was not related to an increased WTD, although "need of conservation" was, suggesting that highlighting the plight of these less appealing threatened species or ecosystems could raise money. Our results suggest that the factors driving donating to mammals, birds or ecosystems differ, and so underline the importance of considering the diverse motivations behind donation behavior in fundraising campaigns. They also provide new evidence of the motivations of online donors, an under-studied group who are likely to become an increasingly important source of conservation funding.

Keywords

Flagship species, ecosystem conservation, aesthetic appeal, conservation, familiarity, willingness to donate, fundraising, online donors

Introduction

Funds for biodiversity conservation are scarce relative to what is needed to halt the ongoing biodiversity crisis (White, Bennett & Hayes, 2001; Waldron *et al.*, 2013). Many environmental non-governmental organizations (ENGOs) raise money for conservation projects by seeking donations, but there is uncertainty over what influences donation behavior (Bennett, Maloney & Possingham, 2015). ENGOs often use species that are known to appeal to humans as flagships to raise funds (Wilcove, 2010; Smith *et al.,* 2012). Additionally, some ENGOs raise money for ecosystem conservation. A better understanding of the factors affecting donation behavior would increase the effectiveness of conservation marketing campaigns, as well as help less appealing species and ecosystems by identifying those attributes that donors consider important (Veríssimo *et al.*, 2017). Many studies dealing with this topic have explored how extrinsic and intrinsic motivations, moral motivation or social identity explain donation behavior (e.g. Brekke *et al.* 2003; Lee & Chang, 2008, Dono *et al*, 2010). The conservation marketing perspective (cf. Wright *et al.*, 2015) to donation behavior complements these findings by trying to understand the needs and preferences of target audiences (Akchin, 2001). This study aims to increase understanding of the factors affecting target audience choice of flagship species and ecosystems to help improve the effectiveness of fundraising marketing strategies.

Individuals' willingness to contribute to conservation via flagship species has previously been studied from the viewpoint of tourists (Kontoleon & Swanson, 2002; Veríssimo *et al.,* 2009), students (Tkac, 1998) and the urban public (Tisdell, Swarna Nantha & Wilson, 2007). Recently, online donating has become an important fundraising method for charities (Hart, 2002; Bennett, 2009; Shier & Handy, 2012; Mejova *et al.,* 2014; Shin & Chen, 2016), helped by the rapid increase in social media use by their target audiences (Saxton & Wang, 2014). Thus, individuals who follow ENGOs' social media accounts form a new source of potential donors. However, few studies have focused on online donors (Mejova *et al*., 2014), so the mechanisms underpinning their donation behavior remain poorly understood (Bennett, 2009; Shier & Handy, 2012; Mejova *et al.*, 2014). Furthermore, a recent study on humanitarian charities suggests the factors driving online donation behavior may differ from traditional "offline" donating (Saxton & Wang, 2014).

Traditionally, flagship species are selected based on their aesthetic appeal (Caro & Girling, 2010; Smith *et al.,* 2012), which includes attributes such as large body size (Smith *et al*., 2012; Macdonald *et al*., 2015), warm and bright colours (Stokes, 2007; Prokop & Fancovicova, 2013), and "human-like" anthropomorphic traits (Root-Bernstein *et al.*, 2013; Borgi & Cirulli, 2015), such as a flat face (Sundqvist, 1992) and forward-facing eyes (Smith *et al.,* 2012). As aesthetic appeal is associated with preferences towards wild and domestic animals (Woods, 2000), and willingness to support species conservation (Metrick & Weitzman, 1996; Martin-Lopez, Montes & Benayas, 2007; Colléony *et al.*, 2017), it is no surprise that aesthetically appealing species are predominantly used in conservation marketing.

Donation behavior may be driven by attributes other than aesthetic appeal, as donors have been found to be a heterogeneous group with dissimilar preferences (Cárdenas & Lew, 2016). Thus far, numerous studies have examined underlying factors influencing willingness to pay (WTP), such as species' conservation attributes (Tisdell *et al.*, 2005; Meuser, Harshaw & Mooers, 2009), aesthetic vs. scientific attributes (Metrick & Weitzman, 1996; Martin-Lopez *et al.*, 2007), and environmental knowledge (Batel, Basta & Mackelworth, 2014; Ferrato, Brown & McKinney, 2016). Nevertheless, with some exceptions (e.g. Martin-Lopez *et al.*, 2007), most studies have examined these factors individually, and have concentrated mainly on exploring factors that affect donating to species, leaving factors driving donations to ecosystem conservation understudied. Geographic locality (or familiarity) of the species (Martin-Lopez *et al.*, 2007; Macdonald *et al.* 2015; Cárdenas & Lew, 2016) or ecosystem may also affect the donation decision. However, there is mixed evidence about the association between "patriotic" values or ethnocentrism and donation behavior. More specifically, some authors have found donors to prefer local conservation causes (Dallimer *et al.*, 2015; Cárdenas & Lew, 2016), whereas others have found no evidence (Verissimo *et al.*, 2018).

It is still unclear how respondent's prior knowledge affects WTP for wildlife conservation. Although previous studies have found knowledge and WTP positively associated (Batel, *et al.*, 2014; Ferrato *et al*, 2016), this might be an artefact of the study design because the WTP-survey first involved testing, and thus increasing, respondents knowledge. Similarly, studies on the effect of information provision in surveys found an increase in WTP after respondents were exposed to additional information (e.g.Tkac, 1998; Tisdell & Wilson, 2004; Tisdell *et al.*, 2007), although Lariviere *et al.* (2014) perceived similar effects with well-informed respondents only when they had been told their quiz results. A high level of education has also been found to increase the WTP for wildlife conservation (Veríssimo *et al.*, 2009; Baranzini, Faust & Huberman, 2010), but the association between educational field and WTP for wildlife conservation has so far been unexplored. The field of education may affect whether the respondent gives more importance to conservation need than to aesthetic appeal.

All of this means donor willingness to fund a specific conservation flagship will depend on a range of factors, including the donor's characteristics and level of conservation knowledge, as well as the species' aesthetic appeal, familiarity/locality and perceived conservation need. Moreover, all of these factors are interdependent and so need to be examined together. In this study we examined how these factors explain willingness to donate (WTD) to flagship species and ecosystems among potential online donors. We sought to answer the following questions: 1) Which factors influence WTD to flagship species that vary in their aesthetic appeal and familiarity/locality? 2) Which factors affect WTD to ecosystem conservation? 3) How, if at all, does prior knowledge of biodiversity conservation relate to WTD to flagship species and does it vary with the aesthetic appeal and familiarity/locality of the species, or to ecosystem conservation? 4) What is the role of donor characteristics on WTD to flagship species or ecosystems?

Materials and methods

Survey design and implementation

We interviewed representatives of three Finnish ENGOs from appropriate departments (administration, fundraising and communications) to help design the questionnaire (Online Appendix S1). The survey was pre-tested on undergraduate environmental science students (n=22), and a group of conservation biologists and researchers, and non-experts (n=27). We targeted the main survey at potential adult online donors, i.e. people who have shown an interest in nature conservation or the work of Finnish ENGOs by following their Facebook pages. We implemented our survey in co-operation with one ENGO, the Finnish Association for Nature Conservation, who posted our survey on their Facebook page (https://www.facebook.com/luonnonsuojeluliitto). The survey was online between 9th and 21st May in 2015. We received 2130 responses, but had to exclude 51 (3 blank, 14 incomplete and 34 underage), resulting in 2079 valid responses. Most of the respondents were women and city-dwellers, half of them had donated previously and one third were ENGO-members (Table 1). Our respondent sample was self-selected (cf. Bethlehem, 2008), and therefore we did not extrapolate the results to the whole Finnish population.

Willingness-to-donate method

We used the contingent valuation method to assess relative differences in allocating money to ecosystems and flagship species. We used a hypothetical donation to an ENGO as a payment vehicle. We had 14 bid levels ranging from €0 to €500, which were chosen based on discussions with ENGOs, pilot studies and previous studies (e.g. Giraud *et al.* 1999; Reaves *et al*, 1999; Baranzini *et al*., 2010). Consequently, we asked our respondents to think about a total sum that they were willing to donate to the conservation of four ecosystems altogether, and then to allocate the sum between these ecosystems. Subsequently, after randomizing the respondents into two groups, we asked the same question about eight mammal (Group 1) and eight bird species (Group 2). This method was similar to the Martin-Lopez *et al*. (2007) study, where respondents first stated their WTD to a hypothetical fund, and then chose five of fifteen species to which the donation would be targeted.

Choice of conservation causes

Because mammals and birds are predominantly used as flagship species, we chose these taxonomic groups for closer examination. To reduce the effect of taxa on WTD-decisions, each respondent concentrated on either mammals or birds (Table 2). We chose our study species so that we had four native and four non-native species to Finland that are used as flagships either by an ENGO operating in Finland or abroad (Online Appendix S2), allowing us to explore differences between native vs. non-native species, as well as the possible effect of familiarity/locality noted in previous studies (e.g. Woods, 2000; Martin-Lopez *et al.,* 2007). We chose species that varied in their aesthetic appeal (ie. colourful vs. brown, cute vs. ugly, large vs. small, species with vs. without anthropomorphic traits). The determination of species' aesthetic appeal was based on a literature review. For example, bats were perceived as ugly or unattractive in previous studies (Knight, 2008; Vincenot *et al*., 2015). Our study species occur in four different ecosystems: savanna, rainforest, Finnish old-growth forest and Finnish freshwater ecosystems, and thus we chose these as study ecosystems (Table 2).

We used freely available photographs under Creative commons license from Flickr and Wikipedia for each species and ecosystems (see a description of selection process of the photos in Online Appendix S2). As information provision or learning in a survey has been found to affect WTD estimates (Tkac, 1998; Tisdell *et al*., 2007; Lariviere *et al.*, 2014), we gave only colour photographs and the common names of the species to be able to study the effect of aesthetic appeal independently from (perceived) need of conservation. For the same reason, WTD-questions were asked prior to the questions about biodiversity conservation.

Self-reported drivers of willingness-to-donate

We wanted to test the effect of different drivers on hypothetical donations. After stating the WTD to ecosystems and species, the respondents were asked to evaluate how different potential drivers had affected their WTD-choices using a five-point Likert-scale ranging from "very much" to "very little". We included drivers that have previously been identified as influencing conservation decisions by government agencies (Metrick & Weitzman, 1996) and on WTP among visitors of a national park (Martin-Lopez *et al.*, 2007). These were: 1) Threat or rarity, 2) Beauty, cuteness, aesthetic appeal, 3) Is present in Finland, 4) Familiarity, 5) Evokes positive feelings and 6) Confined geographical range. All these drivers, apart from the last one, were also used for the ecosystems.

Biodiversity conservation knowledge

We created a four-question quiz with conservation biology experts at the University of Helsinki to measure respondent's knowledge of biodiversity conservation (KBC) (see Online Appendix S1) using a similar scoring system as Uliczka *et al.* (2004). The questions were rated individually on a scale ranging from zero to two (0=wrong, 1=partially correct, 2=correct), with a maximum score of eight points. The scores were used as an explanatory variable in subsequent analyses. Furthermore, as knowledge related to biodiversity conservation can also be obtained through education, we included the field of education (i.e. whether the respondent was educated in the natural sciences, agriculture or forestry) as a possible factor explaining the WTD-choices.

Respondent characteristics

We collected information about respondents' gender, education level, the type of residential environment and memberships of ENGOs.

Data-analysis

We used SPSS Statistics 22 and R version 3.4.3 to analyse the data. All respondents evaluated four ecosystems, whereas one half of the respondents evaluated mammals (Group 1) and the other half birds (Group 2). We performed an independent samples Mann-Whitney U-test to compare differences in WTD across these two groups (groups 1 and 2). In the survey we attempted to replicate a genuine donation situation where the donor chooses one of the predetermined values that s/he considers the most suitable for each cause. Thus, the values are ranked but not within equal intervals. In keeping with the standard practice, we considered these values as minimum donations and treated the WTD-variables as ordinal variables in our analysis, although this is an assumption because we do not know where the real WTD lies.

We used Principal Component Analysis (PCA) to re-combine self-reported drivers of WTD to three broader WTD-motives. Instead of removing correlated variables, we used a PCA to retain more data from our original dataset, as PCAs combines correlating variables into non-correlating components. We named these WTD-motives based on the variables comprising the component as “visceral motives”, “need of conservation” and "familiarity/locality” (see tables B2-B4 in Online appendix S2). We used the factor scores of these WTD-motives in subsequent analyses.

To address our research questions 1-4, we performed a series of ordinal logistic regression (OLR) analyses, which is a useful method for ordinal dependent variables. We found some correlation between explanatory variables (e.g. “need of conservation” and KBC (r=0.108**, Group 1; r=0.078*, Group 2)), but because of the low amount of variance explained (VIF<3) we included them in the same model. We used an information-theoretic approach in model selection, which assumes that there can be several competing models instead of a single model, and the final model is an average from a set of candidate models. In Figure 1 we present the model selection process. We performed the same procedure for all 20 models (see Online Appendix S2 for relative importance values and confidence intervals for each averaged model). We used the Holm-Bonferroni method (Holm, 1979; Abdi, 2010) to adjust the p-values to counteract the type I error in multiple hypothesis testing. To further address research question 3, we used linear regression to test possible associations between the KBC-scores and the WTD-motives.

Results

Willingness-to-donate to species and ecosystems

All conservation causes received support in our WTD-exercise, and there were only small differences in the number of €0 votes between causes (Table 3). However, species or ecosystems that are native to Finland, or species that are aesthetically appealing had the most combined funding. Mammal flagships attracted 29% more funding than bird flagships when comparing the combined sums (Mann-Whitney U-test, U=455975, n=2079, p<0.001).

Willingness-to-donate motives

By using PCA we converted the six self-reported drivers of WTD into three uncorrelated WTD-motives: “visceral motives”, “need of conservation” and "familiarity/locality” (see Online Appendix S2). The order of the three WTD-motives differed between mammals, birds and ecosystems. The first component of the PCA that accounts for the majority of variability within the dataset, was “visceral motives” for mammals and “familiarity/locality” for birds and ecosystems. The third component was “need of conservation”. The total variance explained by these three components was 75.63% for mammals (Group 1), 78.94% for birds (Group 2) and 82.97% for ecosystems (Online Appendix S2).

Biodiversity conservation knowledge

The KBC-scores approximated a normal distribution, although with a slight skew towards higher scores, indicating that it successfully distinguishes between the different levels of knowledge in our respondents (Online Appendix S2).

WTD-motives explaining donation behavior

After applying the Holm-Bonferroni adjustment, the visceral motives showed no effect on WTD to species or to ecosystems (Table 4). In contrast, need of conservation explained WTD well for all study species and ecosystems: the more respondent felt urgency of conservation was important, the higher their payments. In addition, the motive “familiarity/locality” was positively associated with familiar/local birds and ecosystems, and negatively with non-native causes.

Prior knowledge of biodiversity conservation explaining willingness-to-donate

Higher KBC-scores increased WTD, especially for birds and ecosystems (Table 4). Respondents who had studied natural sciences or agriculture/forestry, instead, reported reduced WTD to three Finnish aesthetically appealing mammals. Furthermore, the KBC was positively associated with the need of conservation motive and negatively with visceral motives (Table 5). There was also a positive association between the familiarity/locality motive and KBC in Group 2, although the effect sizes were small and the models explained a very small proportion (0.1−1%) of the variation.

Donor characteristics explaining donation behavior

Regarding donor characteristics, neither gender nor the type of residential area explained WTD to flagship species or ecosystems (table 4). However, ENGO-membership increased with WTD to both species and ecosystem conservation. Similarly, respondents with a high level of education were willing to donate more to ecosystem conservation than those with lower level of education.

Discussion

Influence of self-reported motives on willingness-to-donate

In general, the respondents were willing to donate more to aesthetically appealing species. Despite this, visceral motives were not associated with increased WTD, which mirrors results from the broader literature (Martin-Lopez *et al.*, 2007; Hettinger, 2010; Colléony *et al.*, 2017). It is possible that the respondents did not recognise or admit the effect of visceral motives on WTD-choices when they were reflecting on their own behavior. However, there was a near-significant negative association ($p<0.05$ but considered non-significant due to the repeated hypothesis problem) for an aesthetically less appealing species, suggesting more research is needed to distinguish the possible effect of aesthetic appeal on WTD to flagship species or ecosystems.

The perceived need of conservation increased WTD to ecosystems and species irrespective of their aesthetic appeal, as the people who most appreciated the need of conservation also chose larger sums. Thus, there is great potential for fundraising by appealing to more ecologically-oriented donors. Furthermore, the lack of association between high aesthetic appeal and increased WTD indicates that respondents prioritized the need for conservation among aesthetically appealing species, which made the effect of aesthetic appeal disappear when both types of motives were evaluated at the same time. Our findings partly contradict previous studies (Metrick & Weitzman, 1996; Martin-Lopez *et al*., 2007) that found visceral factors exceeding the importance of scientific ones, but resonate with Tkac (1998) and Tisdell *et al.* (2007) who found that individuals favoured species in conservation need over those with a high aesthetic appeal. We also found some evidence that the order of the motives may change among aesthetically less appealing species.

Familiarity/locality was the most important PCA component explaining the WTD to birds and ecosystems in our study. While familiarity/locality increased the WTD to birds and ecosystems that were native to Finland, it diminished the WTD to non-native birds and ecosystems. However, the examination of total WTD-amounts attracted by each species showed that non-native, well-known mammal flagships attracted most support. Our findings suggest that familiarity/locality motive seems to be driven by both ethnocentricity and familiarity through exposure to media (e.g., nature documentaries) and conservation marketing campaigns. Another way to examine this is to look at it from a brand awareness point of view (Veríssimo *et al.*, 2014), a concept used in consumer behavior studies that is known to explain consumers' purchasing behavior (Macdonald & Sharp, 2000). Brand awareness may similarly affect donation behavior, although the "products" are different, perhaps explaining why both species native to Finland and well-known non-native flagships (orangutan and tiger) were popular in our study.

The effect of knowledge of biodiversity conservation on willingness-to-donate

We found that higher KBC-scores and WTD were related, but we only found this association with birds and ecosystems. This finding suggests that the underlying determinants to donate to mammals, birds and ecosystems may differ at least among online donors. Because visceral motives comprised the most important PCA-component for mammal flagships, aesthetic appeal may have a greater effect on WTD to mammals compared to birds or ecosystems, although we did not find an association between aesthetic appeal and WTD. Rather similarly, Tisdell *et al*. (2005) found species likeability was positively associated with favouring of species' survival for mammals, but the result was less clear with other taxa. Consequently, our results suggest that knowledge of biodiversity conservation may be associated with donation choices among online donors, but further research is still needed to understand their association.

Education in natural sciences or in agriculture/forestry did not increase WTD to species or ecosystems, but we found that these respondents were willing to donate less to three aesthetically appealing Finnish mammals that were non-threatened or threatened only at the national level. Thus, these respondents may have targeted their support to species with more urgent conservation need globally.

Donor characteristics influencing willingness-to-donate

Respondents who were members of an ENGO were willing to donate more to species and ecosystems. We did not find gender differences in WTD to species or ecosystems, which is in line with Cárdenas and Lew (2016). However, as previous research has brought mixed results (e.g. White *et al.*, 2001; Baranzini *et al.*, 2010; Batel *et al.*, 2014), further studies are needed. The majority of our respondents were women, which may reflect the observed tendency of women to act more pro-environmentally than men (e.g. Mainieri *et al.*, 1997; Zelezny *et al.*, 2000). In addition, young women have been found to be more likely to support environmental issues on Facebook (Brandtzaeg, 2017). Furthermore, in Finland women are more likely to donate to environmental causes, although all Finns tend to donate less to environmental causes than other charitable sectors (Pessi, 2008). Thus, the gender distribution in our sample may mirror the same phenomenon, suggesting that our sample is a good representation of the target group of potential online donors.

Complexity of motives affecting willingness-to-donate

Although the need of conservation seemed to affect WTD-choices, we still cannot exclude the effect of visceral motives on WTD, as the influence of aesthetic appeal clearly showed in the WTD-amounts for individual flagships, and because some respondents recognized the role of visceral motives in their decision making. There may also be other motives driving donation behavior, of which the respondents may themselves be unaware. In addition, it is likely that any actual donations would differ from the WTP values, and there was also a possibility of free-riding (i.e. relying that others are paying without making an own contribution) when examining donating behavior (cf. Macmillan et al. 1999). However as the incentive to free ride is unlikely to vary across species, we do not consider this to be a significant issue in our study.

It is also worth noting that the interpretation of items measuring motives may vary among individuals. For example, the item "Evokes positive feelings" can consist of different interpretations that cannot be captured with a questionnaire. It is also possible that the item "Familiarity", was understood differently among respondents: either having knowledge about the species (threat status etc.) or that they could recognize the species, which may have blurred the influence of this motive in our results. Consequently, to better understand the mechanisms behind environmental donation behavior, the use of a mixed method approach that includes both qualitative and quantitative data is required for future research. Further, more research is needed to understand how individuals' donation motives can effectively be utilized in conservation marketing. Marketing research has identified promising strategies that influence individuals' donation motives, such as presenting hedonic products in a donation situation (Savary, Goldsmith, & Dhar, 2015), or presenting the social information about the donations of others (Martin & Randal, 2008).

Conclusions

Our results suggest that the factors that determine how much people donate for mammal, bird and ecosystem conservation may differ. While knowledge of biodiversity conservation and familiarity/locality are related to donating to birds and ecosystems, other factors, such as aesthetic appeal may be more important for mammal flagships, at least online. Although birds generally attracted less financial support than mammals, it is important to note that the preferences are audience specific, and birds may appeal to specific donor types, such as bird-watchers or eco-tourists. Furthermore, our results suggest that WTD to ecosystem conservation is mainly driven by scientific considerations. Thus, including ecosystems as donation targets could induce donations from more knowledgeable individuals, but it is worth noting that it may be limited to a narrow range of donors. The perceived importance of conservation, irrespective of aesthetic appeal, suggests there is scope for increasing donations for all threatened species and ecosystems, including those that are aesthetically less appealing.

Supporting Information

The questionnaire used in our survey (Online Appendix S1) and supportive data from analysis (Online Appendix S2) and the goodness-of-fit tests (Online Appendix S3) are available online. Survey data is collected in Finnish and will be stored in Finnish Social Science Data Archive after this project has ended.

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FIGURE

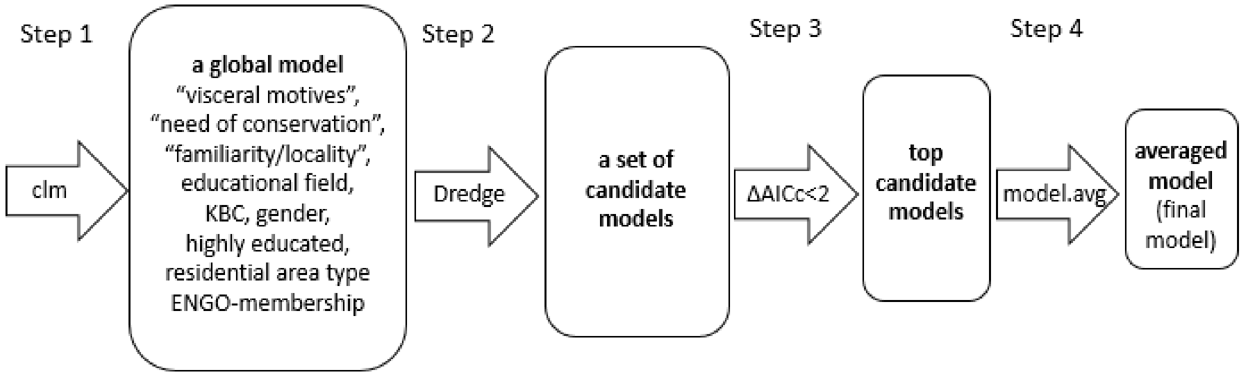

Figure 1 A flowchart illustrates the model selection procedure. In step 1.we used the function *clm* from the ordinal-package (Christensen, 2015) and created a "global model" that included all the covariates. In step 2 we used the "dredge" command from package MuMIn (Barton, 2018) to create a set of candidate models from the "global model". In step 3 we chose the top candidate models using delta AICc<2 as a selection criteria. In step 4 we used "model.avg" function to perform the model averaging. We used the zero average method ("full average" in MuMIn package in R) which is suitable for assessing which attributes affect most WTD-estimates (cf. Grueber *et al.,* 2011).

TABLES

Table 1. Socio-demographic background and previous self-reported donation behavior.

Variable		Group1 (mammals)	Group2 (birds)
n (per group)		1032	1047
Age	mean (SD)	34.5 (11.93)	34.9 (12.30)
Gender: women	%	80.9	82.9
Type of residential area:			
densely built city	%	46.4	46.5
suburb	%	39.1	39.1
countryside	%	13.9	13.8
Highly educated*	%	58.4	60.0
Households monthly income level	median (€)	2 500 - 2 999	2 500 - 2 999
Size of household	mean (SD)	2.15 (1.13)	2.14 (1.15)
Education field in natural sciences/agriculture and forestry	%	23.4	20.6
Knowledge of biodiversity conservation (0-8 p)	mean (SD)	4.53 (1.46)	4.41 (1.47)
A member of a ENGO/ENGOs	%	34.4	33.1
Have participated in conservation organization actions	%	23.1	21.6
Have donated to conservation ENGOs in real life	%	54.0	52.1

* Highly educated = included levels of bachelor´s degree, master´s degree and doctoral degree. Dichotomous variable (y/n).

Table 2. Mammal and bird flagship species that were chosen as study species, with their habitats that were chosen as study ecosystems.

Species	Cons. status[a]	Species is native to Finland	Used by an ENGO operating in Finland	Characteristics perceived as appealing: Large body size[b]	Colourful plumage or fur[c]	Anthro-pomorphic traits[d]	Endemic species	Species is threatened	Occurs in habitat[e]
Mammal flagships									
Lynx *(Lynx lynx)*	VU	x	x		x	x		x	FOF
Siberian flying squirrel *(Pteromys volans)*	VU	x	x					x	FOF
Wolverine *(Gulo gulo)*	CR	x	x					x	FOF
Eurasian otter *(Lutra lutra)*	NT	x	x						FWE
Bornean orangutan *(Pongo pygmaeus)*	EN		x	x		x	x	x	R
Sumatran tiger *(Panthera tigris sumatrae)*	CR		x	x	x	x	x	x	R
Golden-crowned flying fox *(Acerodon jubatus)*[f]	EN						x	x	R
African wild dog *(Lycaon pictus)*	EN			x	x			x	S
Bird flagships									
Siberian Jay *(Perisoreus infaustus)*	NT	x	x						FOF
White-backed Woodpecker (*Dendrocopos leucotos)*	EN	x	x		x			x	FOF
Golden Eagle (*Aquila chrysaetos)*	VU	x	x	x				x	FOF
Lesser White-fronted Goose *(Anser erythropus)*	CR	x	x		x			x	FWE
Philippine Eagle *(Pithecophaga jefferyi)*	CR			x			x	x	R
Honduran Emerald *(Amazilia luciae)*	EN				x		x	x	R
Verreaux's Eagle-Owl *(Bubo lacteus)*	LC					x			S
Southern Ground Hornbill *(Bucorvus leadbeateri)*[f]	VU			x	x			x	S

[a] Foreign species: IUCN red list status. Local species: The 2010 Red List of Finnish Species. Note: some of the species native to Finland are not globally threatened.

[b] Mammals body-size data: Ecological data (Smith et al. 2003). We categorized large mammal >20 kg. Birds body-size data: Ecological archives (Liskevand *et al.*, 2007). We categorized large bird >3 kg

[c] Colourful=the plumage or fur is other colour than solely brown or grey (aposematic colours, white-yellow-black combinations, black and white etc). Or the species has body parts that are bright coloured.

[d] Species has a flat face (Sundqvist, 1992) with relatively forward-facing eyes (Macdonald *et al.*, 2015). The decision on whether the species belongs to species with anthropomorphic traits, is based on subjective evaluation by the authors, but the distinction using the criteria mentioned before was quite easy with these species.

[e] R=rainforest, S=Savanna, FWE=Finnish freshwater environments (near streams, lakes etc), FOF=Finnish old-growth forest.

[f] Presumably less appealing species

Table 3. WTD-results of mammals, birds and ecosystems.

	Mammal flagships (Group 1, n=1032)								Bird flagships (Group 2, n=1047)								Ecosystems (All, n=2079)			
Payment card amount	Sumatran tiger	Bornean orangutan	Lynx	Eurasian Otter	Wolverine	Siberian flying squirrel	African wild dog	Golden-crowned flying fox	Golden eagle	White-backed woodpecker	Siberian jay	Honduran emerald	Lesser. white-fronted goose	Philippine eagle	Verreaux´s eagle owl	Southern ground hornbill	Finish old-growth forests	Finnish fresh-water ecosystem	Rainforest	Savanna
€	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
0	7.2	8.3	8.4	8.4	8.3	8.4	12.0	11.0	8.7	9.3	9.6	14.2	13.3	13.9	14.3	14.5	4.2	4.0	5.9	8.9
1	6.0	9.0	6.4	7.7	8.9	7.4	12.9	12.3	7.2	8.7	9.0	11.4	14.6	12.7	12.3	14.2	1.5	2.2	2.3	5.6
3	8.4	9.2	8.9	10.4	10.1	10.2	11.4	11.0	11.7	12.5	13.8	14.6	13.4	13.8	13.0	14.8	3.4	3.4	3.8	6.2
5	19.9	20.3	21.9	21.7	19.0	20.4	21.5	21.5	19.4	20.6	20.9	21.3	20.8	22.0	22.3	20.8	12.7	12.6	13.1	20.1
10	16.1	18.5	20.5	18.8	19.6	20.4	16.4	16.2	21.7	20.3	19.8	17.0	16.2	17.0	17.0	16.8	16.8	17.9	17.5	22.0
15	7.4	4.8	6.2	5.7	5.9	5.6	4.3	5.3	5.7	6.3	4.2	4.1	4.4	4.1	4.7	3.6	7.0	7.3	7.8	5.1
20	13.0	11.1	11.2	11.7	10.5	11.2	8.6	9.5	9.9	8.7	10.0	7.0	6.7	7.1	6.7	6.1	16.7	16.1	14.4	13.2
30	4.7	3.9	3.3	3.9	3.9	4.6	2.6	2.5	3.8	3.6	3.1	1.9	2.8	1.9	2.3	1.5	8.3	8.3	7.4	3.7
40	2.8	2.2	1.9	1.6	1.7	2.3	1.3	1.6	1.8	1.8	1.2	1.5	1.3	1.2	1.2	1.4	4.2	4.5	4.3	1.6
50	5.5	5.6	5.5	4.8	5.5	4.1	3.4	3.7	4.4	3.7	4.2	2.8	2.7	2.3	2.2	2.0	12.3	11.4	10.7	7.4
75	1.6	1.2	1.0	0.6	1.3	0.7	0.9	0.8	0.9	0.4	0.2	0.6	0.5	0.5	0.2	0.8	2.1	1.7	1.9	1.0
100	3.5	2.5	2.0	1.6	2.3	1.9	1.6	1.7	2.1	1.8	1.8	1.3	1.3	1.5	1.5	1.3	6.2	6.0	5.9	3.1
200	0.8	0.3	0.5	0.6	0.9	0.4	0.3	0.1	1.0	0.9	0.8	0.6	0.7	0.5	0.5	0.2	2.1	2.3	2.3	0.9
500	2.6	2.2	2.0	2.0	1.6	1.8	1.9	1.5	1.4	1.1	1.1	1.0	0.9	1.0	1.0	1.0	2.5	2.3	2.4	1.1
Missing	0.7	0.7	0.1	0.4	0.5	0.5	1.0	1.3	0.3	0.3	0.2	0.8	0.5	0.5	0.9	0.9	0.0	0.2	0.3	0.2
Total (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Total WTP (€)*	32178	27008	25892	24995	24924	24041	21682	19454	23344	19854	19784	16318	15958	15918	15757	14844	86151	83411	82869	48148

*Note: The amount of respondents evaluating mammal flagships, bird flagships and ecosystems, as well as the amount of targets (eight species vs. four ecosystem) differ and therefore the payment card amounts or the total WTP for mammals and birds cannot be directly compared with WTP-results for ecosystems.

Table 4. Factors affecting WTD to flagship species and ecosystems from ordinal logistic regression analysis, showing averaged estimates and the level of significance. Statistically significant results after Holm-Bonferroni adjustments are presented in bold. Standard errors, relative importance values and confidence intervals of averaged models are presented in Online appendix S3

Models for species and ecosystems	*"Visceral motives"*		*"Need of conservation"*		*"Familiarity/ locality"*		*Educational field[b]*		*KBC[c]*		*Highly educated[d]*		*Gender[e]*		*Residential area type[f]*		*ENGO-member*	
	B	*p*	*B*	*p*	*B*	*p*	*B*	*p*	*B*	*p*	*B*	*p*	*B*	*p*	*B*	*p*	*B*	*p*
Mammal flagships (n=848)[a]																		
Lynx*	0.06	0.400	**0.29**	**0.000**	**0.19**	**0.002**	**-0.44**	**0.002**	0.09	0.039			0.13	0.473	0.18	0.041	**0.43**	**0.001**
Orangutan			**0.52**	**0.000**	**-0.19**	**0.002**			0.07	0.154	0.25	0.154	0.07	0.630	0.11	0.290	**0.50**	**0.000**
Wild dog	-0.09	0.183	**0.39**	**0.000**	-0.13	0.031	-0.01	0.902	0.01	0.795			0.02	0.787	0.15	0.128	**0.51**	**0.000**
Flying squirrel*	0.00	0.909	**0.40**	**0.000**	0.13	0.030	**-0.42**	**0.003**	0.04	0.344	0.01	0.885	0.06	0.637	0.19	0.032	**0.42**	**0.002**
G-C. Flying fox	-0.15	0.015	**0.40**	**0.000**	-0.05	0.421	-0.09	0.521	0.05	0.266	0.00	0.907	0.09	0.565	0.03	0.625	**0.49**	**0.000**
Otter*			**0.29**	**0.000**	0.13	0.033	**-0.36**	**0.010**	0.05	0.321	0.02	0.777	0.15	0.427	0.20	0.023	**0.63**	**0.000**
Tiger	0.04	0.491	**0.59**	**0.000**	-0.07	0.315			0.05	0.254	0.15	0.311	0.03	0.783	0.24	0.006	**0.36**	**0.007**
Wolverine*	-0.01	0.807	**0.38**	**0.000**	**0.22**	**0.000**	-0.10	0.481	**0.11**	**0.005**	0.27	0.732	0.03	0.746	0.15	0.140	**0.63**	**0.000**
Bird flagships (n=864)[a]																		
Siberian Jay*	-0.06	0.348	**0.37**	**0.000**	**0.24**	**0.000**	0.07	0.594	**0.17**	**0.000**	0.01	0.902			0.16	0.118	**0.61**	**0.000**
Philippine Eagle	-0.01	0.741	**0.44**	**0.000**	**-0.21**	**0.001**	0.03	0.749	**0.18**	**0.000**	-0.07	0.523					0.27	0.041
W. Woodpecker*	-0.08	0.257	**0.41**	**0.000**	**0.23**	**0.000**	0.04	0.715	**0.15**	**0.000**			0.15	0.434	0.06	0.485	**0.56**	**0.000**
W. Eagle-Owl			**0.44**	**0.000**	-0.14	0.025	0.01	0.903	**0.14**	**0.000**	-0.03	0.694	0.02	0.844	0.00	0.910	**0.29**	**0.030**
Lesser W-f. Goose*	-0.13	0.035	**0.41**	**0.000**	-0.00	0.803	0.08	0.553	**0.15**	**0.000**	-0.05	0.640	-0.00	0.949	0.05	0.559	**0.58**	**0.000**
Southern Hornbill	-0.08	0.260	**0.44**	**0.000**	**-0.21**	**0.001**	0.01	0.914	**0.17**	**0.000**	-0.05	0.637	0.01	0.875			**0.34**	**0.011**
Golden Eagle*	-0.01	0.832	**0.43**	**0.000**	**0.28**	**0.000**	0.04	0.693	**0.16**	**0.000**					0.07	0.468	**0.52**	**0.000**
Honduran Emerald	-0.00	0.876	**0.47**	**0.000**	**-0.18**	**0.004**	0.01	0.893	**0.18**	**0.000**	-0.04	0.684	0.04	0.703	-0.00	0.927	0.21	0.147
Ecosystems (n=1745)[a]																		
Savanna			**0.28**	**0.000**	**-0.19**	**0.000**	0.02	0.771	**0.14**	**0.000**	0.16	0.125	0.25	0.035	0.03	0.557	**0.50**	**0.000**
Fin. old forest*	-0.00	0.841	**0.16**	**0.001**	**0.38**	**0.000**			**0.15**	**0.000**	**0.29**	**0.001**	0.02	0.750	0.14	0.026	**0.76**	**0.000**
Rainforest	0.00	0.908	**0.31**	**0.000**	**-0.15**	**0.000**	0.02	0.723	**0.11**	**0.000**	**0.27**	**0.003**	0.27	0.024	0.01	0.844	**0.47**	**0.003**
Fin .freshwater e.*	-0.03	0.524	**0.20**	**0.000**	**0.34**	**0.000**	-0.03	0.699	**0.10**	**0.000**	**0.24**	**0.006**	0.03	0.687	0.14	0.026	**0.58**	**0.000**

[a] n after removing responses that contained NA to be able to run the analyses, [b] education from the field of natural sciences/ agriculture and forestry (y/n),

[c] KBC=Knowledge of biodiversity conservation (0-8 p) [d] highly educated (y/n), [e] gender: 0=male, 1=female,

[f] residential area type: 1=densely built city, 2= suburb, 3= countryside.

* Species/ecosystem that is native to Finland

Table 5. Associations between the knowledge of biodiversity conservation score (independent variable) and WTD-motives (dependent variable) using linear regression model.

Model	Estimate	SE	P-value	Adjusted R^2
Group 1. Mammal flagships				
Need of conservation	0.073	0.022	0.001	0.011
Visceral motives	-0.068	0.022	0.002	0.009
Familiarity/locality	0.015	0.022	0.483	-0.001
Group 2. Bird flagships				
Need of conservation	0.053	0.021	0.014	0.005
Visceral motives	-0.053	0.022	0.015	0.005
Familiarity/locality	0.046	0.022	0.035	0.003