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Cinderella species: uncovering mammals with conservation flagship appeal

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Abstract

Introduction

Our attempts to stem the rate of biodiversity loss are hampered by insufficient funding and support (Butchart et al. 2010), so there is a pressing need for researchers to engage with conservation marketing efforts and help produce campaigns that are more relevant and effective (Smith et al. 2010). This is particularly important for flagship species campaigns, which are commonly used to raise awareness about conservation issues (Caro 2010) and remain a key fundraising tool for international conservation NGOs. A flagship species acts "as the focus of a broader conservation marketing campaign based on its possession of one or more traits that appeal to the target audience" and so the choice of flagship always needs to be context dependent (Veríssimo et al. 2011b). For example, conservationists have suggested that flagships for local campaigns should be easy to see, have cultural salience and are not linked with human-wildlife conflict issues (Bowen-Jones and Entwistle 2002; Ball 2004). In contrast, flagships used in international fundraising campaigns have to appeal to a broad audience who often lack relevant knowledge and understanding, and so species selection is largely driven by aesthetics (Smith et al. 2010).

Focusing on aesthetics means that international flagships often belong to a handful of taxonomic groups. This can be problematic, as it limits campaigns to certain issues or geographical areas (Clucas et al. 2008) and flagship species are generally poor biodiversity surrogates (Andelman and Fagan 2000; Williams et al. 2000; Caro et al. 2004). However, two common assumptions underpin the continued use of these existing flagships. First, it is assumed that flagship species act as a recognisable "face" for a broader marketing campaign, so using popular species will raise more awareness and funding for the broader issue (Barua et al. 2011). Second, it could be assumed that no

alternative species with similar appeal exist, so using any different species would reduce campaign effectiveness. Here, we test these assumptions by first investigating how international NGOs use flagship species and then determining whether there are any aesthetically appealing but currently overlooked species, referred to as "Cinderella species" hereafter, which could be used in addition to the current set of flagships.

International NGO flagship campaigns have been classified into three types: (i) raising funds for specific projects to conserve the flagship; (ii) using the flagship to raise funds and awareness for a broader issue, or; (iii) using the flagship to raise funds for the NGO that can be spent more widely (Veríssimo et al. 2011a). Initially, the first of these types might not seem a true flagship campaign because funds are raised for the species itself, but there are several reasons why this still brings broader conservation benefits. First, most of the resulting *in situ* conservation project is likely to have some benefits for other species, either through maintaining their habitat or ensuring their part in associated ecological processes. Second, some NGOs explicitly cap the amount of money that will be spent on the species and use any surplus for other projects (Smith et al. 2010). Third, each of these campaigns raises the profile and credibility of the NGO that runs them and so helps with further fundraising and lobbying on conservation issues (Home et al. 2009). However, this type of campaign still has the fewest broad conservation benefits (Joseph et al. 2011).

Identifying Cinderella species is more straightforward, as a number of studies have discussed the traits shared by existing flagships. As noted before, some of these are context specific but aesthetic traits are thought to be fundamental (Lorimer 2007), with previous work suggesting that people prefer large and "cuddly" animals (Clucas et al. 2008; Barua 2011; Fischer et al. 2011). Moreover, these aesthetic factors become more important when dealing with international campaigns, as these seek to appeal to a broad range of the people who may be largely ignorant of the species and know little about the conservation issues that affect it (Smith et al. 2010). Therefore, in our analysis we focused on identifying traits shared by threatened mammal species used in flagship campaigns aimed at an international audience. We selected this group because they are frequently used in international NGO

campaigns and we further restricted this analysis to species found only in developing countries, as they do not share their geographic range with the target audience and so donor choice is less influenced by the type of direct experience that may supplant broader aesthetic preferences. Thus our analysis involved: (i) recording how these different species are used in international NGO campaigns; (ii) determining which traits these species share and producing a flagship potential model, and (iii) using this model to determine whether there are any currently overlooked species with potential flagship appeal that could be considered as Cinderella species.

Methods

We used internet searches to produce a list of international conservation NGOs based in Anglophone countries. To avoid biasing the results, this list excluded zoo-based NGOs, as these may preferentially use flagships found in their animal collections, and animal rights-based NGOs, as these may restrict their choice of species based on perceived sentience levels. We also produced a list of threatened mammal species (defined from IUCN Red List Feb 2010) and then visited each NGO's website and recorded which terrestrial mammalian species were used in the three types of flagship campaign described above (Veríssimo et al. 2011a).

We next assembled data on the body mass, eye position and IUCN threat status of each mammal species. The body mass data were taken from the PanTHERIA database (Jones et al. 2009), which first involved using the synonym information from the Red List database to match up the 32 species that were classified using a different scientific name in the Wilson and Reeder (1993) system used by PanTHERIA. PanTHERIA contained body mass values for 542 of the 1108 species and we filled the data gaps for the remaining species by using the median value for species from the same genus. To measure eye position we asked eleven volunteers to determine whether photos of representative species belonging to each of the 120 taxonomic families had forward-facing eyes. Species were classified as having forward facing eyes if more than six people classified their associated family in this way. Finally, we listed whether each of the threatened species was categorised as Vulnerable, Endangered or Critically Endangered in the Red List.

We used Spearman's Rank correlations to investigate patterns of flagship use by the different NGOs and logistic regression analysis to identify the model that best explained whether a species was used as a flagship, based on AIC criteria. Analyses of species traits are often impacted by phylogenetic autocorrelation, so we randomly selected one species per genus for the regression analysis (n = 48 flagships and 48 non-flagships) and checked for any problems by estimating the phylogenetic autocorrelation in the residuals using Pagel's lambda λ (Pagel 1999) with the mammal supertree (Bininda-Emonds et al. 2007). As the residuals showed no association with phylogeny (ML[λ] = 0), we used the model to calculate a flagship potential score for each of the threatened species. To illustrate how these flagship potential scores could be used, we then identified the highest scoring Critically Endangered mammal species and selected the top five species belonging to different taxonomic orders, as we wanted to choose species that represented a range of taxonomic groups and so could be easily distinguished by the target audience. Finally, we further refined our selection by using the Google search engine to check whether any of these species were already being used as flagships. This refinement included data from zoo- and animal rights-based NGOs, so that the Cinderella species we identified were not used as flagships on any international NGO websites at the time of analysis.

Results

We found 59 international conservation NGOs using flagship campaigns on their websites based on threatened mammal species found only in developing countries. These websites only used 80 of the possible 1099 species as flagships and these belonged to 8 of the possible 24 taxonomic orders, with more than half (58%) of the flagships being primates or carnivores. The number of NGOs using each species was highly skewed, with 45 species only being used by one NGO but 16 species used by five or more NGOs. The tiger, African elephant and Asian elephant were the three most commonly used flagships, being used by 11, 10 and 9 NGOs respectively. Our survey of the type of NGO campaign showed that 53 NGOs only used one campaign type, 23 NGOs used two types and 4 used all three types. Of these campaigns, 60.8% sought to raise funds directly for the flagship (type 1 campaigns),

raising money for 61 species, whereas 2.2% raised funds for broader campaigns (type 2 campaigns) and 37% raised funds for the NGO itself (type 3 campaigns). There was little difference in the flagships used for the different campaign types, as flagships that were frequently used in type 1 campaigns were also frequently used in the other campaign types (when comparing type 1 with combined type 2 and type 3: N = 80, r_s = 0.296, p = 0.008).

Existing flagship species generally had a high body mass and forward facing eyes (log_{10} mass: Wald = 21.28, p < 0.001; eyes: Wald = 15.136, p < 0.001; N = 96, ROC = 0.929: Figure 1). In contrast, the IUCN Red List status of these threatened species was not important, so that Critically Endangered species were no more likely to be selected as flagships than Vulnerable species. Based on this model, we found that species with a high flagship potential score are currently used by more NGOs (N = 80, rs = 0.591, p < 0.001). We then used these scores to identify Cinderella species by setting a flagship potential score threshold, calculated as the median − 1 Standard Deviation of the values from the existing flagships. Based on this, we identified 184 species (Figure 2) and all of these were primates, carnivores, even-toed ungulates, Diprotodont marsupials or odd-toed ungulates (Figure 3). Moreover, 24 of the current flagship species had scores below this Cinderella threshold score, suggesting that some NGOs are willing to select flagship species for reasons other than aesthetics.

Selecting new species for future flagship campaigns based on this list of Cinderella species will depend on each NGO's goals but we illustrated the approach by choosing the five highest scoring Critically Endangered species belonging to different taxonomic orders. This identified the Malabar Civet (*Viverra civettina*), Talaud Bear Cuscus (*Ailurops melanotis*), Pennant's Red Colobus (*Procolobus pennantii*), Mindoro Dwarf Buffalo (*Bubalus mindorensis*) and African Wild Ass (*Equus africanus*) as the five most appropriate Cinderella species (Figure 4).

Discussion

Conservationists have long recognised that flagship species campaigns should be used with caution. Raising the profile of particular species may create resentment amongst people who share their range

5

(Meijaard and Sheil 2008), influence conservation management to overly favour the species (Walpole and Leader-Williams 2002) and create confusion when different flagships have conflicting needs (Simberloff 1998). However, flagship species campaigns remain a key fundraising tool for international conservation NGOs because they strongly resonate with the general public, so research is needed to understand and improve this approach. This study is based on such pragmatism and is the first to systematically review how international NGOs use flagship species and identify a method for reducing some of these limitations. So, in this section we discuss the implications of this flagship use and consider the flagship potential model and how it can be used to identify additional species.

Patterns of flagship use

Flagship species are an example of "conservation by proxy" (Caro 2010), as they aim to create broader benefits for biodiversity. This is why the most intuitive examples of this concept focus on broad conservation issues, such as using polar bears to raise awareness about climate change. This type of campaign is probably more common at the local level, where flagships are frequently used to change behaviour or raise the profile of a specific location, but only 37% of the international campaigns we studied used this approach. Instead, 60.8% of campaigns raised funds directly for the species, so the broader benefits are more diffuse. This pattern is not perhaps surprising, as the target audience for these international campaigns is very broad and so responds to simple messages about saving the species. Thus, if people respond positively to a species at an emotional level then it is better to structure a campaign around saving that species, rather than diluting the message with other issues.

There are, therefore, good marketing reasons for campaigns that only fundraise for individual species but the conservation implications are less positive. The flagship approach has long been criticised for focusing funds on a small number of species (Joseph et al. 2011) and our results support this. In some ways, this bias is understandable: conservation is inherently value-laden and species such as tigers, elephants and apes are highly valued, but any organisation with a biodiversity-based mission has a

duty to broaden the conservation benefits of their fundraising. NGOs achieve this by using these campaigns to sign up new members and then sending them promotional material that encourages them to fund broader projects (Smith et al. 2010). However, this approach suggests that marketing concerns are driving the process, with conservationists adding *post hoc* modifications. This is why we need to identify additional species for use in these traditional international campaigns.

Identifying Cinderella species

The current threatened mammal flagships used by international NGOs are generally large and have forward-facing eyes. The human fascination with large animals is widely recorded (Clucas et al. 2008; Smith et al. 2010) and influences conservation research (Sitas et al. 2009) and policy (Knegtering et al. 2011). The importance of forward facing eyes is also intuitive as these species more closely resemble humans and so seem more familiar. Thus, we would argue that these factors are a measure of aesthetic appeal and the most likely to illicit an emotional response from the target audience in developed countries. However, this emotional response is not inherently positive, as the same factors may lead to these species being widely feared or loathed by the people who share their range (Naughton-Treves et al. 2000). In contrast, we found threat status was not important for predicting whether a species was used as a flagship. This is in contrast to previous studies of eco-tourists in The Seychelles (Verissimo et al. 2009) and members of the public in Australia (Tisdell et al. 2007) and Europe (Fischer et al. 2011). However, our results are intuitive, given that these campaigns generally refer to these species as simply being threatened and so the general public in developed countries is unlikely to know the threat status of these different species (Sitas et al. 2009). This pattern is troubling though, given our finding that most campaigns raise money for the species directly, because it suggests that funding is not being targeted at the most threatened species, although this assumes that money is best spent on the most threatened species (Wilson et al. 2011).

Our flagship model explained most of the observed variation and so provides a robust base for predicting potential flagship appeal score. We found 178 Cinderella species and these have higher

potential scores than 24 of the current flagship species, suggesting much scope for developing campaigns based on these new species. However, such campaigns should adopt a systematic approach that involves specifying the purpose of a campaign before working with the potential target audience to identify the most suitable species (Home et al. 2009; Veríssimo et al. 2011b). To illustrate the value of our modelling process we considered a hypothetical campaign seeking to raise funds for new Critically Endangered species but we could have used a similar approach to select candidate species for campaigns focusing on a specific country or conservation issue by identifying relevant species with the highest potential flagship scores.

When deciding whether to create new flagships, however, it is important to consider existing levels of awareness amongst the target audience. International NGOs use the same set of flagship species because they are already familiar to the general public, which may make fundraising easier (Schlegel and Rupf 2010; Barua et al. 2011). In contrast, the five Critically Endangered Cinderella species that we highlight are poorly known and two of them, the Malabar Civet and Talaud Bear Cuscus, do not even have publicly available photographs. Our analysis suggests these five species could become important conservation flagships, given modest investments in field surveys, research and marketing, but they are still likely to raise less money than traditional flagships. This further emphasises the importance of NGOs specifying the reason for a campaign before selecting a flagship and considering the trade-offs between marketing effectiveness and conservation impact (Veríssimo et al. 2011b). However, what is certain is that selecting a Cinderella species as a new flagship will provide a new source of international funding for that species and so broaden the biodiversity benefits.

Conclusions

Successful marketing campaigns work within the conscious and sub-conscious constraints imposed by the target audience. Large, aesthetically appealing mammals have been popular with people in developed countries before the rise of the environmental movement (Scigliano 2002; Nicholls 2010) and international NGOs wisely adopted the same species for their fundraising campaigns. However, this approach remains overly conservative, so that only a few well-known species receive the bulk of

the money raised. In response, we have used a quantitative approach to show that there are a number of currently neglected mammal species that are both highly threatened and potentially appealing to the public. Thus, we would argue that NGOs need to adopt such novel techniques to broaden conservation benefits and develop a more systematic approach to identify, publicise and conserve new priority species (Veríssimo et al. 2011b). Such research would bring conservation researchers, practitioners and marketers together, replacing the current *ad hoc* system with a more dynamic and effective approach.

Acknowledgements

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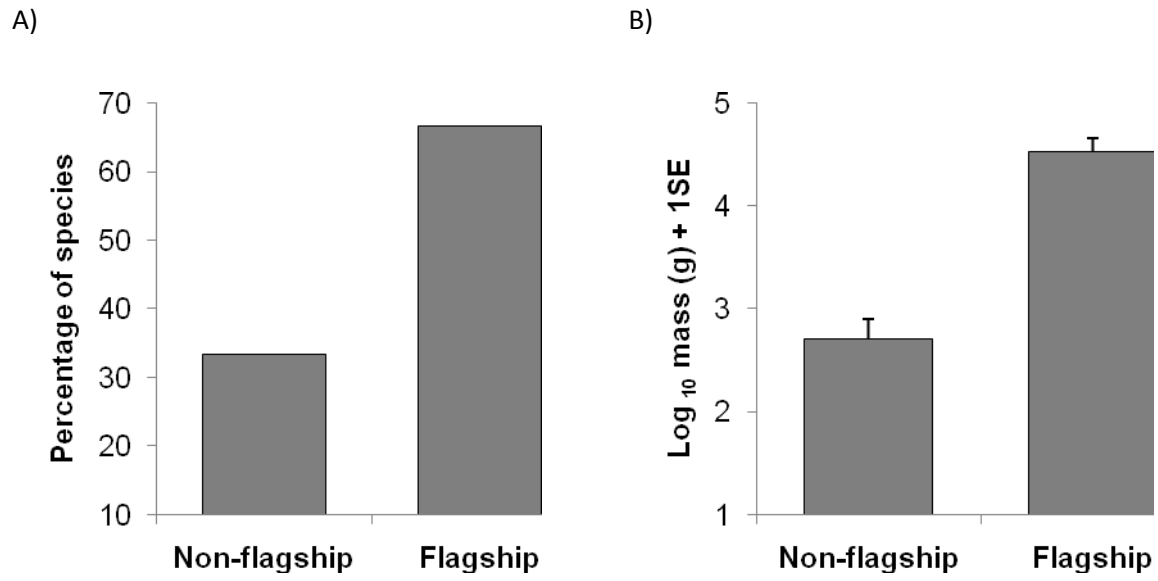
Figure 1: Comparison of (A) percentage of species with forward facing eyes and (B) mean mass of flagship and non-flagship species used in the logistic regression modelling
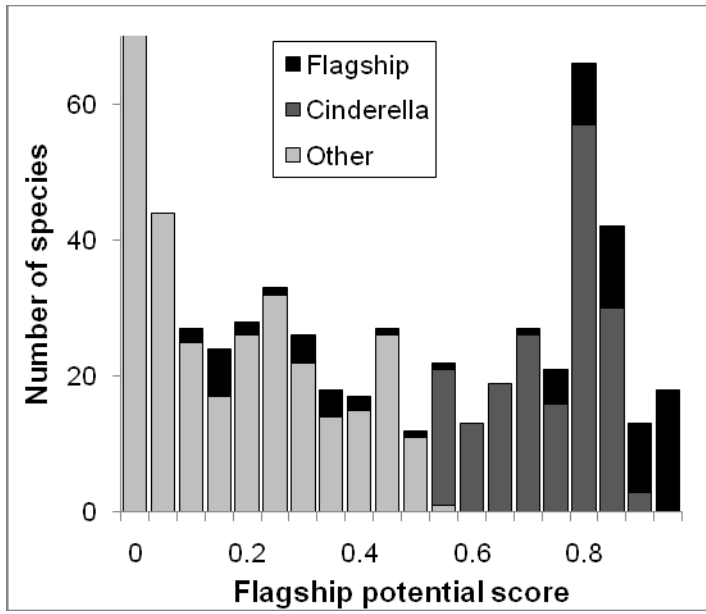
Figure 2: Frequency distribution of flagship species, Cinderella species and other species according to their flagship potential scores.
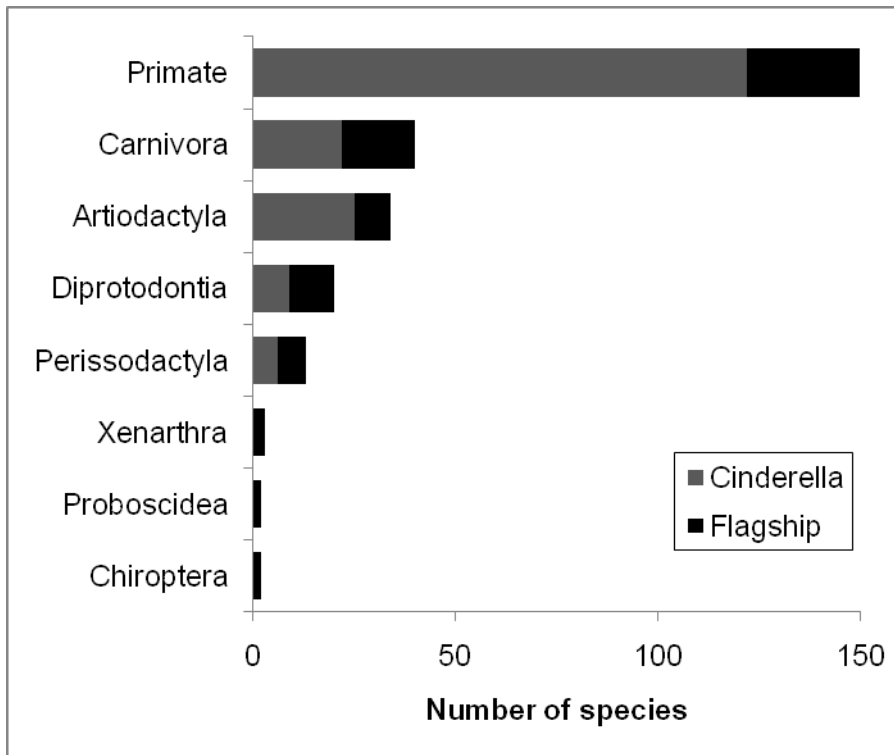
Figure 3; Frequency distribution of flagship species and Cinderella species belonging to the different taxonomic orders.

*Figure 4: Three of the five Critically Endangered Cinderella species selected in this analysis based on their flagship potential score. There are no publicly available photographs of the two top scoring species, the Malabar Civet (**Viverra civettina**), Talaud Bear Cuscus (**Ailurops melanotis**)*