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Birds as tourism flagship species: a case study of tropical islands

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Abstract

Species selected as flagships to promote conservation activities around the world are typically well known and charismatic mega-fauna. Unfortunately this limits the scope for applying the concept as some critical areas for biodiversity conservation, such as tropical islands, lack such species. In this study, we explore the potential to apply the concept of 'tourism flagship species' to tropical island birds of the Seychelles, an archipelago of considerable importance for conservation that is highly dependent on international tourism. In particular we wish to identify which species attributes are most influential with regard to their potential for fundraising among international tourists. Using a choice experiment approach and using state-of-the-art econometric methods, we found that conservation attributes and physical appearance of the bird species are both important in terms of raising funds for conservation. Nevertheless, conservation attributes ranked higher in the respondents preferences. Our results suggest that there is considerable potential for a variety of species to effectively act as flagships in developing nations that are dependent on international tourism and rich in biodiversity but lack charismatic fauna.

Introduction

Flagship species have been defined as 'popular, charismatic species that serve as symbols and rallying points to stimulate conservation awareness and action' (Heywood, 1995). Their mission is therefore twofold, to raise awareness and funding towards conservation efforts. The concept is traditionally associated with charismatic large vertebrates, such as giant pandas and whales (Leader-Williams & Dublin, 2000), which have broad appeal, especially in the western world. The ingredient of charisma, apparently essential for a flagship species, brings with it limitations because some important areas for biodiversity conservation lack charismatic megafauna. Encouragingly, however, recent research suggests that the flagship concept may be more flexible and responsive to a diversity of social, cultural, scientific and political dimensions that might extend beyond the traditional model (Walpole & Leader-Williams, 2002; Labao *et al.*, 2008). Emerging flagship models include 'local' flagships, which are used to promote conservation among local people using locally significant species (Bowen-Jones & Entwistle, 2002) and eco-tourism flagships, which target international tourists with an interest in watching animals or participating directly in conservation (Christian *et al.*, 1996; Walpole & Leader-Williams, 2002).

Our understanding of the flagship concept and how it can be applied continues to evolve and our research seeks to contribute to the academic discourse by (1) improving understanding about the fundamental attributes of a successful flagship species and (2) exploring if the flagship model can translate to different social groups. Specifically, we investigate the potential to create a flagship for international tourists with no special interest in conservation. Such flagships are potentially much more important to conservation than the more targeted eco-tourism model as the latter remains a niche market. As a case study, we explore these issues using the bird species of the Seychelles using a choice experiment approach to estimate the willingness to pay (WTP) for potential flagship species, based on individual characteristics belonging to each bird species, such as population size, endemism, appearance or use value as determined by visibility.

Choice experiments are ideally suited to our research objectives as it allows the researcher to identify the underlying attributes that determine the effectiveness of species to act as a flagship, can generate estimates of WTP for specific flagship projects and identify the relative importance of use and non-use values among general tourists. At a wider level our research adds to a small literature on the use of non-market valuation techniques, in particular choice

experiments, to examine flagship species (White *et al.*, 1997; Kontoleon & Swanson, 2003). Finally, we estimate our results using a Mixed Logit specification using Bayesian methods recently developed by Balcombe, Chalak & Fraser (2009). There has been a rapid adoption and implementation of the Mixed Logit model in the non-market valuation literature. The attraction of the Mixed Logit model stems from the flexibility it provides in terms of approximating any random utility choice problem, and thus, overcoming limitations inherent in existing approaches. In particular, the appeal of using a Mixed Logit is that it allows for preference heterogeneity in the choice data to be captured efficiently in parameter estimates. Existing research in the literature demonstrates that this is important in terms of the resulting WTP estimates reported (see Balcombe *et al.*, 2009 for more details).

Tourism flagships

Numerous characteristics have been cited as important in selecting a flagship species: body size (Ward *et al.*, 1998; Eckert & Hemphill, 2005), appearance and charisma (White *et al.*, 1997; Gunnthorsdottir, 2001), conservation status (Gunnthorsdottir, 2001), population size (White *et al.*, 1997; Bandara & Tisdell, 2005; Eckert & Hemphill, 2005) and biological group (Krüger, 2005). However, criteria for selecting flagships differ depending on context and purpose. Selection of local flagships tends to be governed by local cultural, religious and social values (Kellert, 1986), whereas global flagships are typically high profile, charismatic species, like tigers and gorillas (Leader-Williams & Dublin, 2000; Walpole & Goodwin, 2002). Within a single conservation programme, a specific flagship species may attract varying degrees of support among different stakeholders (Eckert & Hemphill, 2005). Consequently, conservation professionals and policy makers may need to choose different flagship species to suit particular objectives, different target audiences and different geographical settings.

Tourist flagship species offer exciting benefits for conservation, particularly in developing regions, which are dependant on overseas tourism. First, a tourism flagship species could help market the region to tourists and therefore directly benefit the local community in terms of income and employment, thereby offsetting the costs of living with a flagship species (Bowen-Jones & Entwistle, 2002; Walpole & Leader-Williams, 2002). Second, tourists could potentially donate funds directly to conservation projects in the region and third, tourists can help raise awareness about local biodiversity conservation needs in areas lacking charismatic species. In contrast, and by way of example, in Rwanda marketing of the mountain gorilla *Gorilla beringei beringei* alone has supported the tourism industry when other factors like political instability predicted a serious downturn (Wells, 1992). Indeed, Walpole & Leader-Williams (2002) found that tourism revenues related to the conservation of the Komodo dragon *Varanus komodoensis* did result in the protection of biodiversity and encouraged positive local attitudes towards conservation.

Given the high-profile nature of conservation work in the Seychelles, we investigate the potential of bird species, an animal group known to be popular (Loomis & White, 1996), to act as tourist flagships for conservation there. Many bird species in the Seychelles are endemic to the islands and are threatened with extinction – two factors which might be considered important criteria for flagship candidate species. Furthermore, like many other tropical islands, the Seychelles archipelago are remote, lack basic economic resources, have small local markets and face high transport costs (Milne, 1992; Lockhart, 1997; Apostolopoulos & Gayle, 2002). Unlike previous studies, we target general international tourists (the beach tourist in the vernacular), the most important source of economic growth and foreign exchange earnings in the Seychelles and hence a sector that offers considerable potential in terms of promoting biodiversity conservation in the context of sustainable development.

Research methods

Choice experiment design

Choice experiments originally developed in the fields of marketing and transport economics (Louviere, Hensher & Swait, 2000) but have recently found wider application in the fields of environmental policy and biodiversity conservation (Hanley *et al.*, 2003; Tisdell, Nantha & Wilson, 2007), as they allow investigation of value for money from policy initiatives or investments by identifying the value of certain attributes of the policy in monetary terms (Hanley, Mourato & Wright, 2001). Choice experiments also provide a very useful approach to help determine which attributes maximize the suitability of a species as a successful flagship (White *et al.*, 1997; Kontoleon & Swanson, 2003). In this study, we developed a choice experiment that presented survey participants (i.e. tourists) with two species conservation projects, and asked them to choose the project they would prefer to support. Thus, the choice experiment involved each survey participant making a choice between a project with a particular set of attributes and an alternative project. Finally, by including the cost of the project in the choice experiment as one of the attributes, it is possible to produce WTP values for each attribute of the package on offer.

As in any choice experiment, the initial task was to select the attributes (characteristics) of the conservation policy, the levels which these attributes could take in the experimental design, and decide on the 'price tag' that should be attached to each combination of levels and attributes. A review of existing literature suggested that appearance, population size and conservation status were characteristics commonly attributed to flagship species. Existing information on population size and conservation status on candidate bird species suggested a range of realistic levels for these attributes but in order to identify appropriate levels for the appearance attribute a workshop was organized.

Workshop participants, which comprised postgraduate students studying conservation, were asked to identify the most attractive birds by scoring 20 bird species native to the

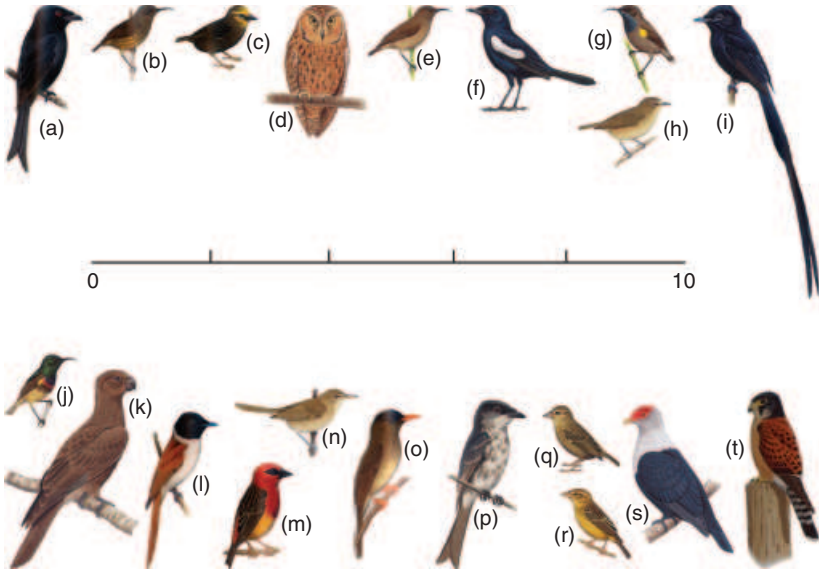

Figure 1 Detailed coloured drawings of the species of birds on Seychelles used in this study (*Source:* Skerret & Bullock, 2001).

Seychelles on their general appearance, using a scale of 0 (low attractiveness) to 10 (high attractiveness). The birds were portrayed using detailed scaled coloured drawings taken from Skerret & Bullock (2001) and identified by letters of the alphabet with no additional information provided (see Fig. 1). The aim of this exercise was to cluster bird species into distinct attribute levels based on physical appearance so as to have a measure of species attractiveness for the appearance attribute. This builds-on on the work of Gunnthorsdottir (2001) who tested the effect of physical attractiveness of species on the WTP for their conservation through the use of images. Grouping into levels was based on the mean standardized score of each drawing, a measure that was obtained after standardizing scores across a respondents range of scores (see MacMillan, Harley & Morrison, 1998), and the frequency of each species in the top and bottom five positions. These results are presented in Table 1. Based on the range of scores used, it was decided to treat attractiveness as a binary attribute (attractive = 1; unattractive = 0) by allocating five bird species with the highest score to the former and the five species with the lowest scores to the latter. Respondents were not informed whether the species was 'attractive' or not but rather each choice option had an image of a bird from one of the two levels of attractiveness. One of the overall aims of the design was to base choice selection on the attributes of a species rather than the species itself, and the use of bird drawings with coding for the appearance attribute rather than real species names was consistent with this aim. To investigate a possible size bias, we compared the areas of the selected five attractive and five unattractive bird drawings. The result was found to be non-significant ($t_8 = 1.481$, $P = 0.177$), which yields that there was no difference in the size of the images used in the final choice experiment questionnaire and as such this element was discarded.

Two additional attributes were used in the choice experiment. To capture the impact of the presence of unusual ecological or behavioural characteristics, we included a dummy variable, 'special characteristics'. For example, these accounted for particular courtship rituals, feeding behaviour or nest-building skills. This variable was included because much of the literature suggests that uniqueness is valued by the public (White, Bennett & Hayes, 2001; Eckert & Hemphill, 2005). The final species-specific attribute we used was the average number of days required to catch sight of a species, assigned to one of three levels: 1, 3 or 7 days. This attribute took into consideration that the average visitor spends around 10 days in the country (Central Bank

Table 1 Results of focus group on the 'appearance' attribute

Species	Weighted score	Five top frequency	Five bottom frequency
Female Seychelles fody (Q)	−6.78	0	11
Seychelles warbler (N)	−6.35	1	11
White-eye (H)	−5.17	0	7
Female Seychelles sunbird (E)	−4.49	0	7
Seychelles magpie (F)	−4.10	0	6
Female Aldabra drongo (P)	−3.85	0	8
Male Seychelles fody (C)	−2.68	2	1
Female Aldabra fody (R)	−2.43	1	3
Female Souimanga sunbird (B)	−2.31	2	7
Male Aldabra drongo (A)	−2.22	2	7
Seychelles bulbul (O)	−0.57	0	1
Male Seychelles sunbird (G)	1.18	0	1
Seychelles scoops owl (D)	2.27	5	1
Blue pigeon (S)	2.37	7	2
Female paradise flycatcher (L)	3.84	3	0
Seychelles kestrel (T)	4.60	7	0
Black parrot (K)	5.96	10	1
Male Aldabra fody (M)	6.39	12	0
Male Abbots sunbird (J)	6.56	9	0
Male paradise flycatcher (I)	7.80	11	1

Letters refer to letters used in Fig. 1.

Table 2 Description of attributes and levels used in choice experiment, and socio-economic data

Attribute	Description
Appearance (App)	Perception of how attractive a species is, presented using drawings divided into two levels: attractive (1) and unattractive (0)
Endemism (End)	Whether geographic distribution of a species is restricted to Seychelles (1) or goes beyond it (0)
Population size (Pop)	Number of individuals of a given species worldwide, here divided into two levels, 150 (low = 0) and 3000 (high = 1)
Special characteristics (Specch)	Presence (1) or absence (0) of unusual or unique ecological or behavioural characteristics
Days needed to see (Days)	Average number of days a visitor has to spend in a given island to have a good change of seeing a species, here divided into three levels, 1, 3 and 7 days
Payment (Pay)	Payment required to carry out the selected project, €10, €20, €60, €100 and €200
Socio-economic variable	**Description**
Gender	Male or female
Age	Years
Education level	Highest level attained – Incomplete high school, high school, incomplete degree, degree, masters, PhD
Environmental membership	Whether respondent is or is not a member of any environmental organization
Annual income	Annual income of respondent in Euros

of Seychelles, 2006) and it tested the hypothesis that use values are relevant to identifying effective flagship species – we speculated that tourists would be willing to pay more if the project improves the chance of seeing the species while on holiday. The chosen payment vehicle in our choice experiment was a charitable donation as this is the vehicle that most closely resembles the reality for which flagship species are designed, because donations are a substantial part of the funds available for conservation. Furthermore, previous studies indicate that tourists will voluntarily pay for biodiversity if they see that by doing so they will contribute to conservation efforts (Gössling, 1999).

A summary of the attributes and levels used in the choice experiment is presented in Table 2, plus information on various socio-economic data collected as part of the survey. These data were used to assess the overall statistical reliability of the survey. In addition, they are used in the subsequent regression analysis to see if there is a relationship between the choices made and profile of survey respondents.

Following Hensher, Rose & Greene (2005) and using SPSS 14.0, we derived a main effects orthogonal design of alternative combinations of attribute levels. To construct the choice cards, we randomly paired various combinations, ensuring that we maintained an appropriate balance in terms of the attribute levels. Thus, every choice in the survey presented respondents with two scenarios (labelled A and B to avoid label biases), each corresponding to a particular species. We then asked respondents to choose which species should have their conservation priority enhanced so as to increase population size by 50% over the next 10 years, plus any translocation or other conservation action necessary. However, if respondents felt they would not, for any reason, be willing to contribute to the conservation project of either of the species presented in the two alternative scenarios, a 'Neither' option was available so as not to oblige respondents to choose. Choosing 'Neither' meant that no cost or benefit was incurred relative to the *status quo* (Pearce & Özdemiroglu, 2002). Thus, the *status quo* was defined as maintaining both species in their current situation presented by the choice cards and was therefore characterized by the joint attributes in both scenarios presented. Finally, every choice experiment questionnaire presented each respondent with eight questions, each composed of three potential options (including the option to choose 'Neither') as to avoid respondent fatigue (Whitten & Bennett, 2001; Pearce & Özdemiroglu, 2002). The survey design and attributes, the respective introductory text and the protocol for the development of the choice experiment survey were explored for clarity, simplicity and time required for completion through a second workshop. Participants had no difficulty in understanding the survey instructions, structure or the task presented to them. An example of the final survey instrument is presented in Fig. 2.

The selected target population comprised English-speaking foreign tourists over 18 years of age, who were visiting the islands of La Digue and Cousin. These islands offer different experiences to visitors: La Digue markets mainly beach tourism, while Cousin, a Special Island Reserve, exclusively markets wildlife tourism. Given the time frame of the project and the fact that it was conducted during the low season, the only sampling technique found to be realistic was opportunistic sampling. Following a small-scale pilot, the survey was conducted using face to face interviews, a method generally recommended for stated preference surveys because it allows a flexible approach and better use of visual aids than other methods such as postal and phone survey methods (Arrow *et al.*, 1993; Pearce & Özdemiroglu, 2002).

Econometric methods

As noted in the 'Introduction', we used Bayesian methods to estimate the Mixed Logit specification following Balcombe *et al.* (2009). Formally, assume that $x_{j,s,n}$ is a $k \times 1$ vector of attributes from the choice experiment, which have been

Programme A		Programme B
Endemic: Yes Population size: 150 Special characteristics: Yes Days needed to see it: 7 Supported needed: 200€	NEITHER	Endemic: No Population size: 150 Special characteristics: Yes Days needed to see it: 1 Supported needed: 200€
Programme A		**Programme B**
Endemic: Yes Population size: 3000 Special characteristics: Yes Days needed to see it: 7 Supported needed: 60€	NEITHER	Endemic: No Population size: 150 Special characteristics: Yes Days needed to see it: 7 Supported needed: 200€
Programme A		**Programme A**
Endemic: No Population size: 150 Special characteristics: No Days needed to see it: 1 Supported needed: 20€	NEITHER	Endemic: Yes Population size: 3000 Special characteristics: Yes Days needed to observe it: 3 Support needed: 60€
Programme A		**Programme B**
Endemic: Yes Population size: 150 Special characteristics: No Days needed to see it: 3 Supported needed: 200€	NEITHER	Endemic: Yes Population size: 3000 Special characteristics: No Days needed to see it: 1 Supported needed: 60€

Figure 2 An example of choice card conservation projects have been designed to prevent the disappearance of these species. These projects aim at increasing the population size of target species by 50% over the next 10 years. However, with more than 200 bird species to preserve there is a need to identify priorities. Consider the characteristics below and select, using an X, which programme within each pair you would most likely support. In case none of the two programmes in a pair satisfy you put an X on the Neither option. Some species are represented by the same pictures as their appearance is very similar, being virtually equal to anyone who is not a specialist.

presented to the jth individual ($j = 1, \ldots, J$) in the sth option ($s = 1, \ldots, S$) of the nth choice set ($n = 1, \ldots, N$). We assume that $U_{j,s,n}$ is the utility that an individual attains from a specific choice. Next, assume that $y_{j,s,n}$ is a variable that is equal to one if the jth individual chooses the sth option within the nth choice set, and zero otherwise.

As is common practice in the choice experiment literature, we assume that an individual j obtains utility from the sth choice in the nth choice set such that the utility function is of the form

$$U_{j,s,n} = x'_{j,s,n} t(\beta_j) + e_{s,j,n} \quad (1)$$

where β_j is a $(k \times 1)$ vector describing preferences for an individual and $t(.)$ is some transformation of the parameters. In the Mixed Logit literature, the function $t(.)$ has taken a varied selection of forms. In this paper, we use the log-normal for the price parameter and the normal distribution for all other parameters in the model, which is typical of the literature to date (see Balcombe *et al.*, 2009 for more details). Finally, the error term $e_{s,j,n}$ is assumed to be extreme value (Gumbel) distributed, independent of $x'_{s,j,n}$ and uncorrelated across individuals or choices.

Like Balcombe *et al.* (2009), we estimate our Mixed Logit specification in what is referred to as WTP space, as opposed to in preference space, which is the typical approach adopted in the literature. To do this requires a simple reparameterization of the following form:

$$t(\beta_j) = t_1(\beta_{1j})(1, t_2(\beta_{2j}), \ldots, t_k(\beta_{kj}))' \quad (2)$$

Thus, the quantities $t_2(\beta_{2j}), \ldots, t_k(\beta_{kj})$ are directly the marginal rates of substitution, which are the estimates of WTP we wish to recover.

By estimating our model in WTP space there are econometric benefits. First, by estimating in WTP space, we estimate directly the values of specific interest in this study. Balcombe *et al.* (2009) note that this approach reduces the instability frequently associated with WTP estimates in preference space. The instability arises because when estimating the Mixed Logit in preference space the WTP estimates are based on the ratio of random variables, which are frequently volatile. Second, by being able to reduce the instability we can avoid many of the practices that have been used in the literature to overcome this problem. For example, researchers frequently fix the payment coefficient for no other reason than to avoid instability. This is an *ad hoc*

approach that can be behaviourally inappropriate if it is assumed that individuals' responses vary independently of socio-economic characteristics.

To estimate our Bayesian Mixed Logit specification, we simulate the posterior distribution of the mean and variance/covariance for β_j using a Gibbs algorithm with a Metropolis–Hastings (M–H) Step. Full details of the algorithm can be found in Balcombe *et al.* (2009). The models are implemented using GAUSS Version 5 and all source code is available on request (I. Fraser). For the analysis presented, we generated all posterior distributions by using a burn-in of 1000 draws and mapping 10 000 draws from the posterior sampler. Importantly, and to ensure high model performance, every one of the 10 000 draws from the posterior sampler are drawn from 500 iterations of the algorithm so as to minimize dependence in the data. This approach to model implementation ensured good model convergence as assessed by various diagnostics.

Results

The total number of interviewees was 230 of which 187 individuals completed all eight choice sets. The sampling was almost equally divided between the La Digue and Cousin study sites with La Digue having *c.* 55% of the questionnaires. A total of 21 different nationalities were recorded with a high predominance of nationals from developed countries, especially Germany (26.5%), UK (17.6%) and France (12.5%). The sample is composed of 56% male and 44% female, with an average age of 37 years. The level of educational achievement is high, with more than half of the respondents having completed a University degree. As we would expect income levels were relatively high with an average income of €45 000 per annum.

We began our analysis by examining if there was any evidence of respondent fatigue. All valuation techniques are known to place a significant cognitive burden on respondents, especially in a holiday setting. Although we presented each respondent with only eight choices, if respondent fatigue was a factor in determining choices, then we would expect different attributes would determine choices at the beginning and at the end of the questionnaire, or that the respondent would simply pick straight A's or B's as a way to simplify the task. To assess respondent fatigue, the proportions of each attribute selected in each choice position of the questionnaire were examined using χ^2 and no significant differences were found. We also tested for a potential 'study site' effect given that La Digue and Cousin catter for a very different target groups but again no significant differences were found.

We next report our preferred model specification that allows for potential heterogeneity in all the parameters characterizing individual's preference. As previously noted, we have assumed that all random parameters are normally distributed. The model specification estimated takes the following form:

$$U_i = \beta_{1i}(\text{Price}_i + \beta_{2i}\text{End}_i + \beta_{3i}\text{App}_i + \beta_{4i}\text{Specch}_i + \beta_{5i}\text{Days}_i + \beta_{6i}\text{Pop}_i) + e_i \quad (3)$$

where Price is the donation made, End is species endemism, App is the appearance of the bird on the choice card, Specch indicates if the species in question has any special characteristics, Days is days to see and Pop is the size of the population. Having estimated the basic Mixed Logit specification, each of the parameters is then conditioned on the set of socio-economic characteristics. In this case, each parameter would be expressed in terms of

$$\beta_{ij} = a_{0,j} + a_{1,j}\text{Gender} + a_{2,j}\text{Age} + a_{3,j}\text{Income} + a_{4,j}\text{Education} + a_{5j}\text{EnvOrg} + u_i \quad (4)$$

These estimates are used to construct the WTP estimates for groups by Gender, Age, Income, Education and membership of an Environmental Organization. In each case respondents are separated into one of two groups within each of these categories: male/female, young/old, high/low income, less/more educated and member/not member of an environmental organization.

The basic Mixed Logit specification results and the resulting WTPs are reported in Table 3. To interpret the results reported in Table 3, it is necessary to understand that because of variable scaling as part of the estimation process, all attribute estimates need to be multiplied by 10. In addition, for all parameters, except Price, a negative sign indicates WTP and a positive sign indicates willingness to accept. From Table 3 we can see that for almost all the parameter estimates reported, including Price, the two and half and 97 and half percentile ranges indicate that our estimates are robust. If a parameter has posterior mass to the positive and negative side of zero as indicated by the percentile estimates this means that we would not be confident that this particular parameter is not equal to zero. The only estimate with this property is days to see.

The attribute with the highest estimate is 'Population size', which has a positive sign. All other attributes have negative signs and take the following order: endemism, appearance, special characteristics and days to see. Thus, respondents were willing to accept on average €189 for a project that targets species with a relatively low initial population. This simply means that respondents place a higher value on smaller populations. In contrast respondents were willing to pay on average an additional €151 for a project that targets endemic species rather than non-endemic species. Overall, the relative magnitude of the estimates is within the range obtained in other animal species valuation studies (see Loomis & White, 1996; Hanley *et al.*, 2003).

Table 3 Mixed Logit results in WTP space

Variable	Mean	SD	97.5 percentile	2.5 percentile
Price	−0.076	0.033	−0.035	−0.138
End	−15.137	0.381	−14.515	−15.759
Pop	18.908	0.374	19.529	18.289
Specch	−3.716	0.373	−3.100	−4.332
Days	−0.429	0.388	0.201	−1.068
App	−12.141	0.378	−11.512	−12.762

WTP, willingness to pay.

Next we consider the Mixed Logit specification where our parameter estimates are conditioned on the various socio-economic variables. These results are reported in Table 4 and they show how the initial estimates are affected by socio-economic variables. If we begin at the top of Table 4, what we observe is that females on the whole are willing to pay/accept more than males. We find the same result for old and young, higher educational attainment and low levels of income. Thus, all of these socio-economic characteristics conform to existing results in the literature about the behaviour of survey respondents. The only socio-economic variable that provides less clear cut results relates to membership of an environmental organization. And even in this case membership is generally associated with higher WTP/accept than being a non-member.

Table 4 Mixed Logit conditioned on socio-economic characteristics

	Gender			
	Female		Male	
	Mean	SD	Mean	SD
Price	−0.056	0.022	−0.070	0.028
End	−20.967	5.452	−17.270	5.664
Pop	27.316	4.772	20.67	5.034
Specch	−3.662	1.469	−5.062	1.553
Days	−0.563	0.566	−0.479	0.595
App	−18.192	3.057	−12.448	3.189
	Age			
	Old		Young	
	Mean	SD	Mean	SD
Price	−0.055	0.022	−0.068	0.027
End	−23.494	4.309	−15.896	4.562
Pop	27.122	5.179	22.15	5.458
Specch	−4.330	1.606	−4.251	1.708
Days	−0.228	0.502	−0.767	0.528
App	−18.342	3.344	−13.450	3.533
	Education			
	High		Low	
	Mean	SD	Mean	SD
Price	−0.060	0.025	−0.065	0.027
End	−23.061	3.622	−13.705	3.488
Pop	−8.304	3.363	18.55	3.451
Specch	−5.331	1.031	−2.689	1.059
Days	−0.232	0.454	−0.964	0.459
App	−18.055	3.032	−12.111	3.074
	Environmental organization			
	Member		Non-member	
	Mean	SD	Mean	SD
Price	−0.071	0.030	−0.060	0.024
End	−22.585	5.856	−18.522	5.556
Pop	27.390	5.889	23.63	5.675
Specch	−3.980	1.687	−4.344	1.632
Days	−1.001	0.543	−0.414	0.532
App	−15.883	4.417	−15.584	4.186
	Income			
	High		Low	
	Mean	SD	Mean	SD
Price	−0.060	0.025	−0.066	0.027
End	−23.086	3.613	−13.666	3.475
Pop	28.298	3.357	18.52	3.462
Specch	−5.338	1.025	−2.696	1.061
Days	−0.228	0.450	−0.964	0.465
App	−18.052	3.033	−12.086	3.074

Discussion

Overall, our results suggest that the most effective flagship species in the Seychelles is endemic, has a low population, is attractive and has unique features of special biological or behavioural interest. Conservation attributes were most influential in the decision-making process, a result supported by Tkac (1998) and Tisdell *et al.* (2007), with the most significant attribute being population size, with respondents preferring to support rarer species. Population size is a key determinant of conservation status (see IUCN Species Survival Commission, 2001) and our findings are consistent with those of Bandara & Tisdell (2005), which show that smaller populations receive the most public support.

While this result is in line with the principles of economic demand theory, in that scarcer populations were more highly valued, the simple use of two population numbers perhaps may not fully convey the complex interplay between number and conservation priority. Fredman (1995) and Bulte & van Kooten (1999) have argued that the primary consideration is if the species is perceived to be above their minimum viable population (MVP) size, as existence values are only highly positive for populations under this threshold. In our study, respondents were not informed as to whether either or both population levels were considered to be below the MVP yet a strong preference was given for the rarer species. A key assumption is that both species were saveable, hence people chose the species that had fewest number and possibly at greatest risk. One also has to note, however, that such assumptions are not always valid, as proven by the findings of Tkac (1998) who found that individuals were even willing to pay for the conservation of species that, while endangered, were not 'saveable'. Research by Bandara & Tisdell (2005) and MacMillan *et al.* (2002) suggests that the absolute number may be less important than current population trends and that more detailed information should be made available to respondents. The relationship between population size and extinction opens up another area of relevance for research on flagships as research based on choice experiments can only be informative and helpful if the general public is knowledgeable enough so as to make the decisions that really benefit conservation. However, the use of flagship species which have a small population size does raise concerns regarding the possibility of the flagship species becoming extinct in the near future (Dietz, Dietz & Nagagata, 1994). Such a scenario could harm future recovery initiatives

elsewhere if the public loses confidence in conservation efforts (Simberloff, 1998). Deliberative valuation methods such as the 'Market Stall approach' could have some relevance here as they give more opportunity for respondents to discuss and acquire more information than interview-based techniques (MacMillan *et al.*, 2002).

Endemism was the second most significant attribute, with endemic species preferred over non-endemics. In economic terms this result means that the public recognizes a low substitution possibility in such species, which leads to a rise in the price of a 'good' as the amount of possible substitutes decreases and hence might largely be associated with concepts of rarity or uniqueness which are attractive to public in developed countries (Shackley, 1996; White *et al.*, 1997). The importance of this attribute had been identified by Kleiman & Mallinson (1998), and suggests, contrary to the proposal of Caro & O'Doherty (1999), that the lack of familiarity of the species to the public does not preclude it from a flagship role. This result is encouraging for areas of high endemism such as tropical islands as these are often developing countries where tourism flagships can potentially have a very important role. However, from a marketing perspective, an endemic species may not be an ideal flagship as they often have very limited geographic distribution and are therefore limited in their application as a flagship for conservation.

Appearance was the third most important attribute in our model, providing some support for the widely held notion that physical appearance can override other considerations in flagship selection and in terms of WTP (Metrick & Weitzman, 1996; White *et al.*, 2001). The final significant attribute was 'special characteristics' that described the unique characteristics and behaviour of particular species. Those species, which had some unusual characteristic(s) were preferred. The value given to this attribute is perhaps a consequence of the importance that societies in developed countries place on the 'unique' and the 'exotic'. One possible implication of this result is that life history, which has not yet been considered as a criterion for a flagship species is relevant and that future research should explore how much and what information on life history is relevant to respondent choice and to the promotion of conservation through flagships more generally. Furthermore, this result shows some potential for combining conservation education with fundraising, as the former frequently uses information on special features of species, which in turn may motivate tourists. Because of our survey design, we were not able to describe the specific characteristics of each species hence it would be worthwhile exploring this attribute in further research.

The attribute 'days to see', was the only variable in the model to yield a posterior density that spanned positive and negative values. The sign of the mean coefficient was negative, which means respondents were less willing to choose a species if it was easy to see. This result is perhaps not surprising as our sample was drawn from tourists who were drawn to the Seychelles for more traditional reasons such as sun and relaxation in tropical surroundings. However, it does contradict the widespread belief that visitors will only contribute towards species they can see, or be close to (see e.g. Eckert & Hemphill, 2005). Another explanation is that the attribute 'days to See' was considered by respondents to be another measure of rarity, with species that are more difficult to see being considered to be more desirable from this perspective. This interpretation would be in keeping with Rollins & Lyke (1998) who found that the existence value of wilderness parks in Canada increased with remoteness. Whatever the reason, it is clear that use values are not important to general tourists, a finding that somewhat contradicts conventional perceptions about flagship species.

Several points about our methodology need to be raised. First, the opportunistic sampling strategy, although clearly the only feasible one, may not have been the most appropriate to collect a representative sample of the target population. However, there was no reference dataset against which to evaluate the demographic profile of the respondents. Thus, although all the socio-economic attributes: age, gender, level of education, income and environmental membership profile, were found to impact the resulting non-market values, this result needs to be treated with some caution if we wished to raise these estimates to the population level. This caveat aside, our results indicate that, preferences for flagships can be explained by socio-economic status of the respondents. However, future research should re-examine this issue correcting for this limitation.

On a more positive note, species in terms of their 'appearance' is novel as it attempts to capture public perceptions rather than *ad hoc* expert opinion which is frequently used in these situations (Reid & Beazley, 2003) and as the bird drawings were coded for overall appearance rather than species name, it allowed us to generalize the results outside the rather narrow context of the birds of Seychelles.

Overall our methodology has advanced our understanding of the flagship species concept and its potential deployment for conservation beyond conventional applications. First, we show that international tourists recognize and value flagship conservation programmes based on their intrinsic conservation value as opposed to use value, which might be especially encouraging for biodiversity rich nations that are highly dependent on tourism but lack biodiversity resources or infrastructure to support eco-tourism. Second, we show that endemism is very important to influencing visitor WTP, indicating the considerable potential of tropical islands and archipelagos, to fully utilize flagships as vehicles for funding conservation. Finally, our findings also have implications for conservation education, because we found that WTP was sensitive to both conservation status and presence of special ecological or behavioural features. Investment in conservation education programmes may not only be desirable but essential to fully exploit the potential of flagship species. In this context, future valuation research needs to focus on better information provision, especially for less familiar species (MacMillan, Hanley & Lienhoop, 2006) and a more extensive programme of environmental education about species conservation, designed to provide accurate conservation information for both locals and tourists should also become an integral part of future

tourism development, and a major secondary goal of protected area management (Lindberg, 1991; Wells & Brandon, 1992). Encouragingly, conservation work on Seychelles is now being supported by active education programmes (Vel, 2008).

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