

A preliminary study of stakeholders' opinions and perceptions of elephants and elephant management in Botswana

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Abstract

Botswana has been lauded by the international conservation community for maintaining the largest population of African elephants on the continent. However, given the size of the elephant population and increasing human population in Botswana, elephants and people are forced at times to live in close proximity to each other, making human–elephant conflict difficult to avoid. It is widely acknowledged that the management of protected areas and wildlife is often a complicated and contentious issue, which requires participation by all stakeholders. This preliminary study aims to determine stakeholders' opinions and perceptions of elephants and elephant management in Botswana. Questionnaires were distributed nationwide and were completed on a voluntary basis. The majority of those who responded, valued elephants for intrinsic reasons, such as their being part of the environment; however, there were concerns over the lack of management and how best to manage the population in the future. These concerns stemmed in part from the perceived lack of communication among stakeholders. There was a significant difference in opinion between those that lived inside and outside of the elephant range. The study provides an insight into stakeholders' opinions and perceptions of elephant management in Botswana, providing inputs for an improved management strategy, aimed at reducing the incidence and impact of human–elephant conflict in Botswana.

Résumé

La communauté internationale de la conservation a loué le Botswana pour le maintien de la plus grande population d'éléphants d'Afrique sur le continent. Cependant, compte tenu de la taille de la population d'éléphants et de la démographie croissante au Botswana, les éléphants et les populations humaines sont obligés parfois de vivre à proximité les uns des autres, ce qui rend le conflit entre les hommes et les éléphants difficile à éviter. Il est largement reconnu que la gestion des aires protégées et de la faune est souvent une question compliquée et contestée qui nécessite la participation de toutes les parties prenantes. Cette étude préliminaire vise à déterminer les opinions et les perceptions des parties prenantes concernant les éléphants et leur gestion au Botswana. Des questionnaires ont été distribués dans tout le pays et remplis sur une base volontaire. La majorité de ceux qui ont répondu apprécient les éléphants pour des raisons intrinsèques comme faisant partie de l'environnement tout en exprimant des soucis quant au manque de gestion et à la meilleure façon de gérer la population à l'avenir. Ces préoccupations découlent en partie du manque de communication entre les parties prenantes. Il y avait une différence significative d'opinion entre ceux qui vivaient à l'intérieur et à l'extérieur de l'habitat des éléphants. L'étude donne un aperçu des opinions des parties prenantes et des perceptions au sujet de la gestion des éléphants au Botswana, ce qui contribuerait à une stratégie de gestion améliorée, visant à réduire l'incidence et l'impact du conflit homme-éléphant au Botswana.

Introduction

Northern Botswana has the largest number (~130,000) of savannah elephants (*Loxodonta africana*) on the continent (Chase et al. 2015).

Botswana is increasingly being regarded as a model for other countries, given its successful conservation record and its consistent commitment to the protection and preservation of the country's wildlife (Motswete 2012). In the 1990s the elephant population stood at approximately 55,000. The 1991 Elephant Conservation Management plan proposed the culling of 3,000 elephants per year (Government of Botswana 2011) as there were concerns about the impact that a large elephant population would have on both people and the environment. The culling programme was never implemented. Although not explicitly stated, within the last 30 years Botswana's management policy towards its elephants has been one of non-intervention (Blanc et al. 2007), with no culling programmes and a recent ban on commercial wildlife hunting (implemented in 2014).

The Botswana elephant population forms part of a continuous elephant population within the southern African area, as individuals move between bordering countries, including Zimbabwe, Zambia, Namibia and, until recently, through to Angola (Chase et al. 2007; 2011). These countries comprise the Kavango-Zambezi Transfrontier Conservation Area (KAZA), one of the world's largest conservation areas. In the 19th century, the elephant population in Botswana was on the brink of collapse due to over-hunting (Cumming and Jones 2005). Largely as a result of conservation initiatives, the population recovered, growing from approximately 55,000 in the 1990s to recent aerial survey estimates of 120,000–130,000 in 2010–2014 (Chase et al. 2011; Chase et al. 2015). While most countries' elephant populations are decreasing due to poaching, urban expansion and landscape fragmentation, the Botswana elephant population remains stable, occupying a range of ~115,000 km² (Chase et al. 2015). During the CITES Conference of the Parties in 2016 (CoP 2016), the Government of Botswana voluntarily offered to place the country's elephant population on Appendix I, thereby banning all hunting of elephants.

A large proportion of the elephant population is located in marginalised regions of the country

(Demotts and Hoon 2010), where the main source of employment is the tourism sector. The most recent aerial survey estimated a density of one elephant per 1.35 km² in a survey area of approximately 100,000 km² (Chase et al. 2015). These elephants share the landscape with an ever-increasing human population (20.5% growth in population since 2001), resulting in more frequent incidents of human–elephant conflict (HEC) (Demotts and Hoon 2010; Gupta 2013). This conflict reflects competition not only for resources such as water and vegetation, but also for space, especially as an estimated 78% of the elephant range occurs outside national parks (Chase et al. 2015).

The management of protected areas and wildlife is often a complicated and controversial issue (Demotts and Hoon, 2010). The opinions and perceptions of those who live alongside wildlife, especially in elephant range, is important to secure habitat and reconcile the often-conflicting needs of people and wildlife. The fundamental tenet of stakeholder theory is that, for any policy or management plan to be successful, all those living and working in the country must be included in its design and implementation (Motswete 2012; Chowdhury et al. 2014). Conservation organisations have identified “stakeholder input as a necessary component in establishing joint responsibility and equal sharing of the burden and benefits of wildlife conservation” (Bandera and Tisdell 2003; Chowdhury et al. 2014). In 1991, Botswana drafted an elephant management plan that attempted to conserve and manage the elephant population while at the same time maintaining habitats and biodiversity and minimising the negative impacts of elephants on rural livelihoods (Government of Botswana 2011). With this objective in mind, Botswana faces the challenge of reconciling the elephant population with the rate of poaching occurring in neighbouring countries (Chase et al. 2016)

The present study aimed to provide information about the opinions of different stakeholder groups with regard to elephants, and their perceptions of current management strategies. This new knowledge will assist in understanding stakeholder concerns and identifying potential solutions and mitigating actions. It will thereby contribute to development of improved management of elephant populations (Bandera and Tisdell 2003) and specifically to the further development of Botswana's elephant management strategy (Government of Botswana 2011).

Materials and Methods

The study area

Botswana has a low population–land resource ratio, with a human population of approximately 2.2 million (Census Office 2012), which is largely concentrated in the southeast of the country, in and around the capital city of Gaborone. The majority of (90%) of children are enrolled in primary school and 39% of the population have completed secondary or tertiary education (Statistics Botswana 2014). Botswana has a network of national parks and other protected areas, largely located in the north of the country. Approximately 17% of the land mass is made up of national parks and game reserves, while a further 22% is mixed use protected wildlife management areas (Chase 2007).

The survey

A 44 question survey written in English was distributed both online and in person randomly to residents, visitors and citizens of Botswana aged 18 years and older. The survey's design attempted to quantify and explore the general opinions and views of citizens (Batswana) and residents (non-citizens) with regard to the management of elephants in the country. The survey was divided into three sections utilizing a combination of (1) tick box (2) Likert scale, and (3) open-ended questions generating both long and short answers. The questionnaire thus aimed to generate both quantitative and qualitative data. The survey was started in January 2013 and concluded in December 2013.

The survey was administered through email invitations, personal invitations and Facebook links to Government offices. Companies within the hunting and photographic safari industries, non-government organisations and community trusts, and a random selection of Botswana businesses were invited to participate.

Data analysis

The answers were manually coded into categorical variables based on the trending responses identified. Place of residence for each participant was coded into those that live inside and those that live outside the known elephant range (Government of Botswana 2013). Statistical analysis was performed using IBM v.21 Statistical

Package for the Social Sciences (SPSS®) to generate frequency graphs and cross-tabulation tables and identify the most appropriate statistical tests for the dataset. Potential relationships between variables were explored further by analysing data generated in all three sections of the survey, using the chi-square (χ^2) test of independence and Fisher's exact test to determine the statistical relevance of the results (Bryman 2012).

The qualitative data was explored using manual critical discourse analysis techniques whereby themes, trends and key statements were identified and connections between themes analysed (Bryman 2012), with key statements isolated and associated into statistically relevant themes identified through the survey.

Results

Section A: Respondents' demographics

The sample comprised 126 participants (69% male, 31% female). Ages ranged from 19 to 71 years, of which 73% were aged between 30 and 49 years. This normal distribution of age brackets is statistically representative of the population (Fig 1a). The respondents resided in six out of the nine rural districts. Over two-thirds (71%) of the respondents lived within the elephant range.

60% of the respondents reported having a university degree, with 21% having finished high school and 14% indicating their highest education level being the completion of a diploma (Fig 1b). The occupations of the respondents varied, with the highest proportion employed in the tourism industry (25%), closely followed by self-employment (23%; Fig 1c).

Section B: General opinions and interactions with elephants

A total of 90% of respondents indicated that they "do like seeing elephants in their natural environment". Of these, 38% citing the reason for doing so as being because elephants are a part of the ecosystem and part of Botswana's natural heritage, with 31% citing a "love" for elephants and an appreciation of them in the natural world (Fig. 2). Additionally, respondents associated liking elephants with tourism (12%; Fig. 2). As this survey question was open-ended, the responses shown in Figure 2 are not mutually exclusive and respondents were able to give more than one answer. The 11% who indicated that they do not like to see elephants in the wild, explained it was due to the

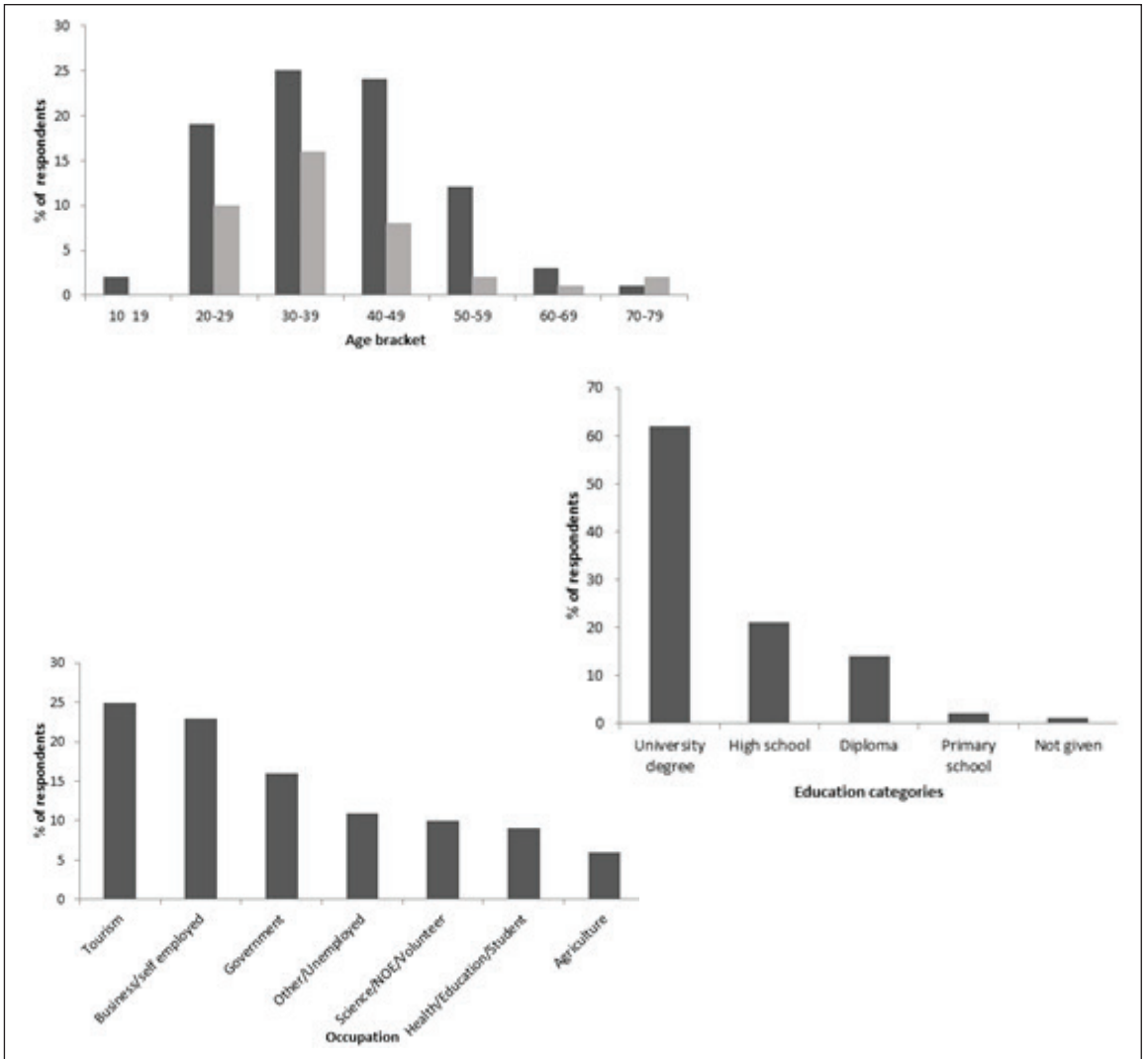


Figure 1. Frequency distribution of total survey sample (n=126) depicting respondents' (a) age, (b) highest level of education and (c) occupation.

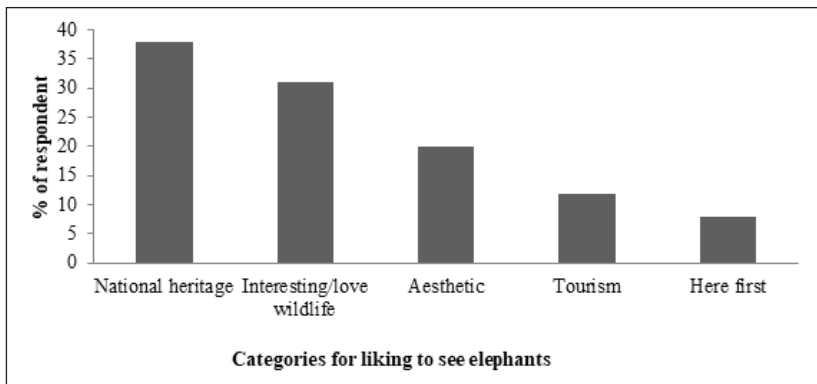


Figure 2. Reasons given by respondents for why they like seeing elephants in their natural environment.

danger that the elephants pose and the damage they cause.

50% of respondents living in an elephant range area reported seeing them on a weekly basis. There was a significant relationship between frequency of sightings and where respondents lived, with those living within the elephant range seeing elephants more frequently than those living outside the elephant areas ($\chi^2=28.4$, degrees of freedom (df)=4, n=123, $p<0.01$).

Survey participants were asked if they believed that elephants cause damage in Botswana, and then asked to indicate where they believe most of the damage occurs. The term damage was used as a broad term, referring to any impact elephants have on the natural and/or man-made environment. In response to this question, 83% of respondents believed elephants do cause damage, 8% thought they do not and 9% indicated that they are unsure. When tested against the variable of residency in elephant and non-elephant areas, no significant relationship was found ($\chi^2 = 0.19$, df = 2, n = 123), $p>0.05$). Two more chi-square tests were run to assess the relation between perceptions of damage by elephants and the education levels and occupations of respondents. Both tests produced non-significant results ($p>0.05$).

In response to a question about where elephants were causing damage, respondents indicated that they believed crop farms and national parks experience significantly higher levels of damage by elephants compared to other land use categories in Botswana (Fig. 3). Respondents' opinions of where elephants caused damage were tested against their location of residence (inside versus outside the elephant range). Perceptions regarding the occurrence or non-occurrence of damage in each land-use category differed significantly based on whether the respondents lived inside or outside the elephant range (Table 1), except for damage to crop farms ($\chi^2=2.75$, df=1, n=126) $p=0.11$). This indicates that residency inside or outside the elephant range is statistically related to the opinions regarding the damage cause by elephants.

The majority of respondents indicated they preferred non-fatal methods for deterring elephants from causing damage (Fig. 4), although 35% did indicate support for culling

or controlled hunting as a method to keep elephant populations from destroying human-occupied areas.

Respondents were asked what their immediate response would be if they had a problem with an elephant. The majority said that they would call the Department of Wildlife and National Parks (DWNP) (77%), with 14% saying that they would deal with it themselves (Fig. 5). There was no statistical difference between the number of respondents who believed there are too many elephants in Botswana and those who lived inside and outside the elephant range ($\chi^2=0.046$, df=2, n=124), $p=0.97$). Conversely, there was a statistical relationship between respondents who felt the population of elephants in Botswana is too large and respondents who indicated that they believed elephants cause damage ($\chi^2=20.65$, df=4, n=124), $p<0.01$).

82% of respondents said they had not been personally, financially or socially affected (negatively) by elephants. Of the 18% of respondents that had been affected, a third received compensation from either private insurance or the DWNP.

Nearly half of respondents indicated that they felt that they or their family personally benefitted from the elephant population. There was no significant difference in opinion based on whether or not respondents lived inside or outside the elephant range.

Section C: Knowledge of current elephant management schemes

The majority of respondents believed that the elephant population needs to be managed (85%), and that the DWNP is responsible for their management (80%; Fig. 6).

The number of respondents who knew that Botswana has an elephant management plan was statistically related to whether or not respondents lived inside or outside the elephant range ($\chi^2=10.04$, df=1, n=124, $p<0.01$), with those living inside elephant range more likely to be aware that there is an elephant management plan (Fig. 7).

The majority of respondents (95%) recognised the value of elephant research and considered that the study of elephants is useful for management plans. However 65% of respondents believed there was a lack of sufficient communication about wildlife between the Government and the public, while 75% believed there should be greater collaboration among researchers, professional hunters (the survey was carried out before hunting was effectively banned in the country) the tourism sector and the Government.

Table 1. Significant statistical relationships (d.f.=1, n=126) between perceptions land-use categories areas damaged by elephants and where respondents' location of residence, i.e. within or outside the elephant range.

Areas damaged by elephants	χ^2 value	p-value
Community areas	5.99	0.02
Villages	6.89	0.016
Roadsides	9.25	<0.01
National parks	6.96	<0.01
River fronts	15.75	<0.01

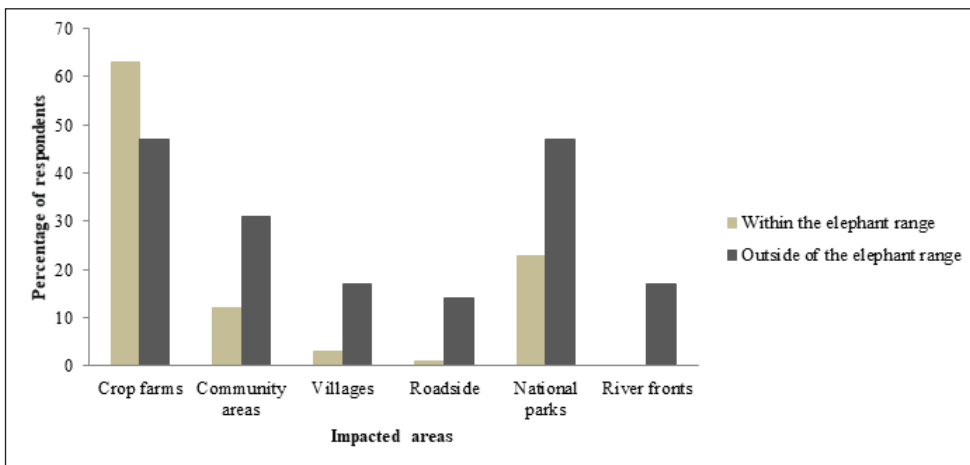


Figure 3. Land-use categories where respondents living within and outside the elephant range believed elephants caused the greatest amount of impact.

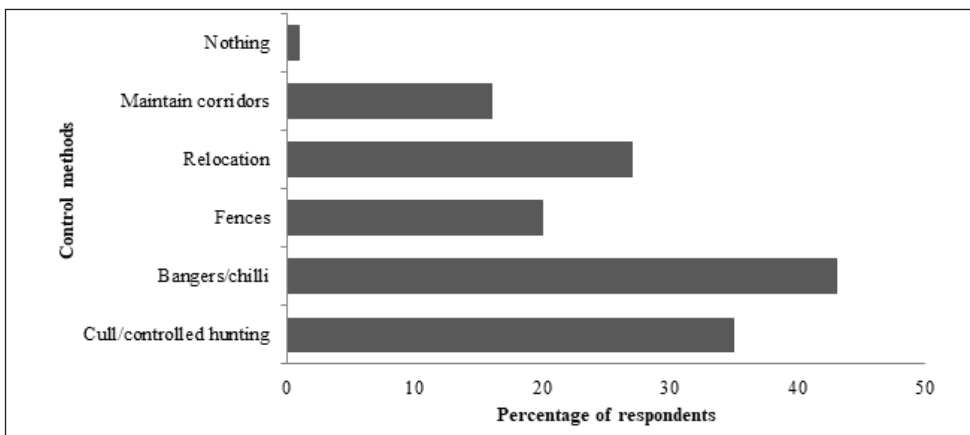


Figure 4. Mitigation strategies mentioned by respondents and means to manage the elephant population.

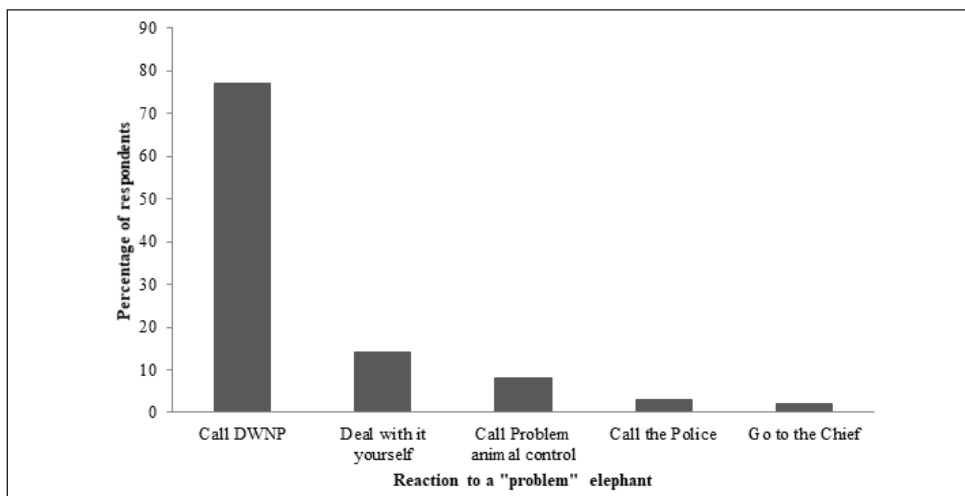


Figure 5. Respondents' indications of how they would respond to a problem with an elephant.

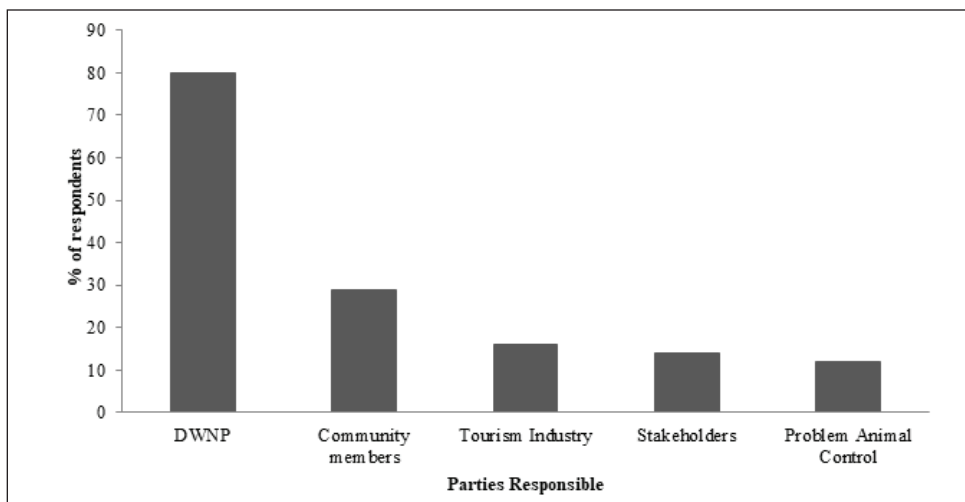


Figure 6. Parties identified by residents as being responsible for the management of the elephant population.

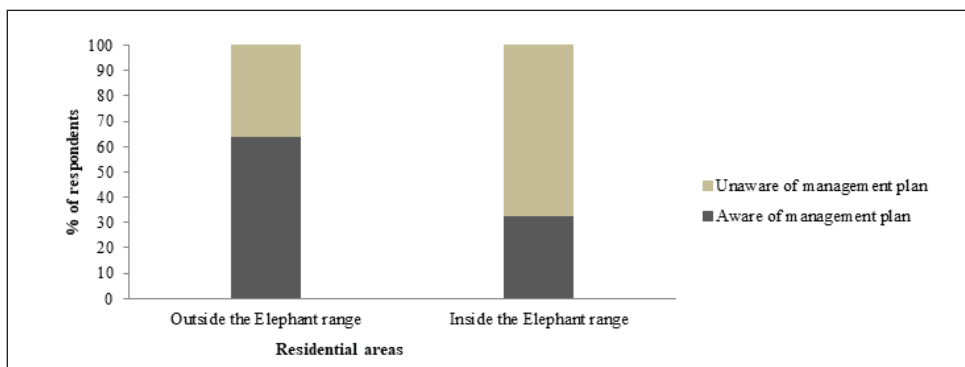


Figure 7. Awareness of the existence of an elephant management plan among respondents living within and outside of the elephant range.

Discussion and conclusions

Respondents' perceptions and attitudes are determined by their values and frames of reference (economic, cultural and environmental) (Chowdhury et al. 2014). In this case, differences in terms of levels of education and occupation appeared to have very little impact on respondents' opinions of elephants and perceptions of elephant management. Whether a respondent lived inside or outside the elephant range was more often influential in determining responses. The results of this questionnaire indicate a generally positive attitude towards elephants in their natural environment; however, there are clear concerns about the perceived damage that elephants cause. Respondents perceive a need for increased communication between the stakeholders affected by elephants and those involved in elephant conservation.

Respondents showed a strong positive attitude towards elephants in their natural habitat. One respondent said "they are part of the balance of nature and an important part of the ecosystem". The primary reason for this positive response was not based on economic reasoning, but rather a feeling that elephants are an intrinsic part of Botswana's natural heritage. Respondents enjoyed seeing elephants. When asked why, their responses included that elephants are relatable to humans because they live in families, that they inhabited the elephant range before people and that they belong in the ecosystem. The opinion of the minority of respondents who did not like seeing elephants (11%) was based on the belief that they pose danger, which is linked to concerns about personal safety and damage to crops.

Despite this overall positive attitude towards elephants in their natural environment, the majority of respondents believed elephants cause damage in Botswana. Only a small proportion of respondents had ever been directly disadvantaged by elephants (18%), but the belief that elephants are causing damage was consistent across the majority of respondents (83%). Both those living inside and outside the elephant range believed the greatest amount of damage caused is to crop fields (Fig. 3). Crop-raiding behaviour of elephants has been identified as the lead cause of conflict with humans within the elephant range in many African countries (Sitati and Walpole 2006; Hoare 2012; Songhurst and Coulson 2014). The location of residence

affected respondents' perception of where elephant damage occurs (Table 1). Presumably those living inside the elephant range had seen the damage first hand, so their answers would reflect this, whereas those that do not see the damage regularly for themselves based their answers on second-hand information. A significant correlation was found between those respondents who believed elephants cause damage and those who believed the elephant population is too large.

The majority of respondents believed that the elephant population needs to be managed, and that the DWNP should be responsible for this management (Fig. 6). This opinion was expressed by the majority of respondents, regardless of location, occupation and education. One respondent explained why they nominated DWNP by stating "it's their job" (26). Another respondent explained that they were not happy with the management of the elephant population as "only once the problem is caused do we think about [elephants]" (70). They explained that there appears to be little foresight, suggesting that management methods are for the present day rather than reflecting sustainable planning for the future. A number of respondents noted that Botswana has a large elephant population as a result of herds which have come from neighbouring countries rather than solely as a result of natural growth rate. "Opening borders, linking parks internationally with corridors, elephants could move elsewhere freely", was another explanation given of why elephants need to be managed. The majority of respondents would call DWNP if they had an immediate problem with an elephant (Fig. 5). This highlights the importance that residents place on DWNP to respond to problems caused by elephants, and the reliance they have on DWNP to manage elephants properly. In addition to reducing HWC, respondents considered that DWNP's roles should include informing the public about how to act in the presence of wildlife, and disseminating new research findings on elephants.

Deterrent methods including bangers and chillies were the most frequently mentioned option for mitigating HEC in communities (Fig. 4). Chillies have been used by a number of social empowerment projects as an effective and harmless elephant repellent (Hanks 2006; Parker and Osborn 2006; Kalahari Conservation Society 2015). Bangers, which emit a loud noise (otherwise known as 'flash bangs'), are commonly used by the Problem Animal Control (PAC) unit of DWNP. As this form of repellent is used in the communities, people living within the elephant range will have had first-hand experience of seeing and hearing them in action. The second option

perceived to be effective in managing the elephant population is culling and/or controlled hunting, ceased 2014. (Fig. 4). Culling is a hotly debated topic filled with factual uncertainty and moral complexity (Dickson and Adams 2009). Culling can perpetuate the problem as it moves elephant population densities towards the level where reproduction is greatest (van Aarde et al. 1999) currently it would be expensive and ineffective in reducing Botswana's elephant population (Hanks, 2006). In 2011–2013 the wildlife authorities tendered special licences for 'problem elephants', in addition to normal elephant annual quota, in an effort to reduce HEC in the community areas (Hoare 2012). Despite increasing evidence that the killing of problem elephants will not reduce HEC at any level including that of the individual, region or nation (Hoare 2001; Chiyo et al. 2011; Hanks 2006), there is still a community perception that it is successful, at least in part because the killing of the problem animal is seen as compensation for the losses and damage that it has caused (Hoare 2012).

The vast majority of respondents believed that there is poor communication and a lack of awareness about elephants, a belief that was held irrespective of where the respondents lived (inside or outside the elephant range). Residents living inside the elephant range would be more likely to see first-hand the damage that elephants cause and the steps that are taken to reduce HEC. However, this study demonstrated that residents living within the elephant range were less aware that there is a Botswana elephant management plan than those who lived outside the elephant range.

The failure to share information was taken up by respondents, with 65% stating that there is a lack of sufficient communication between the Government and the public regarding wildlife management. However, specific opinions on this subject were mixed, with one respondent saying there is "no communication between communities and [government]" and another saying "there are enough kgotla meetings [tribal assemblies] and workshops to teach the public". This suggests that the effectiveness of communication is related to location of residence. The majority of respondents recognised that research is useful (95%); however, 75% of respondents also believed that there was insufficient communication among stakeholders at all levels and that the flow of communication

needs to be improved.

The surveys were primarily filled out by more highly educated people, with 60% of respondents having enrolled in tertiary education, compared to the national average which is only 16.9% (Statistics Botswana 2014). The cause of this is unknown; potentially it could be because the questionnaire was available online, which could favour those that have access to good telecommunication network, or because residents from foreign countries who likely have higher education rate were able to participate. Although educational attainment in Botswana displays a balanced gender distribution, there is considerable variation among geographical areas and poor attainment among certain linguistic groups (Statistics Botswana 2014). This may contribute to the differences in opinion we found between those that live inside and outside of the elephant range, since access to education is lower in more remote areas and among linguistic minorities (Statistics Botswana 2014).

Despite these potential biases, this study offers preliminary insights into respondents' opinions and perceptions of the management of the elephant population in Botswana. The results of this study will be useful in supporting efforts to increase participation in conservation by people in different areas and from a wider range of educational backgrounds, for the design of wildlife education and awareness programmes, and for the development of future management plans to conserve Botswana elephant population, which is of fundamental importance for the southern African region.

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