



Exploring the value of overseas biodiversity to Chinese netizens based on willingness to pay for the African elephants' protection



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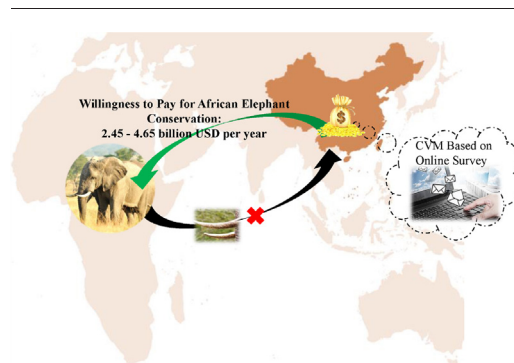
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HIGHLIGHTS

- Chinese public's attitude for overseas biodiversity conservation matters.
- Online survey and contingent valuation method were used to test non-use value.
- Willingness to pay to protect African elephants was stable across scenarios.
- Chinese netizens' motivation to international biodiversity conservation is strong.
- China should be more deeply involved in global biodiversity governance.

GRAPHICAL ABSTRACT



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ABSTRACT

For a long time, Chinese people have been considered to be concerned only with commercial interests but not ecological systems and biodiversity conservation, even though their trade and investment footprints are globalizing rapidly. This study intended to reveal the non-market valuation on the non-use value of African elephant to Chinese people. Taking the ban of ivory trade as the background, in this study, Chinese netizens' willingness to pay for African elephant conservation was investigated using the contingent valuation method. Four versions of questionnaires were designed and distinguished by offering different background information and payment vehicles (tax and donation). It was demonstrated that the differences in both given information and payment vehicles had no significant impacts on the estimated mean willingness to pay value. 53.36% of the respondents gave positive responses for the hypothetical projects of African elephant protection. The mean willingness to pay was 83.62 RMB (12.59 USD) and 158.58 RMB (23.88 USD) per year per household and the aggregated willingness to pay or benefits for the protection of African elephants from Chinese netizens were estimated to be 16.31 billion RMB (2.45 billion USD) and 30.92 billion RMB (4.65 billion USD) per year after grouping regression and benefit transfer adjustments, respectively. The current research shows that Chinese people, living thousands kilometers away from Africa, have a high public awareness for and valuation to the endangered elephants.

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1. Introduction

This paper tried to present a non-market valuation on the non-use value (mainly bequest and existence value) of African elephant to Chinese people. In this study, we tried to disclose that Chinese people, living thousands kilometers away from Africa, were willing to protect the elephants against poaching, which further reduced the possibility of their usage of elephant (ivory). Though there were a few studies, such as Laplante et al. (2010), which explored the willingness to pay (WTP) of the Armenia Diaspora living in the United States for Lake Sevan protection in Armenia, and Wattage and Mardle (2008), which compared the non-use value to use value, can be considered as comparable ones, most of the previous contingent valuation method (CVM) studies for conservation value were based on local people's WTP for local species protection (Kontoleon and Swanson, 2003; MacMillan et al., 2004; Bandara and Tisdell, 2005; Zong et al., 2008; Zhou et al., 2009; Liu and Ma, 2012; Diffendorfer et al., 2014; Vargas and Díaz, 2014; Zander et al., 2014; Richard and Hanne, 2015).

The African elephant (*Loxodonta africana*) is present in 37 states in sub-Saharan Africa (IUCN, 2016) and plays a keystone role in African ecosystems for seed dispersal and the creation of forest gaps, assisting in the diversification of tropical forest faunal and floral species (Viljoen, 1984; Western, 1989). However, it had been widely reported that this species was suffering from the surge of poaching (IUCN, 2007) and many African countries had begun to carry out trade bans and protection actions since last century (Kameri-mbote and Cullet, 1999).

For a long time, Chinese people have been considered to be concerned only with commercial interests but not ecological systems and biodiversity conservation, even though their trade and investment footprints are globalizing rapidly (Schoeman, 2007; Sautman and Yan, 2014; Alden et al., 2010; BobuAfrica, 2016). There were reports about the poaching of African elephants induced directly or indirectly by the consumption of Chinese (CITES, 2013; Wittemyer et al., 2014; Zhan and Weng, 2015). On December 31, 2016, China's State Council made a historical movement and announced the strictest ban on processing and sales of ivory for commercial purposes (General Office of the State Council, 2016). Actually, early before the official movement, Chinese pioneer wildlife conservationists had been already working with African local communities to save wildlife (Xing, 2013; Xinhua News Agency, 2016; Wang and Wu, 2016). Though such cases occurred sporadically and individually, it essentially reminded us that common Chinese citizens might have good awareness and WTP for biodiversity conservation for the remote continent.

This study intended to verify this "guess" based on a CVM survey. With the African elephant as a signal, this study tried to reveal how the Chinese would value the non-use value of biodiversity outside the nation. Chinese netizen was chosen to be the target population of respondents. These groups of people are in general younger, better-educated and with a greater degree of information exposure. It is economically optimal and viable for this particular study to lean towards internet surveys.

2. Methods

2.1. A brief overview of contingent valuation method (CVM)

The contingent valuation (CV) method is a survey-based method frequently used for the evaluation of environmental goods and ecological system services and is considered the only feasible method to integrate non-use value into economic analyses. A CV survey creates a hypothetical market/actions, and respondents are then directly asked to state their preferences concerning those assumptions (Carson, 2000). Davis (1963) was the first to use the CV method empirically when estimating the benefits of goose hunting. In the last several decades, numerous studies have been conducted to evaluate the value of

wildlife, and more attention has been focused on their indirect values, such as ecological and existence values. When estimating the WTP of wildlife conservation, most studies have shown that the groups of people, the social-economic characteristics of individual or households, have significant effects (Zander et al., 2014; Kaffashi et al., 2015; Hundsnes and Lind, 2015). It is also generally reported that using different elicitation techniques provides varied WTP values (Cameron et al., 2002; Kontoleon and Swanson, 2003; Zong et al., 2008).

As the biases and the unsatisfactory performances of early open-ended and payment card formats emerged, the single-bounded dichotomous choice (DC) format that asked respondents to vote for or against a particular level of money was recommended as the most desirable form of CV elicitation and more incentive-compatible than other forms (Arrow et al., 1993; Hanemann, 1994; Zhao et al., 2013). Random assignment of cost numbers to respondents allowed the researchers to trace out the distribution of WTP for the goods (Hanemann and Kanninen, 1999), which was regarded as the major advantage of the DC format (Carson et al., 1996). Therefore, the DC format was adopted in this study to facilitate the respondents to complete the valuation process.

2.1.1. Questionnaire design

A questionnaire survey is the key to collect data for a CVM study. The questionnaire designed in this study mainly included four parts. First, a simple survey on the awareness of wild animal conservation. Second, questions to investigate respondents' attitudes and feelings towards African elephants and the ivory trade. Third, questions to elicit respondents' WTP of African elephants. And forth, questions of social-economic characteristics of respondents. The complete questionnaire is provided in Appendix A.

As it was reported that the type of information provided and the payment vehicles may influence the WTP estimates (Carson, 2000; Champ et al., 2002; Istamto et al., 2014), four versions of questionnaire were designed (Table 1), and they were randomly shown to respondents to ensure the consistency of the subsamples' characteristics. Such a design was aimed to disclose whether the notice of ivory trade information or different payment vehicles would affect respondents' WTP for the protection of African elephants. In the WTP elicitation part, two payment vehicles for African elephant conservation, which were tax and donation, suggested by Lee and Mjelde (2007) when coming across preservation values, were shown randomly. Meanwhile, in the part of background, two pieces of material were designed. Material 1 provided a brief introduction to African elephants, their ecological functions, endangered population under poaching, etc. This piece of information was presented to all respondents. Material 2 was an introduction of the international ivory trade and the role China played in the trade and supply chain. This piece of information was shown to half of the respondents randomly.

Pre-tests through the domestic social networking platform Wechat and an online survey platform were carried out to determine the appropriate content and form of the questionnaire. Open-ended questionnaires were used in the pre-tests, in which the maximum WTP for African elephant protection was directly asked. The results helped to decide the range and the set of bids in the formal single-boundary DC questionnaire, which were 20, 40, 60, 100, 150, 200, 300 and 500 RMB (3, 6, 9, 15, 23, 30, 45, 75 USD, the US dollar to RMB exchange rate was set to 6.64 which was the annual average of 2016) per year, covering 90% of the range of the amounts given by the open-ended questions in the pre-tests. Each bid was randomly shown, and the key WTP question was: "Is your family willing to pay B RMB of the special tax/donate per year to support the projects?"

The present study had used "cheap talk", certain statements, pre-tests, etc., to minimize the potential hypothetical bias, payment vehicle bias, starting point (anchoring) bias and embedding effect bias. The detailed description was listed in Appendix Table B.1.

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