



Understanding consumer preferences and demography in order to reduce the domestic trade in wild-caught birds



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ARTICLE INFO

Article history:

Received 2 December 2016

Received in revised form 23 February 2017

Accepted 2 March 2017

Available online xxxx

Keywords:

Wildlife trade

Captive-bred alternative

Bird market

Pet birds

Song competition

Indonesia

Hunting

Market-based conservation intervention

ABSTRACT

The wildlife trade is now one of the greatest threats to biodiversity, and birds are among the most commonly traded groups worldwide. The demand for pet birds is especially high in Indonesia, a country with many exploited, imperiled bird species. Finding solutions to the threat that trade poses for birds, and wildlife in general, requires an understanding of its socioeconomic dimensions. We examined consumer demography and preferences of 762 bird owners in Medan, Sumatra, focusing on the differences among owners of birds taken from the wild versus birds bred in captivity. We found that the vast majority of bird owners have at least one wild-caught bird. However, wild-caught bird ownership is not uniformly distributed across Medan; rather, there are distinct hotspots with high proportions of people with wild-caught birds. The main reasons for owning wild-caught birds are lack of access to and the high cost of captive-bred birds, and a perception that captive-bred birds do not sing as well as wild-caught ones. We conclude that captive-breeding programs could reduce the pressure on wild populations, especially if suppliers are able to produce relatively cheap captive-bred birds. However, the perceived poorer song quality of captive-bred individuals might be a problem for the captive breeding of some species, notably the White-rumped Shama, *Copsychus malabaricus*. Since many owners of this species compete in bird song competitions, establishing competition categories specifically for captive-bred shamas could promote captive-bred bird ownership. Tackling the problem of the wild bird trade in Indonesia and elsewhere will require consideration of both the economic and the social factors that underlie pet ownership.

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1. Introduction

Wildlife trade is one of the greatest threats to biodiversity, particularly in Africa, Asia, and South America (Robinson et al., 1999; Alves et al., 2013; Challender et al., 2015a). Animals and plants are traded live as pets and collectors' items, or dead for medicine, ornaments, and trophies (Oldfield, 2003). Birds are one of the most commonly traded taxonomic groups worldwide, with 408 Red-Listed species classified as threatened at least in part by trade (Regueira and Bernard, 2012; Alves et al., 2013; Bush et al., 2014). Limiting the threat that trade poses to wildlife requires a rigorous understanding of the ecology of the traded species (e.g. the degree to which populations are in decline due to trade), as well as the economic (e.g. the sales volume and price

of the particular taxon traded, market mechanisms, the role of the wildlife trade in people's livelihoods) and social aspects of the wildlife trade (e.g. motivations for owning animals) (Regueira and Bernard, 2012; Phelps et al., 2014; Challender et al., 2015b; Harris et al., 2015). Even though wildlife trade has received increased attention from researchers and conservationists in recent years, its socioeconomic aspects remain poorly understood. Moreover, most of that attention has focused on a handful of charismatic species, such as elephants (*Loxodonta* spp.) and tigers (*Panthera tigris*), leaving the vast majority of exploited species understudied.

Across Southeast Asia, birds are heavily targeted for the pet trade, and Indonesia represents an important and suitable study system to understand the socioeconomic factors underlying that trade. An astounding 22% of Indonesia's households are estimated to keep birds as pets, and as many as 60% of bird-owning households are believed to have wild-caught birds (Jepson and Ladle, 2005). Bird song competitions are a popular activity, and, indeed, substantial prize money can be

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won with certain species (Jepson et al., 2011). Unsurprisingly, trapping is one of the major threats to a number of Indonesian bird species, further exacerbating the threat posed by habitat loss (Shepherd et al., 2004; Eaton et al., 2015; Harris et al., 2015, 2016). Several bird species have already been identified as being imperiled due to their popularity in the pet bird market, including *Pycnonotus zeylanicus* (Straw-headed Bulbul) and *Garrulax bicolor* (Sumatran Laughingthrush) (Harris et al., 2015). Some have even been driven to the brink of extinction, including *Leucopsar rothschildi* (Bali Myna) and *Cacatua sulphurea* (Yellow-crested Cockatoo) (Eaton et al., 2015; Harris et al., 2015). Wildlife trade thus poses a grave threat to Indonesia's avifauna, and it is therefore crucial to understand its socioeconomic aspects.

Here we aim to understand the socioeconomic factors underlying the pet bird trade in Medan, a major city on the island of Sumatra. This part of Indonesia includes some of the most important bird trade centers and has rapidly disappearing tropical forests harboring numerous endemic birds, including many traded species. Substantial conservation gains could likely be achieved if the bird trade were better understood in Sumatra. We focus particularly on the possibility of substituting wild-caught birds with captive-bred equivalents (Jepson and Ladle, 2005; Dutton et al., 2011; Williams et al., 2014; Phelps and Webb, 2015; Robinson et al., 2015). For such a conservation intervention to be both effective and enduring, a thorough ecological, economic, and social evidence base of the wildlife trade system has to be built up. We argue that, currently, the social dimension of the bird trade is the least well-understood part of the issue. For instance, detailed demographic profiles of bird owners are lacking, which largely prevents demographically targeted social marketing and implementation of conservation interventions (Jepson and Ladle, 2005).

Through structured interviews with bird owners, we: (1) quantify the frequency with which different bird species are owned by people in Medan, distinguishing between captive-bred and wild-caught individuals of each species; (2) establish demographic profiles of bird owners in Medan, Sumatra, and test whether there are any demographic differences between owners of wild-caught birds and captive-bred birds; (3) evaluate the reasons why owners might prefer wild-caught or captive-bred birds as pets; and (4) by carrying out a preliminary playback experiment and further interviews, explore these reasons further in the case of *Copsychus malabaricus* (White-rumped Shama), one of the most coveted bird species in Southeast Asia, which is both bred in captivity and captured in the wild.

2. Methods

2.1. Study design

We conducted structured household interviews of pet bird owners in Medan, Indonesia to understand the socioeconomic factors underlying their bird-keeping behavior. We carried out our research in two phases: Phase 1 (August 2014) involved detailed interviews with randomly selected bird owners. Informed by our findings from Phase 1, in Phase 2 (August 2015) we focused on owners of wild-caught *C. malabaricus*. Phase 2 entailed shorter interviews and a preliminary playback experiment to gauge the ability of bird owners to distinguish between the songs of wild-caught versus captive-bred individuals of *C. malabaricus*.

2.1.1. Phase 1 interviews

We collected data through structured household interviews with 762 bird owners in Medan in August 2014. Six trained local Indonesian interviewers randomly sampled interviewees in 10 districts of Medan. In each district, we established a target number of interviews to be carried out in proportion to the population size of that district, according to the 2010 Indonesian census (22–107 interviews per district). Within each district, we selected random sub-districts to which the interviewers traveled. Using a table of random 5-digit numbers, interviewers

would stop at the n th intersection, where n was the first digit of the first 5-digit number, alternating between left and right turns at each intersection. If this process led to an area with houses, the interviewers would sweep through the area systematically, looking for potential interviewees in the first 10 houses they encountered. The interviewers did not complete >5 interviews within a given sampling area. Once the sampling area was either fully swept, or 5 interviews were carried out, the interviewers used the next random number to get to the next sampling area.

The questions that the interviewers asked fell into three categories, reflecting our three research goals (see questionnaire in Supporting Information). The first set of questions focused on which species of birds the interviewees owned (at the time of the study and in the past), how many of each, and whether each bird was captive-bred or wild-caught. The interviewees were provided with pictures of common pet bird species to help them identify the bird species they owned. The second set of questions was designed to obtain basic demographic information from the interviewees, including age, self-reported socio-economic status, education, ethnicity, and religion. The third set of questions asked about reasons for owning or not owning captive-bred birds, as well as the interviewee's self-reported access to captive-bred birds. We cross-checked on a 10% structured subset of the original sample that interviews had been carried out by having an independent interviewer re-contact the interviewees; confirming that interviews had been indeed carried out in all cases.

2.1.2. Phase 2 interviews

In the second phase, we focused on 307 owners of wild-caught *C. malabaricus*. We chose this species for a case study based on our findings from Phase 1: this species is extremely popular and highly valued in bird song competitions. Additionally, its wild populations are declining due to trade (Harris et al., 2016), and anecdotal evidence suggests that captive breeding of this species is increasing in some parts of Indonesia, including Jakarta (T.M.L. personal observations). This set of 307 owners included both owners previously interviewed in Phase 1 (44 owners), and new interviewees (263 owners), whom we recruited through contacts and visits to bird song competitions. The interview component of Phase 2 consisted of the same questions we asked in Phase 1 related to the demography of bird owners, but it differed in the questions about reasons for not owning a captive-bred bird in that these questions referred specifically to *C. malabaricus* (see questionnaire in Supporting Information).

Answers from each interview in both Phases 1 and 2 were recorded on paper by one of the interviewers, and later entered into a database and translated from Bahasa Indonesia to English. Typically, two interviewers worked together as a team, and we aimed for each team to have one female interviewer, so as to not introduce any bias that the interviewer's gender might have on responses (Huddy et al., 1997; Flores-Macias and Chappell, 2008; Davis et al., 2010). We minimized data entry errors by employing a second assistant who checked all the data entered. The interview questions were not directly related to the interviewees' potential illegal behavior (e.g., owning a protected bird species), therefore we do not expect the results to be skewed toward positive responses. The study protocol was reviewed and approved by the Princeton University Institutional Review Board (permit number 6723 and 6724).

2.1.3. Playback experiment

Results from Phase 2 interviews suggested that many bird owners believe that the song of wild-caught *C. malabaricus* is superior to the song of captive-bred individuals, and that this perception is an important reason for owners to prefer wild-caught individuals (see Results). If this belief is not consistent with owners' actual preferences and abilities to distinguish between the songs of wild-caught and captive-bred *C. malabaricus*, then a potential conservation intervention to reduce trapping pressure on wild populations of *C. malabaricus* might include

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