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RESEARCH ARTICLE

Messaging with appeal to intrinsic or relational values shows potential to shift demand for wildlife as pets

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Abstract

1. Overharvesting of wildlife for trade is a key driver of biodiversity loss. Messaging that is aligned with people's values could play a significant role in reducing this impact through behaviour change.
2. Using an online survey, we sought to gauge the willingness among bird hobbyists, breeders, and song contestants to change their bird-keeping behaviours, and to identify barriers to such change. We then evaluated the persuasiveness of various messages that potentially align with people's values (e.g. addressing conservation, cultural and health considerations), each framed as positive or negative, and with outcomes involving a move to commercially bred birds or cessation of purchasing wild-caught birds.
3. We identified a degree of plasticity in behaviour, with most respondents perceiving the keeping of wild-caught birds to be a conservation problem, and a majority claiming they would attempt to breed birds in the future. However, while most respondents acknowledged the illegality of both buying and catching wild birds, they also recognised that most birds in markets are wild-caught because they are easier and cheaper to source than captive-bred birds.
4. Messages about the damage done by over-exploitation to wild bird populations, to the future of bird-keeping itself, and about the benefits of keeping captive-bred over wild-caught birds, were most effective. Messages about generational, legal and especially health concerns appeared to gain little traction. The persuasiveness of these messages varied little across bird-keeping groups, but age- and user-groups differed in their most trusted sources of information and the media they consulted.
5. Our results suggest that appealing to people's concern over the intrinsic value of wildlife or the relational value of cultural heritage might be more effective at shifting demand for wildlife products than more instrumental or utilitarian considerations.
6. Effective messaging should focus on the negative impacts of over-exploitation on Indonesia's wildlife and/or national heritage, and on the positive aspects of

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sustainable captive-bred alternatives, and be transmitted via multiple media, including local and faith leaders (choice varying geographically), to maximise outreach to the diverse bird-keeping community.

KEYWORDS

Asian songbird crisis, Bird-keeping, Demand reduction, Indonesia, Values, Wildlife trade

1 | INTRODUCTION

The overharvesting of wild populations of animal and plant species is considered one of the major drivers of global biodiversity loss (Maxwell et al., 2016; Morton et al., 2021). Across the planet, transforming patterns of consumption is considered vital to halt further declines in biodiversity (Bush et al., 2014; Kidd, Garrard, et al., 2019; Moss et al., 2017; Schultz, 2011; Thomas-Walters et al., 2021). How such change can most effectively be produced, by appealing to particular values (instrumental, intrinsic, relational), is a growing area of research (e.g. Ghijselink, 2023; Stålhammar & Thorén, 2019; Winkler-Schor et al., 2020). In the context of the global wildlife trade, over which existing or proposed laws have little control, the focus has generally been on the individual actions of consumers (Naito et al., 2022, 2023), since profiling consumer motivations and preferences can help develop interventions to address the problem of wildlife over-exploitation (Marshall et al., 2020b, 2021; Naito et al., 2022, 2023, 2024).

Such interventions include effective messaging that promotes behaviour compatible with sustainable use of natural resources (Kidd, Bekessy, & Garrard, 2019; Kusmanoff et al., 2020; Reddy et al., 2017, 2020). Previous research has led to conservation message-framing often emphasising the environmental or economic benefits derived from wildlife conservation (e.g. Kusmanoff et al., 2016), a traditional line of argument that stretches back to IUCN's *World Conservation Strategy* of 1980, but such approaches have been judged only rarely to increase pro-conservation attitudes or behaviours (Krantz & Monroe, 2016; Reddy et al., 2020). Similarly, increasing consumers' awareness of their impact, on the assumption that this will increase their disposition to modify their behaviour (Heberlein, 2013; Wallen & Daut, 2018), does not necessarily produce the desired result (Green et al., 2019; Olmedo et al., 2018). Instead, messaging that targets people's values (Miller et al., 2018) may be significantly more effective (Kidd, Garrard, et al., 2019; Thomas-Walters et al., 2021; Verissimo et al., 2018, 2020), particularly if delivered by trusted messengers (Krantz & Monroe, 2016).

Overharvesting of wild birds to supply the cagebird trade is a global concern (Daut et al., 2015; Ribeiro et al., 2019; Symes et al., 2018). In parts of Asia, particularly Indonesia where bird-keeping is an ingrained and widespread tradition that overrides issues of illegality (Jepson & Ladle, 2009), trade in wild-caught passerine and other highly vocal and/or colourful birds is so great that its negative impact on wild populations has created an 'Asian

songbird crisis' (Marshall et al., 2020a). In recent decades, bird-keeping in Indonesia has driven the exploitation of wild songbirds to a level that is endangering and even eliminating species, subspecies and populations across Sumatra, Java and adjacent islands (Chng et al., 2015; Collar & Wirth, 2022; Eaton et al., 2015; Indraswari et al., 2020). Around one-third of Java's 36 million households are estimated to keep 66–84 million cagebirds, possibly more than the number of wild songbirds now left on the island (Marshall et al., 2020a). While a proportion of this total relates to commercially bred individuals, 27 Indonesian songbird species are currently threatened primarily due to the cagebird trade (<http://datazone.birdlife.org>), with species that were once likely common across natural and anthropogenic landscapes pushed to and indeed over the edge of extinction owing to excessive harvesting (Eaton et al., 2015; van Balen & Collar, 2021).

To reduce and eventually eliminate unsustainable, unregulated songbird consumption in Indonesia, and especially Java, interventions are needed that engage directly with the communities involved (Challender et al., 2015; Larrosa et al., 2016). 'Demarketing', by highlighting detrimental impacts or social undesirability (Doughty et al., 2020; Verissimo, 2019), is one option. Another is simply to redirect demand to alternatives that can perform (and ideally outperform) the function of the desired consumables (Moorhouse et al., 2020). In the case of Asian songbirds, the obvious alternative to wild-caught birds is commercially bred ones. The questions thus arise as to what messaging might achieve the greatest change in consumer behaviour and, underlying that, what values do consumers have which might be most likely to trigger a significant modification of their bird-keeping behaviour.

We investigated the potential of messaging as a means to improve the sustainability of songbird-keeping behaviour in Java, by both promoting the demarketing of wild-caught birds and redirecting demand towards captive-bred alternatives. We sought to identify barriers to behaviour change among bird-keepers by exploring their knowledge and perceptions regarding the sustainability of the songbird trade. We then compared a suite of messages that appeal to a variety of values (instrumental, intrinsic and relational: IPBES, 2022) to gauge their persuasiveness in encouraging behaviour change. Finally, we reviewed the media most appropriate to the delivery of campaign messages to different demographic and user-groups. The findings from this research are intended to inform future initiatives that aim to promote both demand reduction and redirection in the context of the global wildlife trade and beyond.

2 | METHODS

2.1 | Survey design

Earlier research classified bird-keepers into three user-groups, each with somewhat discrete priorities and perceptions: *Hobbyists*, who keep birds primarily as pets and infrequently participate in song contests; *Contestants*, who keep birds primarily to enter them in singing contests, but may occasionally breed birds; and *Breeders*, who breed and/or train birds as a hobby or for resale, but do not often participate in contests (Marshall et al., 2020b). An initial set of survey questions was developed in early 2020 based on data collected previously on the attitudes and perceptions of these user-groups (Marshall et al., 2021). Originally, the survey was to be conducted face-to-face, but with the onset of COVID lockdowns in Indonesia it was adapted and switched online. The questions (Appendix S1) fell into four categories: those establishing (1) the socio-economic and demographic profiles of respondents; (2) whether respondents owned birds and, if so, which user-group they belonged to; (3) which messages for demand reduction or redirection respondents were thought most likely to produce a change in consumptive behaviour; and (4) the perceptions and misconceptions among respondents about bird-keeping. Figure 1 shows the workflow of this research.

2.2 | Message generation and comparisons

Having previously investigated attitudes and perceptions of current and potential bird-keepers (Marshall et al., 2021), we drafted and framed messages combining multiple aspects: theme (e.g. conservation, health concerns), frame (e.g. positive or negative implication) and behaviour (e.g. choice between captive-bred and wild-caught birds). We created 20 statements combining theme and frame which were then further combined with two behaviours ('Buy captive-bred birds'; 'Do not buy wild-caught birds') to create a total of 40 messages (Table 1). These messages were then presented to respondents, who were asked which they thought would be more persuasive to their friends and family (we used 'friends and family' to avoid respondents biasing their answers in consideration of their own potentially illegal behaviour: Nuno & St. John, 2014; Davis et al., 2019). To reduce respondent fatigue, we reduced the number of comparisons each respondent had to make from 20 to 10, by dividing messages into two sets, so that half the statements were combined with each behaviour in each set respectively. Survey software randomisation functions ensured that each set was shown an equal number of times, to minimise sampling bias.

2.3 | Survey sampling

To promote the online survey, we created the 'Penelitian soal Kicaumania' (Songbird 'mania' research) Facebook page (www.facebook.com/penelitiburungpekicau) and used a combination of posts

and paid advertisements, created using the 'Ad manager' function (Facebook, 2016), to recruit participants. Facebook allows targeting based on the age, gender and location information on an individual's profile page (Akers & Gordon, 2018). We targeted people from all six provinces of Java identifying as male aged 18 and over, with 75% of effort expended on those who either listed birds as an interest or were identified by their Facebook profile as having such an interest (Kapp et al., 2013). We focused on male respondents as songbird-keeping is predominantly a male-orientated pastime (Hartono, 1990; Jepson & Ladle, 2009). To ensure transparency, we created a video (<https://www.facebook.com/penelitiburungpekicau/videos/683592559106623/>) explaining (in Bahasa Indonesia) the goals of the research and asking viewers to take the survey by clicking a link. This post was then promoted using Facebook's 'Boost' function to reach our target demographic, operating in a similar way to the adverts. After an initial pilot period (27/04/20–14/05/20) to determine the best approach, adverts and 'boosted' posts were run continuously over 6 weeks 15/05/20–28/06/20. Throughout this period, adverts were adjusted if necessary to maximise the number of Facebook users reached (Akers & Gordon, 2018; Kapp et al., 2013). Once a respondent clicked on an advert they were redirected to the survey, which was hosted on Qualtrics (www.qualtrics.com).

A further set of responses from a previous household survey carried out by enumerators in 2018 (see Marshall et al., 2020b; also Marshall et al., 2020a, 2021) was included in this study to explore trusted sources of information and commonly used media.

2.4 | Data analysis

Demographic attributes and bird-ownership information were summarised and examined using descriptive statistics to assess the sample representativeness. Further, to understand the likely representativeness of the targeted online survey, the demographic composition of the sample was compared with the sample of bird-keepers collected during the household surveys in 2018 (Marshall et al., 2020a, 2020b, 2021). Proportions of reported responses (to all questions except the message comparison section) were calculated, and differences examined using Pearson's chi-square tests. Where statistically significant differences were found, post-hoc analyses were conducted to determine which groups contributed significantly to overall trends.

The total frequency with which messages were chosen as the more persuasive (of the two presented together) was used to determine which messages 'won' the most contests. These were then ranked by the proportion of the total number of comparisons made. The same process was repeated on two subsets based on the behavioural component of the message: (a) Buy captive-bred birds and (b) Do not buy wild-caught birds (see Table 1). This helped determine whether the theme or frame of a statement would be more successful when combined with a different behaviour. Similarly, to explore whether bird-keeping user-groups or age-groups ranked messages differently, the rank of each message for each user-group

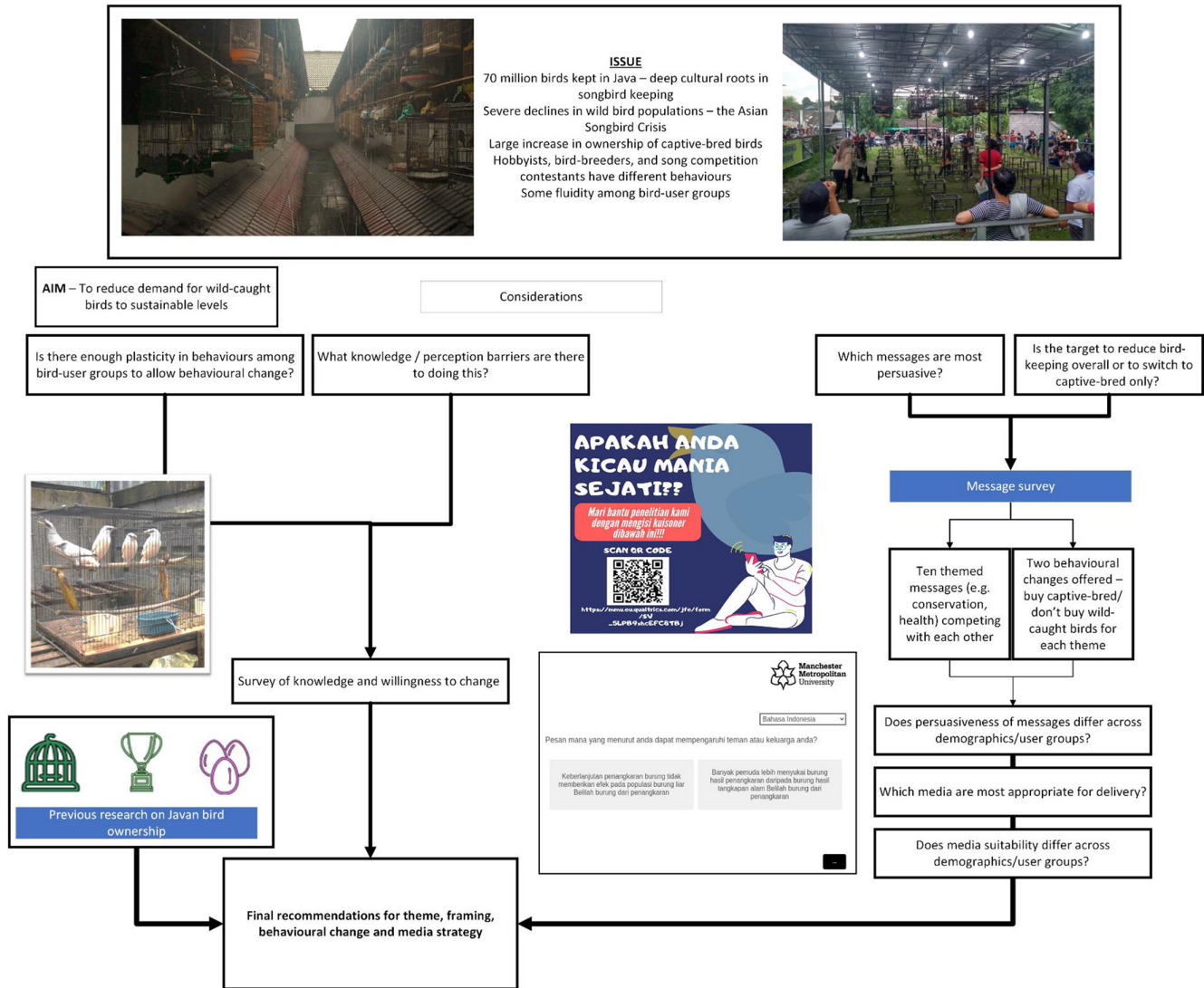


FIGURE 1 Flow diagram showing our pipeline of analysis from issue to recommendations.

and age-group was determined. Differences in rank were calculated to determine increases or decreases in success across groups. All statistical analyses were performed in R version 3.6.1 (R Core Team, 2020).

2.5 | Ethics statement

Potential respondents were presented with information about the project and our objectives prior to engaging with the survey (on the Facebook page), then again after clicking through to the survey link, at which point they either gave or refused consent to participate in the study. Additionally, at the end of the survey, the respondents were presented with further detail on the objectives of the study, particularly our motivations for examining message framings. We obtained ethical approval for our work from the Academic Ethics Committee from Manchester Metropolitan University and the Ethical Review Committee at Chester Zoo. Research permits (427/A/SIP/FRP/E5/

Dit.KI/II/2018 and 2/TKPIPA/E5/Dit.KI/II/2020) were granted by the Indonesian research authority (RISTEKDIKTI) with Universitas Atma Jaya Yogyakarta as the named partner institution.

3 | RESULTS

3.1 | Study sample and its representativeness

Over the data collection period, the adverts and 'boosted' posts reached a total of 5.6M Indonesians on Facebook, resulting in a total of 92K (1.6%) different individuals clicking on the link to the survey. Of these, 1.9K proceeded past the introductory page, 1.7K provided information on presence or absence of birds, 1056 (0.02% of those reached, 1.1% of those clicking the link) completed the message comparison section and 980 provided full socio-demographic data.

Of the 980 respondents who provided demographic information, only 2% were resident outside of Java, with proportionally

TABLE 1 Framework used to generate messages, in Indonesian, to be compared by respondents answering the following question: 'Which of these messages do you think would be more persuasive for your friends or family?'. Elements (Theme + Frame + Behaviour) were combined to create 40 messages (20 combinations of Theme + Frame for each behaviour).

Frame	Positive	Negative
Theme		
Conservation	Sustainable captive-bred birds do not affect wild-bird populations	Wild songbird populations are threatened due to over-extraction for trade
Generational differences	Many young people prefer captive-bred birds over wild-caught ones	Bird-keeping is old-fashioned
Ease of training	Captive-bred birds are easier to train	Wild-caught birds can be harder to train
Economic value	Many bird-keepers think captive-bred birds are a good investment	Some people say keeping birds is expensive and a lot of trouble
Health/Cleanliness	Captive-bred birds are less likely to have wild diseases	Some people think birds are dirty and unhealthy
Legality	It is perfectly legal to keep captive-bred birds	It is illegal to keep wild-caught birds
National pride	Breeding birds demonstrates Indonesian capacity at animal husbandry	Over-exploitation of birds threatens the future of bird-keeping in Indonesia
Personal vs. social good	Most people enjoy seeing birds in the wild, not in cages	Most people think there are fewer birds in the wild now than before
Social norm/perception	Many bird-keepers prefer captive-bred birds to wild-caught	Most people think keeping wild-caught birds is not a good thing
Bird condition	Captive-bred birds are easy to look after, they rarely die or escape	Wild-caught birds die or are in bad condition whilst in transit
Behaviour		
	Buy captive-bred birds	Do not buy wild-caught birds

representative sample sizes from each of the six provinces of Java (see [Table S2a](#)). The key demographic attributes of the sample were: largest age-group 26–35 (39%); the majority with either a high school education (47%) or higher (45%); and commonest occupational category labour (31%) or business (28%), with 52 respondents (5%) in the cage-bird economy (e.g. bird traders, professional breeders, contest organisers; [Table S2a](#)). Overall, 89% of respondents were bird-keepers, with each user-group represented in our sample at similar levels (~21–23%; see [Table S2a](#); user-group profiles in [Tables S3a](#) and [S3b](#)).

Comparing the study sample of bird-keepers collected online in 2020 with that collected in previous work (Marshall et al., 2020a, 2020b, 2021), the online sample tended to be younger (30% more 18–45 year olds), more educated (32% more), with 20% fewer Hobbyists, 6% more Contestants and 14% more Breeders ([Table S2b](#)). This suggests that online sampling was more effective at obtaining data on specialist bird-keepers (higher proportion of Contestants and Breeders), and less effective at collecting data on Hobbyists of an older generation, which would agree with previous results (Marshall et al., 2021).

3.2 | Likelihood of changing behaviours

Only 7% of respondents thought that keeping wild-caught birds is not problematic, whereas 58% thought it is, and 35% thought it

might be. The Indonesian government was most often cited (44%) as responsible for resolving this issue, followed by traders (16%), bird-keepers (15%), all parties (10%) and communities where birds are trapped (8%). The majority (88%) of bird-keeping respondents stated that they would breed birds at some point in the future, with Contestants more likely to do so than Hobbyists. A smaller majority (55%) reported that they could probably be persuaded to stop keeping birds altogether (yes 29%, maybe 26%), with the other 45% reporting the opposite. A larger proportion of Hobbyists (41%) thought they could be persuaded to stop, compared to 25% Contestants and 21% Breeders.

3.3 | Barriers: Perceptions and misconceptions

A majority of respondents believed that catching (66%) or buying (56%) wild-caught birds was illegal, yet a majority (62%) also thought that most birds for sale in markets were indeed wild-caught ([Table 2](#)). A greater majority (79%) believed that wild-caught birds were cheaper than captive-bred birds, but there was less consensus as to whether wild-caught birds sing better (50% agreed). On this topic, the three bird-keeping groups had divergent opinions ([Table 2](#)), although they generally responded similarly in terms of barriers to behavioural change. Breeders were most likely to state captive-bred

TABLE 2 Awareness and perceptions concerning wild-caught and captive-bred birds in the cagebird trade.

Statement	% believing statement true				Overall	n
	Breeders	Contestants	Hobbyists	Non-bird-keepers		
Buying wild-caught birds is illegal	58	56	54	57	56	1266
Captive-bred birds sing better than wild-caught birds	57 >	49	48	38 <	50	1266
Captive-bred birds can be identified by leg rings	90 >	88	80	59 <	83	878
It is illegal to capture birds from the wild	65	69	66	62	66	1266
Most birds for sale in markets are captive-bred	28	29	25	33	28	1266
Most birds for sale in markets are wild-caught	62	62	67	52 <	62	1266
Wild-caught birds are cheaper than captive-bred birds	80	81	81	64 <	79	1266
Wild-caught birds are not permitted in some singing contests	32 >	22	21	25	25	1266

Note: Statements that were cited as true by significantly different proportions of user-groups have their titles highlighted in bold. Groups with significantly greater or lesser proportions than the overall expected are highlighted in bold and indicated with > and < respectively.

birds sing better, and least likely to state that wild-caught birds are permitted to enter singing contests. Non-bird-keepers were less likely to know that captive-bred birds can be identified by leg rings and more likely to assume that most birds in markets were captive-bred rather than wild-caught.

3.4 | Optimal messages for changing behaviours

A total of 1056 respondents (30% Hobbyists, 29% Breeders, 29% Contestants and 9% non-bird-keepers, 3% undisclosed) completed the persuasive message comparison section to obtain a total of 10,610 comparisons. The statement that won the most comparisons was 'Wild songbird populations are threatened due to over-extraction for trade' (Conservation + negative frame) followed closely by 'Over-exploitation of birds threatens the future of bird-keeping in Indonesia' (National pride + negative frame; Table 1). Also scoring highly were two positively framed messages relating to the benefits of captive-bred birds in terms of body condition and ease of keeping/training. Two of the four lowest-scoring messages related to health/cleanliness of bird-keeping. Messaging around legality, social norm/perception, and generational differences tended not to score highly, regardless of positive or negative framing (Table 3). There was a very strong correlation in how the messages were ranked across the two behavioural taglines ('Buy captive-bred' or 'Do not buy wild-caught'; $r_s = 0.97, p < 0.001$).

Persuasiveness of the different messages was fairly consistent across the user-groups, but (perhaps unsurprisingly) with larger differences between bird-keepers and non-bird-keepers than among bird-keepers. Similarly, across age-groups there was only one notable difference in the top-five-ranked messages, with the older group of respondents (over 46 years old) ranking 'Over-exploitation

of birds threatens the future of bird-keeping in Indonesia' (National pride + negative frame) as the most persuasive message.

3.5 | Trusted and commonly used sources of information

Overall, the most trusted information sources were religious leaders (35%), local community leaders (26%), peers (16%) and scientists/experts (11%; Table 4). Most commonly used sources of information were radio and TV (42%), local meetings (24%), and social media and the internet (24%). There was important variation in how different groups obtained information: Hobbyists were the least likely, and Contestants most likely, to use social media and the internet for information. As respondents' ages decreased, they used social media more, and TV/radio and local meeting sources less. Conversely, as age decreased, trusted sources of information tended to shift towards scientists/experts and peers and away from religious and local leaders (Table 4).

4 | DISCUSSION

Building on work to understand the nature and scale of bird-keeping in Java (Marshall et al., 2020a), characteristics of different user-groups (Marshall et al., 2020b), and motivations for keeping birds (Marshall et al., 2021), we have attempted here to identify messages and messaging that will help to catalyse behavioural change to promote sustainability in Java's huge domestic songbird industry. The two messages considered most persuasive had negative frames, focusing on the impact of the trade on either Indonesian wildlife or national heritage. This finding is consistent with other contexts, where

TABLE 3 Most persuasive messages ranked by total number of times respondents chose each statement.

Statement	Theme	Frame	Buy captive-bred	Do not buy wild-caught	Overall		Differences across groups			
					%	Rank	H	C	B	NBK
Wild songbird populations are threatened due to over-exploitation	Conservation	-	77	75	76	1	-	-	-	↓1
Over-exploitation of birds threatens the future of bird-keeping in Indonesia	National pride	-	70	76	73	2	-	-	-	↑1
Captive-bred birds are easier to train	Ease of training	+	69	67	68	3	-	-	-	↓1
Captive-bred birds are easy to look after, and live longer	Bird condition	+	67	66	67	4	-	-	-	↓2
Many bird-keepers think captive-bred birds are a good investment	Economic value	+	61	58	60	5	↓2	-	↓1	↓2
Most people think there are fewer birds in the wild now than before	Pers. vs. soc. good	-	55	64	59	6	↑1	↓1	↓1	↓6
Many bird-keepers prefer captive-bred birds to wild-caught	Social perception	+	57	57	57	7	↓2	↓1	↑2	↑2
Breeding birds demonstrates Indonesian capacity for animal husbandry	National pride	+	53	54	54	8	↓6	↑2	-	↑5
Wild-caught birds can be harder to train	Ease of training	-	55	52	53	9	↑3	-	-	↑1
It is perfectly legal to keep captive-bred birds	Legality	+	52	51	52	10	↑2	↓1	-	↓5
Wild-caught birds die or are in bad condition whilst in transit	Bird condition	-	52	49	51	11	↑1	↑1	-	↓2
Most people think keeping wild-caught birds is not a good thing	Social perception	-	50	46	48	12	↓1	-	-	↑1
Many young people prefer captive-bred birds over wild-caught ones	Generational	+	51	45	48	13	↓2	↓1	-	↑4
Sustainable captive-bred birds do not affect wild-bird populations	Conservation	+	44	49	47	14	↑3	↑1	-	-
Most people enjoy seeing birds in the wild, not in cages	Pers. vs. soc. good	+	46	45	45	15	↑3	-	-	↑5
It is illegal to keep wild-caught birds	Legality	-	37	40	38	16	-	↓1	-	-
Captive-bred birds are less likely to have wild diseases	Health/Cleanliness	+	33	33	33	17	-	↑1	-	↓1
Some people say keeping birds is expensive and a lot of trouble	Economic value	-	26	27	27	18	-	-	-	↓1
Bird-keeping is old-fashioned	Generational	-	28	24	26	19	-	-	-	↑2
Some people think birds are dirty and unhealthy	Health/Cleanliness	-	16	22	19	20	-	-	-	-

Note: The theme of the message and frame (positive or negative) are presented alongside the percentage of times each message won when presented with each behavioural tagline ('Buy captive-bred birds' or 'Do not buy wild-caught birds'). Differences in rankings between overall ranking and across groups (H hobbyists; C contestants; B breeders; NBK non-bird-keepers) are presented using ↓ for a lower ranking for the group in question and ↑ for a higher ranking, with the number representing the difference in positions (e.g. 'Wild songbird populations are threatened due to over-extraction for trade' was ranked one place lower for non-bird-keepers than overall).

TABLE 4 Trusted sources of information and most commonly used media to gather information.

	% non-bird-keepers	% user-groups			% age-groups					% overall
		Hobbyist	Contestant	Breeder	<30	31-40	41-50	51-60	>60	
Most trusted sources										
Religious leaders	37	34	30	27	25 <	34	38	41 >	42	35
Community leaders	24	27	25	35 >	21	26	26	27	28	26
Peers	15	16	22	19	24 >	17	14	12 <	13	16
Scientists/experts	11	10	11	9	17 >	11	9	7	8	11
Themselves	6	6	4	4	4	5	7	6	4	6
Teachers	6	6	8	4	8	6	5	6	3	6
Politicians	1	1	0	1	1	1	0	1	0	1
Most used media										
Radio/TV	43 >	42	36 <	37	38 <	40	42	47 >	47	42
Local meetings	24	25	21	25	16 <	23	26	29 >	30 >	24
Social media/ internet	24	20 <	32 >	27	36 >	28 >	21 <	12 <	8 <	24
Newspapers/ magazines/books	10 <	13 >	12	11	10	9 <	11	11	15 >	11

Note: Sources and media that were cited by significantly different proportions of user- and age-groups have their titles highlighted in bold. Groups with significantly greater or lesser proportions than the overall expected are indicated with > and < respectively.

campaigns that appeal to people's concern for local or national conservation issues of, especially endemic, species have a long history. The effects of such schemes on populations are not always enumerated; however, there has been evidence of conservation successes, for example, with several Caribbean parrot species (Butler, 2000; Jenks et al., 2010) and Philippine crocodiles (van der Ploeg et al., 2011). As such our study provides evidence that appealing to such intrinsic and relational values as concern for local and national heritage (both environmental and cultural) can be an important precursor to pro-environmental behaviour change (Diaz et al., 2015). As Key Message 8 of IPBES Methodological Assessment Report (2022) stresses, transformative change needs 'sustainability-aligned values' to replace those that espouse short-term and material gain, and the evidence from our study suggests that the bird-keepers of Java harbour just such values and can be persuaded to act on them.

It is important to acknowledge that although our study sample was sufficient in size, there was a relatively low response rate when comparing the advertising reach with the number of people who finished the survey. Additionally, compared to the household survey carried out in previous research (Marshall et al., 2020a), the on-line sample contained a higher proportion of younger respondents. However, the lack of variation in responses to messaging across bird-keeping user and age-groups, particularly in the top and bottom five messages, goes some way to allay concerns over the representativeness of the sample and also suggests that message content can be aimed at bird-keepers as a single homogeneous audience, shifting the target where necessary (Thomas-Walters et al., 2021). Indeed, in line with research on traditional medicines (Moorhouse et al., 2020), our results indicate that redirecting demand from wild-caught to captive-bred birds may be a productive strategy. Given

that Hobbyists were the most likely to admit that they could be persuaded to stop keeping birds completely, simultaneously demarketing wild-caught birds may greatly reduce the impact of Hobbyist consumption behaviour (Verissimo et al., 2020).

In this regard, we are encouraged to have found what we consider to be a workable degree of willingness to change behaviour among all types of bird-keeper. As many as 93% of bird-keepers acknowledged that the trapping of wild birds for trade was either problematic (58%) or possibly problematic (35%). Noteworthy, especially given that our survey coincided with the first Covid lockdowns, was the lack of support for health/cleanliness-related messaging: concern for transmission of zoonotic diseases may in some cases yield changes to consumption patterns (e.g. Moorhouse et al., 2021), but evidence for major shifts in the consumption behaviour or trade in wildlife post-COVID is currently weak (e.g. Morcatty et al., 2021; Zhang et al., 2022). These results together suggest that messages seeking to change behaviours should focus on the negative impacts of over-exploitation and on the positive aspects of sustainable alternatives, but not on the negative aspects of the hobby in general (Hinsley & 't Sas-Rolfes, 2020; Margulies et al., 2019).

Nevertheless, as Miller et al. (2019) also found, there was little admission of awareness around the regulation and legality of bird-keeping, with as many as a third of respondents professing not to know that both the capture and purchase of wild birds are illegal in Indonesia (Chng et al., 2015). This is worrying, whether true or not, as shared perceptions, even if not prevalent across a community, can become ingrained within certain sections (Verissimo et al., 2020). Moreover, despite the expectation that respondents would under-report undesirable or even self-incriminating behaviour (Davis et al., 2019), almost two-thirds believed that most birds in markets were wild-caught and

almost 80% thought them cheaper than captive-bred alternatives. On the other hand, many bird-keepers (especially Contestants) showed an interest in breeding their own birds. Keepers also agreed that parties involved in the songbird industry, especially Breeders, should and would increase capacity to breed birds to meet demand. Moreover, a large minority of respondents believed that the Indonesian government was responsible for managing the problem of over-exploitation of wild-caught birds, suggesting that keepers would welcome state intervention to make the trade more sustainable. Navigating this dual ascription of responsibility between individuals and the state by different groups may be key to maximising potential for change towards sustainable behaviour (Naito et al., 2023; Stern, 2000). Somewhat against the insights of Burivalova et al. (2017), we found no strong preference for wild-caught birds, and speculate that the increasingly evidence-based and rigorous training of captive-bred birds may, in some circles, have confuted the traditional presumption that wild birds sing better.

In this study, we explored four key factors: the level of plasticity in bird-keeper behaviours; the barriers to meaningful behavioural change; the degree of difference between bird user-groups; and the most effective media for delivering messages to a diverse audience. Our results point towards the need to employ different media for each target audience (MacFarlane et al., 2022). While a complete cessation of songbird-keeping in Java would seem to be out of the question (Jepson & Ladle, 2009), we suggest that campaigns should focus on demarketing wild-caught birds to Hobbyists in the western provinces of Java (Marshall et al., 2020b), working with religious leaders and engaging communities using the traditional media sources of television, radio, and local meetings. For Contestants, campaigns should focus on aiming to increase the acquisition and breeding of captive-bred birds by younger audiences in urban areas (Marshall et al., 2020b), and highlighting the illegality of wild-caught birds in contests, working with contest communities and communicating via social media. For Breeders, campaigns should focus in the eastern provinces of Java (Marshall et al., 2020b) on demarketing wild-caught birds and encouraging an increase in their breeding activity, engaging with local leaders and traditional media sources. Additionally, our results suggest that it will be important to ensure bird-keepers can distinguish between wild-caught and captive-bred birds. We believe that this approach can be replicated in other contexts where conservation efforts focus on understanding and shifting consumption behaviour towards sustainability (Challender et al., 2015; Larrosa et al., 2016).

The unwritten but not unspoken view of many conservationists is that the Indonesian government has always been anxious not to alienate its bird-keepers, but if that massive constituency were to signal its approval of state intervention to protect their long-term interests it could be a real turning point for bird conservation in Indonesia. However, those long-term interests are not necessarily driven by egotistical considerations of material or social advantage. Although keepers may well sense a growing stigma and inhibition as their buying habits continue to be exposed as a danger not only to wild birds but to their bird-keeping tradition and (when breaking the law) their reputations, they still possess another kind of interest,

in the birds themselves, that reflects much more an intrinsic than an instrumental valuation of nature. To the proposition 'Most people enjoy seeing birds in the wild, not in cages' keepers were considerably less enthusiastic than non-keepers, but this is arguably a strong positive.

AUTHOR CONTRIBUTIONS

All authors played a role in designing the research. Harry Marshall carried out and coordinated data collection. Harry Marshall performed all statistical analyses. Harry Marshall wrote the first draft of the paper with assistance from Nigel Collar and Stuart Marsden. All authors contributed to subsequent drafts of the paper.

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CONFLICT OF INTEREST STATEMENT

The authors declared no potential conflicts of interest.

DATA AVAILABILITY STATEMENT

Data pertaining to this research project are archived on the Manchester Metropolitan University Research Repository e-space at <https://doi.org/10.23634/MMU.00636962>.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Appendix S1: Online survey questions.

Appendix S2: Demographic characteristics.

Appendix S3: User-group bird-keeping profiles.

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