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LETTER

Conservation fundraising: Evidence from social media and traditional mail field experiments

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Abstract

Funding shortages limit conservation impact, making it vital to find effective fundraising methods. To explore how traditional and digital conservation fundraising methods perform, we conducted real-world field experiments by using direct-mail and Facebook advertisements. We compared three types of message frames (simple, seed money, and ecological). We found that the seed money frame, which emphasizes the amount already donated, increased the number of donors, whereas the ecological frame, which focuses on the fact that the fundraiser benefits threatened species, led to a relative reduction in the number of donors. We also found that while Facebook advertising costs exceeded donations, while the opposite was true for the traditional mail experiment. This highlights the importance of identifying appropriate donor pools for online and offline fundraising before implementing campaigns. Our findings illustrate some challenges associated with online fundraising and the importance of behavioral evidence to enhance effective fundraising in conservation.

KEYWORDS

behavior change, behavioral science, donation, endangered species, Facebook, forest conservation, fundraising, Japan, nudging, social media

1 | INTRODUCTION

Funding shortages limit conservation efforts (Waldron et al., 2017). The latest Global Biodiversity Outlook highlighted the lack of financial resources as a key reason why no Aichi Target was fully achieved (CBD, 2020; Xu et al., 2021). Indeed, Target 19 of the first draft of the post-2020 global biodiversity framework highlights the need to fill the funding gap to achieve the biodiversity conservation targets (Seidl & Nunes, 2021; Turnhout et al., 2021). Due to the current substantial shortfall, conservation practitioners have been keen to find new and more efficient ways to raise funds, including through individual donations (Gurney et al., 2021; McCarthy et al., 2012).

1.1 | Online fundraising in conservation

Online fundraising is a relatively new approach, capable of reaching a broad group of donors. Online crowdfunding, for example, raised about 5 million USD for conservation between 2009 and 2017 (Gallo-Cajiao et al., 2018). Yet, despite the reach of online fundraising for conservation, there has been little empirical evidence around

what influences donation behavior. Kubo et al. (2021) and Lundberg et al. (2019) both looked at this topic, but as the former focused on observational data and the latter on stated preference, their ability to draw causal insights into the drivers of success was limited. Given budget constraints, conservation practitioners need to consider the effectiveness of different fundraising strategies from digital platforms to traditional fundraising measures. These insights can go a long way to move conservation beyond the anecdotal accounts and conventional wisdom that still largely dominate fundraising practices (Veríssimo et al., 2018).

1.2 | Behavioral evidence concerning donation behavior

Experimental designs are one powerful way to identify causal impacts and provide robust evidence about what works (Balmford et al., 2021; Ferraro & Hanauer, 2014; Wiik et al., 2020). However, there have been few real-world experiments focused on conservation fundraising. Offline, Salazar et al. (2021) examined the impacts of photographic images on donation behavior at a marine park in Portugal and found no significant difference between four images: dolphins, ocean wildlife, children and watching eyes, while a field experiment at a Japanese mountain park by Kubo et al. (2018) found that announcing the information on seed money was superior to sharing the amount of others' contribution to raise funds for the trail maintenance. Looking at online donations, Shreedhar (2021) found Facebook advertisement videos about wild dogs elicited higher traffic than those about elephants. However, no real-world experimental studies have bridged the gap between online and offline settings in conservation fundraising.

1.3 | Purposes and message frames

We conducted online and offline (i.e., social media and traditional mail) field experiments to investigate what types of channels and message frames encourage people to donate, and to what extent different advertising interventions are worth the investment. We tested three types of message frames (simple, seed money, and ecological) as part of a fundraising campaign to purchase private forest for protection with the Association of National Trusts in Japan (http://www.ntrust.or.jp/index/top_eng.html), a leading environmental non-governmental association. The use of message frames to influence human behavior has received attention in recent literature (e.g.,(Kidd et al., 2019; Kusmanoff et al., 2020; Reddy et al., 2020); however, their application to conservation fundraising has been limited. Our real-world experiments can move the field forward by revealing actual donation behavior and gaining insights into the cost–benefit relationships of online and offline fundraising strategies.

2 | METHODS

2.1 | Study context

Our field experiments were part of the "Amami rabbit campaign" led by the national trust. This fundraising effort was held in 2020/2021 and aimed to acquire approximately 5 ha of private forest on Amami Oshima island, Japan. The island is located southwest of the Japanese archipelago and contains unique sub-tropical rainforests and habitat for endemic and threatened wildlife, including a local flagship species—the Amami rabbit *Pentalagus furnessi* (Kubo et al., 2019; Sugimura et al., 2000). Because of its uniqueness, a part of Amami island became a natural World Heritage site in 2021 (UNESCO, 2021). The fundraiser attempted to contribute to the conservation of this site because most forests were private and fragmented, which hampered conservation efforts (IUCN, 2018). The financial target of the campaign was 50,000 USD (5 million JPY; hereafter, Japanese yen (JPY) with an exchange rate of 100 to the US dollar (USD)). About 55 % (27,500 USD) had been raised by July 2020, when we carried out the research.

2.2 | Experimental design and sampling procedure

In both social media and traditional mail experiments, participants were randomly allocated to three groups: simple (control), seed money, and ecological (Figure 1). Participants in the simple group received the minimum information about the "Amami rabbit campaign", which described the necessity of funding to acquire and/or manage the forest. The seed money group received additional information about seed money, which noted 55% of the fundraising target (i.e., 27,500 USD of 50,000 USD) had been collected at that point (July 1, 2020). The treatment was based on evidence from marketing and economics literature, which suggests that publicly announcing seed money increases the number of donors and donation amounts (e.g.,(List & Lucking-Reiley, 2002). Participants in the ecological group received additional information about threatened species. We highlighted that the proportion of threatened mammals on the island (62%) was higher than the average in Japan (21%). Highlighting threatened species is a common approach in conservation fundraising

FIGURE 1 Three types of messaging frames for the traditional direct-mail and Facebook campaigns: simple (control), seed money, and ecological. In addition to the simple message, the seed money treatment had additional information about seed money, which noted 55% of the fundraising target has been collected. The ecological treatment had additional information about threatened species, which highlighted that the rate of the threatened species on the island (62%) was higher than the average in Japan (21%). See Table S1 for details

(e.g.,(Clements, 2013). See Figure 1 and Table S1 for more details about the description.

2.3 | Sampling procedure

In the traditional mail experiment, we randomly allocated 630 individuals, who had previously expressed interest in national trust activities (e.g., the national trust members, and previous campaign donors), to one of three experimental groups. A letter with one of the message frames was sent to them on July 22 2020, alongside the newsletter of the national trust. The total cost associated with shipping and printing was 819 USD.

In the social media experiment, we used Facebook advertisements which linked to a Yahoo! Japan donation webpage. We set the budget to 20 USD per day for each type of Facebook advertisement and selected the target audience as Japanese residents or recent visitors to the campaign region, aged 20 years and over, and with a broad interest in nature. We did not change the target conditions (i.e., advertisement tags of Facebook) during the experiment to keep samples homogeneous and increase the internal validity. Although it is hard to satisfy the internal validity in social media field experiments in comparison with lab experiments, the procedures are unlikely to be a barrier to causal identification (e.g.,(Chawla & Chodak, 2021; Matz et al., 2018). We posted the advertisements from October 21 2020 to December 21 2020, which cost 3682.44 USD in total. When individuals clicked on the advertisements, they were directed to a Yahoo! Donation webpage. With the support of the national trust and Yahoo! Japan using information on each campaign website link, we were able to identify those who had seen the advertisement, clicked the link, visited the Yahoo! donation page, and clicked donation buttons for different experimental conditions (i.e., simple, seed money, and ecological). The daily number of actual donors and the daily donation amount were provided by the national trust and Yahoo! Japan. See Figure 2 for details.

2.4 | Outcome measures and analysis

In the traditional mail experiment, two outcomes were measured: donation decision and donation amount. We then applied binary logistic regressions and ordinary least square (OLS) regressions, respectively. In addition to the models using the treatment dummies (i.e., seed money and ecological against simple) as independent variables, we also estimated the parameters of models including a membership dummy variable for whether participants were the

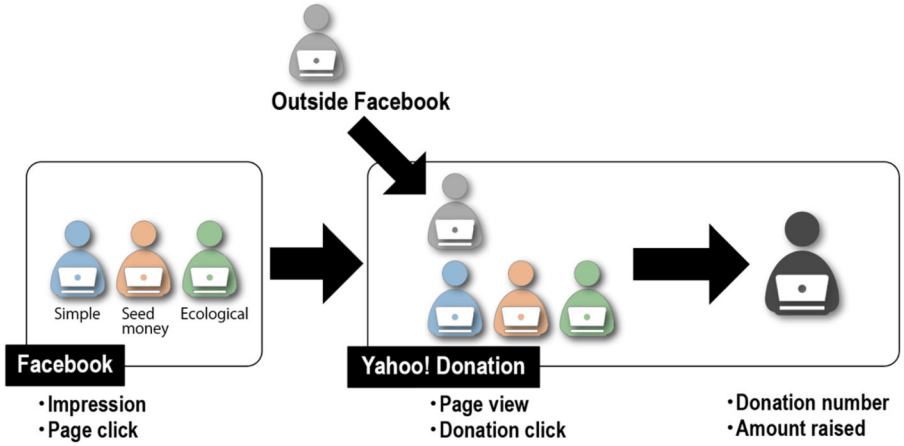

FIGURE 2 Flowchart of online donation behavior pathways through Facebook and Yahoo! Donation website. Treatment types on the four outcomes (impression, page click, page view, and donation click) were identified.

National Trust members or not. This dummy variable and its interaction term with the treatment were added in a model to explore heterogeneous effects of membership.

In the social media experiment, six outcomes were measured: impression, page click, page view, donation click, donation number, and amount raised. The first two variables were sourced from Facebook and the others from the Yahoo! donation webpage (Figure 2). Impression is defined as the number of times that the adverts are displayed on-screen for audiences on Facebook. The collaboration with the National Trust and Yahoo! Japan let us identify the treatment types on the first four outcome measures (i.e., impression, page click, page view, and donation click; Figure 2). To investigate the advertisement impacts, we focused on three outcome measures: (1) page view per impression, (2) donation click per impression, and (3) donation click per page view. For each outcome measure, linear regression models with the treatment dummies were applied by considering day fixed effects and robust heteroskedasticity and autocorrelation consistent standard errors to address potential heteroskedasticity and autocorrelation issues. In each regression, we also implemented joint hypothesis tests to see the statistical differences between treatments (i.e., effects of seed money and ecological information). Explanation of the regression analyses by using equations are described in the Supporting Information. All analyses were conducted in R version 4.0.5, using packages *car*, *lmtest*, and *sandwich* (Fox et al., 2022; Hothorn et al., 2020; Zeileis et al., 2021). The research was approved by the Ethics Committee of the School of Anthropology and Conservation, University of Kent, UK (No. 011-ST-20), and it had been pre-registered before we carried out data collection (https://www.socialscienceregistry.org/trials/6152).

3 | RESULTS

3.1 | Traditional mail field experiment

In the traditional fundraising campaign, 38 participants donated, raising a total of 4120 USD. Although the donation rate was low (6.03%), the amount was about five times greater than the costs composed of shipping and printing (i.e., USD 819). In the simple group, eight participants donated, and the mean and median amount donated was 180 USD and 80 USD, respectively. The donation rate for the seed money group (8.57%) was significantly higher than the simple group (3.81%), whereas the donation rate for the ecological group (5.71%) was not statistically different from the rate of the simple group (Table 1 for the details). However, the mean amounts raised in both treatment groups (i.e., 117.78 USD in seed money and 46.67 USD in ecological) were smaller than that in the simple group (i.e., 180.00 USD), although the differences were not statistically significant (Figure 3, and Table 1 and Table S2). The regressions showed no statistically significant differences between seed money and ecological treatments (Table 1).

3.2 | Social media field experiment

A mean of 20,770 people saw the National Trust campaign advertisements each day (i.e., impression), and, on average, 93 people clicked the link to visit the donation page: Yahoo! Japan (i.e., page clicks).

During the Facebook campaign, the national trust spent 3682.44 USD on Facebook advertisements (a mean of 59.39 USD per day across all three groups), yet only raised 2908.23 USD in total. Note that because the ratio of the

TABLE 1 Coefficients for estimated models concerning the mail experiment

	Logit: Donation decision		OLS: Amount raised (USD)	
	(Treatment)	(Treatment + member)	(Treatment)	(Treatment + member)
Constant	−3.23 ***	−3.76 ***	6.86 *	1.59
	[−4.02, −2.59]	[−4.94, −2.90]	[−1.14, 14.86]	[−7.09, 10.27]
Seed money	0.86 **	1.28 **	3.24	4.24
	[0.04, 1.77]	[0.20, 2.57]	[−8.08, 14.55]	[−8.42, 16.90]
Ecological	0.43	0.73	-4.19	0.32
	[−0.48, 1.38]	[−0.49, 2.09]	[−15.51, 7.12]	[−12.43, 13.06]
Member		1.75 **		32.53 ***
		[0.26, 3.24]		[10.96, 54.09]
Seed money × member		−1.34		−15.95
		[−3.16, 0.45]		[−44.16, 12.25]
Ecological × member		−1.08		−29.78 **
		[−2.99, 0.81]		[−57.72, −1.84]
Number of observation	630	630	630	630
R^2			0.003	0.022
R^2 Adj.			−0.001	0.014
AIC (Akaike information criterion)	288.8	287.9	6931.5	6925.4
BIC (Bayesian information criterion)	302.2	314.6	6949.3	6956.5
Log Likelihood	−141.411	−137.964	−3461.744	−3455.708
Chi-square/F-stat. (seed money = ecological)	1.276	1.242	1.662	0.345

*$p < 0.1$
**$p < 0.05$
***$p < 0.01$.

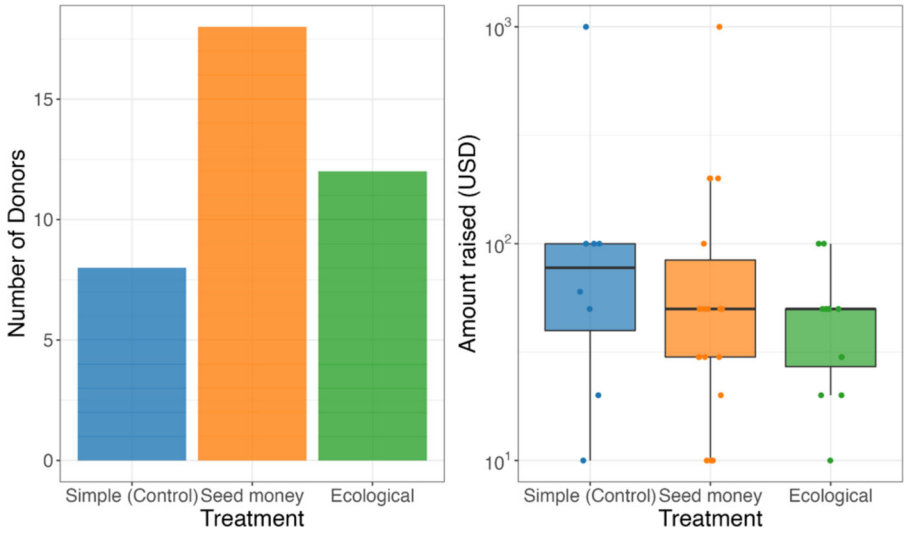

FIGURE 3 Bar chart (left) shows the number of donors through the traditional mail experiment, whereas boxplot (right) shows the range of amounts raised , with each dot representing an observation.

donors from the Facebook advertisement was about 22.54% on average (i.e., nearly 80% of donors came from outside Facebook), the monetary return associated with the advertisement would be substantially smaller than the total amount raised.

We also report key metrics on Yahoo! platform before, during and after the Facebook interventions (Table S3 and Figure S1). The mean number of page views per day was 35.62 before the campaign, 105.89 during, and 11.02 after the campaign. Likewise, the mean number of donors was 7.72 (before), 5.02 (during), and 2.85 (after), and the mean amount raised was 39.96 (before), 46.91 (during), and 12.13 (after), respectively.

In Figure 4, the line graphs depict two control variables (impression and page view). The mean number of impressions per day was 5166.65 (simple), 7469.47 (seed money), and 8134.27 (ecological). These differed due to the Facebook algorithms, even with the same daily budget and targeting measures in each treatment group per day. The mean number of page views per day was 39.06 (simple), 28.92 (seed money), and 25.31 (ecological). The boxplots in Figure 4 show the three main outcome measures. First, the mean number of page views per 10,000 impressions was 80.38 (simple), 40.61 (seed money), and 32.96 (ecological), respectively. The mean number of donation clicks per 10,000 impressions was 3.60 (simple), 2.55 (seed money), and 1.31 (ecological). Finally, the mean number of donation clicks per 100 page views was 4.37 (simple), 6.32 (seed money), and 3.68 (ecological).

Table 2 presents results from the linear regression models of the online experiment data to investigate the effects of each treatment statistically. The simple advertisement increased page views per Impression and donation clicks per impression compared to the seed money and ecological treatments. However, posting the seed money information raised donation clicks per page view compared to the simple advertisement. Results of the joint hypothesis tests showed that seed money information impacts on the main three outcomes were statistically larger than the impacts of ecological information (Table 2).

4 | DISCUSSION

Rigorous evidence on the most effective and efficient fundraising practices is required to achieve financial targets of the post-2020 biodiversity framework (Turnhout et al., 2021). This is the first real-world experimental study using both online and offline fundraising strategies for conservation, enabling us to provide evidence of their strengths and challenges. We found that, in the online setting, the message framing focused on seed money outperformed the ecological framing focused on threatened species. We also found that contrary to the mail fundraiser, the monetary costs surpassed the income generated through the Facebook advertisements. However, the advertisement did increase the number of page views for the donation website.

4.1 | Traditional mail approach raises more money than the costs

Contrary to our expectations, we found that the traditional mail approach raised more funds than its costs, which was not the case with the social media fundraising. The amount

TABLE 2 Coefficients for estimated models of the online experiment

	Page view per 10,000 impression		Donation click per 10,000 impression		Donation click per 100 page view	
Intercept	73.53	***	2.33	***	1.96	
	[57.30, 89.75]		[1.34, 3.31]		[−0.540, 4.46]	
Seed money	−39.77	***	−1.05	*	1.96	**
	[−49.93, −29.61]		[−2.27, 0.162]		[0.326, 3.59]	
Ecological	−47.41	***	−2.29	***	−0.69	
	[−58.75, −36.08]		[−3.56, −1.03]		[−2.30, 0.915]	
Day fixed effects	Yes		Yes		Yes	
Number of observation	186		186		186	
R^2	0.714		0.354		0.397	
R^2 Adj.	0.567		0.021		0.085	
AIC (Akaike information criterion)	1668.1		961.7		1134.5	
BIC (Bayesian information criterion)	1877.7		1171.3		1344.2	
Log Likelihood	−769.034		−415.837		−502.243	
F-stat. (seed money = ecological)	8.467	***	6.616	**	6.823	**

Note: The standard errors and confidence intervals (CIs) were calculated by applying heteroskedasticity and autocorrelation consistent (HAC) estimators of the variance–covariance matrix. The 95% confidence intervals (CI) are given in square brackets.

*$p < 0.1$

**$p < 0.05$

***$p < 0.01$.

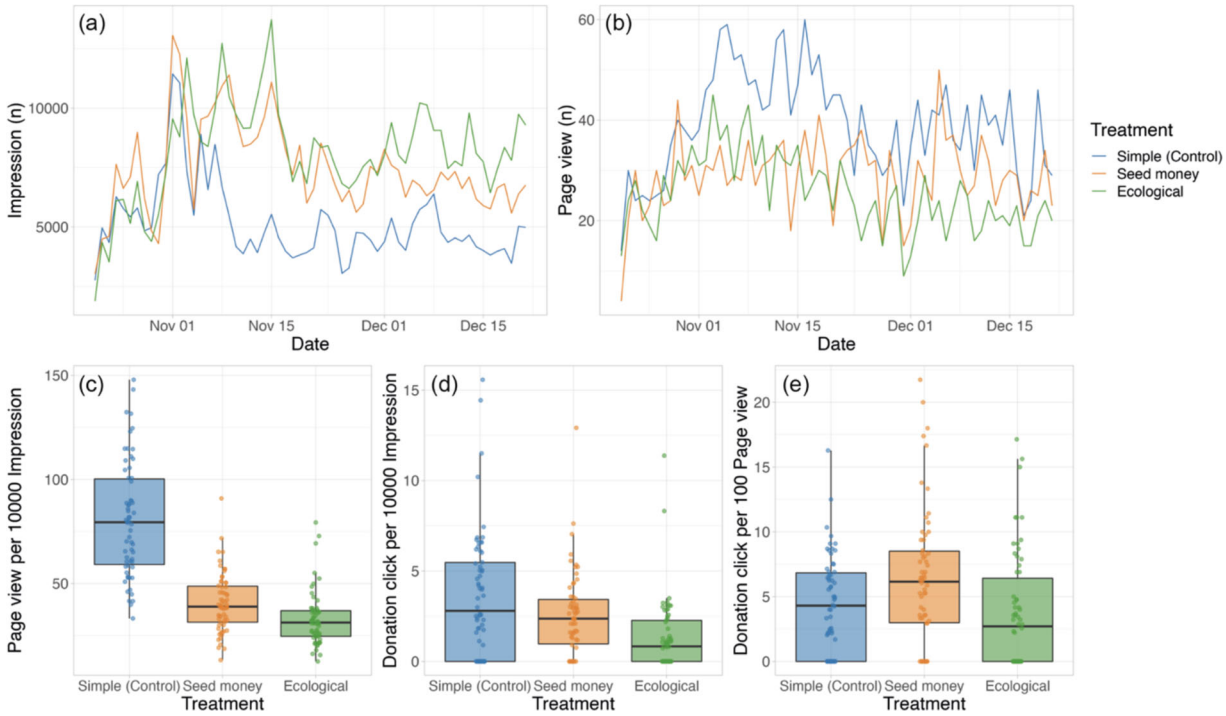

FIGURE 4 The line figures on the above row show the trend in impressions (a) and page view (b), respectively. Vertical axes show each number and horizontal axes are days. The boxplots on the bottom row describe distributions of three main outcome measures (the number of page views per 10,000 impressions (c), the number of donation clicks per 10,000 impressions (d), and the donation clicks per 100 page views (e)) by treatment

raised by the traditional approach was five times larger than the cost, while donations to the online fundraiser failed to cover its cost, even including donations from those who visited the website via non-Facebook advertisements during the advertising period (Figure 2 and Table S3). Note, however, that our analysis does not take into account the potential initial costs of offline fundraising, for example, the collection of the list of contacts used for the mail. Fully accounting for these may reduce the cost efficiency of this approach. In other words, our findings highlight the importance of identifying appropriate donor pools for online and offline fundraising since online fundraising will remain important in the foreseeable future. This is particularly important for organizations looking to expand their donor pool beyond those they have already identified as potential donors, as the number of people an organization can reach online is far greater.

4.2 | Insights from pre-donation behaviors

Before comparing the impact of each message frame, we explored online pre-donation behavior: impressions and page visits. Our evidence suggests that impressions and page visits are not robust measures of success despite their wide use in monitoring and evaluation in conservation and other fields (Doughty et al., 2020), supporting findings from other recent research (Shreedhar, 2021). Note that our social media advertisement reached hundreds of thousands of people but the conversion rate into donations was very low (Figure S1). However, even when researchers use the same budgets and targeting measures between each group, the algorithm of the online platforms adjusts the reach of advertisement posts to maximize their efficiency (Figure 4), which might introduce unintended variance across the experimental groups, although outcomes of this study are conditional on advertisement effort and web browsing behavior. It is therefore key that conservationists carefully unravel the causal relationship between investment and returns by exploring behavioral evidence to improve their strategies in the future. Fundraising collaboration between not only conservation practitioners and/or researchers but also online platforms and marketers should be encouraged, which enhance microtargeting in conservation fundraising practices (Metcalf et al., 2019; Thompson et al., 2021).

4.3 | Economic frame can improve conservation fundraising

Our results reinforce the importance of using marketing insights to guide fundraising efforts, and the need for

specialist skills within conservation beyond natural science (Kubo et al., 2021; Veríssimo et al., 2017). Our finding that publicly announcing seed money encouraged people to donate to the fundraising campaign is consistent with prior literature not only in natural resource management but also in marketing and economics (Gneezy et al., 2014; Kubo et al., 2018). It is also implies that donation behavior in conservation fundraising might be followed by social information such as conformity (e.g.,(List & Lucking-Reiley, 2002). Thus, publicly sharing information on initial budgets from governments and private sectors can improve fundraising success, although applying the seed money framework requires effort to acquire the initial funds.

Our findings also raise questions about the effectiveness of highlighting ecological importance of the campaign target (e.g., species), which is a common approach for many environmental organizations (Clements, 2013; Veríssimo et al., 2017). Compared to the simple advert, highlighting threatened endemic species did not encourage people to donate, either offline or online, nor did it encourage people to visit the donation website. This latter result differed for the seed money frame (Figure 4e). This result suggests that providing more information may in some contexts be a barrier to generating interest, and less information can be desirable for the initial interventions.

Since online advertising is undoubtedly capable of reaching a large number of people, we need to better understand the behavior of those who visited the website but did not donate, and investigate how they become future donors. Our findings emphasize that knowledge around conservation is often not the best way to get into action, which suggests developing the appropriate interventions according to robust behavioral evidence.

4.4 | Toward effective conservation fundraising

We call on practitioners and organizations to share their experiences, both positive and negative, in fundraising for biodiversity conservation. That will enable practitioners and decision makers to evaluate cost effectiveness of different conservation fundraising strategies (Catalano et al., 2019; Game et al., 2014; Kubo et al., 2021; Pienkowski et al., 2021). While there is likely substantial research in this space, most is kept internal with organizations often avoiding discussions around how much they fundraise and how effective they are.

Online advertisement campaigns can be a powerful communication tool (Doughty et al., 2020), and the recent COVID-19 pandemic has accelerated online activities over the world (Corlett et al., 2020). However, our evidence reinforces the view that traditional fundraising strategies cannot be straightforwardly replaced with online measures without evaluation, and differences between fundraising platforms should be acknowledged. Only if we pull together as a field can we deliver the daunting fundraising targets set through the Convention for Biological Diversity. The integration of behavioral science knowledge into conservation science and practice is crucial to fulfilling the bold targets currently proposed for the post-2020 conservation agenda.

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SUPPORTING INFORMATION

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

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