







ESSAY

Barriers to public engagement with biodiversity conservation

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Abstract

Addressing biodiversity loss requires public engagement and action, including changes to individual consumption habits, support for on-the-ground conservation actions, and advocacy for government action and policy change. Conservation organizations are increasingly focused on encouraging probiodiversity attitudes and behaviors through interventions, such as education programs and marketing campaigns. Yet, motivating public audiences to change their behavior or become more active participants in conservation remains a challenge. We used a strategic communication approach to conceptualize barriers to public engagement with conservation and explored how these barriers manifest differently across audiences based on their current level of engagement (e.g., aware vs. active). The psychological, social, and structural barriers discussed are lack of knowledge, misaligned values, low self-efficacy, low personal or social relevance, and limiting structural context. These barriers are recognized across conservation science, behavioral science, and social change literature. Many different communication approaches may be used to overcome these barriers, including raising awareness, working with values, social norming, strategic calls to action, social mobilization, and advocacy. Regardless of the approach, understanding individual behaviors, audience types, and their social context is key to supporting biodiversity conservation actions and positive social change.

KEYWORDS

audiences, behavior, communications, community-based conservation

INTRODUCTION

As the major driver of biodiversity loss, human behavior presents both an opportunity and a challenge for conservation practitioners (Clayton et al., 2013; Schultz, 2011). In biodiversity conservation research and practice, there is increasing interest in implementing strategic and targeted programs to raise awareness or concern, incentivize probiodiversity behaviors, or motivate greater social and political change (Reddy et al., 2017). Traditional knowledge-deficit approaches are increasingly replaced by more sophisticated approaches from behavioral science, psychology, political science, cultural stud-

ies, communication, and sociology (Clayton & Myers, 2015; Green et al., 2019; Nisbet & Scheufele, 2009; Reincke et al., 2020; Selinske et al., 2018). Among these, social marketing is particularly well established in biodiversity conservation (Selinske et al., 2021, 2020; Veríssimo, 2013, 2019; Veríssimo et al., 2017). Most of these approaches recognize that understanding the broader social context of a behavior is key to setting feasible and effective objectives and strategies to achieve them. However, not all explicitly incorporate this social context in their frameworks, potentially limiting understanding of different social and behavioral change approaches and levers.

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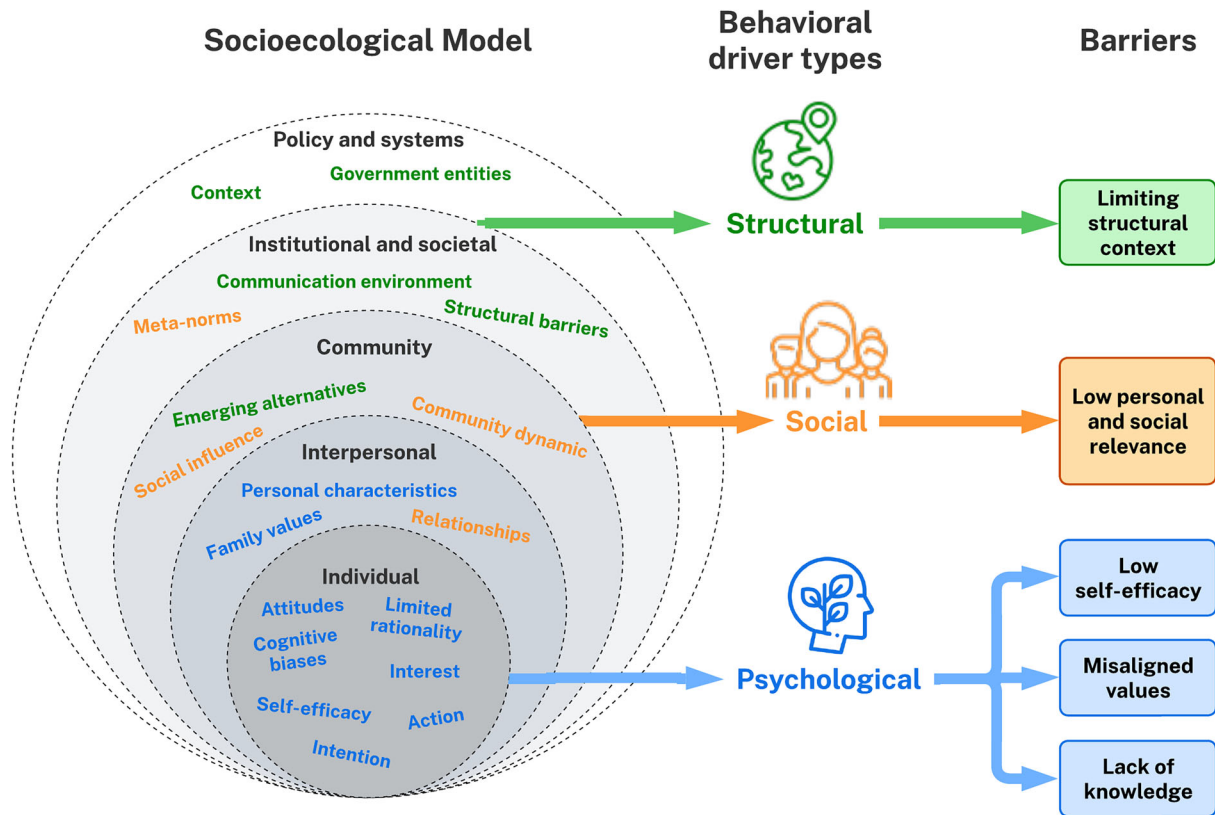


FIGURE 1 Socioecological model populated with the behavioral drivers model's structural (green), social (orange), and psychological (blue) behavioral drivers and linked to the structural, social, and psychological barriers discussed in text. Figure adapted from Petit (2019, Image 25, p. 53).

Systems models for social and behavioral change

Numerous approaches can be applied to understand engagement with biodiversity conservation (e.g., COM-B model [Michie et al., 2011]). Systems-based models allow for visibility of a wider range of outcomes and levers, such as social mobilization and advocacy. The United Nations Children's Fund Social and Behavior Change (SBC) approach systematically seeks to change sociocultural context and individual behaviors through 3 types of action: advocacy; social mobilization and behavior change communication; and use of channels, such as interpersonal communication, community or folk media, mass media, and digital or social media (Petit, 2019; UNICEF, 2024). The SBC approach has been applied to wildlife conservation in combination with a behavioral economics approach (e.g., Change Wildlife Consumers [changewildlifeconsumers.org]), which is in strong contrast to knowledge-deficit approaches.

The SBC approach uses 2 foundational models: socioecological model (SEM) (Bronfenbrenner, 1977) and the behavioral drivers model (Petit, 2019) (Figure 1). The SEM provides a framework for considering how behavior can be influenced through activities at different levels of the sociocultural context: individual, interpersonal (family or peer), community, institutional and societal, and policy and systems. The SEM is multidirectional: each level can influence all others. For example,

although ecotourism organizations (institutional and societal) may discourage human–wildlife contact during wildlife experiences (individual), posting selfies on social media can influence not only peers (interpersonal) but also online networks (community), potentially encouraging the behavior at a larger scale (Otsuka & Yamakoshi, 2020). The behavioral drivers model explores why people do what they do by describing psychological (e.g., attitudes), social (e.g., social influence), and structural (e.g., government entities) drivers of behavior (Petit, 2019). These drivers can be visualized in the SEM, enabling a holistic representation of the complexity of social and behavioral change (Figure 1).

Barriers to social and behavioral change

Drivers and barriers can motivate or demotivate individuals to adopt a behavior. Barriers prevent or increase the difficulty of an individual actioning a behavior (Breakthrough ACTION, 2017) and can manifest at psychological, social, and structural levels (McKenzie-Mohr, 2011) (Figure 1). Understanding the barriers to engagement is a key aspect of planning and designing communication approaches (McKenzie-Mohr, 2011; Nilsson et al., 2020; White & Trower, 2021). Previous work has identified barriers to proenvironmental behavior in the context of energy conservation, water conservation, and climate change (Gifford,

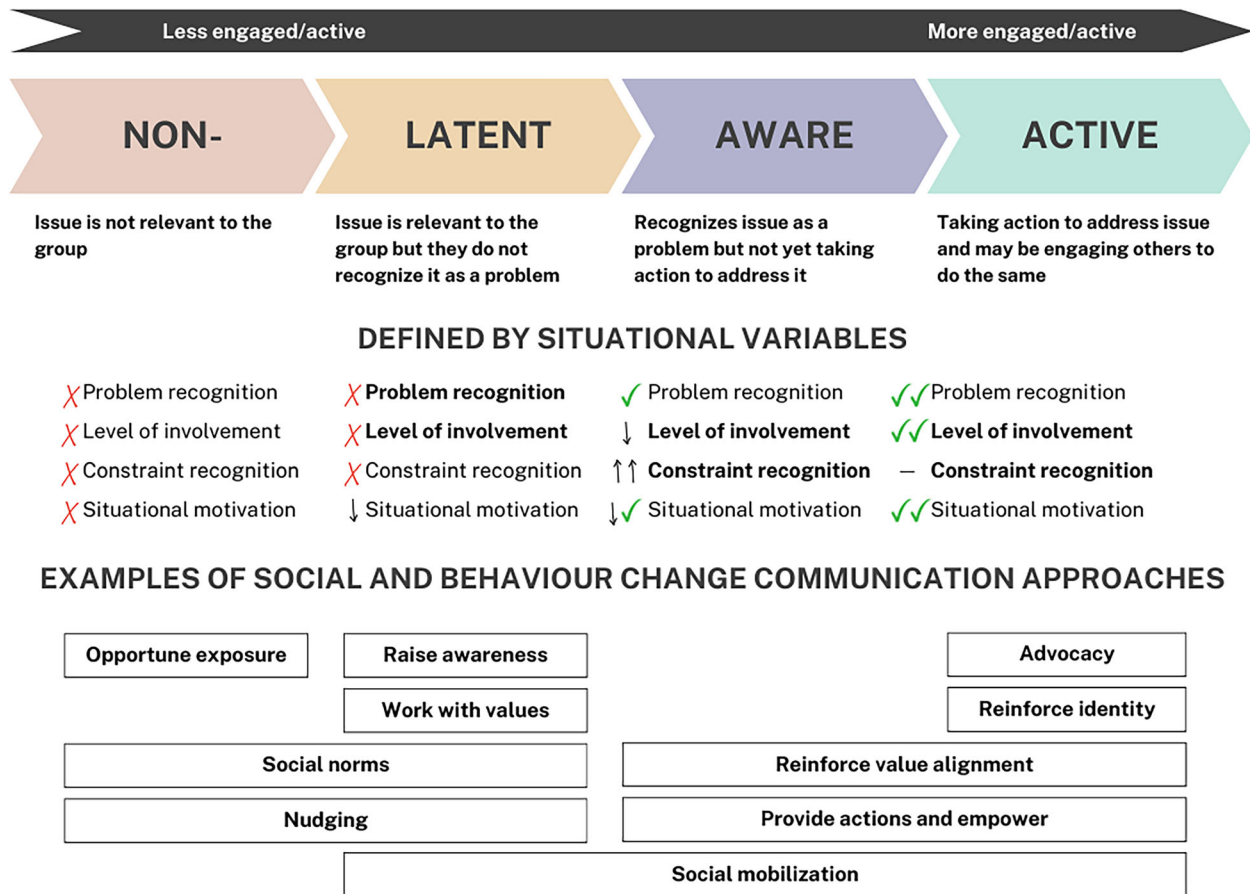


FIGURE 2 Conceptualization of the 4 publics defined by the situational theory of problem solving (Kim & Grunig, 2011), the situational variables they are defined by, and examples of communication approaches suited to these publics (bold, situational variables that are typical targets for influence from communication approaches; icons, how situational variables are expressed; red cross, not present; down arrow, low; dash, no clear expression; up arrow, high; check mark, present; multiple icons express varying expression or extent).

2011; Han & Hyun, 2016; Kollmuss & Agyeman, 2002; Lacroix & Gifford, 2017; Lacroix et al., 2019). Barriers identified in the context of climate change (Lacroix et al., 2019) have also been demonstrated in the fields of biodiversity conservation (Bosone et al., 2022). Namely, these barriers are lack of knowledge, perceptions of change being unnecessary or ineffective, conflicting goals and aspirations, tokenism, interpersonal relations, and external attribution of responsibility to act.

In our experience, 2 of the most common questions posed by our conservationist colleagues are as follows: why are people not doing anything and how does one get people engaged? We present a framework to help answer both questions. Understanding barriers will help conservation professionals better understand their audiences and the social and behavioral change approaches that can be used to overcome barriers to engagement. To explore how to segment audiences for effective communication approaches when people are highly individual, we drew on a theory, the situational theory of problem solving, that examines how people respond based on their relationship to the issue.

Situational theory of problem solving

The situational theory of problem solving is a strategic communication theory used to conceptualize how barriers manifest across different audiences and to identify communication opportunities for addressing them (Kim & Grunig, 2011) (Figure 2). There are 2 key benefits to applying this theory to public engagement with biodiversity conservation. First, like the models described above, the theory conceptualizes individual motivation within the sociocultural context and considers the influence of public motivation and engagement. The model therefore encourages conservation organizations to consider different outcomes and levers to create change, such as social mobilization and advocacy, in addition to behavior change. The second benefit is the audience segmentation method the theory provides. The situational theory of problem solving conceptualizes issue engagement as a spectrum of active involvement with an issue. This spectrum allows for useful segmenting of the general public into different types of publics, which are more specific groups of individuals with defined relationships to the

issue at hand. Situational motivation mediates engagement and represents “the extent to which a person stops to think about, is curious about, or wants more understanding of a problem” and is understood as an effect of problem recognition, involvement recognition, and constraint recognition (Kim & Grunig, 2011, p. 132). Considering whether these recognition factors are at high or low levels provides an audience segmentation method resulting in 4 public types: active, aware, latent, and nonpublic (Grunig & Hunt, 1984) (Figure 2).

Active publics are already taking action on the issue. They are highly engaged and may provide critical support enabling success (e.g., conservation volunteers). An aware public recognizes the issue of focus as a problem but is not taking action. Latent publics do not recognize the issue as a problem. This encompasses audiences who are unaware of or are opposed to conservation actions, including audiences who may undermine conservation success through disruptive behaviors, whether knowingly or unknowingly (e.g., allowing dogs off-lead in protected areas) (Mengak et al., 2019; Selinske et al., 2020; Stern, 2000). The nonpublic is an audience for whom the issue is not directly relevant; knowing whom to exclude can be as important as whom to target. Identifying which public types are relevant for engagement assists audience targeting and saves time and resources. From a strategic communication perspective, the goal is to devise interventions that maximize behavior change, issue support and engagement, and ultimately increase the engaged public (e.g., by increasing issue relevance or empowering action).

Our approach

To identify barriers relevant to public engagement with biodiversity, we drew on literature in conservation, behavioral science, strategic communication, and social change that related to interventions aiming to change the knowledge, perceptions, attitudes, or behavior of individuals for the purposes of environmental conservation. We then synthesized the barriers into 5 categories: lack of knowledge, misaligned values, low self-efficacy, low personal or social relevance, and limiting structural context. In determining these categories, we considered the SEM levels, how barriers were likely to manifest across the 4 situational theory publics for biodiversity conservation issues, and the provision of a relevant and accessible discussion for conservation professionals. We examined these barrier categories to provide examples of how they manifest across different publics and identified communication approaches to address them (Figure 2; Table 1). Given many of these interventions are yet to be evaluated in the conservation context, it was not our intention to suggest that they are certain to overcome the barriers. Rather, we suggest they are promising options that can guide future research and practice.

BARRIERS TO ENGAGEMENT WITH CONSERVATION

Lack of knowledge

Although knowledge is not sufficient on its own to motivate action, it is one of many factors that influence decision-making and behavior change. It is therefore important to consider what an audience already knows about an issue (Groffman et al., 2010; McKenzie-Mohr, 2011). Knowledge is key for individuals to be aware of an issue, understand the extent and impact of an issue, and know how to act on it (Wynveen & Sutton, 2016). For example, beach recreationists who are aware of migratory shorebirds and understand that disturbance negatively affects them will walk around shorebird flocks to minimize their disturbance of shorebirds when using the beach (Comber & Dayer, 2023).

An individual's state of knowledge can be influenced by the difficulty of understanding or uncertainty around interpreting complex issues, such as perceived conflicting scientific evidence or uncertainty around statistical trends (Lorenzoni et al., 2007). For example, the conflicting views on free-ranging dogs in Australia and the different names used to identify them (*dingo* vs. *wild dog*) may trigger different knowledge frames, values, and norms around their conservation and control (Kreplins et al., 2018). Different worldviews and knowledge systems add further complexity to understanding and valuing nature and biodiversity (Pascual et al., 2023). Different ways of knowing (i.e., ontologies and epistemologies) may result in conflicts between what is accepted as legitimate knowledge or evidence or lead to miscommunication or misinterpretation about what the key issue is (e.g., threatened species recovery or overall ecosystem and community health) and what the appropriate solutions are (Barbour & Schlesinger, 2012; Kadykalo et al., 2021; Watson, 2013; Weiss et al., 2013). Understanding can also be influenced by cognitive biases, such as confirmation bias (i.e., “the seeking or interpreting of evidence in ways that are partial to existing beliefs, expectations, or a hypothesis in hand”), which may prevent individuals from accepting new knowledge that conflicts with their preexisting understanding (Nickerson, 1998, p. 1). Another bias, shifting baseline syndrome, describes how individuals may come to accept a situation simply because it has become the norm (Papworth et al., 2009; Poortinga et al., 2011). For example, forest logging that results in an altered grassland landscape over generations may result in perceptions that this altered landscape is the natural state.

The communication opportunities for conveying, clarifying, and updating knowledge about biodiversity conservation depends on the relationship audiences have to biodiversity loss (Figures 2 & 3; Table 1). For active publics, opportunities include sharing success stories and recent updates, whereas for aware publics, information may focus on the actions that

TABLE 1 Examples of communication approaches and opportunities for overcoming barriers to engagement for each of 4 types (non, latent, aware, active)^a of public as defined by the situational theory of problem solving (Kim & Grunig, 2011).

Barrier	Non-Public	Latent	Aware	Active
Lack of knowledge	<p>OPPORTUNE EXPOSURE experience-based learning; e.g., Arid Recovery reserve tours, Zoos Victoria animal encounters</p> <p>NUDGING target actions where knowledge of the issue is not a necessity; e.g., Zoos Victoria's Seal the Loop campaign installs bins specifically designed to contain fishing line at popular fishing sites in place of open bins</p>	<p>RAISE AWARENESS education programs or awareness campaigns; e.g., Zoos Victoria community conservation campaigns (Pearson et al., 2014) connect what the audience already knows to new information use a messenger or source trusted by the audience; e.g., using veterinarians as trusted messengers to encourage domestic cat containment (Ma & McLeod, 2023) present clear on-ground implications or examples; even where knowledge is a primary barrier, audiences are unlikely to listen to or take on board information if it is not presented in an engaging way or related to their own experiences or understanding (e.g., Cotton et al., 2015; Nisbet & Scheufele, 2009; Reincke et al., 2020)</p>	<p>PROVIDE ACTIONS AND EMPOWER communicate a clear action individuals can take; e.g., Birdlife Australia's Birds in Backyards program present accessible opportunities to engage with information and ask questions; e.g., information booths at local markets</p>	<p>PROVIDE ACTIONS AND EMPOWER provide information on successful results or outcomes; e.g., member newsletters sharing updates on impact for those already taking action</p>
Misaligned values	<p>NUDGING target approaches and actions where value alignment is not a necessity; e.g., increasing regulation reminders to address compliance issues in recreational fishing (Mackay et al., 2018)</p>	<p>WORK WITH VALUES use a known and trusted messenger or find allies in target communities and support or elevate their work; e.g., using veterinarians as trusted messengers to encourage domestic cat containment (Ma & McLeod, 2023) connect preexisting values to issue; e.g., Zoos Victoria's Safe Cat, Safe Wildlife campaign reframes the issue to focus on keeping domestic cats safe inside, rather than framing cats as the enemy (i.e., feral cats destroying wildlife) make the intervention attractive and desirable; e.g., appeal to self-interest, appeal to known values of target audience, provide compensation or incentives (MacFarlane et al., 2022) use a values-based social norms approach; e.g., Harvard Alcohol Project to create social acceptability of the designated driver concept</p>	<p>REINFORCE VALUE ALIGNMENT AND RELEVANCE use message framing that elevates aligned values and avoid messaging that undermines them; e.g., focus on environmental or community framing rather than economic framing of issue (Kusmanoff, 2017; Marquina et al., 2022)</p>	<p>REENFORCE IDENTITY use identity messaging if an individual identifies as the kind of person who cares or acts for nature, reinforcing this identity can help trigger action and foster collective identity (Gulliver et al., 2021); e.g., "As someone who cares about nature, I focus on planting native plants in my garden," "I love the outdoors, so I want to help protect it"</p>

(Continues)

TABLE 1 (Continued)

Barrier	Non-Public	Latent	Aware	Active
Low personal and social relevance	<p>SOCIAL NORMS use social norming language; language that emphasises social norms can be highly effective at increasing conservation behavior intentions (Kusmanoff et al., 2020; Niemiec et al., 2020; Stern et al., 1999; Zhang et al., 2017); e.g., descriptive norms = perceptions of how common a behavior is (e.g., “We all recycle.”); injunctive and subjective norms = perceptions of whether others in the same social group or influential people think a behavior should be performed (e.g., “David Attenborough says we all should be taking better care of nature...”); personal norms = individual behavior standards flowing from personal values and identity (e.g., “Are you someone who cares about nature? If so, sign up for our mailing list.”)</p>		<p>REINFORCE VALUE ALIGNMENT AND RELEVANCE talk about the here and now; emphasizing when an issue is relevant locally and immediately (rather than in the future) makes it easier for audiences to see it as relevant to them (e.g., Bar-Anan et al., 2006; Jones et al., 2017) make the action relevant to them and their social group; e.g., relevant to their locality or situation (engaging parents with actions they can feasibly engage their family in or using message appeals focused on preserving nature and wildlife for future generations) (e.g., Hogg & Reid, 2006) use messengers trusted by the audience; e.g., local community members, scientists, firemen, farmers</p>	
Low self-efficacy			<p>PROVIDE ACTIONS AND EMPOWER make the action feel clear, easy, and achievable; e.g., Gardens for Wildlife provides information and support in the form of garden visits and expert advice; Zoos Victoria’s Safe Cat, Safe Wildlife website provides cat hacks and expert advice to assist individuals in containing their cats (also see Bandura, 1977; Kim & Jang, 2018) provide positive feedback; e.g., certificates of achievement, thank-you signage in parks provide pathways to mentorship and leadership, especially for ongoing actions; e.g., online community forums to connect and share advice, community groups</p> <p>REENFORCE IDENTITY provide clear and easy ways to signal affiliation or leadership roles if an individual identifies as a part of a group who cares or acts for nature, they will continue to take action; providing skills to obtain in-group status can be a motivating factor for action, e.g., friends of groups, advisory group membership</p>	
Limiting structural context	<p>NUDGING create the right context for activating this audience or public to take the desired action; e.g., changes to infrastructure, law, or policy changes, choice architecture (i.e., nudging)</p>		<p>PROVIDE ACTIONS AND EMPOWER target audiences that can feasibly engage in the desired action ensure resources and infrastructure are available so the action is possible; e.g., appropriate bins available for disposal of plastic waste (Kusmanoff et al., 2022)</p> <p>ADVOCACY work with active audiences to advocate for structural change; e.g., advocate for environmental policy change (Gulliver et al., 2022) or participate in new ways of measuring the value of nature (Pascual et al., 2023)</p>	

^aDefined in the “Situational theory of problem solving” section.

How to identify communication approaches to overcome barriers	Example
<p>(1) Determine ecological and social objective and target audience</p>	<p>Objective: To increase the number of cat owners keeping their cats contained to reduce threat to native wildlife.</p>
<p>(2a) Identify public type of target audience/s</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; width: 15%;">NON-</div> <div style="border: 1px solid black; padding: 5px; width: 15%;">LATENT</div> <div style="border: 1px solid black; padding: 5px; width: 15%;">AWARE</div> <div style="border: 1px solid black; padding: 5px; width: 15%;">ACTIVE</div> </div> <p>Issue is not relevant to the group Issue is relevant to the group but they do not recognise it as a problem Recognises issue as a problem but not yet taking action to address it Taking action to address issue and may be engaging others to do the same</p>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">LATENT</div> <div style="margin-right: 10px;">Some cat owners are aware of the impact pet cats have and some are not. We choose to target both types. We won't target noncat owners.</div> </div> <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">AWARE</div> </div>
<p>(2b) Identify likely barriers to engagement</p> <div style="display: flex; justify-content: space-around; text-align: center;"> <div style="color: blue;">Lack of knowledge</div> <div style="color: blue;">Misaligned values</div> <div style="color: blue;">Low self-efficacy</div> <div style="color: orange;">Low personal and social relevance</div> <div style="color: green;">Limiting structural context</div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> Lack of knowledge </div> <div style="margin-right: 10px;"> Low personal and social relevance </div> <div style="margin-right: 10px;"> Low self-efficacy </div> <div> <p>Many cat owners are unaware their cats are having a negative impact or are unaware of alternatives to letting cats roam. It is also seen as normal in our target audience (in Victoria, Australia) to let cats roam outside.</p> </div> </div>
<p>(3) Explore suitable communication approaches to overcome the barrier for the public type (see Table 1), e.g.</p> <div style="display: grid; grid-template-columns: repeat(3, 1fr); gap: 5px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">RAISE AWARENESS</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">WORK WITH VALUES</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">PROVIDE ACTIONS AND EMPOWER</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">REENFORCE VALUE ALIGNMENT AND RELEVANCE</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">SOCIAL NORMS</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">NUDGING</div> </div>	<div style="display: flex; justify-content: space-around; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">LATENT</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">AWARE</div> </div> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 45%;"> <p>WORK WITH VALUES</p> <p>Focus on the health and safety benefits of cat containment, rather than the wildlife benefits.</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center; width: 45%;"> <p>PROVIDE ACTIONS AND EMPOWER</p> <p>Focus on helpful tips and tricks through blogs and emails on how to keep pet cats safe and happy at home.</p> </div> </div>

FIGURE 3 Approach to identification of potential communication approaches to overcome barriers for different public types. Example drawn from van Eeden et al. (2021) and Zoos Victoria's Safe Cat, Safe Wildlife campaign (safecat.org.au).

they can take. For latent publics, communication should focus on raising awareness using trusted messengers and ensuring alignment with their preexisting knowledge. For nonpublics, information by itself will not make an impact; however, raising the visibility of the issue in the public domain will help provide the context for them to shift to a more active role.

Misaligned values

Individuals can be aware of an issue and yet not recognize it as a problem because it does not align with their values or expectations. Values are complex, interrelated beliefs that arise from knowledge, experiences, culture, and religion (Schwartz, 1992). Values and their resulting expectations can manifest on both personal and social levels. Misaligned values and expectations can manifest as priority differences, skepticism, shifting responsibility, apathetic disinterest, and self-interest. Priority differences arise when biodiversity conservation is considered a low priority compared to other issues (e.g., humanitarian crises) (Uzzell, 2000) or when overshadowed by other priorities in daily life (e.g., health care) (Maslow, 1943). For example, communities living alongside large carnivores may be unwilling to conserve them if they pose a risk to life and property (Jacobson et al., 2012; Krafte Holland et al., 2018). Even when considered

important, if biodiversity conservation is seen as a low-priority issue, then an individual is unlikely to become engaged in pro-biodiversity behaviors (Schultz, 2011; Uzzell, 2000). Indeed, if values clash with an existing knowledge system or worldview, then antagonistic or skeptical positions can result.

Values can be influenced by exposure to messages or narratives through social or media discourse. The way messages are framed in the media can diagnose problems, place blame, propose solutions, and make a moral case for certain actions (Elliott, 2020; Entman, 1993). For example, much media representation of COVID-19 framed bats as the cause of the disease, reinforcing negative associations between wildlife and zoonoses (Gregg et al., 2021; MacFarlane & Rocha, 2020). Indeed, framing the issue instead in a way that highlighted both human and animal causes elicited greater support for proconservation policies (Shreedhar & Mourato, 2020). Improved understanding of how different values are used when framing information is useful for conservation, particularly when it comes to partnerships or conflicts with industries, such as mining, agriculture, or housing construction. This is particularly crucial in the current social and political climate, in which vocal minorities are readily activated against issues that are perceived to be part of a broader culture war, making careful use or avoidance of message frames important in avoiding potential backlash. For example, the Great Northern Brewing Company received

backlash when they partnered with the Foundation for National Parks and Wildlife to raise money to create more national parks (see <https://cub.com.au/statement-from-great-northern/>). This was labeled as woke by vocal advocates, who wanted to save the bush by keeping parks open for recreational use (e.g., hunting, fishing) and so were opposed to these areas becoming national parks. From a segmentation perspective, this is an example of misunderstanding what the audience cares about. In this case, the audience did not necessarily care about the well-being of nature, but rather access to it.

It is only to be expected that individuals are likely to act in a way that provides them with the most benefits and least costs, regardless of the environmental impact (de Groot & Steg, 2009). For biodiversity conservation, this is particularly relevant because many probiodiversity behaviors will not directly benefit the individual who undertakes them (Selinske et al., 2018). Indeed, probiodiversity action may be to their own relative detriment (e.g., by paying more for an alternative product) and be inherently reliant on the audience's altruistic and probiodiversity values (de Groot & Steg, 2009; Winkler-Schor et al., 2020). Where an action is out of step with social norms, there may also be perceived social costs due to nonconformity (Telesetsky, 2017). Some individuals may therefore shift the responsibility toward others, particularly government and other organizations with greater perceived responsibility and resource capacity (Bickerstaff, 2008; Bosone et al., 2022). Individuals may also contend that human technology will eventually be able to resolve environmental crises (Stoll-Kleemann, 2001) or invoke the status quo, favoring doing things the way they have always been done (Telesetsky, 2017). Detrimental behaviors may also be driven by a fear that one will miss out on benefits that others will continue to gain (i.e., free-rider effect) (Lorenzoni et al., 2007). This is particularly problematic as most conservation issues are large-scale problems that require collective community participation to achieve meaningful results (Stern, 2000). The desire to retain or improve one's own lifestyle or status can reduce common motivators for conservation behaviors, such as empathy, communality, and altruism (de Groot & Steg, 2009). In contrast, there are successful examples of social status playing a key role in motivating some select biodiversity conservation behaviors (e.g., private land conservation; Selinske et al., 2015).

Overall, values-based communication opportunities are most relevant for latent and aware publics (Table 1). There are many opportunities to promote probiodiversity behaviors without having the audience highly value nature (e.g., eating less meat because it is cheaper and healthier, using car share schemes because it is cheap and convenient, buying electric vehicles because you do not pay for petrol). For latent publics, therefore, a key opportunity is to highlight values they already hold that align with probiodiversity actions, including using trusted messengers and messages that highlight potential benefits for individuals and their communities, and reinforce social norms. Setting clear expectations and being consistent in messaging are

important for aware and active publics to maintain trust and keep them engaged. For active publics, reinforcing their identity can help them continue to feel connected and maintain trust that their efforts make a difference.

Low personal and social relevance

A strong and personally meaningful connection between an individual and an issue is a great motivator and a conducive context for action (Kim & Grunig, 2011). Meaningfulness can be inwardly personal or related to social connections. Renninger and Hidi (2015) distinguish between individual interest, which is a predisposition to re-engage with a particular activity or topic over time, and situational relevance, which is sparked by factors in the environment. Perceived relevance can lead to more meaningful engagement and to longer term individual interest. In biodiversity conservation, many factors can decrease personal and social relevance of conservation, including psychological distance, intangibility, and social norms (Bar-Anan et al., 2006).

The concept of psychological distance proposes that the way in which an individual construes an issue depends on whether that issue is perceived as being near or far on multiple dimensions (Trope & Liberman, 2010; Wang et al., 2021). Geographic or spatial psychological distance refers to the physical distance in space from a problem and can include the physical separation of people from nature (Schultz, 2011) and interactions with species, as well as the perception that an issue is taking place far away (McDonald et al., 2015). Temporal psychological distance describes the perception that an issue will occur far into the future and may be associated with a propensity for self-interest despite facing a future of diminishing resources (McDonald et al., 2015; Zhang et al., 2019). With decreased experience of nature and biodiversity, the relationship between individuals and biodiversity loss is abstract and feels far away (Pett et al., 2016; Wang et al., 2021). This extinction of experience (Miller, 2005; Pyle, 1978) is thought to contribute to increasing apathy and a declining sense of care and responsibility toward the natural environment (Gaston & Soga, 2020). Even researchers working directly with nearly extinct species will rarely witness dramatic species decline or extinction directly (but see Lunney et al. [2011]). This intangibility (abstractness) and psychological distance may contribute to increasing apathy and lead individuals to only act on issues they view as close to home. Audiences may struggle to empathize with species that appear very different to themselves, particularly those that are feared (e.g., snakes), perceived as unappealing (e.g., insects), misunderstood (e.g., native rodents), rarely seen (e.g., frogs), or easily overlooked (e.g., plants, marine life) (Balding & Williams, 2016; Batt, 2009; Troudet et al., 2017). In contrast, common flagship species that are seen as appealing, familiar, or symbolically resonant, such as tigers, koalas, and butterflies, benefit from their social relevance (Bowen-Jones & Entwistle, 2002; Clucas et al., 2008).

Social relevance emerges from a perceived connection or relevance to others (Cialdini & Goldstein, 2004; Hogg & Reid, 2006). Social norms are “informal and shared behavioral rules that prescribe what one ought or ought not to do that people comply with because of social expectations and potential social sanctions” (Andrighetto & Vriens, 2022, p. 3). The behaviors of individuals will influence their peers, particularly through social-signaling actions (e.g., sharing social media posts) that hold potential to influence social norms by providing positive (or negative) reinforcement for behaviors (Amel et al., 2017; Naito et al., 2022; Selinske et al., 2020). Some individuals and groups will have a greater social influence than others due to their proximity to the individual or perceived role as leaders (Hogg & Reid, 2006). Where probiodiversity behavior requires deviation from prevailing social norms, these norms present a barrier to biodiversity conservation buy-in and behavior (Wynveen & Sutton, 2016). However, this desire to fit in means that social praise can be a strong motivator for behavior change (Handgraaf et al., 2013). The language used to talk about biodiversity in social and media discourse can create or reinforce message frames and narratives that influence broader public understanding of the personal and social relevance of biodiversity conservation as an issue (e.g., crisis or anthropocentric narratives) (Gregg et al., 2021; Louder & Wyborn, 2020).

Communication opportunities for targeting personal and social relevance of biodiversity conservation depend on the audience's level of involvement (Figure 1; Table 1). For latent publics with no existing level of involvement with biodiversity loss, the opportunity is to demonstrate the personal relevance that they do not yet see, making it concrete and as local as possible. Similarly, aware publics can be motivated into deeper involvement by conveying the personal and social impact of the problem and creating situations for specific action and engagement (i.e., social mobilization). Highlighting social norms and opportunities for social mobilization and collective action are ways to create social relevance, especially for nonpublics for whom there is no personal relevance or involvement. The actions of proactive organizations and governments can have a strong positive influence, even when only rhetorical or symbolic, and convey a sense of importance or relevance to an issue. Social movement calls from advocacy organizations for collective action can be effective by perpetuating new social norms and providing individuals with support and motivation through their peers (Johnson, 2012). However, this relies on individuals trusting the initial source of the call and having faith that the collective action will be effective (Cotton et al., 2015; Le et al., 2015).

Low self-efficacy

Where interventions aim to promote specific behavior change, enhancing self-efficacy is key for promoting action (Bandura, 1977; Clayton et al., 2017; Taberero & Hernández, 2010). Self-efficacy is one's individual belief in one's ability to execute

behaviors to get a particular result, and response efficacy is one's belief in the effectiveness of the action (Bandura, 1977). We considered both here. Our focus is on the perceptions of individuals as to their own ability to engage; their actual ability is also influenced by contextual factors, which are further discussed in “Limiting structural context” below.

Biodiversity conservation can be perceived as such a large and complex issue that individuals may feel their contribution will not make a difference (Bandura, 1977; Hunter & Jordan, 2020). Fatalism, the belief that a certain outcome is inevitable regardless of an individual's actions, has been particularly problematic relative to the issue of climate change (Lorenzoni et al., 2007). A fatalistic audience may care about an issue but be passive and despondent when it comes to engaging in positive behavior. For example, individuals presented with information about an overwhelming rate of extinction may think it inconceivable that they could possibly make a meaningful difference. Fatalism can be exacerbated by oversaturation of messages, particularly negative messages or messages that include appeals for money or time (Sherry, 2002). If individuals receive constant requests for care or action, they may perceive this as an indication of an enormous issue that they cannot hope to fix alone (similar to the behavioural economics concept of “mental bandwidth” [Samson, 2021]).

The perceived difficulty of a specific action can have a strong impact on whether an individual is motivated to complete it. An action may be perceived to be difficult if it presents risks or costs, such as time, money, status, or other social or physical costs (particularly friction costs, i.e., the hassle factor). Individuals tend to be risk averse, particularly when they are unsure about an issue, so a costly behavior can dramatically decrease the motivation to act (Litchfield et al., 2018). Costs are not always material, and the willingness of individuals to act may be influenced by how they anticipate they may feel after an action (e.g., pride, removal of ecoguilt, embarrassment due to engaging in behaviors outside social norm) (Graton et al., 2016; Han & Hyun, 2016). Despite high motivation, if an action requires a break in habit, the perceived difficulty of the action may prove greater than otherwise expected (Klößner & Verplanken, 2018). Even actively engaged individuals may lose motivation to continue if there are insufficient positive feedback mechanisms following an enacted behavior (e.g., encouragement or rewards).

Communication opportunities that build capacity and increase self-efficacy will have the greatest impact on aware and active publics (Figure 1; Table 1). For active publics, the unique opportunities include developing advocacy skills and empowering individuals to engage others to do the same. Both active and aware publics can be empowered to develop new skills and practice actions that overcome constraints they recognize at their individual and system levels. Consistency and clarity of the actions provided will build trust and increase self-efficacy. For non- and latent publics, low-self efficacy by itself will not have an impact; however, providing clear, simple actions that can be taken by anyone will build capability and lower this potential barrier to engagement.

Limiting structural context

All the above barriers are influenced by an individual's personal and social context, including social, cultural, and structural (e.g., infrastructure) elements (Stern, 2005). For example, in areas with insufficient or sparsely distributed rubbish bins, individuals may be physically prevented from being able to dispose of waste and therefore limited in their capacity to address associated problems, such as impacts of plastic pollution on local waterways and wildlife (Yukalang et al., 2017). Other contextual limitations on an individual's engagement can include socioeconomic circumstances, governmental structures, laws and regulations, a lack of technology or enabling initiatives, current political or cultural governance, or other cultural and social factors (Schmitt et al., 2020; Semenza et al., 2008). Communication approaches can be applied to implement advocacy and social mobilization or collective action campaigns and to affect such actions over time. However, it is also necessary to consider these barriers when selecting appropriate objectives and audiences. For example, it may be completely inappropriate (and ineffective) to design communications asking for large donations from households in low-socioeconomic suburbs or for volunteer time from busy parents (Gregg et al., 2022). Addressing structural barriers to biodiversity conservation through transformative change (e.g., policy change) is crucial to addressing the biodiversity crisis on national and global levels (Jones & Niemiec, 2023; Pascual et al., 2023; Waddock, 2020). Promoting high engagement with biodiversity conservation is a key part of ensuring the cultural context and social will required for this transformative change.

Although most conservation professionals will not be able to directly overcome the barriers resulting from limiting structural context, understanding these barriers is key to recognizing opportunities for impact through social, institutional, cultural, and organizational levers. For nonpublics and latent publics, structural and social nudges (e.g., curbside recycling) provide the greatest opportunity to support probiodiversity actions. Providing ways and means for aware and active publics to participate and empowering them to engage in socioculturally appropriate ways are key. Also important is empowering active publics to engage in advocacy to help change the systems that generate these structural barriers.

CONCLUSION

There are many well-established strategic approaches to public engagement that show promise for biodiversity conservation (Gregg et al., 2021; Kidd & Dayer, 2020; Smith et al., 2024; Thomas-Walters et al., 2022). As interest in such interventions for conservation increases, targeted research is required to test the effectiveness of these interventions (Selinske et al., 2021). Drawing on preexisting evidence and experience inside and outside the conservation field will be key to success in this endeavor because the processes that shape individuals' attitudes and behaviors are nuanced and complex (Kidd et al., 2019). We have introduced readers to this complex-







ity by drawing from systems theory, the situational theory of problem solving, and a broad multidisciplinary literature. The frameworks and discussion we presented provide an accessible starting point for conservation professionals to explore and identify relevant audiences and barriers for their specific conservation challenges and inform the planning and design of interventions. To successfully engage audiences with biodiversity conservation, ongoing research is required to empirically test the suitability of different approaches to overcome barriers in different publics and contexts. Increased focus is also needed on exploring pathways for shifting audiences to be more engaged and active in biodiversity conservation as a broad issue. We hope our discussion provides a starting point for this challenging but necessary endeavor. Although barriers to engagement present a challenge to conservation professionals, they also provide an opportunity to plan, design, and test new interventions to improve public engagement with biodiversity and ultimately work toward long-term success for conservation.

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REFERENCES

- Amel, E., Manning, C., Scott, B., & Koger, S. (2017). Beyond the roots of human inaction: Fostering collective effort toward ecosystem conservation. *Science*, 356, 275–279.
- Andrighetto, G., & Vriens, E. (2022). A research agenda for the study of social norm change. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 380(2227), Article 20200411.

- Balding, M., & Williams, K. J. (2016). Plant blindness and the implications for plant conservation. *Conservation biology*, 30(6), 1192–1199.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215.
- Bar-Anan, Y., Liberman, N., & Trope, Y. (2006). The association between psychological distance and construal level: Evidence from an implicit association test. *Journal of Experimental Psychology: General*, 135(4), 609–622.
- Barbour, W., & Schlesinger, C. (2012). Who's the boss? Post-colonialism, ecological research and conservation management on Australian Indigenous lands. *Ecological Management & Restoration*, 13(1), 36–41.
- Batt, S. (2009). Human attitudes towards animals in relation to species similarity to humans: a multivariate approach. *Bioscience horizons*, 2(2), 180–190.
- Bickerstaff, K., Simmons, P., & Pidgeon, N. (2008). Constructing Responsibilities for Risk: Negotiating Citizen-state Relationships. *Environment and Planning A*, 40, 1312–1330.
- Bosone, L., Chaurand, N., & Chevrier, M. (2022). To change or not to change? Perceived psychological barriers to individuals' behavioural changes in favour of biodiversity conservation. *Ecosystems and People*, 18(1), 315–328.
- Bowen-Jones, E., & Entwistle, A. (2002). Identifying appropriate flagship species: The importance of culture and local contexts. *Oryx*, 36(02), 189–195. <https://doi.org/10.1017/s0030605302000261>
- Breakthrough ACTION. (2017). *Barriers and facilitators to behaviour change*. <https://sbccimplementationkits.org/gender/barriers-facilitators-behavior-change>
- Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, 32(7), 513–531.
- Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, 55, 591–621.
- Clayton, S., Litchfield, C., & Geller, E. S. (2013). Psychological science, conservation, and environmental sustainability. *Frontiers in Ecology and the Environment*, 11(7), 377–382.
- Clayton, S., & Myers, G. (2015). *Conservation psychology: Understanding and promoting human care for nature*. John Wiley & Sons.
- Clayton, S., Prévot, A.-C., Germain, L., & Saint-Jalme, M. (2017). Public support for biodiversity after a zoo visit: Environmental concern, conservation knowledge, and self-efficacy. *Curator: The Museum Journal*, 60(1), 87–100.
- Clucas, B., McHugh, K., & Caro, T. (2008). Flagship species on covers of US conservation and nature magazines. *Biodiversity and Conservation*, 17(6), 1517–1528.
- Comber, C. A., & Dayer, A. A. (2023). Beach recreationists perceive a lack of knowledge about shorebirds' needs as a constraint to walking around shorebird flocks. *Ornithological Applications*, 126(1), Article duad050. <https://doi.org/10.1093/ornithapp/duad050>
- Cotton, D., Miller, W., Winter, J., Bailey, I., & Sterling, S. (2015). Knowledge, agency and collective action as barriers to energy-saving behaviour. *Local Environment*, 21(7), 883–897.
- van Eeden, L. M., Hames, F., Faulkner, R., Geschke, A., Squires, Z. E., & McLeod, E. M. (2021). Putting the cat before the wildlife: Exploring cat owners' beliefs about cat containment as predictors of owner behavior. *Conservation Science and Practice*, 3(10), Article e502.
- Elliott, K. C. (2020). Framing conservation: 'biodiversity' and the values embedded in scientific language. *Environmental Conservation*, 47(4), 260–268.
- Entman, R. M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication*, 43(4), 51–58.
- Gaston, K. J., & Soga, M. (2020). Extinction of experience: The need to be more specific. *People and Nature*, 2(3), 575–581.
- Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, 66(4), 290–302.
- Graton, A., Ric, F., & Gonzalez, E. (2016). Reparation or reactance? The influence of guilt on reaction to persuasive communication. *Journal of Experimental Social Psychology*, 62, 40–49.
- Green, K. M., Crawford, B. A., Williamson, K. A., & DeWan, A. A. (2019). A meta-analysis of social marketing campaigns to improve global conservation outcomes. *Social Marketing Quarterly*, 25(1), 69–87.
- Gregg, E. A., Kidd, L. R., Bekessy, S. A., Martin, J. K., Robinson, J. A., & Garrard, G. E. (2022). Ethical considerations for conservation messaging research and practice. *People and Nature*, 4(5), 1098–1112.
- Gregg, E. A., Kusmanoff, A. M., Garrard, G. E., Kidd, L. R., & Bekessy, S. A. (2021). Biodiversity conservation cannot afford COVID-19 communication bungles. *Trends in Ecology & Evolution*, 36(10), 879–882.
- Groffman, P. M., Stylinski, C., Nisbet, M. C., Duarte, C. M., Jordan, R., Burgin, A., Previtali, M. A., & Coloso, J. (2010). Restarting the conversation: Challenges at the interface between ecology and society. *Frontiers in Ecology and the Environment*, 8(6), 284–291.
- de Groot, J. I. M., & Steg, L. (2009). Morality and prosocial behavior: The role of awareness, responsibility, and norms in the norm activation model. *The Journal of Social Psychology*, 149(4), 425–449.
- Grunig, J. E., & Hunt, T. (1984). *Managing public relations*. Harcourt Brace Jovanovich College Publishers.
- Gulliver, R., Fielding, K. S., & Louis, W. R. (2021). Assessing the mobilization potential of environmental advocacy communication. *Journal of Environmental Psychology*, 74, Article 101563. <https://doi.org/10.1016/j.jenvp.2021.101563>
- Gulliver, R. E., Star, C., Fielding, K. S., & Louis, W. R. (2022). A systematic review of the outcomes of sustained environmental collective action. *Environmental Science & Policy*, 133, 180–192.
- Han, H., & Hyun, S. S. (2016). Fostering customers' pro-environmental behavior at a museum. *Journal of Sustainable Tourism*, 25(9), 1240–1256.
- Handgraaf, M. J. J., Van Lidth de Jeude, M. A., & Appelt, K. C. (2013). Public praise vs. private pay: Effects of rewards on energy conservation in the workplace. *Ecological Economics*, 86, 86–92.
- Hogg, M. A., & Reid, S. A. (2006). Social identity, self-categorization, and the communication of group norms. *Communication Theory*, 16(1), 7–30.
- Hunter, R. H., & Jordan, R. C. (2020). "I have a little, little, little footprint on the world" and "I'm not political": Feelings of low self-efficacy and the effect of identity on environmental behaviour in educators. *Environmental Education Research*, 26(5), 666–683.
- Jacobson, S. K., Langin, C., Carlton, J. S., & Kaid, L. L. (2012). Content analysis of newspaper coverage of the Florida panther. *Conservation Biology*, 26(1), 171–179.
- Johnson, B. B. (2012). Climate change communication: A provocative inquiry into motives, meanings, and means. *Risk Analysis*, 32(6), 973–991.
- Jones, C., Hine, D. W., & Marks, A. D. (2017). The future is now: Reducing psychological distance to increase public engagement with climate change. *Risk Analysis*, 37(2), 331–341.
- Jones, M. S., & Niemiec, R. M. (2023). Motivating relational organizing behavior for biodiversity conservation. *Conservation Science and Practice*, 5(2), Article e12880.
- Kadykalo, A. N., Cooke, S. J., & Young, N. (2021). The role of western-based scientific, Indigenous and local knowledge in wildlife management and conservation. *People and Nature*, 3(3), 610–626.
- Kidd, L. R., Bekessy, S. A., & Garrard, G. E. (2019). Neither hope nor fear: Empirical evidence should drive biodiversity conservation strategies. *Trends in Ecology & Evolution*, 34(4), 278–282.
- Kidd, L. R., & Dayer, A. A. (2020). Evidence-based recommendations for strategic communication efforts for shorebird conservation. *Wader Study*, 127(3), 191–199. <https://doi.org/10.18194/ws.00211>
- Kim, H., & Jang, J. (2018). The easier the better: How processing fluency influences self-efficacy and behavioral intention in pro-social campaign advertising. *Sustainability*, 10(12), Article 4777. <https://doi.org/10.3390/su10124777>
- Kim, J.-N., & Grunig, J. E. (2011). Problem solving and communicative action: A situational theory of problem solving. *Journal of Communication*, 61(1), 120–149.
- Klößner, C. A., & Verplanken, B. (2018). Yesterday's habits preventing change for tomorrow? About the influence of automaticity on environmental behaviour. In L. Steg & J. I. M. de Groot (Eds.), *Environmental psychology: An introduction* (pp. 238–250). John Wiley & Sons Ltd.
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239–260.

- Krafte Holland, K., Larson, L. R., & Powell, R. B. (2018). Characterizing conflict between humans and big cats *Panthera* spp: A systematic review of research trends and management opportunities. *PLoS ONE*, *13*(9), Article e0203877.
- Kreplins, T. L., Gaynor, A., Kennedy, M. S., Baudains, C. M., Adams, P., Bateman, P. W., & Fleming, P. A. (2018). What to call a dog? A review of the common names for Australian free-ranging dogs. *Pacific Conservation Biology*, *25*(2), 124–134. <https://doi.org/10.1071/pc18018>
- Kusmanoff, A. M. (2017). *Framing the Conservation Conversation: An investigation into framing techniques for communicating biodiversity conservation*. RMIT University.
- Kusmanoff, A. M., Fidler, F., Gordon, A., Garrard, G. E., & Bekessy, S. A. (2020). Five lessons to guide more effective biodiversity conservation message framing. *Conservation Biology*, *34*(5), 1131–1141.
- Kusmanoff, A. M., McIntosh, R. R., Boag, S., & Bekessy, S. A. (2022). “Bins on boats”, a behaviourally-based intervention to curb marine pollution in Bass Strait, Australia. *Conservation Science and Practice*, *4*(4), Article e12659. <https://doi.org/10.1111/csp2.12659>
- Lacroix, K., & Gifford, R. (2017). Psychological barriers to energy conservation behavior: The role of worldviews and climate change risk perception. *Environment and Behavior*, *50*(7), 749–780.
- Lacroix, K., Gifford, R., & Chen, A. (2019). Developing and validating the Dragons of Inaction Psychological Barriers (DIPB) scale. *Journal of Environmental Psychology*, *63*, 9–18.
- Le, L., Bagstad, K. J., Cook, P. S., Leong, K. M., & DiDonato, E. (2015). Determinants of public support for threatened and endangered species management: A case study of cape lookout national seashore. *Journal of Park and Recreation Administration*, *33*(4), 16–31.
- Litchfield, C. A., Lowry, R., & Dorrian, J. (2018). Recycling 115,369 mobile phones for gorilla conservation over a six-year period (2009–2014) at Zoos Victoria: A case study of ‘points of influence’ and mobile phone donations. *PLoS ONE*, *13*(12), Article e0206890.
- Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*, *17*(3–4), 445–459.
- Louder, E., & Wyborn, C. (2020). Biodiversity narratives: Stories of the evolving conservation landscape. *Environmental Conservation*, *47*(4), 251–259.
- Lunney, D., Law, B., & Schulz, M. (2011). Turning the spotlight onto the conservation of Australian bats and the extinction of the Christmas Island Pipistrelle (pp 485–498). In *The Biology and Conservation of Australasian Bats* (eds B. Law, P. Eby, D. Lunney & L. Lumsden). Royal Zoological Society of NSW, Mosman, NSW, Australia.
- Ma, G. C., & McLeod, L. J. (2023). Understanding the factors influencing cat containment: Identifying opportunities for behaviour change. *Animals*, *13*(10), Article 1630.
- MacFarlane, D., Hurlstone, M. J., Ecker, U. K. H., Ferraro, P. J., van der Linden, S., Wan, A. K. Y., Verissimo, D., Burgess, G., Chen, F., Hall, W., Hollands, G. J., & Sutherland, W. J. (2022). Reducing demand for overexploited wildlife products: Lessons from systematic reviews from outside conservation science. *Conservation Science and Practice*, *4*(3), Article e627.
- MacFarlane, D., & Rocha, R. (2020). Guidelines for communicating about bats to prevent persecution in the time of COVID-19. *Biological Conservation*, *248*, Article 108650.
- Mackay, M., Jennings, S., van Putten, E. I., Sibly, H., & Yamazaki, S. (2018). When push comes to shove in recreational fishing compliance, think ‘nudge’. *Marine Policy*, *95*, 256–266. <https://doi.org/10.1016/j.marpol.2018.05.026>
- Marquina, T., Hackenburt, D., Duray, H., Fisher, B., & Gould, R. K. (2022). Lessons from an experiment with values-based messaging to support watershed conservation. *Conservation Biology*, *36*(5), Article e13910.
- Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*(4), 370–396.
- McDonald, R. I., Chai, H. Y., & Newell, B. R. (2015). Personal experience and the ‘psychological distance’ of climate change: An integrative review. *Journal of Environmental Psychology*, *44*, 109–118.
- McKenzie-Mohr, D. (2011). *Fostering sustainable behavior: An introduction to community-based social marketing*. New Society Publishers.
- Mengak, L., Dayer, A., Longenecker, B., & Spiegel, C. (2019). *Guidance and best practices for evaluating and managing human disturbances to migrating shorebirds on coastal lands in the northeastern United States*. U.S. Fish and Wildlife Service.
- Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*, Article 42.
- Miller, J. R. (2005). Biodiversity conservation and the extinction of experience. *Trends in Ecology & Evolution*, *20*(8), 430–434.
- Naito, R., Zhao, J., & Chan, K. M. A. (2022). An integrative framework for transformative social change: A case in global wildlife trade. *Sustainability Science*, *17*, 171–189.
- Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, *2*(2), 175–220.
- Niemiec, R. M., Champine, V., Vaske, J. J., & Mertens, A. (2020). Does the impact of norms vary by type of norm and type of conservation behavior? A meta-analysis. *Society & Natural Resources*, *33*(8), 1024–1040.
- Nilsson, D., Fielding, K., & Dean, A. (2020). Achieving conservation impact by shifting focus from human attitudes to behaviors. *Conservation Biology*, *34*(1), 93–102.
- Nisbet, M. C., & Scheufele, D. A. (2009). What’s next for science communication? Promising directions and lingering distractions. *American Journal of Botany*, *96*(10), 1767–1778.
- Otsuka, R., & Yamakoshi, G. (2020). Analyzing the popularity of YouTube videos that violate mountain gorilla tourism regulations. *PLoS ONE*, *15*(5), Article e0232085.
- Papworth, S., Rist, J., Coad, L., & Milner-Gulland, E. (2009). Evidence for shifting baseline syndrome in conservation. *Conservation Letters*, *2*(2), 93–100.
- Pascual, U., Balvanera, P., Anderson, C. B., Chaplin-Kramer, R., Christie, M., González-Jiménez, D., Martín, A., Raymond, C. M., Termansen, M., Vatn, A., Athayde, S., Baptiste, B., Barton, D. N., Jacobs, S., Kelemen, E., Kumar, R., Lazos, E., Mwampamba, T. H., Nakangu, B., ... Zent, E. (2023). Diverse values of nature for sustainability. *Nature*, *620*(7975), 813–823.
- Pearson, E. L., Lowry, R., Dorrian, J., & Litchfield, C. A. (2014). Evaluating the conservation impact of an innovative zoo-based educational campaign: ‘Don’t Palm Us Off’ for orang-utan conservation. *Zoo Biology*, *33*(3), 184–196.
- Petit, V. (2019). *The behavioural drivers model: A conceptual framework for social and behaviour change programming*. UNICEF.
- Pett, T. J., Schwartz, A., Irvine, K. N., Dallimer, M., & Davies, A. G. (2016). Unpacking the People–Biodiversity Paradox: A Conceptual Framework. *BioScience*, *66*(7), 576–583.
- Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S., & Pidgeon, N. F. (2011). Uncertain climate: An investigation into public scepticism about anthropogenic climate change. *Global Environmental Change*, *21*(3), 1015–1024.
- Pyle, R. M. (1978). The extinction of experience. *Horticulture*, *56*, 64–67.
- Reddy, S. M. W., Montambault, J., Masuda, Y. J., Keenan, E., Butler, W., Fisher, J. R. B., Asah, S. T., & Gneezy, A. (2017). Advancing conservation by understanding and influencing human behavior. *Conservation Letters*, *10*(2), 248–256.
- Reincke, C. M., Bredenoord, A. L., & van Mil, M. H. (2020). From deficit to dialogue in science communication: The dialogue communication model requires additional roles from scientists. *EMBO Reports*, *21*(9), Article e51278.
- Renninger, K. A., & Hidi, S. (2015). *The power of interest for motivation and engagement*. Routledge.
- Samson, A. (2021). *The Behavioral Economics Guide 2021 (with an Introduction by John List)*. <https://www.behavioraleconomics.com/be-guide/>
- Schmitt, M. T., Neufeld, S. D., Mackay, C. M. L., & Dys-Steenbergen, O. (2020). The perils of explaining climate inaction in terms of psychological barriers. *Journal of Social Issues*, *76*(1), 123–135.
- Schultz, P. W. (2011). Conservation means behavior. *Conservation Biology*, *25*(6), 1080–1083.
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, *25*, 1–65.
- Selinske, M. J., Coetzee, J., Purnell, K., & Knight, A. T. (2015). Understanding the motivations, satisfaction, and retention of landowners in private land conservation programs. *Conservation Letters*, *8*(4), 282–289.
- Selinske, M. J., Bekessy, S. A., Geary, W. L., Faulkner, R., Hames, F., Fletcher, C., Squires, Z. E., & Garrard, G. E. (2021). Projecting biodiversity benefits of

- conservation behavior-change programs. *Conservation Biology*, 36(3), Article e13845. <https://doi.org/10.1111/cobi.13845>
- Selinske, M. J., Garrard, G. E., Bekessy, S. A., Gordon, A., Kusmanoff, A. M., & Fidler, F. (2018). Revisiting the promise of conservation psychology. *Conservation Biology*, 32(6), 1464–1468.
- Selinske, M. J., Garrard, G. E., Gregg, E. A., Kusmanoff, A. M., Kidd, L. R., Cullen, M. T., Cooper, M., Geary, W. L., Hatty, M. A., Hames, F., Kneebone, S., McLeod, E. M., Ritchie, E. G., Squires, Z. E., Thomas, J., Willcock, M. A. W., Blair, S., & Bekessy, S. A. (2020). Identifying and prioritizing human behaviors that benefit biodiversity. *Conservation Science and Practice*, 2(9), Article e249.
- Semenza, J. C., Hall, D. E., Wilson, D. J., Bontempo, B. D., Sailor, D. J., & George, L. A. (2008). Public perception of climate change voluntary mitigation and barriers to behavior change. *American Journal of Preventative Medicine*, 35(5), 479–487.
- Sherry, J. L. (2002). Media saturation and entertainment-education. *Communication Theory*, 12(2), 206–224.
- Shreedhar, G., & Mourato, S. (2020). Linking human destruction of nature to COVID-19 increases support for wildlife conservation policies. *Environmental and Resource Economics*, 76, 963–999.
- Smith, L., Curtis, J., Bragge, P., & Kellner, P. (2024). *Inspiring change: How to influence behaviour for a better world*. Monash University ePress, an imprint of Monash University Publishing.
- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407–424.
- Stern, P. C. (2005). Understanding individuals' environmentally significant behavior. *ELR News & Analysis*, 35, Article 10785.
- Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, 6(2), 81–97.
- Stoll-Kleemann, S., O'Riordan, T., & Jaeger, C. C. (2001). The psychology of denial concerning climate mitigation measures: evidence from Swiss focus groups. *Global Environmental Change*, 11, 107–117.
- Taberner, C., & Hernández, B. (2010). Self-efficacy and intrinsic motivation guiding environmental behavior. *Environment and Behavior*, 43(5), 658–675.
- Telesetsky, A. (2017). Eco-restoration, private landowners and overcoming the status quo bias. *Griffith Law Review*, 26, 1–27.
- Thomas-Walters, L., McCallum, J., Montgomery, R., Petros, C., Wan, A. K. Y., & Verissimo, D. (2022). Systematic review of conservation interventions to promote voluntary behavior change. *Conservation Biology*, 37(1), Article e14000. <https://doi.org/10.1111/cobi.14000>
- Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, 117(2), 440–463.
- Troudet, J., Grandcolas, P., Blin, A., Vignes-Lebbe, R., & Legendre, F. (2017). Taxonomic bias in biodiversity data and societal preferences. *Scientific reports*, 7(1), 9132.
- UNICEF. (2024). *SBC Program Guidance: The social and behaviour change toolkit*. <https://www.sbcguidance.org/>
- Uzzell, D. L. (2000). The psycho-spatial dimension of global environmental problems. *Journal of Environmental Psychology*, 20(4), 307–318.
- Verissimo, D. (2013). Influencing human behaviour: An underutilised tool for biodiversity management. *Conservation Evidence*, 10, 29–31.
- Verissimo, D. (2019). The past, present, and future of using social marketing to conserve biodiversity. *Social Marketing Quarterly*, 25(1), 3–8.
- Verissimo, D., Vaughan, G., Ridout, M., Waterman, C., MacMillan, D., & Smith, R. J. (2017). Increased conservation marketing effort has major fundraising benefits for even the least popular species. *Biological Conservation*, 211, 95–101.
- Waddock, S. (2020). Thinking transformational system change. *Journal of Change Management*, 20(3), 189–201. <https://doi.org/10.1080/14697017.2020.1737179>
- Wang, S., Hurlstone, M. J., Leviston, Z., Walker, I., & Lawrence, C. (2021). Construal-level theory and psychological distancing: Implications for grand environmental challenges. *One Earth*, 4(4), 482–486.
- Watson, A. (2013). Misunderstanding the “nature” of co-management: A geography of regulatory science and indigenous knowledges (IK). *Environmental Management*, 52(5), 1085–1102.
- Weiss, K., Hamann, M., & Marsh, H. (2013). Bridging knowledges: Understanding and applying indigenous and western scientific knowledge for marine wildlife management. *Society & Natural Resources*, 26(3), 285–302.
- White, A., & Trower, M. R. (2021). *Behavioral mapping and blueprinting cheat sheet*. Centre for Advanced Hindsight.
- Winkler-Schor, S., van Riper, C. J., Landon, A., & Keller, R. (2020). Determining the role of eudaimonic values in conservation behavior. *Conservation Biology*, 34, 1404–1415.
- Wynveen, C. J., & Sutton, S. G. (2016). Engaging Great Barrier Reef stakeholders: Mediation analyses of barriers among the antecedents of pro-environmental behavior. *Human Dimensions of Wildlife*, 22(2), 126–141.
- Yukulang, N., Clarke, B., & Ross, K. (2017). Barriers to effective municipal solid waste management in a rapidly urbanizing area in Thailand. *International Journal of Environmental Research and Public Health*, 14(9), Article 1013.
- Zhang, X., Geng, G., & Sun, P. (2017). Determinants and implications of citizens' environmental complaint in China: Integrating theory of planned behavior and norm activation model. *Journal of Cleaner Production*, 166, 148–156.
- Zhang, S., Liu, P., & Feng, T. (2019). To do it now or later: The cognitive mechanisms and neural substrates underlying procrastination. *Wiley Interdisciplinary Reviews: Cognitive Science*, 10(4), e1492.

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