BEHAVIOR

# How behavioral science can help conservation

## Leveraging cognitive biases and social influence can make conservation efforts more effective

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Most conservation initiatives require changes in human behavior. For example, the establishment of a protected area will typically require some people to change their land-use or fishing practices. Yet conventional attempts to encourage pro-environmental behavior through awareness campaigns, financial incentives, and regulation can prove ineffective (*1*, *2*). Insights into inducing behavior change from the social and behavioral sciences are therefore of critical importance for conservation scientists and practitioners (*2*–*4*). Conservation initiatives have begun to leverage a wide range of such behavioral insights (*5*) particularly regarding cognitive biases and social influence (see the figure). However, their application in the diverse socioeconomic and cultural contexts in which many conservation programs operate raises important ethical and implementation-related challenges.

### LEVERAGING COGNITIVE BIASES

Numerous cognitive biases affect the conscious and unconscious decisions that humans make (*6*, *7*). These biases can make people behave in seemingly strange but predictable ways that have important implications for conservation (see the figure).

People have a strong tendency to avoid making difficult decisions, and as a result, they are prone to accepting whatever default option they are presented with—even when this option is not in their own, or society's, best interest. This status quo bias means that if people are asked to opt into a conservation program voluntarily (such as choosing electricity generated from renewables), they most likely won't, even if they think it is a good idea. Participation in programs intended to promote energy efficiency or green energy increases markedly when these options are the customer's default settings (*5*). Likewise, a university was able to reduce paper use by 15% simply by switching the default printer settings to double-sided (*5*). Of course, people should always be able to opt out (*6*).

People also have a cognitive bias that causes them to disproportionately weight initial information when making decisions (*7*). When a group of students were first asked to write down the last two digits of their social security number before estimating how much they would be willing to pay for a range of goods (such as chocolate and wine), those with the highest last two digits of their social security numbers were willing to pay three times as much as those with the lowest (*7*). The social security number, even though it was arbitrary and irrelevant, acted as an anchor—a starting point for decision-making under uncertainty.

This anchoring bias has conservation applications. Many fisheries do not allow fishers to retain fish below a minimum (usually reproductively viable) size. This minimum size often becomes the anchor for fishers, but it is easy to slip just below this anchor and keep fish that are too small. To reduce the likelihood of recreational fishers keeping fish that are too small, management authorities have used persuasive messaging that encourages people to aim for larger fish to reset people's conceptual anchor well above the minimum size (*8*).

Although these cognitive biases have already been leveraged in conservation activities spanning fisheries, energy use, waste production, and land use (*5*, *8*), further opportunities exist to integrate people's cognitive biases directly into operational tools used for conservation planning. For example, there is a cognitive bias that causes people to perceive that losses hurt about twice as much as gains feel good, often referred to as loss aversion or prospect theory (*6*). Yet, when determining where to place protected areas, conservation planners tend to give the same weight to potential losses from establishing a reserve in a specific location as to potential gains. To more accurately reflect people's loss aversion bias, systematic conservation planning could assign a heavier weight to losses (this could even be directly integrated into the software used to plan locations of reserves).

Likewise, loss aversion bias could be integrated into the framing of incentive-based conservation activities to improve motivation and participation. Many conservation issues are framed to highlight the benefits associated with sustainable resource use (*9*). Yet because of people's loss aversion bias, motivations to use resources sustainably can be higher when issues are framed to highlight the potential losses from not doing so, rather than the gains. A high-tech manufacturing company was able to increase output by experimentally manipulating the framing of bonuses. Total team productivity increased by 1% when bonuses were framed as a loss (a deduction from a maximum when benchmarks were not met) compared to when they were framed as a gain (a bonus for meeting a benchmark), even though the bonus system was actually the same (*10*). A similar type of loss-framing could be built into incentive-based conservation programs that provide rewards for achieving sustainability benchmarks, such as reforestation or curbing non–point source pollution, to help motivate participation (*11*).

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Additionally, conservation interventions could also leverage what is known as the decoy effect. The decoy effect is the phenomenon that people tend to change their preference between two options when presented with a third option that is meant to be inferior in some regard (a decoy). A third option can thus be used to make one of the initial options seem more attractive. The decoy effect is often used in car sales and marketing to get people to purchase a more expensive product, but recent applications have shown that it can also be harnessed to promote cooperation (*12*). When faced with the options to cooperate or not, the presence of a third option—cooperate and reward someone else—vastly improved cooperation rates, even though this third option was rarely used (*12*). Some voluntary conservation initiatives could leverage the decoy effect to improve participation and cooperation.

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## LEVERAGING SOCIAL INFLUENCE

Human behavior is also profoundly influenced by our innate desire for prestige, reputation, conformity, and reciprocity (see the figure). Social influence refers to the ways in which our decisions and actions are shaped by perceptions (whether accurate or not) of what other people do and what they approve of (*1*, *4*).

Some power and water companies have managed to dramatically reduce resource use simply by including in bills a comparison between the usage rates of the customer, their neighbors, and the most efficient users (*9*). This comparison conveys social norms about both what is right to do and what other people are doing (*2*) and enables feelings of agency and self-control (*1*). People tend to respond best to such comparisons when they feel that the comparison groups are like themselves. To date, social comparisons have generally been targeted at individual customers, but they offer the potential for scaled-up impact when they are targeted at leaders, policymakers, and even engineers. One experiment found that project designs were 28% more sustainable when civil engineers had social norms about sustainability reinforced just prior to starting the project (*13*).

People also behave differently when they think they are being observed (*4*). Some power companies have leveraged this knowledge by making customers' power usage public, resulting in substantial reductions in electricity consumption (*3*). Likewise, prosocial behavior such as compliance with conservation rules can be encouraged when stylized images of watching eyes are visible (i.e., on signs or posters), which make people feel as if they are being watched (*8*, *14*). However, it is unclear how long the effects of these types of behavior change intervention last, and it remains to be shown whether people eventually get desensitized.

Of course, we are also influenced by the source of our information. Spreading conservation ideas and practices can be facilitated through use of trusted messengers (i.e., popular actors, athletes, or public figures), key players in social networks, and block leaders (volunteers who help to inform people about an issue) (*1*, *15*). Other social influence levers include obtaining publicly visible commitments or pledges to change behavior—for instance, to start recycling (*1*, *3*). Inducing behavioral change through social influence levers works best when the behavior is visible—such as curbside recycling or hiking on as opposed to off the trail—and when there is strong social group cohesion, communication, and identity (*1*, *4*).

## Leveraging behavioral insights for conservation

### Cognitive biases

**The status quo bias**
Most people prefer to maintain the status quo. This can be addressed by setting the default option so that people need to "opt out" rather than "opt in" to sustainable options.

**Anchoring**
People tend to rely on initial information. This bias can be leveraged by setting cognitive anchors early and far from critical thresholds.

**Issue framing**
People have a strong aversion to losses. Highlighting what they stand to lose by unsustainable practices and policies helps to catalyze action.

**Decoys**
When people have trouble making decisions, the desirability of sustainable options can be emphasized with the use of less desirable "decoy" options.

### Social influences

**Social norms**
People want to fit in with what "most people do" and what "should be done." Communicating social norms about conservation can help to encourage sustainable behaviors.

**Observability**
People behave more prosocially when they think others know what they are doing. Increasing observability can promote sustainable behaviors.

**Block leaders**
Whom we receive information from can be as powerful as what we receive. Trusted messengers and block leaders can amplify uptake.

**Public commitments**
People want to maintain prestige and reputation, which can be leveraged through public commitments or pledges to change behavior.

## IMPLEMENTATION CHALLENGES

Behavioral insights have been used to inform a broad range of public policies, including health care and tax compliance. They also hold much promise for conservation, but applications to date have yielded mixed results (*5*), and critical questions remain about the context under which they can be most effective (*2*). Integration of behavioral insights into a wider range of conservation issues will require the development of an operational framework that helps practitioners to determine the types of behavioral interventions that might work best and be most appropriate in a particular context. Different types of implementing organizations, such as private companies, government agencies, NGOs, and community-based organizations, have different rights and degrees of social license to implement behavioral interventions. The best choice of intervention may also depend on whether the targets are consumers, resource users, leaders, policy-makers, project designers, or other types of stakeholders. Likewise, certain types of interventions may be more effective depending on whether the target behavior is a one-off or repeated decision; costly or cheap; under high or low uncertainty; visible or discrete; and whether the resource being conserved is public, private, or common-pool. Finally, sociocultural contexts such as attitudes, beliefs, norms, prices, and policies can all influence people's behavior and may help to inform the types of behavioral interventions that may work best (*2*, *3*).

Most behavioral interventions, and even the behavioral studies upon which they are founded, have been conducted in developed countries (*1*) and may not necessarily reflect people's behavior in the diverse social, economic, and cultural settings where many conservation programs operate. It is therefore crucial that researchers test many of the behavioral insights in field settings. These applications will, however, raise new ethical challenges, particularly when applied to traditionally marginalized peoples who may lack the agency to opt out of behavior change interventions. The development of a code of conduct may help to ensure that behavior change interventions are not viewed as coercive, a perception that could ultimately undermine support for conservation initiatives (*2*). Further research is also needed to explore the potential for behavior change interventions to displace certain norms and motivations, such as engaging in conservation because it is "the right thing to do" (*2*). ■

### REFERENCES AND NOTES


1. W. Abrahamse, L. Steg, *Global Environ. Change* **23**, 1773 (2013).
2. S. M. W. Reddy *et al.*, *Conserv. Lett.* **10**, 248 (2017).
3. E. Yoeli *et al.*, *Behav. Sci. Pol.* **3**, 68 (2017).
4. K. Nyborg *et al.*, *Science* **354**, 42 (2016).
5. H. Byerly *et al.*, *Front. Ecol. Environ.* **16**, 159 (2018).
6. R. H. Thaler, *Am. Econ. Rev.* **108**, 1265 (2018).
7. D. Ariely, G. Loewenstein, D. Prelec, *Q. J. Econ.* **118**, 73 (2003).
8. M. Mackay, S. Jennings, E. I. van Putten, H. Sibly, S. Yamazaki, *Mar. Policy* **95**, 256 (2018).
9. S. Díaz *et al.*, *Science* **359**, 270 (2018).
10. T. Hossain, J. A. List, *Manage. Sci.* **58**, 2151 (2012).
11. P. Ferraro, K. D. Messer, S. Wu, *Choices* **32**, 1 (2017).
12. Z. Wang *et al.*, *Nat. Commun.* **9**, 2954 (2018).
13. T. Shealy *et al.*, *Sustain. Cities Soc.* **40**, 182 (2018).
14. S. Pfattheicher, J. Keller, *Eur. J. Soc. Psychol.* **45**, 560 (2015).
15. E. K. Mbaru, M. L. Barnes, *Biol. Conserv.* **210**, 222 (2017).



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