

Psychological science, conservation, and environmental sustainability

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Because environmental degradation has the potential to negatively affect mental and social well-being, environmental sustainability is highly relevant to psychologists, who have a tradition of interventions designed to change behavior. Although many psychologists are already using psychological knowledge and tools to protect environmental resources, their efforts are neither widely known nor extensively utilized in applied conservation settings. Here, we describe some barriers to effective conservation interventions adopted by psychologists and conservation professionals alike, and provide suggestions to both disciplines for more productive engagement. We also present an illustrative example of psychological science applied to promote environmental conservation in a zoological park setting. Our aim is to raise awareness of the possibilities for such collaboration and to urge conservation professionals and psychologists to work together in order to proactively address pressing environmental challenges.

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Rising temperatures, vanishing forests, and diminishing biodiversity threaten ecosystems and are all linked to human activity. Addressing such phenomena will therefore require attention to human behavior, its causes, and possible means of changing it (Schultz 2011). These environmental challenges arise, at least in part, from anthropogenic causes, and they also threaten human health and well-being. Communities may be uprooted as the natural resources on which they depend become contaminated or depleted; social and political conflicts may develop over access to diminishing resources; and individuals may experience increased depression, stress, and anxiety as a direct or indirect response to these environmental changes (Doherty and Clayton 2011). Because of both the causal influence of humans on environmental degradation and the potentially harmful effects that such degradation can have on humans, we argue that psychological science must be involved in environmental protection.

In a nutshell:

- Protecting natural resources requires changing human behavior
- Attempts to change behavior should take into account the potential for substantial positive impact on the environment and the plasticity of the behavior
- Influences on behavior are not always obvious or intuitive, and interventions that do not incorporate relevant psychological science may be unsuccessful as a result of inaccurate assumptions
- Collaborations can help both psychologists and ecologists meet their professional goals

Policies to promote resource conservation and ecosystem protection can be more effective if informed by psychological research. Psychologists have already been working in this area, but much of the research is insufficiently mindful of the practical context for conservation. Meanwhile, conservation initiatives have sometimes ignored important psychological principles. Here, we offer suggestions to encourage effective involvement by psychologists, review basic principles of human behavior and behavior change, and discuss certain misperceptions that may thwart effective communication about conservation. To illustrate the potential for collaboration, we describe one conservation project in detail and close by emphasizing the importance of working together to achieve conservation aims.

■ Psychologists and environmental conservation

Psychologists have been working for decades to discourage environmentally destructive behaviors such as wasteful consumption of natural resources and to promote environmentally beneficial behaviors such as the use of mass transit. A typical approach includes an evaluation of the behavior and its social and physical context, an intervention that targets direct antecedents and/or consequences of the behavior, and an assessment of the intervention's impact. Numerous studies have demonstrated the effectiveness of these approaches (see reviews by Lehman and Geller 2004; Abrahamse *et al.* 2007; Steg and Vlek 2009; Osbaldiston and Schott 2012).

To a large degree, however, effective interventions for environmental protection have not “escaped” from the pages of scholarly journals to make substantial contributions toward solving sustainability problems. Research with limited applicability, limited external validity, or limited availability to practitioners will have limited

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impact. As a countermeasure, we suggest 11 specific ways to address these issues (Panel 1).

■ Choosing appropriate behaviors

When considering how to promote behavior change, the behavioral target must be carefully chosen. In studies of behavior change, psychologists frequently focus on behaviors that are easy to measure. Yet some important behaviors are relatively difficult to perceive, thus complicating any attempt to either assess or support them. Others are easier to assess but have a limited impact on environmental protection. One-time efficiency behaviors, such as purchasing an electric automobile, will typically have a larger impact than ones that require repetition, like walking instead of driving (Stern and Gardner 1981). For purely practical reasons, publicly monitored, high-impact behaviors should be the first candidates when attempting to foster change (Points 1–2 in Panel 1).

Recognizing the limits to people's control over particular behaviors is also important. Institutional practices may have a greater impact on the environment than individual choices, in a given context. Although individuals have more influence than is generally recognized (eg Dietz *et al.* 2009), in some cases people have very little freedom to choose their behavior. If resources to support interventions are limited, conservation efforts should be prioritized at a more structural level, focusing on institutional policy (Point 3 in Panel 1).

■ Identifying determinants of behavior

It is often assumed that humans make free and informed choices about what they do, and thus that behavioral change is best achieved by educating people about the effects of their actions. In fact, although individuals usually can control their behavior, they often do not exercise conscious control and instead may respond reflexively to stimuli, or unknowingly imitate the behavior of others. For this reason, education or attitude change may be an ineffective approach to encouraging pro-environmental behavior. Changing the “default” option – for example, setting indoor electric lights to turn off automatically after people leave the room and requiring active intervention to leave those lights on – can be highly effective in changing behavior (Thaler and Sunstein 2008). Having others display the behavior can be powerful (McKenzie-Mohr 1999), particularly when that behavior is modeled by those who are locally influential (Point 9 in Panel 1).

When making voluntary decisions about behavior, individuals may be guided by factors that are not immediately obvious. The external context within which behavior occurs, and particularly the costs and benefits associated with particular behaviors (eg Lehman and Geller 2004), must be considered (Point 4 in Panel 1). People are not motivated solely by economic considerations or by the desire to minimize effort, but are strongly influenced by the consequences of different behaviors. Such consequences could be monetary; all other things being equal, rational people choose behaviors that are less financially costly or are financially beneficial. But other costs, such as time and effort, are also powerful incentives. Social approval (or disapproval) is a possible reinforcer (or punisher).

To bring about long-term behavioral change, we maintain that internal factors such as attitudes and values are also relevant. Geller (2013) encouraged individuals to engage with their social and physical envi-

Panel 1. Principles for effective application of psychological science in conservation and sustainability

Points 1–3 relate to the type of behavior that is targeted for change. Points 4 and 5 highlight selected influences on behavior, whereas Point 6 emphasizes the importance of communicating findings to non-psychologists. Points 7–9 describe meaningful ways to work with others. Point 10 underscores that human behavior is subject to empirical analysis, and behavioral-change attempts should be assessed. Finally, Point 11 centers on the need to foster interdisciplinary collaborations.

1. Target conservation behaviors with potential for the greatest sustainability impact.
2. If possible, target efficiency behaviors (one-time choices, like buying an efficient car) over curtailment behaviors (behaviors that must be repeated, such as taking shorter showers).
3. For maximum impact, target organizations rather than individuals.
4. Examine the external context for barriers and for rewards and punishments associated with particular behaviors, whether intentional or unintentional.
5. Incorporate intrinsic reinforcement: that is, rely on the self-motivational advantages of perceived choice, competence, and community rather than trying to manipulate behavior solely through external rewards such as money or things with economic value.
6. Teach relevant principles of behavioral science to people in a position to make changes.
7. Work with architects and engineers to develop and test simple design modifications.
8. Work with policy makers and professionals to construct intervention programs designed to change behavior.
9. Engage local and indigenous staff as agents to carry out the interventions.
10. Collect, review, and report behavioral data to assess impact.
11. Address the challenge of dissemination by: (a) developing an interdisciplinary support network of researchers, practitioners, corporate leaders, community volunteers, and government personnel concerned with sustainability; (b) exchanging jargon-free, practical information with policy makers and grassroots organizations; (c) documenting research findings in publications (including periodicals and newsletters) that reach potential change agents; (d) using the news media to promote cost-effective interventions; and (e) gaining support from the private sector.

ronments through “actively caring”. People often care about nature, have strong ethical and moral convictions, and are motivated by both prosocial (concerned with the welfare of others) and transcendent (concerned with absolute ideals such as truth and justice) values. Thus, changing people’s minds may not be necessary. Rather, given that most people value the natural environment, effective behavioral change may only need to highlight these values (Schultz and Kaiser 2012). When reminded of their attitudes or values, people are more likely to make behavioral decisions that are consistent with them (Fazio 1995).

Even when individuals want to engage in environmentally beneficial behaviors, their choices may be based not on value preferences but on knowledge (or the absence thereof). Some behaviors are avoided because people believe, rightly or wrongly, that they do not know how to perform them. In these cases, behavioral skills training is more important than encouragement. People may need to hear how to reduce their carbon emissions, for example, rather than just being exhorted to do it. Information about behaviors may also increase perceptions of self-efficacy (competence at achieving a desired outcome), which have been shown to be strongly related to pro-environmental behavior (Figure 1; Hines *et al.* 1987; Eigner and Schmuck 2000).

Attempts to encourage pro-environmental behavior run the risk of possible reactance, a backlash against the perceived threat to personal autonomy represented by a behavioral prescription or proscription (Brehm 1966). Because people do not like to feel that their personal control is being challenged or taken away, the best strategies will preserve the perception of choice by making the pro-environmental choice more desirable, rather than by punishing the less sustainable option (Brehm and Brehm 1981). If “love of nature” is not a compelling motive for a particular target, interventions can emphasize other values such as financial savings, community health, or environmental stewardship. It is important to correctly identify the motives that might operate for a given set of people in a specific situation so as to avoid both backlash and negative spillover – a situation in which refraining from one harmful behavior makes people feel more entitled to engage in another (Evans *et al.* 2012). Interventions that are effective in one situation may be ineffective or even counterproductive in another. The most effective behavioral-change interventions will consider both external and internal motivators (Geller 2013).

■ Designing effective communications

Psychologists can not only provide information about behavioral-change techniques; they can also ensure that



Figure 1. A sign at the Cleveland Zoo designed to encourage perceptions of self-efficacy among visitors.

conservation scientists incorporate accurate assumptions about human nature and do not include messages that may lead to the opposite effect from the one intended. Cialdini (2003), for example, described cases in which messages designed to deter a particular behavior have the paradoxical effect of encouraging that behavior: by describing the large numbers of people who engage in an environmentally destructive behavior, the message normalizes the behavior. Messages that emphasize potentially dire consequences of selected human behaviors may frighten people into a state of denial (Witte 1998; Fritzsche and Häfner 2012).

With regard to animal conservation, messages designed to promote awareness may incorporate three potentially harmful myths: (1) the myth of the “wild” (pristine wilderness areas, free of human activity), (2) the myth of the “evil” predator (demonized species), and (3) the myth of “cute” and “cuddly” exotic pets (idealized species). Manipulation of images (eg cropping out humans) or documentaries that avoid showing humans in wilderness areas may contribute to the myth of the wild (Litchfield 2013). Images that include evidence of human activities and interventions in wilderness areas can be truthful and powerful because they highlight the beauty of animals against the backdrop of reality (Figure 2).

Some species, particularly predators, have been “demonized” by their portrayal in commercial movies (eg leopard seals in *Happy Feet*, hyenas in *The Lion King*, wolves in *The Grey*), and scientists themselves can malign species by labeling them as “pests” (eg rhesus macaques [*Macaca mulatta*]) or “weeds”. People may be less likely to actively support the conservation of species that they neither appreciate nor connect with. Therefore, changing attitudes about these maligned species is critical. Conversely, the illegal pet trade is fuelled by the desire to own exotic animals. People think non-human primates are cute and amusing based on their “antics” in advertisements or appearances in movies or television sitcoms



Figure 2. Humans are part of the wildlife-viewing experience.

(Figure 3). Such popular media portrayals of chimpanzees (*Pan troglodytes*) distort public perception of this endangered species and may hinder its conservation (Ross *et al.* 2008; Schroepfer *et al.* 2011).

In counteracting misrepresentations of animals in the media, communications professionals in conservation-oriented organizations may debate whether public outreach efforts will be more effective if they describe animals as, for example, vulnerable or powerful, or as similar to or different from humans. These decisions require empirical testing (Point 10 in Panel 1). Rather than rely-



Figure 3. Unrealistic depictions of non-human animals can affect the way that they are perceived.

ing on intuition and assumptions about human behavior, conservation professionals need to access the relevant psychological research.

■ Integrating psychologists into conservation – the case of zoos

Collaborations between psychologists and natural scientists, including those working in applied conservation settings, are necessary to reach non-academic audiences on a large scale (Point 11 in Panel 1). Zoos provide one opportunity for such collaborations, which target a massive organizational network (through associations of zoos) rather than households (Litchfield *et al.* 2012). Zoos not only operate across the whole spectrum of conservation activities – from ex situ breeding of imperiled species; to research, public education, and advocacy; to in situ support of

species, populations, and habitats (WAZA 2005) – but also have a large audience of visitors whose knowledge, understanding, attitudes, behavior, and involvement can be influenced and harnessed (Litchfield *et al.* 2012; Smith 2012). The experiences and messages that people encounter during zoo visits (Smith *et al.* 2011) can be applied to target pro-conservation behaviors (Smith *et al.* 2012). Although many zoos emphasize conservation education, they also have the opportunity to develop effective campaigns directed at changing behavior, whether advocating environmentally responsible use of natural resources (eg water, energy), fostering volunteerism or other “helping” behaviors, minimizing human–wildlife conflict, or promoting the development and use of sustainable products or technologies (Litchfield and Foster 2009).

Australian zoos have participated in several behavioral-change campaigns, including the national “They’re Calling on You” (mobile phone recycling) and “Don’t Palm Us Off” (to gain mandatory labeling of palm oil) campaigns to help protect wild great apes (initiated by Zoos Vic; Lowry 2009; Litchfield *et al.* 2012), as well as the “Fish4Life Challenge” (to promote sustainable seafood consumerism; managed by Taronga Zoo; Smith *et al.* 2011). However, through lack of either resources (time, staff availability, money) or expertise, the impact of zoo campaigns is not always formally assessed (ie ignoring Point 10 in Panel 1). Addressing this omission is the ideal task for a conservation psychologist working within a zoo or collaboratively with a team of other experts to both evaluate the campaign and disseminate the findings widely (lay and academic audiences; see Panel 2).

Panel 2. Illustrative example – the “Seal the Loop” program

The “Seal the Loop” program initiated by Zoos Victoria (Zoos Vic) combines principles of psychology and community-based social marketing in an interdisciplinary and multi-stakeholder community conservation project (Geller 1989; McKenzie-Mohr 1999). This project, based on the Zoos Vic “Connect–Understand–Act” model (Lowry 2009), merges education and behavioral changes within and outside the zoo in an effort to reduce solid waste (plastics, fishing line, etc) discarded along the coast, which threatens hundreds of thousands of seabirds, mammals, and fish every year.

Visitors to Melbourne Zoo are encouraged to recycle their plastic waste onsite, which is then manufactured into special “Seal the Loop” bins (Figure 4); these bins are placed in popular fishing locations in and around Melbourne, making it easier for recreational anglers to dispose of their unwanted fishing tackle in an environmentally responsible way. This approach targets a behavior with an unmistakable environmental impact that can be easily monitored (eg amount of waste collected). Although it is a repeated behavior rather than a one-time decision, the relative ease of performing this behavior as well as the large potential audience for the intervention makes it worth targeting. Posters provide information, and disposing the waste into visible recycling bins can enhance the sense of effectiveness that recyclers experience. Seals housed at Melbourne Zoo – including Silva, an Australian fur seal (*Arctocephalus pusillus doriferus*) rescued more than 20 years ago after being found entangled in a discarded fishing net – serve as “ambassadors” for their wild counterparts and encourage motivation based on intrinsic reinforcement among the zoo visitors.

After a 5-month trial period using 20 of these bins, more than 1.5 km of fishing line, > 300 hooks, 77 swivels, and other fishing-related waste materials were collected (Sanders 2011). Consequently, a Victorian Government grant, funded through fishing license fees, was acquired, which allowed more than 80 “Seal the Loop” bins to be installed. This project involved collaboration between zoo staff, government and non-government organizations, community volunteer groups, recreational fishing groups, local councils, and others (Sanders 2012). However, from a conservation psychology perspective, another step remains in the collaborative process: assessment.

One of the authors (CL), an adjunct conservation psychologist at Zoos South Australia, will work with her colleague E Pearson to evaluate the “Seal the Loop” project systematically and determine the project’s impact on the local community, in particular the fishing community. A study will be conducted to measure knowledge about marine wildlife entanglement and other threats to marine wildlife as a result of human behavior, attitudes toward marine wildlife, attitudes toward the “Seal the Loop” project, and finally, effectiveness of “Seal the Loop” bins in educating and changing behavior.



Figure 4. Signage and bin associated with the Melbourne Zoo’s “Seal the Loop” program.

■ Toward effective collaboration

The discipline of psychology has traditionally been guided by both science and values: the dual objective to understand human behavior and to promote human well-being (Doherty and Clayton 2011; Geller 2013). Unfortunately, psychologists are often trained to adopt a narrow, individualistic perspective on well-being, emphasizing changes in individual behavior and cognition in order to promote an individual’s mental and physical health. Psychologists must recognize that the phenomena they study are embedded within a context that incorporates non-psychological processes. Psychological health and well-being are not attributes of the individual regardless of context; rather, they result from a socioecological system that supports an individual’s needs.

Most psychologists understand the relevance of the social environment to well-being, and it is increasingly difficult for them to ignore the relevance of the natural environment to well-being. Humans undeniably require clean air, clean water, and sufficient environmental

resources to supply them with food and shelter. Beyond that, a growing body of evidence demonstrates the importance of the natural environment to more abstract indicators of human functioning. Stress, creativity, interpersonal relationships, and cognitive abilities exhibit both short-term and long-term effects of exposure to “green” environments such as trees, grass, and water (Staats 2012; Wells and Rollings 2012). Environmental degradation will not only prevent people from benefiting from the natural environment, it will also increase social inequities in the distribution of environmental “goods”.

While psychologists consider how their work can further environmental sustainability, those working to promote conservation in the field should consider ways in which people are relevant to their project. Zoos are far from being the only example. Collaborations could involve community-based conservation projects, work in regional and national parks, and citizen science, among other possibilities. Can human behavior ensure or prevent the success of any of these projects? Does the success of the conservation initiative have implications for human well-

being? Professionals involved in conservation and sustainability need to recognize the role of human actions and reactions in environmental protection.

To protect natural resources and biological diversity, both behavioral and natural scientists should do more to look beyond their disciplinary boundaries. Psychologists ought to be involved in environmental conservation and sustainability, not only because it is in their interest as human beings, but because it is a professional obligation to consider environmental health along with other factors relevant to physical or mental health. Conservation professionals, in turn, should consider the human dimensions of conservation initiatives. Both groups need to educate themselves about relevant projects and activities in other disciplines, and seek out ways to make their own professional expertise useful. Papers written for a broad audience, as well as cross-disciplinary, problem-focused workshops and conferences, will provide more opportunities to collaborate in helping to conserve the environment and its resources for future generations.

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