Cooperative conservation: Seven ways to save the world

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Abstract
The world faces serious environmental problems. To solve them we must work together. Fortunately, humans are a very cooperative species. We have faced a range of cooperative problems in the past, and have evolved and invented a range of cooperative solutions to them—kin altruism, mutualism, reciprocity, heroism, deference, fairness, and property rights. Here, we illustrate how each of these solutions can be pressed into the service of conservation goals. Unlocking this potential will require overcoming conservationists' current cycloptic focus on only one type of cooperative problem (the prisoner's dilemma) and one type of solution (reciprocity). Only then will policy makers be able draw on the full range of cooperative dispositions and design more systematic and effective environmental interventions.

KEYWORDS
conflict resolution, conservation, cooperation, coordination, game theory, kin selection, social dilemmas

1 INTRODUCTION

Humans are a remarkably successful species: population size, longevity, and consumption per capita have increased dramatically since the industrial revolution (https://ourworldindata.org). However, we now risk becoming victims of our own success. The world faces a catalogue of environmental problems, including climate change, habitat destruction, biodiversity loss, resource depletion, and pollution (United Nations Environment Programme, 2012). Solving these problems, or even mitigating them, will require cooperation on an unprecedented global scale.

Fortunately, humans have a tremendous capacity for cooperation. We descend from a long line of social primates who have lived in groups for tens of millions of years. During this time, we faced a wide range of different cooperative problems and opportunities—allocating resources to kin, coordinating to mutual advantage, engaging in social
exchange, and minimizing the costs of conflict—and we evolved and invented a range of different solutions to them. As a result, humans possess cooperative dispositions that lead us to (1) care for our families, (2) maintain coalitions, (3) reciprocate favors (and punish cheats), and resolve conflicts through contests involving displays of (4) heroism and (5) deference, (6) fairness, and (7) respect for prior possession (Table 1). These cooperative dispositions appear to be evolutionarily ancient, psychologically distinct, and cross-culturally universal (Curry, Mullins, & Whitehouse, 2019). When triggered by the right conditions, these “better angels” of our nature can change the world (Pinker, 2011).

The same problems and opportunities for cooperation—between individuals, between nation states, and between humans and nature—arise in the context of conservation; hence each of these cooperative dispositions could and should be pressed into the service of conservation goals. We need environmental policy interventions that harness the full power of human cooperation in order to advance on the broadest possible front. As Cummings has put it: “Deep understandings of cooperation and how it can be achieved are therefore essential for effective conservation practice” (Cumming, 2018). However, as we show below (Figure 1) the extant literature focuses almost exclusively on one type of cooperation—reciprocity—at the expense of all the rest. Hence our aim here is to provide a sketch of what a more comprehensive approach to cooperation looks like, to broaden conceptual horizons, provide a more panoramic view of potential solutions, fire-up policymakers’ imaginations, and stimulate more creative research. For each type of cooperation, we introduce the basic problem and solution, and give examples of how policymakers might take advantage of the relevant cooperative disposition and its by-products.

### 1. Family values

Humans are kin altruists, who have evolved to detect, deliver benefits to, and avoid harming, their offspring and wider families (Hamilton, 1964; Salmon & Shackelford, 2007). Policymakers can harness this powerful aspect of our psychology by drawing attention to the larger long-term costs of environmental degradation to our relatives, including our children and grandchildren, as opposed to the lesser, short-term costs to self. For example, a campaign to reduce energy consumption that emphasized environmental and health costs—in terms of “pounds of pollutants, childhood asthma, and cancer”—achieved energy savings of 8% compared to a control group, whereas a campaign that emphasized monetary costs led to increased consumption; the environmental campaign was particularly effective among families with children, who achieved energy savings of 19% compared to the control group (Asensio & Delmas, 2015). Appealing to obligations to future generations could be
especially useful in cultivating support for conservation projects that carry immediate costs but may not provide benefits for decades—such as long-term projects including reforestation, soil conservation, recovery of wide-ranging, or long-lived species and atmospheric protection. The U.S.’s national parks, for example, were established “for the enjoyment of future generations” (Rosenblum, Orr, & Murray, 2016; see also: http://www.ourchildrenstrust.org).

Policy-makers can also harness a by-product of our parental psychology: sympathy for cute and charismatic animals (Macdonald et al., 2015) that can serve as “ambassadors” for conservation (Macdonald et al., 2017). And, by emphasizing the evolutionarily relationships between humans and all other species, policymakers could encourage people to view nonhuman species as “kin” (Qirko, 2017), and thereby further widen the circle of concern.

2. Coordination around salient focal points

Humans are mutualists, who readily coordinate their behavior and form coalitions to collaborate on projects of common interest. To do so they must overcome daunting coordination problems—identifying not only “what to do” but “when to do it”, and “with whom” (Lewis, 1969). No one wants to act alone for fear their effort will be wasted—a problem compounded in situations where first movers pay higher costs (Sheng-Feng, Reeve, & Herrnkind, 2010). Individuals tend to participate in coordinated projects only if they know that others will too, and if they know that others know that others will do so, and so on—a situation referred to as “common knowledge” (Thomas, DeScioli, Haque, & Pinker, 2014). Such coordination problems occur in conservation when, for example, everyone would benefit from adopting a new green technology, but only if everyone else does too, because acting alone incurs a substantial cost (Kimmich & Sagebiel, 2016; Mielke & Steudle, 2018).

Policy-makers can help solve coordination problems by providing or promoting salient focal points around which expectations can converge, thereby creating the required common knowledge. For example, industry bodies can ensure that competing firms act in concert (where it is legal to do so) by highlighting common interests and efforts to realize them (Abrahamse & Steg, 2013; Forsyth, van Vuurt, Schlelin, & Story, 2015), establishing common standards (Millar, Hepburn, Beddington, & Allen, 2018), launching unilateral commitments to achieve a solution (McAdams, 2000), and providing incentives such as tax breaks or subsidies for first movers (Couture & Gagnon, 2010). Conservationists can also take advantage of serendipitous focal points—such as the sensational killing of Cecil the lion by a trophy-hunting dentist—which galvanized action in a way that a constant stream of (objectively worse) biodiversity bad news had not (Buhrmester et al., 2018).

3. Escaping the prisoner’s dilemma

Humans are reciprocators, who escape from prisoner’s dilemmas, and avoid free-riders, by pursuing a strategy of conditional cooperation (Axelrod, 1984; Trivers, 1971).

The prisoner’s dilemma (also known as the tragedy of the commons, social dilemmas, public goods games, common pool resource games, and so on) is by far the most well-studied paradigm for analyzing environmental problems (Figure 1). To give a straightforward example: everyone benefits from cutting consumption and slowing global warming; but any given individual can benefit even more by continuing to consume, while enjoying the environmental benefits brought about by others’ restraint. Thus a collective good unravels due to individual selfishness.

The solutions to this problem are similarly well-known (Cumming, 2018). Policymakers can create space for reciprocity by changing the game from a one-shot dilemma (in which noncooperation is the only stable outcome) to a repeated encounter, in which there are long-term consequences to one’s actions. This can be done by breaking down one large problem into a series of smaller problems (Ostrom, Walker, & Gardner, 2013), and publicizing individuals’ contributions, making it possible to reward cooperators and punish noncooperators at each step (Kraft-Todd, Yoeli, Bhanot, & Rand, 2015). For example, in the context of lion (Panthera leo) conservation, repeated Conferences of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora combined repeated interactions between states with publicity about how well each is doing, thereby allowing participants to monitor each other’s behavior, and so build trust and cooperation over time (Bauer, Nowell, Sillero-Zubiri, & Macdonald, 2018). Another way to enforce cooperation is to create a strong centralized authority with the power to punish free-riders—as in the case of the regulation of SO2 emissions to eliminate acid rain (Chan, Stavins, Stowe, & Sweeney, 2012).

4 and 5. Hawkish heroism and dove-ish deference

Humans are peacemakers, who employ a range of strategies for minimizing the costs of protracted conflicts (time, energy, and injury) that all involved have a common interest in avoiding. For this reason, conflicts are modeled as non-zero-sum hawk-dove games (also referred to as games of “chicken”), rather than games of pure zero-sum competition (Maynard Smith & Price, 1973).

One way to forestall conflict is for people to “hawkishly” signal their ability to win and—after assessing their
opponent—“dove-ishly” withdraw from conflicts they expect to lose. The outcome of these “ritual contests” is the same as a real contest would be—the stronger party wins—but both parties benefit by avoiding the costs of actually coming to blows. Hawkish displays of winning traits can include acts of heroism and generosity (Gintis, Smith, & Bowles, 2001; Kraft-Todd & Rand, 2019). Dove-ish displays of deference, meanwhile, are typically exaggerated submission cues, including expressions of meekness, humility, and respect (Curry, 2007; Mazur, 2005).

Policymakers could press hawkish dispositions into the service of environmental conservation by creating contests in which environmentalism is a badge of excellence, and individuals and organizations compete for the prestige of being the greenest (Griskevicius, Tybur, & Van den Bergh, 2010; Iredale & Van Vugt, 2011). Constructive competition for reputation and prestige can generate a race to the top to reduce harmful emissions or improve biodiversity conservation. For example, in the Japanese top runner energy efficiency program, the most efficient product sets the standard for all products in the next target year (Siderius & Nakagami, 2013). Similarly, publishing mega-fauna conservation rankings can “foster healthy pride and competition among nations” (Lindsey et al., 2017), as could other international league tables of environmental performance (Wendling, Emerson, Esty, Levy, & de Sherbinin, 2018).

Policymakers could also activate dove-ish strategies by emphasizing the grandeur and destructive power of nature, making clear that playing chicken against the environment is a game you cannot win, and thereby eliciting from the public greater respect, reverence and awe for the natural world (Piff, Dietze, Feinberg, Stancato, & Keltner, 2015). It would be fascinating to investigate, for example, whether making people feel small in this way might trigger the monkish virtues of self-denial, temperance, and thrift, and in turn lead people to reduce consumption, avoid waste, and adopt the simple life—minimalism, voluntary simplicity, frugality, and other forms of eco-asceticism (Evans, 2011; Meissner, 2019; Merdin-Uygur, 2019).

6. Fair shares

People are fair-minded, and resolve conflicts over divisible resources by sharing them equitably (Messick, 1993; Skyrms, 1996). For example, when conflicts over how to allocate the costs of mitigating climate change stall negotiation, increasing costs for all, the impasse can be overcome by explicit appeal to fairness (Gampfer, 2014). This sense of fairness is a common theme in discussions of environmental equity and justice (Bennett, Blythe, Cisneros-Montemayor, Singh, & Sumaila, 2019)—often supporting the underdog in disputes over the allocation of environmental costs and benefits—and arguably underpins the call to give animals equal rights (Regan & Singer, 1989). Indeed, the Nature Needs Half campaign (natureneedshalf.org) makes an explicit appeal to fairness when advocating that, to reduce anthropogenic stress on biodiversity, people allocate to nonhumans an equal share of land and energy flows.

7. Respect for property

Finally, people resolve conflicts over resources by respecting prior possession and awarding property rights (Hare, Reeve, & Blossey, 2016; Sherratt & Mesterton-Gibbons, 2015). Policymakers can leverage intuitions about the legitimacy of prior possession to prevent potentially costly and environmentally harmful conservation conflicts—for example, by favoring traditional sustainable small-scale fisheries in conflicts with newly arrived, and unsustainable, industrial fishing interests (Pauly, 2018). Prior-appropriation—the principle of “first in time first in right”—originally used to resolve conflict over water use, also serves to reduce its over-exploitation; and the principle could be extended to prevent over-production of air pollution (Rose, 2008). And policymakers could increase support for protecting places high in biodiversity by emphasizing their prior possession by human or nonhuman inhabitants (Hadley, 2015).

2 NEW HORIZONS

There are many different problems of cooperation, and many different solutions. This systematic view of human cooperation, rooted in evolution and the theory of games, provides a solid foundation for analyzing the many different opportunities for cooperative behavior, the obstacles that stand in their way, and how we might overcome them. By making use of them all, conservation researchers and policymakers can design a more comprehensive and systematic set of strategies that, by going with the grain of our evolved cooperative psychology, engender greater support and bring about more effective conservation outcomes.

More broadly, this expanded cooperative approach could even provide a new foundation for environmental ethics. Previous research suggests that these cooperative dispositions provide the motivation for (and the criteria by which we judge) moral behavior (Curry, 2016). This theory of “morality as cooperation” has no problem explaining the moral obligations that people feel to family, friends, neighbors, rivals and even strangers—but it may also explain (and help to foster) the moral obligations many feel to nonhuman entities such as other animals (Singer, 1975), plants (ECNH, 2008), and abiotic aspects of the natural world (Elliot, 1991). In many ways we do directly cooperate with these entities: by conserving them, they provide goods and
services essential to our survival (Hare, Blossey, & Reeve, 2018). In other ways, our obligations to the environment may be by-products of our moral intuitions. Exploring the implications of this view could help us better understand the psychology of moral concern for particular species and the environment in general, and help to design more effective environmental appeals (Feinberg & Willer, 2013).

In order to realize this potential, existing research on cooperation and conservation must overcome its current cycloptic focus on only one type of problem (the prisoner’s dilemma) and one type of solution (reciprocity). We conducted a Web of Science citation search for conservation articles mentioning cooperative problems and solutions relating to kin altruism, mutualism, reciprocity, heroism, deference, fairness and property rights (see Figure 1 and Supporting Information). The search returned 974 citations. Over 85% of these articles were related to reciprocity, whereas there were no articles explicitly linking cooperative problem to cooperative solution in the cases of heroism, deference and property. This extreme bias towards the prisoner’s dilemma and reciprocity as the almost exclusive paradigm for the study of environmental cooperation makes it more difficult to accurately diagnose problems, restricts awareness potential policy solutions, and—because prisoner’s dilemmas are in many ways the most intractable problem—creates an unduly pessimistic expectation of such policies’ success. We need to, if not “eliminate the negative”, then at least “accentuate the positive.” Further research into, and greater awareness of, these other cooperative problems and potential solutions will be required to trigger a new wave of policies for stimulating effective conservation behaviors.

In conclusion, reciprocity is not the only solution to the global problems that we face. We must also “think of the children,” foster a sense of kinship with the natural world, encourage industries to move en masse, establish environmental competitions where the greenest get the glory, engender awe, appeal to fairness, and acknowledge the claims of those who came first. Expanding our environmental imagination in this way will enable conservation researchers, policymakers, civil society and the public to work together for the common good, and for the good of the planet—a synergy that might be called “cooperative conservation.”

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

AUTHOR CONTRIBUTIONS

O.S.C. conceived of the project, conducted the literature search, and took the lead in writing the report. D.H, C.H, D.D.P.J, M.D.B., H.W., and D.W.M sourced examples and contributed to writing the report.

DATA AVAILABILITY STATEMENT

The results of the literature search are available in the Supporting Information.

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

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