


Why does conservation minimize opportunity costs?

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Abstract

Effective management of depleted natural resources can be achieved only through changes in human actions. Opportunity costs represent the forgone benefits that would have flowed in the absence of conservation interventions. To the extent that opportunity costs reflect lost opportunities for extractive uses (e.g., fishing or logging), and to the extent that those extractive uses present threats to nature, opportunity costs therefore reflect the positive differences for natural values that can be made through conservation management. Thus, logic dictates that, if conservationists make choices to minimize opportunity costs, they are also necessarily limiting their impact. Unfortunately, empirical evidence from many conservation contexts implies that conservationists indeed make choices consistent with an aim to minimize opportunity-costs, and hence impact. A better understanding of the relationship between opportunity costs and conservation impact will make the language used to communicate conservation progress, targets, and planning more honest and accountable and more explicitly focused on the differences our actions make.

KEYWORDS

biodiversity, conservation, conservation planning, counterfactual, impact evaluation, marine spatial planning, opportunity costs, protected areas, residual conservation

1 | INTRODUCTION

The fundamental premise of conservation is to protect nature through actions that are also fair and equitable for the people they affect (Friedman et al., 2018; Montambault et al., 2018; Watson & Venter, 2017). Depending on the views and priorities of society at large, or numerous organizations specifically, conservation can focus on preserving biodiversity, ecosystem function, wilderness, or other aspects of nature perceived to hold value (Harvey et al., 2017; Mittermeier et al., 2003; Srivastava & Vellend, 2005). Conservation actions are also expected to promote the sustainable use of resources such as land, water, soil, plants, and animals, with a

particular focus on how management affects the quality of life for both present and future generations (Cox & Arnold, 2010; Lockwood et al., 2010). At its core, conservation relies on reducing the detrimental impacts of anthropogenic activities. Therefore, if human impacts were not causing harm to nature, then nature conservation would not be necessary. This statement might seem self-evident, but it has important implications for spatial approaches to conservation, particularly in relation to opportunity costs.

Opportunity costs are the occupational hazard of conservation. They can be broadly defined as the loss of benefits to individuals or groups of people that would have been available from alternative courses of action

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(Cameron et al., 2008; Faith et al., 1996; Moffett & Sarkar, 2006) (Table 1). Throughout this article we refer specifically to opportunity costs in the context of forgone extractive activities with the potential to harm biodiversity and other conservation values. For example, gazetted marine protected areas (MPAs) can incur costs to income and subsistence of fishers in lost fishing grounds (Adams et al., 2010, 2011), just as implementation of

terrestrial national parks incurs lost opportunities for agriculture, mining, logging, or grazing (Venter et al., 2013). As conservation interventions expand, so do the opportunity costs borne by society (Kockel et al., 2020). Much conservation action and much research on conservation planning therefore focus on minimizing opportunity costs, for example, by minimizing the extent to which logging or fishing is affected by

TABLE 1 Key terms and definitions

Term	Definition	Example
Conservation opportunity cost	The loss of benefits to individuals or groups that would have been available from alternative courses of action (Cameron et al., 2008)	The extent, abundance, or value of a resource or industry (e.g., fisheries or forestry) that is lost or given up as a result of a conservation intervention
Conservation impact	The intended and unintended consequences (e.g., changes in knowledge and attitudes, behaviors, and/or social and environmental conditions) that are directly or indirectly caused by an intervention over and above the counterfactual of no intervention or a different intervention (Ferraro, 2009).	Greater fisheries biomass in local fishing areas as a result of implementing no-take MPAs, compared to counterfactual conditions (Smallhorn-West, Stone, et al., 2020)
Counterfactual	The outcome that would have occurred in the absence of the intervention considered, or a different intervention (Smallhorn-West, Weeks, et al., 2020)	A group of control samples quantitatively paired with treatment samples based on variables known to bias protected area establishment (Smallhorn-West, Stone, et al., 2020)
Residual conservation	Conservation interventions, targets, or policies that can be implemented and achieved with little to no impact for nature.	Across 147 nations, terrestrial protected area networks are biased toward places unlikely to face land conversion pressures even in the absence of protection (Joppa & Pfaff, 2009). Likewise, the global pattern of MPA expansion is biased based on the rapid growth of very large, remote MPAs (Devillers et al., 2015).
Conservation target: extent and number	The abundance and coverage of spatial conservation interventions such as terrestrial national parks or MPAs; typically defined by policy; ignores relative urgency of protection of features (Pressey et al., 2017)	Targets such as Aichi 11 by the Convention on Biological Diversity, which called for 17% coverage of land and 10% coverage of the oceans in protected areas, regardless of risk of exploitation (Pressey et al., 2017); likewise the push for 30% of the planet to be protected by 2030
Conservation target: representation	Counts of features (or metrics of coverage of environmental space) and their relative levels of protection; ignores relative urgency of protection of features (Pressey et al., 2017)	Targets such as the rezoning of the Great Barrier Reef Marine Park which, while achieving at least 20% representation of each bioregion in no-take zones, placed those zones on the parts of the soft-bottom bioregions with the least value for trawling (Devillers et al., 2015)
Societal acceptability	The willingness of society at large, or specific societal groups, to endorse conservation actions.	Social acceptability in forest management results from a judgmental process by which individuals decide whether an observed condition is superior, or sufficiently similar, to the most favorable alternative condition; if the existing condition is not judged to be sufficient, the individual or group attempt to shift conditions towards a more favorable alternative (Brunson, 1996)

protected areas, while reaching explicit conservation objectives (Naidoo et al., 2006). While this approach is thought to find an acceptable balance between protection and use, and to promote support for conservation (Gaymer et al., 2014; Hansen et al., 2011; Mills et al., 2012), in many instances it can be counterproductive since it also minimizes the degree to which extractive activities are reduced and biodiversity loss is avoided.

Prior to implementing actions or policies, conservationists and managers should seek to undertake strategies that are likely to make the greatest possible difference to desired ecological or socioeconomic outcomes for a given cost (Ferraro & Pattanayak, 2006). Conservation impact is the extent to which a difference has been made, or could be made, by an action over and above the counterfactual condition of no action or a different action (Ferraro, 2009). If conservation is about saving parts of nature, then the impact of a management policy, strategy, or action (balanced with its cost) should therefore be the key metric used to determine its success.

Unfortunately, the widespread emphasis on minimizing opportunity costs in conservation planning, that is minimizing forgone extractive activities, has resulted in the paradoxical development of conservation goals that are often achieved with little actual impact for nature, a process termed “residual” conservation (Andam et al., 2008; Cockerell et al., 2020; Devillers et al., 2015;

Joppa & Pfaff, 2009; Stevenson et al., 2020) (Figure 1). This is highlighted by two widely used, yet potentially perverse goals in conservation planning: extent and representation (Pressey et al., 2017). Extent of protection, dominated, for example, by large offshore marine protected areas or remote, high-altitude terrestrial national parks, can conceal low impact if that protection is situated where detrimental effects would not have occurred in its absence, that is, those areas for which the counterfactual scenario of no protection would also result in minimal loss of biodiversity. Representation objectives typically set a notional amount of each biodiversity feature, such as an ecoregion, vegetation type, marine habitat, or species distribution, to be contained within protected areas (Cowling et al., 1999). Weighing representation objectives against costs has been the dominant paradigm in systematic conservation planning (Ward et al., 1999). But even when representation objectives are achieved, the often tenuous relationship between representation and impact means that this kind of formulation can miss the fundamental purpose of conservation (Pressey et al., 2017, 2021).

The pervasive political emphasis on minimizing opportunity costs to achieve policy targets for extent and representation of protected areas has consistently led to publicly funded conservation networks that achieve low impact because they are residual to the extractive uses

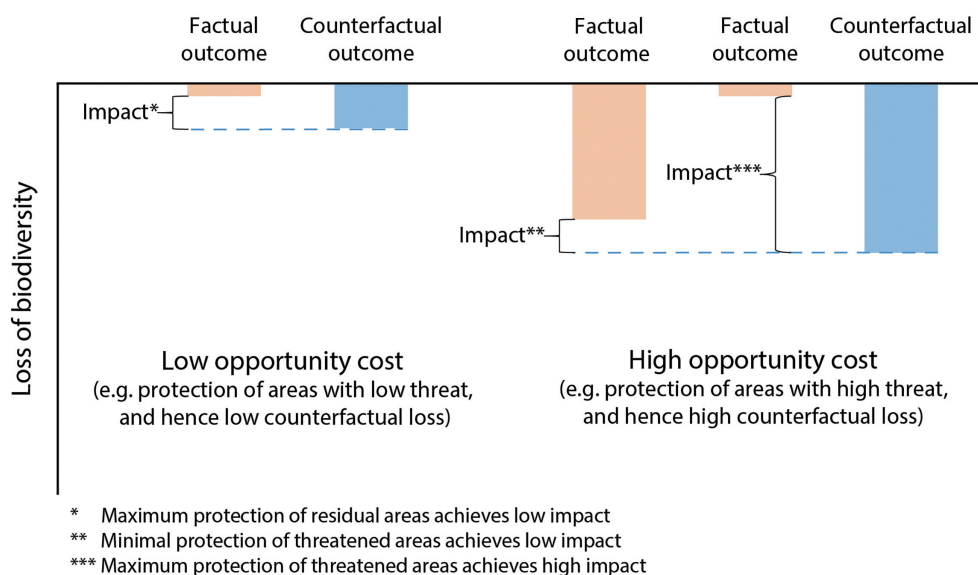


FIGURE 1 Opportunity costs and conservation impact. In situations where the opportunity costs of protection are low (left columns), factual loss of biodiversity can be low yet impact small because counterfactual loss of biodiversity is also low. In situations where the opportunity costs of protection are high (right columns), the counterfactual loss of biodiversity is correspondingly high and impact depends on the strategy taken for factual outcomes. If protection seeks to minimize opportunity costs, then the factual loss of biodiversity is relatively high and impact relatively low. If protection seeks to maximize opportunity costs, then the factual loss of biodiversity is relatively low and impact relatively high. Adapted from Pressey et al. (2015)

BOX 1 How extent and representation can fail to protect nature: case studies of marine protected areas

In 2018 Australia completed the design of its National Representative System of Marine Protected Areas, purportedly using representation of marine bioregions as a core goal for biodiversity conservation. One outcome, widely touted as a measure of world-leading success, was to place 3.1 million km² of the country's exclusive economic zone under some form of marine protected area (MPA). Unfortunately, there were three crucial weaknesses underlying the Australian government's announcements. First, the notion of representation was not supported by quantitative objectives for marine bioregions. This meant that the many bioregions with very small occurrences in MPAs could be counted as represented. Second, zonings within most of the MPA system allowed extractive uses damaging to marine biodiversity to continue, so actual protection was much smaller than reported. Third, highly protected zones not allowing extractive uses were placed almost entirely where no protection was needed. Cockerell et al. (2020) analyzed three iterations of this MPA system (2012, 2015, and 2018), each conferring progressively less conservation impact. Across all three iterations, reductions in threats to biodiversity were minimal. For most bioregions, high protection was lacking in the 2012 iteration, with 3.7% median representation, reduced to 3.2% in 2015, and 1.8% in 2018. High protection also had 3.5 times more coverage in water deeper than 500 m. Overlap between commercial fishing grounds and high protection was negligible, covering only 0.2%–0.4% of pelagic longlining areas. Likewise, only between 0.1% (2015 and 2018) and 0.3% (2012) of trawling grounds were protected by zones that prohibited trawling, with 98.5% of commercial trawling grounds left unprotected. Unprotected areas also had prior catch rates typically 9–100 times greater than highly protected MPAs, with forgone catch being 2.4% in 2012, 1.4% in 2015, and 1.1% in 2018. Management zones that limited petroleum extraction covered only 4.5% of high and medium-high prospectivity areas, and only 0.3% on the North West Shelf where most petroleum extraction occurs. Similar patterns of protection were demonstrated for the Great Barrier Reef Marine Park. The 2004 rezoning increased high protection from 4.6% to 33.3% of the Park, but still only reduced the extent of business-as-usual trawling by less than 5% and areas trawled more than once by 0.82% (Devillers et al., 2015). Such results are not limited to Australia. Globally the largest 10 MPAs, collectively making up 53% of the world's coverage, are almost all situated in remote areas with little or no fishing (Devillers et al., 2015; Watson et al., 2004). Global analysis of the likelihood of 15 human-induced pressures to influence the presence of marine protection demonstrated that pelagic and artisanal fishing, shipping, and invasive species all have negative relationships with protection, indicating that MPAs have been established systematically where there is low political, economic and social opposition, but also limiting their capacity to achieve conservation impact (Stevenson et al., 2020). Moreover, many MPAs globally also allow some resource extraction within their boundaries, further diluting their impact (Day, 2002; Pala, 2013). Clearly, developing management plans using extent and representation is a process that can reach stated targets with little or no mitigation of threats to nature. Therefore, we must ask ourselves: if these vast management networks fail to change any present-day actions, then what exactly are they meant to achieve?

that threaten nature (Andam et al., 2008; Cockerell et al., 2020; Devillers et al., 2015; Joppa & Pfaff, 2009; Stevenson et al., 2020) (Box 1). The only chance of achieving impact from an area that is managed residually is by its potential effects on future human actions if available resources within managed areas become more appealing. This is problematic in three ways: first, it lets business as usual continue with ongoing loss of biodiversity in areas needing protection; second, it passes the responsibility of changing behavior onto future generations that bear no responsibility for the current or future situations; and, third, there is always the possibility that future management practices could change, such as the degazettement of protected areas once future societies require the resources within (Mascia & Pailler, 2011).

Here, we consider why minimizing forgone resource extraction in conservation policy and planning, including systematic conservation planning, can be counterproductive to the conservation agenda. If the goal of conservation is to protect and sustainably manage nature, then opportunity costs, to the extent they represent forgone extractive activities, should not be minimized. Put another way, if managing human pressures on nature is achieved only through changes to human behavior (e.g., forgone fishing pressure or

deforestation) (Cinner, 2018), then maximizing these changes should generate the greatest conservation impact. The circumstances in which this is true will vary, depending on data on biodiversity, costs and pressures, and goals for conservation. Further, conservation, especially if it achieves high impact for nature, can have negative effects on other societal values, requiring decisions about balancing multiple priorities. We therefore begin with a decision framework that reduces the risks of data and objectives being used perversely to achieve low conservation impacts. We then explore the relationships between conservation and other societal values. Lastly, we finish with a call for developing a language of honesty and accountability in conservation that realigns our best efforts with the preservation of nature.

2 | STRENGTHENING THE CONNECTION BETWEEN CONSERVATION PLANNING AND CONSERVATION IMPACT

Integrating impact framing into systematic conservation planning and the development of conservation targets in general can be improved with some checks on data and

TABLE 2 Policy and planning pitfalls in conservation. Five key considerations related to opportunity costs that those involved with conservation policy and science should be able to answer in the interest of accountability. Green boxes indicate potentially positive outcomes for conservation impact. Red boxes indicate potentially negative outcomes

Key considerations related to opportunity costs of conservation actions	Yes	No
	1. Is there overlap between pressures and proposed protection?	The degree of change in extractive activities will likely determine impact
2. Are there quantitative management objectives?	Objectives can be achieved regardless of overlap with threat	There will be zero or minimal representation of features that overlap with threats
3. Are management objectives based solely on spatial extent?	Incentivizes conservation targets that can be achieved with minimal overlap between pressures and protection, resulting in correspondingly low impact	Impact can be maximized if the appropriate quantitative management objectives are used instead
4. Are features to be represented large or heterogeneous?	Incentivizes protection of parts of features least valuable for extractive activities	Facilitates protection of finer-resolution features regardless of opportunity costs
5. Is there a scheduling strategy for conservation actions, and is scheduling based on threat?	The most imminently threatened features will be protected first	Imminently threatened features will decline or disappear without protection

objectives when formulating policy and developing conservation plans (Table 2). An important initial question to address is whether there is overlap between proposed protection and pressures. If the overlap is slight, then extent or representation objectives are probably

inadequate and/or biodiversity features have been defined too broadly.

A second consideration is whether there are quantitative objectives for conservation features. If these are absent, then even very small occurrences of features can be counted as adequately protected, as demonstrated recently in Australia's marine jurisdiction (Cockerell et al., 2020). Alternatively, science-based objectives (e.g. Burgman et al., 2001; Pressey et al., 2003) can be formulated to reduce the risk of features subject to extractive pressures being poorly protected.

Third, if policy goals or conservation targets will be pursued for a specified extent of protection, how will these goals be achieved? Such goals are common, yet often counterproductive. The 2020 Aichi Target 11 for protected areas by the Convention on Biological Diversity, for example, called for 17% coverage of land and 10% coverage of the oceans. This target was adopted by many jurisdictions, arguably motivating a race to the bottom for conservation impact, with extensive declaration of protected areas in remote and unproductive areas (Pressey et al., 2021), thereby rendering planning for impact irrelevant.

Fourth, if policy goals or conservation targets will be pursued by protecting representative areas of various habitats, then are these features large or heterogeneous? Very extensive features, such as ecoregions or species ranges are generally highly heterogeneous with respect to biodiversity, pressures, and opportunity costs. That means that even large proportions of such features can be placed under protection while missing important biodiversity (Venter et al., 2014; Visconti et al., 2019) and even under-representing the species of direct interest (Rondinini et al., 2006), and promoting residual biases (Margules & Pressey, 2000). To avoid these problems, planning must focus on much more locally defined features such as species occurrences and fine-resolution maps of vegetation types.

Lastly, it is the common reality that protected-area systems are established incrementally over years or decades (Pressey et al., 2013), during which pressures expand and intensify, potentially compromising the achievement of conservation objectives. These situations require strategies, not just for spatial allocation of protection, but also for scheduling protection through time to minimize the extent to which objectives are compromised (e.g., Pressey et al., 2003).

Addressing these considerations would begin the process of directing policy and planning toward conservation impact. This transition would be further advanced by explicitly targeting conservation impact, in terms of avoided loss and/or promoted recovery, in policy and planning. Possible formulations of impact-directed policy

targets have been proposed (Pressey et al., 2015, 2021), as have broad-scale impact objectives for species (Akçakaya et al., 2018), ready to be translated into objectives for fine-resolution decisions. Impact targets would be informed by spatially explicit scenarios of future pressures, with and without expanded protection, intersected with spatial data on biodiversity features of interest. Such approaches have been applied recently (Brum et al., 2019; Fulton et al., 2015; Smallhorn-West et al., 2019; Visconti et al., 2015), indicating that there are no technical barriers to formulating goals for impact.

3 | THE RELATIONSHIP BETWEEN CONSERVATION IMPACT AND OTHER SOCIETAL VALUES

At first, the concept of maximizing opportunity costs might appear incendiary. Nature conservation is only one of society's values, among many, and where conflict can be avoided conservationists should not actively seek to provoke it. But if we accept that preserving nature through reduced resource extraction is the goal of conservation, then we must also accept that minimizing those changes will likely minimize impact (Figure 2a). At the extreme, by this definition, the greatest impact would be

achieved by the mass displacement of society, assuming a net reduction rather than a spatial shift in overall pressure. However, given the importance of trade-offs between the conservation of nature and other human values, a balance, often implicit, is inevitably struck between what society is willing to give up to nature and society's other core values. This has been and should be an acceptable and ongoing part of the conservation discourse, and a key component of sustainable management.

The diagonal line in Figure 2a implies that conservation impact and opportunity cost are equivalent, although this might not always be the case. For conservation acquisition, costs and pressure can be unrelated (Sacre et al., 2019) or correlated but with variation around the line of best fit (Newburn et al., 2006), providing potential bargains where cost is relatively low and impact is relatively high. The same might apply to opportunity costs in some situations (Figure 2b). For example, the most profitable extractive uses do not always exert the most pressure on biodiversity (Sacre et al., 2019), and forgone fishing in marine reserves can be mitigated by subsidies to fished waters through spillover of adults and larvae (Harrison et al., 2012).

Correlated conservation impact and opportunity costs imply that, as conservation impact increases through increasing overlap of protection with human pressures, the willingness of society to endorse conservation will

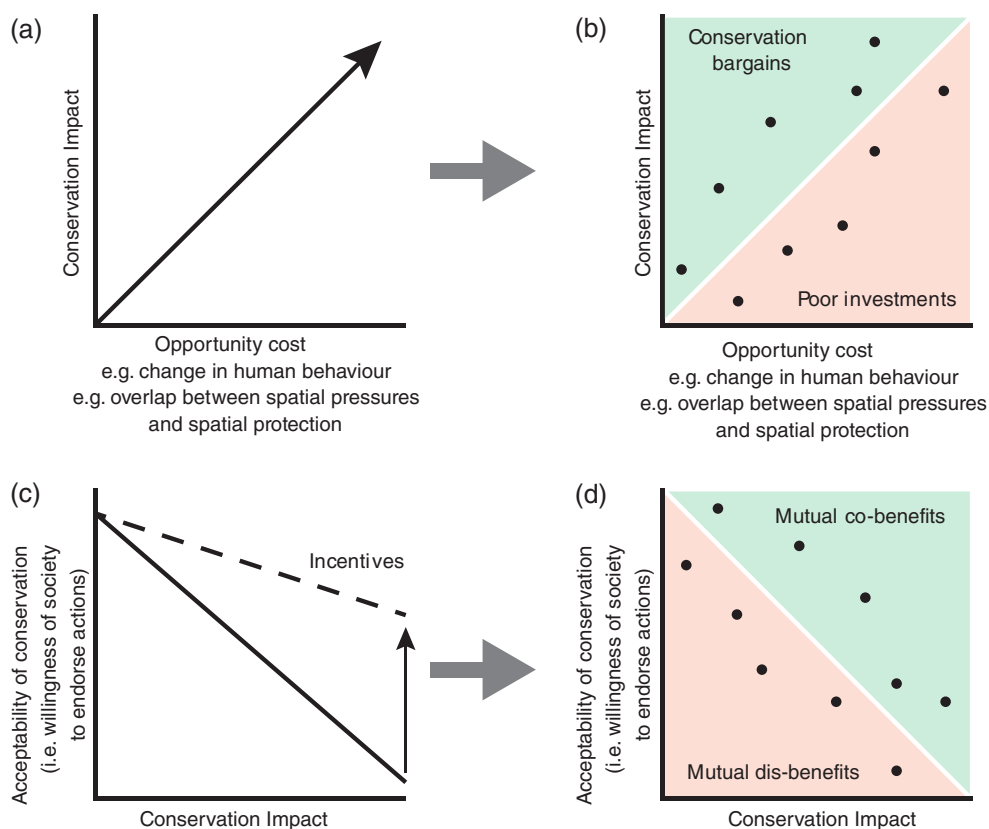


FIGURE 2 Conservation impact and other societal values. (a,b) Relationship between opportunity costs and conservation impact. In figure (a) protected areas that are managed residually have low opportunity cost, but correspondingly low conservation impact. (c,d) Potential relationship of conservation impact and society's willingness to endorse conservation actions. In figure (c) protected areas that are managed residually have greater societal acceptance due to low opportunity cost, but correspondingly low conservation impact

decrease (Figure 2c). For example, the political feasibility of implementing large offshore marine protected areas with minimal conflict with extractive interests and thus minimal impact is probably much higher than conserving areas of an equal size over important coastal fishing grounds (Pressey et al., 2015). However, like impact and opportunity cost (Figure 2a,b), there are reasons why acceptability and impact might not be equivalent, opening opportunities to achieve relatively high impact with relatively high acceptability (Figure 2d). The reasons for the variation in Figure 2b also apply here, as well as other considerations: culture (Jupiter, 2017), cognitive biases (Cinner, 2018), policy, political will and leadership (Pressey et al., 2017), and perceptions of justice (Lau et al., 2021). For example, costs are not spread evenly throughout society, with the powerful and influential often paying the least, while those with the least power paying the most (Adams et al., 2010). Systematic conservation planning often is also unable to account for who pays the costs, which can be estimated coarsely, or are assumed away, and rarely are the differential capacities of various actors to absorb costs considered in planning. Despite widespread societal acceptance, conservation actions can also be diverted by vested interests, lobbyists, or political grandstanding, as well as changes in economic circumstances (Pressey et al., 2017). These patterns of social acceptance are also influenced by perceptions of justice, and conservation can be undermined by failures to address injustices because people can care more about injustice than about the sustainable management of a resource (Lau et al., 2021). Ultimately, these factors can exert a negative influence on the relationship between conservation impact and societal acceptance by reducing the amount of change society is willing to accept for a given outcome.

If there are trade-offs between conservation impacts and other societal values, then: (i) what options are available to mitigate these trade-offs?, (ii) when are these trade-offs an acceptable course of action?, and (iii) in what instances can trade-offs be substituted for co-benefits?

Incentives are key tools for easing the trade-offs by increasing the acceptability of conservation impact (Figure 2c) and the resulting forgone opportunities for extraction (Redford & Adams, 2009). Common examples include direct payments to land and water stewards for ecosystem conservation and restoration, with corresponding changes to deforestation and water quality (Milder et al., 2010; Sone et al., 2019). Non-monetary incentives can also be provided, such as the legal recognition of fishing access rights in exchange for implementation of no-take MPAs or other marine management measures

(Smallhorn-West, Sheehan, et al., 2020). However, while strategies that incentivize conservation have obvious potential for improving tolerance of opportunity costs, they also come with risks. For example, they can lead to “crowding out”, whereby an actor’s intrinsic motivation to comply with a social norm such as valuing nature is weakened by extrinsic motivations in the form of externally imposed regulations or incentives (Cinner et al., 2020; Gurney et al., 2016). Focus on incentives around payments for ecosystem services can also create inequities, whereby as these services become increasingly scarce and valuable people will compete to gain control of them, with significant risks related to who holds the rights to these services (Redford & Adams, 2009). Mitigating the risks associated with incentives is critical for developing just conservation strategies, and includes processes such as the clear articulation of goods and services, communal governance, participatory and transparent decision processes, and incorporating equity principles into conservation design schemes (Hayes & Murtinho, 2018; Pascual et al., 2014; Zabel & Roe, 2009).

A parallel course of action is to acknowledge that trade-offs between conservation impacts and other societal values are inevitable and acceptable. Other priorities, such as the reduction of suffering and the improvement to wellbeing of people must also be considered as priorities. Indeed, emphasis on the importance of biodiversity conservation often comes from the privileged elite, with little understanding of the ramifications of conservation actions for those in less privileged or more vulnerable positions (Foale, 2001). In addition, in many societies and cultures, it is impossible to meaningfully separate concepts of conservation from “sustainable use”, since they might not share the same intrinsic values ascribed to species and ecosystems by a western, evolutionary-based worldview (Foale, 2001; Jupiter, 2017). The goal of maximizing conservation impact should therefore be approached with the intent of doing so while remaining situated within the context of other core values. Many characteristics associated with high conservation impacts are also those associated with the least effectiveness for poverty alleviation, suggesting that “win-win” efforts to protect ecosystems and alleviate poverty might be possible only when policymakers are satisfied with low levels of one of the outcomes (Ferraro & Hanauer, 2011).

Lastly, in many instances, there can also be substantial co-benefits between conservation and other societal values, which provides an alternative viewpoint in which maximizing the impacts of one could also improve the other. For example, there is a large and growing body of literature demonstrating that contact with nature can lead to direct measurable benefits for individuals. These

include psychological (e.g., well-being), cognitive (e.g., productivity), physiological (e.g., stress reduction), social (e.g., sense of place), and cultural (e.g., inspiration) benefits (Sandifer et al., 2015). On a broader scale, while there are concerns associated with payment for ecosystem services (e.g., Redford & Adams, 2009), the services themselves nevertheless underpin the persistence of our society by creating the resources we need and use every day (Goldman, 2010). High conservation impact will sometimes coincide with high value for ecosystem services such as carbon sequestration (Ferraro et al., 2015) and protection of water sources (Kjelgren et al., 2000). Positive socioeconomic impacts have also been demonstrated from the expansion of protected area networks with reductions in poverty (Ferraro et al., 2011; Holland et al., 2010). These positive impacts have also been demonstrated from conservation initiatives that support the efforts of those already engaged in the stewardship of nature through more bottom-up approaches, such as indigenous peoples and local communities who have been managing their lands and waters for centuries. For example, social impacts of locally managed marine areas can include better economic outcomes and more effective decisions about resource management (Gurney et al., 2014). In addition, endorsing local management can improve legitimacy, buy-in, and compliance, which can be lower, and with correspondingly smaller impact, in top-down management systems that make people feel that rules are not created equitably or insightfully (Cinner et al., 2012).

4 | CHANGING THE LANGUAGE OF CONSERVATION TO FOCUS ON IMPACT

We propose that the most benefit that could follow from this discourse is a change in the language of conservation to focus explicitly on the differences our actions make. This entails a shift in terminology and conceptualization so that the value we attribute to a conservation action is correlated to the extent to which it changes human actions. Put another way, the predominant framing should simply be to ask: “how much does/will this intervention change what people are doing”? This change in framing would extend the idea through society that conservation is about giving something up. This change in framing also precludes placing value on, unless with heavy caveats, language and framing that do not discuss, or only assume, changes in what people are doing (i.e., impact). We propose that impact terminology should be integrated into conservation targets, conservation

policy, conservation planning, and conservation monitoring and evaluation. While this shift might sound daunting, in most instances we do not suggest that the processes themselves need to change as much as the framing (see below for exception). For example, the expansion of large and remote protected areas has been driven primarily by framing conservation progress through extent instead of impact targets. Fully embracing these changes in terminology would likely result in redirecting actions to where they are needed most and enable much greater honesty, transparency and accountability in conservation. Below are four benefits that would be gained from using impact framing in conservation:

First, it would minimize reliance on inputs, outputs, and outcomes as poor proxies for impact. Inputs (e.g., cost, staff), outputs (e.g., number or extent of protected areas), and outcomes (e.g., occurrences within protected areas) are the most commonly used metrics in conservation policy, planning, monitoring, and evaluation. The attractiveness of these metrics is their ease of quantification. Their relationship to impact is implicitly assumed, yet, as discussed above, that assumption is often incorrect, which then promotes misleading actions. Focusing on impact side-steps the problem of poor proxies by directly assessing the targets we are truly interested in.

Second, it would hold policy makers, governments, and managers accountable for actions that achieve low impact. Regardless of intentions, it is clear that many of those responsible for implementing conservation actions are consistently doing so in ways that lead to low impact (e.g., Cockerell et al., 2020; Devillers et al., 2015; Joppa & Pfaff, 2009, 2011). Framing progress in terms of impact, opportunity costs and changes in human actions, and then incorporating this approach into the language of targets and planning, will make it increasingly difficult to propose benefits from conservation actions that might appear bold, yet do little.

Third, it would reduce the emphasis on very large protected areas situated in residual locations. Impact framing immediately makes the issues with residual management areas, such as very large MPAs (Craigie et al., 2014; Singleton & Roberts, 2014), much more apparent, and hence much more difficult to ignore, since until changes in human behavior have occurred no impact has been achieved.

Fourth, it would increase the visibility of actions over potentially smaller spatial extents but with disproportionately larger impact. Thus far we have focused on issues such as strong political support for residual protection in areas of low resource value, and hence low impact. Yet the inverse is also true, that small protected areas are typically deemed less useful than larger ones, despite

potentially far greater impact if implemented in areas of high resource value (Smallhorn-West et al., 2019). Furthermore, if the process of protecting smaller areas with higher value (i.e., higher displacement potential) is integrated with bottom-up participatory approaches, then those most affected by these actions are more likely to become engaged participants, resulting in more equitable protection and greater changes in actions than might be anticipated (Smallhorn-West, Karen Stone, et al., 2020).

Lastly, as outlined in section two above, we suggest that the main sector for which procedural changes are required is that of conservation planning, including systematic conservation planning (SCP). Systematic conservation planning typically aims to minimize cost layers while achieving targets for representation or extent, and using explicit impact targets to frame SCP would sidestep the limitations of representation and extent altogether. Minimizing costs can be acceptable, economically and politically, so long as cost does not correlate with impact (see Section 3). Thus the objectives of SCP should be to avoid loss, and then minimize costs where possible so long as this does not simultaneously minimize impact. Rather than seeking to achieve a target of acres protected or species covered, conservationists should seek to achieve a target of foregone acres, species, or ecosystem services lost. Setting targets based on avoided losses are entirely feasible, with examples provided in Pressey et al. (2021):

- “By 2030, the management of existing protected areas, including security from intrusions of unsustainable extractive activities, will avoid the loss of (x amount of biodiversity) within protected areas that would otherwise have occurred since their establishment and/or promote the recovery of (Y amount of biodiversity) within protected areas that would otherwise have not occurred.”
- “By 2030, the establishment and management of new protected areas will have avoided the loss of (X amount of biodiversity) that would otherwise have occurred outside the existing protected area system and/or promoted the recovery of (Y amount of biodiversity) that would otherwise not have occurred outside the existing protected area system.”

5 | CONCLUSION

Conservation is about making a difference, and to do so involves changing the way human societies in the Anthropocene affect our planet. However, to enable this change we need to be clear about the goals of conservation and sustainable use, while also acknowledging that human society has other priorities. Logic dictates that

maximizing the amount humans are willing to give up for nature is the clearest path towards maximizing impact. Therefore, returning to the title of this article: “*Why does conservation minimize opportunity costs?*”, we suggest that, in most cases, minimizing opportunity costs will also minimize conservation impact and should be avoided. By using this language we can avoid the now pervasive problem of residual management, since these actions can no longer claim to be making a difference. Organizations, governments, and other bodies promoting examples of easy conservation wins with minimal disruption of human actions should hence be viewed with immediate skepticism. Incorporating these concepts into the language of conservation will increase the honesty and accountability of our actions, and help to realign our best efforts with the preservation of nature.

AUTHOR CONTRIBUTIONS

Both authors contributed equally to the writing, research, and conceptualizing of the article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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