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Perspective

Conservation at the edges of the world

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ABSTRACT

Remote areas harbor some of the world's most undisturbed ecosystems. Major conservation gains can be made by effectively protecting nature in these remote zones. Conducting conservation work in remote settings presents both unique challenges and promising opportunities. We discuss how five commonly used approaches for conservation (buy and protect conservation; conservation motivated by the intrinsic values of nature; ecosystem service based conservation; ecotourism driven conservation; and conservation enabled by community planning) can be optimally applied to protect ecosystems in these special settings. In this discussion we draw examples from two model remote sites: Palmyra and Tabuaeran Atolls. Spatial analyses conducted using population density as a proxy for remoteness indicate that many existing recognized protected areas already include remote regions, but that the vast majority of the overall remote zones on the planet are not yet formally protected. Initiating discussions that directly consider both the roadblocks and opportunities for conservation in remote areas will help increase our odds of successfully protecting biodiversity in these unique and strategically important contexts.

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1. Introduction

Extremely remote locales host some of the most intact ecosystems and richest biodiversity on the planet. Examples include remote and uninhabited islands in the central Pacific, the interior forests of Borneo, certain inaccessible sections of Western Australia, and isolated tracts of Amazonian forest. All parts of the earth have been influenced by humans to some degree (Kareiva et al., 2007). This is particularly apparent in an age when climate change and its myriad insidious ecological effects (e.g. ocean acidification, hydrological regime change) have truly reached across the globe. Nevertheless, extremely remote sites stand out in our globally altered bioscape as places where ecosystems have been evolving for millennia with less disturbance from our species. As such, they are some of our most valuable scientific and cultural assets.

Threats to the integrity of extremely remote ecosystems have rapidly emerged in the past several decades as human populations expand, transportation networks enlarge, economies develop, and technology seeps to the edges of civilization (Kramer et al., 2009). Many strongholds of biodiversity that had long received some measure of de facto protection by virtue of their remote position now increasingly require the aid and intervention of conservation. Antarctica provides a fitting example. The continent of Antarctica, sometimes hailed as one of the most remote and pristine places on the planet (Halpern et al., 2008), is now under risk from exploitation from industrial fishers and whalers (Croxall and Nicol, 2004; Ainley, 2011). The Galapagos Islands, north-central Democratic Republic of Congo, and mountainous sections of Papua New Guinea are just a few of the many other iconic, once remote regions that presently face similar risks (Laporte et al., 2007; Durham, 2008; Shearman et al., 2009).

Recent estimates calculate that only about 10% of the world's land area can still be considered "remote" – when remote is defined as locations that are more than 48 h travel from large cities (>50,000 people) (Nelson, 2008). Similarly, Sanderson et al. (2002) estimated (now more than a decade ago) that the 'human footprint' extends to 83% of the world's land surface, and Halpern et al. (2008) reported >95% of the world's oceans are impacted by humans. As the extent of our influence advances and the frontiers of remoteness fall back, conservation must acknowledge that the strength of this traditional ally will be greatly weakened.

The suggestion that remote areas are deserving targets for conservation is not wholly new. The value of inaccessible "wild" areas has long been appreciated (Nash, 1967) and modern conservation scientists have used a variety of different strategies to identify and draw attention to the world's remaining less-impacted wilderness regions (Bryant et al., 1997; Sanderson et al., 2002; Mittermeier et al., 2003; Brooks et al., 2006). Despite this fascination with remote sites and these attempts to map out where they remain, little attention has been given to considering how the rules for conservation may differ in these isolated and inaccessible contexts. We believe, in fact, that practicing conservation in highly remote zones presents a suite of fundamentally unique challenges. Nevertheless, awareness of these obstacles and recognition that doing conservation in extremely remote contexts is often different than it is elsewhere can enable progress to be made in these strategically important regions.

Here we review some of the shared qualities of remote ecosystems and consider some of the difficulties and opportunities that may be encountered when applying commonly used conservation tactics in these special environments. The issues we consider are pertinent to conservation professionals working in remote zones situated in a wide variety of different geographic and cultural contexts. However, to focus and ground this discussion, we draw heavily from examples from two model remote sites in the central Pacific with which we have direct experience: Palmyra and Tabuaeran Atolls. Providing an in-depth treatment of these two illustrative case studies helps to more cogently exhibit some of the specific opportunities and challenges that face conservation practitioners working in remote zones.

2. What is remote?

Remote sites, regardless of their location, tend to share a number of common characteristics. By definition remote sites are isolated from large human settlements, are uninhabited or sparsely populated, and are difficult to access. Barriers to access are generally geographic, but can also be political or climatic. Remoteness does not necessarily correlate with biological richness. Extremely high latitude, high altitude, or otherwise physically harsh remote areas are less likely to harbor large quantities of biodiversity, although they may still contain a high proportion of endemic and evolutionarily unique species. The dynamic between biodiversity and humans in remote places varies considerably. In some remote areas local communities have caused rapid ecological change, while in others – particularly those with long histories of evolutionary association with humans – biodiversity has been shown to benefit from human activity (Smith and Wishnie, 2000; Bliege Bird et al., 2008). A disproportionately large number of the world's remote areas occur in developing nations (Nelson, 2008).

3. Portrait of the remote: Palmyra and Tabuaeran Atolls

The two model remote sites that we will use to illustrate our points in this discussion are Palmyra (5°52′N, 162°04′W; USA)

Fig. 1. Palmyra Atoll is one of the most remote sites in the United States and serves as an excellent example of how less-disturbed reef ecosystems function. Palmyra was directly purchased to conserve the biodiversity that it harbors. Courtesy of Kydd Pollock.