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Assessing the benefits of Transboundary Protected Areas: A questionnaire survey in the Americas and the Caribbean

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ABSTRACT

There are more than 3000 protected areas (PAs) situated on or near international boundaries, and amongst them there is an increasing trend towards the establishment of transboundary cooperation initiatives. Proponents of Transboundary PAs (TBPAs) highlight the potential for biodiversity protection through spatial, management and socio-economic benefits. However, there have been few formal studies that assess these benefits. It is possible that the relaxation of boundary controls to optimise transboundary connectivity may increase the risk of impacts from invasive species or illegal human incursion. We sought to investigate the validity of these proposed benefits and potential risks through a questionnaire survey of 113 PAs, of which 39 responded and met our inclusion criteria. 82% felt that transboundary cooperation has benefits for biodiversity and, across PAs, the self-reported level of transboundary communication was positively associated with some improved spatial, management and socio-economic benefits. However, 26% of PAs reported that they never communicated with their internationally adjoining protected area, indicating unrealised potential for greater gains.

1. Introduction

A Protected Area (PA) is a defined space designed to "achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley et al., 2008). In part this is delivered by protection from various threats (Struhsaker et al., 2005; Andam et al., 2008; Maiorano et al., 2008; Gaston et al., 2008; Craigie et al., 2010). A Protected Area that Adjoins an International Boundary (PAAIB) is a subset of the PA concept. In 2007, the United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC) identified 3043 protected areas that sit on or close to international boundaries (Lysenko et al., 2007). PAAIBs are therefore a substantial part of the global PA network. However, in an age of increasing globalization, international boundaries and frontier zones are becoming more highly populated areas of cultural and commercial transition, regulation and development (Van Schoik et al., 2007). This increase in population, development and trade can result in negative impacts on biodiversity from either side of the international boundary, both inside and outside PAAIBs. The effects of these impacts may be hard to control because the source may originate in another country with different socio-economic pressures, environmental laws and enforcement capabilities. Illegal transboundary activity may also have security or political implications. As a result, selecting optimal management strategies for PAAIBs is an important, yet difficult, task.

Transboundary Protected Area (TBPA) initiatives are one possible approach for managing these threats. TBPA initiatives seek to cooperatively protect and maintain ecosystems and/or species that are ecologically connected across international boundaries. Two or more contiguous PAAIBs may decide to identify and map a shared ecosystem (Sandwith et al., 2001) and then adopt and adhere to a cooperative management strategy. Equally there may be more informal, local arrangements between PAAIB staff, communities and/or non-governmental organisations (NGOs). In each case, TBPA proponents highlight the potential for spatial, management, socio-economic and political benefits through transboundary cooperation. Below, we analyse each of these elements in turn and explore their validity as well as possible obstacles to their realisation.

Availability of habitat is a critical factor in the persistence of species (Morrison et al., 1992) and in Struhsaker et al. 's (2005)

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study of PA efficacy, conservation goals were shown to be best met by large PAs. Because they combine two or more PAAIBs, TBPAs should provide more contiguous, varied and core habitat, resulting in increased dispersal opportunities and access to suitable resources. These should in turn support increased species richness and resilience (Diamond, 1975; Kitchener et al., 1980; Edenius and Sjoberg, 1997; Claudet et al., 2008; Prugh et al., 2008). This viewpoint is supported in the literature with references to TBPA in relation to increased habitat for species as varied as the Andean condor (*Vultur gryphus*) (Lambertucci et al., 2014), wolf (*Canis lupus*) (Falucci et al., 2013) and Marco Polo sheep (*Ovis ammon polii*) (Schaller and Kang, 2008). It has also been cited as valuable in the marine realm (Mackelworth, 2012). Increased overall area can also restrict access for invasive species (and unwanted human activity) within core habitat, because of the increased distances between edge and core.

However, by relaxing boundary infrastructure to optimise these spatial advantages, TBPAs may increase the risk of negative effects. Habitat change (DeFries et al., 2005), invasive species (Pauchard and Alaback, 2004), pollution (Collins, 2010) and extraction (Gavin et al., 2010), all pose a major threat to biodiversity inside PAs (Craigie et al., 2010) and may be more widely felt in TBPAs due to their geographical characteristics and any relaxation of international boundary controls. Furthermore, many of the proposed spatial advantages of TBPAs are derived from broader theories of ecology or from politico-economic studies (e.g. Wolmer, 2003; Duffy, 2007; Ramutsindela, 2007) because it is difficult to measure these effects in the same place at the same time (Busch, 2008).

TBPAs can also present opportunities for cooperative ecosystem management, creating a better safeguard for biodiversity (Talukdar and Sinha, 2013; Schaller and Kang, 2008; Plumptre et al., 2007; Sandwith et al., 2001). This cooperative management might include better overall habitat and species maintenance, improved science over wider spatial scales and shared crisis management, brought about by joint early warning, threat analysis and containment. For example, treatment of all infected individuals within an ecosystem (rather than those on just one side of a boundary) could improve the chances of controlling an outbreak of disease. And transboundary law enforcement can be effective in curtailing and deterring illegal activity (Talukdar and Sinha, 2013) and eliminating cross-boundary sanctuaries. These cooperative management activities may also enable participants to benefit from shared human and material resources, providing economies of scale and reducing expenditure. Assuming that these efficiency savings are directed carefully, they may in turn improve biodiversity conservation. However, TBPA communication and management requirements may place additional pressure upon PAAIB managers and they may find that the potential advantages are overshadowed by the requirements of maintaining the TBPA relationship (Pedynowski, 2003). Furthermore the theoretical value of such cooperation may be impossible to put into effect due to geographical, cultural or political impediments.

Socio-economic and political activity fostered by transboundary cooperation may reduce some drivers of illegal activity, in turn reducing likely impacts such as resource-exploitation, poaching and smuggling within a TBPA (Groff and Axelrod, 2013). Transboundary tourist activity can enable sustainable use of the shared natural asset leading to increased revenues (Scovronick and Turpie, 2009; Plumptre et al., 2007), which may or may not be directly reinvested in biodiversity conservation, but should at least ensure maintenance of the asset. It is also assumed that local cooperation can lead to wide-scale national political cooperation between nations, reducing the risk of conflict and the plethora of challenges that this throws up for biodiversity conservation. Such initiatives do require management, law enforcement and the education of nearby human populations in order to ensure sustainable interaction (Altrichter et al., 2006; Jacobsen, 2010). However, the potential socio-economic benefits of TBPAs may not be fully apparent to governments. As a result TBPAs may not have the human or material resources (Mackelworth, 2012) to deliver the necessary safeguards (Colwell et al., 1997), even with the shared resources of a TBPA partner. Furthermore, the ability of PAs to alleviate poverty is unproven (Naughton-Treves et al., 2005; Struhsaker et al., 2005) and may be difficult to realize in conjunction with conservation (McShane et al., 2011). This may be even more challenging in a TBPA context.

The trade-offs and possible contradictions raised above have not been scientifically tested sufficiently to provide decision makers with the robust evidence required to make the large financial, political and ecological decisions required to initiate, or sustain, a TBPA initiative. The main problem is that direct experimental comparisons are very hard to make; a TBPA site cannot exist at the same time in the same place as a non-TBPA site (Busch, 2008).

In the absence of clear evidence, relevant management decisions are often shaped by socio-economic, political and security agendas and by subjectivity (Colwell et al., 1997). There is therefore some urgency to address these issues, because of the increase in biodiversity loss (IUCN, 2013) and the ongoing development of transboundary conservation projects.

2. Aims

The general aim of this research is to help identify conservation approaches that are likely to be successful. In particular we aimed to test spatial, management, socio-economic and political benefits and risks and identify the trade-offs implicit in TBPA schemes. Furthermore we wanted to understand how these variables might be influenced by transboundary communication levels.

Our results should help PAAIB managers and policy makers present an informed case when considering TBPA schemes and should help them to direct their resources effectively to optimise planning, funding, coordination and management of such sites for the benefit of biodiversity protection.

3. Methods

Given the difficulties of directly quantifying the effects of TBPAs on biodiversity through field studies, a TBPA questionnaire survey was selected as the best means of collecting data. Questionnaires directed at experienced personnel on the ground can be effective in measuring PA and conservation trends, threats and levels of success (e.g. Hockings, 2003; Ervin, 2003; Goodman, 2003). System-wide assessments, based on qualitative scoring or broad-scale quantitative data can help to identify common patterns (Ervin, 2003). While it is recognised that respondents in surveys of this type may be self-selecting, Hockings (2003) suggests that, "… the subjective responses of PA managers are likely to be based on years of field-level experience, and these responses may better capture the realities and complexities of the PA than many monitoring programs" (Hockings, 2003).

Members of the Transboundary Conservation Specialist Group (TBC-SG) of IUCN World Commission on Protected Areas (WCPA) provided contact details for 113 PAAIBs in the Americas and the Caribbean. At the time of this research, contact details were not available for all PAAIB globally and therefore we focused, as an initial study, on the Americas and Caribbean, where we had a full dataset. The PA manager in each PAAIB was sent an invitation to respond to an online survey. It was understood that not all of the PAs would respond, even if they did receive the invitation. However, some research suggests that any response level above 25% is