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A global assessment of the social and conservation outcomes of protected areas

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Abstract: Protected areas (PAs) are a key strategy for protecting biological resources, but they vary considerably in their effectiveness and are frequently reported as having negative impacts on local people. This has contributed to a divisive and unresolved debate concerning the compatibility of environmental and socioeconomic development goals. Elucidating the relationship between positive and negative social impacts and conservation outcomes of PAs is key for the development of more effective and socially just conservation. We conducted a global meta-analysis on 165 PAs using data from 171 published studies. We assessed how PAs affect the well-being of local people, the factors associated with these impacts, and crucially the relationship between PAs' conservation and socioeconomic outcomes. Protected areas associated with positive socioeconomic outcomes were more likely to report positive conservation outcomes. Positive conservation and socioeconomic outcomes were more likely to occur when PAs adopted comanagement regimes, empowered local people, reduced economic inequalities, and maintained cultural and livelihood benefits. Whereas the strictest regimes of PA management attempted to exclude anthropogenic influences to achieve biological conservation objectives, PAs that explicitly integrated local people as stakeholders tended to be more effective at achieving joint biological conservation and socioeconomic development outcomes. Strict protection may be needed in some circumstances, yet our results demonstrate that conservation and development objectives can be synergistic and highlight management strategies that increase the probability of maximizing both conservation performance and development outcomes of PAs.

Keywords: biodiversity, management, new conservation, socioeconomic development, trade-offs

Una Evaluación Global de los Resultados Sociales y de Conservación de las Áreas Protegidas

Resumen: Las áreas protegidas (APs) son una estrategia clave para la protección de los recursos biológicos, pero estas varían considerablemente en su efectividad y son reportadas frecuentemente por tener impactos negativos sobre los habitantes locales. Esto ha contribuido a un debate divisivo y sin resolución con respecto a la compatibilidad de los objetivos de desarrollo socioeconómico y ecológico. Esclarecer la relación entre los impactos sociales positivos y negativos y los resultados de conservación de las APs es esencial para el desarrollo de una conservación más efectiva y más justa socialmente. Realizamos un meta-análisis de 165 APs usando datos de 171 estudios publicados. Evaluamos cómo las APs afectan al bienestar de los habitantes locales, los factores asociados con estos impactos y significativamente, la relación entre los resultados socioeconómicos y de conservación de las APs. Las APs asociadas con resultados socioeconómicos positivos tuvieron una mayor probabilidad de reportar resultados positivos de conservación. Los resultados positivos, tanto socioeconómicos como de conservación, tuvieron una mayor probabilidad de ocurrir cuando las APs adoptaron regímenes de co-manejo, les otorgaron poder a los habitantes locales, redujeron la inequidad económica y mantuvieron los

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Content

beneficios culturales y de sustento. Mientras los regímenes más estrictos de manejo de APs intentaron excluir las influencias antropogénicas para alcanzar los objetivos de conservación biológica, las APs que integraron explícitamente a los habitantes locales como actores tuvieron la tendencia de ser más efectivos en la obtención de resultados conjuntos de desarrollo socioeconómico y de conservación. La protección estricta puede ser necesaria en algunas circunstancias, pero nuestros resultados demuestran que los objetivos de desarrollo y de conservación pueden ser sinérgicos. También resaltan las estrategias de manejo que incrementan la probabilidad de maximizar tanto al desempeño de la conservación como a los resultados de desarrollo de las APs.

keywords

Palabras Clave: biodiversidad, compensaciones, desarrollo, manejo, nueva conservación

heading

Introduction

Content

An alarming erosion of taxonomic and functional biodiversity is occurring in half of tropical protected areas (PAs) (Laurance et al. 2012). The magnitude of this decline is directly linked to human mediated habitat disruption, including land-use change, hunting, and exploitation of other forest-related resources. These human-induced pressures on PAs and conflict between biodiversity conservation and the needs of local people are predicted to increase due to numerous factors, including market forces and a reduction in distance between PAs and human population centers (Joppa et al. 2008; McDonald et al. 2008). Conflicts between local people and conservation initiatives have generated one of the greatest and longest running debates in conservation science (Roe 2008). At one end of the spectrum is the fences-and-fines approach, which contends that to deliver successful conservation outcomes people must be excluded, even forcibly, from PAs (Brockington & Igoe 2006). Opponents of this approach consider such exclusionist protection arrangements ethically troubling because they frequently result in PAs having disadvantageous social outcomes for local people that ultimately result in ineffective long-term conservation outcomes (Adams et al. 2004). An increasingly advocated strategy is that to deliver effective and long-term environmental protection PAs must accommodate the needs of local people so as to secure sustainable livelihoods and enhance their well-being (Roe 2008). The debate between adherents to these two approaches and the importance of considering human well-being in conservation remains lively, intense, and unresolved (Soulé 2013; Marvier 2014).

A key factor limiting the resolution of this debate is the insufficient evidence base, which is currently limited to individual case studies, with few studies specifically testing causal pathways (e.g., Andam et al. 2010) and lack of a global analysis (Geldmann et al. 2013). Available case studies do, however, usefully highlight several key issues (Table 1). First, social impacts of PAs take different forms, including economic, livelihood, and cultural impacts, and can result directly from PA policies, such as hunting regulations, or indirectly through

Content

wider social and economic changes, for example the effects of increased tourism (Holmes & Brockington 2012). Second, how local people experience and respond to the social impacts of PAs is influenced by socio-political contexts at both local and regional scales (Brockington & Igoe 2006; Nelson & Agrawal 2008). Third, impacts of PAs are unevenly distributed. They are felt most intensely at local rather than national scales and within communities along lines of class, gender, ethnicity, and caste; benefits tend to accrue to the wealthiest and most powerful and costs fall on the weakest and poorest (Holmes 2007).

The lack of a global study on the impact of key recurring factors affecting PA socioeconomic and conservation outcomes has resulted in three specific knowledge gaps (Adams & Hutton 2007; Mascia & Claus 2009): how the socioeconomic and biodiversity conservation outcomes of PAs are linked to specific social impacts; how social impacts are influenced by the management and other characteristics of PAs; and how social impacts relate to socioeconomic and biodiversity conservation outcomes, given the insufficient performance of many PAs. Addressing these questions is critical for the design of efficient and effective conservation and development interventions that meet both biodiversity conservation targets and socioeconomic needs.

We conducted a global review and analysis of the scientific literature that addresses these knowledge gaps regarding the principal drivers of the social impacts of PAs and their consequences for biodiversity conservation. We used data from 160 terrestrial and marine PAs distributed across six continents and that were representative of all International Union for Conservation of Nature (IUCN) PA management and governance categories (Supporting Information). We quantified and determined how PAs' geographical, physical, and management characteristics were associated with their social impacts (Table 1). We then evaluated how these geographical, physical, and management characteristics were associated with overall PA socioeconomic and biodiversity conservation outcomes and assessed whether these two contrasting types of outcomes trade off against each other or are positively associated.

Authors

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Conservation Biology
Volume 30, No. 1, 2016

Content

Table 1. Protected area (PA) properties and impacts.*

PA property	Definition	Justification for inclusion in analysis
Protection arrangement	PA protection categories included in the WDPA IUCN categories (I-IV, strictly protected; V-VI & biosphere reserves, sustainable use)	Strict protection can increase costs for local people (West et al. 2006).
Governance	entity responsible for PA management (state, community, co-managed)	Community and co-managed areas may benefit communities and lead to better conservation outcomes (Berkes 2004). Regional differences in political contexts and histories may lead to variations in impacts (Nelson & Agrawal 2008). Large PAs may have greater impacts on people (Brockington & Igoe 2006) than small PAs. Marine resource governance differs from terrestrial resource governance (Schlager & Ostrom 1992).
Geographical region	Africa, Europe, Oceania, North America, Central America, South America, Central Asia, Southeast Asia, Southern Asia	
Size	PA size (km ²) included in the WDPA	
Biome	terrestrial or marine	
Social impacts		
Displacement	voluntary or involuntary displacement, including moves in response to livelihood changes	Displacement is an often cited impact but its frequency is uncertain (Brockington & Igoe 2006). PAs may increase or decrease income within neighboring populations (Andam et al. 2010).
Monetary	increases or decreases in monetary wealth of any section of local communities resulting from the existence of a PA	
Livelihood	positive or negative livelihood impacts outside the monetary economy (e.g., subsistence farming, hunting, and gathering of natural resources)	PAs may restrict non-monetary livelihood activities (West & Brockington 2006).
Cultural	impacts on cultural identity or community cohesion, access to culturally important sites and resources, and aesthetic appreciation of surroundings	PAs may increase or restrict access to spiritually important sites (Dudley et al. 2009).
Compensation	acts by PA authorities designed to offset negative impacts of PAs	Compensation can lessen negative impacts or lead to positive conservation outcomes (Beazley 2009). The creation of PAs may lead to direct conflicts between PA authorities and local communities (Holmes 2013). Empowerment may improve socioeconomic and conservation outcomes (Karanth 2007).
Conflict	heavy handedness, corruption, or extortion from PA staff toward local people and local resistance to these impacts	
Empowerment	increased control over lives and livelihoods, including control over natural resource management, or increased land-tenure security	
Unequal distribution of impact	PA impacts differ among sections of neighboring communities	Impacts of protected areas are not felt equally among local people (Holmes 2007).

Abbreviations: PA, protected area; WDPA, World Database on Protected Areas; IUCN, International Union for Conservation of Nature.

heading
Methods

Headline
Case Study Selection

We created a database of peer-reviewed articles on the social impacts of PAs by conducting systematic searches in ISI Web of Knowledge using the following Boolean search terms: topic = ("protected area" OR "reserve" OR "national park") AND topic = ("social impact" OR "cost" OR "benefit" OR "eviction" OR "displacement" OR "livelihood" OR "compensation" OR "culture" OR "gender" OR "class" OR "caste" OR "indigenous" OR "income" OR "community") AND topic = ("Conservation") NOT topic = ("Species"). To minimize bias in our searches, we chose keywords that were either neutral (14 of 19 keywords) or identified general or specific known negative impacts (3 keywords, i.e., *displacement*, *eviction*, and *cost*) and keywords related to measures of restitution or general positive impacts (2 keywords, i.e., *compensation* and *benefit*). We refined our search further by focusing on

Content

the following research areas: environmental sciences and ecology, biodiversity conservation, forestry, sociology, anthropology, government law, ethnic studies, and social issues. Following Waylen et al. (2010), we also entered the search terms in Google Scholar and reviewed the first 500 results. We purposefully excluded the substantial body of non-peer-reviewed studies on social impacts of PAs because of potential biases and lack of detailed statistical analysis within much of this material (Holmes & Brockington 2012). Peer-reviewed studies were only selected if we could clearly identify impacts on local communities resulting from a protected area.

Our initial search yielded 1635 studies. Inclusion in our final selection required studies to meet precise criteria (Supporting Information). To be included, studies had to have assessed the impacts of a specific, named PA. The impacts could have resulted directly from PA policies, such as hunting regulations, or indirectly, such as through increased tourism to the PA. Impacts also had to be directly linked by the authors to the presence of a PA and its