



## Research article

# Changing perceptions of protected area benefits and problems around Kibale National Park, Uganda



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## ABSTRACT

Local residents' changing perceptions of benefits and problems from living next to a protected area in western Uganda are assessed by comparing household survey data from 2006, 2009, and 2012. Findings are contextualized and supported by long-term data sources for tourism, protected area-based employment, tourism revenue sharing, resource access agreements, and problem animal abundance. We found decreasing perceived benefit and increasing perceived problems associated with the protected area over time, with both trends dominated by increased human-wildlife conflict due to recovering elephant numbers. Proportions of households claiming benefit from specific conservation strategies were increasing, but not enough to offset crop raiding. Ecosystem services mitigated perceptions of problems. As human and animal populations rise, wildlife authorities in Sub-Saharan Africa will be challenged to balance perceptions and adapt policies to ensure the continued existence of protected areas. Understanding the dynamic nature of local people's perceptions provides a tool to adapt protected area management plans, prioritize conservation resources, and engage local communities to support protected areas.

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## 1. Introduction

Conservation policies in East Africa, particularly those for national parks, have favoured the protectionist approach. This approach is viewed by many conservationists as the most effective means of biodiversity conservation (Chapman et al., 2016; Gray et al., 2016). However over the past four decades, the conservation narrative has evolved to recognize that poverty in communities near protected areas (PAs) may constrain conservation

(Adams et al., 2004), and that communities near PAs disproportionately accrue the costs of conservation (MacKenzie, 2012a; Brockington and Wilkie, 2015). As a result, conservation policies have evolved, calling for benefits to incentivize local residents to support conservation while alleviating poverty (Brockington and Wilkie, 2015), partnering with stakeholders (Liberati et al., 2016), and providing payments for ecosystem services (Suich et al., 2015). Although PAs can exist without support from local communities (Holmes, 2013), compliance with PA regulations, conservation attitudes, and support for PA existence are enhanced if needs of local communities are met, if local communities benefit from conservation and tourism, if community members participate in PA decision-making, and if conservation strategies are adapted based upon perceptions of local people (Tessema et al., 2010; Allendorf et al., 2012; Andrade and Rhodes, 2012; Mutanga et al., 2015). Adopting this adaptive community-conservation strategy requires an on-going commitment to local engagement to understand the

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changing dynamics of local perceptions about the PA (Allendorf et al., 2012). In this paper we examine shifting local perceptions of benefits and problems associated with living next to a Ugandan national park from 2006 to 2012, and the associated implications for PA management.

Despite burgeoning efforts by conservation managers to manage landscapes for both biodiversity and human wellbeing, people perceive widespread negative effects of living near PAs (Sarker and Røskaft, 2011; Namukonde and Kachali, 2015). The creation of PAs can force the displacement of people, resulting in hardship and loss (Brockington and Igoe, 2006; Salerno et al., 2014), and restrictions on resource access can limit livelihood activities (West et al., 2006). Wildlife roam outside PA boundaries, damaging and eating crops, attacking livestock, and even maiming or killing local residents (Dickman et al., 2011; Sarker and Røskaft, 2011; Namukonde and Kachali, 2015). There can also be benefits to living next to a PA that may help offset the costs incurred, such as ecosystem services (Namukonde and Kachali, 2015; Suich et al., 2015) and tourism. Tourism is becoming a promising revenue source for many developing countries and may provide employment and marketing opportunities for communities near tourist destinations (Ferraro and Hanauer, 2014; Naidoo et al., 2016). Other PA benefits include payments for ecosystem services (Suich et al., 2015), sharing hunting and tourism revenues (Naidoo et al., 2016), negotiated access to PA resources (Sarker and Røskaft, 2011), employment as research assistants and planting trees for carbon sequestration (Dempsey and Suarez, 2016), and non-governmental organizational aid for schools, medical clinics and income generation projects (Chapman et al., 2015; MacKenzie et al., 2015).

The extent and magnitude of problems and benefits that PAs confer upon local communities vary (Brockington and Wilkie, 2015), with local geography and PA proximity contributing to varying perceptions of costs and benefits (MacKenzie, 2012a). Close proximity to park boundaries increases the likelihood of crop raiding and livestock predation (Salerno et al., 2016), yet closer proximity may afford greater access to employment or PA-associated services, and access to PA resources, officially sanctioned or not (MacKenzie et al., 2011; Baird, 2014). While conservation strategies typically account for changing forest ecology, wildlife populations, and biophysical conditions, far less consideration is given to changing perceptions of PA neighbors (Berkes, 2004; Allendorf et al., 2012).

The Ugandan Government has made remarkable steps to conserve biodiversity in a country where human population density is increasing at one of the fastest rates in the world (Hartter et al., 2015). Conservation policy in Uganda has evolved from pure protectionism to a PA-neighbor strategy. While the shift in strategy includes efforts to provide benefits to neighboring households, the increasing population densities, declining resource availability, and recovering wildlife populations of some species may serve to exacerbate existing tensions and outweigh benefits. It remains unclear how perceptions and experiences parallel shifts in conservation policy. To address this uncertainty, we combine three data sources to quantify changes in perceptions over time. Although not initially designed for temporal comparison, we compare data from three household surveys collected in 2006, 2009, and 2012 and triangulate that comparison with long-term data to understand the changing perceptions of local people about the benefits accrued and problems encountered as a result of living next to Kibale National Park (hereafter Kibale). We ask: (1) how are household perceptions of PA-based benefits and problems distributed over space, time, and household wealth categories? and (2) what factors are influencing the changing perceptions of benefits and problems? We discuss the implications of our findings for conservation management and how adaptive management at the

people-PA interface must be incorporated into conservation planning.

## 2. Methods

### 2.1. Study site

Kibale (795 km<sup>2</sup>) is located in western Uganda (Fig. 1), and contains the highest primate density of all PAs in East Africa (UWA, 2015), and one of the highest in the world (Chapman et al., 2010a). It provides critical habitat to eastern chimpanzees (*Pan troglodytes schweinfurthii*), 12 additional primate species, elephants (*Loxodonta africana*), and a diversity of other species (Chapman and Lambert, 2000). The authority to manage PAs in Uganda belongs to Uganda Wildlife Authority (UWA) as prescribed by the Uganda Wildlife Statute (1996). The Kibale management plan incorporates four conservation strategies (UWA, 2015). The **first** is resource conservation and management, enforcing boundaries, policing against illegal resource extraction, and restoring degraded areas within the PA. The **second** strategy focuses on research and ecological monitoring. Community conservation is the **third** strategy and includes a revenue sharing program where 20% of gate revenues are shared with local governments for community projects (MacKenzie, 2012b), negotiated resource access to non-threatened resources inside designated areas of the PA by community associations (MacKenzie et al., 2011), efforts to mitigate human-wildlife conflict, and community conservation awareness and education programs. **Fourth**, UWA supports development of tourism. Ranking fifth of ten in the most visited national parks in Uganda, visitor numbers to Kibale have grown, from 2125 in 1997 to 10,834 in 2013 (MTWA, 2014). The primary attraction is the opportunity to view habituated chimpanzees. Tourism accommodation is clustered in three tourism areas near Kibale: the urban center of Fort Portal, the Crater Lakes region on the western side of Kibale, and near the town of Bigodi close to the chimpanzee ecotourism site (Fig. 1).

Human population density has been increasing around Kibale due to immigration and natural increase (Fig. 1b, c & d; Hartter et al., 2015). Population density, estimated by averaging Worldpop United Nations adjusted data (Linard et al., 2012) in pixels located outside the PA but within 5 km of Kibale's boundary, increased from 160 people/km<sup>2</sup> in 2002 to 308 people/km<sup>2</sup> in 2015; almost doubling in 13 years. Most local people are smallholder farmers, with some earning income from cash crops and off-farm work on tea plantations, as research assistants, in the tourism industry, excavating elephant trenches for crop raiding protection, and planting trees for carbon sequestration (Hartter, 2010; MacKenzie, 2012a), as well as from trades and casual labour. Although the boundaries of Kibale remain intact, much of the surrounding forest cover has been reduced to fragments and small groves (Hartter and Southworth, 2009). As wood becomes scarce, households are planting trees, stopping neighbors from accessing trees on their property, and entering Kibale to harvest firewood and building poles (Hartter et al., 2011; MacKenzie et al., 2011). Some areas of Kibale were designated as timber concessions until the mid-1970s, but all commercial logging has now stopped, with the exception of limited paid agreements to extract exotic trees (MacKenzie et al., 2011). However, illegal wildlife poaching and tree harvesting continue.

### 2.2. Survey data collection

In 2006, the first of the three surveys collected data from 130 households in two areas bordering Kibale: a north-western sector and an eastern sector (Fig. 1b). This survey focused on the impact of Kibale on its neighbors, by examining the changes in wetlands and

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