



Forest edges in western Uganda: From refuge for the poor to zone of investment[☆]



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ABSTRACT

Western Uganda is home to growing populations of smallholder agriculturalists, expanding commodity plantations, and protected forests. In this setting, we document a shift in who uses forest edge land and how it is used. In developing countries, protected forest edges are traditionally sites where marginalized people can subsist, but increasing land competition has the potential to change this scenario. We used longitudinal field data spanning two decades to characterize the evolution of landownership and land use neighboring Kibale National Park. The number of households has more than doubled since 1993. Land values are rising, and people buying land near the park in recent years are significantly wealthier and have more off-farm income than those who acquired land there in earlier periods. The reverse is true of renters. More people are growing inedible perennial cash crops like eucalyptus, tea, and coffee, especially those with larger amounts of land and capital. Some long-term residents are prospering, while others are squeezed onto ever smaller pieces of land and opting for precarious rental arrangements as land competition increases. We discuss the implications of this transitioning park neighborhood, both for conservation and local livelihoods.

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1. Introduction

1.1. Changing dynamics around protected forests

The boundaries of tropical forest parks often mark areas where poor people subsist on economically marginal land (Naughton-Treves et al., 2005). However, as economies and populations grow and physical infrastructure more tightly links remote places to international and urban demand, competition for historically marginal land increases (Lambin and Meyfroidt, 2011). Land competition can lead to land user change as some groups compete more successfully, and shifts in users' capital and constraints may also spur land cover change. As we plan for the future of forest protection, with high stakes for forests and forest-dependent people, it is important to attend to processes changing the social and ecological context around protected forests.

Protected forests are affected by exogenous socioeconomic and ecological processes, and parks in turn shape local land use and livelihood strategies. Parks can create or exacerbate poverty when they displace people or cut off access to resources (Adams and Hutton, 2007). Existence of protected areas can depress suitability for agriculture on neighboring land due to crop loss to wildlife, a particularly serious concern around African parks where elephants abound (e.g. Vedeld et al., 2012). Yet, even

when parks themselves cause nearby land to be marginal for agriculture, this makes land near parks cheaper and thus more accessible to the poor who may not be able to secure land elsewhere (Naughton-Treves, 1997). On the other hand, poorer people may be attracted to park edges because they benefit from forest resources (Byron and Arnold, 1999; Angelsen and Wunder, 2003; Naughton-Treves et al., 2011) or income from integrated conservation and development projects, forestry, or tourism (Wittemyer et al., 2008; Sims, 2010). Parks are also associated with poverty through more circumstantial relations - land that is remote or marginal for agriculture is less likely to be cleared already and is politically easier to protect because it is less suitable for competing uses, the same characteristics that make it easier for the poor to find room and maintain claims in these locations (Joppa et al., 2008; Zommers and MacDonald, 2012). The geographic coincidence of protected areas with poorer people in the tropics, i.e. the "poor people - rich forests" scenario, is a well-documented pattern with competing explanations (Peluso, 1992; Naughton-Treves et al., 2011). Whether they find room near parks when they cannot compete for better land elsewhere or are attracted by natural resources or community conservation projects, poor households are often disproportionately represented at the edges of protected forests.

The role of the forest edge as a haven for the poor may not last. Where populations or economies are growing rapidly, the value of formerly marginal land may rise faster than the incomes of the people currently using it, especially as land becomes scarce. Classic frontier dynamics are characterized by expansion of poorer households into increasingly remote or less suitable land as land settled earlier is developed, consolidated, and purchased by wealthier owners (Barbier, 1997), but as these waves of socioeconomic pressure reach areas that

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are protected and closed to expansion, the social and ecological currents and eddies in that zone of contact are harder to predict. They depend on the mechanisms by which particular parks affect surrounding land values, and on the regional drivers of development pressure. The potential for market or institutional conditions to quickly change park edge dynamics may be significant, depending on which combination of factors is making land around a protected forest relatively cheap. In cases where parks are refuges for both humans and nonhumans struggling to find space in increasingly crowded landscapes, the buffer of cheap and less desirable land may be shrinking. For example, park-edge land values could rise if they had been traditionally depressed by risk of crop damage from park animals and regional markets get stronger for crops unpalatable to wildlife (e.g. eucalyptus) (Foster and Rosenzweig, 2003). This could represent a boon for current users, or a risk of displacement by more capitalized land owners enticed by new or improved prospects for potential returns¹ (Jayne et al., 2014). Pathways like these have the potential to dramatically change composition of park neighbors, with implications for who gets to use the land and the way that land around protected forests is used.

Land dynamics surrounding protected forests are important for biodiversity conservation, in addition to livelihood concerns raised above. Protected areas are a key strategy for maintaining forests and the species that depend on them, especially in regions with high potential for agriculture or other land uses (Naughton-Treves et al., 2005). However, deforestation in surrounding regions is leaving tropical parks more isolated and biodiversity more vulnerable to climate change or other threats (DeFries et al., 2005; Hall et al., 2009). Sharp park edges are especially evident in the highlands of East Africa, where deforestation rates have soared in past decades (Oluka, 2014; Twongyirwe et al., 2015). A shift among land users around protected forests may mean intensified land use at the park edge or a displacement of poorer land users to land still unclaimed and unprotected. Alternatively, a shift in land users toward investors growing perennial tree crops could mean less extraction from natural forests and less wildlife conflict. As has been documented at broader scales, the impacts of increasing wealth on forests can work in multiple directions (Foster and Rosenzweig, 2003; Rudel et al., 2005; Alix-Garcia et al., 2013).

1.2. Study site: Uganda's Kibale National Park

The area around Kibale National Park in Western Uganda is an apt microcosm for examining the dynamics associated with increasing land competition around protected forests. The park is home to many threatened species and boasts one of the highest primate densities in the world (Chapman et al., 2005b), attracting both tourists and forest research programs. Its tropical pre-montane climate and fertile volcanic soils favor rain-fed agriculture and the park is neighbored by smallholder farmers intermixed alongside commercial tea plantations. In the 1960s and 1970s, a wave of agriculturalists from land-scarce regions immigrated to the area to work in the tea plantations, subsequently purchasing land nearby and resuming independent farming activities (Mulley and Unruh, 2004; Hartter et al., 2015). Newer and poorer residents disproportionately settled immediately adjacent to Kibale forest as locals preferred to give or sell land in this border zone to buffer their communities' farms from wildlife (Naughton-Treves, 1997).² During the past decade, the Ugandan government, the tea industry, and other aid and development groups have been making significant investments in the region's infrastructure. Like other East African highland sites, population density around Kibale is high: ~300 people/km²

(Hartter, 2010), and growing at a rate of over 3% per year (Naughton-Treves et al., 2007). Recent decades have been marked by rising household incomes and declining forest cover around Kibale (Naughton-Treves et al., 2011). Today, little closed canopy forest remains outside the park boundaries (Southworth et al., 2010). These local trends mirror the rapid economic change and deforestation found elsewhere in Western Uganda and the East African highlands (Plumptre, 2002).

1.3. Study objectives

In this study, we track park-edge land use dynamics over a 22-year period in a region of rapid population growth and economic development. We use information about land sales during this time period to support qualitative claims for rising land competition. We document a shift over time in the characteristics of people buying land near the park, alongside changes in how people are using land against the park. We subsequently explore factors predicting which households are able to participate in the shift to alternative more profitable land uses. We conclude by discussing social and ecological implications of potential changes in forest-people relationships around protected areas in the East African highlands and elsewhere in the tropics where high biodiversity, historically cheap land, and rapid growth coincide.

2. Methods

This study consists of complimentary lines of inquiry to characterize change over time in the focal area. We use reported land transactions to track change in land prices, transects to characterize crop cover change, and household surveys to capture change in land user characteristics and circumstances. Our focal area is set in agricultural land bordering Kibale National Park where 60 original transects were established in 1993 in 5 hamlets to study crop-raiding by wildlife.³ In each hamlet, transects were spaced 50 m apart extending perpendicularly from the park boundary into neighboring agricultural land. The small hamlets are located in 3 wards: Kanyawara (containing the hamlets of Kanyasohera and Kabucikire), Rurama (containing Kyakiheka and Kijonjomi), and one hamlet in Nyabubale (Fig. 1). The transects extend a quarter to a half kilometer from the edge of the park. In 2011, we re-established the 1993 transects using landowner maps, natural landforms (e.g. streams), and roads for reference. Two members of the 1993 research team helped to maintain consistency in location and methods. In both time periods, we measured crop types, mapped landholdings, and surveyed land users in the area under transects.

Crops were recorded at the beginning of each of the year's two planting seasons, every 10 m, for the 25 m on either side of a transect. All crop types (e.g. maize, cassava, and 1 year-old fallow) were mapped along transects in 2011, and transect cover maps were updated in July 2015 using broader categories of land cover: food crops,⁴ brewing bananas, fallow, pasture, natural forest, and the main perennial inedible crops - eucalyptus, tea, and coffee. We calculate crop cover as presence or absence of a given crop type within resulting transect grid cells with a 10 × 25 m resolution, and we track changes in percent of cells containing each category of land cover in 1993 and 2015.

We mapped parcels in both time periods to aid identification of people using land on the transects. For socioeconomic data, our unit of analysis is the household.⁵ The inclusion criterion was owning or

¹ Land is an especially attractive investment when imperfect financial institutions limit other opportunities for investment (Shackleton et al., 2001).

² Informal land markets have been active in Western Uganda at least as early as the 1960s (Chimowu and Woodhouse, 2006; Hartter et al., 2015), and the Ugandan government has promoted the transition from customary to market-based freehold tenure (Deininger and Mpuga, 2002).

³ When the transects were first established in 1993, they covered practically all locations where agriculturalists were living immediately adjacent to the park in the park's northwestern quadrant; since that time, intervening areas have also been cleared and settled. Because these sites are located in the quadrant of the park nearest the town of Fort Portal, the land dynamics we document are more representative of situations where protected land occurs in areas of development pressure- socioeconomic conditions vary across regions of the 766 km² park (Naughton-Treves, 1997).

⁴ Includes annual food crops along with sweet and edible bananas.

⁵ We defined a household as a group of people sharing a compound, regardless of familial relationships.

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