This work was funded with the generous support of the American people through the Leader with Associates Cooperative Agreement No.EPP-A-00-06-00014-00 for implementation of the TransLinks project. The contents of this report are the responsibility of the author and do not necessarily reflect the views of the United States government.

Land Tenure Center

DEFORESTATION VS. POVERTY AT KIBALE NATIONAL PARK, UGANDA:

A TEN-YEAR PERSPECTIVE

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In PROTECTED AREAS AND HUMAN LIVELIHOODS,
edited by Kent H. Redford and Eva Fearn,
WCS WORKING PAPER NO. 32, DECEMBER 2007

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6.4 Deforestation vs. Poverty at Kibale National Park, Uganda: A Ten-year Perspective

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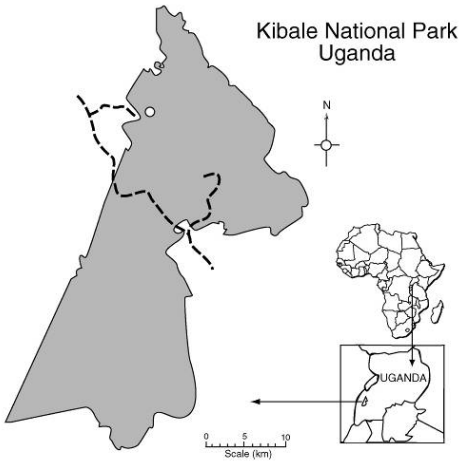
Parts of this paper are excerpted from Naughton-Treves et al. 2006. Burning biodiversity: Woody biomass use by commercial and subsistence groups in western Uganda's forests. Biological Conservation 134(2): 232-241. See also Naughton-Treves (www.geography.wisc.edu, "Deforestation in Western Uganda: Biodiversity and Poverty Concerns").

Physical and Ecological Characteristics

Kibale National Park (795 km^2) is located in Kabarole District in western Uganda, lying immediately northeast of the Rwenzori Mountains. Kibale National Park holds the last substantial tract of premontane forest in East Africa (Chapman and Chapman 1996) (**Figure 1**). Surrounding Kibale National Park is a mosaic of grasslands, smallholder agriculture, papyrus swamps, tea, eucalyptus plantations, and patches of natural forests. These forest patches average 32 ha in size (range 3 to 350 ha) and are located almost entirely in wet lowlands or steep slopes.

Figure 1: (Colin Chapman, McGill University)



The forest in this region is classified as a *Parinari* forest, distinguished on photo aspect maps by large spreading crowns of *Parinari excelsa* (Skorupa 1988; Kingston 1967). At this elevation (1370 m to 1525 m), the presence of *P. excelsa* and the subdominants (*Pouteria altissima, Olea capensis, Newtonia buchananii*, and *Chrysophyllum gorungosanum*) is associated with old-growth forest (Osmaston 1959). As is typical of many tropical tree communities, tree growth rates in the region are highly variable among species (Chapman 2004). Species typically found in old-growth or mature trees have growth rates of between 1 and 3 cm Diameter at Breast Height (DBH) per year, while species colonizing gaps or disturbed areas can have growth rates exceeding 10 cm DBH/year and can reach >15 m in height and >10 cm DBH in just five years (Chapman, unpublished data). While rates of seed dispersal into areas of disturbed forest are not reduced, recruitment of seedlings and saplings is very poor,

due to competition with grasses and an aggressive herbaceous layer. Areas of mature forest are not typically susceptible to fire, while areas of degraded forest are (Chapman et al. 1999; Lwanga 2003).

Cultural and Social Context and Rules of Forest Resource Access

The dominant ethnic group in the area is the Batoro people. Since their arrival in Kabarole District during the 19th century (Naughton-Treves 1999), the Batoro have developed a local system of ownership and forest use, incorporating both spatially explicit resource domains (e.g., royal and village forests) and user rights to specific tree species (Kapiriri 1997). (Prior to independence, the region was known as the Toro Kingdom.) Royal forests are managed similarly to village forests except that a special tax, which is collected by a representative of the *Omukama* (king), is levied on any commercial users (J. Kasenene, pers. comm.). As is common in East Africa, forest access rules are complex and include overlapping tenure claims (Rocheleau and Edmunds 1997). Most forest patches and swamp forests are considered village property that is subdivided into individually-managed parcels. Few individuals have legal title to their land; they claim it instead under customary rules. Some elements of communal ownership persist. Individual owners are typically obligated to give kin and neighbors permission to use natural forests and old fallows for fuelwood, medicinals, drinking water, and other subsistence purposes.

Traditional forest property regimes were undermined by state-imposed regulations and commercial timber markets during and immediately after the colonial period. During this time, the Ugandan Forest Department assumed ownership of all large blocks of forests (including Kibale Forest in 1932) and managed them for timber extraction. Local people were prohibited from harvesting resources in state forests and were expected to rely instead on surrounding forest patches. Two to three communities of roughly 12 households each were displaced from the reserve at this time. Following independence, between 1971 and 1986 Uganda experienced war, severe economic recession, and the disintegration of the state. The Forest Department lost control of Kibale and other forest reserves (Hamilton 1984), and during this turbulent period, the population density in Kabarole District tripled (from 27 to 97 people per km^2) due to high fertility rates and the immigration of tens of thousands of Bakiga people from southwestern Uganda (World Bank 1993).

Recent History of the Protected Area

In 1990, the post-war Ugandan government "upgraded" Kibale from a reserve to a national park and used force to control illicit use of park resources (Feeny 1998). It was during this period that the EU funded an eviction of ~30,000 illegal settlers from the Kibale Corridor connecting Kibale National Park with Queen Elizabeth Park. This eviction was carried out by the Ugandan Forest Department staff with support from the Ugandan police and district staff (Feeny 1998). Oxfam and other observers sharply criticized Uganda Wildlife Authority (UWA) for the violence associated with the eviction and the failure to provide resettlement or compensation for those evicted. Years later, an inter-ministerial task force investigated the eviction and condemned the manner in which it was implemented. Some of those evicted eventually received land in Bugangaizi, but there they suffer far poorer infrastructure and soil fertility (Feeny 1998). The following study is from a culturally and ecologically distinct region roughly 30 km north of the corridor.

Ugandan environmental agencies have gradually shifted toward more participatory approaches and, in recent years, park managers and local leaders have begun to discuss collaborative management at Kibale. They now allow some neighboring communities to use non-timber forest products within specified zones provided they prepare formal contracts delineating rights and responsilities (KNP General Management Plan 2005). Outside the park, the continued rapid population growth (3.4%, among the fastest in Uganda) and high demand for fuelwood and charcoal has intensified pressure on forests (Government of Uganda 2002).

Resource Use, Sustainability, and Patterns of Deforestation

Over 95% of Kabarole's people rely exclusively on wood for energy (Government of Uganda 2002). Charcoal production for regional and national urban markets is expanding (Chapman and Chapman 1996). Brick production is also increasing to meet construction demands of growing urban and semi-urban areas. The area devoted to tea cultivation in Kabarole has expanded by 2,000 ha (~10%) in the past 40 years (Mulley and Unruh 2004), much of this within 10 km of Kibale Park, where tea production expanded six fold between 1955 and 1988 (S. Mugisha, unpublished data). Mulley and Unruh (2004) explain that this expansion intensifies pressure on forests in two ways: First, tea companies require significant amounts of eucalyptus to dry their tea (roughly one hectare of eucalyptus is needed per every three hectares of tea), and second, they import laborers from outside Kabarole, many of whom eventually leave the tea companies and establish homesteads on land near the park boundary. Roughly half of the local tea labor force is recruited from areas beyond Kabarole District (K. Lameck, J. Manager, Finlay Tea Ltd., pers. comm. 2006).

Amidst growing demands for forest resources and uncertain access rules, deforestation in Kabarole has continued apace. According to remote sensing analysis by Mulley and Unruh (2004), between 1955 and 2001 forest declined by 7,967 ha outside of Kibale National Park, while increasing by 10,823 ha within the park due to forest regrowth in formerly cultivated areas. A similar analysis along the western boundary of Kibale showed that closed canopy forest loss inside the park within 500 m of the boundary proceeded at 0.2% per year between 1995 and 2001. During this same period, closed canopy forest declined outside the park by 3 to 4% per year, with the fastest rates occurring within 1 km of the park boundary (**Table 1**). This peak in deforestation rates near the park was similarly observed for other forest reserves of the Albertine Rift (Plumptre 2002). The accelerated deforestation near the park boundary is cause for concern given the deleterious effects of isolation on biodiversity conservation (Balmford et al. 2001). As in the case of other African forest parks, the pattern of deforestation portends future pressure on Kibale, particularly if surrounding forests are exhausted (Struhsaker et al. 2002).

Table 1: Deforestation within and outside Kibale park boundary[1]

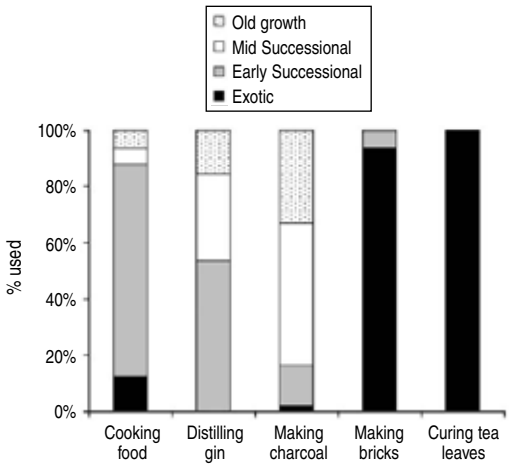
	Forest loss 0-5 km from park, annual % (error)	Forest loss 0-1 km inside park, annual % (error)
1995-2001	3.5 (.77)	0.2 (.1)
2001-2005	4 (1)	0.3 (.2)

A survey of 160 residents neighboring Kibale found that all respondents rely on firewood for cooking. Charcoal production was the second most frequent use (17.8%), but this was confined largely to natural forest edges and prevalent around village-managed forest patches. Banana gin distillers (14.4% of the total respondents) resided mainly along the edge of forest remnants and Kibale Park. Only 2.5% of respondents baked bricks. Overall the amount of biomass harvested per combustion episode differed significantly amongst the different users (Kruskall Wallis = 68.01, $P<0.001$), with charcoal using more biomass than any other group (Mann-Whitney tests between pairs $P<0.02$ or less). Brick-making used more woody biomass than stills ($P=0.003$), and biomass collection for stills was more than collection of cooking firewood ($P<0.001$).

As a group, women gathering firewood for cooking ("domestic consumers") used the greatest number of woody species (50). At the other extreme was the tea processing plant, which relied entirely on one species of eucalyptus (*Eucalyptus grandis*) to fuel its tea leaf driers. Brick makers, gin distillers, and charcoal producers all used a comparable number of species (~26). The number of woody species used during each combustion episode also differed significantly among the five user groups (Kruskall Wallis = 9.264, $P=0.026$). The number of species burned during an average brick-making project was less than that taken to fuel stills (pairwise comparison using Mann-Whitney, $Z=3.1$, $P=0.008$), produce charcoal ($Z=3.3$, $P=0.002$), and cook food ($Z=3.4$, $P<0.002$). Fueling stills typically involved a species harvest that was comparable to charcoal production and used marginally more species than the average used during a day's cooking ($Z=1.98$, $P=0.054$). Finally, the number of species used in charcoal production was similar to that collected for fuelwood. The major difference seems to be that in producing bricks people are more selective and only use trees found near roads (e.g., *Eucalyptus* sp. and other exotic species).

More important than a simple tally of the average number of species used per combustion episode is the *type* of species harvested by the different groups (**Figure 2**). Women relied mainly on fast-growing early successional species like *Vernonia* sp. for cooking. In previous research (Naughton-Treves and Chapman 2002), we calculated that each household in the study area would require roughly 0.5 ha of land fallowed for ~4 years to meet their fuelwood needs for cooking (8.4 kg per day). Brick makers meanwhile primarily harvested eucalyptus trees. By contrast, gin distillers and charcoal producers burned slow-growing hardwood species such as *Parinari excelsa*, *Newtonia buchananii*, and *Olea welwitschii*. These species are rapidly disappearing from forests outside the park and provide important food resources for frugivores in the region. During interviews, respondents ranked these three old-growth species as "most scarce" along with two early successional species: *Bridelia micrantha* and *Prunus africana*. *Prunus africana* is listed on Appendix II of CITES and is highly valued for its medicinal properties (Anonymous 2005).

Figure 2: Type of species harvested and percentage of use



Resource Use, Access Rules, and Governance

On average, women collect just over half their firewood for cooking from fallow land and woodlots on their own property. Their second major source is woody species growing on their neighbors' land. During interviews, women explained that this is customary and that it would be rude for their neighbor to refuse them "small sticks" for cooking. Women also collected fallen branches of hardwoods from forest remnants. Average time spent searching for and collecting firewood was 1.1 hours/day (range 0.5 to 3), relatively low compared to the travel and collection times of nearly 5 hours/day recorded in some other parts of Africa (Kammen 1995).

Charcoal production is officially regulated by a license system where individuals pay the equivalent of ~US $14.60 ($8.70 transport fee and $5.88 burn fee) per month to produce as much as they can from anywhere in the district. There is an active, illicit trade in sharing and duplicating these licenses. Individuals living in remote forested areas do not buy licenses; rather, it is the intermediary who buys and transports the charcoal to town that must have the license. Certain individuals (often Kiga immigrants) specialize in manufacturing charcoal, an arduous job commonly referred to as "poor man's work." The access rules for charcoal producers are often unclear. In fact, during several interviews, landowners asked us to explain to them who had the right to produce charcoal. Most typically, landowners who agree to have charcoal produced from a portion of their territory of village forest receive one or two sacks of charcoal (each worth ~2500/= or ~$1.40) as payment (average yield per "heap" is 17 sacks). Individuals residing on Royal forested land have no right to demand payment or to deny permission to charcoal producers. In such cases, the King's representative collects one or two sacks of charcoal per heap. Some individuals, single women in particular, complained that they could not refuse "men who come with papers" (i.e., licenses). Evidently, customary norms of access do not govern the charcoal business, and neither do legal codes. For example, it is illegal to clear forest alongside streams, yet the majority of charcoal production occurred close to water given that this is where the last natural forest grows.

Unlike the other fuelwood uses described so far, tea is part of the formal national and international economy. Tea processing factories in Kabarole appear to abide by environmental laws. Most keep careful records of their fuelwood use. Some publicly post rules for environmental stewardship, and one

company, J. Findlay (U), attained accreditation for Environmental Management under the ISO 14001 system. The tea factory in the study area now burns only eucalyptus trees grown on their private property. But some other factories continue to buy eucalyptus from local farmers. Moreover, as tea production continues to expand in Kabarole, more land for raising eucalyptus is required, which the tea companies acquire by buying land from local people. Under this practice, eucalyptus is often planted in wetlands, although this practice is illegal (Mulley and Unruh 2004).

Current Relations between the Protected Area and Local Peoples

Using survey data from 1996, 1998, 2005, and 2006 (n=224 households), I tested poverty (various welfare indicators: roof material, water source, livestock ownership, woodlot size) vs. proximity of landholding to Kibale Park. Some indicators suggested that there is a disproportionate presence of very poor households on Kibale's edge. For example, one is more likely to encounter homes with grass thatch roofs near the park edge, and households neighboring the park have fewer employees and smaller woodlots.

These data reveal that most households are far better off than they were eight years ago, including those at Kibale's edge. But over 30 households were missing from the original set of 243 when we attempted to interview them in 2006. They had sold off all their land and moved to Kasese (a much poorer district) or to Kampala. Their neighbors described these "missing" households in regretful tones. Most Ugandans consider losing all claims to a piece of land a dire scenario. To predict who was most likely to sell off their land, I used a multivariate analysis. Some variables were too strongly correlated to enter the same analysis (e.g., distance to road and distance to park, in which case I selected the stronger variable). Preliminary results indicate that the most vulnerable households were those living on small farms, far from Kibale, at sites where the forest patch was severely reduced or eliminated. These households account for the bottom quintile of rural population and are the only group that showed impoverishment during the study period in parallel with declining forests. This result accords with research elsewhere indicating that the poorest households rely on communal access forests during times of crisis (health problems or injury, or loss of income) (Vedeld et al. 2004).

Conclusions

Kibale National Park is becoming isolated due to rapid deforestation on adjacent land. The fact that forest loss was much slower within the park during the past decade is a signal of effective conservation in the short term. In the future, the park's forest resources will be under increasing pressure as natural forest is eliminated from the surrounding area.

- Local people are clearing forest in response to extralocal forces, such as urban charcoal demand, uncertain forest access rules, population growth, and tea expansion.
- Overall, during the past decade forests have declined rapidly, and human welfare has improved significantly.
- The poorest of the poor (bottom quintile) have not enjoyed consistent improvements in livelihood as have the rest of the population. As communal forest patches are privatized or eliminated, these very poor are forced to sell off all their land and move to cities or regions with cheaper land.

- The disproportionate presence of poor households at the edge of Kibale does not signal that the park is acting as a "poverty trap." Rather, the park allows some poor to persist because it offers a source of "emergency" resources. But complicating the causal relationship is the fact that land markets are not as well developed at the park edge.

[1] Results from ASTER & LandSat image analysis of 15 km2 of closed canopy forest along western boundary. Full results available in Naughton-Treves (www.geography.wisc.edu).