



## Analysis

# Insiders, outsiders, and the role of local enforcement in forest management: An example from Tanzania



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## ARTICLE INFO

## Article history:

Received 25 April 2013

Received in revised form 31 July 2014

Accepted 8 August 2014

Available online 16 September 2014

## Keywords:

Participatory forest management

Enforcement

Tanzania

Charcoal production

Non-timber forest products

Bee keeping

Livelihood projects

Energy

## ABSTRACT

In low-income countries, both nearby local villagers, “insiders”, and non-locals, “outsiders”, extract products from protected forests even though their actions are illegal. Forest managers typically combine enforcement and livelihood projects offered to nearby communities to reduce this illegal activity, but with limited budgets cannot deter all extraction. We develop a game theoretic model of a forest manager’s decision interacting with the extraction decisions of insiders and outsiders. Our analysis suggests that, depending on the relative ecological damage caused by each group, budget-constrained forest managers may reduce total forest degradation by legalizing “insider” extraction in return for local villagers’ involvement in enforcement activities against outsiders.

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## 1. Introduction

During the last 30 years, the number of protected areas worldwide established to safeguard natural systems has grown dramatically. Coinciding with that expansion, many government agencies and conservation NGOs are advocating for combinations of development/livelihood policies and conservation/enforcement policies that attempt to address rural poverty and welfare while conserving forests (Naughton-Treves et al., 2005). For example, WWF’s policy on forests and poverty states that “national and international forest policies and the conservation movement should address both the sustainable management of natural forests and rural poverty alleviation; one should never be addressed at the other’s expense” (Gutman, 2001; p.9, para 1). The economics literature discussing policies aimed at conservation and poverty, such as Community-based Forest Management (CBFM), Joint Forest Management (JFM), and their predecessor Integrated Conservation-Development Projects (ICDPs), emphasizes their failure to create

incentives for conservation by rural people (see Hughes and Flintan, 2001, for a literature review; Behera and Engel, 2006; Ghimire, 1994; Johannesen, and Skonhofs, 2005; Ligon and Narain, 1999; Muller and Albers, 2004; and Shyamsundar, 1996).

Even where there is an emphasis on poverty alleviation and the provision of livelihood projects for nearby villagers who lose access to forest resources, some level of enforcement of access rules is typically needed to deter illegal extraction, whether by locals or outsiders (Clarke et al., 1993; Robinson et al., 2010). Ostrom (1990) emphasized monitoring and enforcement as key aspects of protecting forests and forest resources (Chakraborty, 2001). Increasingly management policies such as CBFM require local people’s involvement in protecting the forests (Robinson and Lokina, 2012). An expanding literature finds that the involvement of local communities in monitoring and enforcing access and extraction rules tends to result in more favorable outcomes in terms of forest quality and reduced conflict. Gibson et al. (2005) highlights the debate over who should be responsible for enforcement, specifically whether governments should take on the role – as proposed by Bruner et al. (2001) and others; or local forest users – as emphasized by Stevens (1997) and Wells and Brandon (1992). Baland and Platteau (1996) stress the difficulties in protecting forests from outsiders particularly when markets develop for forest products such as

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wood fuels. More recently, Chhatre and Agrawal (2008) provide one of the first multi-country studies of the importance of local enforcement. The authors explore the relationship between forest regeneration and the extent of local enforcement using data that spans nine countries and find that the relationship between local enforcement and forest regeneration is complex but positive. That complexity depends in part on the extraction pressures on the particular forest, including whether people collect primarily for subsistence or commercial motives. Porter-Bolland et al. (2012) highlight the reality of many low-income countries: that most forests, even those under strict protection designations, are traditionally inhabited and managed by local people who extract various forest products. The authors suggest that in these situations forest cover is often better maintained than when these local people are excluded from the forest. Much of this literature emphasizes the actions of people located in or near protected forests. Yet many settings also face resource extraction by non-locals, which CBFM and related policies may not address adequately. For example, in West Bengal, India, forest protection committees were unable to restrict outsiders from collecting forest resources (Ravindranath and Sudha, 2004).

Our paper contributes to this expanding literature with a game-theoretic economic model of the interactions of forest manager and forest user decisions, while providing a new perspective on local-level community enforcement. The paper is motivated by Kibaha's forests in Tanzania, particularly the Ruvu North and South Forest Reserves, where forest managers struggle to protect the forests with limited budgets while facing illegal extraction pressure from both nearby villagers, "insiders", and non-local people, "outsiders." Insiders typically rely on the forests for fuelwood and other non-timber forest products, which is illegal given the forests' specific designation as a reserve. "Outsiders" illegally extract timber and produce charcoal, typically for sale in nearby Dar es Salaam.

In the following Section 2 we describe the particular situation in Kibaha district, Pwani Region. Motivated by a number of meetings with forest managers, patrollers, and rural villagers in Kibaha's Ruvu South forest reserve, we develop an economic modeling framework that incorporates the goals and tools of the forest reserve manager and the decisions of the two groups of resource extractors – insider village NTFP extractors and outsider charcoal producers – from those reserves, described in Section 3. Although meant to inform Kibaha's management directly, the model is sufficiently general to address a wide range of forest reserve settings with goals of forest protection and rural poverty alleviation. Section 4 concludes the paper with a discussion of the implications of our findings for including local people in forest management.

## 2. An Example from Tanzania: Kibaha's Forests

Despite the lack of well-established and documented mechanisms to induce conservation through poverty alleviation projects in and around parks, many parks still expect managers or NGOs to generate goodwill and achieve compliance with park regulations through a combination of enforcement activities and compensation for lost access to resources through poverty alleviation projects (Gutman, 2001; Wells and McShane, 2004). In Kibaha, we observed just such a combination of patrols and projects intended to provide the sticks and carrots needed to protect the nearby forests. Nearby villagers that we met with reported to us that they are pleased with the reserve management's tree planting in a designated buffer zone, and the provision of efficient stoves and beekeeping projects. But they are frustrated with charcoal producers from outside of local communities whose activities markedly degrade the forest (personal communication, village focus groups, Kibaha, 2011). Despite their concerns about widespread charcoal production, villagers tell us that they do not try to prevent outsider charcoal production nor contact forest guards about that production. After many discussions to understand why villagers do not report charcoal production, a group of women villagers described candidly their

own extraction behavior as it relates to the forest reserve-supplied beekeeping projects. When the women go to check on their beehives in the reserve forest, it is natural for them to collect forest resources, such as fuelwood and forest fruits and vegetables, at the same time. Although they often see outsiders making charcoal, they do not report them to the forest managers because the villagers' own collection is illegal. The villagers suggested that if their collection of forest resources was not illegal, they would have an unofficial mandate to report the charcoal producers to the forest manager, thereby improving the forest manager's ability to detect and punish charcoal production, given their small enforcement budget.

As in many settings, villagers have traditionally, though albeit illegally, relied on protected forests near their homes for important non-timber forest products (NTFPs). In addition, illegal extraction of logs and the in-reserve production of charcoal, often by non-local "outsiders," for sale in nearby Dar es Salaam cause serious forest degradation in addition to conflict with local people and forest guards (Godoy et al., 2012). Urban populations rely on charcoal for much of their energy needs and Kibaha's proximity to Dar es Salaam's large charcoal market makes illegal charcoal production a significant cause of degradation in Kibaha Forest Reserve (NBS, 2007; World Bank, 2009; interviews and personal communication, 2009 and 2010). We observed abandoned charcoal pits and young men leaving the reserve on bicycles laden with charcoal during our multiple visits to the reserve and surrounding villages. This charcoal extraction by and for outsiders reduces the ability of the forest to provide ecosystem services, whether provisioning, such as food and fuelwood collected by nearby villagers; regulating, such as climate control and carbon sequestration; or supporting, such as nutrient cycling (Millennium Ecosystem Assessment, 2005).

Many forests face different pressures from insiders and outsiders. For example, Alden Wily (1997) found in Tanzania's *miombo* woodlands that insiders used the forests for grazing, hunting, and charcoal production, while outsiders mainly were engaged in timber extraction. In Assam state, India, outsiders have been found mainly responsible for rhino poaching (Hussain, 2001). In Kibaha we found locals collecting a variety of non-timber forest products including fuelwood, medicines, vegetables, and thatching materials; while charcoal production (along with timber) is one of the most important forest products for outsiders (a similar finding to Haarstad et al., 2009).

The forest manager's typical tools to contain resource degradation include enforcement against extraction and income-generating livelihood projects, in addition to the less tangible goodwill and cooperation from nearby communities. Enforcement can be used to deter the illegal activities of both insiders and outsiders, whereas livelihood projects only provide incentives for households that live within project areas. Initiatives such as CBFM also often assume implicitly that goodwill will be generated through livelihood activities that will translate into "social fencing" by local villagers to protect the forest from illegal activity (Brandon and Wells, 1992; Lal, 1997; Lise, 2000; Nielsen, 2006). However, if local villagers collecting NTFPs such as fuelwood and forest vegetables face similar enforcement as outsiders producing charcoal, a potentially destructive forest-based activity, any goodwill generated through livelihood projects may well be lost. In Kibaha we found that forest managers hope that local villagers would be sufficiently invested in the forest reserve to help to enforce access restrictions against outsider charcoal producers, yet express dismay at the lack of such cooperation (personal communication in interviews, 2011). Motivated by informal discussions that we had with women living near to Kibaha's forests and findings from the literature, here we consider a third management tool for forest managers: defining some resource access rights for locals to motivate their cooperation in enforcing against outsiders.

## 3. Game Theoretic Model of Resource Extraction

We develop an economic model to explore some of the key issues raised by our observations in Kibaha. Our game theoretic modeling

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