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The impact of community forest concessions on income: an analysis of communities in the Maya Biosphere Reserve

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ABSTRACT

Forests in developing tropical countries are frequently overexploited because they are essentially treated as open access due to the lack of resources dedicated to protect the area. In response, some governments have shifted towards community-based, common property resource management policies. While there is emerging evidence that these policies can reduce deforestation, there has been less research assessing the effect of these concessions on rural livelihoods. This is surprising, since sustainable income generation is an important outcome that can influence the long-term success of concession policies. This study examines the effect of community-managed forest concessions on income in the context of the Maya Biosphere Reserve in northern Guatemala. In this region, forest concessions have been established in the past 20 years to give local residents access to the forests. Residents granted access to a forest concession are required to reduce overexploitation by abiding by a sustainable forest management plan and obtaining certification from the Forest Stewardship Council. In the Maya Biosphere Reserve, the characteristics of concession communities vary and the sustainable management plan is often tailored to meet the needs of the community. The results show that the effects of participating in a forest concession on income are generally positive, although there is significant heterogeneity among communities with different socioeconomic characteristics.

1. Introduction

Many of the world's most valuable forests are located in developing countries where local communities often depend on forests for their livelihoods. Although protection policies may exist, many governments do not, or cannot, devote enough resources to enforce forest protection to prevent over-exploitation in the form of unsustainable timber harvesting or conversion to agriculture. This issue is a common property resource (CPR) problem, where the forest resource is managed essentially as an open access system, even when the government claims control. Because resources ultimately are limited, land rents will be dissipated in an open-access situation (Arágon et al., 2015; Besley, 1995; Galiani and Schargrodsky, 2010; Gordon, 1954). The solution to open access in many cases is to provide for property rights, either individually or in groups.

In the case of natural resource management, communal property rights have been used widely and have encouraged sustainable resource use (Ostrom, 1990; Schlager and Ostrom, 1992). Where it is difficult to exert property rights in forests, particularly in developing countries, many governments have opted for common property resource systems. In these systems, local communities are granted property rights to manage large forest estates in exchange for adopting sustainable practices. With the proper incentive (e.g., sustainable livelihoods through avoided rent dissipation), the idea is that groups will work together to protect the landscape. There is evidence that community-based forest concession policies have succeeded in decreasing deforestation (Agrawl and Chhatre, 2006; Blackman, 2015; Bray et al., 2008; Fortmann et al., 2017; García-Amado et al., 2012; Kumar, 2002; Nittler and Tschinkel, 2005; Primack, Bray, Galletti, & Ponciano, 1998). However, other studies suggest that, although community forest management may reduce forest degradation or increase tree density and basal area, it does not always succeed in reducing deforestation (Bowler et al., 2012; Pelletier et al., 2016; Samii et al., 2014).

Questions remain about whether community forest management can be sustained. Sustainability requires income, and while forest concession policies appear to have had an impact on observable deforestation, it is not obvious that the rural populations they serve have benefited with higher income. For example, Meilby

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et al. (2014) finds mixed results with forest-dependent communities in Nepal. Primack et al. (1998) find that the *ejidos* (communal pieces of farmland) in the Calakmul Biosphere Reserve decrease deforestation and provide a sustainable source of income for community families. Kumar (2002) finds that Joint Forest Management (JFM) systems in India have been successful at reducing deforestation, but resulting benefits have only gone to the rural elite. Adhikari et al. (2004) and Adhikari, (2005) report similar findings in Nepal, but also show that socioeconomic characteristics of community groups affect individual outcomes.

One reason for the mixed results may be free riders (Holmstrom, 1982). Although free-riders may dissipate rents, Rotemberg (1994) suggests that efficient production and cooperation can occur if altruism exists among team members. For example, when goods are produced jointly by teams, an increase in a team member's compensation can benefit an individual if it has a positive effect on his/her own future earnings through increased productivity of a team member. The theory outlined in Rotemberg (1994) depends on workers knowing that their team members display similar patterns of trust and altruism. If trust is not present, members will behave more selfishly and exert a suboptimal level of effort if they are paid as a function of total team output alone (Holmstrom, 1982). In some cases, however, teamwork and cooperation have been shown empirically to increase productivity (Hamilton, Nickerson, & Owan, 2003). Thus, with the right incentives and if altruism is present, teams may increase productivity.

In this paper, we assess whether a communal property rights system in the Maya Biosphere Reserve in Guatemala increases household income among rural households involved in the community systems versus similar households that are not involved in them. The systems we examine are community-based forest concessions, which provide concession members with land-use rights to extract timber and non-timber forest products sustainably on forestland within the reserve. For our analysis, we compare household income levels among community concession members and neighboring non-members using data from a household survey conducted in 2012. This region is unique because there are three types of concessions that differ along socio-economic and cultural backgrounds (Maas and Cabrera, 2008; Radachowsky et al., 2012). These differences allow us to assess whether trust and cohesive group formation influence the effect of concession membership on household income. Fortmann et al. (2017) show that these differences do influence deforestation rates, but they do not investigate effects on household welfare.

The paper begins with a household labor allocation model where households in the reserve allocate labor between agricultural activities and forest harvesting activities. In the model, we assume households that are members of a community concession will be more productive at harvesting timber and non-timber forest products than if those same households were not concession members. Since forest harvesting activities are relatively more productive under the concession, this leads to higher income levels for member households. This result relies on the relatively higher forest product harvesting productivity of group membership. If groups are not more productive than individuals, because, for instance, they lack trust and cohesiveness, then group members will not necessarily have higher income.

Although we assume in the theoretical model that households are more productive at forest harvesting as concession members, in the case of the Maya Biosphere Reserve, being part of a team may be more of a burden on some households than others. For example, if individuals who did not previously know each other came together simply to obtain a land-use right through the formation of a concession, it may be hard for individuals to trust each other. As a result, they will be more likely to dissolve the contract and treat the concession land as open access. To test for this, we assess income differentials empirically across individuals inside and out of concessions and compare our results for different classes of concessions. There is also the possibility of selection bias since unobservable factors about the households may lead to increases in income. Also, being wealthier may lead to a higher likelihood of being a concession member (reverse causality). To control for the possibility of selection bias, we employ matching techniques.

The next section provides a brief introduction to the Maya Biosphere Reserve and the concessions we examine. The "Model of Optimal Household Labor Allocation" section of the paper illustrates theoretically why joint production in the forest setting can lead to greater income than individual production, and the "Results" section presents our regression results. Our findings suggest that the effect of concession membership on annual income is positive, but there is heterogeneity among communities in the Maya Biosphere Reserve. Members of recently inhabited concessions, composed of many individuals who have recently migrated to the area, do not gain income relative to non-concession members, while the non-inhabited concessions, composed of individuals with stronger ties to the region and those engaged largely in forestry, gain income. These results are robust across several tests for selection effects.

2. Background of the Maya Biosphere Reserve

The Guatemalan government established the Maya Biosphere Reserve (hereafter MBR) in 1990. The purpose of the establishment of the MBR was to control deforestation and forest degradation, as well as to protect known and unknown Mayan cultural resources (Sundberg, 2003; Nittler and Tschinkel, 2005; Radachowsky et al., 2012). It covers over half of the Petén department, which amounts to nearly one-fifth of Guatemala's territory. The MBR is divided into three zones: the core zone, the buffer zone, and the multiple-use zone (Fig. 1). The core zone consists of high-priority preservation areas such as national parks and ancient ruins. Timber harvesting on this land is forbidden, although in some parks it is not clear these rules are followed (e.g., Blackman, 2015). The buffer zone runs along the southern-most border of the reserve and is meant to divert pressure for land-use change away from the core zones. Finally, the multiple-use zone is where sustainable forest extraction is permitted.

Communities in and near the reserve had the opportunity to organize and partner with a NGO to apply for a community forest concession in the multiple-use zone with the National Council for Protected Areas (CONAP). If the concession was granted to the community, concession members received communal property rights to manage timber and non-timber forest products. The management plans established in the concession contracts outline stipulations for preventing deforestation such as conducting an environmental impact evaluation. One of the stipulations is that it is mandatory for the concessions to maintain Forest Stewardship Council (FSC) certification. If the concession members fail to maintain FSC certification throughout the length of the contract, their concession is suspended or canceled. Additionally, the partner NGO instructs the concession management units throughout the length of the contract on how to sustainably and profitably extract timber to be sold on international markets. The community conessions that were approved by CONAP were granted communal land-use rights to a forest concession in the MBR for a renewable, 25-year period (Primack et al., 1998; Radachowsky et al., 2012; Taylor, 2010).

Currently, there are four types of concession arrangements: industrial, recently inhabited, long-inhabited and nonresident