



Analysis

Between economic loss and social identity: The multi-dimensional cost of avoiding deforestation in Eastern Madagascar

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ABSTRACT

This paper exhibits the multiple dimensions of the cost of stopping the main driver of deforestation in Madagascar, slash-and-burn agriculture (tavy). As well as being a major component of the economic livelihoods of most local households living at the edge of forests, tavy has been described by anthropologists as an important cultural practice. In this paper, we show that stopping tavy does not only entail an economic cost for local households. The loss of the cultural dimension of tavy would come at an additional “cultural cost” for some. Our results suggest that a viable cessation of deforestation in Madagascar would require going beyond simple compensation of the opportunity costs of avoiding deforestation.

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1. Introduction

Slashing the forest to convert it into agricultural lands and using the cut vegetation to enrich the quality of soils has been practiced all over the world since the Neolithic era (Peters and Neuenchwander, 1988). This slash-and-burn practice remains common in the tropics where forested lands are often de facto openly accessible and farmers have limited access to inputs necessary for agricultural intensification (Ducourtieux, 2009; van Vliet et al., 2012). High rural population growth has increased the demand for new agricultural lands, and consequently slash-and-burn is currently considered as a major source of deforestation and forest degradation in the world as in Madagascar (De Wilde et al., 2012; FCPF, 2013).

Madagascar, the fourth largest island on the planet, was separated from Africa some 165 million years ago. Ecosystems followed their own evolutionary paths making the island an outstanding haven for

endemic species: 85% of its flora, 39% of its birds, 91% of its reptiles, 99% of its amphibians and all but two of its lemurs can only be found in Madagascar, primarily inside forests (Madagascar Action Plan, 2006). While the country represents less than 1% of the Earth's surface, it hosts 5% of the world's global biodiversity (World Bank, 2011). Yet this biodiversity is threatened by deforestation: from 2000 to 2010, Madagascar recorded an annual loss of close to 44,000 ha of natural forests, i.e., 0.5% per annum (ONE, 2013). The combination of exceptional biodiversity and high pressure on forests makes the island one of the hottest spots for global conservation (Myers et al., 2000), which explains why Madagascar is among the top ten countries receiving aid for environmental protection from the international community (Miller et al., 2013).

Madagascar is also one of the poorest countries in the world with 92% of its 22 million inhabitants living on less than \$2 per day in 2010 and around 80% living from agriculture, according to the World Bank's statistics. The country is ranked 151st out of 187 countries in the 2012 Human Development Index. Madagascar's high population growth rate (about 3% per year), the lack of available economic alternatives and the low level of public investments in the rural and agricultural sectors have contributed to the growing need for new agricultural lands, leading to increasing deforestation.

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Although the burning of forests has been officially banned since 1881 (Kull, 1996), slash-and-burn agriculture or tavy remains the primary economic activity of thousands of households living at the edge of forests whose members are among the poorest in the country with what Amartya Sen calls low capabilities, i.e. people with low abilities to achieve various living conditions (Sen, 1999).

In 2003, the Government of Madagascar decided to triple the size of its protected areas to alter deforestation. Stricter enforcement of forest laws is coming at a direct economic cost to the local population as they are seeing their access to fertile lands restrained. Estimating the opportunity costs of avoiding deforestation of local households has been a longstanding exercise in the tropics, particularly in Madagascar (Larson, 1994; Norton-Griffiths and Southey, 1995; Shyamsundar and Kramer, 1997; Kremen et al., 2000; Ferraro, 2002; Carret and Loyer, 2003; Minten, 2009). Today, the assessment of opportunity costs remains at the top of the research agenda as these costs play a central role in the implementation of Payments for Environmental Services (PES). PES is a new incentive tool for natural resource conservation that has attracted enormous interest over the last fifteen years (Ferraro and Kiss, 2002; Pagiola and Platais, 2002). Its definition has been importantly debated in the literature with some stressing on the defining features of an ideal PES (Wunder, 2005; Wunder, 2015) and others focusing more on the social and institutional context of implementation of PES (Sommerville et al., 2009; Swallow et al., 2009; Muradian et al., 2010; Van Noordwijk and Leimona, 2010; Karsenty and Ezzine de Blas, 2014; Wunder, 2015). Most of them converge to recognize PES as a “system for the additional provision of environmental services through conditional payments to voluntary providers” (Tacconi, 2012: p. 35) even if many issues around them remain highly debated.

In addition to economic opportunity costs, some studies have highlighted that changes in livelihoods may cause additional non-economic costs for locals (Larson, 1994; Ferraro, 2002; Sheil and Wunder, 2002; Bush et al., 2012). Only a few have measured these costs, and to the best of our knowledge only within developed countries (Hoyos et al., 2009; Zander and Straton, 2010).

In Madagascar, anthropologists have often pointed out the socio-cultural role played by tavy within forest communities (Kull, 2000; Aubert et al., 2003), particularly for the Betsimisaraka ethnic group (Charbolin, 1965). Tavy is the support of social relationships (Locatelli, 2000). Tavy is also central in local religious customs. Yet, this role has not been taken into account in studies dedicated to assessing the opportunity costs of avoiding deforestation on the island.

In this paper, we help to fill in this gap by quantitatively highlighting the socio-cultural costs induced by a potential stop to tavy in Madagascar. We use Contingent Valuation (CV) to elicit peasants' Willingness To Accept (WTA) to stop tavy. We explore its determinants so as to identify if WTA is driven by economic or by socio-cultural factors. Our analyses are based on survey data collected in 2012 from 215 households in two newly-created protected areas located in the eastern part of the island: the Ankeniheny–Zahamena Corridor (CAZ) and Makira Natural Park. We confirm our estimates using Revealed Preferences (RP) data from a natural experiment in the CAZ in which 73 agricultural households were offered material support to switch from tavy to sedentary farming.

The remainder of the paper is structured as follows. In Section 2, we return to the main cause of deforestation in Madagascar, i.e. tavy. After discussing the historical role of tavy in the depletion of the Malagasy forests, we explain the constraints that make tavy the most viable practice for peasants. We then explore the anthropological literature to show that tavy also serves a symbolic and cultural function. Section 3 presents the study area, data and protocol used to perform the analysis. Section 4 provides results from CV data that we validate in Section 5 with RP data. We discuss the results in the light of economic vs socio-cultural explanations and provide some policy implications for forest conservation in Madagascar (Section 6).

2. The Economic and Social Roots of Tavy

Rice is the staple food in Madagascar. Traditionally, peasants use two different agricultural techniques to crop rice: permanent cultivation on bottomlands and lowlands (irrigated or non-irrigated), and slash-and-burn cultivation (tavy) practiced on forested slopes. Tavy is a shifting agriculture system where primary and secondary forests are cleared, left to dry, burnt and then cropped. Rice is generally associated with crops such as maize, pumpkin, and legume, and may be followed by a tuber crop like yam or cassava (Aubert et al., 2003). Rice is cropped once or twice on the same tavy plot depending on the soil fertility and after one or two annual harvests, peasants leave the field to allow re-growth of the secondary forest and move on to clear other plots.

2.1. Tavy as a Threat: A Historical Perspective

Tavy has been considered as a major threat for Madagascar's biodiversity since the French colonial era. The colonial administration described tavy as an archaic activity practiced by lazy peasants who were not concerned about the future of their children.¹

While tavy has been banned since 1881, logging and other activities based on the extraction of natural resources contributed significantly more to deforestation in Madagascar during the early 1900s (Jarosz, 1993; Kull, 1996). In fact, the prohibition of tavy was more likely to be motivated by financial concerns than by environmental ones. Forbidding shifting agriculture was indeed a method to settle peasants in order to improve the collection of taxes (Jarosz, 1993). Therefore, tavy has not always been the unique cause of forest depletion in Madagascar, nowadays it constitutes the main driver of deforestation in dense humid forests.

Indeed, in many parts of Madagascar, the average fallow period has become much shorter in recent decades because of increased land pressure, mainly caused by high population growth, from 8–15 years in the 1970s to 4–5 years nowadays (Styger et al., 2009; Locatelli, 2000). None of the fallow species are able to withstand the 4–5 year slashing frequency: after three or four cycles following primary forest deforestation, herbaceous species begin dominating the fallows, and soil fertility drops to a level so low that peasants abandon the old deforested fields and clear new patches of primary forest (Styger et al., 2007).

2.2. Tavy as an Economic Activity

Shifting slash-and-burn agriculture is well-adapted to the economic and environmental constraints of Malagasy forest farmers. First, de facto large availability of forest lands allows farmers to maximize the productivity of labor compared to intensive permanent rice cultivation (Boserup, 1970). Second, burning wood biomass restores soil fertility, and compensates for the lack of access to other agricultural inputs (van Vliet et al., 2012). Finally, combining bottomland and upland plots is a risk-management strategy to cope with climatic vulnerability (Delille, 2011) which is particularly critical in Madagascar since the country is one of the most vulnerable to the vagaries of climate (Shepherd et al., 2013).

2.3. Tavy as a Social Practice

In addition to being a rational strategy for sustaining peasants' livelihoods, tavy can also be considered as a social practice. Locatelli (2000) underlines the ties of mutual assistance involved in activities related to tavy, describing it as the “support of social relationships”. For example, putting fire to a new field ensures

¹ In a 1923 issue of a colonial newspaper, an officer from the French Museum of Natural History depicted peasants as “lead[ing] a sleepy life focused on growing rice obliging them to have a nomadic life” (L'Information from 03/12/1923 – Archives from the Bibliothèque Nationale Française).

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