



# Qualitative and Quantitative Evidence on the True Local Welfare Costs of Forest Conservation in Madagascar: Are Discrete Choice Experiments a Valid *ex ante* Tool?

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**Summary.** — Protected areas may impose local welfare costs through the enforcement of use restrictions. Predicting their welfare impacts before their establishment could help with the design of compensation schemes. Discrete choice experiments (DCEs) are increasingly used for *ex ante* evaluations but their validity is largely untested in low-income settings. Using a case study of a new REDD+ (Reducing Emissions from Deforestation and forest Degradation) project in eastern Madagascar, we explore the validity of DCEs in two ways: (i) whether the estimates of welfare costs derived from DCE are affected by respondents' prior experience of conservation (ii) whether DCE results have high theoretical and content validity. We surveyed households who have varying degrees of experience of restrictions to swidden agriculture. We also qualitatively debriefed a sub-sample of respondents to better understand their thought processes. Latent class analysis shows that DCE outcomes vary with conservation experience. Households more experienced with forest protection are less willing to trade-off rights to clear forest for swidden agriculture with any compensatory interventions whereas less experienced households highly favor support for alternative agricultural techniques and a secure right to clear one hectare of forest. Although the results show apparent non-attendance to some attributes (e.g., cash payments), qualitative debriefings suggest that respondents in fact do expect relatively low or no utility from the given attributes and hence have theoretically valid preferences. Similarly, the DCE has generally high content validity. Although DCE can elicit current preferences in this context, using *ex ante* DCE to estimate the welfare costs of such a long-term intervention requires caution. We conclude that it is difficult to robustly estimate compensation in advance of an intervention, there is therefore a need to rethink conservation approaches, and the feasibility of achieving fair compensations for conservation-imposed restrictions.

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## 1. INTRODUCTION

Conserving biodiversity through the establishment of protected areas (PAs) has been the foundation of conservation in the tropics. The number and extent of PAs have increased rapidly in the last decades (Jenkins & Joppa, 2009), particularly in least developed countries where they are viewed as an urgent response to the increasing loss of biodiversity. Although there is a wide range of PA categories, most involve some degree of restrictions on access to natural resources which may have negative impacts for the welfare of local communities dependent on those resources. REDD+ (Reducing Emissions from Deforestation and Forest Degradation) is resulting in a further increase in tropical forest areas where access restrictions are imposed on local resource users (Ghazoul, Butler, Mateo-Vega, & Koh, 2010).

Despite decades of recognition of these local costs, compensation measures are often delayed, incomplete, or non-existent (e.g., Cernea & Schmidt-Soltau, 2006). Attempts to provide compensation started with integrated conservation and development projects (ICDPs) in the 1980s, which promoted rural development projects but which generally failed to achieve development on a scale commensurate with the costs (Brandon & Wells, 1992). Community-based natural resource management (CBNRM) and related concepts have been pur-

sued to enable communities to participate in the management of natural resources and benefit from these resources (Brosius, Tsing, & Zerner, 1998). Although there are successful cases, CBNRM has often not been able to compensate for the

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opportunity costs of protection (e.g., Berkes, 2004). More recently, Payments for Ecosystem Services (PES) schemes emerged, with an aim to internalize the benefits that people obtain from ecosystems using market or quasi-market exchanges (Grieg-Gran, Porras, & Wunder, 2005). However, emerging evidence suggests that this is not providing a better outcome for local people and that compliance is mostly obtained by coercion (e.g., Milne, 2012). The REDD+ concept, which can be seen as a carbon-focused PES scheme, could be a means to finance the establishment of a new wave of PAs (Harvey, Dickson, & Kormos, 2010). However, the effectiveness of REDD+ social safeguards in adequately compensating local people has also been questioned (Chhatre & Agrawal, 2009).

The perceived urgency of conservation may have resulted in the dearth of *ex ante* assessment<sup>1</sup> and lack of consideration of alternative policy options, and the inclusion of the views of the affected population. All of these may have contributed to compensation failures. In this context, predicting the welfare impacts of PAs before their establishment could provide valuable evidence to improve compensation. However, a major constraint is finding robust methods to estimate welfare impacts in advance. Discrete Choice Experiments (DCEs), a stated preference valuation technique<sup>2</sup> (Freeman, 2003), can offer one approach to estimating welfare impacts *ex ante* through the construction of hypothetical scenarios (e.g., Cranford & Mourato, 2014). While DCEs may be prone to hypothetical bias (Hensher, 2010a), they may help decision makers predict how respondents would adapt to a policy change and devise compensation mechanisms that would integrate the affected population's needs. Besides, by inferring policy impacts from the trade-offs that respondents make, DCEs avoid asking direct questions about the policy being valued and therefore may be useful when valuing sensitive goods, such as illegal activities (e.g., Moro *et al.*, 2013; Nielsen, Jacobsen, & Thorsen, 2014). We conducted a DCE survey with rural households in eastern Madagascar affected by forest conservation to investigate the trade-offs local people would make between the right to clear new forests for swidden agriculture, cash payment compensation, and support for improved rice farming.

Although DCE methods are increasingly used in environmental valuation, their validity, especially in low-income rural settings, is largely untested (Rakotonarivo, Schaafsma, & Hockley, 2016; Whittington, 2010). First, this paper uses a natural experiment to assess the validity of *ex ante* DCE, conceptualized as the degree to which the method is measuring what the researcher intends it to measure (Bateman *et al.*, 2002). If researchers' aim is to measure the welfare impacts of forest conservation to inform the design of compensation policies, validity therefore concerns how well the DCE method, as an *ex ante* impact assessment tool, can achieve this.<sup>3</sup> How well *ex ante* assessment can predict the impacts of conservation may depend on the effect of respondents' prior experience with the policy. If DCE outcomes are affected by experience of forest conservation, this suggests that DCE conducted only with respondents who are yet to experience conservation may not be suitable for predicting welfare impacts and required compensations.<sup>4</sup> Complex and long-lasting interventions such as forest conservation may have long-lasting effects on household wellbeing which are hard for a respondent to estimate in advance.

Second, this paper aims to examine the theoretical and content validity of our DCE results by assessing how well they conform to the assumptions of the method. The first assumption relates to the continuity axiom of rational choice theory

which postulates that DCE respondents need to attend to all attribute levels across each of the alternatives and make "compensatory" trade-offs (Campbell, Hensher, & Scarpa, 2011; Campbell, Hutchinson, & Scarpa, 2008). However, it may be difficult to distinguish genuine attribute non-attendance (that is ignorance of an attribute because of an incomprehensible survey design or other concerns not captured or raised by the DCE survey) from no (or low) preference for given attributes (i.e., low attribute importance) (Hess, Stathopoulos, Campbell, O'Neill, & Caussade, 2013). The former is a violation of the continuity axiom, the latter is not. What is observed in DCE results, e.g., apparent patterns of non-attendance to some attributes, may not always reveal respondents' thought processes, and qualitative debriefings that directly examine decision processes, i.e., how people make decisions, can help disentangle such issues (Arana & Leon, 2009; Powe, Garrod, & McMahon, 2005). Here, we test the extent to which our results conform to the continuity axiom by exploring the processes through which respondents arrive at their choice decisions using qualitative debriefing interviews with a subsample of respondents.

Another assumption of the DCE method pertains to the content validity of DCE, i.e., whether the survey descriptions and questions are "clear, plausible, and unbiased" so that respondents are motivated to reveal their true preferences (Bateman *et al.*, 2002). If respondents protest some features of the survey scenario, they may not have the incentives to accurately state their true welfare costs (e.g., Meyerhoff & Liebe, 2009). If respondents for instance distrust or misperceive the payment vehicle i.e., the means through which the policy outcome is delivered (Morrison, Blamey, & Bennett, 2000), or they do not believe that their responses could potentially influence policy (Vossler & Watson, 2013), their choice decisions may not be valid indications of their preferences. In our qualitative debriefing interviews we examined the extent to which a perceived lack of plausibility of the payment vehicle or consequentiality of the DCE survey may bias the results.

This is the only DCE study we know of that investigates the validity of DCE results in a low-income setting by explicitly looking at the effect on people's choices of varying exposure to a complex and long-term intervention (in this case restrictions on land use). We also believe it is the only study in a low-income context to enrich a DCE survey with rigorous qualitative data collection approaches which can significantly help to understand the psychological processes leading to respondents' answers. These additions to established economic valuation techniques for use in a low-income setting have broad applicability for environment and development researchers. However the paper also has significant implications for conservation policies and the design of compensation measures around protected areas including PES and REDD+ projects.

## 2. METHODS

### (a) Case study and sampling procedure

Madagascar's protected area network has been recently expanded from 3.1% of Madagascar terrestrial surface area (1.8 million hectares) in 2003 to 10% in 2012 and now covers most of the remaining natural habitat. The local swidden agricultural system known as *tavy* (De Wilde, Buisson, Ratovoson, Randrianaivo, Carrière, & Ii, 2012) has been regarded as the main driver of deforestation in eastern Madagascar. At low population densities *tavy* may be sustainable,

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