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Contributed Paper

Perceived barriers to and drivers of community participation in protected-area governance

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Abstract: *Protected areas (PAs) are a frequently used conservation strategy, yet their socioeconomic impacts on local communities remain contentious. A shift toward increased participation by local communities in PA governance seeks to deliver benefits for human well-being and biodiversity. Although participation is considered critical to the success of PAs, few researchers have investigated individuals' decisions to participate and what this means for how local people experience the costs and benefits of conservation. We explored who participates in PA governance associations and why; the perceived benefits and costs to participation; and how costs and benefits are distributed within and between communities. Methods included 3 focus groups, 37 interviews, and 217 questionnaire surveys conducted in 3 communities and other stakeholders (e.g., employees of a nongovernmental organization and government officials) in PA governance in Madagascar. Our study design was grounded in the theory of planned behavior (TPB), the most commonly applied behavior model in social psychology. Participation in PA governance was limited by miscommunication and lack of knowledge about who could get involved and how. Respondents perceived limited benefits and high costs and uneven distribution of these within and between communities. Men, poorer households, and people in remote villages reported the highest costs. Our findings illustrate challenges related to comanagement of PAs: understanding the heterogeneous nature of communities; ensuring all households are represented in governance participation; understanding differences in the meaning of forest protection; and targeting interventions to reach households most in need to avoid elite capture.*

Keywords: comanagement, community-based conservation, Madagascar, participation, protected areas, theory of planned behavior

Las Barreras y los Conductores Percibidos para la Participación Comunitaria en la Gobernanza de las Áreas Protegidas

Resumen: *Las áreas protegidas (AP) son una estrategia de conservación que se usa con frecuencia, sin embargo los impactos socioeconómicos que tienen sobre las comunidades locales todavía son polémicos. Un cambio hacia la participación incrementada por parte de las comunidades locales en la gobernanza de las AP busca entregar beneficios para el bien estar humano y la biodiversidad. Aunque se considera que la participación es crítica para el éxito de las AP, pocos investigadores han explorado las decisiones que toman los individuos para participar y lo que esto significa para la manera en la que las personas locales experimentan los costos y beneficios de la conservación. Exploramos quiénes participan en las asociaciones de gobernanza de las AP y por qué; los beneficios y costos percibidos de la participación; y cómo se distribuyen los costos y los beneficios dentro y entre las comunidades. Los métodos incluyeron tres grupos de estudio, 37 entrevistas y 217 cuestionarios realizados en tres comunidades y entre otros accionistas (p. ej.: empleados de una organización no gubernamental y oficiales del gobierno) de la gobernanza de las AP en Madagascar. Nuestro diseño del estudio estuvo basado en la teoría del comportamiento planeado (TCP), el modelo de comportamiento de aplicación más común en la psicología social. La participación en la gobernanza de las AP estuvo limitada por la mala comunicación y la falta de conocimiento sobre quién podría involucrarse y cómo. Los respondientes percibieron beneficios limitados y costos altos y una distribución desigual de estos*

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dentro y entre las comunidades. Los hombres, los hogares más pobres y las personas en las aldeas remotas reportaron los costos más altos. Nuestros hallazgos ilustran los retos relacionados con el co-manejo de las AP: entender la naturaleza heterogénea de las comunidades; asegurar que todos los hogares estén representados en la participación dentro de la gobernanza; entender las diferencias en el significado de la protección del bosque; y enfocarse en que las intervenciones lleguen a los hogares con mayor necesidad para evitar la captura elite.

Palabras clave: áreas protegidas, conservación basada en la comunidad, co-manejo, Madagascar, participación, teoría del comportamiento planeado

摘要: 建立保护地(*PAs*)是一项常用的保护策略,但保护地对当地社区的社会经济影响仍存在争议。通过提高当地社区在保护地管理中的参与度,从而造福于人类和生物多样性。尽管社区参与被认为是保护地成功的关键,很少有研究者调查过个人参与的决定过程以及这对于当地人感受保护的利弊的意义。我们探究了谁参与了保护地管理机构及为什么参与;他们认为有何利弊;以及这些利弊在社区内、社区间的差异。研究包括了马达加斯加保护地管理中的3个社区和其他利益相关者(如非政府组织的雇员、政府官员),选取了3个焦点群体,进行了37次访谈和217份问卷调查。我们的研究设计以社会心理学中应用最广泛的行为模型—计划行为理论(*TPB*)为基础。由于受沟通不畅以及缺乏谁可以参与、如何参与等方面的知识影响,人们对保护地管理的参与受到了限制。调查对象认为,参与保护地管理收益有限而代价高,且在社区内和社区间收益和代价的分布不均。男性、贫困家庭以及偏远村民参与保护地管理的代价最大。我们的发现阐述了保护地共同管理所面临的挑战:理解社区的异质性;确保所有家庭都参与到保护地管理中来;理解森林保护意义的不同;以及有针对性地干预以帮助最需要帮助的家庭来避免精英掌控。

关键词:共同管理, 基于社区的保护, 参与, 计划行为理论, 马达加斯加, 保护地

翻译:胡怡思

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Introduction

Governance, that is the formal and informal processes and structures through which decisions are made, has been identified as "central to the conservation of protected areas throughout the world" (WCPA 2004: 257). Protected areas (PAs) are a frequently used conservation tool; global coverage reached 15.4% in 2014 (Juffe-Bignoli et al. 2014). This is set to increase to meet the Aichi Target to protect 17% of terrestrial areas by 2020 (CBD & UNEP 2010).

Case studies document the costs and benefits of PAs to local communities (Brockington et al. 2006; Andam & Ferraro 2010) and the globally and locally uneven distribution of PA-related impacts; the poorest and weakest communities are often most affected (Oldekop et al. 2016). Protected areas are expected to deliver benefits beyond biodiversity protection to communities living nearby or within them, including increasing communities' well-being (Pullin et al. 2013) and promoting human rights (Corson et al. 2014). To meet these new aims, there has been a global expansion of community-based and other bottom-up approaches to PA governance relative to top-down fences-and-fines approaches (Berkes 2009).

Comanagement or shared governance refers to PAs where power, responsibility, decision making, and enforcement are shared between the state and other nonstate actors, including nongovernmental organizations (NGOs), local communities, and private companies (Berkes 2010; Borrini-Feyerabend et al. 2012). Although

PA management (the means and actions taken to meet PA objectives) differs from PA governance (who holds the authority, power, and responsibility and how they are held accountable), these terms have become intertwined in the literature (Borrini-Feyerabend et al. 2012). Shared governance structures do not necessarily lead to comanagement structures (Lyver et al. 2014), and arrangements tend to evolve over time. There is no universally accepted definition of comanagement, and many definitions do not consider the multiple layers of complexity (Berkes 2010). In this study, stakeholders were involved in both governance and management structures, and we refer to this approach as comanagement throughout. Following much of the conservation and development literature (e.g., Ojha et al. 2016; Wright et al. 2016), we did not consider a community a "static, isolated group of people" (Berkes 2004: 623); rather, we considered a community heterogeneous and an entity that changes over time, is affected by global trends, and is geographically bounded.

Participation of local communities in decision-making processes is central to many comanaged PAs (Borrini-Feyerabend et al. 2012). Levels and timings of participation vary from brief stakeholder consultations during establishment to stakeholders becoming active management decision makers (Stringer et al. 2006). Participation is important both for pragmatic reasons (improved decision making, increased support, and reduced costs) and because it is a more democratic approach (increased representation, empowerment of marginalized groups, increased trust, promoting social

learning) (Reed 2008; Sterling et al. 2017). Protected areas with meaningful participation are more likely to deliver positive outcomes for livelihoods and biodiversity, although local context is also an important predictor of success (De Vente et al. 2016; Oldekop et al. 2016). Yet, there are disadvantages to participation: increasing the range of perspectives in decision making can increase potential for conflict; it is expensive and time-consuming to involve all stakeholders, leading to trade-offs in who is able to participate; and it can be susceptible to elite capture. Elite capture is where wealthier or more powerful individuals gain a disproportionately large share of benefits, increasing inequalities and marginalizing weaker stakeholders (Persha & Andersson 2014). Real or perceived social inequity can create conflict and impede achievement of socioeconomic and biological PA goals (Gurney et al. 2015).

Participatory conservation governance is now globally widespread (Ojha et al. 2016), and nonparticipatory governance systems are increasingly seen as "illegitimate, ineffective and undemocratic" (Bulkeley & Mol 2003: 144). Yet few studies provide evidence to evaluate participation. Participation can be affected by socioeconomic factors at individual and community levels (Gurney et al. 2016). This underlines the need to understand the factors in participation and perceptions of related benefits and costs. Given the continued popularity of community involvement, it is important to understand why people choose to participate in governance processes, the perceived benefits and costs of participation, and how benefits and costs are distributed within and between communities. We addressed these questions through a case-study PA in Madagascar.

Methods

Conceptual Approach

Measuring subjective views or perceptions, rather than solely focusing on objective measurements or indicators, is crucial to conservation success (Bennett 2016). Perceptions are important in measuring human well-being (Woodhouse et al. 2015), understanding and influencing human behaviors (Ajzen 1991), enlisting stakeholders' support (Gurney et al. 2015), and minimizing negative impacts of conservation interventions. Perceptions of PA-related benefits and costs are often linked to socioeconomic and geographical variables (Chinangwa et al. 2016; Diedrich et al. 2017). For example, individuals who perceive PA management as effective are more likely to perceive PA-related benefits (Bragagnolo et al. 2016). However, because few studies have established the relationship between predictors of participation and the distribution of benefits and costs within communities, we aimed to fill this gap.

We grounded this research in the theory of planned behavior (TPB), the most commonly applied behavior model in social psychology (St. John et al. 2011). It considers that people's decisions to behave in particular ways are controlled by their attitudes (overall evaluation of the behavior), subjective norms (estimate of the social pressure to perform or not perform the target behavior), and perceived control (the extent to which they feel able to perform the behavior) (Ajzen 1991). Because the purpose of conservation interventions is generally to modify human behavior (St. John et al. 2011, 2013), TPB can be applied to identify the relative importance of each determinant (attitude, subjective norms, and perceived control) for a specific behavior, which informs intervention design (Fishbein & Ajzen 1975; Ajzen 1991). TPB has been widely applied to designing successful interventions in health and education; two-thirds of these reported some positive behavioral change (Hardeman et al. 2002). Few researchers have applied TPB to conservation-related behaviors, but those who have (e.g. Williams et al. 2012; Mastrangelo et al. 2014) found that attitudes, which are frequently used as a proxy for proconservation behaviors, offer a limited explanation of human behavior (St. John et al. 2011, 2013). There have been calls for greater use of TPB to better understand and influence human behaviors driving biodiversity loss and conservation (St. John et al. 2013). Additions to TPB, including contextual and cognitive considerations (e.g. Gurney et al. 2016), have increased TPB's explanatory power. We combined TPB predictors (attitudes, subjective norms, and perceived control) with socioeconomic factors, forest reliance, and perceived benefits and costs to understand the motivations behind participation in community forest governance. Use of both qualitative and quantitative data can provide an in-depth understanding of individuals' reasons for participating in PA governance alongside their perceptions of how it impacts them (St. John et al. 2013).

Study Area

Madagascar, as one of the least developed but most biodiverse countries (Goodman & Benstead 2005; World Bank 2013), presents a "classic conservation and environmental management conundrum" (Scales 2014: 2). Protected-area coverage in Madagascar has tripled over the last 30 years. Although deforestation is, on average, lower in PAs (Eklund et al. 2016), it remains a key driver of biodiversity loss (Waeber et al. 2016). This, combined with increasing poverty (Waeber et al. 2016), highlights the need for conservation interventions that enhance social and economic development and protect the environment.

The Durban Vision aims to increase PA coverage in Madagascar while encouraging local ownership and sustainable use of natural resources (Gardner 2014) via comanagement between local community associations (LCAs) and a nonstate partner (promoter). Local

community associations provide a mechanism for individuals to participate in PA governance, from establishment through to daily management decisions. Associations may be established by the promoter or based on existing village associations and consist of a committee and members. Anyone over the age of 18 in the community is eligible to join, and the committee is elected by community members. Concerns about this new governance form include difficulties in ascertaining true levels of participation; differences between verbal and written agreements; marginalization of weaker stakeholders; and a lack of compensation for local communities (Corson 2012, 2014; Virah-Sawmy et al. 2014). As comanagement of PAs increases globally, Madagascar offers an important case through which to understand how this governance approach plays out in reality.

We focused on a newly established PA, Mangabe Forest, in eastern Madagascar, that is comanaged by a national NGO and 10 LCAs and was established by the NGO. All villages surrounding the PA were involved in establishing LCAs, although they differed in their forest use. Due to time constraints, 3 study villages were selected (Supporting Information). These all had similar distances from forests (1 hour walking), which we used as a proxy for use of forest resources, and LCA establishment processes, but levels of participation different within LCAs (personal communication with NGO staff). Differing levels of LCA participation allowed us to explore the factors affecting participation. Although we presumed distance to roads and towns was likely to affect levels of forest resource use, no 3 villages which had similar distances to roads or towns.

Research Design

We used village focus groups (FGs), semistructured interviews with key stakeholders, and questionnaire surveys to collect (Table 1) data on LCA participation and perceived benefits and costs from September to December 2015 and April to July 2016.

Focus groups were asked questions about forest ecosystem services (ES) and aspects of LCA membership (Supporting Information). Seven focus groups were held (village 1, $n = 2$; village 2, $n = 1$; village 3, $n = 2$), and there were 8–10 participants in each. Groups were split into LCA members and nonmembers to reduce risks of conflict. Participants were recruited with the help of key stakeholders in each village. Focus groups were facilitated by translators trained by the lead author and recorded and summarized by the lead author and translator.

Interviews contained questions on PA governance, LCA membership, forest use, and livelihoods (Supporting Information). Thirty-seven interviews were conducted with village members. LCA and village presidents were interviewed first and further interview participants were identified via snowball sampling. Interviews were conducted by C.W. and interpreted by a translator.

Questionnaire design was informed by FG and interview data. Ordinal and categorical questions relating to socioeconomic indicators and forest resource use and open-ended questions about perceived benefits and costs of LCA membership were included (Table 2 & Supporting Information). The questionnaire was written in English and translated to Malagasy. Questionnaires were administered by Malagasy research assistants from the University of Antananarivo. Questionnaire piloting in study villages tested for clarity and length. No modifications were needed, so pilot data were included in the final sample. Methods were approved by the University of Leeds ethics committee before data collection.

Measuring Wealth

We used material style of life (MSL) as a proxy for wealth and calculated it for each household based on locally relevant household structures and possessions (Supporting Information). Material style of life is widely used in developing countries providing a useful and robust indicator (Cinner et al. 2010; Hill 2011). We calculated MSL scores by running a principal component analysis (PCA) on all the variables. Items with low factor loadings were removed (Cinner et al. 2010).

Theory of Planned Behavior

To measure attitudes, subjective norms, and perceived control relating to LCA membership, participants rated their agreement with each statement on a Likert scale: strongly disagree, disagree, neutral, agree, and strongly agree (Supporting Information). Statements were written to be target, action, context, and time specific (St. John et al 2011). Determinants were measured directly and indirectly. For indirect measures, participants were asked about specific beliefs and outcome evaluations, motivations to comply, or perceived control . Response items were converted to numbers prior to analyses (strongly disagree, 1; disagree, 2, etc.) in order to calculate scores. For the indirect measurements, belief scores were multiplied by the relevant evaluation score and results were summed (Aipanjiguly et al. 2003; Francis et al. 2004).

Sampling Strategy and Data Analyses

Village-level census information was unavailable because there were few records on the location and size of communities in rural Madagascar. This made it difficult to ensure representative sampling in each village, but discussions with village presidents and elders confirmed all remote areas of the villages had been sampled. Households were randomly selected.

Table 1. Methods used in a study of participation in protected-area governance, perceived benefits and costs of participating, and distribution of benefits and costs and total sample sizes.*

Method	Purpose	Sample size
Village focus groups	to free-list ecosystem services or benefits gained from the forest	7
Semistructured interviews	to gain an in-depth understanding of protected-area (PA) governance and opinions relating to local community association (LCA) and nonstate partner comanagement	37
Questionnaires	to sample a larger proportion of the population for a more representative set of views relating to LCA and nonstate partner comanagement and PA governance and collect socioeconomic details	240

*The study took place in 3 communities surrounding a comanaged protected area in eastern Madagascar. Data collection took place from September 2015–July 2016.

Table 2. Components of questionnaire used to explore participation in protected-area governance, perceived benefits and costs of participation, and the distribution of benefits and costs.*

Section	Purpose
Introduction	explain the purpose of the study, inform participants of anonymity, and ensure prior informed consent
Sociodemographics	gather information to ascertain representation within the local community association (LCA), influence of reasons for joining LCA, and distribution of benefits and costs of LCA participation (material style of life used as proxy for wealth)
Protected-area governance	to determine whether participants were LCA members and what they perceived were the benefits and costs of participating
Forest resource use	to determine how reliant participants were on forest resources (measured by listing of resources accessed or used in the last year)
Theory of planned behavior	to investigate how attitudes, subjective norms, and perceived behavioral control affected decisions to join the LCA

*The questionnaire included ordinal and categorical questions relating to socioeconomic indicators and forest resource use, and open-ended questions on participation.

Because of non-normally distributed data, nonparametric tests with R (R Core Team 2013) were used to measure differences between demographics, socioeconomic characteristics, and perceived benefits and costs to members and nonmembers.

To assess whether attitudes, subjective norms, or perceived control predict behavior, a general linear model was used with LCA membership as the binomial response variable and a conditional log-log function because this gave the lowest residual deviance and Akaike information criterion (AIC) value (Thomas et al. 2015). A second model also included socioeconomic variables (village, gender, age, education level, and wealth), forest reliance, and perceived benefits and costs. Models were refined using the drop1 function until only significant variables remained. The AICs of refined models were also compared to ensure that model refinement improved goodness of fit (Supporting Information). These values are frequently used as a measure of goodness of fit, where the lowest AIC indicates the best model (Burnham & Anderson 2003). Prior to constructing scores for the direct and indirect attitudes, subjective norms and perceived control, McDonald's omega was calculated to verify internal consistency of measurement items (Dunn et al. 2014). Consistency is deemed questionable if $\Omega < 0.4$, which suggests items should be assessed separately (Dunn et al. 2014). For direct measurements, the scores for each

statement were added together. Indirect measures were checked for validity by testing for correlations between them and direct measures (Francis et al. 2004; Supporting Information).

Transcribed interviews and FG summaries were analyzed using NVIVO software through reading, coding, comparison with quantitative data, and recoding (Newing et al. 2011). Qualitative data are used throughout to support or further explain quantitative results.

Results

Participation

Members of LCAs were more likely to be male ($\chi^2 = 34.08$, $p < 0.001$). Differences in AIC used to refine the model were marginal, so results should be interpreted with caution but are supported by qualitative results below. The model with the lowest AIC retained gender, forest reliance, and the indirect measurement of attitude as significant predictors of membership (Supporting Information). Thus, individuals were more likely to join the LCA if they were male, had higher reliance on forest resources, and a positive attitude toward membership.

In this model, a higher indirect attitude score suggested individuals were more likely to participate if they perceived participation would protect the forest and make

it easier to access forest resources (Supporting Information). Of questionnaire respondents, 37.6% cited environmental reasons for joining the LCA, including "I like protecting the forest" (member, male, village 2) and "In the beginning I saw the forest was being destroyed and I wanted to improve it" (member, male, village 3). Individuals were more likely to participate if they used a wider range of forest resources. This was supported by questionnaire responses highlighting the practical importance of the forest: "[I joined] to protect the environment because we depend on it" (member, male, village 3).

Subjective norms was not a significant predictor of membership in the model, but 21.8% of members gave reasons for joining relating to social pressure: "I joined because everyone else was joining" (member, female, village 1) and "I just do what everyone else does" (member, male, village 2). 18.1% gave reasons relating to community or teamwork, such as "I liked the idea of working together" (member, male, village 2) and "It's good to be in an association, we are stronger together" (member, male, village 3).

Gender was a significant predictor in the model. 7.41% of nonmembers, all female, felt excluded due to their gender: "I thought it isn't for women to join" (nonmember, female, village 2). Other reasons for not joining the LCA were a lack of information or not having heard of the LCA (33.3%) (e.g., "No one told me about the LCA or asked me to be a member" [nonmember, male, village 3].); time constraint (18.5%) (e.g., "Being a member takes up too much time" [non-member, female, village 2].); disinterest (13.6%); and perceived exclusion due to age or ethnicity (9.9%).

Advantages and Disadvantages of Participation

Perceived advantages and disadvantages to LCA membership varied between members and nonmembers. Most respondents reported advantages (72.4%) and disadvantages (76.5%) to participation.

When asked about advantages of LCA membership, 36.8% of members and 13.1% of nonmembers stated there were not any, and 60.7% of nonmembers and 11.3% of members answered "don't know." Environmental advantages were highlighted by both members (23.3%) and nonmembers (11.9%). For both groups, responses followed similar logic to environmental reasons for joining the LCA (i.e., "Protecting the forests is important" [member, male, village 2] and "The forest is kept safe" [member, male, village 1]).

Receiving direct benefits from the NGO was mentioned by both members (16.5%) and nonmembers (11.9%). Direct benefits included paid work (e.g., " . . . being a porter and building the new campsite" [member, male, village 3]), training (e.g., "we get training on techniques for farming and growing crops" [member,

male, village 2]), and materials (e.g., provision of seeds and farming tools).

When asked about disadvantages to membership, the majority (54.8%) of nonmembers answered "don't know"; whereas members were most likely (36.1%) to state negative livelihood impacts. Responses focused on being unable to burn or clear the hills surrounding their rice fields ("Our fields are becoming useless because we can't clear the edges" [member, female, village 1].) and activities in the forest being restricted ("There are fewer livelihood activities we can do" [member, male, village 2].). A smaller proportion of nonmembers (14.3%) also identified negative livelihood impacts as a disadvantage, stating the same reasons. Interview responses linked negative livelihood impacts to a lack of available alternatives, for example, "Our lives haven't gone well since the forest was protected because now we can't go to the forest to cut and sell trees. The rice we grow isn't enough. Maybe if we had funding from [the NGO] to help us develop things would be better" (member, male, village 1).

Of members 14.3% and of nonmembers 4.8% reported conflict as a disadvantage of membership. This included conflict among members (e.g., "We often have arguments between members" [member, male, village 1].); between villagers and outsiders coming to use forest resources ("We are not popular, especially with [outsiders] who come here to hunt" [member, male, village 3].); between members and the NGO ("[We] disagree with [the NGO] about the way to protect the forest" [member, male, village 2].); and most frequently between members and nonmembers ("There are clashes between members and nonmembers" [member, male, village 3] and "Nonmembers hate us" [member, male, village 2].). Members noted they were often blamed for restrictions on forest access and prevention of certain livelihood activities, even though they felt they were not fully involved in decision making: "We don't have full rights, and we are not completely entitled to take decisions on our own- we have to rely on the NGO and the ministry of forest" (member, male, village 1).

Of members 27.8% and of nonmembers 16.7% reported there were no disadvantages to membership.

Distribution of Advantages and Disadvantages

Negative livelihoods were reported by significantly more respondents in village 2 ($\chi^2 = 31.5$, $p < 0.001$, df = 2) (49.4%) relative to village 1 (20.0%) and village 3 (8.62%). Only village 2 reported reduced forest access as a disadvantage (3.8%). This village was the most remote from markets, roads, and towns; therefore, households may have been more reliant on forest livelihood activities. Interview data suggested in this village particularly, new restrictions left people struggling: "We can't do gold mining anymore and we can't expand the rice fields, so we don't have a way of making money now" (member, male,
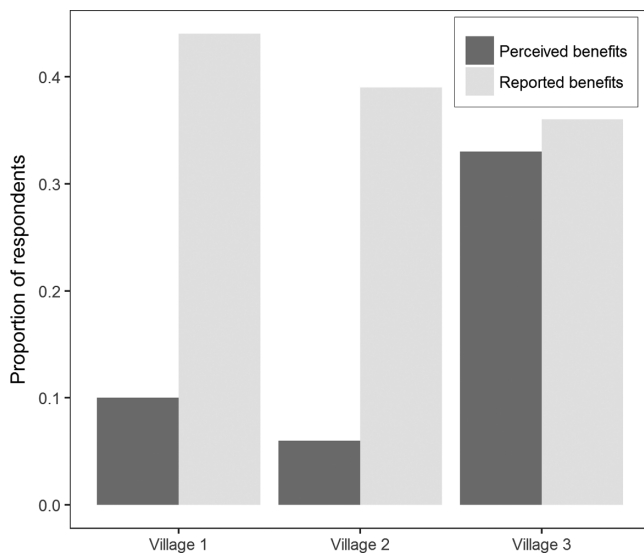
Figure 1. Proportion of respondents (total respondents 217) who perceived receiving direct benefits (work, training, or materials) from the nongovernmental organization (NGO) was an advantage of local community association membership relative to the proportion of respondents who reported receiving direct benefits from the NGO.

village 2). Of respondents in village 3, 32.8% perceived receiving direct benefits (work, training, or materials) from the NGO to be an advantage to membership, which was significantly higher than 10.0% in village 1 and 6.33% in village 2 ($\chi^2 = 23.18$, $p < 0.001$, df = 3). Interview responses frequently mentioned that not everyone involved in the LCA necessarily received benefits: "Not everyone gets help from [the NGO], so we want some sort of compensation from [them] or something because we protect the forest, but we don't get anything in return" (member, male, village 3). However, when directly asked which households received direct benefits from the NGO, questionnaire responses showed there were no significant differences among villages ($\chi^2 = 0.83$, $p < 0.65$, df = 3) (Fig. 1) (i.e., the distribution of direct benefits from the NGO was fairly even between villages), but there were large differences in whether respondents considered this a key advantage of LCA membership. Conflict was reported as a cost by significantly more respondents ($\chi^2 = 6.12$, $p < 0.05$, df = 2) in villages 1 (15.0%) and 3 (13.8%) than in village 2 (3.8%). This could have been linked to the very high reporting of negative livelihood impacts in village 2.

Men were significantly more likely to report conflict (13.8%) as a cost of participation than women (1.75%; $\chi^2 = 6.38$, $p < 0.05$, df = 1). Two potential explanations for this emerged from interviews and focus groups: men are more likely to be members, attend meetings, and therefore be aware of conflicts within the LCA or with the NGO and men are more likely to go into the forest and

therefore more likely to encounter other village members or outsiders breaking rules. Women who are less likely to attend LCA meetings or go into the forest may still encounter conflict within the village, however.

Households who perceived receiving benefits from the NGO as an advantage to LCA membership, on average, had a significantly higher wealth score (0.534) than those who did not (−0.083; $t = -2.30$, $p < 0.05$, df = 215). Households receiving direct benefits from the NGO also had a higher wealth score on average (0.0457) than those who had not (−0.0136), although this is not significant ($t = -0.32$, $p > 0.05$, df = 215).

Discussion

The quantitative analysis results showed the importance of gender, attitudes, and forest reliance in predicting participation in comanagement associations. The theory of planned behavior allows for informed intervention design by identifying the most important determinant or determinants of behavior. Our results suggest that focusing on attitudes could encourage participation. Individuals were more likely to participate when they perceived it would help to protect the forest and make it easier to access the forest. This set of statements highlights the struggle of individuals aware of the importance of protecting their environment who rely on it for their livelihoods and a different cultural perspective on the environment and conservation from those designing conservation interventions. Shared governance structures need to find a way in which different sets of values can be combined and are understood by different stakeholder groups.

To meet the aims of shared governance, comanagement associations should be representative (CBD & UNEP 2010; Borrini-Feyerabend et al. 2012), yet women were less likely to participate due to perceived financial and time constraints and miscommunication about LCA rules and eligibility. Virah-Sawmy et al. (2014) highlighted that traditional Malagasy village-level institutions are dominated by older men, and basing LCAs on this risks marginalizing women and migrants. In Belize women reported similar barriers to participation (Kaeser et al. 2016). Yet, communities in India and Nepal had more effective forest protection when a higher proportion of women were involved in governance (Agarwal 2009).

Lack of knowledge about comanagement associations and how to join, limited participation. Communication may be logistically difficult in countries such as Madagascar, where households are often extremely inaccessible and dispersed. Households in rural Madagascar rely on subsistence farming (World Bank 2013) and may be reluctant to give time to attend village or community-association meetings. When local people are excluded from conservation decision making it can lead to acts of resistance (Holmes 2007). In another area of Madagascar,

anger toward PA authorities led to local people killing a radio-collared sifaka (*Propithecus edwardsi*) after communities were prevented from accessing forest resources (Jones et al. 2008). Effective communication in participatory governance can ensure incorporation of local knowledge, increase accountability of decision making, and increase perceived legitimacy of rules. In coastal communities in Madagascar, a social marketing campaign was successful in improving knowledge of, attitudes toward, and enforcement of local laws (Andriamalala et al. 2013). Success there was due to good understanding of existing governance structures and integration of the intervention within these.

Respondents reported limited benefits and high costs to participating in comanagement. Although comanaged PAs are typically associated with delivering greater benefits than community- or state-managed PAs (Oldekop et al. 2016), local context is also important. Other studies illustrate that comanagement can improve livelihoods because local communities design locally relevant and useful schemes that include income-generating activities, facilitate local lending and savings, and enhance social capital and development of human capital through training (Chinangwa et al. 2016). Limiting the costs of conservation interventions to local communities is not just a socioeconomic issue; it can also affect conservation outcomes (Oldekop et al. 2016).

Communities are heterogeneous, and the impact of PA-related costs and benefits will be felt differently throughout social divisions, as we found. This is why efforts to increase participation in conservation governance need to be representative. Local institutional capacity building is likely to be important for successful and equitable projects (Brooks et al. 2012), yet using preexisting institutions may reinforce or exacerbate inequalities, where elites are able to have a greater say or capture more of the benefits. Risks of elite capture can be mitigated where external organizations are involved (Persha & Andersson 2014). Comanagement organizations, such as NGOs, could work to ensure that participatory decision-making processes are inclusive and representative while promoting monetary benefits and their equitable distribution (Oldekop et al. 2016).

We identified both the potential and limitations of applying TPB to conservation-related behaviors. The TPB provided useful insights into the drivers surrounding choices to participate in forest governance; however, it missed factors highlighted by the qualitative data, such as subjective norms. Other researchers have found that TPB explains behavior incompletely, and many authors suggest contextual and other additions (Mastrangelo et al. 2014; Gurney et al. 2016). As we found, qualitative data can be valuable in exploring and understanding quantitative results.

Community participation in governance has been shown to more likely provide socioeconomic and biolog-

ical benefits and reduce costs for local communities than other governance approaches (Persha et al. 2011; Oldekop et al. 2016). Our results provide further evidence that PA-related benefits and costs, as well as participation within communities, can be unevenly distributed. We found several challenges related to comanagement of PAs: understanding the heterogeneous nature of communities; ensuring all households are represented in governance participation; exploring differences in perceptions of forest protection; and targeting interventions to reach households most in need (and avoid elite capture). By designing governance structures that specifically address these challenges, PAs may be better able to provide socioeconomic and biodiversity benefits and ensure that the costs of PA establishment are not borne by the poorest, most marginalized groups.

Acknowledgments

Supporting Information

Village selection criteria (S1), AIC values for model comparison (S2), FG protocol (S3), interview protocol (S4), household questionnaire (S5), MSL variables and PCA results (S6), TPB statements and calculations (S7), measures of TPB validity (S8), and the GLM coefficient plot (S9) are available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

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