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Conservation begins after breakfast: The relative importance of opportunity cost and identity in shaping private landholder participation in conservation

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ABSTRACT

The conservation opportunity literature increasingly emphasises opportunity cost as an important determinant of willingness to engage in conservation on private land. We investigated the explanatory power of a group of opportunity cost variables in the decision to participate in a landscape-level conservation initiative on the Agulhas Plain, Cape Floristic Region. Opportunity cost variables outperformed affiliation and demographic variables when used in one model and had almost as much explanatory power as the combined model when used on their own. In the opportunity cost model, conservation was positively related to farm size and education and negatively related to share of income from farming and size of the remnant of natural vegetation on the farm. Of these relationships, that between education and participation was the most elastic: a 1% increase in education led to an almost 2% increase in the likelihood of participating in conservation. A large group of identity variables jointly explained nothing, but a subset of age, gender and Afrikaans language status had some explanatory power when used separately. We suspected this subset of demographic variables to have done nothing but proxy patterns of opportunity cost in the farming community. When re-estimated with the untransformed remnant as a share of farm size rather than an area, similar results were obtained and the negative sign on the remnant was confirmed. We concluded that understanding what opportunity cost conservation imposes on private landholders is not only important, but critical, for predicting which private land will come into and stay in conservation.

1. Introduction

It is common cause internationally that land of low economic value is over-represented in protected areas (e.g. Pressey, 1994; Balmford and Whitten, 2003), leaving high priority conservation land at the mercy of private landholders (Knight, 1999). Private land should ideally become part of conservation plans, because the statutory protected areas are insufficient to protect biodiversity effectively (Brooks et al., 2004; Rodriques et al., 2004). Biodiversity targets could be achieved at significantly lower cost by incorporating private conservation land into the global network of protected areas (Gallo et al., 2009). But for this strategy to be successful, it is important to explore which farmers are likely to sign up for conservation and what schemes and programmes have the greatest chance of success (Knight et al., 2011; Raymond and Brown, 2011; Michael, 2003).

When private landholders on the Agulhas Plain in the Cape Floristic Region claim that "conservation begins after breakfast" they imply that conservation is a luxury which has to wait until the urgent work of farming is done. Australian cattle farmers expressed the same sentiments with the assertion that "it is hard to be green when you are in the red" (Richards et al., 2005). If these claims accurately reflect how most farmers predominantly think about conservation, it means that participation in conservation is a matter of affordability and forgone income, and is not primarily determined by attitude or identity. Several multivariate conservation models include elements of opportunity cost (Sekhar, 2003; Shrestha and Alavalapati, 2006; Ma et al., 2009; Cross et al., 2011), but none of these models test opportunity cost variables explicitly against other (identity) variables. We do not present this paper as a choice between opportunity cost and identity; we simply want to understand the extent to which opportunity cost variables can provide, or contribute to, an explanation of conservation on private farmland.

2. Methods

2.1. Study area

The setting for this study is the Agulhas Biodiversity Initiative, a landscape-level conservation initiative rolled out across an area of

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335,335 ha of private farmland on the Agulhas Plain, South Africa, in the early 2000s. The Initiative aimed to promote sustainable resource use, strengthen conservation partnerships and raise general conservation awareness (Lochner et al., 2003). Its broad intended impact meant that landowners encountered the work of the Initiative in a number of contexts. For example, some landholders were recruited into a sustainable wildflower harvesting certification programme, while others were involved in the establishment of a private protected area.

The Agulhas Plain (S34°40′ E19°40′) is exceptionally rich in biodiversity, including 1751 plant species, among them 99 endemics and 112 Red Data Book species (Cowling and Holmes, 1992; Cowling and Mustart, 1994; Raimondo et al., 2009). Biodiversity is threatened by agriculture and urbanisation, which have already transformed 23% of the land, and invasive alien vegetation, which has claimed at least 11% of the land and continues to spread (Lombard et al., 1997). More than 70% of the land is in private hands. Traditional farming enterprises, such as mixed livestock-grain and dairy farming, account for 42% of the average landholder's household income, while 25% of income derives from biodiversity businesses such as wildflower harvesting (Conradie, 2010). The survey recorded off-farm income as contributing 34% of the average household's income in the sample. Most of the off-farm income derives from lifestyle or hobby farms, but in a handful of cases it indicates subsistence farms. The main growth sectors within traditional agriculture are dairy, grains and wine grapes. The majority of farmers are male, white and Afrikaans-speaking.

2.2. Data collection

Data were collected during semi-structured, face-to-face interviews in the winter of 2009. We collected information about the farmer, the farm and the farmer's involvement in the Agulhas Biodiversity Initiative. The membership lists of four local chapters of the farmers' union were used in combination with contact details provided by neighbours and NGOs working in the area to compile a population of rural landholders from which a random sample of was drawn. Our interviews targeted owner-operators or senior farm managers and on occasion we interviewed husband and wife together. Interviews were conducted in the home of the respondent. To maximise the response rate, we phoned ahead to make appointments and used a single Afrikaans-speaking interviewer with a background in agriculture and a good knowledge of the area. The sample of 75 observations corresponds to a response rate of 82% of farms sampled and represents 73% land coverage on the Agulhas Plain. Sample size was restricted by the small scope of the Initiative, which limited the complexity of the multivariate regression models presented below. Significant non-response on variables like income and farm size was a further challenge to the model building process.

2.3. Model specification

Previous studies have used pair-wise tests and multivariable modelling to distinguish landholders who are willing to engage in conservation and those who are not. If sample size is limited, pair-wise tests are an attractive option, but where sample size is large enough, multivariable models have the advantage of showing the interaction between various potential determinants of willingness to conserve. Both approaches were used in this study in order check for internal consistency. For pair-wise testing, the process was to categorise landholders according to their conservation status or attitudes and then to test for significant differences in farm and farmer characteristics across the categories, one characteristic at a time. In multivariate models the dependent variable usually measures attitudes (Sekhar, 2003; Shrestha and Alavalapati, 2006; Cross et al., 2011) or the adoption of a given strategy (Ma et al., 2009). The dependent variable in this study was self-reported participation in any of the Agulhas Biodiversity Initiative's conservation activities. The response was binary. Where respondents were unsure of what the Initiative was, participation was recorded as no. No attempt was made to quality-adjust for extent of participation. The variation in the likelihood of participating in the work of the Agulhas Biodiversity Initiative was explained using the variables defined in Table 1.

Table 1
Definitions of exogenous variables with expected signs.

Name	Variable description	Expected sign
Opportunity cost variables		
ln(size)	Natural log of hectares of all land	+
%farm income	Share of household income from traditional farming enterprises	−
ln(education)	Natural log of years of formal schooling	+
ln(remnant)	Natural log of hectares of untransformed land	−/+
%remnant	The untransformed remnant as a share of farm size	+/−
Identity variables		
ln(family tenure)	Natural log of years of family tenure on the land	+
Farmers union D	Dummy variable = 1 if farmers' union member, else = 0	−
Conservancy D	Dummy variable = 1 if conservancy member, else = 0	+
Tourism D	Dummy variable = 1 if involved in eco-tourism enterprise, else = 0	+
PA proximity D	Dummy variable = 1 if holding land next to protected area, else = 0	−
ln(age)	Natural log of age in years	−
Gender D	Dummy variable = 1 if male, else = 0	−
Language D	Dummy variable = 1 if Afrikaans-speaking, else = 0	−

The opportunity cost hypotheses were formulated as follows: farm size was used as a proxy for income and share of income from agriculture was used to control for the degree to which farm size could capture household income. The higher income, the more affordable conservation was hypothesised to be. The expected sign on share of income from agriculture (%farm income) was negative, as receiving less income from the land would lower the opportunity cost of conserving it. We expected education to be positively correlated with conservation for two related opportunity cost reasons: only better educated professional people can afford hobby farms, and if commercial farmers were to set aside land for conservation, better educated farmers would find off-farm work more easily than the less educated ones. Two options were considered for the specification of the remnant variable, namely area and proportion of total farm size. When defined as an area, the sign on the remnant variable was hypothesised to be negative, as larger remnants would imply more foregone production when switched into conservation. Alternatively, larger remnants would also represent more critical mass for starting up conservation compatible enterprises, in which case its relationship with conservation would be positive. Winter et al. (2005) reported a positive, but insignificant, relationship between the remnant area and conservation attitudes. The same arguments applied to the%remnant variable, except that very high remnant shares would almost certainly indicate hobby farms on which the opportunity cost of conservation was low. Therefore% remnant was expected to be positively related to conservation. The main advantage of the remnant share specification was that it was likely to be uncorrelated with farm size, while the remnant area specification was likely to be highly correlated with farm size.