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Exploring the value-action gap through shared values, capabilities and deforestation behaviours in Guatemala

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SUMMARY

Understanding drivers of deforestation is essential for developing any successful intervention to reduce forest degradation or loss, yet there remains relatively little consensus or clarity on how drivers should be identified and classified. To capture the full range of values and mediating factors that may contribute to land use behaviours, an approach derived from a shared values perspective that includes a range of values associated with whole landscapes and ecosystems is required. We developed a model that combines behavioural theory with the Capability Approach as a conceptual framework through which to investigate the value-action gap. We used exploratory factor analysis of Likert scale responses to belief statements to identify land-users' shared values in the Sarstun-Motagua region of Guatemala. We then qualify and quantify the role of capabilities in mediating between the shared values of different cultural groups of land users (Q'eqchi Maya and Ladinos) by comparing their factor scores with their self-reported forest cover change behaviours. Our results indicate

that Maya and Ladinos share a set of values, but hold different value orientations that predict their behavioural intentions. We find that their different value orientations reflect behavioural intentions, but an understanding of the capabilities available to different groups is also necessary to fill the value-action gap. These findings have implications for behavioural theory, providing empirical links between shared values, capabilities and behavior and identification of the role of value orientations, as well as demonstrating a useful approach for decision makers seeking to understand drivers of change at landscape and whole ecosystem levels.

INTRODUCTION

Understanding the role of values in informing behavioural outcomes has been a focus in the forest conservation literature in recent years (Drescher et al., 2017; Eriksson et al., 2015; Ramcilovic-Suominen et al., 2012; Sharaunga et al., 2015, 2013). However, values alone do not lead directly to behaviours (Ramcilovic-Suominen et al., 2012; Sharaunga et al., 2015; Vaske and Donnelly, 1999). Understanding what fills this value-action gap (Blake, 1999) remains a challenge.

One of the earliest behavioural models is the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975), which uses attitudes as a primary factor driving behavioural intentions, alongside subjective norms and the relative importance (or value) of both. In time, this model was adapted to take greater account of the other factors that influence behavioural intentions, one of the most well-known of which is Ajzen's Theory of Planned Behaviour (TPB) (1991) that includes the concept of 'perceived behavioural control', which influences norms, behavioural intent and behaviour.

Social-psychological behavioural theory stipulates that specific attitudes and norms influence associated behaviours (Fishbein and Ajzen, 1975). Attitudes are derived from values, and are specific to individual behaviours and situations (Fulton et al., 1996; Li et al., 2010). In this field, attitudes and norms are themselves derived from, and are predicted by, values (Fulton et al., 1996; Li et al., 2010; Schwartz, 2001). Rokeach (1973) and Schwartz (2001, 1992) suggest that values are 'single, stable beliefs that individuals use as standards for evaluating attitudes and behaviour' and 'values are beliefs, cognitive structures that are closely linked to affect', respectively. The broad and stable nature of these values can provide an insight into a wide range of behaviours (Hofstede, 1980; Rokeach, 1973; Schwartz, 2001). As deforestation and forest degradation (DD) is often a result of a range of different behaviours, actions or decisions, values could provide an effective starting point for a holistic exploration of drivers of DD. However, although values can provide explanations for a range of actions, Kollmuss and Agyeman (2002) and Darnton (2008) provide extensive reviews of a variety of models that account for the non-linear link between values and actions/behaviours, termed the 'value-action gap' (Blake, 1999).

The Capability Approach is a concept initially developed by Sen (Sen, 2001; Sen and McMurrin, 1979), and further built on by Nussbaum (2003), initially in response to monetary indicators of wellbeing commonly found in development planning and assessment. The 'wellbeing' considered in the Capability Approach is that of 'functionings' that people have a reason to value, such as being educated or having self-respect. However, in line with the value-action gap concept in behavioural theory, the act of achieving specific functionings is mediated by the 'freedom to achieve' these functionings. In the Capability Approach, these freedoms are individually referred to as capabilities, and collectively as a person's capability set (Sen, 2001).

Robeyns (2005) set out to clarify the steps between the means of achievement, the creation of the capability and the final achieved functioning. In order to identify which factors constitute capabilities, and how they can be enhanced, it is important to know the means available to an individual, and subsequently the process of conversion that occurs to transform these into capabilities (Sen, 2001). Robeyns (2005) categorised these conversion factors into three groups: personal, social and environmental. Personal conversion factors are specific to the individual (i.e. physical strength, sex, intelligence), social conversion factors are social practices and norms, and environmental factors include geographic location, infrastructure and public goods. These factors interact to either create or destroy capabilities available to the individual.

Many of the factors mediating the value-action-gap identified by behavioural theorists (e.g. social norms, feelings/emotions or information) can be accounted for within these conversion factors. The conversion factors also relate practically to drivers of DD, providing an explicit categorisation system that is broad enough to account for both social-psychological and external factors.

The concept of a set of shared universal human values has been well developed, but large scale empirical studies also show that preferences for, or orientations towards, these values may differ across cultures (Hofstede, 1980; Rokeach, 1973; Schwartz, 1994; Schwartz et al., 2012). Studies specifically on forest values have similarly found that although people may have similar forest values, value orientations (e.g. ecological vs production) often vary between different cultures and social groups (Eriksson et al., 2015; Vaske and Donnelly, 1999). The differences in these orientations or preferences are often a result of how different cultures and social groups view themselves in relation to other objects and people, so an understanding of these perspectives is important for identifying social and cultural norms that populate the value-action gap

and help predict behaviours (Hills, 2002; Kluckhohn and Strodtbeck, 1961). Therefore, to capture the full range of values and mediating factors that may contribute to land use decisions, behaviours, and ultimately change, an approach derived from a shared values perspective that includes a range of values associated with whole landscapes and ecosystems is required.

The relationship between forest values and behaviour has been explored (Ní Dhubháin et al., 2007; Ramcilovic-Suominen et al., 2012; Sharaunga et al., 2015; Vaske and Donnelly, 1999), often with a focus on a specific type of value (e.g. forest values or individual values) or mediating factor (e.g. attitudes, norms). However, shared values have been increasingly noted as important to ecosystem services and landscape level approaches to decision making (Brunetta and Voghera, 2008; Fish et al., 2011; Kenter et al., 2015).

We propose a conceptual model based on social-psychological behavioural theory combined with the Capability Approach to identify and structure drivers of DD. The model is then applied, using a mixed methods approach, to explore the link between land users' shared values and forest cover change behaviour in the Sarstun Motagua region of Guatemala.

METHODOLOGY

The Sarstun Motagua Region

The Sarstun Motagua region lies in the north east of Guatemala, spanning from the city of Guatemala to the Caribbean coast. Two NGOs, Fundaeco and Fundacion Defensores de la Naturaleza (FDN) manage various categories of protected land in this region, together with the National Council for Protected Areas, CONAP. The FDN manages the Sierra de Las Minas Biosphere Reserve (RBSM). Fundaeco manages

areas in the department of Izabal, including multiple use zones, municipal parks, hydrological reserves, biotopes and special protected areas. The area to the north of the RBSM is outside of NGO management.

Land access, ownership and management arrangements vary across the region, as do the livelihood activities of the residents. There is also a mix of Ladino (non-indigenous) and Mayan ethnicities throughout the region. The diversity of the land users and the presence of different nature reserves provides an excellent case study to explore the different factors that can mediate between shared values and behaviour.

Methods

The Behaviour-Capability-Drivers model (Figure 1) provided the conceptual framework for this study. The model explains how beliefs derived from external sources (social and situational capabilities) form values, which in turn inform attitudes, and behavioural intentions. The final behaviours are influenced by both the intentions, and the social and situational factors that constitute (or are absent from) a person's capability set (which fills the value-action-gap). The behaviours, if maintained, eventually integrate into people's beliefs which may lead to new (or revised) value formation in the long-term, in a cyclical feedback model similar to that of Knott et al. (2008).

[Figure 1 here]

In late 2014, researchers at Universidad del Valle de Guatemala (UVG) held workshops with key stakeholders involved in land use decision making in the Sarstun Motaguá region, including individuals from government, academia, community associations, cooperatives, private sector and NGOs. These actors' perceptions of drivers of deforestation were used as a source of stakeholder belief statements about

land use. The statements were written with relevance to those who make direct decisions regarding land use.

A five-point Likert scale of ´strongly agree´ to ´strongly disagree´ was chosen for the belief statements (Foddy, 1994), which were tested for their relevance and comprehension with 42 land use decision makers from community associations, cooperatives and NGOs across the Sarstun Motaguá region.

A questionnaire survey (Appendix S1) was conducted of 501 land users (including land owners, renters and those with land use rights) (Table S1) from the Sarstun Motagua region of Guatemala. For practical reasons, sampling was limited to those communities that were accessible by vehicle. Responses were gathered through face-to-face interviews of land users in mid 2015 by staff from FDN, Fundaeco and UVG. Respondents were self selected according to their willingness to participate, which was probably influenced by their knowledge or experience with the organizations applying the questionnaire. This may represent some self-selection bias.

To collect forest cover change data, respondents were asked how much land they owned, how much of the land was forested when they acquired it, and how much forested land they had currently. These were converted to percentages of land owned to ensure that large differences in land owned did not skew the results. Four hundred and two participants responded to all the forest change questions and were used for further statistical analyses.

Statistical Analysis

We first carried out exploratory factor analysis (EFA) using the responses to belief statements in SPSS v.22, to identify the common factors (or shared values) associated with land use. The belief statements within each factor provide insights into the

situational capabilities associated with each value. Factor scores for different land user characteristics (age, gender, sector, location, ethnicity and number of children) were compared by analyses of variance (ANOVA).

Factor scores were regressed against forest cover change to identify which of the shared values had a significant effect on forest cover change. The land user characteristics were then used as proxies to identify some of the social and situational capabilities available (or not) to land users that may determine their behaviour. These different land user characteristic groups were compared using multiple Tukey post-hoc tests, to identify which characteristics (and thus capabilities) are likely to influence forest cover change.

In order to identify potential significant interactions between the values and the capabilities that may influence forest cover change behaviour, ANOVAs of the factors and the land user characteristics that were found to significantly correlate with forest cover change were conducted in an iterative process of elimination to find the significant main effects and interactions. In order to explain the interactions, we categorised open answer responses to the question 'why have you maintained this amount of forest' and compared them with the factor scores and land user characteristics in an ANOVA.

Focus Group Discussions

The statistical results indicated a clear difference in the actions between ethnic groups in their response to one of the factors from the exploratory factor analysis. Therefore, we also decided to run two further analyses on datasets consisting of Maya and Ladino respondents separately. We carried out a factor analysis and used these with the other statistical results in focus groups with Q'eqchi Maya (n=25) and Ladino (n=31)

participants separately, to further explain and validate the results. Participants were invited from the communities in the buffer zone around the RBSM.

Focus groups were used to validate the EFA results for the Sarstún Motagua land user shared values and elaborate on associated social capabilities. Deliberative processes such as focus groups can allow the exchange of information and perspectives on values, beliefs and norms which is essential for bringing out these shared values (Kenter et al., 2011; Reed et al., 2013).

The Ladino focus group was carried out in Spanish. The Maya focus group was carried out entirely in the Q'eqchi language, with translation to Spanish carried out by FDN faciliators, who also recorded the outputs in written Spanish.

The structure of the focus groups was designed to validate or interprete the factor grouping from the statistical analyses through the following process.

1. Understanding different perspectives on the shared values: a) participants were asked to separate into five small groups, b) each group was given the list of belief statements for one of the factors from the full, combined EFA analysis (or the list was read out), c) the groups were asked to discuss the key ideas expressed in the statements, and suggest a name for the factor (they were not told that these were meant to represent shared values), d) the different suggestions and perspectives across both the focus groups were integrated to help the researchers come up with one final name for each factor.

2. Validation of the shared values: a) each group was given three versions of the same factor: one from the combined analysis, one from the Mayan sub-analysis and one from the Ladino sub-analysis, b) the groups were asked to choose which factor version they preferred and why.

3. Validation of the interaction effect: a) participants were asked to indicate how strongly they related to the shared value with the significant interaction effect from the statistical analysis, b) participants were asked to volunteer why they related to the factor in this way.

In the case of the Ladino group, this resulted in further votes on how many people had de/reforested and why, and how many had taken part in incentive schemes and why. For the Mayan group, a follow up one-on-one interview with a community leader provided deeper insights into some of the reasons why he reforested.

RESULTS

Shared values across land users in Sarstun Motagua

The exploratory factor analysis of the full combined dataset (Table S2) identified five factors (Table 1). The factors were named based on the results of the ANOVAs and focus group discussions.

[Table 1 here]

Factor 1

The Q'eqchi Maya interpreted this factor as 'respect our land and love our forest'. They explained that with no forest there is no life. The Ladino group interpreted this factor as 'management and sustainable use of natural and economic resources with wellbeing and social responsibility'. They disagreed with Qs 24, 32 and 35. They also mentioned how they needed to balance necessity with the need to care for the environment, and that improving wellbeing and encouraging social responsibility could be approaches to incentivising people to care for the environment.

We named this factor ‘valuing sustainable futures’. For Ladinos this future is linked to the use of natural and economic resources for the future of the community. Q’eqchi Mayans felt it was more about a symbiotic relationship with people and the forest, where the life of each one sustains the other.

Factor 2

The Q’eqchi interpreted this factor as ‘to be conscious of the care of natural resources through the good use of soil’ and explained that they believe organic practices are the best. The Ladino group interpreted this as ‘the importance of natural resources’. They believed they should know who landowners are in order to regulate activities and engage in sustainable management practices to avoid deforestation and obtain better incomes. They also discussed how they needed more resources to help conserve the forests and that people do not understand the importance of the law.

We named this factor ‘valuing good governance’. The Maya focused on aspects of ‘stewardship’: they considered themselves to be the ones who provide the care, while the Ladinos considered the law (or municipality) to be responsible for governance. The two perspectives indicate the importance of governance of good practices, but from different cultural perspectives.

Factor 3

The Q’eqchi identified this factor as ‘to know, love and care for the forest is to know love for life’. They considered that if people do not care for the forest, they do not care for themselves or the future of their children. The Ladinos interpreted this factor as ‘regulation of, and strengthening of institutions and environmental education for conservation of natural resources’. They believed that when people have no environmental conscience they use the land badly, and environmental education could

help cultivate an environmental conscience. They also mentioned that they would like offices in each department where they can report bad land uses, as currently it is a complex process to do so.

We named this factor ‘valuing environmental conscience’. Q’eqchi Mayans considered this factor to reflect an intrinsic, symbiotic relationship with the environment and people, highlighting that if people do not care for the forest, they do not care for themselves. The Ladinos considered environmental conscience to come from education, not necessarily an intrinsic value.

Factor 4

The Q’eqchi interpreted this factor as ‘I engage in caring for the forest but also I need more capacity to have a sustainable livelihood’. They said that people needed more environmental education to be able to develop and reforest, that knowledge about the environment equals care for the environment. The Ladinos interpreted this as ‘formation and training through community extension work in good forest (and agricultural) management practices and alternative production.’ They discussed how people need to know more about the environment, but they often do not have enough information to engage in good practices. We named this factor ‘valuing environmental conservation’.

Factor 5

The Q’eqchi interpreted this factor as ‘We respect our laws as we love our forests’ and they explained that for development to occur in communities they need laws. The Ladino group interpreted this factor as ‘regulation of sustainable farming’. As both groups mentioned some sort of respect for the law (whether formal or informal), we named this factor ‘valuing the rule of law’.

In the focus group discussion, the Q'eqchi Maya and Ladinos unanimously agreed with the combined factor 1, although Ladinos also discussed how they disagreed (sometimes strongly) with several statements in factor 1. Therefore, it appears that although the Ladinos disagreed with the belief statements in the factor, their interpretation of the factor ('management and sustainable use of natural resources with wellbeing and social responsibility', a clearly 'positive' idea) reflects the value they wished to achieve. This would suggest that the belief statements outline capabilities that enable or inhibit achievement of their values. Furthermore, the agreement with these statements (or capabilities) reflects the extent to which these issues are relevant to participants' lives: the Ladino focus group did not consider most of the statements in the combined factor 1 to be relevant to their lives, while the Mayans did.

Shared values when analysed by ethnic group

The separate Ladino and Mayan exploratory factor analyses produced differing factor structures (Tables S3 and S4). The Mayan factor 1 and Ladino factor 2 (Table 2), together contained all the statements in the combined analysis factor 1. These three factors were chosen for comparison in the focus groups.

[Table 2 here]

When the focus groups were asked to choose which of these factors they associated with most, the majority of the Q'eqchi Maya chose the Maya factor 1. They mentioned how having a big family (Q32) negatively impacts the forest. Taking into account that the average number of children per family is eight, their response suggests that they are choosing this factor due to its relevance to their lives: they see first hand how large families negatively affect the environment.

The majority of Ladinos chose the combined factor 1, their reason being their perceived importance of protected areas for the environment. According to one of the FDN facilitators, to this group 'protected areas' meant forest plantations, not necessarily reserves such as the RBSM. Approximately half of the Ladinos in the focus group owned land that they had reforested, although not as part of an incentive scheme, again suggesting that they are identifying with the idea of 'protected areas' due to its relevance to their lives. The other Ladinos chose the Ladino factor 1. Similarly, they discussed how the statements in the factor made them think about all the ways in which they need to avoid deforestation in their communities (e.g. Q28).

None of the Ladinos identified with the Mayan factor 1, and only a few Mayans identified with the Ladino factor 1, suggesting that there is a significant difference in the separate values across the two groups. However, several Mayan and Ladino focus groups chose the combined factor 1, supporting the idea that the combined analysis is likely to represent some form of shared value structure.

Shared Values, Land user Characteristics and Forest Cover Change

All land user characteristics, except number of children, varied significantly with at least one of the combined factors (shared values). Factors 1 ($p < 0.001$; $R^2 = 0.034$) and 5 ($p = 0.005$; $R^2 = 0.02$), and ethnicity ($p = 0.036$), location ($p < 0.001$) and number of children ($p = 0.021$; $R^2 = 0.015$) all significantly correlated with forest cover change. Factors 1 and 5, and ethnicity and location were taken forward for exploring interactions, as they all varied significantly with each other and with forest change.

Ethnicity alone had a significant effect on forest cover change (Ladino = -17.46% vs Mayan = -2.71%, $p=0.01$); Ladinos tended to report more negative forest cover change than Mayans. Ethnicity significantly interacted with the combined factor 1 score in its

334 influence on forest cover change ($p < 0.001$), with Mayan forest cover change
335 negatively associated with disagreement with Factor Score 1 (Figure 2a) and Ladino
336 forest change positively associated with disagreement with Factor Score 1 (Figure 2b).

337 [Figure 2 here]

338 We found that the reasons provided for keeping forest for Ladinos tended to either be
339 related to conservation of/for the environment (n = 24) or necessity (n = 31). While, for
340 Mayans, it was conservation of/for the environment (n = 169) or access to incentive
341 schemes (n = 20).

342 Among the Mayans, there was no significant difference between those who stated
343 their motivation as conservation or incentive schemes. However, when the Mayans
344 who also spoke Spanish alongside their indigenous Maya language were removed (n
345 = 62 total, of whom 20 responded to the 'maintaining forest cover' open question),
346 there was a significant interaction with factor 1 ($p=0.004$). Mayans who agreed with
347 the combined factor 1 tended towards increased forest cover, the opposite of the
348 Ladinos (Fig 20). The Mayans who tended to agree with the combined factor 1 had
349 accessed forestry incentive schemes, suggesting that when they experience necessity
350 they use forest plantations to generate income, instead of deforesting.

351 We found a significant difference between Ladinos who cited necessity, versus
352 conservation as their motivation. Ladinos who agreed more with the combined factor
353 1 tended towards forest cover loss ($p=0.001$), suggesting that Ladinos that experience
354 necessity engage in DD activities. Conversely, Ladinos that do not experience
355 necessity may not rely on the forest for survival, and engage in activities that increase
356 forest cover.

In a one-on-one interview, a community leader from the Q'eqchi Maya group told us how that in order to afford to feed his children and find a way to support them growing up, he had used a government forestry incentive scheme available to private landowners. His children were now in various professions (e.g. teachers, police officers). However, he preferred that they did not leave the community to find work, but acknowledged the difficulty in surviving solely from the farm. His story lends to our interpretation that access to incentive schemes provided Mayans with an opportunity to make money to survive, while maintaining their preferred lifestyle closely associated with the land and forest.

When the Ladinos were asked how many had ever engaged in reforestation activities on their own land, 16 out of the 31 said they had. When asked how many had ever had to deforest due to necessity, only five people said "yes". Only four Ladinos said they had ever accessed any type of financial incentive scheme for reforestation activities. When asked why some of them had chosen to reforest even though they were not receiving financial payments, they responded that they do it purely for the environmental benefits related to conservation of water sources, animals and plants. They also said that they did not trust the government enough to engage in incentive schemes, partly because they considered the government to lack the capacity to run the incentive programmes, and partly because they were afraid to lose their land once the incentive scheme was over (they would be required to continue to pay rent on the forested land which they may not be able to afford without incentive payments).

The discussion supports our interpretation that Ladinos that had not experienced necessity tended to engage in reforestation activities, in a converse relationship to Mayan decision making.

DISCUSSION

Our study provides evidence that shared values were present across land users in the Sarstun Motagua region of Guatemala. These shared values could be attributable to their shared identity as *campesinos* (smallholder farmers; Orlove, 2002), although *campesino* identities were not discussed with land users nor was it a concept that they used in discussing their attitudes. Other studies have similarly found that diverse stakeholders may have similar values, but were separated by their orientations within that value (e.g. Eriksson et al., 2015; Vaske and Donnelly, 1999). The different perspectives associated with the shared values suggest the presence of common themes, but different orientations within these themes that is separated by culture. Therefore, the Q'eqchi Mayan value orientation on the combined factor 1 (Valuing Sustainable Futures) represents an intrinsic relationship for them ('forest as life') while Ladinos considered the 'forest as opportunity'.

The study has several limitations which often come with research conducted into behaviour or social issues. These include the potential bias associated with self-reported data, the influence of interviewers on participant responses to interviews or focus groups and the question of whether 'measuring' values or behaviour is possible. EFA results are dependent on the quality of the study design, only able to identify common factors that are described by the inputted variables and therefore factors rarely cumulatively account for 100% of variance in the sample. Reliability tests were conducted on the data including split data and Cronbach's alpha. The data presented appear robust and have been validated through follow up focus groups.

Language differences are another consideration, most of the questionnaires (58%) were delivered by an interviewer in a Mayan language, and for each of these they

were translated by a member of the community who could speak both Spanish and the local Mayan language. The Mayan focus groups were carried out fully in the Mayan language, and we were provided with a translation into Spanish. This still meant that there is likely to be some loss of richness and information in this translation process, but the participants were able to speak and discuss freely in their own language. Although, this also meant we had limited 'control' over the avenues of discussion which the focus group developed it did evolve more naturally from the participants potentially providing a truer overall picture.

Overall, the results still provide a useful insight into the shared values of land users in Guatemala, and how this approach could be used to further understand forest change behaviours. Several studies have found that biocentric (but not anthropocentric) value orientations predicted positive attitudes and behavioural intentions towards wildland preservation (e.g. Fulton et al., 1996; Milfont and Duckitt, 2004; Milfont and Gouveia, 2006). In our study, people with both the forest as life (biocentric) and forest as opportunity (anthropocentric) engaged in practices that increased forest cover. In the case of the Q'eqchi, when they experienced necessity, their preference was to find ways to meet their basic needs while maintaining forest cover (e.g. accessing incentive schemes). If they could not access incentive schemes (due to negative capabilities outlined in the belief statements associated with the shared value), then it is likely they would be forced to deforest.

Conversely, when Ladinos could not meet their more anthropocentric view of a sustainable future value (e.g. with no access to off-farm income opportunities, a negative capability) they used the forest to generate income first, only once they had met their basic needs would they consider conservation practices.

Knowing the different capabilities available to different social and cultural groups is important for effectively targeting intervention design. Additionally, if DD interventions are designed without taking into account cultural perspectives, this could exacerbate current land use problems and cultural divides by playing off of existing cultural misunderstandings (already particularly prevalent in Guatemalan societal history (Hale, 2002)), having further negative effects on the environment (creating a negative social capability) (Figure 3).

[Figure 3 here]

In socio-psychological theories, value orientations are considered to more tangibly link to attitudes and behavioural intentions, are an expression of basic values (our shared values) and can provide consistency and organisation among the broad spectrum of beliefs, values, attitudes etc. (Fulton et al., 1996; Li et al., 2010; Manfredo et al., 2003; Vaske and Donnelly, 1999). Therefore, our results align with broader theory where value orientations would sit between shared values and behavioural intentions.

There has been some other work exploring the value differences between ethnic and cultural groups, including between the Maya and Ladinos of Guatemala. In the Petén region of Guatemala, land use practices between Q'eqchi Maya and Ladinos can be similar, as Lopez-Carr (2004) found that location, not ethnicity, was the driving factor. His identification of locational aspects (e.g. lack of market access and rural underdevelopment) fit well with our identification of negative situational capabilities, but he claims that the same intervention approaches (e.g. limiting access to forest land and promoting alternative livelihoods) can be used across both cultures to effectively reduce forest cover change.

Our results clearly indicated that the Maya and Ladino groups had different capabilities available to them. The contrast of the Lopez-Carr (2004) results with ours may be due to the immigrant nature of the Q'eqchi in the Peten region, while Alta Verapaz (in the Sarstun Motagua region) is their homeland. The bond between human and environment appears to be severed when Q'eqchi move to another region. Lopez-Carr (2004) may account for the significant relationships observed between the combined factor 1, forest cover change and location in our study, indicating 'place' can be important, but in our case study ethnicity was of greater importance.

CONCLUSIONS

Land users in the Sarstun Motagua area have a set of shared values and a number of different capabilities associated with the achievement (or not) of actions related to forest cover change. However, we found a significant difference in the way in which the two predominantly different cultures (Ladino and Maya) relate to these shared values, and how these relationships influence their behaviour. Our results support the theory behind the Behaviour-Capabilities-Drivers model, where social and situational capabilities mediate between shared values and behaviour. Additionally, we found that value orientations appear to determine behavioural intentions, and that an understanding of both value orientations and capabilities is necessary to fill the value-action gap.

Other studies on pro-environmental values and behaviours tended to focus on particular actions, values or mediating factors, which may be expensive and time consuming to carry out or review individually for the range of possible actions and factors that may contribute to land use change. The approach could be useful for decision makers working at a landscape/whole ecosystem level to identify factors that

may enable or inhibit pro-environmental behaviours. For environmental policy making, either hyper-localised approaches or a 'one size fits all' approach to policies are often the only options. The shared value approach used here identified a wide range of values and subsequent capabilities that were not limited to a specific type of action/behaviour, but could be explored in depth to elicit capabilities relevant to specific cultural groups.

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Supplementary material

For supplementary material accompanying this paper, visit http://www.journals.cambridge.org/ENC

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611 Table 1 EFA rotated factor matrix for the full combined dataset showing grouping of
612 belief statements into five factors (shared values)

Factor	Belief Statements
1	Q35 People should be able to use land that is not theirs
	Q32 Having a big family is important
	Q24 It is more important to make money today than think about the future of the forest
	Q34 Protected areas are *not* necessary for forest conservation
	Q11 I need to cut down the forest for sustenance
	Q28 We need more employment opportunities although this causes more loss of forest
2	Q27 We should know who is the owner and who can use the land
	Q31 People who live in the forest make little money
	Q8 I should avoid cutting down forest but I don't know why
3	Q1 It is important to manage forest resources sustainably regardless of time or cost
	Q2 If I owned land I would care for it more
	Q30 I am against cutting down the forest
	Q21 There are no places nearby where we can make complaints about bad land use practices
4	Q33 I want to do something good for the forest
	Q36 I need more capacity to engage in good agricultural practices
5	Q15 There should be more rules about how people can use the forest
	Q29 The state makes laws that are important for the environment

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Table 2. Maya factor 1 and Ladino factor 2 belief statements from EFA analyses by ethnic group

Factor	Belief Statements
	Mayan
1	Q35 People should be able to use land that is not theirs Q32 Having a big family is important Q24 Making money today is more important than thinking about the future of the forest Q11 I need to cut down the forest for sustenance
	Ladino
2	Q11 I need to cut down the forest for sustenance Q38 If there were more opportunities to sell my products I would need to cut down more forest Q30 I am *not* against cutting down the forest Q28 We need more employment opportunities although this causes more loss of forest

620 Figure 1: The Behaviour-Capabilities-Drivers model with numbered annotations explaining the methods used to elicit each aspect of

621 the model.

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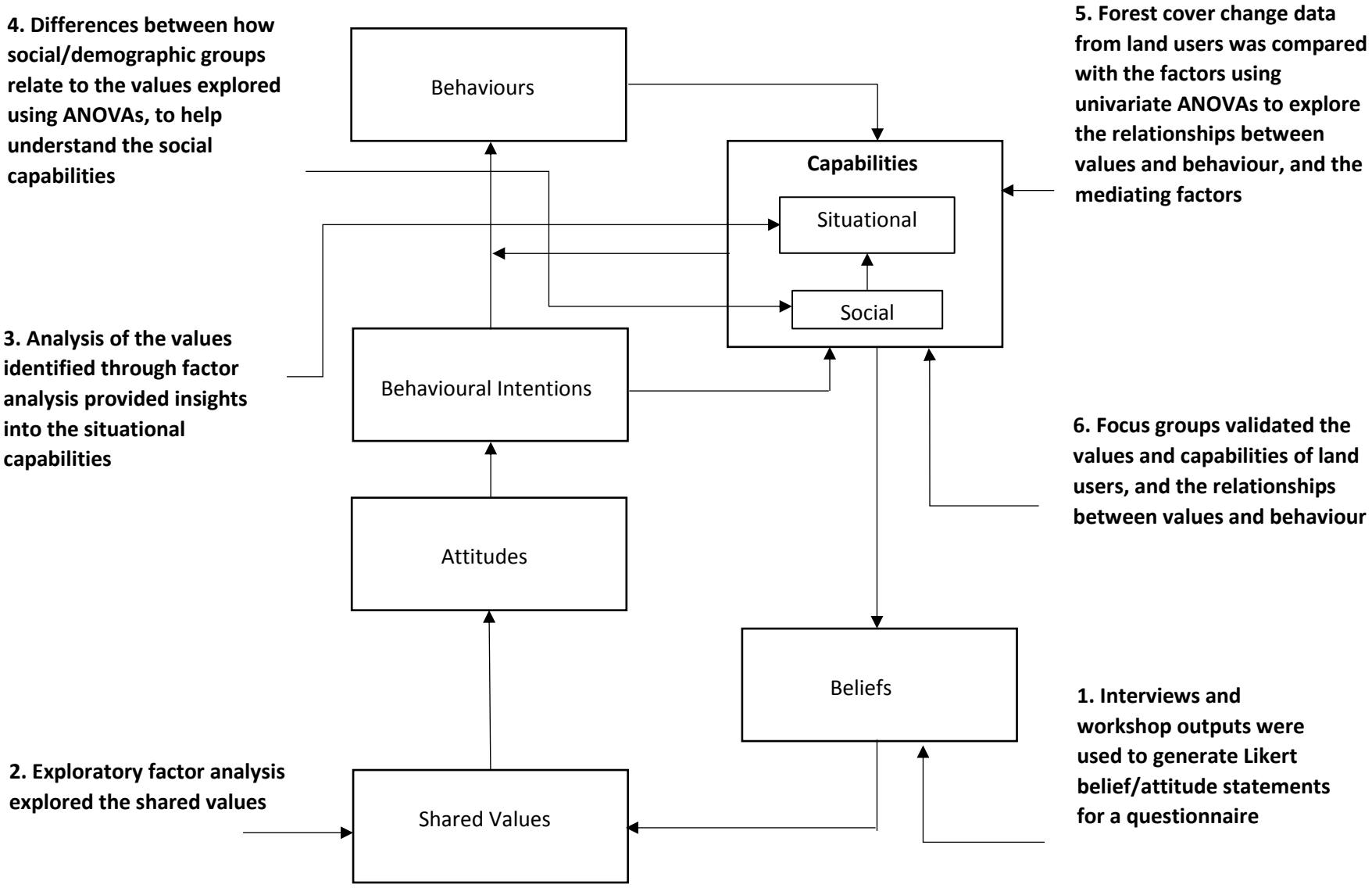

623 Figure 2: Plot of % change in forest cover (y) against level of agreement with Factor 1 Score (x) for a) Mayan and b) Ladino
624 respondents (Factor score of 1 = strongly agree, Factor score of 5 = strongly disagree). Linear regressions are plotted for each ethnic
625 group (Mayan, $y=24.52 + (-9.27x)$, $R^2 =0.053$; Ladino, $y=-40.4 + 7.81x$, $R^2 = 0.022$).

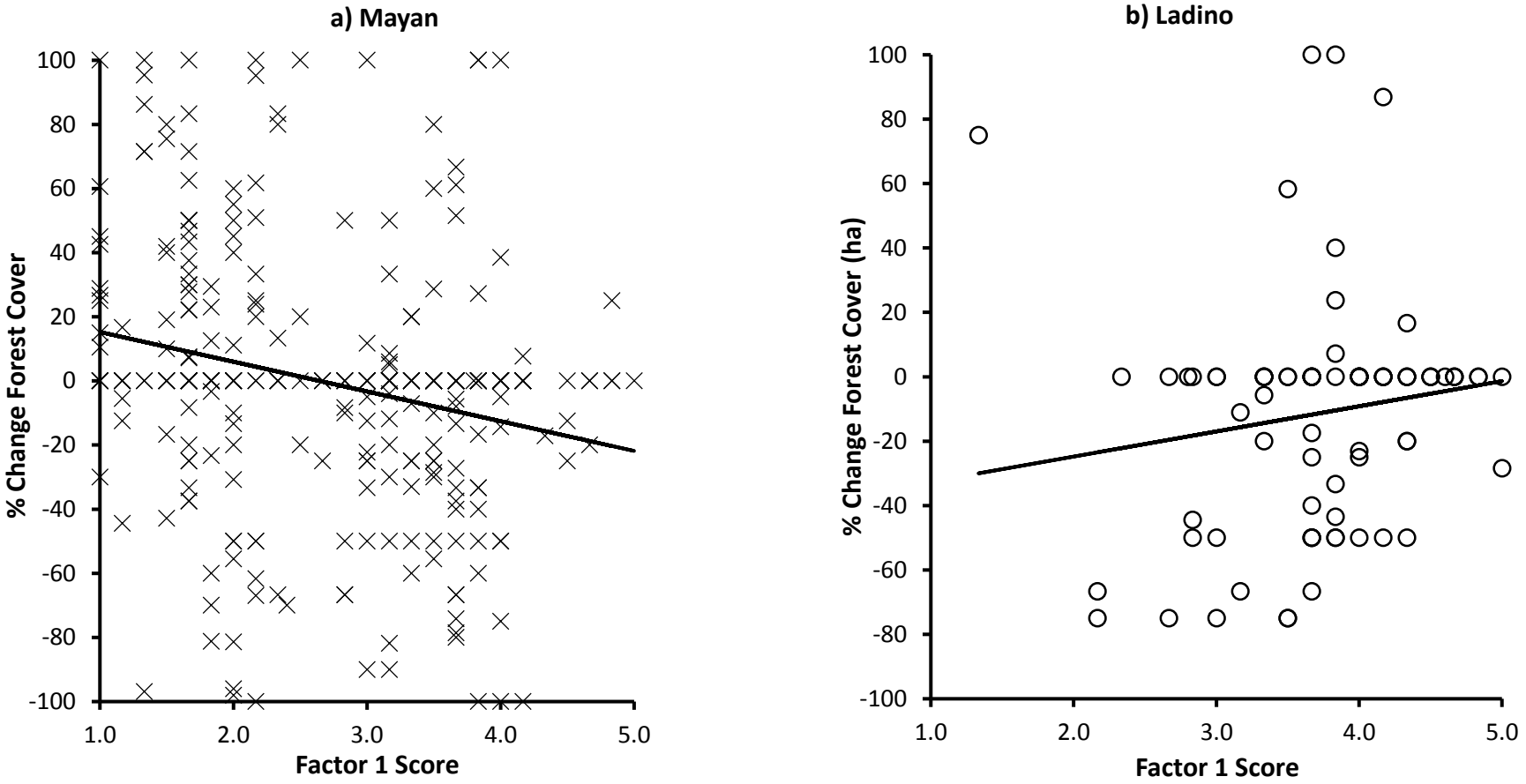

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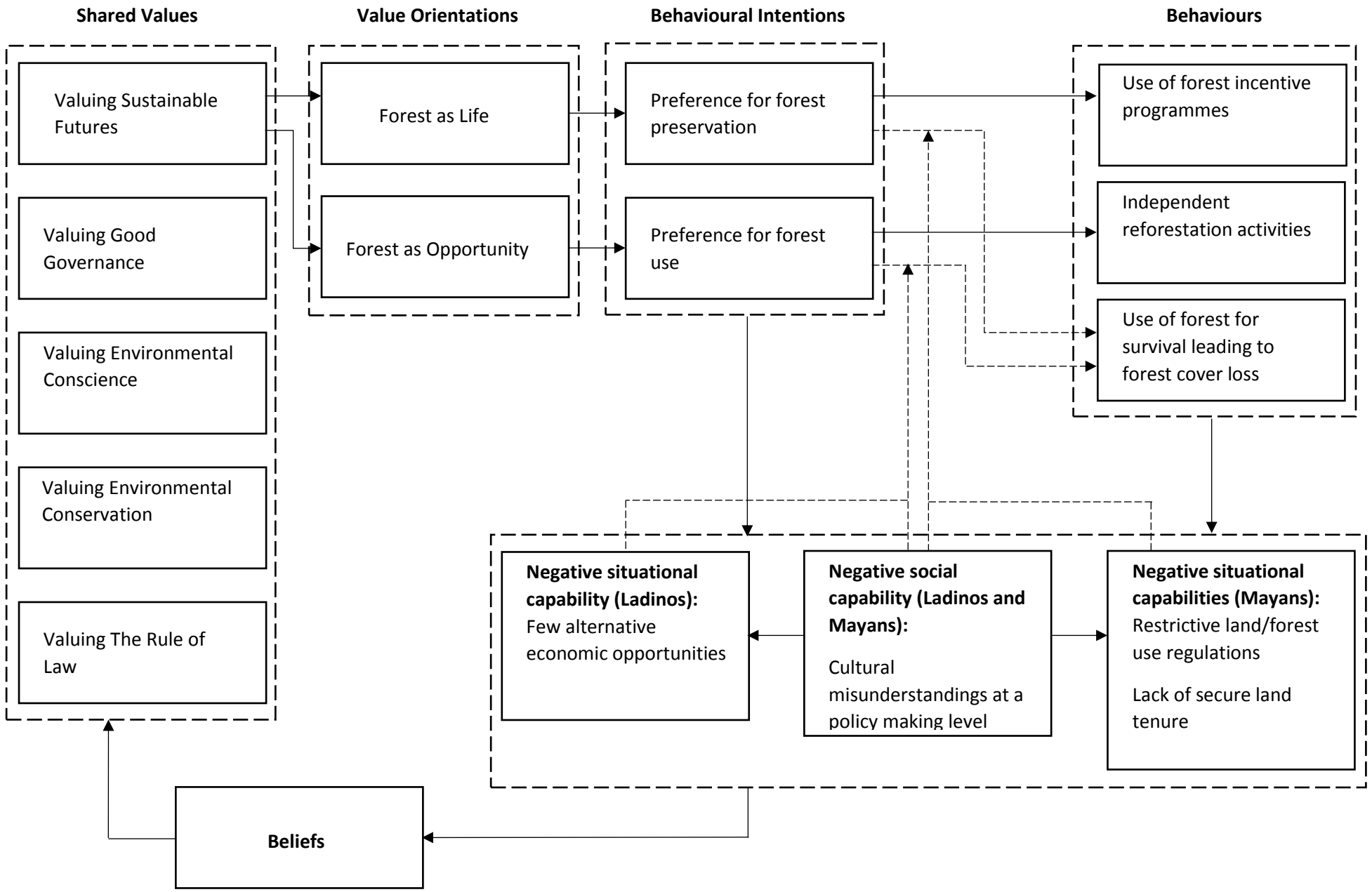
Figure 3: The results of the study applied to the Behaviour-Capabilities-Drivers model, showing land user shared values, value orientations, (negative) capabilities and links to behaviours.



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