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CONSERVACIÓN DE AVES EN BOLIVIA

Understanding factors influencing cattle ranchers' adoption of conservation practices in the Beni savanna, Bolivia

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Declaration of Own Work

I declare that this thesis, "Understanding factors influencing cattle ranchers' adoption of conservation practices in the Beni savanna, Bolivia", is entirely my own work, and that where material could be construed as the work of others, it is fully cited and referenced, and/or with appropriate acknowledgement given.

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List of acronyms

ACA	Asociación Civil Armonía
AGAYAC	Asociación de Ganaderos de la Provincia de Yacuma
BANR	Barba Azul Nature Reserve
BMP	Best Management Practices
FEGABENI	Federación de Ganaderos del Beni y Pando
INRA	Instituto Nacional de Reforma Agraria
IUCN	International Union for Conservation of Nature
NGO	Non-Governmental Organization
PA	Protected Area
PPA	Privately Protected Area
SENASAG	Servicio Nacional de Sanidad Agropecuaria e Inocuidad Alimentaria
SFI	Stewardship Functions Inventory
WWF	World Wide Fund for Nature

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Understanding factors influencing cattle ranchers' adoption of conservation practices in the Beni savanna, Bolivia

Abstract

Biodiversity protection on private land is being increasingly recognized as an effective strategy to achieve conservation targets where statutory protected areas are difficult to establish or where enforcement is lacking. However, the success of conservation initiatives on private land primarily depends on the landowner's motivations to adopt these strategies. Therefore, understanding the factors that shape landowners' decision-making process is essential for effectively designing and implementing private-land conservation initiatives.

This study focuses on the human and social factors that influence cattle ranchers' adoption of conservation practices in the Beni department, northeastern Bolivia. I used a structured questionnaire to survey 34 landowners in Santa Ana del Yacuma and Trinidad in order to assess their motivations towards potentially joining an initiative on sustainable cattle ranching promoted by the conservation NGO Asociación Civil Armonía. Results show that respondents had positive attitudes towards conservation in general and that the majority were willing to participate in the program. Overall, respondents were mostly attracted to the scheme because of the opportunity to enhance their land productivity through improved management practices. Moreover, participants expressed more interest in receiving support from the initiative in terms of capacity learning, infrastructure, and equipment, rather than from direct financial incentives. This study highlights the challenges and opportunities for conservation strategies on private land in Beni, and provides useful guidelines and recommendations for the design and implementation of the initiative on sustainable cattle ranching.

Keywords: Attitudes; conservation psychology; conservation strategies; land management; Llanos de Moxos; private land conservation; social research; sustainable ranching.

Introduction

Protected areas (PAs) are important tools for large-scale biodiversity conservation, covering about 18.8 % of the Earth's lands and oceans (UNEP-WCMC 2018). Yet, their effectiveness as sole tools in minimizing species and habitats loss is questionable as PAs are often isolated, are located in areas with low productivity, contain only a fraction of the global biodiversity, and lack effective management (Gallo et al. 2009; Geldmann et al. 2013; Kamal et al. 2015). In fact, the majority of the world's PAs are located in state-owned lands and waters (Watson et al. 2014), however, almost half of the earth's species under pressure from extinction occur on private land (Knight 1999).

The establishment of statutory PAs has been the dominant approach towards conserving biodiversity in many countries globally (Brooks et al. 2004). However, as PAs are often difficult to create or expand due to high land acquisition costs and lack of funds from government bodies (Naidoo & Ricketts 2006), privately protected areas (PPAs) are a valuable cost-effective alternative strategy to effectively achieve the desired conservation outcomes (Farmer et al. 2011; Selinske et al. 2015). PPAs are defined by the International Union for Conservation of Nature (IUCN) as: "a protected area, as defined by IUCN, under private governance (i.e. individuals and groups of individuals; non-governmental organizations (NGOs); corporations – both existing commercial companies and sometimes corporations set up by groups of private owners to manage groups of PPAs; for-profit owners; research entities (e.g. universities, field stations) or religious entities" (Stolton et al. 2014). PPAs complement state-owned PAs considerably in terms of overall biodiversity protection, therefore increasing the number of conservation targets achieved (Stolton et al. 2014). In this regard, PPAs are a valuable tool to reach global strategic goals, such as the Aichi Biodiversity Targets (Stolton et al. 2014).

Nevertheless, the implementation and management of PPAs is challenging due to the nature of landownership and the complex social and economic dimensions that drive land-use decisions

(Raymond & Brown 2011; Kamal et al. 2015). Landholders' motivations and limitations to adopt conservation practices on their land depend upon several psychological and social characteristics (Selinske et al. 2015; Greiner 2016; Liu et al. 2018). In this sense, landowners' engagement in PPAs must begin by measuring and understanding the values, attitudes and behaviors that shape their decisions on land-use management (Cocklin et al. 2007; Moon et al. 2012). However, these social and psychological dimensions are often disregarded in the design of conservation schemes such as PPAs, which leads to ineffective conservation actions (Knight & Cowling 2007; Ahnström et al. 2009; Knight et al. 2010).

Covering an area of approximately 213,564 km^2, Beni is the second largest department in Bolivia. Cattle were introduced to the region by Spanish Jesuits missionaries in 1682 (Denevan 1966). Today, large-scale, extensive cattle ranching for meat production represents the primary form of land use in the department, where 53% of the territory (approximately 10.7 million ha) is designated for livestock grazing (FEGABENI 2017). With an estimated 3,088,148 heads of cattle, Beni is the second largest cattle-producing department in Bolivia, after Santa Cruz (INE 2015).

Extensive cattle ranching, and some of its current management practices, are considered to be drivers of biodiversity loss due to altered fire regimes, grazing pressure from cattle, and the spread of non-native grasses cultivated as forage (Hesse & Duffield 2000; Mayle et al. 2007; Hordijk et al. 2019). Particular landscape elements such as forest islands, which are small forest units within the savanna matrix, found on mounds of natural or human (pre-Columbian) origin (Langstroth 1999), are threatened by cattle due to overgrazing and soil compaction from trampling, which affect tree regeneration and therefore threaten the long-term survival of these landscapes (Hesse & Duffield 2000; Hordijk et al. 2019).

To address these issues, Asociación Civil Armonía (ACA), a conservation organization which owns and manages the Barba Azul Nature Reserve (BANR), located in the Yacuma province of Beni, is

73 planning to implement an initiative to support cattle ranchers' adoption of sustainable ranching best
74 management practices (BMP) by creating voluntary agreements with landowners. Although the
75 initiative is in its preliminary phase at the time of the present study, the planned management
76 practices to be implemented consist of: (1) rotational grazing systems to improve pasture growth and
77 to reduce the use of fire; (2) fencing-off of forest islands to prevent vegetation overgrazing and soil
78 compaction from cattle, while maintaining areas of refuge; (3) promotion of natural pastures over
79 cultivated non-native pastures; (4) promotion of the use of anti-parasitic treatments that do not harm
80 the environment; (5) a controlled burning management scheme; and (6) promotion of management
81 techniques that improve animal welfare. One of the main goals of the project is to develop a
82 certification label for meat products produced following these practices. Moreover, a portion of
83 BANR is to be dedicated to the establishment of a "model ranch", acting as an example of best
84 ranching practices.
85 This study focuses on understanding the psychological and social characteristics that shape cattle
86 ranchers' motivations to adopt BMP. In particular, this study aims to: (1) understand ranchers'
87 knowledge, attitudes and behaviors related to conservation; (2) understand how ranchers perceive
88 the implementation of the sustainable ranching initiative promoted by ACA; and (3) identify which
89 combination of mechanisms will best contribute to the effectiveness of the initiative. The findings of
90 this research are intended to be used by ACA.
91

92 ## Methods

93 This study received approval from the JRCO/Science, Engineering and Technology Research Ethics
94 Committee (SETREC) at Imperial College London.
95

Study area

The Beni savanna, also known as the Llanos de Moxos, is a biogeographic region of the southwestern Amazon basin that covers an area of 127,096 km^2 (Larrea-Alcázar et al. 2011). Primarily located in Beni, northeastern Bolivia (Fig. 1), it consists of a forest-savanna mosaic dominated by open grasslands, gallery forests and forest islands, some of which are less than 50 m wide (Hordijk et

Figure 1 – Location of the Beni savanna ecoregion in northeastern Bolivia.

al. 2019). The Beni savanna has been identified as a Neotropical ecoregion by the World Wide Fund for Nature (WWF) (Olson et al. 2001), and it includes some of the world's largest sites declared by the Ramsar Convention on Wetlands of International Importance (The Ramsar Convention 2019).

The region is characterized by its hyper seasonality, with a dry season from May to November, and a wet season from November to May. During the latter, a large proportion of the plains are entirely

106 flooded. The Beni savanna can be divided into different sub-regions according to biotic and abiotic
107 factors, although the main biogeographic division occurs between the northern Beni Cerrado and the
108 southern Moxos plains (Langstroth 2011). Variations in seasonal flooding also exist between the two
109 zones, with floods of greater magnitude and frequency in the south (Mayle et al. 2007).

110 The landscape of the Beni savanna is composed of three main topographic elements: *alturas*,
111 *semialturas*, and *bajíos* (Langstroth 2011). Bajíos are extensive seasonally flooded grasslands, and
112 alturas are raised lands of natural or human origin mostly dominated by forest vegetation that are
113 very rarely flooded. Semialturas are areas of middling elevation that experience small and shallow
114 floods. How these landscape elements are distributed on private lands affects the climatic problems
115 faced by ranchers, namely seasonal inundations and droughts. Uplands do not become flooded
116 during the wet season, but pastures experience significant droughts during the dry period due to
117 poor water retention capacity in the soil. Conversely, lowlands are entirely flooded for
118 approximatively seven months of the year during the wet season, but pastures do not dry as easily
119 as uplands in the dry season as water is better retained in the soil.

120 The Beni savanna hosts a rich diversity of species and habitats due to its mosaic of distinctive
121 ecosystems, with over 5,000 plant species, 796 bird species, and 146 mammal species having been
122 recorded (Beck & Moraes 1997, 2004). Many species of conservation interest are present, such as
123 the endangered Black Caiman (*Melanosuchus niger*), the near threatened Maned Wolf (*Chrysocyon*
124 *brachyurus*), and the endemic critically endangered Blue-throated Macaw (*Ara glaucogularis*), which
125 nests and feeds on palm trees species of the genus *Attalea*, found only in the forest islands of the
126 savanna (Hordijk et al. 2019). The region also represents an essential stopover site for many
127 migratory bird species (Hennessey & Sanchez 2014).

128

129 *Questionnaire design*

130 I developed a structured questionnaire (Supporting Information) based on the Stewardship
131 Functions Inventory (SFI) produced by Selinske et al. (2015), and included additional elements
132 relevant to the context of the region. The SFI is a psychometric instrument used to understand how
133 motivations influence landowners' decisions to engage in conservation practices (Selinske et al.
134 2015). Following an additional literature review, I identified eight factors that describe the
135 psychological and social characteristics influencing ranchers' motivations and limitations to adopt
136 BMP (Table 1).

137 **Table 1**. Summary of psychological and social factors hypothesized to influence the adoption of best
138 management practices by cattle ranchers.

Factor	Measured variable
Demographic	Age; gender; proportion of income derived from ranching; education level
Ranch characteristics	Ranch size; number of cattle; cattle density; geo-environmental characteristics
Conservation knowledge	Knowledge and awareness of local conservation issues and the impacts of ranching practices
Attitude towards conservation	Views towards biodiversity protection
Conservation behavior	Management practices carried out to benefit biodiversity
Willingness to collaborate	Disposition towards working with a conservation NGO
Willingness to participate	Disposition towards adopting biodiversity-friendly management practices; what mechanisms and instruments a landowner will accept to engage
Social network	Level of collaboration and reciprocity with neighbors; involvement in groups associations; local sense of belonging

139

140 The questionnaire was written in English and was subsequently translated to Spanish by a biologist
141 working for ACA. Together, we piloted the survey using hard copies with five ranchers from five
142 different properties surrounding BANR, and further refinements to the survey were made prior to
143 the start of the data collection process. The questionnaire was significantly simplified from its original
144 form, as its structure appeared difficult to understand for the ranchers on whom it was piloted. In
145 particular, the number of items on each Likert scale was reduced, as these were intended to measure
146 participants' satisfaction of a programs in which they were enrolled.
147 Initial questions were mainly closed-ended and focused on ranching activity's characteristics and
148 on knowledge and awareness of the region's conservation issues. I used five-point Likert scales to
149 explore attitudes towards a series of statements on biodiversity protection, and to evaluate
150 participants' social networks. Current land-use practices, such as fire use, grazing rotation, pasture
151 cultivation, and conservation practices, were explored using a simple set of yes/no/unsure questions.
152 I explored willingness to collaborate with ACA by presenting the sustainable ranching initiative to the
153 participants and by asking if they would consider participating in it. I measured how they perceived
154 the project using a five-point scale ranging from very positive to very negative. Participants could
155 indicate their reasons for potentially participating in the program by selecting one or more options
156 among a set of six potential reasons. Ranchers' willingness to participate in the program was
157 measured through a simple set of yes/no/unsure questions on which management mechanisms, such
158 as rotational grazing systems or fencing-off areas of forest islands, they would engage. Open-ended
159 questions explored their knowledge of ACA's activity and the kind of support participants would
160 prefer in order to benefit from joining the initiative.
161

Data collection

I chose to survey landowners only as these are the primary decision-makers regarding land management on their property. Landowners were identified from a list provided by Asociación de Ganaderos de la Provincia de Yacuma (AGAYAC) and by Federación de Ganaderos del Beni y Pando (FEGABENI), from their members records, and subsequent 'snowball sampling' (Goodman 1961) was used during interviews to recruit additional participants. I contacted participants by phone and surveyed them through face-to-face interviews conducted in Spanish, mostly at their primary residence in Santa Ana del Yacuma and Trinidad, during May and June 2019. In one case, both the husband and the wife owned and managed the land, therefore they were interviewed together. Four participants completed the questionnaire on their own. On some occasions, interviews were conducted at the participant's ranch. Interviews lasted 45 minutes on average, with some exceeding 3 hours. I initially audio recorded every interview after asking the permission of the participants, but I later decided to abandon this practice as it seemed to be uncomfortable for some and potentially affected their response quality.

The choice to conduct face-to-face interviews instead of, for example, mailing the survey, was made because interviews deliver better response quality and higher response rates (Babbie 2008), although they are more time consuming. Moreover, the discussions that arise during interviews often allow further investigation of essential topics that might not emerge with mailing techniques.

Data analysis

The collected data was collated and coded using Microsoft Excel (2019). Analysis was performed using RStudio Version 1.2.1335 (RStudio Team 2015).

The internal consistency of the Likert scales, namely the degree to which individual items measure the intended construct, was tested using McDonald's Hierarchical Omega (ω_h), as it has been

186 demonstrated to be a more robust test than the widely used Cronbach's Alpha (α) (Zinbarg et al.
187 2005). The suggested acceptability threshold for McDonald's ω_h was set at ω_h = 0.60 (Knight et al.
188 2010). Responses to statements contained in 5-point Likert scales exploring conservation attitudes
189 were coded from one (strongly disagree) to five (strongly agree) and summed for each item in order
190 to obtain individual scores. Answers to yes/no/unsure questions measuring conservation knowledge,
191 behavior, and willingness to participate were coded as two (yes), zero (no) and one (unsure), and
192 were likewise summed to create individual scores. Response frequencies of multiple-choice closed-
193 ended questions were calculated. Responses to open-ended questions, such as preferred support
194 type, were divided into sub-classes to then create a list of categorized responses.
195 Relationships between these factors and potential explanatory variables, i.e. age, gender, ranch
196 size, number of cattle, cattle density, and socio-economic factors (income and education), were
197 analyzed using Spearman's rank correlation test (as the distributions of variables were significantly
198 non-normal and, therefore, Pearson correlation coefficient was not suitable), two sample and paired
199 t-tests, and one-way analysis of variance (ANOVA) (Diekhoff 1992).
200 I detailed my observational standpoint describing my position as a researcher and some
201 considerations on the interview procedure (Supporting Information).
202

203 ## Results

204 *Characteristics of participants*

205 A total of 34 cattle ranchers were surveyed, of which 91% were male. The majority (62%) of
206 participants were aged 50 or older, with an average age of 55 years old. All participants were owners
207 or co-owners (in case of a family-owned ranch), except in one case where the interviewee was the
208 land-manager for the enterprise owning the land. Nearly two-thirds (65%) of participants had owned

209 their land for 21 years or more, and the majority had more than one property. Most (62%) of
210 respondents attended university.

211 Ranch sizes varied from 450 ha to 60,000 ha (median = 3,300 ha, mean = 5,047.42 ha SE = 1,758
212 ha). The majority (55%) of properties were at least 2,500 ha in size. Most ranchers (62%) owned 1,000
213 or more head of cattle (median = 1,200, mean = 1,583 SE = 348). The average cattle density was 0.45
214 head of cattle per hectare (SE = 0.046). There was a significant positive relationship between ranch
215 size and number of cattle (r_s = 0.712, P = 0.0087).

216 Cattle ranching represented more than half of the overall income for 83% of participants.

217

218 *Conservation knowledge*

219 The majority (88%) of respondents considered themselves aware of conservation issues in the Beni
220 department. Approximately 61% of participants perceived that the nature of the region in which they
221 live is negatively affected by human activity. Overhunting by humans was the cause most frequently
222 attributed to wildlife decline (n = 7, 33%). Issues directly related to ranching, such as uncontrolled
223 fires or water contamination from burned ashes after rainfall, were generally well-known (67% and
224 79% of respondents were aware of these issues, respectively). Fewer (30%) ranchers were aware of
225 the impacts of cattle on forest island vegetation, and 39% were aware of the impacts on soil trampling
226 from cattle. Almost all ranchers (94%) agreed that overgrazing has a negative effect on pasture
227 quality.

228

229 *Attitudes towards conservation*

230 The internal consistency coefficient of the conservation attitude scale was considered to be
231 acceptable (ω_h = 0.60). Conservation attitude scores ranged from 16 to 35 (mean = 29.7 SE = 0.65),
232 with 35 being the highest possible score.

233 The majority (94%) of respondents expressed personal concern about threats to nature in their
234 region. Most (68%) participants strongly agreed that wildlife deserves to be conserved, and the
235 majority (74%) felt that the wildlife in their region does not receive enough protection. Nevertheless,
236 opinions varied on whether the Beni should have more protected areas to preserve wildlife (69%
237 were in favor, 21% against, and 18% unsure).
238 There was a significant positive relationship between age of respondents and conservation attitude
239 combined score (t_{32} = 23.694, P = 0.002), in that older participants had higher conservation attitude
240 scores than younger participants. Equally, women participants showed significantly more positive
241 attitudes towards conservation than men (t_{31}= –3.0106, P = 0.028).
242 Relationships with socio-economic factors were mixed. Respondents whose income from cattle
243 ranching was half or less than their total income had significantly more positive attitudes towards
244 conservation than those whose overall income was primarily derived from ranching (t_{18} = – 2.2558,
245 P = 0.037). Participants who attended university showed, on average, a lower conservation attitude
246 score than those who did not attend university, although this difference was not statistically
247 significant (t_{24} = 1.8232, P = 0.081).
248
249 *Conservation behavior*
250 Conservation behavior scores ranged from 1 to 7 (mean = 3.7 SE = 0.245), with 7 being the highest
251 possible score. There were no significant correlations between the conservation behavior score and
252 ranch size, number of cattle, cattle density, or socio-economic factors. However, the data showed a
253 trend in which ranchers who attended university had higher conservation behavior scores on
254 average. Equally, those whose income from ranching represented at least half of their overall income
255 had higher conservation behavior scores on average.

256 Less than half (41%) of the respondents said that they perform some type of conservation action
257 on their land, such as prohibiting bushmeat hunting and net fishing. Nearly all participants (88%)
258 claimed that they protect their ranch from the spread of neighboring fires by creating firebreaks.
259
260 *Willingness to collaborate*
261 Most (97%) respondents were interested in collaborating with scientists or conservationists in
262 general to improve their ranching management practices. A considerable proportion (41%) of the
263 participants had never heard of ACA, however, most (59%) of the participants considered ACA's
264 sustainable cattle ranching initiative as very positive and 88% said that they would participate in it.
265 Most (94%) of the respondents felt that the objectives of the initiative positively reflected their
266 ranching activity's goals. The majority (81%) of respondents indicated that they would prefer meeting
267 with a program representative once a month.
268
269 *Willingness to participate in the sustainable cattle ranching initiative*
270 The primary reasons for participating in ACA's sustainable ranching program indicated by
271 respondents were to gain better knowledge of innovative management techniques (n = 26, 81%), to
272 enhance land productivity (n = 22, 72%), and to gain knowledge of sustainable management practices
273 (n = 21, 66%). Wildlife protection was mentioned by 59% of respondents (n = 19).
274 Combined willingness to participate scores ranged from 5 to 10 (mean = 9.1 SE = 0.31), with 10
275 being the highest possible score. There were no statistically significant relationships between
276 combined willingness scores and ranch size, number of cattle or cattle density. However, there was
277 a significant correlation between willingness scores and education level, in which participants who
278 attended university showed lower willingness scores on average (t_{14} = 2.497, P = 0.025). There was
279 no significant correlation between willingness to participate score and income, although participants

280 whose ranching activity represented half or less of their total income showed higher willingness
281 scores on average.

282 Rotational systems (*n* = 29, 85%) and improve pasture growth without the use of fire (*n* = 28, 82%)
283 were the schemes with which participants expressed a greater interest of engaging. Fencing-off areas
284 of forest islands to protect them from cattle pressure would be adopted by 53% of respondents (*n* =
285 18).

286 Participants mentioned a relatively wide range of supports that they would like to benefit from by
287 enrolling in ACA's sustainable ranching alliance (Fig. 2). The three most common mechanisms listed
288 by respondents were capacity learning (such as on-ground training courses), equipment and
289 infrastructure (for example fencing material and machinery supply), and scientific advice (such as soil
290 or biodiversity assessments). Support through direct financial incentives was mentioned only twice.

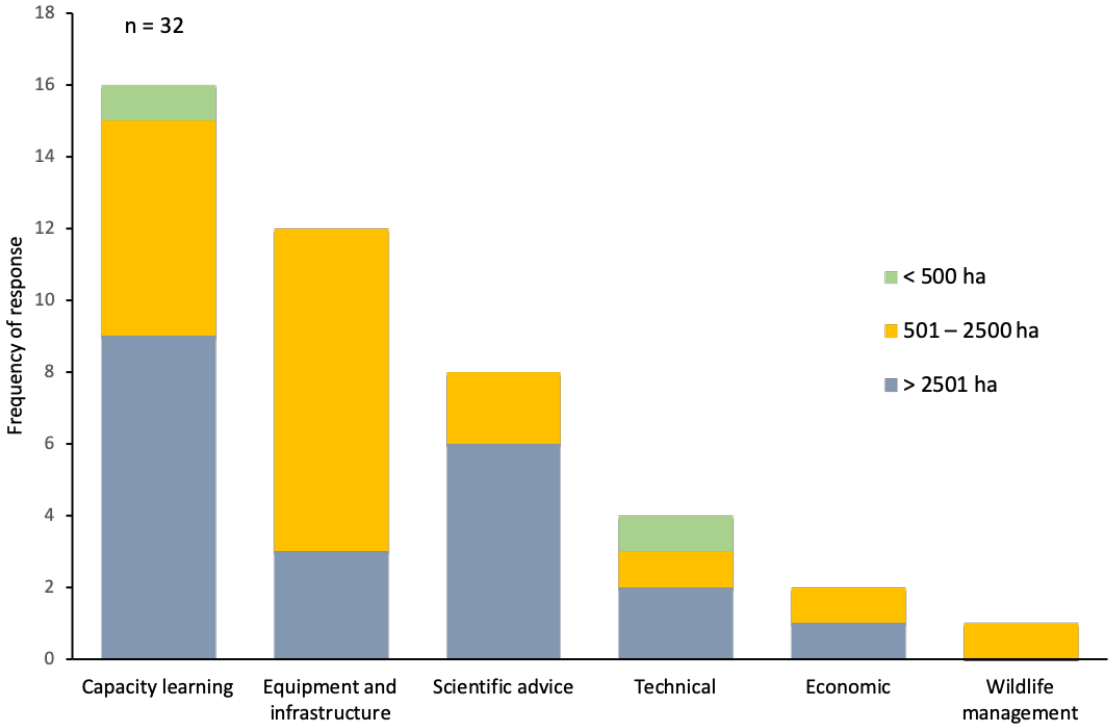

Figure 2 – Preferred support types mentioned by participants (n = 32) according to their ranch size. Size ranges used here correspond to the categories posed by the national law on agricultural reform (INRA 2019). They correspond to small, medium, and large sized properties (FEGABENI 2017).

There were no significant relationships between preferred support type and ranch size or socio-economic factors.

Social network

Social network scores ranged from 5 to 22 (mean = 14.74 SE = 0.73), with 25 being the highest possible score. There was no significant correlation between social network score and willingness to participate score (r_s = 978.25, P = 0.104), but there was a positive trend indicating that ranchers with higher social network scores also had higher willingness scores. There were no significant relationships between social network score and ranch size or socio-economic factors.

The majority of respondents (88%) were members of a ranching association, however none of the participants were members or were collaborating with any environmental or conservation groups.

Only 22% of respondents strongly agreed that nature protection was highly valued among their peers.

Discussion

Amazonian savannas constitute areas of great conservation value as they host high species diversity and endemism due to their habitat heterogeneity (Larrea-Alcázar 2011). However, little research has been conducted on these biomes, meaning that they are often absent from large-scale conservation programs (De Carvalho & Mustin 2017). Cattle ranching is the main form of land use in many Amazonian savannas, including the Beni savanna. Achieving sustainable cattle ranching through the development of best management practices is becoming essential to face the current threats that these ecosystems face (Hoogesteijn & Hoogesteijn 2010).

The process of designing PAs for biodiversity protection has historically relied primarily on ecological and biophysical data, and on the distinctiveness of the area and its utility in promoting biodiversity

315 conservation (Raymond & Brown 2011; Kamal et al. 2015). This tendency to fail to consider the
316 psychological and social dimensions of environmental issues is often the cause of poorly designed
317 conservation strategies, and of their subsequent failure to achieve the desired outcomes (Ostrom
318 2007; Knight et al. 2010). Many areas of high conservation priority are part of complex socio-
319 ecological systems, where human and social dimensions as well as other non-ecological factors play
320 an essential role in the success of conservation initiatives. Landowners' decisions to adopt alternative
321 management practices are driven by a set of personal attitudes, goals, and values, making
322 understanding these dimensions essential for the effective planning and implementation of
323 conservation strategies such as PPAs (Ingram et al. 2013; Greiner 2015).
324
325 *Awareness and attitudes towards conservation practices*
326 A considerable proportion of the respondents did not know about ACA, and those who had heard
327 about the organization were often unable to describe what activities it performed. Landowners
328 decide whether or not to collaborate with an organization based on their perceptions towards it.
329 Therefore, raising awareness of the identity and the work of ACA among the ranching community is
330 essential. Moreover, most landowners were not aware of environmental issues such as the threats
331 to forest islands caused by the presence of cattle. This lack of knowledge may explain the fact that
332 nearly half of the respondents would not engage in fencing-off portions of forest islands, as they
333 might not see a reason to do so, or they may think that it could negatively affect them in terms of
334 production. In fact, forest islands are crucial for ranching as they provide vital shelter for cattle during
335 storms and floods. For conservation, forest islands are essential habitats for a great number of
336 species in the Beni savanna, such as the endemic critically endangered Blue-throated Macaw. In this
337 sense, these landscape elements represent a convergence of interests for both ranchers and
338 conservation organizations. Raising awareness of these issues is therefore fundamental, as

339 landowners with better knowledge may be more inclined to adopt conservation strategies (Rhodes
340 et al. 2002). However, it is worth to mention that responses given by participants were to theoretical
341 future scenarios, and that there could be greater reticence to adopt conservation practices if
342 ranchers were actually asked to make the decision for real.

343 Opinions on fire use were mixed. There was a general consensus that fire is an essential
344 management tool to improve pasture regeneration. However, the lack of a proper fire management
345 system and regular control from authorities were often ascribed as major causes of habitat
346 destruction, especially during the dry season. Nevertheless, pasture burning appeared to be a
347 sensitive topic, and participants often claimed that they do not burn, but everyone else does. In this
348 sense, addressing fire management as part of the initiative should start by properly understanding
349 how frequently ranchers burn their pastures and how this apparent necessity might be influenced by
350 climatic conditions and/or personal beliefs, in order to prescribe appropriate mechanisms that
351 mitigate the excessive use of fire.

352 Older participants showed more positive conservation attitudes than younger participants. This
353 might be explained by the "sense of place", as defined by Masterson et al. (2017), i.e. people's
354 connection and emotional feeling towards the land, which appeared to be stronger among older
355 respondents. One landholder mentioned that she felt a moral obligation to protect nature for future
356 generations ("our children") and described how growing up in the field made her respect and care
357 about nature. Moreover, many respondents expressed pride when talking about their ranching
358 activity and how they consider themselves as nature keepers. In this regard, a focus on emphasizing
359 their role in biodiversity protection would be useful to increase motivation for engaging in
360 conservation practices.

361 The influence of socio-economic factors on attitudes towards conservation and conservation
362 behaviors was mixed. Respondents who derived half or less of their overall income from on-ranch

363 activities showed more positive attitudes towards conservation. Greiner et al. (2009) reported that
364 “lifestyle”, or “hobby”, farmers in northeastern Australia, i.e. those whose farm income is not their
365 major source of income, had considerably higher adoption rates for conservation practices. However,
366 conservation behaviors were less common among “hobby” farmers in our study. Equally, those who
367 attended university showed less positive attitudes towards conservation but had higher conservation
368 behavior scores. Deeper investigation to understand the cause of this apparent contradiction would
369 be useful.
370
371 *Considering a broad range of requirements*
372 The term “cattle rancher” defines a broad social group, which includes various typologies of actors
373 such as small- or medium-scale family owners, large ranching enterprises, or community-owned
374 lands that also have cattle. These sub-groups differ in that they have different needs and goals related
375 to their ranching activity, which should be carefully taken into consideration when planning
376 conservation strategies. In this study, only one land manager of a large enterprise was interviewed,
377 which might not be representative enough. Future research should endeavor to reach a larger sample
378 size of various types of ranchers, in order to gain a better understanding of potential differences in
379 terms of, for instance, ranching activity goals among these groups.
380 The landscape features of the Beni savanna strongly influence the climatic issues that ranchers face
381 over time. Therefore, the design of incentives as part of PPA initiatives must consider these
382 characteristics, as landholders need different kinds of support based on the problems they
383 experience. In this sense, planning bespoke optimal combinations of mechanisms would be more
384 appropriate than of a simplified, generic scheme. Moreover, as landowners’ participation in
385 conservation programs can be driven by intrinsic motivations (for example, feeling a moral
386 commitment to protect biodiversity) and/or extrinsic motivations (such as being moved by the

387 incentives provided by the program), it is important to understand their nature in order to design
388 adequate incentives that reflect landowners' motivations (Rode et al. 2015).
389 Overall, results show that respondents seemed to be attracted by the benefits they could gain in
390 terms of productivity through adopting the sustainable management practices presented by the
391 initiative. Opinions to the statement "protecting wildlife will benefit my activity" were divergent (44%
392 strongly agreed, *n* = 15). Again, this might reflect a lack of knowledge on the importance of
393 biodiversity and the ecosystem services it provides, which are beneficial for productivity.
394
395 *The implementation of a sustainable cattle ranching initiative: challenges, opportunities, and*
396 *key recommendations*
397 Less than 8% of roads in the Beni department are paved (Jiménez et al. 2007), and terrestrial
398 transport is highly limited for several months a year due to seasonal floods. This lack of infrastructure
399 acts as a barrier to socio-economic development in the region, with difficulties for the livestock
400 sector, such as access to the market. Participants often stated how the ranching sector in Beni lacks
401 national government assistance in terms of infrastructure development, technical innovation, and
402 support in case of environmental disasters. In facts, ranchers are often forced to sell their cattle when
403 under pressure from unfavorable climatic conditions and a lack of financial security.
404 Cattle breeds well-adapted to local climatic perturbations after centuries of presence, such as the
405 Yacumeño Creole (*Bos taurus*), have been almost entirely replaced by more productive selected
406 breeds, mainly Nelore cattle (*Bos indicus*), which are less well-adapted to the flooding cycle of the
407 region (Wantzen et al. 2008). Moreover, best management practices have to be developed in
408 accordance with marketing strategies that would increase the value of products coming from Beni,
409 such as the development of a certification scheme, which has been regarded as an effective means
410 of increasing landholders' willingness to engage in conservation practices (Wantzen et al. 2008; van

411 Dijk et al. 2016). However, investing in a certification system should be pursued only if access to
412 exporting markets with a demand for more expensive "green" beef is guaranteed, and if securing
413 consumers' welfare and traceability of the product quality throughout the whole supply chain can be
414 achieved (Wantzen et al. 2008; Euclides Filho 2004). In fact, achieving sustainability of a product
415 means that the whole production system must respect the established standards. For instance, in the
416 case of this study, a considerable proportion of cattle raised in Beni is sold to ranchers in Santa Cruz
417 for fattening and slaughter. In this sense, the initiative promoted by ACA, and particularly the
418 certification scheme, would have to ensure that their conditions are met for the entire production
419 process.

420 Overall, there is potentially a strong opportunity to establish an initiative focused on sustainable
421 cattle ranching in Beni. However, to ensure its effectiveness, I consider it critical that ACA promotes
422 itself among the ranching community. Moreover, the findings of this research should be used to
423 develop and support an appealing strategy that achieves conservation outcomes. Due to the fact that
424 respondents mainly seemed focused on production rather than conservation, a production-focused
425 combination of land management mechanisms would be most desirable for the initiative.

426 Delivering appropriate support that reflects the needs expressed by respondents is essential to
427 increase the satisfaction of the program's participants, and thus to ensure their commitment (Knight
428 et al. 2010; Selinske et al. 2018). Most participants expressed a desire to receive support in terms of
429 guidance on land management techniques rather than direct financial support. Equally, the majority
430 of participants indicated that they would favor frequent contact with a program representative or
431 other program participants. Thus, meeting these expectations is fundamental to ensure landowners'
432 satisfaction with the program. However, it is also important to consider that factors contributing to
433 participants' satisfaction and commitment in the program might vary in the future, and therefore it
434 is essential to continuously explore these (Selinske et al. 2018). Ranches are part of complex and

435 dynamic socio-ecological systems that change over space and time; thus, the design of conservation
436 strategies should not be based on their assumption as static entities.
437 Nearly two-thirds of respondents were aged 50 or older, which represents a major challenge for
438 the long-term effectiveness of the initiative, as successive landowners may not prioritize biodiversity
439 management or could be less enthusiastic about the program (Selinske et al. 2018). To ensure the
440 success of the initiative, and thus to achieve positive conservation outcomes in the long-term, I
441 recommend undertaking continuous engagement in the land transfer process. Locating landowners
442 that are influential and well-respected among their peers might facilitate the initiative's outreach and
443 the recruitment of additional participants in the scheme, as well as help to spread the initiative to
444 other sectors (Knight et al. 2010).
445
446 *Future research opportunities*
447 Although there is a growing body of scientific literature exploring landowners' motivations to join
448 conservation programs in many countries worldwide, this is the first study I am aware of that focuses
449 on cattle ranchers' adoption of conservation practices in Bolivia.
450 I recommend that future studies using a similar approach to the one used for this research consider
451 reaching a larger sample size, in order to report results that might be more strongly supported by
452 statistical analyses.
453 Effective design alone does not guarantee successful outcomes of conservation strategies. Frequent
454 monitoring and evaluation of the initiative needs to be undertaken in order to maintain participants'
455 satisfaction with the program, and therefore their commitment to it (Selinske et al. 2015). Moreover,
456 as the distributions of some species of interest for ACA's projects, such as the Blue-throated Macaw,
457 are still poorly known, future research should focus bettering our understanding of the range of these
458 species in order to establish priority areas for conservation. This can then be combined with studies

459 on human and social dimensions in order to achieve a more complete understanding of areas where
460 conservation action is more likely to be implemented successfully.

461 This study did not explore ranchers' knowledge of endangered species that are of interest to ACA. I
462 recommend that more research on this topic is conducted, as it may provide useful additional
463 elements for the implementation of the initiative, such as wildlife monitoring by participants.
464 Moreover, future studies focusing on the costs and benefits of forest islands for both conservation
465 and production would be useful.

466 Deeper investigation into the potential effectiveness of a certification system for sustainable meat
467 products is fundamental.

468 Conflicts between ranchers and wildlife were rarely clear. Few ranchers indicated cattle losses from
469 wildlife, such as jaguars, as the main problem affecting their activity, however many claimed that
470 other ranchers kill jaguars to prevent cattle losses. More research to understand the level of conflict
471 with big cats in the region, as well as other wildlife, is recommended.

472

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Supporting Information Statement

The questionnaire (Appendix S1), observational standpoint and considerations on conducting the interviews (Appendix S2) 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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Supporting Information

Appendix S1: Questionnaire

Welcome!

This questionnaire has been developed jointly by researchers Luciano Simonetti (Imperial College London), Dr. Andrew T. Knight (Imperial College London) and Tjalle Boorsma (Asociación Armonía). This study is a student research project conducted as part of the completion of the master's degree in Conservation Science at Imperial College London, United Kingdom.

Although this is a voluntary survey, you are kindly urged to complete it as your opinions are critical if improvements are to be made. Nevertheless, if you do not feel comfortable answering any specific question you may leave it blank. You can also request for your responses to be withdrawn from the research at any time during this study.

The results of the survey will be kept strictly confidential and your anonymity is guaranteed. Only Luciano Simonetti, Dr. Andrew T. Knight, and Tjalle Boorsma will have access to individual surveys. The results will not identify individual landowners.
Your answers will not affect your relationship with any authorities, NGOs, or agencies with whom you are involved.

Instructions

This survey takes approximately 45 minutes to complete. Please be as accurate as possible in answering the questions, so our results are a realistic representation of your opinions, feelings and views. Many of the questions ask you to simply mark (X) a box.

If you have any queries you are more than welcome to contact:

Luciano Simonetti (researcher):
Phone: +41 79 256 54 60
Email: lmasimonetti@gmail.com

Asociación Armonía
Phone: 591 – 3 – 3568808
Email: armonia@armonia-bo.org

Thank you in advance for your support!

Interview Code: _____ Date of interview: _____

1. Background information

1.01) On this ranch you are: ☐ Owner ☐ Manager ☐ Employee ☐ Other: …….

1.02) Do you own or work in other properties other than this one? ☐ Yes ☐ No

If yes, how many? ……

1.03) What is the name of this property? ……

1.04) Do you know the previous name of this ranch, before you and your family lived here?
☐ Yes ☐ No ☐ Not sure

If yes, please write it down:

……..

1.05) How many years have you and your family owned/lived on this property?

☐ Less than 5 years
☐ 5 to 10 years
☐ 11 to 20 years
☐ Longer than 21 years
☐ Two generations
☐ Three or more generations

1.06) What is the size of this ranch (in hectares)? ……

1.07) How many people are employed on this ranch? ……

1.08) If you are not living on this ranch, how frequently do you visit it?

☐ Once a week or more
☐ Every two weeks
☐ Once a month
☐ Every two or three months
☐ Every six months or less

1.09) What are the activities that you are undertaking on this ranch?

☐ Cattle ranching
☐ Small stock ranching (e.g. sheep, goat)
☐ Pig ranching
☐ Dairy
☐ Eco-tourism (e.g. wildlife viewing, hiking, bird watching)
☐ Agriculture
☐ Other (Please specify) ……

1.10) How many head of cattle are there on this ranch? ……

1.11) What are the cattle races you have in this ranch? ……..

1.12) Do you have more or fewer cattle than 5 years ago?

☐ Many more ☐ More ☐ Same ☐ Fewer ☐ Many fewer

1.13) What proportion of your total income is derives from cattle ranching?

☐ All ☐ More than half ☐ Half ☐ Less than half

1.14) What are the forms of income from cattle on this ranch?

☐ Cattle fattening
☐ Cattle breeding
☐ Newborns selling
☐ Other (Please specify): ……..

1.15) Where do you mainly sell your cattle?

☐ Directly from ranch ☐ Local market ☐ National market ☐ International Market

☐ Other (please specify): ……..

1.16) Where are your main buyers coming from?

☐ Bolivia ☐ Foreign country (Please specify): ……

1.17) What problems affect your annual income from cattle? Please rank, where 1 is the most serious:

___ flood

___ drought

___ diseases (in cattle)

___ theft of cattle

___ wildlife killing cattle

___ other: ……

1.18) What solutions do you undertake to solve the two most serious problems indicated in the last question?

……

1.19) Please indicate if your upbringing was rural or urban:

☐ Rural
☐ Urban
☐ Both
☐ Peri-urban (rural-urban transition zone around major towns and cities)
☐ Other (Please specify): ……

1.20) Are you currently a member of any cattle-ranching, land management, environmental or conservation organizations?

☐ No
☐ Yes (Please list them): ……

1.21) If yes, what type of activities do you realize with this organization?

☐ Meetings
☐ Production-linked activities
☐ Receive technical capacity
☐ Other: ……

2. Conservation Knowledge

Please answer to the following questions by marking (X) "Yes", "No", or "Unsure" and by explaining when asked:

		Yes	No	Unsure
2.01	Do laws or norms that protect some wildlife species exist in Bolivia?			
2.02	In your opinion, is wildlife in the region where you live affected by any problem, such as threatened animal species, destruction of natural habitats, etc.?			
2.03	If yes, can you list what these issues are in your opinion?			
2.04	Do you think that regular grassland burning impacts wildlife in your region?			
2.05	If yes, can you describe what these impacts are in your opinion?			
2.06	Have you seen any changes in grass diversity over time due to regular fires?			
2.07	Have you seen any changes in the abundance of forest islands on your land in the last 20 years?			
2.08	Have you seen a change in vegetation in forest islands in the last 20 years, such as new species or different types of vegetation structure?			
2.09	Have you seen any forest island disappear?			

Please indicate to what extent do you agree or disagree with the following statements by marking (X) a box:

		Agree	Unsure	Disagree
2.10	Ashes produced by fires affect the water quality of rivers and lakes			
2.11	Over-grazing by cattle has a negative effect on grasslands			
2.12	The presence of cattle in the forest islands affects the growth of young trees			
2.13	Soil compaction has changed in the last 10 years due to the presence of cattle in forest islands			
2.14	Soil fertility of pastures has changed in the last 10 years			

3. Conservation attitudes

Please indicate to what extent do you agree or disagree with the following statements by marking (X) a box:

		Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
3.01	Wildlife deserves protection					
3.02	I am concerned about the threats to wildlife in my region					
3.03	I think that biodiversity receives enough protection in my region					
3.04	The nature/wildlife in El Beni is a national treasure					
3.05	I consider myself aware of conservation problems in El Beni					
3.06	El Beni needs more nature reserves to protect biodiversity					
3.07	Protecting biodiversity will benefit my business					
3.08	El Beni needs more development					

4. Conservation Behaviour

Please answer to the following questions by marking (X) "Yes", "No", or "Sort of" and by explaining when asked:

		Yes	No	Sort of
4.01	Have you undertaken any management activity specifically for a better use of natural resources (natural pastures, forest islands, soil, water sources) in your property in the last 5 years?			
4.02	If yes, can you list what these activities are?			
4.03	Have you performed any management activity specifically for restoration of degraded land in your property in the last 5 years?			
4.04	If yes, can you list what these activities are?			
4.05	Have you undertaken any soil conservation measures for reducing soil compaction in the last 2 years?			
4.06	If yes, can you list what these activities are?			
4.07	Have noticed an increase of anthills on your land in the last 5 years?			
4.08	Have you undertaken any land zoning plan for cattle management on your land in the last 5 years?			
4.09	Do you perform a rotational system for cattle?			
4.10	Have you burned grassland on your land in the past year?			
4.11	If so, how many times?			
4.12	Have you undertaken any measures to reduce or control fires on this land?			
4.13	If yes, please list what these measures are:			

4.14	Have you planted grasses in this ranch?			
4.15	If yes, what species have you planted and in what area (lowland/highland)?			
4.16	Do you perform any other natural resource use on this ranch, such as wood cutting, hunting, fishing?			
4.17	If yes, can you list what these uses are?			
4.18	Have you undertaken any measures to ensure higher productivity through best management practices?			
4.19	Have you heard of Buenas Prácticas Ganaderas (BPG)?			
4.20	If yes, can you briefly describe what these practices are?			
4.21	Have you undertaken any practices specifically to improve cattle's wellbeing?			
4.22	If so, can you list what these practices are?			
4.23	Do you employ any land-use practices specifically for wildlife protection on this land, such as live-fencing, rotational system, protecting forest islands for tree regeneration?			
4.24	If yes, can you list what these practices are?			
4.25	Have you undertaken any nature conservation activities for any animals in the last 2 years, such as surveys, re-introductions, limiting hunting, prohibiting fishing with nets, wildlife-friendly fencing?			
4.26	If yes, can you list what these activities are?			

5. Conservation Intentions

Please indicate to what extent do you agree or disagree with the following statements by marking (X) a box:

		Yes	Unsure	No
5.01	I would adopt an alternative rotational system on this ranch if this would increase the productivity and generate more income			
5.02	If there are alternative ways to improve grass growth without burning, I would agree to adopt them			
5.03	I would be interested to collaborate with scientists and conservationists to develop alternative management practices that would benefit my activity			
5.04	I am willing to adopt live-fencing in parts of this ranch if this would benefit my activity			
5.05	I would agree to protect areas of forest islands from cattle with measures such as fencing			

6. Willingness to collaborate with Asociación Armonía

6.01) Have you heard of Asociación Civil Armonía? ☐ Yes ☐ No

6.02) Do you know what type of activities does Armonía perform? ☐ Yes ☐ No ☐ Unsure

6.03) If yes, please explain what these activities are:

……

……

La Alianza del Pastizal is an initiative launched in 2006 to protect the natural pastures and its wildlife of the Southern Cone region of South America, involving areas in Argentina, Paraguay, Uruguay and Brazil, by developing sustainable land management practices which benefit both the regional biodiversity and the cattle ranching activity. One of the main results of this alliance is the creation of a Certification for meat produced under the initiative's norms, which adds a market value on the product.

Asociación Armonía is developing a project to create an alliance with similar goals in the Beni department, which would consist in a collaboration between producers, conservation NGOs and government authorities to develop cattle ranching best practices to protect the Beni's biodiversity.

The following questions aim to evaluate your opinions on this future project and your willingness to become a part of this alliance.

6.04) How would you perceive this initiative to be introduced in Beni?

☐ Very positive ☐ Positive ☐ Unsure ☐ Negative ☐ Very negative

6.05) In the future, would you like to join an alliance of this type focused on sustainable land-use practices?

☐ Yes ☐ No ☐ Unsure

If yes, please answer the following questions:

6.06) What would be your potential reasons for joining such program? You can select more than one option:

- ☐ I want to improve the productivity of my land
- ☐ I want to gain more knowledge on innovative land management techniques
- ☐ I want to increase the income of my activity
- ☐ I want to protect the wildlife
- ☐ I want to benefit of the increase of financial income thanks to the Certification

6.07) Would you like to have contact with other participants of such program and how often?

- ☐ None
- ☐ 1 every three years
- ☐ 1 per year
- ☐ 3 per year
- ☐ 8 per year
- ☐ Other (Please specify) ……

6.08) What is your preferred number of visits from a Program Representative (e.g. program managers, scientific researchers, or any other member of the program)?

- ☐ None
- ☐ 1 visit every three years
- ☐ 1 visit per year
- ☐ 3 visits per year
- ☐ 8 visits per year
- ☐ Other (Please specify) ……

6.09) What kind of support would to like to receive from a representative of the program?

……

……

……

		Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
6.10	People I am close to would support my decision to collaborate with Asociación Armonía and the Alliance					
6.11	My friends place a high value on protecting nature					
6.12	The people I know best believe it is important to actively work to protect the environment					
6.13	I feel that the goals of the Alliance reflect the goals of my activity					

7) Relationship with neighbours

		once a year or less	once in six months	once a month	once a fortnight	once a week or more
7.01	My neighbours and I help each other with work-related matters (e.g., fencing):					
7.02	My neighbours and I loan each other resources, equipment or staff:					

8. Interviewee Personal Information

8.01) Year of birth: _ _ _ _

8.02) Gender: ☐ M ☐ F

8.03) Marital status:

☐ Single
☐ Married
☐ Divorced
☐ Widowed
☐ Other: ……

8.04) Highest level of education completed: ……..

8.05) Are you retired? ☐ Yes ☐ No

8.06) I am thinking of selling my property…

☐ Never
☐ This year
☐ Next year
☐ In 3–5 years
☐ In 6–10 years
☐ In 11–20 years
☐ In 21–30 years
☐ In 31–40 years
☐ Other: ……..

8.07) Do you know of other landholders who might be willing to take this survey? If so, could you list their contact details here please so that I can contact them.

	Landholder name(s)	Phone number
1.		
2.		
3.		

8.08) Do you agree that Asociación Civil Armonía contacts you in the future regarding the project on sustainable cattle ranching presented in section 6, for example if they organize events or meetings?

☐ Yes
☐ No

If yes, please provide your complete name and phone number:

……

Thank you very much for your participation!

Appendix S2: Observational standpoint and considerations on conducting the interviews

I am a 24-year-old white male born in a small city in the Italian-speaking region of Switzerland. My father was born in the French-speaking part of Switzerland from Italian immigrants, and my mother was born in Czech Republic but lived in Switzerland her whole life. I have had the privilege of travelling to many countries both in and out of Europe, which I believe has partly contributed into building an open-minded and critical way of interpreting reality.

I studied Biology and Ethnology as an undergraduate at the University of Neuchâtel. It was during these three years that I became familiar with system thinking approaches to understanding natural and social processes.

Before this study, I had little experience with face-to-face interview techniques and quantitative survey design. I conducted semi-structured interviews for my undergraduate research project, in which I investigated the role of different stakeholders in the decision-making process related to the management of a small nature reserve in an urban context, in southern Switzerland. Despite the fact that this protected area was located 200 m from where I lived, I had to reflect on my role as a university student conducting social research, and on how the people I was interacting with saw my position. This was probably the first time that I realized how important it is to continuously question my standpoint and to distance myself from any preconceived opinions that, without doubt, influence my interpretation of the studied object.

I had never travelled to Bolivia prior to this study, and all of the information that I obtained before doing my field work was based on what I read and on the discussions that I had with my co-supervisor.

This obviously generated various opinions towards the topic of my research, which 'truthfulness' had carefully to be reconsidered from my part once I started to interact with participants.

The questionnaire that I used was drawn up in English and was later translated to Spanish by Luz Natalia, the biologist working for Asociación Armonía who collaborated with me for the first few weeks of my stay in Bolivia. Together, we piloted the survey with five ranchers, and we carried out the first three interviews together. Although I knew Spanish at an intermediate level, I recognize that, at first, I was not feeling at ease enough to conduct an entire interview by myself. Therefore, the first interviews were mostly conducted by Luz. I then mastered the language at a relatively good level, which enabled me to undertake all of the following interviews alone, once Luz returned to her hometown.

I began every interview by presenting myself as a Swiss student doing a master's degree in conservation science in the United Kingdom. The fact that my thesis project is in collaboration with a conservation NGO that has an interest in its findings, made it necessary to always emphasize from my part that I was not working for them, to avoid additional biases in participants' responses.
I believe that the majority of respondents perceived me in a positive way. Many of them invited me to visit their ranch and to spend time together at various meals. However, at times, I found myself under the impression that some participants were giving me answers that they deemed appropriate to my position. Without doubt, social desirability bias is an ever-present constraint in social sciences; however, I believe that it might be accentuated or reduced depending on the situation. As a foreign person conducting research in Bolivia, this bias may have been more present.