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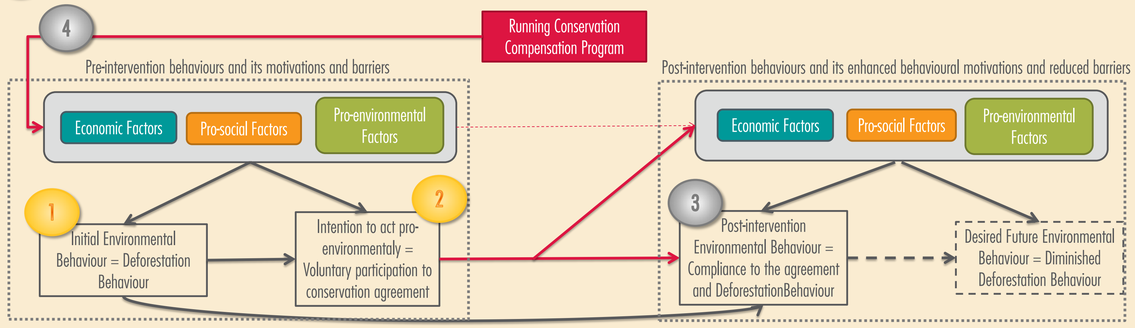
Factors influencing the participation to individual and community forest conservation compensation agreements in Bolivia

INTRODUCTION and OBJECTIVES

Designing forest conservation compensation programs that are successful over the long term requires to understand precisely the motivations underlying land-use behaviors in order to correctly target the causes of deforestation and build on different types of motivations to conserve forest.

Objectives :

1. Identify the initial causes and motivations of pre-intervention deforestation behaviours
2. Identify the motivations and barriers to participate to forest conservation agreements



MODELS and MAIN PRELIMINARY RESULTS

A. Analysis of the causes and variables affectig deforestation behaviours using **sample A** :

$$Defor_{2000\text{-}2016} = f(x_1,\dots x_n ; y_1,\dots y_n ; z_1,\dots z_n)$$ [Censored Model]

B. Analysis of the motivations and barriers to participate to individual conservation agreements using **sample B** :

$$P(Particip_{ind}=1) = g(x_1,\dots x_n ; y_1,\dots y_n ; z_1,\dots z_n)$$ [Logistic Model]

C. Analysis of the motivations and barriers to participate to communal conservation agreements using **sample C**:

$$P(Particip_{com}=1) = h(x_1,\dots x_n ; y_1,\dots y_n ; z_1,\dots z_n)$$ [Logistic Model]

	Variable	A. Deforestation (ha)		B. Participation in individual agreements		C. Participation in communal agreements	
		Coefficient	P-value significance	Probability	P-value significance	Probability	P-value significance
Economic Factors	Number of household members	-0.239	ns	0.516	ns	0.563	*
	Age of head of Household	-0.006	ns	0.496	ns	0.493	*
	Number of cows	0.058	*	0.501	ns	0.508	*
	Grazing area	0.021	**	0.500	ns	0.501	ns
	Ownership of grazing areas	2.143	ns	0.854	**	0.359	ns
	Ownership of cultivated areas	0.060	ns	0.549	ns	0.811	*
	No other remunerated activity (not dependent on land)	1.763	.	0.661	.	0.552	ns
	Perceived forested land suitability for agrarian purpose	3.740	*	0.824	***	0.664	ns
Pro-social Factors	Member of an association of dairy/breeding producers	-4.169	*	0.736	*	0.387	ns
	Member of a water cooperative	-2.085	*	0.510	ns	0.634	ns
	Number of days of collective work on neighbours' plot	-0.009	ns	0.638	**	0.481	ns
	Number of days of collective work on their own plot	0.021	ns	0.448	ns	0.695	*
	Confidence in Institutions and NGOs	1.415	ns	0.802	.	0.772	
Pro-environmental Factors	Perceived consequences of water problems related to health	-0.613	ns	0.646	.	0.720	*
	Desire for support in environmental management	-0.636	ns	0.621	ns	0.889	*
	Forests kept for conservation	1.619	ns	0.266	ns	0.725	ns
	AIC	380.95		360.34		290.76	
	n	136		295		470	

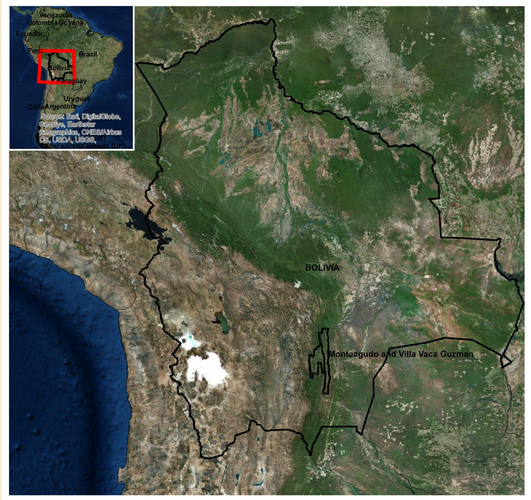
Signif. codes:
'***' < 0.001
'**' < 0.01
'*' < 0.05
'.' < 0.1
'ns' >= 0.1

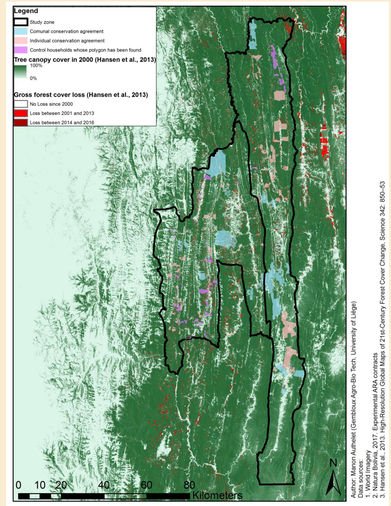
STUDY ZONE and DATA USED

Randomized Control-Trial Experiment with 3-years Voluntary In-kind Forest Conservation Compensation Agreements

A. Control Communities (Conservation agreements not offered)
B. Communities with agreements offered on individual plots
C. Communities with agreements offered on communal plots

Study Zone : two municipalities in the Bolivian inter-andean valleys





Voluntary Participation in the individual or communal agreements = Binary variable *Particip* = 1 or 0

Variables at the household level

Remote sensing data
(Global Forest Change Dataset: Hansen et al., 2013)
used to quantify **deforestation** behaviours on individual plots

=

Defor

AND

Pre-intervention household face-to-face questionnaire survey
(Natura Foundation Bolivia, 2014)
Households' **socio-economic** and **psycho-social** characteristics =

- $x_1,\dots x_n$: economic factors
- $y_1,\dots y_n$: pro-social factors
- $z_1,\dots z_n$: pro-environmental factors

DISCUSSION and CONCLUSION

Regarding economic factors :

- Deforestation that occurred between 2000 and 2016 is significantly related to livestock farming → The objective of the project to reduce livestock farming is justified.
- Farmers have to present their property document to enter in the individual agreements → A significant barrier to participate is the ownership of grazing areas (including grasslands and grazed forests), which are eligible for conservation as opposed to cultivation areas.
- Farmers do not need property document to enter in communal agreements as conservation is realized on communal land → Farmers who own the area they cultivate (who do not cultivate in the communal area) are more willing to participate in communal agreements, as they may have more security regarding their agricultural activity and would suffer less from potential extension limits due to conservation.
- Farmers who have kept forest because it was not an area suitable for other purposes have deforested more and participate more in individual contracts → The direct environmental additionality of the agreements may be low, because the compensation seem to reward some people for conserving forest on an area that is not subject to deforestation which will not require any behaviour change from them (pers. obs. on the process for the designation of the conservation areas). Moreover, the utilitarian perception of forested land as a land reserve may be a cause of deforestation.

Regarding pro-social factors :

- Farmers who are members of an association of dairy/breeding producers have deforested less and participate more in individual contracts → Lower dependence on the forest and/or existence of pro-social norms?
- Farmers who have done many days of collective work on the plots of other community members also participate more → The conservation program could echo pro-social norms of collective work, since the compensation agreements are presented to farmers as a form of "ayni" (ancestral collective work) towards Mother-Earth (Bétrisey & Mager, 2015).

Regarding pro-environmental factors :

- No existing pro-environmental values or attitudes are reducing deforestation → This does not mean that they do not exist, but that the methodology used to measure them may not be the most appropriate or that they do not have the opportunity to express themselves in the presence of other more decisive economic and social causes of deforestation → Any program wishing to reduce deforestation must address the existing economic and social causes while building on existing pro-environmental values and creating new ones.
- Pro-environmental factors do not influence participation in individual agreements but do influence participation in communal agreements, where economic and social factors have less influence.

To go further:

3. Analysis of the factors affecting compliance with the conservation compensation program :

$$Compliance = f(Defor_{2000\text{-}2014}; x_1,\dots x_n ; y_1,\dots y_n ; z_1,\dots z_n)$$

4. Analysis of the impact of the conservation compensation program using the Randomized Control Trial Design on deforestation behaviours and its causes and motivations

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