Toward zero-deforestation value chains: Environmental upgrading and downgrading among non-certified cocoa producers in Colombia

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Environmental upgrading

downgrading


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Non-certified sustainable practices

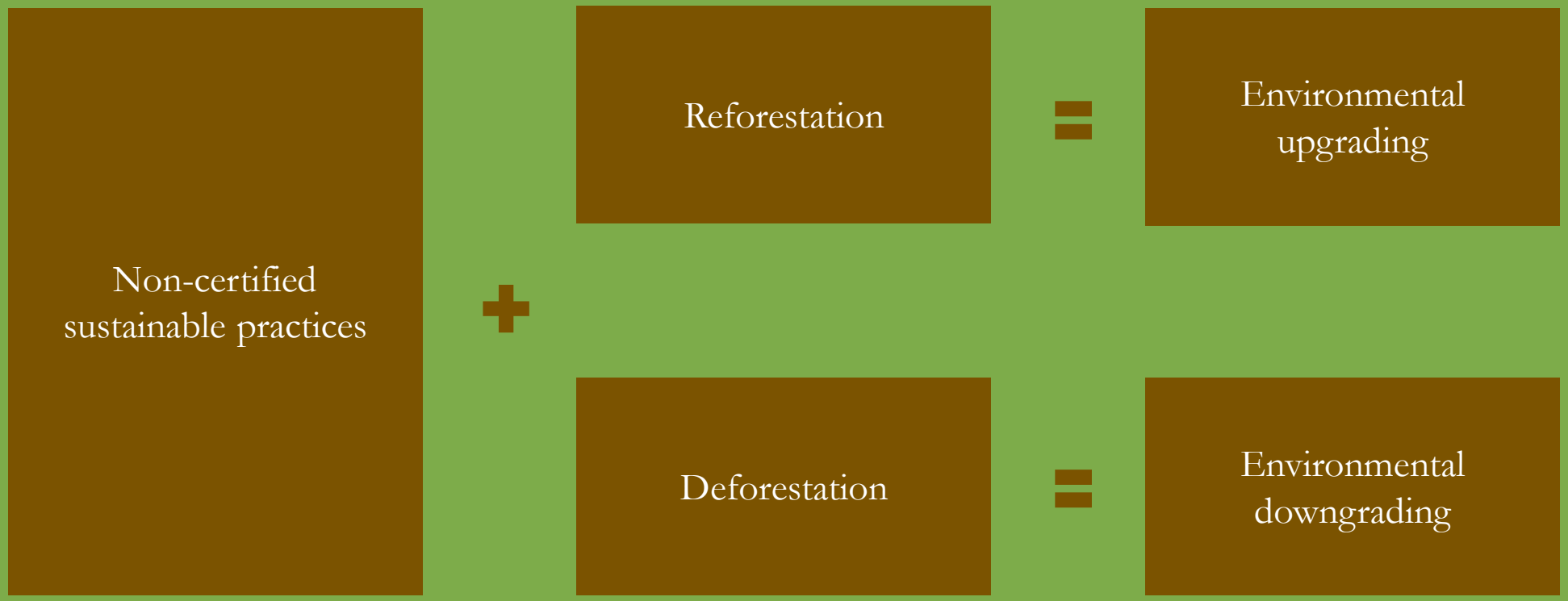
embody the processes that farmers implement because they have the agency to do so rather than due to the need to comply with standards.

Having the agency to implement sustainable intensification — defined by Pretty et al. (2014) as "a process or system where agricultural yields are increased without adverse environmental impact and without the conversion of additional non-agricultural land"— embodies this notion.

What is the extent that non-certified sustainable practices facilitate environmental upgrading in an agrifood value chain?

Assumption:

Non-certified sustainable practices are associated positively with reforestation and negatively with deforestation.


Non-certified sustainable practices
+
Reforestation
=
Environmental upgrading
Deforestation
=
Environmental downgrading


Puerto Rico
Santo Domingo
Caribbean Sea
Nicaragua
Caracas
Costa Rica
Panama
Medellín
Venezuela
Bogotá
French Guiana
Guyana
Cali
Colombia
Suriname
STATE OF RORAIMA
STATE OF AMAPÁ
Quito
Ecuador
Manaus
STATE OF AMAZONAS
STATE OF PA
STATE OF ACRE
Map data ©2023

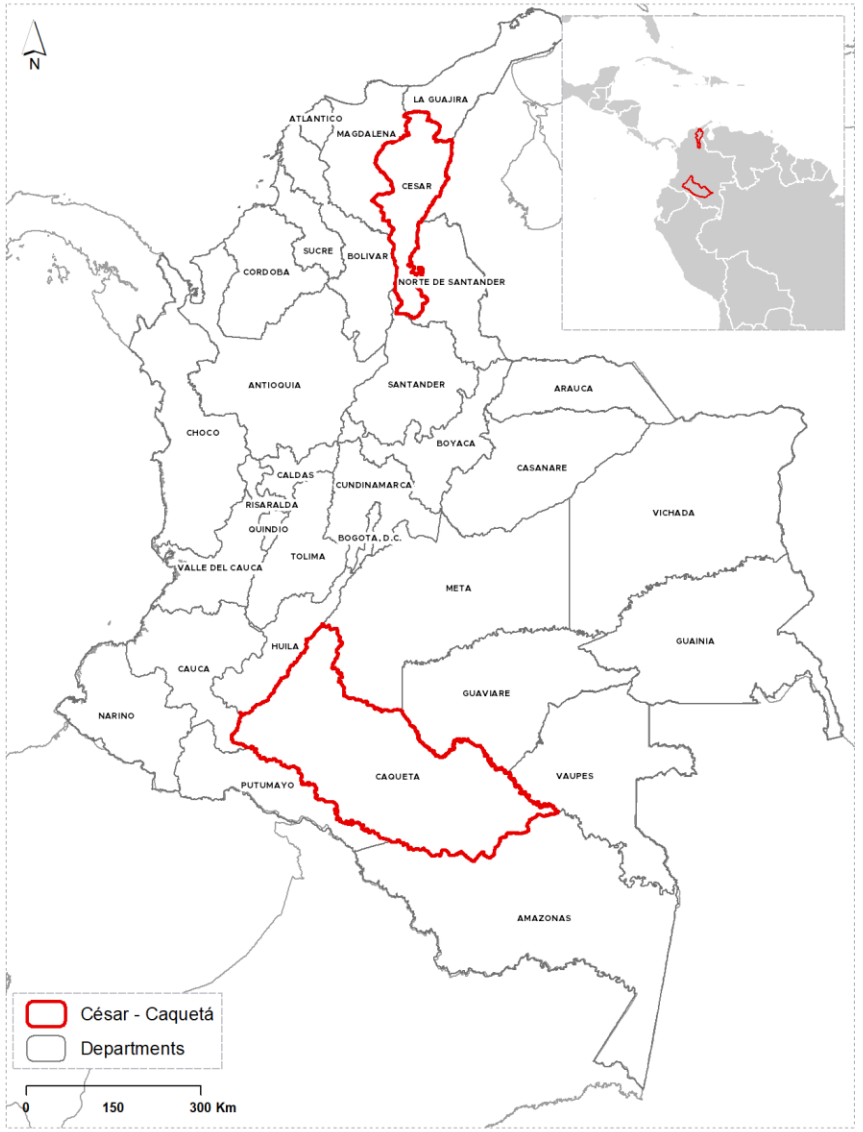
Socioeconomic and environmental survey for implementing sustainable cacao systems for forest conservation for climate change mitigation and peacebuilding in Colombia

Version 1.2

Romero Sanchez, Miguel Antonio; Perez Marulanda, Lisset; Quintero, Marcela; Gonzalez, Carolina; Calderon, Victor; Vanegas, Silvia; Del Rio Duque, Martha; Vanegas-Cubillos, Martha; Castro-Nunez, Augusto, 2022, "Socioeconomic and environmental survey for implementing sustainable cacao systems for forest conservation for climate change mitigation and peacebuilding in Colombia", https://doi.org/10.7910/DVN/G76RMO, Harvard Dataverse, V1, UNF:6:nAvkJdpHMnfGnZrcTMYi1g== [fileUNF]

Description

The main goal of the baseline survey was to understand and document the current farmers' socioeconomic and environmental conditions and characterize their farming practices to analyze the enabling conditions and determinants of adoption of promising sustainable land use systems (SLUS) and better management practices in Caquetá and Cesar Colombia. The survey consisted of 14 modules that collected information on socio-demographic and economic characteristics, use of natural resources, characterization of the production system and agroforestry systems, propensity to adopt agricultural practices, dissemination and transfer of technology, peacebuilding, and effects of the COVID-19 pandemic. Methodology: The survey data were collected using Android tablet devices CSPro 6.2 and 6.3 (U.S. Census Bureau 2020). The interview method was face-to-face in Spanish, and it was based on a closed-ended survey questionnaire. The data was collected from January 2021 to August 2021. The duration of each interview was approximately 60 minutes. Participation was voluntary and farmers responded freely, and under prior informed consent.



Indicators analyzed

Indicator		Equivalent survey question
Non-certified sustainable practices	Cocoa plantation age	Age of cocoa trees in lot 1(to lot 10)?
	Area of agroforestry cocoa	Area with cocoa in agroforestry?
	Number of coups	Number of trees planted in lot 1 (to lot 10)
	Fermentation of cocoa in wood bin	Place of fermentation?
	Drying of cocoa by solar method	Method of drying cocoa (on the farm)?
	Organic fertilization	Use of organic fertilizers?
	Rainwater irrigation	Source of irrigation water: Rainwater reservoir?
Forest cover change	Reforestation	Hectares reforested from 2000 to the present?
	Deforestation	Hectares of forest cleared on from 2000 onward? Hectares of forest cleared off the farm from 2000 onward?

Hypotheses

- ✓ Except for cocoa plantation age, all other indicators of non-certified sustainable practices have a positive association with reforestation and a negative association with deforestation.

- ✓ There is no significant difference in mean deforestation rates between certified and non-certified farmers, but there is a significant difference in reforestation rates between these two types of farmers.

Characteristics relevant to farms and households of surveyed producers

Indicator	Cesar (n=497)		Caquetá (n=433)	
	Freq.	%	Freq.	%
Agroforestry system	445	89%	433	100%
Rainwater Irrigation system	36	7%	10	2.3%
Organic fertilization	109	22%	177	40%
Fermentation of the cocoa bean (box)	170	34%	174	39%
Dried of the cocoa bean (solar method)	81	16%	139	31%
Certified	15	3%	22	5%
	Mean		Mean	
Cocoa under agroforestry (area has)	2.88		2.16	
Age of trees in cocoa lots	9.93		6.65	
Number of trees in cocoa lots	2382		1651	
Hectares of forest cleared on the farm from 2000 onward	0.21		0.36	
Hectares of forest cleared off the farm from 2000 onward	0.01		0.016	
Hectares reforested from 2000 to the present	0.85		0.83	
% Of area in primary forest	0.159		0.182	
Farm size (area)	23.74		39.31	
Characteristics of the household head				
	Mean		Mean	
Age	51.42		54.82	
Farmer education	5.52		5.24	
	Freq.	%	Freq.	%
Gender (male)	431	87%	380	89%
Victim of the armed conflict	245	49%	158	37%

Correlation test results

Indicator of non-certified sustainable practices	Reforestation		Deforestation	
	Caqueta	Cesar	Caqueta	Cesar
Cocoa plantation age	0.1111**	0.0878**	0.0698	-0.0281
Area of agroforestry cocoa	0.1206***	0.1895***	0.0246	0. 0869**
Number of crops	0.0790	0.3351***	0.0246	0. 1609***
Organic fertilization	0.0902*	0.1332***	0.0902***	0.0802*
Fermentation of cocoa in a wood bin	-0.0169	-0.0577	-0.00012	0.0315
Drying cocoa by solar method	-0.0399	0.1455***	-0.0258	-0.131
Rainwater irrigation	0.1108**	-0.0221	-0.0135	0.0751*

Reforestation

Source of variation	Sum of squares	Degrees of freedom	Mean square	F-value	P-value
Between groups	69.26	1	69.26	9.17	0.0025
Within groups	7004.13	923	7.56		
Total	32.91	924	7.62		
Number of obs	= 929				
R-squared	=0.0098				

Deforestation on-farm

Source of variation	Sum of squares	Degrees of freedom	Mean square	F-value	P-value
Between groups	1.85	1	1.85	0.86	0.35
Within groups	1985.42	923	2.15		
total	1987.26	924	2.15		
Number of obs	= 925				
R-squared	=0.0009				

Deforestation off-farm

Source of variation	Sum of squares	Degrees of freedom	Mean square	F-value	P-value
Between groups	.0056	1	.0056	0.16	0.6913
Within groups	32.89	923	.0355		
total	32.91	924	.0355		
Number of obs	= 925				
R-squared	=0.0009				

Findings

- ✓ Non-certified sustainable practices can facilitate environmental upgrading and discourage environmental downgrading but only in some cases.
- ✓ There is no significant difference in deforestation rates but a significant difference in reforestation rates between certified and non-certified farmers.
- ✓ Although there is a significant difference in the mean reforestation rates between certified and non-certified producers, it does not mean the latter do not reforest; they do but at a lower rate.

Implications

- ✓ Potential of non-certified sustainable practices as alternative to certification to access sustainable agrifood markets
- ✓ Potential of cocoa production as strategy to restore degraded land in Colombia
- ✓ Potential to expand the discussion on the factors that influence the agency of farmers to protect the natural environment

Thank you!

Questions and comments are welcome.