

# How to boost sustainable land use systems at different scales in conflict affected areas and prone to deforestation

**Lisset Pérez M.**

([lpm@ign.ku.dk](mailto:lpm@ign.ku.dk))

([Lisset.perez@cgiar.org](mailto:Lisset.perez@cgiar.org) )

**Supervisor:** Martin Rudbeck Jepsen

**Co-supervisor:** Augusto Castro

UNIVERSITY OF COPENHAGEN



At the end of the  
presentation please give  
us your inputs:

How do you see this  
research from a  
geography research  
perspective?

**Overall Question:** How to promote sustainable development in conflict affected areas and prone to deforestation?



<https://www.las2orillas.co/las-farc-son-un-monstruo-que-compra-conciencias-por-doquier-en-caqueta/>

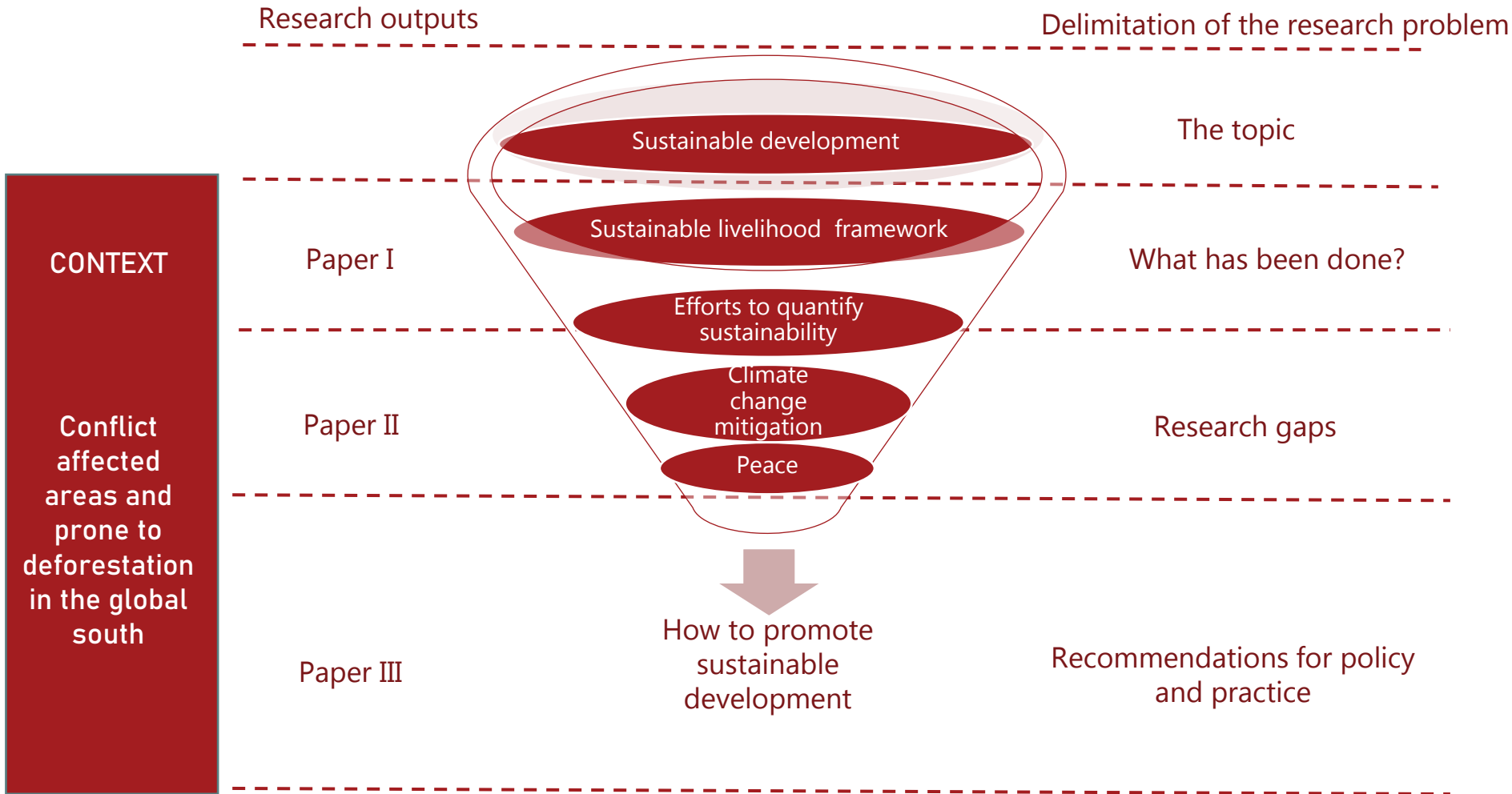


Source:<https://especiales.semana.com/deforestacion/caqueta.html>

# Study Area: Conflict affected areas and prone to deforestation in Colombia



# Thesis's Scope



# Paper I

## Farmscape Composition and Livelihood Sustainability in Deforested Landscapes of Colombian Amazonia

Status: Published

Pérez Marulanda, L.; Lavelle, P.; Rudbeck Jepsen, M.; Castro-Nunez, A.; Francesconi, W.; Camilo, K.; Vanegas-Cubillos, M.; Antonio Romero, M.; Suárez, J.C.; Solarte, A.; Quintero, M.

*Agriculture* 2020, 10, 588.

<https://doi.org/10.3390/agriculture10120588>



Article

### Farmscape Composition and Livelihood Sustainability in Deforested Landscapes of Colombian Amazonia

Lisset Pérez Marulanda <sup>1,2,\*</sup>, Patrick Lavelle <sup>3</sup>, Martin Rudbeck Jepsen <sup>2</sup>, Augusto Castro-Nunez <sup>1</sup>, Wendy Francesconi <sup>1</sup>, Karen Camilo <sup>1,4</sup>, Martha Vanegas-Cubillos <sup>1</sup>, Miguel Antonio Romero <sup>1</sup>, Juan Carlos Suárez <sup>5</sup>, Antonio Solarte <sup>6</sup> and Marcela Quintero <sup>1</sup>

<sup>1</sup> International Center for Tropical Agriculture (CIAT), km 17 recta Cali-Palmira, Cali 763337, Colombia; augusto.castro@cgiar.org (A.C.-N.); w.francesconi@cgiar.org (W.F.); K.Camilo@cgiar.org (K.C.); m.vanegas@cgiar.org (M.V.-C.); m.a.romero@cgiar.org (M.A.R.); m.quintero@cgiar.org (M.Q.);

<sup>2</sup> Department of Geosciences and Natural Resource Management, University of Copenhagen, DK-1350 Copenhagen, Denmark; mj@ign.ku.dk

<sup>3</sup> Institute of Ecology and Environmental Sciences (Biodis), Paris Sorbonne University, 75005 Paris, France; patrick.lavelle@ird.fr

<sup>4</sup> Department of Economics, Universidad ICESI, Cali 760031, Colombia

<sup>5</sup> Facultad de Ingeniería, Universidad de la Amazonía, Florencia, Caquetá 184010, Colombia; ju.suarez@udla.edu.co

<sup>6</sup> Centro para la Investigación en Sistemas Sostenibles para la Producción Agropecuaria (CIPAV), Cali 760042, Colombia; antonio@fun.cipav.org.co

\* Correspondence: lisset.perez@cgiar.org; Tel: +57-(2)-445-0100; Fax: +57-(2)-445-0073

Received: 23 September 2020; Accepted: 23 November 2020; Published: 27 November 2020



**Abstract:** In this article, we operationalized a sustainability framing based on the Sustainable Rural Livelihood Resources Framework (SLR), which consists of five capitals—human, physical, social, financial, and natural. We proposed a sustainability index (SI) for two landscapes dominated by two agricultural systems: cattle ranching and small-scale family agriculture. Farm variables within each capital were analyzed using confirmatory factor analysis. Key variables were identified and index values were calculated for each capital. These were combined through a set of simultaneous equations to estimate farm-specific capitals and SI from the observed farm variables. Principal component and cluster analyses were used to group the farms according to their index scores and to further compare their characteristics. Furthermore, with the purpose of comparing the index scoring with an independent metric, a landscape indicator, which comes from a continuous forest, was calculated. From the results, the capitals that contributed to a higher SI score the most were financial and physical. As cattle ranching was associated with higher economic returns and infrastructure investments, this livelihood was identified as the most sustainable. Yet, cattle ranching has been a deforestation driver in the region. These results are attributed to the current conceptual framework design, which gives greater weight to material and economic variables; therefore, it generates a weak sustainability measure. Although the framework allowed us to identify land-use alternatives that could improve SI scores (i.e., silvopastoral systems), corrections to the proposed framework and methodological approach will need to include additional environmental benefits currently unaccounted for. Farmers that use their farms for conservation purposes should be recognized and compensated. An improved environmentally focused SI operational framework could help to endorse and promote sustainable livelihoods and to generate a strong sustainability measure.

**Keywords:** silvopastoral system; confirmatory factor analysis; sustainable land-use; farmscape; sustainability

# General Objective: To quantify sustainability in conflict affected areas and prone to deforestation in Colombia

- Sustainable Livelihood Framework (Scoones, 1998)
- Confirmatory Factor Analysis (SI)
- 341 Household Interviewed (2016)
- 2 different land use systems



# Questioning the conceptual framework

## Big conclusion of Paper I

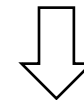
Despite the inclusion of physical and financial capital provides a more comprehensive accounting of **human needs**, there is a risk that **environmental concerns may be overlooked**

## Better integration to environmental and climate dimensions

Brundtland Report (1987)

Triple bottom line (3 dimensions)

- Environmental
- Social
- Economic



## Paper II


Integrating climate change mitigation and peacebuilding

Environmental  
Peacebuilding







Sustainability  Sustainable Land Use Systems



# What are the key characteristics of a sustainable land use system, and what practices can be implemented to achieve them?



SLUS Farm,  
Caquetá Colombia

# Sustainable cocoa productive system



COCOA AGROFORESTRY SYSTEM



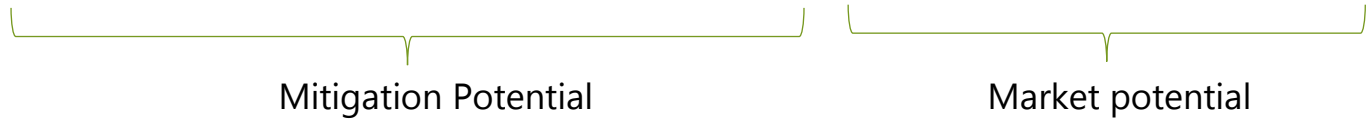
HIGH FOREST TREE DENSITY



ORGANIC PRODUCTION



PRODUCT QUALITY





## Paper II

### **A novel framework for measuring peacebuilding co-benefits from sustainable production systems in conflict-affected areas**

**Status: Submitted (Ecological Economics)**

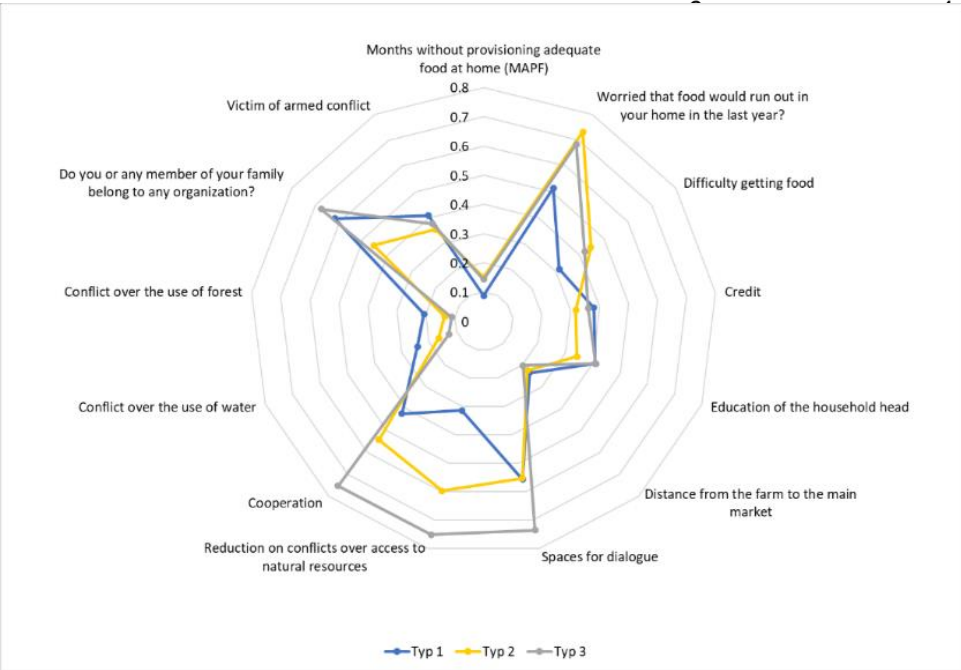
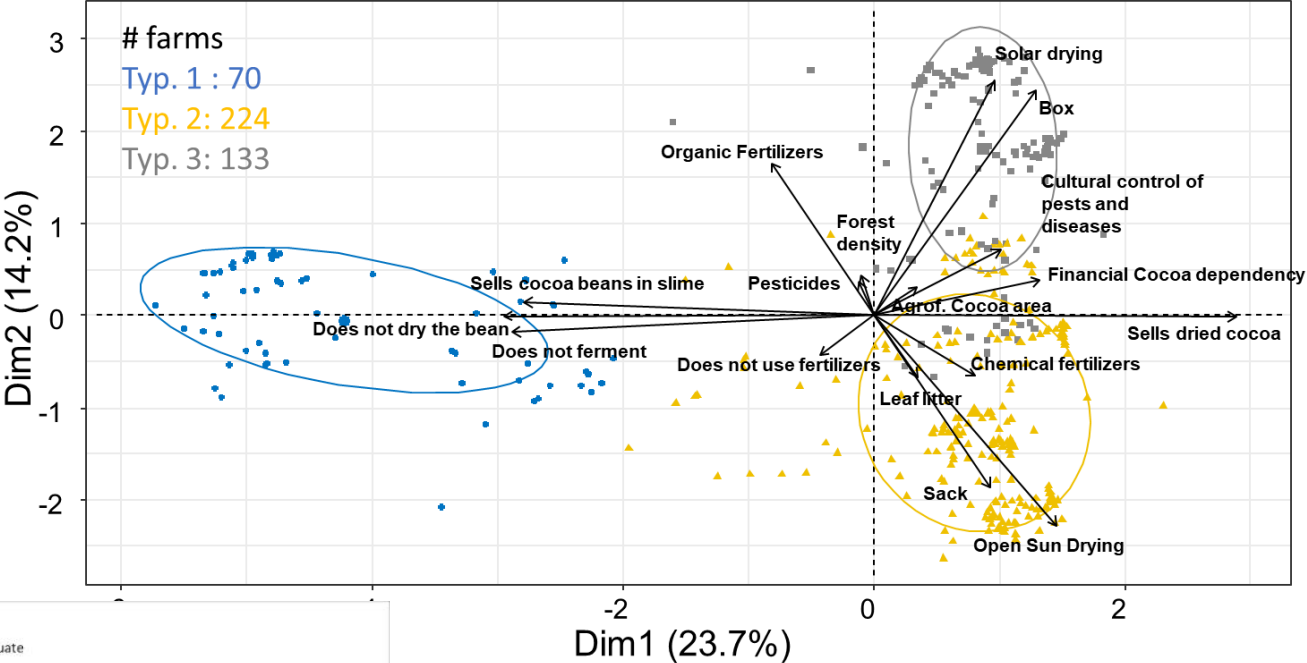
Pérez Marulanda, L.; Rudbeck Jepsen, M.; Loehr, K., Muñoz; H.; Quintero, M, Castro-Nunez

**General Objective:** Integrate peacebuilding and climate change mitigation agendas in the sustainability measures

# Framework for assessing contributions to land-based climate action and peacebuilding from interventions in agriculture

Sustainable Land-Use Systems contributions	Critical points	Indicators
Agricultural Production	<p>Land-use productivity</p> <p>Profitable production with an emphasis on increased net farm income and competitiveness</p>	<p>Yields</p> <p>Farm net income, ability to labor, number of crops income sources</p>
Land-based climate action	<p>Carbon Emissions</p> <p>Management of natural resources. (Environmental Co-benefits)</p>	<p>Carbon stock, carbon sequestration</p> <p>Water: Supply, quality</p> <p>Forest and natural ecosystems: Area/ type</p> <p>Biodiversity: Number of species, diversity of habitats, diversity of landscapes</p> <p>Soil: quality, fertility</p> <p>Conservation: Reforestation, deforestation</p>
Peacebuilding	<p>Food Security</p> <p>Socio-economic Inclusion</p> <p>Cooperation</p> <p>Governance of natural resources</p> <p>Trust and social capital</p>	<p>Months of provisioning adequate food at home (MAPF)</p> <p>Access to credits and markets, household literacy rate</p> <p>Cooperation, spaces for dialogue</p> <p>Conflict over access to natural resources,</p> <p>Association, community relations, victim of the armed conflict</p>

We surveyed 920 farmers, and clustering cocoa systems according to their productive characteristics







Given the benefits of SLUS, how can we promote the transition from traditional systems to SLUS?



## **Paper III**

### **Boosting the adoption of sustainable land-use systems for climate-change mitigation and peacebuilding**

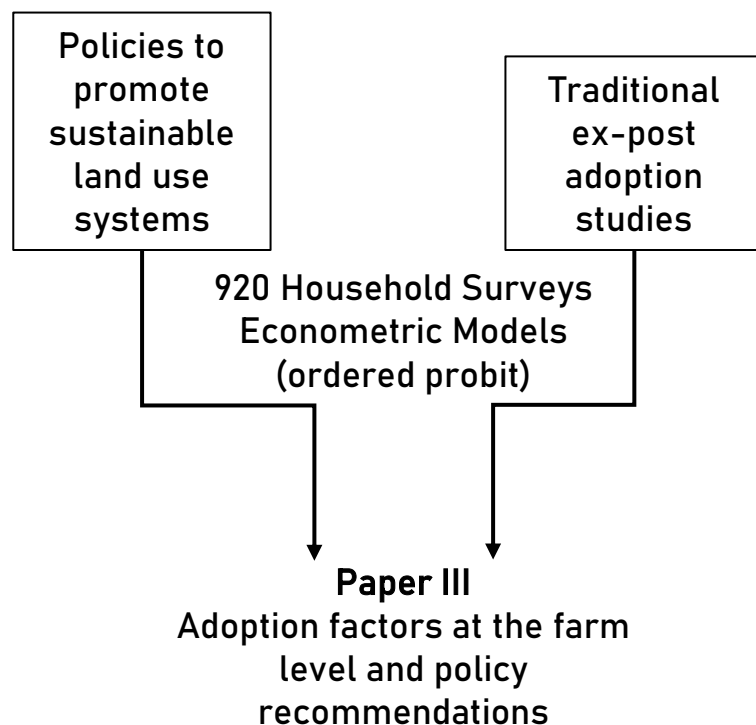
**Status: Submitted (World Development)**

Pérez Marulanda, L.; Rudbeck Jepsen, M.; Castro-Nunez, A.

**General Objective:** To determine how policies to promote SLUS in Colombia can target real barriers and increase its adoption to promote climate-change mitigation and peacebuilding.

# HOW TO PROMOTE THE ADOPTION OF SUSTAINABLE LAND USE SYSTEMS?

**Agricultural interventions have the potential to promote sustainable development by adopting practices that enhance environmental sustainability and peacebuilding**



## Some recommendations (from quantitative outcomes)

- Support farmer's associations and increasing capability with more technical help.
- Stimulating farmer-to-farmer connections.
- Promote conversion of land use as opposed to expansion
- The land conversion from grasslands to sustainable cacao may be made easier by previous land rehabilitation



Thank you for listening!  
Looking forward for your contributions!