Propensity of farmers to conserve forest within REDD + projects in areas affected by armed-conflict

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A B S T R A C T

The implementation of carbon-storage efforts in countries experiencing armed conflicts or confronting illegal activities (such as illicit crop cultivation) will permit additional tropical forests to be protected for climate change mitigation. Yet, despite these potential gains, the appropriate design and application of forest conservation and climate change mitigation approaches such as the mechanism for Reducing Emissions from Deforestation and Forest Degradation (REDD +) in such contexts remain little studied. Unanswered questions relate to the propensity of farmers in conflict affected areas to conserve forests for climate change mitigation. Such questions include, for what reasons and under what circumstances would such farmer participate in climate change mitigation activities? In this paper we address these questions by developing an econometric Logit model to understand factors influencing the propensity to conserve forest of farmers from 14 villages in Colombia. These villages are located in a region recognized as a stronghold of guerrilla insurgencies and as the center for illegal crop cultivation. The region was selected as it is also the proposed target area for piloting Colombian government REDD + activities. A household survey (n = 90) showed that four explanatory variables are significantly related to the 'propensity to conserve forest'. 'Harvest of non-timber forest products' (specifically bush meat) positively influences a farmer's propensity to conserve forest. In contrast, higher 'percentage of forest area', 'deforestation for (the production of) subsistence crops' and 'harvest of wood product', each have a negative influence. Overall, results show an already high propensity to conserve forest among farmers (70% of respondents) and indicate their growing propensity toward the conservation of primary forest and management of degraded lands and secondary forest. These results might be attributable to efforts undertaken to reduce the causes of armed-conflicts and ecosystem deterioration, such as enhancement of land tenure security and farmer associations' rules to reduce deforestation. They might also be linked to communities' positive attitudes toward water resources conservation. We conclude that most farmers will not oppose forest conservation as long as it is compatible with their respective livelihood priorities.

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1. Introduction

Developing countries are gradually integrating climate change mitigation approaches into their public policies. These include efforts such as Reducing Emissions from Deforestation and Forest Degradation (REDD +), which seeks to incentivize the implementation of national policy measures to halt deforestation and forest degradation (Agrawal et al., 2011). However, based on UCDP (2014) and Themnér and Wallensteen (2013), we estimate that some 39% of countries participating in any of the three available REDD + funds (UN-REDD, Forest Carbon Partnership Facility and Forest Investment Program) are experiencing,

or are emerging from, armed-conflicts[1] which, to some extent, are related to unclear land tenure regimes and unbalanced land-use competition (de Jong et al., 2007). Consequently, despite the imminence of climate change impacts on ecosystems and human life, it appears that priority should be given to first tackle the causes of armed-conflicts. Nonetheless, integration of policies around peacebuilding and land-based climate change mitigation remain limited, even where these might apply in the same areas.

Synergies between land-based climate change mitigation and peacebuilding efforts may be possible in some, but not all, conflict

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[1] In this study, armed conflict is defined as a contested incompatibility that concerns government or territory (or both) where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle deaths in a year (Themnér and Wallensteen, 2013; UCDP, 2014).

affected areas (Castro-Nunez et al., Unpublished results). This will depend on the impacts of periods of violence on forest cover, which can be very diverse. Land-uses emerging during (and after) armed-conflict periods can contribute to the recovery or, conversely, the reduction of forested lands (Sánchez-Cuervo and Aide, 2013a; Sánchez-Cuervo et al., 2012). While no form of violence can be deemed 'positive', conflict might, in some circumstances, be associated with 'positive' environmental outcomes, such as the reduced pressure on forest ecosystems (Burgess et al., 2015; Hecht and Saatchi, 2007). An example of this is when vast amounts of forested lands are systematically isolated and abandoned due to armed violence or as part of an armed group's military strategies. Under these circumstances, abandoned land recovers, and forest carbon stocks and biodiversity habitats are enhanced due to the displacement of economic activities such as cattle grazing or unsustainable forest management (Sánchez-Cuervo and Aide, 2013a, 2013b; Sánchez-Cuervo et al., 2012). Nonetheless, under other circumstances, violent conflict can increase the exploitation of forested areas, for instance when armed groups undertake damaging illegal or excessive revenue-generating activities, such as the overharvesting of forest species (Didia, 1997) and wildlife (Dudley et al., 2002).

Peacebuilding processes could incorporate conservation strategies (Brottem and Unruh, 2009) and land reforms, such as individual or collective land-titling (Albertus and Kaplan, 2013; Hecht and Saatchi, 2007). However, while the effects of land reforms on peacebuilding have been demonstrated (Albertus and Kaplan, 2013; Unruh, 2009), their effects on households' land-use decisions, environmental degradation and particularly on deforestation (and therefore on GHG emissions) remain a matter of debate and are probably dependent on a set of factors defined by site-specific circumstances (Angelsen, 2007; Bromley, 2009; Dokken et al., 2014; Feder and Nishio, 1998; Gould, 2006; Wannasai and Shrestha, 2008).

Although peace processes might be conducive to forest conservation, they do not determine a farmer's decisions toward forest conservation. Similarly, financial benefits alone are unlikely to prompt tropical forest carbon conservation (Karsenty and Ongolo, 2012). Farmers' decisions as to whether or not they adopt particular alternative practices or technology greatly depend on specific characteristics of respective farms and households (Lapar and Pandey, 1999). Decisions are also linked to the availability of other livelihood support, such as extension services, social networks or subsidies (Conley and Udry, 2001; Knowler and Bradshaw, 2007). It is commonly recognized that no single factor can determine farmers' sustainable land-use decisions (Baumgart-Getz et al., 2012; Knowler and Bradshaw, 2007; Pannell et al., 2006; Prokopy et al., 2008; Tey et al., 2014). Furthermore, there is evidence that factors such as forest dwellers' priorities and cultural preferences highly influence REDD + adoption (Coomes et al., 2008; Peterson St-Laurent et al., 2013; Sheil et al., 2006),

Identifying factors that discourage or encourage farmers to implement forest conservation practices would be useful prior to implementing REDD + projects. This would be particularly useful in complex armed conflict affected contexts where many additional factors might come into play. One approach to identifying such factors is via the systematic evaluation of multiple variables that might influence the adoption of forest conservation practices. As a response to these research gaps and to advance the understanding of potential synergies between peacebuilding and climate change mitigation, this study aims to: (1) assess the propensity to conserve forest among farmers affected by armed-conflict; and (2) understand which factors encourage or discourage forest conservation in conflict-affected areas. These aims are targeted by posing the question: what factors explain the propensity to conserve forest among armed-conflict affected farmers? The research question is explored in the context of Colombia, a country confronted with well-known challenges relating to illegal crop cultivation, smuggling, and ongoing armed-conflict, dating back to the 1940s (Ross, 2007). We start this paper by introducing the research area in order to set the stage for the analysis. We then provide a review of other studies

on adoption of sustainable land use practices that has guided the choice of our hypotheses. The subsequent sections describe the methods and present the results, discussions and conclusions.

2. Study area

Colombia provides a range of pertinent study sites due to its national: strategy for '(peace) territorial consolidation' (involving land titling and land restitution programs for those displaced by armed-conflict) (Summers, 2012); commitment to reduce forest-based net emissions to zero by 2020 (Colombia-Reports, 2013); and ongoing peace negotiations with the Revolutionary Armed Forces of Colombia (FARC) (Zuleta et al., 2013). The Special Management Area of the Macarena (AMEM; Fig. 1) was chosen as a study site based on three of its characteristics: firstly, it is regarded as a FARC-stronghold and Colombia's center for illegal crop cultivation (Asdal, 2013); secondly, three Government-led REDD + Projects are scheduled to be implemented in the area (Zamora and Malky, 2014); and thirdly, since 2009, an ambitious land titling program has been implemented in the area, as part of the strategy for (peace) territorial consolidation as mentioned above (INCODER, 2009).

The AMEM covers parts of the departments of Meta (90%) and Guaviare (10%). It comprises four national parks (Sierra de la Macarena-616,789 ha; Tinigua-227,389 ha; Picacho Mountains-274,422 ha; and Sumapaz-211,563 ha) and three 'Districts for the Integrated Management of Natural Resources' (DMI) (Ariari – Guayabero-2,361,100 ha; North Macarena-402,001 ha; and South Macarena-33,000 ha). The AMEM was established in 1989 in order to regulate human activities that affect the ecological stability of the territory, conserve biodiversity in the region and build a biological corridor between the Andes, the Colombian Amazon and the Orinoco regions. These conservation initiatives coexist alongside several programs and projects that, despite their diverse objectives and approaches, commonly seek to improve livelihoods and reduce illegal activities.

The REDD + initiative of the Ariari-Guejar-Cafre region (the 'Incentives for Conservation' project), is used as the local-level case study. The project builds on going engagements and previous work with local institutions, in particular with the Farmer Association for Organic Agriculture and Fair Trade in the Guejar River Basin (AGROGÜEJAR). AGROGÜEJAR comprises about 43,612 ha, of which 15,457 ha are forested. AGROGÜEJAR is made up of 17 'veredas' (a municipality subdivision, here after referred to as 'villages'), comprising 579 households. Fifteen of these villages are located in the Puerto Rico municipality and the remaining two are situated in the municipalities of Puerto Lleras and Vistahermosa, respectively. 'Incentives for Conservation' is to be implemented in the Sierra de la Macarena National Park by the Orinoquian Territorial Directorate of the Colombian National Parks Office, with support from the Natural Inheritance Fund ('Patrimonio Natural') and the Dutch Government.

The AMEM's history of land-use is linked to socio-political violence, forced displacements, illegal cultivation of coca (*Erythroxylum coca*) and the presence of armed actors such as guerrilla forces, paramilitaries and the military (Armenteras et al., 2006). Various policies and projects have sought to influence land-uses (such as illicit crops eradication) and reduce causes of conflicts ('territorial consolidation for peace'). These approaches have included: the Colombian Government's granting of demilitarized areas (Área de Distensión) to the FARC between 1999 and 2002 (Etter et al., 2006a); manual coca crop eradication and glyphosate fumigation, as part of Plan Colombia from 1998 to 2010 (Ross, 2007; Sánchez-Cuervo and Aide, 2013a, 2013b); and conditional payments made on the production of sustainable 'alternative' (to illegal) crops, as part of the governmental program Familias Guardabosques (Giraldo and Lozada, 2008).

According to local people, settlement of the study area began in the 1960s. This is comparatively recent in contrast with AMEM's neighboring areas, where settlement began in the early 1930s, mainly for rubber