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Farmer participation in a climate-smart future: Evidence from the Kenya agricultural carbon market project

Jean Lee

Environmental Program, Colorado College, 14E. Cache La Poudre St., Colorado Springs, CO 80903, USA

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ABSTRACT

Smallholder agricultural carbon market projects have potential to achieve climate-smart agriculture (CSA), a "triple-win" for food security, climate change mitigation, and adaptation. Farmer participation is critical for achieving widespread impact, yet their adoption of sustainable land management practices is constrained by eligibility, willingness, and ability to participate. This research examines how the Kenya Agricultural Carbon Project enabled smallholder participation, with results emphasizing the importance of institutional conditions and farmers' perceptions. Findings highlight the necessity of international collaborations and high levels of synergistic coordination. Building social capital and adopting participatory learning approaches are strategies that can increase participation and create inclusive climate-smart agriculture projects.

1. Introduction

Direct emissions from agriculture and indirect emissions from related forest conversion contributes up to 25% of global greenhouse gas (GHG) emissions (Vermuelen et al., 2012). In developing regions, smallholder farmers manage 80% of agricultural land, living on the margins of poverty and facing an increasing number of climate shocks that affect their ability to increase production (Harvey et al., 2014). Their decisions and actions have a significant impact, yet measures to address emissions often risk compromising food security and undermining livelihood strategies (Caplow et al., 2011).

Agricultural carbon markets have been proposed as a mechanism to incentivize adoption of agricultural practices that lower GHG emissions. These markets emulate payment for ecosystem services (PES) projects, where ecosystem service providers—here, smallholder farmers—are paid to adopt practices that reduce GHG emissions (Grieg-Gran et al., 2005; Landell-Mills, 2002). These projects have recently been the subject of considerable interest; developers hope that the carbon payment could incentivize farmers to implement sustainable agricultural land management (SALM) practices that increase crop productivity and build farmer resiliency to climate change without increasing GHG emissions—the "triple-win" of climate-smart agriculture (CSA). While widespread farmer uptake of SALM practices is essential for projects that wish to achieve poverty alleviation and climate change mitigation objectives, projects often encounter difficulty in initial stages of the project cycle due to project design and implementation, which prevent many farmers from adopting.

The aim of this paper is to identify the factors influencing smallholder uptake of sustainable agricultural land management practices in agricultural carbon market projects. Using an in-depth case study approach, this paper examines a project in sub-Saharan Africa, highlighting broader institutional constraints project developers encounter and discussing farmer perspectives, thereby expanding the analysis of factors from a top down view to one that is also more bottom-up and inclusive of farmers' opinions.

1.1. Smallholder agricultural carbon markets and climate-smart agriculture: an overview

International programs such as the Clean Development Mechanism (CDM) and Reducing Emissions from Deforestation and Forest Degradation (REDD+) demonstrate interest in leveraging the carbon market to mitigate greenhouse gas emissions while simultaneously alleviating poverty (Mahanty et al., 2013; Hein et al., 2012). While forests and avoided deforestation have been long-recognized for their potential to achieve both objectives (Angelsen and Wunder, 2003; Sunderlin et al., 2005; Harris et al., 2012), agriculture was largely ignored due to the sensitivities about economic growth and food security (Godfray et al., 2010).

However, the significant role of the agricultural sector in both climate change mitigation and adaptation strategies has brought agriculture to the forefront of debates on climate change and rural development, gaining traction at international conferences such as the UNFCCC[1] Conference of Parties in Paris in 2015 and again in

E-mail address: jean.lee@coloradocollege.edu.

[1] United Nations Framework Convention on Climate Change.

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Marrakech in 2016. Renewed attention has focused on the potential of smallholder carbon market projects in the agricultural sector to leverage climate finance and fund CSA projects aimed at sustainably increasing food production, enhancing the resilience of farmers, and mitigating GHG emissions (Lipper et al., 2014; Porras, 2015). Under this framework, smallholder farmers who adopt SALM practices would increase farm productivity despite climate shocks and receive a carbon payment for providing the ecosystem service of GHG mitigation.

Even though soil carbon holds high carbon sequestration potential, large variations in soil carbon and technical difficulties in calculating carbon sequestration result in few approved carbon accounting methodologies (Lal, 2010; Cacho et al., 2003). Land-based carbon accounting methodologies were initially focused on afforestation and reforestation (A/R). In 2012, these methodologies expanded to include SALM practices such as terracing, composting, and residue management, which can increase crop productivity by 20–30% (Cooper et al., 2013). The multiple practices, and their co-benefits, have spurred renewed interest in the potential to leverage the carbon finance for CSA initiatives.

Widespread adoption of SALM practices will be necessary to make a significant impact on both GHG emissions and poverty alleviation. However, persistent challenges related to farmer adoption rates prevent projects from scaling up and achieving their full potential. Efforts to scale up farmer adoption include both top down approaches to disseminate technology and information to as many people over as large a geographical region as possible, as well as bottom up strategies to build human capacity and foster an environment of learning (Franzel et al., 2001; CIAT, 2004). As agricultural carbon markets seek to gain traction, effective strategies to recruit farmers and scale up projects, without marginalizing farmers and compromising their livelihoods, will be critical to success.

1.2. Farmer participation: concepts and considerations

Equity has been a central concern in many carbon market projects as evidence has emerged that project developers often prioritize efficiency over equity (Chhatre et al., 2012; Corbera et al., 2007). For example, carbon market projects are often limited in project funds and operate on short time frames. Developers need to engage farmers quickly and inexpensively, which may compromise equity objectives of reaching the relatively poor in the community and ensuring farmers' voices are included in the process (Brown and Corbera, 2003; Lee et al., 2015). Information asymmetries jeopardize the extent to which farmers can be involved in making decisions and negotiating contracts with buyers (Lee et al., 2016). Many fear carbon projects will exacerbate entrenched power dynamics between the state and the locals, reverse decentralization, and solidify state control (Phelps et al., 2010). The potential negative impacts of carbon market projects on farmers' livelihoods have led many to emphasize the importance of focusing on access and recognition; procedures and decision-making; distribution of benefits and risk, and the overall context under which these projects occur (McDermott et al., 2012; Pascual et al., 2014).

Deeper analyses of equity in carbon market projects necessitate identifying the factors influencing participation. Participation, at the narrowest form, is understood as whether one can "retain some access to potential benefits" (White, 1996; Cornwall, 2008, p.273). In the context of the carbon market projects, farmer access to project benefits such as the carbon payment and increased crop productivity is contingent on adoption of SALM practices. While some may view equating farmer participation to the uptake of practices as too limited in scope because it does not explicitly include other dimensions such as power and influence decision-making, the practical outcome is that this framing provides a structured way to analyze the barriers farmers experience in gaining access to the carbon market and identify strategies to increase adoption and scale up projects.

Based on Pagiola et al. (2005) framework on participation in PES projects, farmer participation in carbon market projects can be grouped into three factors: eligibility (i.e., are farmers located in a carbon market project area), willingness (i.e., do farmers want to adopt practices), and ability (i.e., do farmers have the means to do adopt).

Farmer eligibility to participate is hindered by the paucity of land-based carbon market projects. Carbon markets are made up of a complex set of institutional arrangements (Peskett et al., 2011), such as securing funding and negotiating contracts between carbon buyers and sellers, adopting carbon accounting methodologies appropriate to the region, and abiding by monitoring and verification protocols to assure buyers carbon has been sequestered. Farmers have limited avenues for engaging with the international market, and project developers often act as intermediaries who connect the smallholder farmer with carbon buyer (Lee et al., 2016). However, project developers avoid areas that have high transaction costs, few accepted methodologies, and inadequate institutional support, factors that lower the rate of return or increase risk for project developers (Cacho and Lipper, 2006; Jindal et al., 2008). Without interested project developers, farmers have little to no avenue for engaging with the market.

Eligibility is only the first hurdle in participation: fostering an environment where farmers are willing and able to participate is also necessary for project success. Willingness has largely been attributed to profitability or complementarity with farming systems (Goldman et al., 2007; Pascual and Perrings, 2007). Carbon market project developers have tried to incentivize participation by advertising monetary income from carbon credits or promoting other benefits such as technical trainings or employment (Lee et al., 2016). However, the success of such tactics are mixed (Bond et al., 2009), likely because of low carbon payments and the failure to acknowledge that farmers engage in complex decision-making models that include feedbacks from their social, political, and ecological environment (Scoones, 1992).

Previous studies suggest that social norms and trust among farmers increase their willingness (Vatn, 2010; Sommerville et al., 2010). While strategies to understand, explain, and incentivize participation are varied, rarely are farmers' voices captured, despite evidence from rural development literature that suggest identifying farmers' perception of their own capacities and that of their environment, as well as their perceptions of risks versus benefits, will increase willingness to participate in and adhere to project activities (Petheram and Campbell 2010; Leeuwis 2002). Given the low prices of carbon credits[2] and the concern that many projects do not include farmers in meaningful ways, identifying farmers' perceptions will be a critical aspect in the success of agricultural carbon market projects and climate-smart agriculture initiatives.

Farmer ability to participate has largely been attributed to secure land tenure, access to financial capital, and the technical difficulty of practices (Tschakert, 2007; Pagiola et al., 2005). For example, purchasing seedlings for tree-planting activities are expensive and require watering and weeding, and farmers often need proof of secure land tenure to plant trees and sell carbon credits (Smith and Scherr, 2003; Lee and Newman, 2012). While these barriers have been discussed and explored in carbon market projects focused on tree-planting, they have yet to be explored in-depth in agricultural carbon projects.

This paper fills the current gap in our understanding of how to design and implement agricultural carbon market projects so farmers are eligible, willing, and able to participate. The institutional design of a smallholder agricultural carbon market project in Kenya is examined to determine necessary actors and rules that lead to farmer eligibility. Farmers' perceptions of carbon market project activities, and the barriers they encountered when they wanted to adopt SALM practices, are discussed. The empirical results on farmer participation drive the discussion on how to scale up agricultural carbon market projects to

[2] Carbon prices in the voluntary market hit a low of 3.3 USD/ton CO_2e in 2015 (Hamrick and Goldstein, 2016).