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Bridging organizations in agricultural carbon markets and poverty alleviation: An analysis of pro-Poor carbon market projects in East Africa

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ABSTRACT

International agricultural carbon market projects face significant challenges in delivering greenhouse gas mitigation objectives whilst also seeking to provide additional benefits for poverty alleviation. The carbon credit producer (the smallholder farmer) and carbon credit buyer in the carbon market transaction typically operate at different spatial and temporal scales. Buyers operate at a global scale, responding to opportunities for financial speculation and both private and public climate action plans. Farmers operate within households, farms, and immediate agricultural landscapes, pursuing livelihood and food security needs. These different scales often result in mismatches of timing, payment, and knowledge in market transactions and can be partially rectified by project developers who serve to broker the relationship between the farmers and the buyers. We examined eight East African agricultural carbon market projects to determine how project developers function as bridging organizations and minimize the mismatches between these actors. Results show that projects better bridged the timing and payment gap between buyers and producers when project developers provided non-monetary benefits or direct monetary assistance to farmers. However, knowledge gaps remained a significant barrier for farmers wishing to participate in the market. We discuss how project developers brokered relationships in ways that reflected their interests and highlight the limitations, trade-offs, and challenges that must be overcome if win-win outcomes of poverty alleviation and climate change mitigation are to be realized.

1. Introduction

The global agriculture sector is responsible for up to 25% of the world's anthropogenic greenhouse gas (GHG) emissions though direct emissions from agricultural practices and indirect emissions from converting forests to cropland or pasture (Vermeulen et al., 2012, p. 200). These numbers are projected to increase an additional 30% by 2050 due to increasing demand of food and changing consumption patterns (Tubiello et al., 2014, p. 23). Globally, these emissions are increasing most rapidly in the developing world due to in population growth (Smith et al., 2008; FAO 2014). While agricultural emissions in many developed countries are relatively small in portion to their total emissions, emissions in developing countries are frequently a dominant part of a nation's emissions profile. For example, emissions from agricultural activities in sub-Saharan Africa are 1500 $MtCO_2$/year, in contrast to just under 500 $MtCO_2e$/year in the US and Canada (Vermeulen et al., 2012, p. 200).

Addressing GHG emissions from the agricultural sector entails changes in agricultural practices at the farm-level that intersect with crop production goals in both positive and negative ways. The need to address GHG emissions without compromising food security and broader social goals of human development poses a problem for small-scale producers who operate at the margin of subsistence. Substantial numbers of farmers in the developing world are smallholders cultivating fewer than 2 ha of land and who are often food insecure (Smith and Olssen, 2010). In sub-Sahara Africa, they manage an estimated eighty percent of total farmland (Altieri et al., 2008; Morton, 2007), where there is a high potential

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for carbon sequestration (Vågen et al., 2005; Montagnini and Nair, 2004) and thus have been the target of agricultural GHG mitigation projects intended to also alleviate poverty (Jindal et al., 2008; Lee and Newman, 2012).

Increasingly, efforts are being made to integrate climate change mitigation with poverty alleviation and adaptation to increase farmers' resiliency to climate change (Beg et al., 2002). Due to the scale of investments needed to create substantial structural changes in the agricultural sector in Sub-Saharan Africa, the intervention of the market mechanisms, such as carbon markets, has increasingly been seen as not only positive but also inevitable (Gledhill et al., 2011). Agricultural carbon market interventions seek to secure avoided GHG emissions or enhanced carbon stocks and deliver monetary benefits (e.g. a carbon payment) to farmers by connecting buyers at the international level with local-level carbon producers.

1.1. Agricultural carbon markets and livelihoods

The central challenge for the design and management of agricultural carbon markets is to mitigate climate change through the reduction of carbon emissions *and* to improve smallholder farmers' food security, a so-called 'win-win'. The concept of using PES schemes in general, and carbon markets as one particular form, to achieve a 'win-win' outcome has been discussed elsewhere (Brown and Corbera, 2005; Grieg-Gran et al., 2005; Muradian et al., 2010; Milder et al., 2010). Carbon markets in the forestry and agricultural sector in particular have been championed by rural development and environmental conservation agencies as a mechanism to efficiently and effectively achieve dual objectives (Corbera and Brown, 2008). In Sub-Saharan Africa, for example, agroforestry and improved cultivation systems can sequester between 0.4–18.5 TgC/year and 0.2–1.5 TgC/year, respectively (Vågen et al., 2005). These practices also provide farmers with livelihood benefits such as fruit, windbreak, fodder, and firewood (Smith and Scherr, 2002) and increase crop productivity (Cacho et al., 2003; Vågen et al., 2005). Voluntary carbon markets in particular may hold the potential for achieving these win-wins, given that buyers are often willing to pay a higher premium where ancillary, non-carbon benefits such as biodiversity preservation and livelihoods improvement can also be ensured (Benessaiah, 2012; Hamrick and Goldstein, 2015).

However, some advocates for carbon markets also caution that achieving win-win results are not as straightforward as it may appear (Brown and Corbera, 2003; Smith and Scherr, 2003) and emphasize that specific attention to project design will be a necessary precondition for the poor to benefit (Tschakert, 2004). For example, the poor are often left out of the market due lack of secure land tenure (Milder et al., 2010; Smith and Scherr, 2003; Bailis, 2006; Barbier and Tesfaw, 2011) and high costs of adoption (Bailis 2006; Pagiola et al., 2005; Tschakert, 2004). In addition, project developers face high transaction costs due to the need to aggregate smallholder farmers (Boyd et al., 2009; Cacho and Lipper, 2006; Jindal et al., 2008; Tschakert, 2004). In additions to difficulties in engaging smallholders, projects may also fail to deliver the carbon payment, or deliver it on time, thereby increasing farmers' livelihood risks (Smith and Scherr, 2003; Lee and Newman, 2012).

These difficulties in achieving the "win-win" are in part because agricultural carbon market mechanisms span numerous spatial and temporal scales – local to global, immediate actions on changing agricultural practices compared to long-term global carbon market trends – and, in so doing, manifest a number of problems common to management across scales (Cash et al., 2006). Inter-scalar issues arising in environmental governance requires effective coordination amongst a diverse set of actors who operate along a number of scales. Developing trust and cooperation across these scales requires a high degree of social capital, which is typically lacking where there has been no previous interaction (Yaffee et al., 1997). Other key differences between these sets of actors – related to scale but not essentially scalar – may also be important. For example, differences in knowledge present an important obstacle to the full participation of local producers. Local communities may not have a deep understanding of the relevant policy environment, institutional arrangements or market dynamics necessary for participation at higher scales, while global managers may lack a sufficient understanding of local social and ecological conditions and dynamics to allow for adequately informed decision-making (Olsson et al., 2007).

In the context of agricultural carbon markets, these scalar and scale-related issues result in significant obstacles. These include, among other things, (a) mismatches in operational timeframes between buyers and sellers, (b) differences in incentive structures, and (c) lack of knowledge and data access amongst farmers due to the high technical demands of project establishment, crediting and monitoring, reporting and verification (MRV). Mismatches in operational timeframes arise because buyers typically operate on longer time frames than farmers and do not pay for carbon until verification of carbon sequestration, which in some cases can only be achieved following several years of implementation and monitoring. Cash-strapped farmers, however, need money in the immediate-term to adopt and maintain practices and to ensure food security in the interval prior to receiving carbon revenues, limiting their ability to participate in projects. Non-permanence risk buffers, which withhold a certain percentage of credits to ensure non reversal of emissions reduction, further strain this timeframe gap. Challenges with regard to incentives for farmers arise due to the low carbon prices that have persisted in voluntary markets, making carbon sequestration an economically infeasible option for many farmers (Havemann and Muccione, 2011; Tschakert, 2004). Verification and validation processes, necessary to demonstrate carbon has indeed been sequestered, are complex and expensive, lowering the final payment to the farmers and creating an additional barrier for farmers who seek to directly interact with the global market (Bass et al., 2000; Thomas et al., 2010). Farmers who do not understand the requirements may not be able to achieve sequestration objectives and thus be ineligible for carbon payments. Agricultural carbon projects that are unable to encourage initial and continued participation in carbon sequestration activities will fail to meet not only the co-benefits of these projects for poverty alleviation, but also risk the failure of their primary objective of sequestering carbon in agricultural landscapes in the long-term due to lack of farmer recruitment or member attrition.

Given these obstacles, the success of agricultural carbon markets depends on their ability to effectively bridge actors at different scales and to overcome differentials of timing, incentive structure and knowledge. Bridging these scales is essential to the effective delivery of the win-win of the agricultural carbon markets, and may also be particularly important given the vast amount of uncertainty surrounding global climate change and the urgency to address adverse impacts, particularly on the poor (Smith and Scherr, 2003). Under changing and uncertain conditions, managing interventions adaptively may require the devolution of decision-making to lower-levels (Kooiman, 2003) and the creation of polycentric institutions with overlapping and complementary decision-making structures (Olsson et al., 2004) that mediate between institutions at different scales.