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Old wine, new bottles? Investigating the differential adoption of ‘climate-smart’ agricultural practices in western Kenya

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A B S T R A C T

This study assesses factors influencing the adoption of land management practices associated with a World Bank-financed project on ‘climate-smart’ agriculture: the Kenya Agricultural Carbon Project. Drawing upon mixed-methods research with participating farmers in Bungoma County, western Kenya, we find modest reported adoption rates overall for project-encouraged practices, amounting to 53.6 percent on average. However, we also find that there are systematic differences in the reported adoption rates of individual practices. Disaggregating our sample into three classes or ‘wealth groups’, we find that the ‘very poor’ and ‘poor’ groups exhibit substantially lower adoption rates (42 percent and 49 percent, respectively) relative to the ‘less poor’ wealth group (73 percent). Across these groups, practices related to livestock management and pest management are systematically less adopted (0–45 percent) than more popular practices such as agroforestry and tillage management, the reported adoption of which both range from 60 to 80 percent. Consequently, we suggest that barriers to the adoption of apparently ‘climate smart’ agricultural practices at scale may increasingly be political-economic rather than simply technical-managerial in nature. This reflects the poorest strata of farmers' struggles to negotiate the increasingly externally imposed imperatives of climate adaptation and mitigation with the necessity of ‘simple reproduction’ or survival of the household as a socioeconomic unit. Future generations of ‘climate smart’ agricultural programmes may thus benefit from disaggregating adaptation and mitigation objectives in order to avoid unduly burdening the poorest strata of participating households in rural African contexts.

1. Introduction

Land use-based strategies continue to play a prominent role in international efforts to pursue both mitigation and adaptation to global climatic and environmental change. In addition to carbon offset forestry initiatives, a growing number of ‘climate smart agriculture’ (CSA) programmes are emerging in developing countries. These are often presented as a means of producing ‘triple win’ outcomes for farmer productivity, climate adaptation, and climate mitigation in the agricultural sector (e.g. FAO, 2013, see also Cavanagh and Benjaminsen, 2014; Svarstad and Benjaminsen, 2017). In general, CSA projects attempt to achieve such outcomes by promoting and incentivizing the adoption of sustainable agricultural land management (SALM) systems, typically involving agroforestry, soil conservation measures, and related agronomic practices intended to facilitate the “sustainable intensification” of agricultural production (FAO, 2013, 2014). Though certainly building upon previous iterations of agroforestry and conservation agriculture programmes, CSA's proponents claim that it is distinguished by an explicit attempt to link the adoption of on-farm practices with institutional and finance mechanisms at larger scales (FAO, 2012), in some cases including emerging mechanisms for agricultural carbon finance (Atela, 2012). Particularly in Sub-Saharan Africa, CSA has gained considerable traction, including under the auspices of the African Union's New Partnership for Africa's Development (NEPAD) and the Alliance for Climate Smart Agriculture in Africa (ACSAA). NEPAD, for instance, now proposes the scaling up of CSA programmes throughout sub-Saharan Africa to reach 25 million households by 2025 (NEPAD, 2014), whereas

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ACSAA aims to extend similar initiatives to a further six million households by 2021.[1]

Multilateral agencies and agricultural research organizations have adopted a variety of pilot programmes and projects that are intended to demonstrate how CSA can deliver the above-mentioned 'triple win' outcomes. This has resulted in prominent reporting of "success stories" concerning their effects (CGIAR, 2013; FAO, 2014). Yet there is currently a paucity of independently-obtained and analysed information about the actual socioeconomic impacts of projects that are explicitly framed as manifestations of 'climate smart agriculture.' This is particularly so in relation to the possibility of enduring barriers to adoption resulting from complex legacies of agroforestry and conservation agriculture programmes, as well as uneven cost-benefit distributions within and between households resulting from the implementation of these (see also Naess, 2014). Indeed, the broader scientific literature suggests that there may occasionally be divergences between earnest donor narratives of successful 'triple win' outcomes and complex realities faced by rural populations affected by conservation agriculture and CSA interventions (Govaerts et al., 2009; Andersson and Giller, 2012; Sumberg et al., 2012; Jerneck and Olsson, 2013; Andersson and D'Souza, 2014; Halbrendt et al., 2014; Whitfield et al., 2015). Here, potentially negative impacts on agricultural labour burdens (and especially women's labour burdens), possible unsuitability for local agro-ecological conditions in certain cases, and/or potential to lower farm yields over either the short or the long term have been identified as salient challenges to adoption (see Pannell et al., 2006; Giller et al., 2009, 2015). In short, complex interventions into the livelihoods and production systems of a multifaceted and diverse stakeholder population raise the prospect of similarly complex and differentiated results. These outcomes may defy simple declarations of a 'triple win' in many cases, however inconvenient that might be for donors or implementing agencies.

Accordingly, this article seeks to contribute to an understanding of such nuances in local context, providing empirical insights on factors influencing rates of SALM adoption, as well as the relationship between socioeconomic inequality and inclination toward adoption. In doing so, we undertake a case study of a flagship 'climate smart agriculture' initiative: the Kenya Agricultural Carbon Project (KACP), and proceed as follows. First, we situate the project in relation to ongoing conceptual debates about the drivers of adoption of conservation agriculture and other sustainable land management practices. Second, we present our methodology, and provide essential background on both the project itself and the context of its implementation specifically in Bungoma County, western Kenya. Third, we present findings on participating farmers' livelihoods, inter-household inequalities, and varying patterns in the adoption of project-related land management practices, identifying both incentives for and constraints on adoption. We conclude with a discussion of farmers' understanding of the influences on such decisions, as well as their implications for initiatives to scale-up the adoption of CSA both in Kenya and beyond.

2. Conservation agriculture, 'climate smart' agriculture, and the adoption debate

Simply put, the adoption of new and often externally-encouraged interventions by specific farmers is a function of both individually and collectively perceived benefit relative to the suspected burdens or detriments of the intervention in question. However, the ways in which farmers, development practitioners, and scientists perceive these benefits and burdens is often quite different, and the extant literature continuously identifies a growing range of factors that affect farmer decision-making in this regard (e.g. Pannell et al., 2006; Giller et al., 2009, 2015). Of particular interest is how prospective innovations combine with households' access to and use of various assets (land, labour, capital) to produce more outcomes (e.g. higher yields) or to produce outcomes in more efficient ways (e.g. with less fertilizer, less labour input, etc.) Decision-making on adoption will also be contingent on or mediated by various aspects of a given local context, such as political-economic and market conditions for inputs, outputs and access to non-farm employment; asymmetric power relations; infrastructure and market access; state policies and trade agreements; agro-ecological and socio-cultural factors, as well as vulnerability contexts (Blaikie, 1985; Blaikie and Brookfield, 1987; Koning and Smaling, 2005; Muzari et al., 2012; Andersson and D'Souza, 2014; Benjaminsen, 2015). Producer environments, historical legacies, local knowledge, technical competence, and various formal and informal social institutions are also salient, and impinge significantly on the likelihood of both individual and social or community-scale adoption (Vedeld and Krogh, 2003; Wall, 2007).

The *potential* benefits of adopting both conservation agriculture and agroforestry systems are well known and established. These are often reported to include enhanced soil fertility, yield increases, heightened resilience to environmental change, and livelihood improvements more generally (e.g. Jose, 2009; Kassam et al., 2009; CGIAR, 2013). Nonetheless, influences on the adoption of relevant practices at the household level have been the subject of a long-standing debate (e.g. Giller et al., 2009, 2015; Andersson and D'Souza, 2014; Whitfield et al., 2015). Despite the 'multiple win' rhetoric that often accompanies such initiatives, numerous potential barriers to adoption have been identified (see Table 1). For example, Giller et al. (2009, 2015) review considerable case study evidence suggesting instances where the adoption of conservation agriculture or CSA practices has increased labour burdens both for households and for women in particular, and in addition have actually lowered rather than increased yields. Increased labour requirements can arise, for example, when projects require the coupling of zero-tillage and replacement of herbicides or pesticides with 'traditional' or 'organic' methods – leading to increased labour for weeding and pest control. Likewise, when crop residues are insufficient to fulfil both mulching and fodder or other needs, this can necessitate additional harvesting labour from other sources, potentially resulting in 'leakage' effects or the displacement of activities outside the project area (VCS, 2011). Replacement of inorganic fertilizers with on-farm manure collection and spreading can have similar implications for labour intensity, especially if livestock are not part of a household's asset portfolio, and manure must be bought or collected from elsewhere. Further, the adoption of water-management practices such as contour ploughing, basin preparation, and terracing have also been shown to be limited by the labour-intensive nature of such practices, and in a range of examples from the colonial era to present (e.g. Belsky, 1994; Carswell, 2006; Rusinamhodzi, 2015). Depending on the prevailing gender division of on-farm work, the bulk of this additional labour burden may fall on women, as both weeding and fodder collection – for example – tend to be women's responsibilities in eastern and southern African households in particular (see also Lee et al., 2015).

Lower yields, or failure to increase yields via adoption in the short-to-medium term, can ensue from a variety of factors (Rusinamhodzi et al., 2011; Brouder and Gomez-Macpherson, 2014; Stevenson et al., 2014). In a recent meta-analysis of 610 studies in

[1] See NEPAD (2014), http://www.nepad.org/programme/climate-smart-agriculture (accessed 10.09.2016), and Alliance for Climate Smart Agriculture in Africa (2016), http://csa.octoplus.co.za/ (accessed 13.09.2016).