



Can Climate Interventions Open Up Space for Transformation? Examining the Case of Climate-Smart Agriculture (CSA) in Uganda

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In this paper, we investigate the ways in which climate change-related interventions such as climate-smart agriculture (CSA) may open up—or close down—spaces for transformation. We explore the interface between worldviews, power relations and policy interventions, focusing in particular on the way that asymmetric gender and expert-farmer relations may be reinforced or contested through climate-smart agricultural interventions. It has been argued that fundamental changes required in the face of climate change can only take place through transformation across the personal, practical and political spheres. In particular, it is in the interaction between these spheres where spaces for transformation lie; for example, in the contesting of subjectivities casting farmers as passive recipients of expert advice, in the assumptions regarding what constitutes “good development”, and in how worldviews frame the way we see human-nature relations. Nevertheless, interventions like CSA are often focused mainly on changes to practices or technologies, rather than on how power relations or worldviews shape practices, food security and inequity. Through a case study of Hoima, Uganda, we examine the ways in which the implementation of climate-smart agriculture reinforces existing subjectivities and authority relations or opens up for new (and potentially more emancipatory) subjectivities. First, we describe food security and social inequality drawing on survey data from Hoima. Next, we examine how social actors such as farmers, project workers, local leaders, and government officials position particular farmers or practices as good/progressive or problematic/traditional. We then analyze how these subjectivities reflect authority relations, and the ways in which CSA reinforces or creates space for contesting these. We argue that a focus on commercial agriculture as “good” by many social actors also persists within CSA activities, and is intertwined with asymmetric gender and expert-farmer relations. Commercialization takes place within the need to increase agricultural production to feed growing urban populations. However, commercialization for the case of Uganda has also entailed state attempts to govern farmers through farmer associations, the institutional set-up through which

CSA often works. A closer attention to these dynamics could potentially help create deeper transformational change through climate-smart agriculture and related climate change interventions.

Keywords: climate change adaptation, subjectivity, power relations, gender, Africa, climate-smart agriculture, worldviews

INTRODUCTION

In this paper, we investigate the ways in which climate-smart agriculture (CSA) may open up spaces for agricultural transformation, drawing on the case of Hoima, Uganda. While the need for transformative change in the face of climate change is increasingly emphasized in international research and policy debates, questions of how transformation in agricultural and food systems can take place become particularly urgent in the context of persistent food insecurity in sub-Saharan Africa (SSA), a situation exacerbated by climate change (IPCC, 2014; Porter et al., 2014; FAO, 2018a). Several types of interventions are designed to address this challenge, including CSA.

We explore the interface between worldviews, power relations, and policy interventions, focusing in particular on the way that asymmetric gender and expert-farmer relations may be reinforced or contested through climate-smart agricultural interventions. Recent conceptual and theoretical discussions increasingly argue that transformation needs to take place across three spheres of transformation simultaneously, that is across the personal, political and practical spheres (O'Brien and Sygna, 2013; O'Brien et al., 2015). If we take as a starting point that addressing the interface between the personal, political and practical is critical to create spaces for transformation, the question emerges, what are the ways in which projects or approaches like CSA can address this interface? While the personal (worldviews, beliefs, discourses, understandings) drives the political sphere (including governance and power relations), which in turn shapes which practical actions are possible and promoted, the relationship is not one-way. Indeed, Nightingale and Ojha (2013), Eriksen et al. (2015a), Nightingale (2017) contend that the political is performed through practice, that is, power relations are reproduced or altered through practice. It is through everyday actions that the authority of an individual or entity to make decisions is recognized or contested. The way that farmers are subjectivized—positioned as subjects of development for example as “traditional” versus “modern,” or “vulnerable” vs. “driving development” by actors involved in CSA, including government and project staff, local leaders and farmers themselves—forms part of the performance of authority relations. Similarly, our values such as equity, compassion, and dignity are embodied in daily actions (Sharma, 2017). The practical sphere is indeed important, but cannot easily be separated from the political and personal spheres. The question then emerges, what room exists for social transformation to take place through practice, such as agricultural development projects? To what extent do practices open up for new subjectivities and knowledges, and to what extent do they reinforce authority and power relations through a focus on

particular solutions or the recognition of particular actors to make decisions about these solutions? What are the opportunities for creating real spaces for transformation across spheres?

In this article, we first examine the conceptual understanding of social transformation in the context of CSA, and the implications of such an understanding of transformations for how “development is done.” Next, we describe CSA in Uganda as a case, and the characteristics of the Hoima site. In the section Findings/Analysis, we use the lens of subjectivity and authority to analyze policy documents as well as qualitative key informant and group interviews carried out at village, district and national levels. Finally, we draw on the case of CSA activities in Hoima to further develop a conceptual understanding of how village level climate change projects intervene in the interaction between the personal, political and practical spheres of transformation. We argue that in order to understand how changes in local practices are able to spur changes in policies and development pathways in society more widely, and vice versa, the ways that these practices reinforce or challenge socio-political relations of production are important. In the case of Hoima, for example, gender and authority relations interact closely with contrasting ideas of what is “good development” and who is recognized as a driver of local development.

THEORETICAL FRAMEWORK

There is increasing recognition that anthropogenic climate change can only be addressed through transformation toward sustainable, low-emission, climate-resilient development pathways (O'Brien, 2012; Denton et al., 2014; Pelling, 2014; Eriksen et al., 2015b). What does this mean for small-scale farmers, who produce a significant part of the world's food? Food insecurity and poverty persist in sub-Saharan Africa (SSA), suggesting that climate resilient development pathways must involve development trajectories that encompass justice, equity and poverty reduction in addition to environmental integrity. Sixty years of agricultural research for development have resulted in a wide range of technologies and interventions aimed at improving the lot of smallholder farmers in SSA. There are many reasons for persistently low adoption rates of most of these: limited capacity of smallholder farmers to bear risk, limiting investment; insufficient understanding of the context within which much smallholder agriculture operates; limited infrastructural support in the rural areas; and many more (Thornton et al., 2017).

Climate change now poses additional challenges to agriculture and food security in SSA (IPCC, 2019). CSA is an approach to integrating the complications brought about by the changing

climate into planning and implementation of agriculture strategies. It focuses on three objectives as defined by Lipper et al. (2014, p. 1069): “(1) sustainably increasing agricultural productivity to support equitable increases in income, food security and development; (2) adapting and building resilience to climate change from the farm to national levels; and (3) developing opportunities to reduce GHG emissions from agricultural compared with past trends.” One of the main considerations in developing CSA interventions is the enablers of uptake, for example an enabling policy environment. CSA has been criticized for being so broad that nearly any agricultural practice can be labeled climate-smart (Neufeldt et al., 2013), so for the purposes of this research we bring in the concept of transformation to highlight the idea of major change from the status quo. Transformation is generally described in terms of altering the fundamental attributes of the system, challenging the systems and structures, economic and social relations, and beliefs and behaviors that contribute to climate change and social vulnerability (Adger et al., 2009; Ostrom, 2009). It can be defined as significant changes in form, structure or meaning-making. This implies fundamental changes in not only practices, but also in values and governance systems (IPCC, 2014). In the context of CSA, we envisage transformation of small-scale farming to entail increased household resilience to climate change and increasingly frequent and severe climate extremes, increased food security for rural and urban populations, and reduced total amounts of GHGs or emission intensity of production.

Past work identifies spaces for transformation being opened up through tension between environmental governance, institutions and practice, as well as untenable social and environmental conditions acting as pressures on the political regime (Pelling, 2011). However, identifying how such transformation can take place is a major challenge. Indeed, it has been shown that climate interventions represent opportunities for social transformation, but also for entrenchment of inequities and vulnerability (Nagoda, 2015; Benjaminsen and Kaarhus, 2018).

Diverse theories of transformative change, as well as political approaches to understanding social transformation, provide some directions on how spaces for transformation can be identified. Given the increasing emphasis on implementing CSA widely in many parts of SSA, we use this case study of CSA implementation in Uganda to investigate the strengths and weaknesses of this approach. The overarching framework of this study draws on different theories of transformative change, which can be generally represented through three interacting spheres of transformation, referred to as the practical, political, and personal spheres (O’Brien and Sygna, 2013). These spheres capture the way that beliefs, discourses and worldviews interact with political decision-making and governance, as well as with on-the-ground practices that contribute to sustainable food systems. O’Brien et al. (2015) describes transformation in practices as contingent on the political sphere, which includes the systems and structures that create the rules, norms, and incentives for different types of behaviors and practices. These in turn are influenced by the personal sphere; indeed, individual and shared beliefs, values and worldviews often drive political priorities

and goals and influence framings of problems and solutions. Meadows (1999) argues that the most powerful leverage point for system change is the goal of a system and the mindset out of which the system arises. Mindsets, or individual and collective ideas about what is just, desirable and sustainable, are hence critical to any transformations in social and political relations, governance, and practice. This observation suggests that ideas of what “good development” or “good adaptation” entails, and who is vulnerable and why, are important for triggering transformational adaptation. Furthermore, shifting people from being “objects to be changed” to “agents of change,” in terms of viewing themselves as capable of contributing to systemic transformations, is an important starting point for transformation (O’Brien, 2018).

Socio-political conceptualizations of social transformation provide a lens through which to understand the interactions between the three spheres, and where, within these interactions, spaces for transformation may be found. Eriksen et al. (2015a), Nightingale (2017) suggest that creating spaces in which actors can contest subjectivities, knowledge and authority is essential for supporting transformation of the social and political structures driving inequity and vulnerability. Subjectivities reflect how the operation of power produces social differentiation through the way that people both internalize and contest how they are situated in relation to others as, for example, along gender or ethnicity lines, or as “progressive farmer,” “vulnerable farmer,” “expert” etc. These subjectivities are produced through daily interactions and practices (Nightingale and Ojha, 2013), such as those carried out by project staff, policy makers and farmers. Adaptation actions—and how the social actors participating in them are viewed—can serve to reaffirm existing power relations, but can also potentially directly challenge them and hence contribute to transforming socio-political relations. This is particularly the case where the “natural (political) order of things” does not match changing livelihood activities, social allegiances and interactions as populations respond to emerging social and environmental challenges (Eriksen et al., 2015a). The three interacting spheres of transformation are integral in the politics of adaptation: the authority to make decisions (political sphere) about practical action (practical sphere) is contested and reinforced through subjectivities and knowledges, which emerge from changing values, belief systems and discourses (personal sphere). Disaggregating the analysis of power and politics into the interaction among different spheres of transformation can provide critical insights that not only can help explain how, in some cases, adaptation processes can result in the perpetuation of vulnerability, but also the ways in which communities can, and do, gain control over their futures through adaptation practices.

In addition to identifying spaces for transformation, understanding the way in which climate interventions such as CSA may open up or close down such spaces is a critical research problem. There are increasing concerns that many climate measures may exacerbate vulnerability (Olsson et al., 2014; Atteridge and Remling, 2018). In particular, REDD+ and several other climate measures have emissions reduction or carbon capture, rather than food security and vulnerability, as their chief concerns. However, several more recent approaches,

such as CSA, do have a stated goal to address food security, often targeting small-scale farmers. Within both development research and the agricultural development communities, CSA has been heavily promoted as a means of increasing adaptation among farmers, especially small-scale farmers in developing countries, while simultaneously reducing emissions from the agricultural sector (Lipper et al., 2014), although the approach has also been contested, for example due to equity concerns (Karlsson et al., 2018).

Moving to the personal sphere of transformation, climate measures can be interpreted to reflect particular mindsets, representing or privileging particular approaches to development as well as understandings of human-nature relationships. Some contend that the term adaptation itself signifies a worldview of climate change as being separate from society, and isolates responding to climate change as a separate process from the politics through which social change and development take place and vulnerability is produced (Nightingale et al., 2019). Adaptation and other climate change interventions then only make sense as managerial, discrete exercises, addressing the symptoms of climate change while reproducing the development pathways that create the climate change problem as well as inequity (Pelling, 2011; Nightingale et al., 2019). Nightingale et al. (2019) argue that it is the framing of nature and society as separate that closes down the space for imagining different futures and developments from the present trajectories. If adaptation is an isolated exercise positioned outside rather than being embedded in social change, it risks either being translated as everything (“more of current development and institutional setups,” with development actors relabeling their activities as adaptation) or it risks becoming a technical activity carried out according to predetermined formulae directed by experts. Both these interpretations of adaptation shift authority relations, undermining the influence of local populations while reinforcing the authority of existing project managers, global consultants and politicians who gain influence by “doing development.” Such a shift in authority may be reinforced by technical regimes for funding interventions and measuring impacts that require global expertise in order to meet technical criteria for receiving funding, managing projects, as well as reporting on indicators and outcomes. Yet, globally framed interventions are also renegotiated in the implementation process, as they are translated on the ground through local knowledges, understandings of socio-natural relations, and interests (Benjaminsen, 2014, 2017). It is therefore important to explore what mindsets, understandings of socio-natural relations, as well as authority relations are reproduced, negotiated or contested through climate and development practice on the ground.

Indeed, the worldviews framing climate change-related interventions, and the governance of such interventions, shape power and authority relations as well as which practices are recognized as valuable. If adaptation is framed as something that happens when climate finance is received and turned into a project, the fact that farmers often experiment autonomously and make adaptations when needed is downplayed. At the same time, adaptation at the farmer level alone may be insufficient in the face of multiple socio-environmental stressors

including climate change, land dispossession, market changes and conflict. There may be a tipping point after which the need for radical change overwhelms the capacity of local communities to “adapt” and outside intervention is required. Nevertheless, the case of REDD+ (Benjaminsen and Kaarhus, 2018) shows that climate measures often reinforce modernization of developmental values or worldviews through a commodification and separation of nature from society/discrete resources, leading to negative social transformations with regard to both equity and environmental stewardship.

While projects represent opportunities for much needed investment and funding, they also enroll people into the ideas and values that frame the projects (such as commodification or private property), privilege some resource uses and users over others, as well as shift authority relations by recognizing the decision making of some actors more than others. For the case of REDD+, Benjaminsen and Kaarhus (2018) showed that ideas of commodification, private property, and maximizing monetary incomes (implicitly separating nature and society) are connected to particular types of politics and practices including the recentralization of decision-making. Here, climate interventions and forest management become a site of governing people, and in effect giving local populations the responsibility for solving global problems of climate change (Arora-Jonsson, 2011). An important question is therefore the extent to which the translation on the ground of such interventions promote a narrow conception of “good development,” for example prioritizing economic material benefits and functions, and the ways in which projects spur the imagining of different, less exploitative and less inequitable socio-environmental relations. Interventions directed at meeting some local needs for services or support may not explicitly be dealing with the socio-politics of why local needs are persistently unmet in current development trajectories; nevertheless, even if interventions are limited by their framing and scope, can their practice create spaces for transformation?

CSA is often approached primarily from a technical point of view, treating climate change as a challenge to be addressed through improved knowledge, expertise, and innovation. Most studies and guides emphasize the practical aspects of CSA interventions, including the types of crops, agricultural practices, and marketing relationships needed for low-carbon, well-adapted food systems (see, for example, Arslan et al., 2015; Quinney et al., 2016). While contributing important support for agricultural development, these approaches often downplay or disregard the social and cultural dimensions of agricultural transformation, including how beliefs, values and worldviews influence institutional arrangements, decision-making processes, and the policies and practices that are prioritized (Tanner and Allouche, 2011; Eriksen et al., 2015a,b). Consequently, the potential role for farming communities to contribute to transformative change is often underestimated and undervalued in interventions. In this paper, we address a gap in understanding regarding the role that CSA can play in transformation across personal, political and practical spheres. We investigate what values and problem understandings underlie CSA as implemented on the ground. We ask how is CSA translated at the local level in terms of whether it subjects

smallholders as active and capable or passive recipients, culprits or drivers of “good development”? Can it find avenues to make adaptation something more than a techno-managerial exercise, by contesting expert–farmer hierarchies as well as gender relations? Does the practice of CSA open up spaces for shifting or contesting power relations, as well as imaginings of “good development” that differ from dominant policy narratives so far? We investigate these questions through a case study of Hoima, Uganda, an area where CSA has been promoted, in part aimed at improving food security.

METHODS AND RESEARCH SITE

Hoima Site Description

Hoima District is located in western Uganda, east of Lake Albert, bordering the Democratic Republic of the Congo (**Figure 1**). It is one of the country’s most populated districts, with 573,903 residents. According to the Uganda Bureau of Statistics (2017), the majority of households, nearly eight in ten, are male-headed. Most school-aged children are enrolled in primary school, nonetheless, just 26% of 13 to 18-year-olds attend secondary school—more than half of households in Hoima live over 5 kilometers away from the nearest one. Meanwhile, illiteracy is widespread as nearly 32% of people over 18 years of age cannot read or write. In Hoima, 8% of households have access to piped water, while 27% use a borehole. Meanwhile, only 16% of households have electricity (Uganda Bureau of Statistics, 2017).

About 80% of the population in the district rely on agriculture as a livelihood (Uganda Bureau of Statistics, 2017). Key food crops include beans, cassava, sweet potatoes, and maize, while many households also depend on livestock as a source of food and income. A number of households grow cash crops like coffee and tea. As seen in **Figure 2**, which is survey data from the baseline survey conducted by CCAFS in 2011 before it began its work in the area, the majority of households were producing between five and eight agricultural products, and slightly less than half of households were selling three to five products. About one-fifth of households were at a high level of production and commercialization diversification, and a third of households were selling one or two products or none at all (Mubiru and Kristjanson, 2012). Farming is becoming increasingly difficult in the area, with land degradation and declining soil fertility as some of the key challenges (Recha et al., 2016). Deforestation in the district is increasing as forests are a source of timber, firewood and charcoal (Onyango et al., 2012).

In Hoima, a wide range of partners and national research networks have been focusing on CSA to facilitate adaptation in cereal-based and livestock systems to build agricultural resilience. Here, the community and researchers work together at a CCAFS research site on local actions aimed at enhancing food security, promoting adaptation and building resilience to climatic stresses. Participatory action research activities involving researchers, local partners, farmers’ groups and policymakers have been testing portfolios of CSA technologies and practices with the aim of scaling up successful innovations. This provides an opportunity to study transformation across local, district and national levels.

Climate-Smart Agriculture in Uganda

Agriculture is a key sector in the Ugandan economy and contributed approximately 23% to the country’s total GDP in 2014 (MAAIF, 2016), although most agriculture is rainfed (FAO, 2015). Two-thirds of the population is engaged in rain-fed mixed farming for food and cash income (Osiru, 2014). Key challenges for the agricultural sector include low production and productivity, weather variability, and pests and diseases. Other challenges include low value addition to agricultural produce and limited market access, weak implementation of agricultural laws and policies, and weak public agricultural institutions. Climate change will have serious impacts on agriculture in Uganda. Changing temperatures and shifting rainfall amounts and patterns may lead to a 10–20% decline in maize and bean yields by the middle of the century in the mixed humid-sub humid and mixed arid-semiarid systems. Still, yields may not be much affected in the highland areas that make up about 8% of the country’s area (Thornton et al., 2010).

To address the challenges that climate change poses to agriculture in Uganda, the government has adopted the idea of CSA. The concept of CSA was developed in 2010 by FAO to address the intertwined challenges of agricultural development and climate change adaptation and mitigation (FAO, 2010). The main goal of CSA is to integrate climate change considerations into both the design and implementation of sustainable agricultural policies (Lipper et al., 2014). By evaluating the trade-offs and synergies between different actions, CSA is intended to reach the ultimate outcomes of food security and sustainable resource use. CSA is highly context-specific, and there is no specific set of practices that can be considered climate-smart everywhere (Thornton et al., 2018a).

In Uganda, CSA has been incorporated into a number of policy documents. The Ministry of Water and Environment (MWE) is the focal point for the United Nations Framework Convention on Climate Change (UNFCCC) in Uganda and houses the Climate Change Department (CCD), which was created in 2008. The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) plays a key role in creating and implementing CSA policies (CIAT, BFS/USAID, 2017). In 2015, Uganda adopted its Climate Smart Agriculture Programme 2015–2025. It is structured around six result areas and is jointly implemented by MAAIF and MWE. Additionally, CSA has been integrated in the Agriculture Sector Strategic Plan 2015/16–2019/20 (ASSP) and the country’s Nationally Determined Contribution (NDC) submitted to the UNFCCC.

CSA has also been promoted by several agricultural research institutions and development partners. CCAFS began working in Uganda in 2011 as one of its focus countries for the East African region. In addition to working at the national level to promote the inclusion of climate change concerns and responses in agricultural policies, CCAFS conducted on-the-ground research in Hoima. FAO and the United Nations Development Programme (UNDP) also promoted CSA in Uganda among national and district level policymakers through its Integrating Agriculture in National Adaptation Plans (NAP-Ag) program. This work involved the creation of an agricultural National

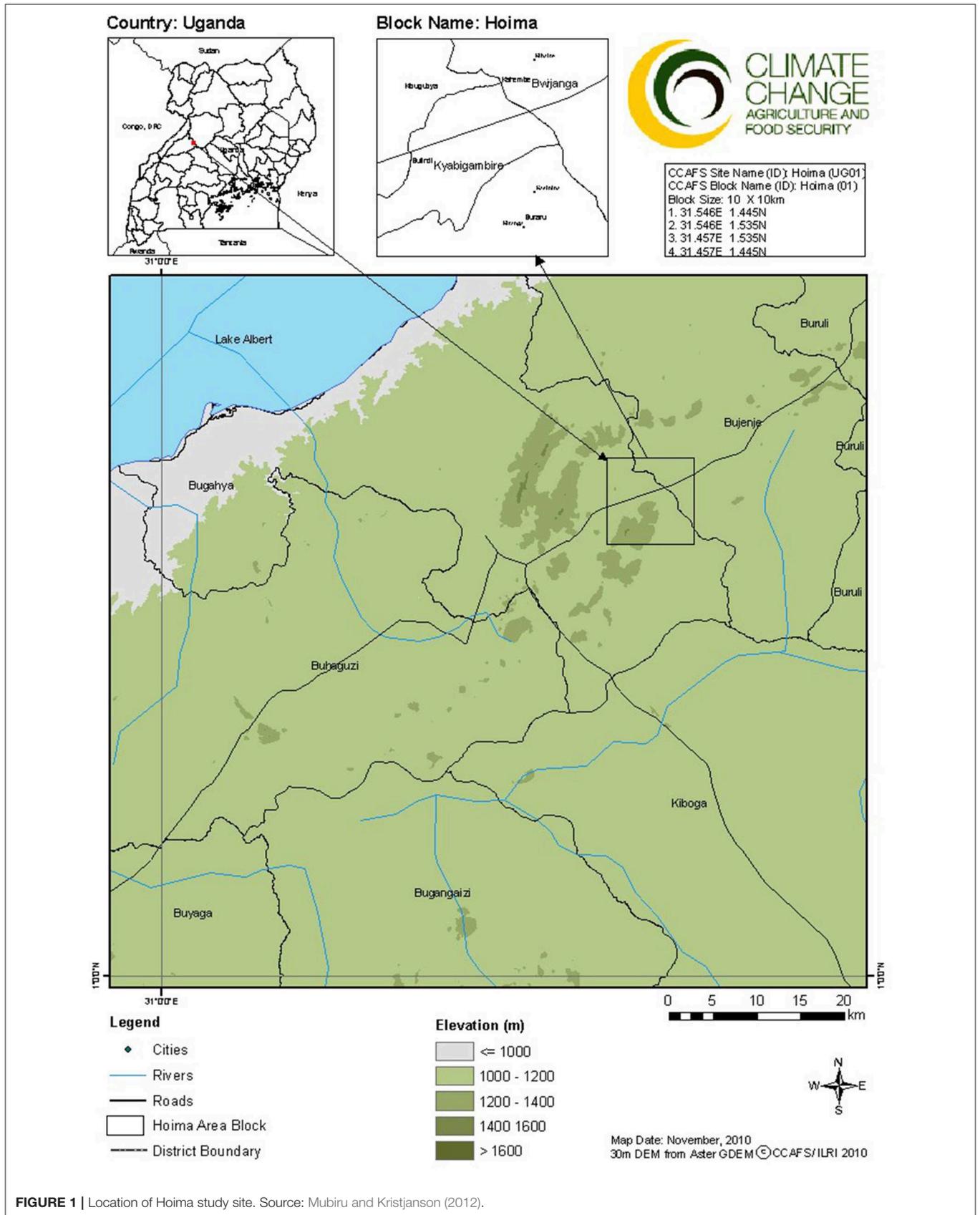
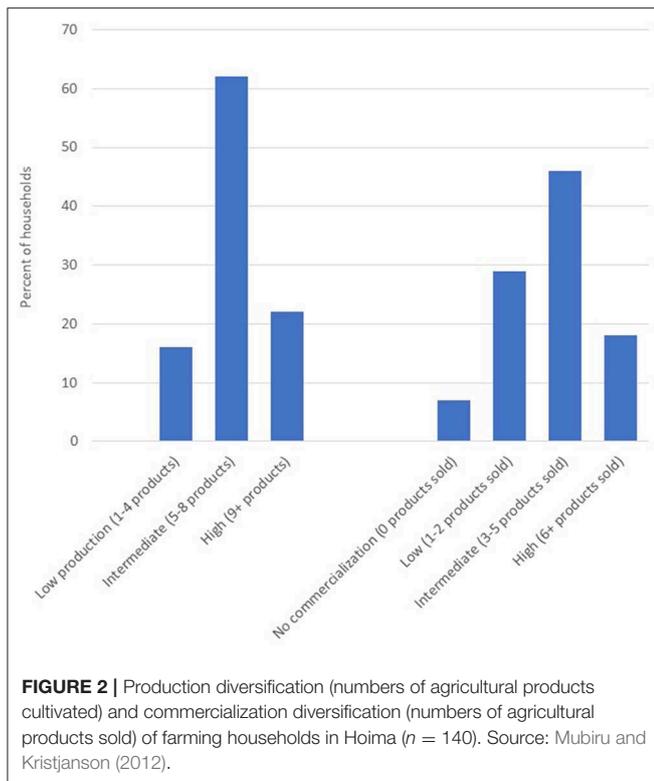


FIGURE 1 | Location of Hoima study site. Source: Mubiru and Kristjanson (2012).



Adaptation Plan, an investment framework, and a performance monitoring and evaluation framework (FAO, 2018b). Other development partners have also been promoting CSA at the policy level, and development and faith-based organizations have been involved in CSA demonstrations and awareness raising at local levels (CIAT, BFS/USAID, 2017).

CSA practices trialed and promoted in Uganda include intercropping, improved varieties, and water harvesting (Bonilla-Findji et al., 2017). Most of the focus is on working with small-scale farmers growing staple crops, but CSA practices are also being promoted in the coffee sector (Margiotta and Giller, 2018). As with the debates over equity considerations within CSA in recent years (Thornton et al., 2018a), part of the dialogue within Uganda has been in regards to gender concerns in the context of agriculture and climate change (Acosta et al., 2016). Uganda and its development partners have been working to better incorporate gender issues into policies on agriculture and climate change, with more work needed especially in the areas of gender budgeting (Acosta et al., 2016).

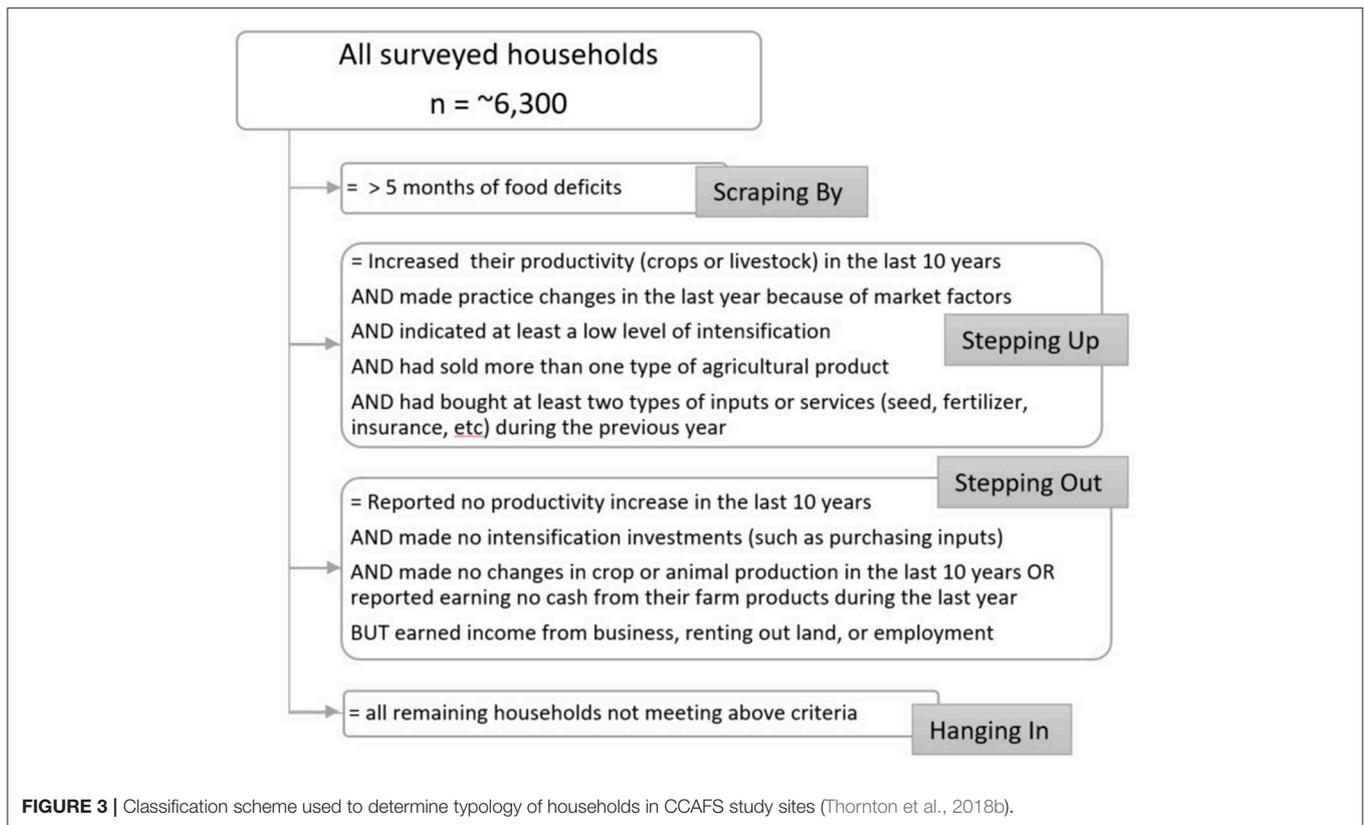
In Hoima, CCAFS partnered with a National Agricultural Research Organization (NARO) center, the Bulindi Zonal and Agricultural Research and Development Institute (Bulindi ZARDI), in 2012 to promote CSA practices among farmers in the district. Farmers from seven villages in Hoima came together and formed two collective action groups in 2014. These two community-based organizations (CBOs) have provided farmers with access to agricultural inputs such as improved seed varieties, village savings through banking and loaning, climate information

services and trainings on improved agronomic practices through NARO, where farmers are selected and trained to then teach or promote CSA practices to smallholders in their communities. For instance, in 2013, 40 farmers from the two groups were trained on agroforestry practices that included the management of mango trees and other land management practices. After completing the training, the farmers established demonstration sites in their communities. The CBOs initially covered seven villages in Hoima, and had by 2016 expanded to 21 villages (Recha et al., 2016).

The CSA actions have had an impact on the implementation of climate-smart technologies in Hoima District, and contributed to increased bean productivity, a key food crop, through the promotion of drought resistant varieties (Recha et al., 2017). For instance, in 2011, 67% of farmers had already started diversifying and using higher yielding crops. By 2016, more than 90% of households had adopted at least one new crop variety in their farming—among these were drought tolerant and higher yielding varieties of maize, beans, and the nutritious sweet potato, promoted and distributed by the CSA initiative. In addition, the project has increased farmers' access to agricultural inputs through loaning and banking, and improve their ability to manage climate risks, due to weather information services available on mobile phones (Recha et al., 2016). More women farmers have also been included in the research process, to evaluate new seeds developed by NARO (Recha et al., 2017, p. 17).

Methods

In order to identify the ways in which CSA interventions may open up—or close down—spaces for transformation across spheres, this study employed a mixed methods approach. The analysis focused on how farmers were subjectivized, and whose worldviews and beliefs, and which knowledges, were prioritized and given authority in CSA practice. The analysis then particularly focused on how these subjectivity processes and authority relations were gendered. A variety of sources were used to help gather information about food security patterns in Hoima as well as subjectivity and authority relations. The first source is a set of exercises conducted when the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) selected Hoima, a rural community in the western part of Uganda, as a research site in 2011. As part of a broader program to investigate food security, it was one of six research sites selected across East Africa. Other sites were also selected in West Africa, South Asia, Latin America and Southeast Asia. A household survey was conducted with 140 households in each site to assess a number of baseline indicators with respect to household characteristics, farming practices, access to inputs, asset ownership and other categories. A participatory community exercise was also implemented to gather information on natural resource management, the organizational landscape, information networks, and the future vision for the community (Förch et al., 2014). The data from the household surveys were used to create a typology of households defined by criteria derived from expert knowledge as part of an analysis of the entire dataset containing all of the CCAFS research sites. The categories created to classify households were “scraping by,” “stepping up,” “stepping out,” and



“hanging in.” **Figure 3** presents the characteristics of each of these categories. For a full description of the methods used in creation of the typologies, see (Thornton et al., 2018b). This paper draws on the categorization of households in Hoima in understanding food security.

The second source of data drawn upon were key informant interviews and focus group discussions (FGDs) with farmers, local leaders, project staff, and local government representatives within Hoima District. Nineteen semi-structured, in-depth interviews and one FGD of four farmers were conducted between March and May 2018. Both the interviews and FGD were conducted using semi-structured questionnaires. The key informant interviews targeted 10 farmers, half of whom were members of farmers’ associations involved in the CCAFS agricultural research-for-development work conducted after the 2011 survey in Hoima, the other half of whom were not members. In addition, nine key informant interviews were carried out with village leaders (who were also members of farmers’ associations), local organization employees, agricultural experts in the area, and local government officials. Men and women respondents were represented equally in each of these types of informants, with the exception of national level officials, where two men and one woman were interviewed.

Respondents were asked to give their opinion on “good development” and the most important actors needed to achieve this. They were also asked about climate change, important sources of knowledge, influence and farmers’ role in development. The data were analyzed by identifying how the

different social actors described themselves and other actors in terms of their contribution to agricultural development, what constitutes “good development,” their understanding of climate change and environmental change, and who makes key development decisions.

The third source of information was key policy documents related to agriculture and climate change at the national and district level in Uganda. Policy documents were analyzed to examine the role of gender and investigate other elements of the ways in which agriculture is incorporated into climate change policies. This analysis also aimed to identify how climate change is considered in agriculture and food security policies. The focus was on analyzing whether and how local perspectives and practices have informed district or national policies within policy documents. For example, one aspect was to examine the extent to which farmers are portrayed as agents of change or passive recipients of knowledge and technologies in interviews and policies.

FINDINGS/ANALYSIS

Food Security and Community Needs in Hoima

According to the Hoima District Local Government (2015), the percentage of Hoima’s population that lives below the poverty line has dropped from 35% in 2005 to 24% in 2014. This matches with a similar drop across the whole country of Uganda

TABLE 1 | Results of household categorization, Hoima, $n = 140$.

HH category	Percentage
Scraping by	15
Hanging in	54
Stepping up	12
Stepping out	19

Source: Thornton et al. (2018b).

between 2003 (38.8% below national poverty line) and 2013 (19.7%), which is attributed mainly to poverty reduction among agricultural households (World Bank, 2016). Development of infrastructure for oil exploitation in the region during the past decade has provided incomes to some, especially the educated who can access employment opportunities. At the same time, land acquisitions to make space for oil projects have resulted in displacement, landlessness and social tensions (Aboda et al., 2019; Ogwang and Vanclay, 2019). Moreover, the annual average income in Hoima remains only three quarters of the national average, at 554 USD, according to the District Development Plan. While the majority of households in Hoima rely on subsistence farming as their main source of food (Mubiru and Kristjanson, 2012), food insecurity is on the rise in the district. Pests and diseases are key challenges to livestock farming and crops, and smallholders are also increasingly exposed to climate risks. Unpredictable rainfall is making it difficult for farmers to plan when to plant their crops, and higher temperatures affect food production. As a result, only one in three families are food secure throughout the year, while two-thirds experience food shortages in at least 1 month (Recha et al., 2016).

When the household typology analysis is applied to the households surveyed in Hoima ($n = 140$), we find a spread of households across categories as shown in **Table 1**. Those households that are categorized as “scraping by” have more than 5 months of food deficits, while those which are “hanging in” are classified as not being as food insecure as the former category, but also as not making significant changes to agricultural practices, not achieving increases in productivity, and not diversifying their livelihoods with other income sources. This is in line with findings that show that only a quarter of Ugandan farmers used fertilizers on their crops in 2012 and only 12% used pesticides (World Bank, 2016). The fewest number of households provided responses that indicated they are intensifying their agricultural production, using agricultural inputs, and selling some of the produce, putting them into the category of “stepping up.” The remainder of households are not making investments in agricultural intensification but do derive income from business, employment, or renting out land, putting them in the “stepping out” category.

These results indicate a wide range of needs and aspirations among households within Hoima. Some are scraping by and need safety nets, while others are investing in their agricultural endeavors and could possibly benefit from infrastructure development such as improved roads and connections to markets. Other households are taking action to step away from

agriculture as their primary livelihood and are looking to other sectors of the economy for income and employment.

The household typology reflects an “expert” view of food security based on agricultural production and investments, directing attention to the need for safety nets, infrastructure, and alternative livelihoods. The more qualitative participatory community exercise regarding the collective vision for the future of Hoima revealed a diverse set of concerns beyond the agriculture sector. Transportation and access to services and resources (especially markets) were the primary issues of concern mentioned by the local population. The participants in the future visioning exercise proposed that they would like to have additional roads and upgrading of existing ones to first class murrum (laterite gravel) roads. For example, they wanted a road to the nearest secondary school so that children can continue their education. They also wanted footpaths improved and maintained, culverts and drainage channels to be fixed, and bridges to be constructed where the road crosses the swamp. A second major theme was the management of natural resources. There was a desire for forests and wetlands to be protected and encouraged to grow, with an end to pollution in the wetlands. A third theme was an increase in public services to match the demands of the growing population. They envisioned a larger village with more buildings, electricity supply, and a town council for better management. Piped water networks are desired, requiring the protection of water sources and streams. Additionally, they wanted to see the weekly market become a daily market, and they hoped the area would get another secondary school and a technical school. Lastly, they proposed that the health center should be connected to electricity and upgraded.

These data focused on collective visions and do not account for variations in aspiration between groups, nor how some concerns and groups are more visible than others in participatory exercises (such variations are further investigated in the next section). Nevertheless, an important finding regarding the topics of concern identified collectively was that few of these topics involved agriculture explicitly. Protection of natural resources was a major concern, but not because of agricultural productivity. Market access may be related to the food system, but the desire for the weekly market to become daily could be driven by other functions performed by the market—not only purchasing and selling of foodstuff. Despite the majority of households relying on agriculture in Hoima, people see food security and other desirable improvements as connected to a wide range of sectors beyond agriculture. Ongoing and desired agricultural transformations clearly transcend agricultural production.

The Translation of Climate-Smart Agriculture on the Ground

In this section, we use subjectivity as an analytical lens for investigating how the uptake of CSA practices may either open up or close down spaces for transformation across the political and personal spheres. In **Figure 4** below, we map the contestations over subjectivities and knowledges—men and women’s roles in development, as well as views of commercial agriculture and

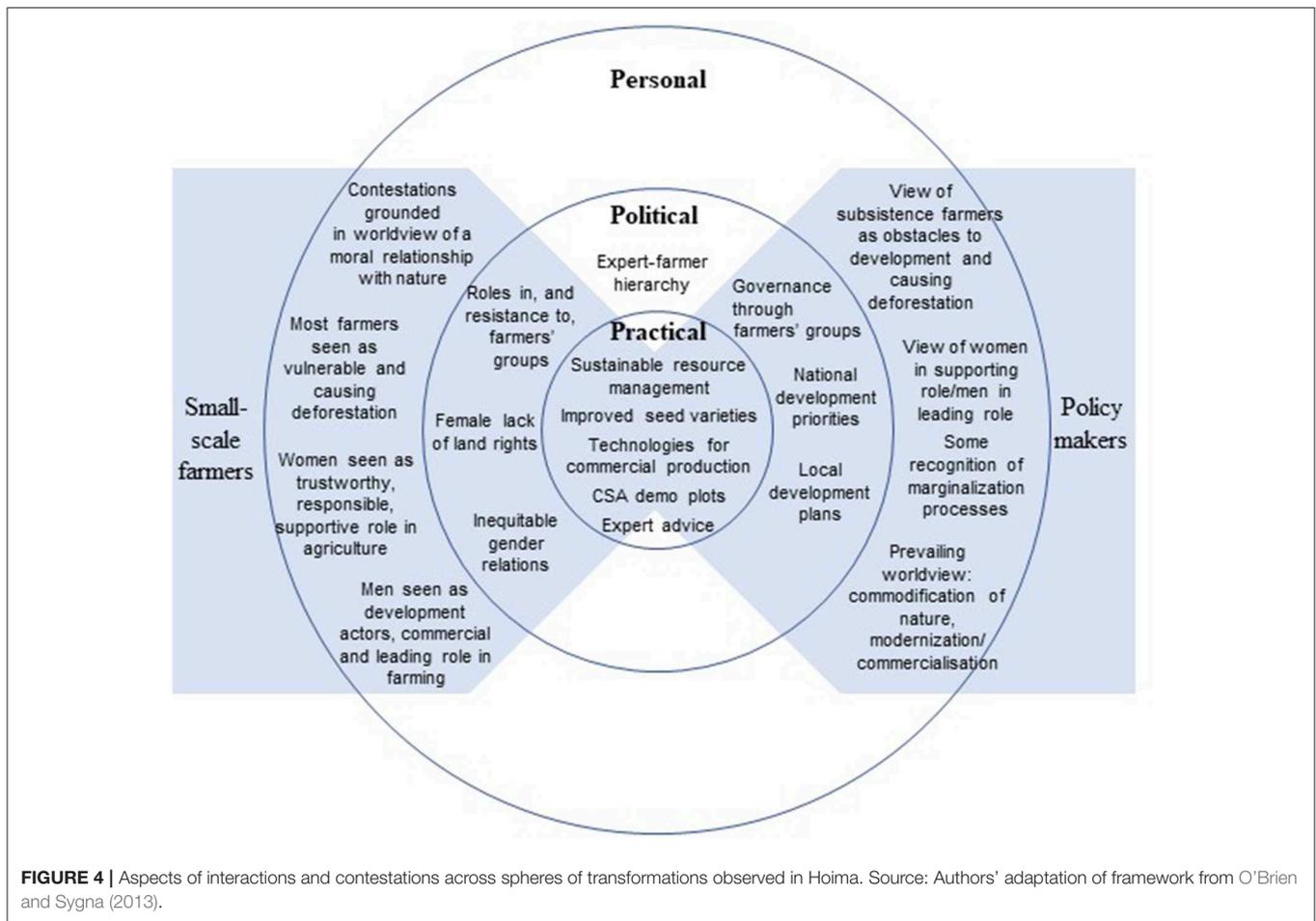


FIGURE 4 | Aspects of interactions and contestations across spheres of transformations observed in Hoima. Source: Authors' adaptation of framework from O'Brien and Sygna (2013).

reforestation as “sustainable development”—and their related governance structures and promoted practices onto the three spheres of transformation. This helps placing the analysis within the three spheres framework and to identify how people's roles and knowledges (within CSA activities) serve to either entrench inequitable socio-political relations or potentially contest and transform them along with agricultural practices. We analyze key informant interviews, a focus group discussion and policy documents in order to identify how subjectivities are reinforced or contested through daily interactions and decision-making in CSA. We also examine how these interactions legitimize particular knowledges or encourage diverse knowledges of “good development.” These subjectivities, and in particular who is considered a “development actor” and capable of making decisions, reflect power relations between social actors.

Farmers' Roles in Development

There are some clear patterns in the way that different social actors involved in CSA, including farmers, project staff, local leaders and local and national government officers present themselves and others. Exploring differences in the way that farmers are cast—such as in active/leading or passive/supporting roles—with regard to agricultural development and climate

change, reveals how subjectivities contest or reinforce expert hierarchies.

The analysis of subjectivities shows that the way that the role of farmers in relation to development and environmental change is perceived interacts with the political sphere of socio-political relations and government policies. In the vast majority of interviews, farmers were described as vulnerable, needing expert advice, and as causing deforestation. These statements include the views of project staff engaged in CSA activities as well as local government officials, but also many of the farmers themselves, who hence internalize a subjectivity as poor resource managers. Interviews with village leaders and farmers suggested that rainfall variability and uncertain timings, involving both too much rainfall and prolonged dry spells, represent local conceptions of “climate change.” This is attributed almost universally to deforestation by informants. Interviews also revealed that the need to conserve nature as a way to address climate change persists as part of the “good development” discourse, in particular among CSA-affiliated farmers. These subjectivities, casting farmers as vulnerable and as causing deforestation, legitimize actions such as replanting of trees, restricting charcoal burning and other forest uses, and organizing farmers into groups. Hence, they reinforce power relations

that authorize project and government staff to make decisions regarding agriculture and natural resource management, on behalf of farmers.

While farmers were viewed as people who cause climate change, smallholder farming was also commonly described in interviews as “an obstacle” to development. A male local leader stated that subsistence agriculture was a “problem” and expressed that there was a need to go into commercial farming, described as “modern” agriculture. The Hoima District Development Plan (DDP) for 2015/16–2019/20 also presents subsistence farming as problematic, attributing poverty and environmental degradation to subsistence farming. The DDP recounts that the main system practiced in the district is subsistence farming on small land holdings, using minimal inputs, which is characterized by low productivity. The majority of the people (over 70%) are subsistence farmers, described by the plan as being associated with low incomes, living in marginal conditions and posing challenges to sustainable development. “Production implements are generally limited to the hand hoe and machetes. Mechanization is almost non-existent while fertilizer and pesticide usage being minimal. Except for a few progressive farmers, most of the agricultural producers still rely on family labor” (p. 21). This quote implies that smallholders, and their farming methods, are seen as traditional (rather than progressive/modern).

The subjectivity of farmers as capable or vulnerable, the way that they are positioned with regard to “good development,” and which knowledges are recognized by different actors, also illustrate some key authority relations. First, the interviews suggest an uneven expert-farmer hierarchy. Both local leaders, government officers and farmers view the government, research institutes (NARO) and projects as key to development—agencies that should provide expert advice to farmers. The authority relation is reproduced through “experts” such as NARO researchers and policy makers deemed the most important “development actors” by farmers and themselves, and as being responsible for developing improved seeds and training. According to the District Development Plan, the “problem” of unsustainable subsistence farming is to be solved through increased information and technologies disseminated by experts: “Agricultural output in the district is falling short of its potential despite generally favorable environmental conditions. Significant improvements can be generated in the agricultural systems currently in place if the extension system was strengthened and responsive and farmers were convinced of the potential and advantages.” (p. 34). The extension worker is generally perceived to have a central role in “reaching people,” and farmers are viewed as “implementers” of agricultural technology. The role of farmers, one local government official said, “should be to embrace government programs.” She further expressed how she often found it difficult to make farmers form collective action groups, or practice “modern methods” of agriculture, as many wanted to continue farming like they always had. A project worker echoed this view, explaining how “dealing with farmers could be tricky.” She presented an example where farmers had been granted access to loans through an agricultural project for farming purposes, but used the money on “other things” than agriculture.

Within this expert-farmer hierarchy, farmers’ associations also become a governing and differentiating mechanism among local populations. Farmers’ associations are promoted as a means for farmers to voice concerns and exert influence, but equally as a method of governing and “disseminating information” from experts to farmers. Farmers had mixed perceptions of these associations, reflecting some resistance to this mode of governance. The women who were not members of farmer groups expressed that they had never heard about them in their area, while some felt excluded. On the other hand, male farmers who were not members of associations had mainly chosen not to join. For example, one male farmer stressed how he did not trust fellow farmers, while another man cited time constraints for his absence and lack of participation. In contrast, project workers and local leaders described farmers as too stubborn to join associations, or explained that many people chose not to become a member because of “cultural reasons.” The District Development Plan describes the role of the farmers’ associations in enrolling people into more productive agriculture: “Development in the agricultural sector is also constrained by the fragmentation and small size of holdings; and the large numbers and individualism of small farmers and relative paucity of farmers’ organizations or groups.” (p. 21). Farmers are described as difficult to buy from, and as not forming groups well, implicitly a preferred way to organize (and govern) farmers. Commercialization of agriculture is therefore intertwined with ambitions for governing farmers through groups.

CSA activities may reinforce a “governing farmers through farmer groups” pattern as CSA activities are typically organized through farmers’ associations. Project workers explain that farmers have a voice through these associations. However, they argue that there is little space for policy makers to take up the suggestions voiced in farmers’ associations. This observation suggests that the farmers’ associations mainly act to organize, govern and inform farmers, rather than creating a space for recognition of farmers’ knowledge by policy makers. This tendency may also reflect the role that national government officials see these associations having in the context of climate change. In interviews, officials describe climate initiatives to take place through agricultural officials incorporating climate guidelines into farmers’ associations. In order to address climate change, they argue, people must be told (by national and local government, NGOs, cultural and religious institutions) how to change their practices. Similarly, CSA project staff described farmers as having limited knowledge on how to tackle climate change, and that what was needed was support to researchers and extension workers to develop technology that could be brought to beneficiaries. Hence, farmers are seen as part of the climate change problem through engaging in the use of firewood and deforestation, but also as responsible for the solution—namely being taught sustainable resource management and new agricultural technologies.

Contestations of these relations are often grounded in worldviews regarding the moral relationship between people and nature, illustrating the close relations between the political and personal sphere of transformation (**Figure 4**). As explained in interviews, inequities and predominant development strategies

were contested in local problem understandings, such as seeing environmental problems as being related to immoral or greedy behavior, often attributed to commercial actors. Key informant interviews suggest that people perceive politicians and local leaders as profiting most from commercial agriculture (and hence promoting them). They also suggested that politicians do not stop commercial actors from exploiting timber from the forest for sale, in order to ensure continued political support. Several informants also identify the draining of swamps for agriculture, and potential exploitation of oil, as bad practices causing climate change. Sustainable environmental management involving a moral relationship between nature and people, then, is seen as being threatened by actions representing a commodification and commercialization view of nature.

Subjectivity and Gender Relations in CSA Interventions

In this section, we discuss how CSA interventions intersect with gender dimensions and authority relations. The examination of interviews with CSA project staff, farmers, and national government officials reveals that gender relations are an aspect from which subjectivities and inequities in development are reproduced, but to some extent also contested. While project staff and farmers are set in fairly persistent subjectivity and authority relations, CSA activities provide some spaces for transforming these relations by engaging women in project roles that promote a recognition of their authority and knowledge in the community.

The role that women are seen to have in agriculture appears to be at the crux of both gender relations and development—and potentially an entry point for transforming both agricultural practices as well as uneven social relations. Gender dynamics are closely intertwined with what is considered and promoted as “good development.” For example, commercial farming, which was favored as a tool for development and food security by most informants, is described as dominated by men. One male farmer described commercial farmers as the “real farmers” and the best development actors. In general, male farmers viewed themselves as “development actors” working faster and being more productive than women, often adding that women are unable to operate machinery like a tractor, that, according to many interviewees, is an important tool in terms of farming and food security. A male village leader and a male project worker, for instance, described how women farm for domestic use while men farm for commercial use. While they both interpreted the role of women as those responsible for the “development of the family,” the farmer stated how they should follow the order of the husband, who owns the land, and thus is the one in charge of agricultural decisions. Services such as distribution of inputs and seeds are typically targeted toward commercial activities rather than the home-oriented food security activities of women. So far, women are cast in very limited roles within agricultural development, in particular in commercial agriculture, which dominates as the interpretation of good development in official discourses.

As observed above, government officers and policy documents value commercial agriculture and large-scale production over smallholder production. Meanwhile, interviews revealed

criticism among some of the informants (including technicians, administrators, leaders, politicians) regarding the strategy to prioritize commercial agriculture in agricultural interventions. At the national level, policy makers recognize several facets of marginalization, such as women’s lack of land rights, and services focusing predominantly on technologies for commercial production, rather than activities in which women are engaged. As men are seen as land owners, natural resource management groups often consist of men, one informant explains. The focus on commercial agriculture nevertheless dominates, dovetailing with a wish to increase tax revenue in order to boost services delivery. The current Hoima District Development Plan aims to reduce the proportion of people living in extreme poverty by 10%, by the end of 2020. The policy document proposes to achieve this through increased social and physical infrastructure, as well as a reduction of land degradation. Increasing commercial agriculture and reduction of forest exploitation among smallholders are hence seen as instrumental to reducing poverty. This strategy may, however, risk reproducing current inequalities as some groups have better access to support for commercial agriculture than others.

Importantly, the CSA project represented a recognition of the importance of small-scale farmers for food security, but this recognition co-existed with a problem understanding of subsistence farmers being the most vulnerable to climate change, and with increasing commercial farming seen as the solution. This is not unproblematic: project staff described how farmers found it difficult to use new technologies like improved seeds, as well as how many farmers were, in their view, irresponsible in looking after money. Commercial activities and services for these farmers were still highly valued by project staff, while at the same time, the project has targeted activities particularly to women. Interviews with CSA project staff reflected the shifting roles and diverse views of women. On one hand, women were described as having a supportive role, looking after the home so that the man can work and get an income. On the other hand, women were also described as being responsible for growing food for the family, increasingly taking on a lot of responsibilities from men, but that their position was constrained by their lack of land rights. The female farmers themselves described, more often than male farmers, how they had experienced having their crops destroyed as a result of unpredictable weather patterns.

The CSA activities and the knowledge developed through them represented an opportunity for women to acquire more active subjectivities, with their role in experimenting with new techniques and teaching these to others—potentially representing a source of recognition of authority. However, there were no clear trends distinguished between CSA and non-CSA farmers in terms of gender perceptions; these perceptions were very mixed in both groups of informants. Being involved in CSA activities did not necessarily entail a shift in women’s subjectivities: for example, two CSA-affiliated male farmers suggested that men should get more agricultural support than women. Moreover, two women and one man saw no difference in needs between gender, and one woman said that men are abandoning their traditional roles. While all women stressed the need for better adaptation practices, farmers involved in the CSA

activities would explain how they could solve this problem by receiving more training on adaptation from the leaders of their associations or from “model” farmers who learned CSA practices from NARO. Arguably, women could be cast in active and less “supporting” roles, by increasingly appointing them as experts to help provide advice to others, rather than as mere recipients of training or benefits. This was illustrated by an informant who had been appointed volunteer by a non-CSA project. She explained how she was often approached by farmers for advice, by men and women alike, altering her position in the village.

DISCUSSION AND CONCLUSION

Although this study was carried out in one site with a relatively small sample size, it reveals some patterns that are useful for understanding how adaptation interventions intersect with the three spheres of transformation that was described in this study's framework. We used subjectivity as an analytical lens to examine the interaction between the personal sphere of worldviews, discourses and beliefs, and the political sphere of socio-political relations, governance and policies, as well as the practical sphere of CSA activities. Importantly, findings show how the practice of CSA project activities both reproduce entrenched socio-political relations through the subjectivities in which they cast farmers, but also how they may potentially create space for transforming relations through, for example, engendering more active and empowered farmer subjectivities. The study reveals several key features of agricultural transformation that are of conceptual and policy relevance, in particular regarding how climate interventions such as CSA may open up space for deeper transformation across all three spheres.

First, the case of CSA in Hoima illustrates that the relationships between the personal and political spheres are both deep and complex, with subjectivities spanning processes in the personal and political spheres. Subjectivities are rooted in discourses of what constitutes, and who is capable of contributing to, good development. These subjectivities are deeply connected to the political sphere in terms of socio-political relations, and determine whether different groups and individuals are given active responsibilities, as well as who gets support. The analysis suggests that the way that the climate change problems and efforts to address them are currently framed, both within resource governance and agricultural development, risk reinforcing inequitable relations. By continually framing farmers as vulnerable and needing help, policy makers and other actors, even those associated with CSA activities, ignore the agency that farmers do possess and fail to legitimize their knowledge. Karlsson et al. (2018) warn that the re-distributional effects of CSA should be more thoroughly investigated. Similarly, we find that, in Hoima, CSA activities risk reinforcing asymmetric authority relations in the site by seeing the majority of farmers as people relying on traditional methods, and mainly involving farmers who have commercialized as “model” farmers for others to emulate, leading to elite capture of resources. A modernization discourse predominant in policy documents as well as among many policy makers and project workers, dovetails with a view of

farmer malpractice as being the cause of both poor production, poverty and deforestation. Subsistence farmers in particular are hence subjected as problematic and unknowledgeable, legitimizing an expert-farmer hierarchy as well as governance through farmer groups. The emphasis on reforestation also resonates with persistent conceptions of good development by government and development organizations, and with more recent climate change related motivations elsewhere in East Africa to increase carbon stocks in the soil—discourses that often remove control over natural resources from local populations to global actors (Benjaminsen and Kaarhus, 2018).

Like policy makers, many farmers also see deforestation as a cause of climate change. However, this problem understanding reflects a worldview of a close moral relationship between people and nature, unpredictable weather patterns being a consequence of “immoral” or “greedy” behavior upsetting the relationship between humans and resources. A second feature of transformation, then, is how contestation forms part of the interaction across the personal, political and practical spheres. Eriksen et al. (2015a) highlight that it is through contesting subjectivity, authority and knowledges that space is opened up for social transformation. The case of Hoima shows how farmers source worldviews as a means to contest modernization development discourses and problem understandings of deforestation, as well as resist socio-political relations, including top-down governing of farmers and natural resources through project led farmer groups. The personal sphere of worldviews is hence an entry point for processes of contesting subjectivity, authority and knowledges, extending the understanding of Eriksen et al. (2015a) of how social transformation can take place.

An important policy implication of this feature is that in order to open up space for deeper transformations, CSA and other climate related interventions need to focus on, as part of project activities, revealing and questioning the different worldviews, development discourses and subjectivities that project staff, policy makers, farmers, and local leaders embody in their decision-making and daily practices. An open discussion among these actors about which of these worldviews, discourses or subjectivities may need to shift, and how they can be shifted through the way that practical interventions are implemented, is important in order to open up space to transform inequitable relations and unsustainable practices. Key aspects of such practical implementation may include who/which activities are prioritized for support, whose knowledge is drawn upon in project activities, and the extent to which diverse knowledges are explored, as well as the roles that farmers are assigned in project activities. Hence, the study contributes understanding of the practical entry points for shifting paradigms through daily practice and going beyond talking about change to “being change” in everyday actions (Sharma, 2017; Leichenko and O'Brien, 2019).

Third, socio-political relations, such as those involving gender, are a potential entry point for wider social and practical transformation. However, in order to understand how this entry point may effectively open up spaces for transformation, it is important to simultaneously pay attention

to the development discourses and worldviews in which gender relations are nested, as these are sometimes contradictory to measures targeting gender equity. CSA interventions represent sources not only of external support, but also a recognition of authority, influence, and legitimizing ways of production. The way that CSA activities are being implemented does potentially provide roles—and recognition—for women but may fail to transform asymmetric authority relations because very particular types of production carried out primarily by men (essentially commercial production) are recognized as most valuable. While not explicitly investigated here, other development interventions in Hoima may also cast farmers and women in very different, and sometimes contradictory roles and subjectivities. The analysis above shows how a focus on commercial agriculture as “good” by many social actors persists within CSA activities and is intertwined with asymmetric gender and expert-farmer relations. Commercialization is also related to an ambition by the government to govern farmers through farmer associations, the institutional set-up through which CSA activities are implemented. Hence the interventions in Hoima are possibly shutting down some spaces for transformation and are unlikely to lead to the needed transformation because they are not reaching into all three spheres.

If CSA projects are able to promote a bold recasting of roles that women play in agricultural development, they may create a space for transformation across spheres. Such a contestation of subjectivities and gender relations could not yet be observed in Hoima, which matches with the findings of Acosta et al. (2019) who found that the translation of gender concerns within agriculture and climate change discourse in Uganda disappears from national down to local levels. Organizations implementing CSA projects are trying to make changes in the practical sphere within Hoima as well as influencing actions in the political sphere at the local and national level by having CSA included in policies. But they often fail to examine how the subjectivities of farmers and other local actors may close down spaces for contesting subjectivities, positioning farmers as constantly in need of help from experts (local or external). Other research examining transformations in food system governance shows that collective action and the exercise of local agency is highly important for supporting transformative actions (van Bers et al., 2019). By being more reflective of farmer subjectivities and taking into account the differing characteristics of men and women farmers (and other social classifications), organizations working on promoting CSA can allow for a wider variety of options available to farmers based on their personal risk aversion level, household aspirations and perceptions of the future. This suggestion relates to other findings on transformational adaptation which show that transformation can happen across a larger scale when landscape issues need to be addressed but at a more individual farm scale when conditions are changing, farmers react differently depending on their needs and aspirations (Vermeulen et al., 2018). Promoters of CSA can also work with policy makers at local and national scales to explore the entrenched perceptions of small-scale farmers they may hold intrinsically and their notions of “good development”. Examining these beliefs openly may allow for a broader conceptualization of men and women

farmers and how they can best be supported, whether through continued emphasis on farmers’ associations or through other types of services.

Finally, while CSA may be a useful concept to help farmers adapt to climate change, it does not directly address the possibility that some households may not want to continue in the agricultural sector in the near to medium term. Our analysis of farmer livelihoods as well as aspirations in the section Food Security and Community Needs in Hoima Draws attention to the need to keep in view that agricultural transformation forms part of wider transformations, such as transformations in livelihoods. Local actors and national policy makers therefore should consider the possibility that people want to shift out of farming and into other livelihoods (Vermeulen et al., 2018). The three spheres framework can be used to consider how shifts in livelihoods (practical sphere) are connected with transformations in socio-political relations and governance, as well as worldviews and subjectivities.

Importantly, local social and agricultural transformations are nested in transformations at a national level—raising the question of how examining interactions across the three spheres can help support transformation toward a climate resilient development that embodies equity, adaptation, mitigation and sustainable development goals across geographic scales (Denton et al., 2014; Patterson et al., 2017). National policy makers in countries with high population growth rates coupled with high economic reliance on agriculture have to make important choices regarding development pathways. On the one hand, the agricultural sector will need to grow to increase production of staples so that rapidly growing urban populations can be fed. But on the other hand, developing the smallholder sector may not provide the production increases needed over the relatively short term, because of land, labor and capital shortages. These challenges demand that the options available to national governments—and the mindsets and goal of the system that govern which options are seen as desirable—are deliberated. For example, a first option is that national food self-sufficiency objectives could be relaxed, increasing the need for foreign exchange to purchase imports. A second option is that government could facilitate the agricultural sector to embrace a “sustainable intensification” approach, based on intensifying production through carefully-managed inputs of fertilizer, water, and feed to minimize waste and environmental impact, supported by improved access to markets, new varieties, and technologies (Herrero et al., 2010), bearing in mind that there may be limits to what smallholders may be able to achieve through sustainable intensification (Ritzema et al., 2017). A third option is that government could actively seek to develop a highly dualistic agricultural economy in which commercialization and smallholder development take place at the same time, although in different landscapes and with highly differentiated commodity orientation.

These alternatives all embody particular worldviews and subjectivities, opening up space for some imaginings of the future while closing down others (Nightingale et al., 2019). In order to understand how CSA and other climate interventions may provide a vehicle for imagining different development from

the present, as well as contesting predominant farmer roles and inequitable relations, policy and development actors need to engage in deliberative processes that include smallholder farmers as well as other stakeholders. Understanding how mindsets shape adaptation knowledges and practical adaptation, and how mindsets may make some knowledges and options invisible, is a key leverage point for transformation (Meadows, 1999). Deliberating worldviews and future development may constitute the types of partnerships and changes in governance required to place more power in the hands of those affected by climate change (Blackburn and Pelling, 2018). Going beyond a focus on transforming just the practices of small-scale farmers to include reflexivity and intentional explorations of beliefs and worldviews held by different actors can help bring to the surface how socio-political relations and discourses may be hindering fuller transformations within agricultural systems. Such an exploration is also important in addressing the danger, as increasingly observed in empirical studies (Taylor, 2014; Atteridge and Remling, 2018), that adaptation projects inadvertently exacerbate vulnerability—including how current CSA measures may in fact be reinforcing inequitable and unsustainable development and shutting down spaces for transformations.

DATA AVAILABILITY STATEMENT

The CCAFS baseline data are available publicly at <https://dataverse.harvard.edu/dataverse/CCAFSbaseline>.

ETHICS STATEMENT

Data collection included key informants and focus group discussions conducted in 2018 in Hoima. Written informed consent was obtained from the key informants and group discussion participants. The proposal/ interview guides/consent forms for this data collection were reviewed and approved by an ethics committee at Makerere University, Uganda as well as by the Norwegian Centre for Research Data—Data Protection Services (a requirement for all Norwegian researchers and research students). The questionnaires and sampling procedures

used for the CCAFS baseline studies carried out in 2011 were vetted by a team of experts with many years' experience in research with farmers and communities. A formal ethics approval was not required as per applicable institutional and national guidelines in place at the time of the household survey. The experts came from several different institutions and disciplines, including from a group specialized in research methods. This committee served as the ethics approval body within CCAFS (the CGIAR research programme on Climate Change, Agriculture and Food Security). The questionnaires and exercises were reviewed to ensure that there would be minimal to no risk to participants and that all proper protocols would be followed. Oral informed consent was obtained from all survey respondents and community participants. Written consent was not used due to low levels of literacy in many of the CCAFS research sites. The consent procedure was approved by the ethics committee that approved the study.

AUTHOR CONTRIBUTIONS

SE has coordinated the writing process and led the writing of the theoretical background, Introduction, Findings/Analysis and Conclusions sections. LC has led the writing of the Methods and Research Site section as well as analysis of the CCAFS baseline study data, and contributed to analyzing policy documents, writing the theoretical and Findings/Analysis sections, as well as general language editing. IV has collected and analyzed qualitative data in Hoima and contributed to analysis of policy documents. PT has contributed to writing the Conclusions and has provided input to all other sections.

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The reviewer MV, declared a shared affiliation, with no collaboration, with one of the authors, PT, to the handling editor at time of review.

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