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Agricultural Investments and Farmer-Fulani Pastoralist Conflict in West African Drylands: A Northern Ghanaian Case Study

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Abstract: In the Global South, there is a push to drive agricultural modernisation processes through private sector investments. In West African drylands, land concessions are required for such agri-businesses are often negotiated through customary authorities, and inject large amounts of money into localised rural systems with low cash bases. The article argues that such transactions serve to increase area under crop cultivation on an inter-seasonal basis, as financial spill-overs allow for farmers to purchase larger quantities of agricultural inputs and prepare larger tracts of land. Simultaneously, such direct and indirect cash flows also result in larger local herd sizes and an increase in the number of locally-owned cattle, as cash is exchanged for cattle, largely regarded as an interest-accruing, savings buffer. Larger herd sizes, in turn, attract Fulani pastoralists in search of employment as contracted herders for local cattle owners. Taking Integrated Water and Agricultural Development (IWAD), a private sector, large-scale irrigation initiative in northern Ghana as a case study, the article argues that there is an inevitability of the pathway, which leads from large-scale land acquisitions in West-African drylands, to an increase in conflict (and/or the risk thereof) between sedentary and Fulani pastoralists.

Keywords: Fulani; pastoralist; farmer; private sector; landscape; conflict; northern Ghana

1. Introduction

There is a contemporary push to modernize agriculture in northern Ghana. The three regions that make up ‘northern Ghana’ represent the three poorest of Ghana’s 10 regions, as well as the most exposed to climatic changes [1]. With this in mind, the push to improve agriculture in northern Ghana comes from many sources, bringing together a number of development trajectories, and takes many forms. The drive to modernize agriculture in northern Ghana is, for instance, embedded in many of the Sustainable Development Goals (SDGs), including Eradicating Poverty (1); Zero Hunger (2); Decent work and Economic Growth (8); Reduced Inequalities (10); and, Climate Action (13). It also increasingly forms an important part of donors’ growing mandate to enable private sector actors (both foreign and local) as key drivers of development. Finally, Ghana’s new government campaigned on a number of flagship programs, including One Village; One Dam policy, which aims to make agriculture a year round enterprise in northern Ghana, a call behind which number of donors have rallied [2]. Thus, whilst rural development in northern Ghana has perhaps traditionally been mobilized through NGOs and government agencies, including agricultural research institutions, there is a growing effort to facilitate private sector operations to drive the agricultural modernization process [3]. International investment has been identified as one of the channels in which countries can economically interact and integrate [4,5]. This process is driven by flows of capital, expertise, and a very specific ideologically, in which root development in neo-liberal notions (development as residual of economic growth).

Foreign-owned (or part foreign-owned) companies investing in northern Ghana's agricultural sector, whilst initiating flows of capital and 'expertise', function on the one hand, as normal business seeking to maximize profit, whilst on the other hand, they are held accountable to developmental objectives such as, for instance, 'leaving nobody behind' [6]. The development benefits of private companies are largely regarded as a residual of companies seeking to maximize profit. As a result, agri-businesses in the global south have largely been monitored and evaluated in terms of their commercial success (does the business model generate profit). This is so because it is neoliberal assumptions that if businesses are commercially successful (and abides by basic environmental and social legal frameworks, such as minimum wages), developmental benefits will automatically follow (as a residual). However, if businesses are drivers of broad developmental processes, a far broader perspective of impact is required. This perspective should take account of the winners (and losers) within the company's operational landscape. Whilst quite some attention has been given to assessing the impact of private sector land acquisitions, the frameworks employed are diverse, and it is difficult to compare across cases [7–9]. This article proposes that a landscape lens might be adopted more widely for the purposes of capturing the development impacts of land acquisitions by private actors. Such a lens should bring into focus not only land uses and associated institutions, as traditional landscape approaches that are designed to do, but also, it should bring into sharp focus the social inter-connectedness of groups interacting within that landscape, especially in terms of access to natural resources. Together with more traditional landscape approaches, as well cost-benefit analyses associated with doing business, the proposed lens is intended to serve as a more holistic approach to understanding private sector agricultural initiatives as drivers of development. This article is a first step in doing that, and seeks to identify wider changes resulting from new private sector operations in northern Ghana's agricultural sector. The article focusses especially upon the impact of such private sector investments on the relations between farmers and Fulani pastoralists.

In contexts of rural poverty and customary land tenure, flows of capital from private investments inject large amounts of money into otherwise cash-poor localities. These flows of knowledge and expertise may enable a sudden and drastic expansion of area under cultivation and/or, changes in crop calendars. Because these changes occur in the context of competing claims to scarce natural resources, such flows may play a role in exacerbating conflict within landscapes. This obvious fact which is rarely considered in agricultural policies or programming, except in contexts of ongoing open-violence, where discourses relating to 'conflict-sensitivity' have found some traction. Whilst this is true of all flows, because land-based, private-sector operations focus largely on the potential for profit (of which 'development is seen as a residual), the focus of businesses is largely on the mechanics of doing business (inputs, production, labor, supply chains, logistics, etc.). They are therefore less likely to have the operational mechanisms for, and/or, direct interest in, assessing the impacts of business, upon a wider socio-relational context.

In light of this, in Ghana's northern ecological zone, in line with national Ghanaian agricultural policy frameworks, efforts to modernize agriculture, including more recent attempts to afford a more central role to the private sector, work to expand crop farming, both in space and time. This push drives expansion in space, due to land concessions purchased by private sector actors for their respective operations, as well as, as a result the gradual diffusion and uptake of more modern agricultural technologies, such as tractors for preparing land for farming, and pesticides. Similarly, an expansion in time is created as dry-season farming along river banks and around cultivated water sources (dams and dug-outs) is made possible by mechanized irrigation, creating new uses for previously uncultivated 'bushland' (during the dry-season). Furthermore, as a result of the introduction of early yielding crop varieties, smallholder farmers attempt two harvests during one rainy-season, starting earlier in the rainy season, and ending later. Such expansions of agriculture (in space and time) in northern Ghana have important implications for the distribution of, and access to, local natural resources. As competing claims to natural resources, between farmers, fishermen, women, and pastoralists are recalibrated to accommodate a new distribution of natural resources, new dynamics of conflict may arise, or old

cleavages become hardened. Such conflicts may, in turn, have implications for the effectiveness of development efforts.

Whilst northern Ghana is prone to intermittent outbreaks of conflict, including conflict between and within ethnic groups, a persistent conflict, which receives relatively little policy attention, is that between farmers and Fulani pastoralists. Relationships between sedentary farmers and Fulani pastoralists are largely defined by competing claims to natural resource use. Intuitively, the push to modernize agriculture in northern Ghana, and the subsequent expansion of crop farming in time and space, reduces the available resources for pasture, and as this article argues, increases both the frequency and the intensity of farmer-pastoralist conflicts. The article illustrates that this does not end in a zero-sum game, where farmer win, and pastoralists lose. Instead, the resulting conflicts and insecurity undermine both Fulani pastoralist livelihoods, as well as the effectiveness of agricultural programming more generally, including that of the private sector. More specifically, the article demonstrates how private sector agricultural engagements and/or other successful efforts to increase yields and income, not only drive agricultural expansion (thereby reducing pasture), but also induces local increases in cattle herd sizes. What results, is therefore, a simultaneous increase in the area under crop cultivation, and an increase in the number of cattle owned locally. The increase in the number of cattle is further exacerbated as Fulani pastoralists are drawn to the area in search of employment as contract herders, bringing with them cattle of their own. Anecdotally, northern Ghana is seeing an increase in the frequency and intensity of farmer-pastoralist conflicts. An increase in the frequency and intensity of farmer-Fulani conflict, in turn, is likely increase local insecurity around land use and harvests, and in so doing, undermines the effectiveness of attempts at rural development more generally.

In terms of human security, the initial impacts of increased farmer-Fulani pastoralist conflicts will be highly localized. However, within academic security discourses, there is increasing attention for linkages between excluded Fulani pastoralists who use radical Islamic discourses as a means of voicing discontent in the state in Nigeria, Mali and Burkina Faso [10,11]. Indeed, although this is beyond the scope of this article, if one extrapolates the exclusion of Fulani from broad agricultural development processes (as discussed in this article), in terms of what is already known elsewhere in West African drylands, it is not unthinkable that the long-term exclusion of Fulani pastoralists from broader development trajectories in Ghana might spark similar radicalization dynamics.

In short, this article aims to unpack wider dynamics resulting from private sector, agricultural modernization efforts, and how the flows of capital, knowledge, and ideas supporting such efforts drive farmer-Fulani conflicts in northern Ghana. Whilst the article takes as a case study Integrated Water and Agricultural Development (IWAD), a private sector entity, which, through the use of various irrigation and un- and out-growers models, seeks to modernize agriculture, it reflects on empirical data to conceptualize, more broadly, how agricultural investments in northern Ghana and elsewhere in West African drylands, may impact upon farmer-Fulani pastoralist relations.

2. Contextual Analysis: IWAD in the Sisili-Kulpawn Basin

The Sisili-Kulpawn basin is located in Ghana's Northern Region, in the area known as 'Overseas', on account of being beyond a river that is not passable during the rainy-season. In terms of livelihoods, it is not particularly distinct from elsewhere in the Northern Region, with households that are largely dependent upon rainy-season subsistence farming. A lack of dry-season water sources (dams, dug outs, boreholes), and perhaps as a result of problematic market access, dry-season farming does not appear to be widely practiced, except increasingly along the riverbanks. The region is governed by a complex hierarchy of sub-divisional, divisional, and paramount chieftaincies [12]. By and large, chiefs are custodians of the land, and land is largely perceived as belonging to the chief. The chief therefore has the power to sell and/or distribute land as he sees fit. Adjacent to customary governance structures are local government structures. Each community elects a Unit Committee, who supports an elected Assemblyman. The Assemblyman represents the community in the District Assembly (DA). The DA is presided over by a District Chief Executive (DCE) who is appointed by central government.

DCE's in turn are accountable to Regional Ministers, who like the DCEs themselves, are appointed by ruling party.

Yagaba, the operational base of Integrated Water and Agricultural Development (IWAD), is located in the Mamprugu-Moagduri district, within the Sisili-Kulpawn basin (see Figure 1).

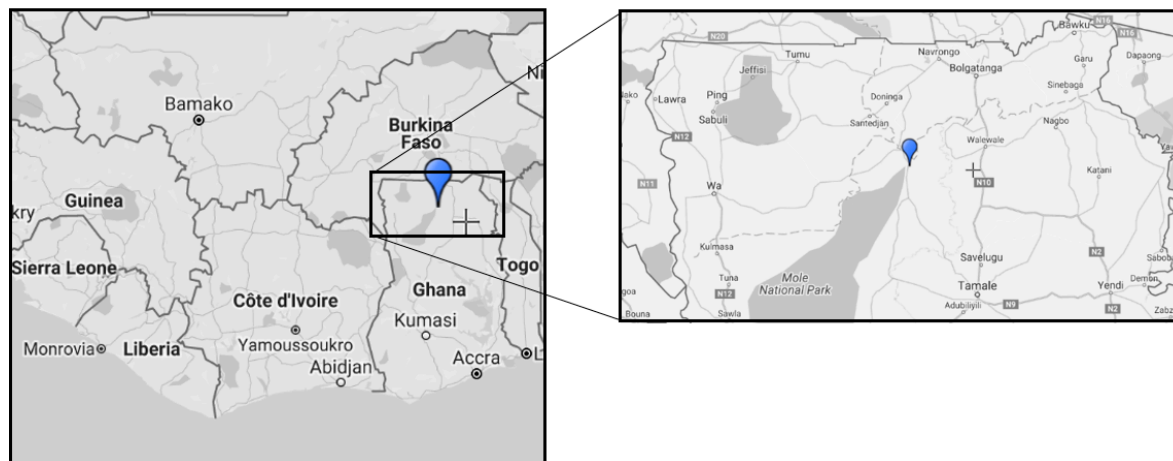


Figure 1. West Africa and Northern Ghana, showing IWAD Operational Base at Yagaba.

The Mamprugu-Moagduri district has a total population size of 46,894 [13]. Average household size in the district is 9.0, as compared to a regional average of 7.8 and a national average of 4.5 [13]. The 'Incidence of Poverty' in Mamprugu-Moagduri is between 70% and 79.9% [1], amongst the highest in Ghana (with a national average of below 25%). The 'Depth of Poverty' of 'Poverty Gap' in Mamprugu-Moagduri is also high, falling between 24.9% and 29.9% [1]. IWAD is a subsidiary of African Tiger, with its head office in Accra. IWAD is a private company (Whilst IWAD is a privately-owned company, it has received public funding from donor for specific initiatives within the broader aims of both the Government of Ghana and the donor community to modernize agriculture in northern Ghana.) seeking to reconfigure agriculture within the basin in two distinct ways. It has introduced multiple agricultural and irrigation models upon a 400 Ha land concession, which has been granted to IWAD by the chief of Yagaba. The land concession includes 250 Ha of Nucleus Farm (NF), and 150 Ha for an irrigated (dry-season) 'in-growers' scheme (1 Ha each). The type of irrigation systems include Pivot Irrigation (4 in total, irrigating 65 Ha of land each), Furrow Irrigation, Drip Irrigation and a Sprinkler block (see Figure 2).

The NF employs laborers (mostly women) to sew, weed, and sort a variety of crops. Those laborers, who all reside in Yagaba itself, or a nearby community, are paid on a daily basis. Depending on the time of year, a rough estimate of 100 laborers are employed on the NF daily. Within the land concession itself, a number of different crops are being experimented with, including sugar cane, Bambara beans, and rice. Beyond the concession land, IWAD is also rolling out Conservation Agricultural efforts to smallholder farmers in nearby communities, through an out-growers scheme. This involves establishing demonstration farms in communities, and training interested farmers in improved agricultural techniques for planting, cultivating, water management and use of fertilizer. Payments for inputs and services supplies to CA farmers are recouped retroactively as a portion of harvests. At the time of writing, 21 communities in had been engaged, with demonstration farms established. Over half of the communities targeted for CA are within the Mamprugu-Moagduri district, which consists of 20 (large) communities [14]. The number of communities engaged in the CA out-growers scheme is expected to grow. Amongst the out-growers (distinct from the in-growers, who take up parcels of land within the concession land), rice production is being promoted by IWAD through conservation agriculture practices.

The 400 Ha land concession, as is the case of land in northern Ghana more generally, is controlled by the local chief of Yagaba, together with a number of land owning families. They have the power and the authority to distribute and allocated it as they see fit. Because the chief is the custodian of the land, negotiations regarding the concessions took place between IWAD and the Yagaba chief and a number of land owning families, and cash transactions for the concessions were also paid to him. The chief also controls the influx of Fulani, allowing them to settle in the area, or indeed, expelling them from the area—it is upon his agreement that they are allowed to settle. Because cattle are largely regarded as a wealth indicator, and wealth props up customary authority, chiefs in much of northern Ghana, including Yagaba, are likely to possess large herds of cattle. In this way, they have most to gain from Fulani who come in search of work as contract herders.

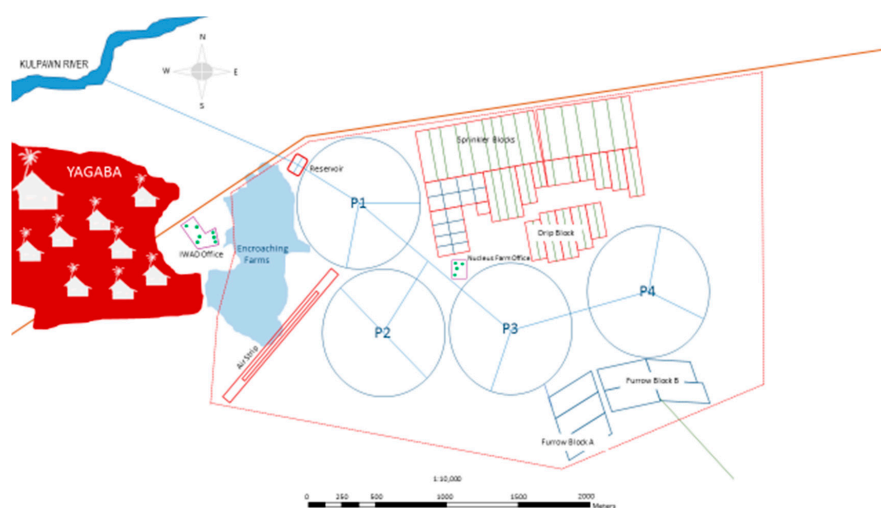


Figure 2. The Integrated Water and Agricultural Development (IWAD) land concession showing various irrigation schemes.

Whilst subsistence farming is at the base of livelihoods in the Mamprugu-Moagduri district, livestock also forms an element of local livelihoods. According to the 2010 Population and Housing Census (PHC), there were 34,962 cattle in the district [15]. The total number of cattle was owned by 1897 cattle owners, with an average of 18 cattle per owner [15]. The total number of cattle owned per person is high as compared to other districts (0.7 cattle per person, as compared to an average of 0.4 person for the Northern Region [15]. The number of cattle per cattle owner (18), however, is below average for the Northern Region (25 cattle per cattle owner) (Tamale Metropolitan Area is not included in the calculations. As an urban area (325 persons per square kilometer, the dynamics relating to cattle ownership are significantly different to rural areas, and therefore misrepresent the data). Taking these two calculations, we can infer that an above average number of households in the Mamprugu-Moagduri district possess cattle (as compared to other districts in the Northern Region). Except for some isolated cases, cattle are almost always attended to by Fulani pastoralists who are contracted by cattle owners. All of the cattle owners (farmers) spoken to for this study had given their cattle to Fulani to care for.

In terms of the current case study, pastoralist Fulani livelihoods exist within the Sisili-Kulpawn landscape within two broad categories. The first group are semi-nomadic Fulani who are employed by local cattle owners, including chiefs, as contract herders. These Fulani come to settle close to existing farming communities. Cattle ordinarily graze under the care of Fulani pastoralist during the day, and are returned to the community in the evening. Whilst the majority of cattle under Fulani care are owned by local cattle owners, this groups of Fulani are likely also to own some of their own cattle. The ratio of cattle for which such Fulani care and own themselves varies. They are usually paid in milk that they are allowed to extract from the cattle owner's cattle, or indeed other non-cash

benefits, such as manure for compost, although this appears to occur infrequently. None of the Fulani settlements visited for this study were connected to the power grid, or the water supply, and they are generally regarded as poor. The second broad category of pastoralist livelihood in northern Ghana are nomadic Fulani. Fulani in this category migrate seasonally from Sahelian territories southwards into Ghana in search of pasture and water for their herds. Unlike contracted Fulani, they own their own cattle and, whilst contracted Fulani are present throughout the year, nomadic Fulani arrive in Ghana at the start of the dry-season (December/January) and return northwards at the onset of the rainy season (May/June). As in the case of the distinction IWAD, CA operations and out-growers initiatives within the land concession, the distinction between semi-nomadic (contracted) Fulani and nomadic Fulani is important both in terms of defining the problem, and in terms of how potential solutions are considered. This article focusses primarily on semi-nomadic, contracted Fulani who have come to settle in the Mamprugu-Moagduri district.

Dry-Season Farming in Northern Ghana

Initiatives such as IWAD form part of a larger attempt to stimulate dry-season farming in northern Ghana. This is seen to solve many of northern Ghana's development gaps, including youth unemployment, increased income and food security, as well as an important pillar in efforts to strengthen adaptive capacity to climate change amongst northern communities, since dry-season farming is irrigated (as opposed to rain-fed, rainy season farming), and are therefore less exposed to immediate climatic shocks, such as rainfall variability.

The push to stimulate dry-season farming not only serves as an impulse to expand (rainy-season) farming, since farmers have more cash to invest in agricultural inputs and pay for agricultural services, such as land preparation by tractors, it also greatly alters and congests existing crop calendars. This change is important, especially in the context of farmer-Fulani pastoralist relations (see Figure 3). Not only are more Fulani pastoralists (and cattle) present in the zone as a result of seasonal migration of transhumance mobility from the Sahelian belts to the north (Burkina Faso, Mali, Niger, etc.), but the absence of water sources (dugouts and dams are largely empty during the period) congests banks of perennially flowing rivers as Fulani pastoralists drive cattle to rivers for drinking, the same banks are increasingly exploited for dry-season farming. Fulani in particular complain that they struggle to access river water for allowing the cattle to drink, as a result of an increase in dry-season farming along the riverbanks. Dry-season farmers, in contrast, widely agree that since the Fulani are not Ghanaians, they have no right to demand access to water or other natural resources. This type of activity might also be seen as a strategy to exclude Fulani fully, making their livelihoods untenable, and ultimately driving them from the area.

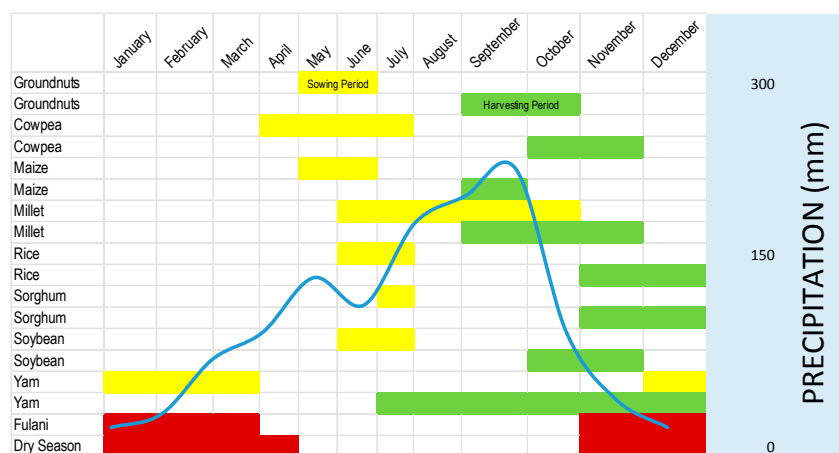


Figure 3. Seasonal calendar of cereals, leguminous and tuber crops in the Guinea Savannah agro-ecological zone of Ghana [16].

3. Methodology

Research for this study was an extension of earlier research conducted that followed a similar line of questioning in Ghana's Upper East Region. In that initial case study, the research focused on the impact of a new, lucrative, donor-driven, dry-season watermelon farming sector on relations between farmers and Fulani pastoralists [17]. The research employed social capital theories as a way of understanding changes in relations between farmers and Fulani pastoralists as result of the dry-season watermelon farming. Whilst the cases were not intended to be comparable (as a result of time constraints), insights gained during the watermelon case study were used as points of departure for the present one.

Fieldwork for the present article was conducted during two short periods in March and in August 2017. As a qualitative study, the fieldwork involved interviews with key stakeholders, including chiefs, farmers, Fulani pastoralists, local youth, and District Assembly (DA) officials (12 interviews in total). Furthermore, four focus group discussions (FGDs) were conducted, two amongst Fulani pastoralists from two different settlements, and two amongst the farmer groups from two different communities, both of who had been engaged by IWAD by as a part of the CA out-growers scheme. The FGDs were conducted during the first fieldwork period in March 2017. Whilst IWAD staff, both operational staff and management staff where engaged intensively during both fieldwork periods, there have been ongoing discussions to validate the findings. During the first fieldwork period (March 2017), all of the Fulani settlements visited were geotagged and included in a map provided by IWAD. The second fieldwork period (August 2017) was used primarily to validate findings amongst participants from both farmer and Fulani groups who had participated during the first fieldwork period. During the second fieldwork period (August 2017) youth were also engaged. This was done informally (in local bars) in an attempt to provoke more honest responses regarding their sentiments towards IWAD operations.

FGDs focused upon the impact of IWAD on livelihoods and decision making. Farmers were asked, for instance, whether they felt CA had been successful, and in what terms they felt it had been successful. Discussions with farmers also focused on issues with Fulani pastoralists, such as whether the frequency of conflicts had increased, and on how incidents of crop damage were settled (and if these had changed, and why?). Both groups of farmers indicated that the number of incidents with Fulani pastoralists around crop damage had indeed increased. They attributed this to the fact that they were farming larger areas, were using new maize varieties, which allowed them to attempt two harvest during one rainy season, starting earlier, and ending later, and to an increase in the amount of cattle present. Fulani FGDs also focused on if incidents were increasing, why they felt they were increasing, and if mechanisms for resolution had changed (and why they had changed).

Interviews were conducted with the Yagaba chief and several of his elders. The primary take-away from the interview was his apathy towards the problem. For instance, asked about his own role in resolving farmer-Fulani pastoralist conflicts so as to avoid damage of property and/or death, he replied, 'I tell the people that they must exercise patience'. An assemblyman was also interviewed, although it proved difficult to break down populist 'campaign rhetoric'. Asked about the potential solutions to the problem he answered, 'we need to sack them (Fulani) from the area, so that my people can farm in peace', a solution that is widely known to be neither feasible, nor effective (nor indeed legal). As mentioned previously, discussions with IWAD in the form of semi-structured interviews have been ongoing. Finally, Ghana's 2010 Population and Housing Census [15] was referred to extensively, as too was the Ghana Living Standards Survey 5 (GLSS5), although both documents proved to be limited in their usefulness.

4. Landscapes as a Lens for Understanding the Impact of Agricultural Investments in West African Drylands

Since around the 2000s, approaches to development practice have sought to recognize the inter-connectedness of multiple-land uses within bounded geographies. Different sectors (notably

farming and forestry) were found to be competing with one another within bounded spaces. Integrated Landscape Approaches (ILA) served as an approach that shifted away from sectoral approaches, instead seeking place-based, integrated development solutions, which holistically considered the complexity and inter-connectedness of different land uses within places [18]. This shift has had a number of important implications, including institutional/governance implications as, for instance, ministries with competing agendas (forestry, farming, fisheries etc.) are required to better coordinate in making landscapes 'work' for development. Whilst ILAs have been propagated as a way of doing development better, they also provide a set of analytical tools for assessing the impact of development more holistically. For example, ILAs might seek to assess an increase in an area under crop cultivation as a result of agricultural policies or programs, not as an end unto itself, but in terms of its impact on, for instance, the loss of forest land that is initiated as a result of the increase in area under cultivation. The balancing of land uses in this way is clearly a more effective way of measuring impact, than where other sectors are ignored.

Whilst ILAs have been useful in recognizing different and competing land uses, they have been less successful in recognizing different groups of people, or different livelihoods, associated with land uses within a landscape. This trend in ILA stems largely from its origins in conservationist discourses, focused as they are, on managing environmental trade-offs in the context of pressure for farmland at the expense of forests and other land uses [19]. Despite this, in a given northern Ghanaian landscape, for instance, landless women may be dependent on economic trees, such as Shea and Dawadawa, for foraging and/or for firewood, whilst their husbands exploit the land for farming. As a result, any discussion about permutations of land for farming versus land for forests has profound implications on gender and intra-household relations. In the same way, landless men, often members of settler communities of a different ethnic origin than indigenous groups (being settlers, rather than indigenes, they struggle to access land), establish dominant positions in non-land based sectors, such as fishing or foraging. This is so because these livelihoods rely on less ethnically-territorialized resources (water, or natural forests), than in the case of farming (land). Designating water to irrigation would have an impact on groups dependent upon fishing for their livelihoods. Another example of this type of dynamic is pastoralism; replacing bushland for farmland will have implications for the relations between farmers and Fulani pastoralists, who depend on bushland for pasture for the cattle herds upon which their livelihoods depend. Importantly, this does not represent a radical departure from existing ILAs; there is no structural reason why ILAs fail to capture the impacts on social relations of different permutations of land use within landscapes. Rather, we advocate for a specific social lens to be used within exiting ILAs in order to better capture changing land use on relationship between livelihoods, and ultimately, for the purposes of conflict sensitivity.

Since 2008, following the financial crisis, and a loss in appetite amongst Northern electorates for publically-funded traditional development models, the private sector is increasingly propagated as the most effective engine for development. Whilst much hype has been generated around 'sustainable', 'development-orientated', and 'inclusive' business, success in terms of financial sustainability is often conflated with development impact. Very few attempts have been made to understand the broader (landscape) impacts of businesses, except in terms of very direct and immediate implications (for instance, increased yields of x number of farmers; number of people employed etc.). As engines of development, which donors increasingly frames the private sector as being, better tools need to be developed, and much more effort needs to be made, in order to understand how private investments impact development more broadly. With this in mind, the remainder of this article adopts a social lens to understand the changes initiated with the landscape, in order to understand the impact of large-scale, private land investments in northern Ghana on relations between farmers and Fulani pastoralists. Taking IWAD's operation as a case study, we develop an evolutionary model which demonstrates how large-scale agricultural investments in northern Ghana (and West African drylands more generally) will inevitably exacerbate conflicts between farmers and Fulani pastoralists.

5. Emerging Farmer-Fulani Relations in Northern Ghana

Traditionally, the Fulani inhabit the Sudano-Sahelian region north of Ghana. Since the pre-colonial period, until today, the Fulani traditionally base livelihoods on seasonal transhumance. As a result, during the dry-season, Fulani herdsmen migrate into the southern Guinea Savannah belt, including in Ghana, in search for pasture and water resources for their livestock. However, since the Sahelian droughts of the late 1960s and 1970s, groups of nomadic, transhumant Fulani pastoralists have started settling on a more permanent basis in the greener southern parts of West Africa, including Northern and Central Ghana [20]. As such, there are two broad categories of Fulani pastoralists in Northern Ghana today; nomadic pastoralists who migrate from the Sahelian belt during the dry-season, and return upon the onset of the rains, and sedentary or, semi-nomadic Fulani pastoralist, who have settled in northern Ghana and elsewhere on a more permanent basis. Despite the fact that this group is settled or semi-settled, they generally make low capital investments, due to continued risk of being forced to move as result of conflicts with local farmers. Whilst some of the cattle to which they tend belongs to them, as Tonah [21] notes 'even the richest amongst the Fulani have been given cattle by the indigenous population to manage' [21]. Much of the work on and/or thinking about Fulani pastoralists in northern Ghana conflates different types of Fulani livelihoods into one category. This leads to ineffective and/or inappropriate policy options. For instance, after mentioning an overall increase in cattle, Ghana's Third National Communication to the UNFCCC states: 'Socially, the insufficiency of rangelands has also led to the creation of friction between the Fulani herdsman and food crop farmers in the country. Unfortunately, overgrazing leads to desertification, while especially large ruminants are sources of methane emission' [22]. Whilst the second part of this statement berates pastoralism as a driver of degradation and climate change, it ignores the importance of Fulani pastoralists for livestock assets owned by local cattle owners.

When the influx of permanent Fulani settlers started in northern Ghana in the 1960s and 1970s, they were generally allowed to settle on the outskirts of existing farming communities, usually on the condition that they took care of locally-owned cattle [23]. Once the Fulani households settled, they assisted their family and friends in also settling in the area [21,24,25]. Cooperation and economic exchanges developed, and Fulani pastoralists utilized their superior herding skills to benefit both of the groups [21]. Local livestock owners contracted the settled Fulani, who took their livestock to more distant pastures for long periods during the dry-season. The Fulani obtained milk from the animals, while Ghanaian livestock owners focused on farming. While the Fulani were required to take care of Ghanaian livestock in exchange for settlement, they were also able to build up their own herds through interbreeding [24].

During the Sahelian droughts of the 1960s and 1970s, when larger numbers of Fulani came to settle in Ghana, conflicts became more widespread, and broader farmer-Fulani relationships began to deteriorate. Local farmers and stockowners accused Fulani pastoralists of being responsible for the increasing prevalence of cross-border stock rustling, and therefore began retrieving stock placed under Fulani care [26,27]. Numerous conflicts also arose from the alleged destruction of crops by cattle, and the destruction of economic trees, such as Shea and Dawadawa trees. Population growth, deteriorating environmental conditions, and increasingly extensive farming practices, increased competition over natural resources [28,29]. When conflicts continued and intensified during the late 1970s and 1980s, the Ghanaian government developed an increasingly hostile approach towards Fulani pastoralists, resulting in infamous militarized, anti-Fulani operations in the 1980s, such as 'Operation Cowleg' and 'Operation Livestock Solidarity'. During these operations, the military and police were ordered to expel Fulani pastoralists from Ghana, including from northern Ghana, as well as seize their cattle.

Despite the aggressive stance towards Fulani pastoralists, the policy of expulsion was difficult to enforce. A sizeable proportion of livestock under Fulani care belonged to Ghanaian stockowners, including chiefs, who continued to employ Fulani to manage their animals. To some extent, the measures were counter-productive because the Fulani pastoralists that herded cattle that were

owned by Ghanaians were allowed to stay. As a result, many Fulani pastoralists sought partnerships with Ghanaian stockowners to secure their stay [24]. Some of these stockowners were also local authorities, which made their role highly ambiguous, whilst adopting a strong rhetoric in favour of expelling Fulani they had also incentives to allow their stay.

During the 1990s, large numbers of Fulani pastoralists continued to settle in northern Ghanaian. As there were more official restrictions on settlement, they sought agreements with the customary landlords (Tindana) and local chiefs. Permission was given to those who agreed to leave the area in the event that a conflict arose with local farmers. New Fulani settlers also agreed not use land that was acquired from the customary authorities for farming until after an initial period of “acclimatization and good behavior” [30]. Simultaneously, the cattle-numbers in Northern Ghana grew and competition for grazing areas intensified. As a result, anti-Fulani sentiments re-emerged, and Fulani pastoralists came to be widely accused of involvement in cross-border stock rustling, cattle theft, as well as unrelated crimes, such as the rape of women and armed robbery, further deteriorating the farmer-Fulani pastoralist relations [24,31,32].

6. Farmer-Fulani Relations in the IWAD Landscape

Since the chief of Yagaba, the district capital of the Mamprugu-Moagduri district, and the operational base of IWAD, has granted the land concession to IWAD, he appears to have come under pressure from the local youth associations who feel that a land shortage has emerged as a result, and that they have not directly benefitted from IWAD operations [33]. Whilst there are indications of broad-based, economic developments relating to IWAD’s arrival, including connection to the electricity grid, a new bank, a new hotel, a new school, and a new police station, there appears to be some dissatisfaction amongst youth regarding individual gains made as a result of IWADs operations. As a result, the chief, who is seen as having condoned and facilitated IWADs arrival in Yagaba (and personally gained the most), is not well positioned to control encroaching farms or urban expansion eastwards towards the land concession, some of which might be seen as a way of voicing dissatisfaction with the chief. The chief is also responsible for approving the settlement of Fulani families who wish to settle in Yagaba. He has recently allowed Fulani (2 separate settlements) to settle within disputed part of the land concession. Furthermore, whilst the northern, eastern and most of the southern perimeter of the IWAD land concession has been fenced, a land dispute with the Yagaba chief about the exact location of the western perimeter of the land concession, has delayed efforts to fence the concession fully. This appears to be an effort by the chief to push back on contrast with IWAD, in order to appease dissatisfied youth in the community. This appears to be a strategic part of ongoing negotiations about the precise location of the western perimeter of the land concession, thereby relieving pressure from local youth associations.

These dynamics result in the erosion of the Yagaba chief’s authority in two fundamental ways. Firstly, whilst people are reluctant to speak openly regarding their feelings towards IWAD operations, it appears that the land concession, and IWAD operations, is not broadly regarded as representing the interests of the community. This appears to have been a problem of expectation management, with the chief having made financial promises to the community upon granting the land concessions, promises in which the residents of Yagaba do not feel have materialized [34]. Secondly, his function as a conflict resolution mechanism is particularly undermined in the instances of cattle destroying crops. Because it is widely known that much of the cattle belongs to him, and he is responsible for allowing the Fulani to settle (in part to tend to his own cattle), farmers feel that in cases of conflict between farmers and Fulani pastoralists, he tends to rule in favor of Fulani. As a result, this mechanism (for conflict resolution) therefore breaks down, and farmers interviewed for this study, by and large, do not take cases of crop damage to the chief. This is true elsewhere in northern Ghana, but certainly also in Yagaba, where hostilities towards the chief as a result of granting the land concession, exacerbate this effect. Because the chief is largely regarded as not acting in the interests of the people of Yagaba, especially in matters pertaining to farmer-Fulani conflicts, violence against

Fulani is vigilante in the event of cattle destroying crops. Fulani interviewed for this study noted that violence against them was frequent. They noted that only a few days before the commencement of fieldwork for this study, a Fulani boy had been killed by a number of farmers from a nearby settlement after cattle passed close to a farm of one of the farmers (Interviews, Fulani, March 2017). According to IWAD management staff, in the months since the fieldwork period (between March 2017 and August 2017), another Fulani herder is said to have been killed in the Mumprugu-Moagduri district also as a result of incidents relating to crop damage [33]. During a second fieldwork period in August 2017, a number of Fulani settlements that had been visited during the first fieldwork period had been abandoned, and huts burned. According to nearby Fulani settlement, those residents had been chased away by farmers, and their huts burned, although it was difficult to verify this account [35]. Such incidents are not widely reported, and no database is kept on such incidents, including when deaths occur. IWAD experiences almost daily incidents of cattle destroying harvests within the land concession, many of them occurring on Pivot 2, with Fulani entering the land concession through the unfenced south-western corner (see Figure 4). This not only increase security costs, but also undermines profits through the destruction of saleable crops.

The IWAD land concession is said to have been unsettled land prior to the IWAD's arrival in Yagaba. According to local Fulani pastoralists, however, this is untrue; whilst no 'locals' had houses on the land, and the land was largely unfarmed, there were a number of Fulani settlements located in what is now the land concession [35]. Whilst IWAD played no direct role in relocating the Fulani settlements, the chief of Yagaba appears to have resettled them for the purpose of granting the land concession. The Fulani, some of whom have been settled within the IWAD landscape for more than two decades, were relocated to a new site several kilometers to the north of Kulpawn River (with the IWAD land concession located to the south of the river. Fulani interviewed for this study indicate that at times cattle 'stray' onto the land concession because those cattle originally resided upon the area that is now concession land (since they have been settled to the north of the river, the only water source during the dry-season there is no obvious reason for the cattle to cross the river and the IWAD land concession is to the south of the river, where the IWAD land concession is located). The cattle, they note, find their way there, 'because they know that area'. Fulani complained that an increasing number of farmers are establishing farms to the north of the Kulpawn River, including a Member of Parliament (MP), leading to an increase in the frequency of incidents of crop damage and conflicts. Fulani complain that it is increasingly difficult for them to find pasture and water for their cattle, and attribute much of that to IWAD.

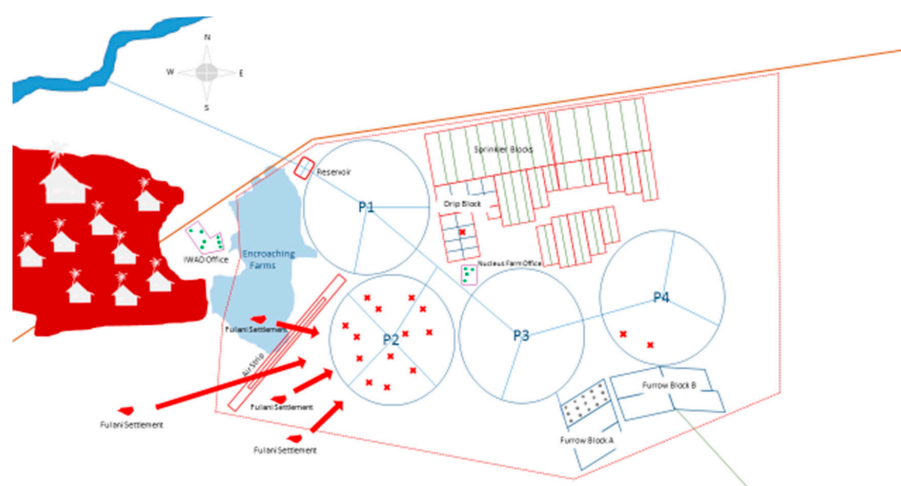


Figure 4. The Integrated Water and Agricultural Development (IWAD) land concession showing incidents of cattle on the land concession between 20 March 2017 and 5 May 2017.

Many of the incidents in which cattle enter the IWAD land concession during the dry-season and destroy crops, are entering the land concession from the south. Fulani note that this happens as they are trying to access the Kulpawn River to the north, to allow the cattle to drink. Since Yagaba has expanded eastwards, there is no corridor for them to get to the river in the area between the land concession and Yagaba's 'built-up' area. Whilst there are a number of alternative man-made water sources to the south of the concession land during the rainy-season (dugouts and dams), during the dry-season, the Kulpawn river serves as the only source of water, and the places at which cattle can access the water (due to steep banks), are limited to a few, including at the IWAD pump house, from which a pipe carries water to the concession land for irrigation. Some of this is supported by an apparent drop-off of incidents in the period immediately after rain (see Figure 5). Fulani settled to the south of the IWAD land concession regard difficulty in accessing the Kulpawn River during the dry-season as one of the major negative impacts of IWAD's presence in the region.

Despite this, they attribute the problems of increasing congestion to the uncoordinated manner in which land use shifts have occurred in order to make place for the IWAD land concession, including the expansion of Yagaba township eastwards. The Fulani, both in the FGD, as well as in interviews, appear less hostile towards IWAD than Yagaba's youth associations. IWAD is currently assessing the potential for a cattle route over the airstrip, through the western corridor of the land concession, connecting to the Kulpawn River. This has been proposed to the chief of Yagaba as a way of settling the dispute regarding the western perimeter. It is hoped that such a corridor would also prevent the increasing encroachment of the Yagaba settlement.

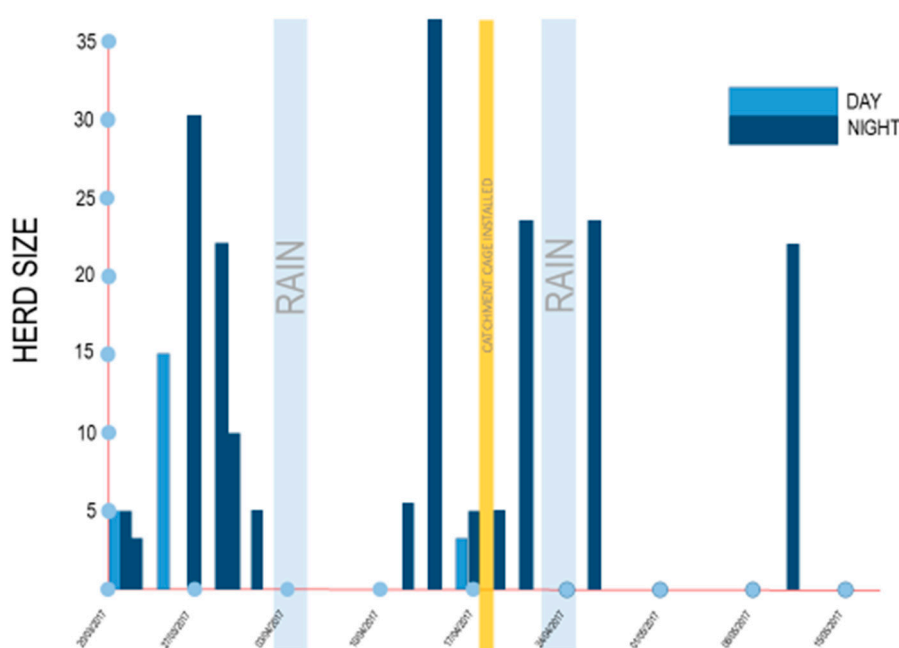


Figure 5. Incidents of cattle entering IWAD land concessions between 20 March 2017 and 5 May 2017 [36].

In terms of the out-grower (The out-growers operation refers to the promotion of rainy-season, conservation agricultural practices, outside of the concession, in contrast to in-growers operations, in which local farmers claim a land parcels within the land concession for irrigated, dry-season farming purposes) operation in communities surrounding the land concession, whilst no baselines exist for incidents in which Fulani cattle destroy crops, both farmers and Fulani indicate that there are increases in the number of incidents [35,37]. Furthermore, farmers noted that the size of the area that they put under cultivation depends largely on the success of the previous period [38]. Farmers noted that since CA methods have increased yields, they have more money available for inputs and services,

and will increase the area of land which they put under cultivation [38]. Most FDG participants indicated that they had already expanded farms to make use of unfarmed, bushland. The farmers noted that many communities' members were also using the new market that had emerged at Yagaba, not far from their village (7 km to the north), to generate income through trade. Profits from petty trading, the farmers noted, were often also used to invest in farming larger tracts of land. Furthermore, the introduction of early yielding maize varieties has encouraged some farmers to attempt two harvests in one rainy-season, starting planting earlier in the rainy season (in fact at the end of the dry-season), and completing their second harvests later in the rainy-season.

Fulani pastoralists recognize that cattle they tend to, or they themselves own, stray onto farms and destroy crops. They suggest that pasture is becoming scarce, because the area under crop cultivation, including the IWAD land concession, continues to increase. When asked why the area under cultivation is increasing, Fulani interviewed for the purposes of this study note that modern agricultural inputs and practices allow people to farm increasing large areas [35]. The hoe, they note, has been replaced by the tractor, and manual weeding, has been replaced by weedicide. Finally, Fulani FDG participants noted, that the increasing drive to farm along riverbanks, facilitated by water pumps and irrigation, has resulted in difficulties in access drinking water for cattle.

7. Identifying Drivers of Farmer-Fulani Conflict: Adopting a (Social) Landscape Lens

Whilst there is the tendency to regard incidents of cattle destroying crops as issues of scarcity and/or a coincidence of geography, a broader landscape approach reveals more structural drivers of farmer-Fulani pastoralist conflict.

The cash transactions which occur directly between a private actor and a local chief are likely to have a series of important implications. The authority of chiefs in northern Ghana rests in the first instance on the power of chiefs to allocate land, as custodians of land. In the second instance, chiefly authority is legitimized by large herds of cattle, as both indicators of wealth, and as a savings account in the event of emergencies. Whilst these are seen ordinarily as manifestations of chieftaincy, they are, simultaneously, symbols that legitimize chiefly authority. As a result, a chief who 'sells' a portion of land (and thereby loses some of his legitimacy), may use some of the proceeds to increase herd size. A direct transaction from an external actor, such as IWAD, to a chief (or indeed other customary authorities or land-owning families) is likely to increase the amount of cattle within the landscape. Whilst the amount of the cash transaction between IWAD and the local chief is undisclosed, it is certainly several thousand dollars, which serves as a significant cash injection in the Mamprugu-Moagduri district, where the 'Incidence of Poverty' (Poverty Line = Ghc1314 (the equivalent of about \$1 a day at time of writing) is 71.2% [1], amongst the highest in the country. Whilst this dynamic (trading land for cattle) is particularly true of chiefs and other customary authorities, it is also the case more broadly that as the amount of money in circulation increases in rural localities, so does the number of cattle. In discussions with IWAD staff, they estimate that IWAD pays about Ghc50,000 (approximately \$10,000 at the time of writing) in wages to laborers who were working on the Nucleus Farm (and living in Yagaba). The total wage bill for non-management IWAD staff is another Ghc50,000, who also live in Yagaba, and spend their wages in there.

It is difficult to accurately capture the correlation between an increase in money in circulation and local herd sizes because income is certainly not the only variable driving local herd sizes. For example, local herd sizes are also likely to be correlated to the availability of water sources, cultural factors, such whether or not bride prices are paid in cattle (this is not true for all ethnic groups in Ghana), population density, and income inequality, to name a few. More research is required to quantify the contribution of increased incomes to increases in local herd sizes. Unfortunately, time-series data, comparing increases in wealth and increases in number of cattle person, is not available. Furthermore, income increases may be so localized (such as in the case of Yagaba, which is only one of 20 large communities in the Mamprugu-Moagduri district) that they are unlikely to show up on district level data. Despite this, livestock ownership is generally accepted as a proxy for a household's wealth.

Laube [39] notes of Ghana, for instance, ‘the wealth of a household is usually measured in the number of cattle a household own’ [39]. Furthermore, the Ghana Statistical Service (GSS) uses cattle ownership as an indicator in developing composite wealth indicators [40], as too have many previous quantitative studies seeking to stratify community-level groups by wealth [41]. Thus, whilst it is difficult to be precise about to what extent cash injections drive local herd sizes, it can be assumed with some confidence that increases in income (or in cash in circulation in a locality) will result in an increase in the total number of cattle within a locality (regardless of the distribution of those cattle across households). Furthermore, where the total number of cattle increases, we expect to see a larger Fulani population present, since increases in herd sizes draws in Fulani seeking work as contract herders. Whilst there may well be other drivers of the number of Fulani settlements (such as availability and access to water and pasture), the number of Fulani settlements is also a function of the number cattle in a locality (and therefore the potential for employment). In this regard, Maria del Pozo Garcia notes that there are 25 Fulani families residing in Yagaba. None of the other seven communities within the district surveyed by del Pozo Garcia have more than five Fulani families residing in, or around, the communities [42]. Furthermore, of the 25 Fulani families residing in Yagaba, more than half have settled in Yagaba in the last five years, since IWAD began operations [42], each of which has been given permission to settle by the chief, in return for contract herding services (for his cattle, or other local elites). Furthermore, Fulani bring some of their own cattle; whilst the portion of self-owned cattle versus cattle tended to for local cattle owners varies significantly per Fulani household, all Fulani interviewed for this study came to Yagaba owning at least some cattle.

A second related dynamic has to do with area under cultivation. As with cattle, despite some drawbacks, farm sizes are regularly used as an indicator for wealth in northern Ghana. Furthermore, farmers interviewed for this study indicate a correlation between yield in one year and the area under cultivation in the next [43]. More specifically, farmers indicate that some of the income generated through a successful farming season will be used to increase area under cultivation in the following year. As a result, successful out-growers schemes which seek to provide farmers with improved seed, fertilizer and pesticide, as well as improved agricultural practices (sewing, watering, harvesting, etc.) not only increase yields, in doing so, on an inter-seasonal basis, contribute to increasing the total area under crop cultivation.

The simultaneous increases in the number of cattle and the expansion of land under crop cultivation, both of which, as we have argued, are significantly influenced by large foreign investments, is likely to exacerbate conflicts between farmers and Fulani pastoralists as the amount of pasture reduces (in favor of farmland), and the probability of Fulani controlled cattle destroying harvests therefore increasing. This total dynamic is illustrated in Figure 3 above. It presents an evolution of how agricultural investments focused on crop farming unfold in African dryland landscapes. In Step 1, prior to the intervention, land is distributed amongst a number of uses, namely, farmland, land for pasture, and land for settlement. This is not to say that no conflicts occur, but simply to define a point of departure in terms of land use within a landscape. In Step 2, a land concession is acquired, and the amount of land available for both crop farming and cattle rearing decreases (directly as a result of the land concession). This coupled with an increase in the supply of money injected into the local economy through direct cash transfers to chiefs and other high-ranking persons (for the land concession), as well as a series of spill overs, such as demand for hotels, banks, bars, and police stations, provides remunerative opportunities for local residents and pulls in others from elsewhere. What follows is illustrated in Step 3; the size of the land for settlement expands as more people come to settle in order to exploit new remunerative opportunities. New residents also seek land for farming, which causes a linear increase in the area under crop cultivation. Money transferred to chiefs for the transaction, as well as that generated as a result of spillovers, increases relative wealth. This increases local herd sizes and people use a part of their newly acquired wealth to purchase cattle. This in turn, draws in Fulani in search of employment as contract herders. Farmers engaged as out-growers, as result of access to improved agricultural technologies and practices, increase yields and income and

expand the area under cultivation on an inter-seasonal basis. The increased competition over natural resource use, coupled with existing momentums of conflict between farmers and Fulani pastoralists, is likely to exacerbate conflict, or indeed, increase the risk thereof (see

The analysis presented here goes beyond the suggestion that an increase in area under crop cultivation reduces the natural resource that are available for pastoral livelihoods, such as pasture and/or access to water. Instead, it suggests that agricultural investments that either directly increase money in circulation, or indeed agricultural programming that raises the aggregate incomes, not only initiate an expansion of agricultural (crop-based) activity, but simultaneously increase the number of locally owned cattle. This, in turn, draws in Fulani in search of work as contract herders. In this way, there is an inevitability of heightened competition between sedentary and pastoral livelihoods over natural resources and, in turn, under existing conditions, an increase in the likelihood of conflict. The analysis further argues that these dynamics undermine chiefs as mechanisms for the resolution of conflict, resulting in a greater likelihood that especially violence against Fulani by farmers takes on a vigilante nature (in contrast to conflicts between farmers, for instance, where the chief continues to be impartial, and an effective authority for resolving conflict). By implication, whilst this type of scenario rests on a number of assumptions that require further research to validate, it seems clear that unless Fulani and the cattle they either own themselves, or care for on behalf of local cattle owners, are mainstreamed within large-scale, land-based agricultural investments and operations, there is an inevitability of an increase in farmer-pastoralist conflicts in landscapes where such investments manifest. Importantly, as previous political-ecology studies of resource conflicts have shown, a diminishing per capital resource base alone cannot explain an increase in conflict between farmers and Fulani [43,44]. However, this dynamic, coupled with a history of conflict over natural resource use, as is symptomatic of farmer-Fulani relations in northern Ghana, provides the conditions through which rapidly changing natural resource management structures (in the context of competing claims), may exacerbate conflicts and/or increase the risk thereof. Figure 6).

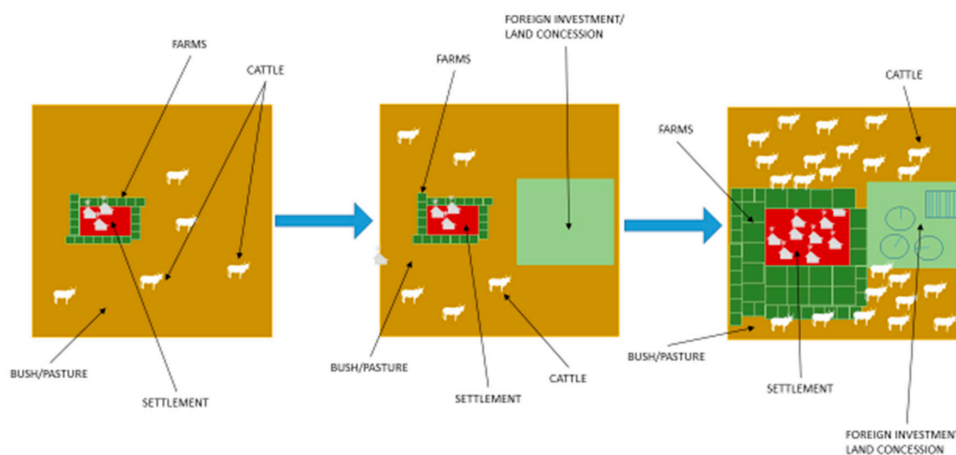


Figure 6. Representation of the evolution of dryland landscapes in which agricultural investments have been made.

8. Discussion

As this article has illustrated, increases in local herd sizes (and Fulani in search of work), not only undermine the legitimacy local governance institutions, but also undermines agricultural business itself, by increasing security costs (including costs associated with fencing), as well as, through the destruction of valuable crops by cattle.

If one zooms out and extrapolates Fulani marginalization in order to consider the consequences of the systematic, widespread, and sustained exclusion of Fulani livelihoods from larger development frameworks and trajectories, there are real, albeit perhaps not immediate, threats to security in northern

Ghana. The Broker, a reputable knowledge broker between academia and the wider policy arena, reported in a recent article entitled 'Africa's pastoralists: A new battleground for terrorism', a strategic shift in the operation of radical Islamic organisations in the Sahelian region to target marginalized, Muslim Fulani [11]. Of one such organisation, they note that 'what makes (the newly formed) Front de Libération du Macina (FLM) different is the attempt to rally nomadic Fulani herdsmen to its cause' [45]. Furthermore, Andrew MacGregor's recently published article in West Point's, CTC Sentinel argues that, 'At a time when resources such as land and water are diminishing in the Sahel, semi-nomadic Muslim herders of the widespread Fulani ethnic group are increasingly turning to violence against settled Christian communities to preserve their herds and their way of life . . . What is primarily an economic struggle has already taken on an ethnic and religious character in Mali. If Nigeria follows the same path, it is possible that a new civil war could erupt with devastating consequences for all of West Africa' [10]. According to other sources, there appears to be a strategic relationship between Boko Haram and the Nigerian-based Fulanis [45], and whilst Burkina Faso has been a target of terrorist attacks, the organisations committing the attacks were not 'home-grown'. However, there is reportedly a new home-grown, radical organisation lead by a Fulani Malam (Malam Ibrahim Dicko), which 'seeks to re-establish the ancient Fulani kingdom with recourse to radical Islamic discourses' [46]. Ghana does not share many of the vulnerabilities of its neighbours; it is not marked by religious violence, as in Nigeria; it is not torn apart by warring factions, as has been the hallmark of contemporary Mali; and neither does it fundamentally lack political stability, as in the case of Burkina Faso. Despite this, and whilst more accurately linking exclusion to radicalisation in West Africa goes well beyond the scope of this paper, it is not unthinkable that a systemic, widespread, and sustained exclusion of Fulani from development processes in northern Ghana might not have consequences in this direction in the medium or long term, and it is certainly not irrelevant to consider such consequences in present agricultural programming as it is unfolding in northern Ghana. Both semi-settled, contracted Fulani, as well as nomadic, transhumance Fulani might become exposed to this threat.

9. Conclusions

Whilst a substantive body of research focusses upon better understanding the conditions under which farmer/Fulani conflicts unfold, few have focused upon agricultural policy and programming as a driver of such conflicts. The article has several aims. Firstly, the article serves as an attempt to illustrate how agricultural, land-based private sector investments can be better assessed against more traditional development criteria. We have done so by applying a wider landscape view, and by applying a social lens. Through this type of approach, we have attempted to demonstrate that the ripple effect created by large-scale private investments in cash-poor regions are integral in assessing the development impact of such operations. Such spillovers may be positive, or indeed negative. Secondly, the article hopes to contribute to a wider literature on farmer-Fulani pastoralist relations. Whilst policy interest in conflict between farmers and Fulani Pastoralists ebbs and flows, the current emphasis on security and migration provides a new impetus for the policy relevance of farmer-pastoralist relations, perhaps especially in West Africa. In this regard intuitively, the more land and water employed for farming, the less land available for other livelihoods, including pastoral livelihoods, this article further unpacks this dynamic. The article demonstrates that increases in the area under crop-cultivation, either as a result of the acquisition of a land concession or, indirectly, inter-seasonally, as a result of increases in yields of out-growers, does not occur in a vacuum. Instead, the consequences have spillovers in terms of heightening competition over natural resources, and ultimately, conflict and/or the risk thereof. This happens since successful agricultural programming does not simply result in farmland replacing 'bushland' or pasture, but since if the programming is successful in increasing income, and the local supply of money, it results not only in the expansion of farmland (as farmers are able to purchase more inputs and pay for services, such as renting tractors for ploughing land), but also in an increase in the number of locally owned cattle. This happens because some of the newly-acquired wealth is also

used to purchase cattle. This, in turn, draws in Fulani in search of work as contract herders, but who are likely to bring in some cattle of their own. In this event, the landscape becomes characterized by a simultaneous increase in both area used for crop farming, as well as a demand for pasture for cattle. In Yagaba, the locality in which IWAD operates, a new market has emerged, and people travel significant distances to trade at the market. The new market is both as an indication of new wealth, as well as raising incomes. Such developments draw in new residents, expanding the area for settlement, which further increases competition between land uses and associated livelihoods. What emerges is not simply a zero-sum game, where farmer livelihoods win at the expense of Fulani pastoralist livelihoods. The undermining of chiefly authority, mistrust within communities, difficulty on the part of Fulani pastoralists to access pasture and water, increased conflict and violence between farmers and pastoralists, and finally, increased risks to IWADs operations as cattle enter the land concession and destroy crops, suggest instead that all of the stakeholders lose, albeit to different degrees. As a result, there is an urgent need to systemize and institutionalize conflict-sensitive agricultural policy and programming by designing and implementing agricultural models that explicitly seek to better synergize sedentary farming and pastoralist livelihoods in northern Ghana, and elsewhere in the West African drylands.

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