

Socio-economic impact of biofuel feedstock production on local livelihoods in Ghana

Acheampong, Emmanuel¹

&

Campion, Benjamin Betey²

Abstract

*The production of liquid biofuels has become an issue of concern in many developing countries, due mainly to the establishment of large-scale biofuel feedstock plantations. These plantations present potential socio-economic benefits, particularly in terms of agricultural employment, as well as risks. The spread of large-scale commercial production of biofuel crops in Ghana has raised concerns from civil society organizations, local communities and other parties. This paper draws on studies that have been conducted in Ghana to assess the socio-economic impact of large-scale production of biofuel crops, especially *Jatropha*, on the livelihoods of local communities and people in Ghana, focusing on land grabbing and alienation, impact on food production and security, and impact on employment and income generation. Even though the biofuel industry in Ghana is still in its early stages of development, the paper reveals that commercial biofuel production impacts significantly on the livelihoods of local people.*

Keywords: Biofuel feedstock plantations; *Jatropha curcas*; land grabbing; local livelihoods; Ghana.

¹ Emmanuel Acheampong is a senior lecturer in the Kwame Nkrumah University of Science and Technology (KNUST). His interests focus on natural resource governance, environmental policy, rural livelihoods and natural resource economics.

² Benjamin Betey Campion is a lecturer in the Kwame Nkrumah University of Science Technology (KNUST). The main areas of his research in the last 5 years have been in land resources management and urban ecology.

Introduction

In recent years there has been increasing interest in biofuels¹ as the 'green' and golden solution to the energy and ecological problems facing the world. Biofuels have rapidly emerged as a major issue for agricultural development, energy policy, and natural resource management. The growing demand for biofuels is being driven by recent high oil prices, energy security concerns, and global climate change (Sulle and Nelson, 2009). The use and development of alternative sources of energy is increasingly encouraged in Western countries, with private and public sources of financial support for biofuel development expanding substantially. Consequently, many European and American governments, international financial institutions such as the World Bank and multinational agribusiness, oil and transport companies are promoting the cultivation of biofuel crops as a solution to the world's energy needs (Bassey, 2009).

In Africa, there is growing interest from foreign private investors in establishing biofuel projects, as well as growing support from bilateral and multilateral donors for incorporating biofuels into government policies and development plans (Sulle and Nelson, 2009). Biofuels are presented as a sustainable source of higher income for farmers in Africa and the business is touted as a ready avenue for employment opportunities for youths. Energy-hungry and importing countries of the North and their agribusiness partners claim that Africa has so much unused land which they characterize as marginal lands that can be put to better use to save the world from an energy crunch. Indeed, the UN estimates that Africa has at least 500 million hectares of marginal, unused and underused land and that the Democratic Republic of Congo alone is believed to have around 150 million hectares (Dynes, 2008). Without any evidence of rigorous science, it is proposed that Africa's marginal lands should be turned into *Jatropha* plantations to save the world from an energy crisis (Bassey, 2009).

In Ghana, there was literally a scramble for land between 2004 and 2010 by multinationals and local companies in partnership with foreigners for the cultivation of the *Jatropha* plant to produce biodiesel (Dogbevi, 2009). Several companies from various countries acquired land during this period and started cultivation of *Jatropha* for the production of biodiesel, mostly for export. Even though biofuel production has the potential to provide a new source of agricultural income in rural areas, and a source of improvements in local infrastructure and broader development, the current land grab by corporations for the large-scale and export-driven expansion of biofuel production has ominous implications for local livelihoods in Ghana. The spread of large scale biofuel crops in Ghana has raised concerns from civil society organizations, local communities and other parties. This paper draws on studies conducted in Ghana to assess the impact of large-scale production of biofuel crops, especially *Jatropha*, on the livelihoods of local communities and people in Ghana. The focus is on large-scale

¹ Biofuels are broadly defined as liquid, solid or gaseous fuels that are predominantly or exclusively produced from biomass. The main types of biofuels include biodiesel, ethanol, or purified biogas derived from crops, plant residues or wastes. All of these can be used as a substitute or supplement for the traditional fossil fuels used for transportation, domestic, and industrial uses (Sulle and Nelson, 2009).

cultivation of biofuel monocultures rather than small-scale, locally produced and owned biofuel activities.

The paper is divided into five main sections. In order to put the impact of biofuel feedstock cultivation in context, the next section presents an overview of rural livelihoods in Ghana. This is followed by a discussion on the state of biofuel investments in Ghana. The subsequent sections present the effects of biofuel crops production on local livelihoods in Ghana, focusing on land grabbing and alienation, impact on food production and security, and impact on employment and income generation. The last section concludes the paper and provides recommendations for making the emerging biofuel industry in Ghana pro-poor.

Overview of rural livelihoods in Ghana

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base (Scoones, 1998; Carney, 1998; Chambers and Conway, 1992). In particular, the asset dimension is critical to an appreciation of the concept. Assets, in this context, are resources and stores (tangible assets), and claims and access (intangible assets) which a person or household commands and can use towards a livelihood (Chambers and Conway, 1992). Five main assets or forms of capital are accessed by households to build their livelihoods: human, social, natural, financial and physical capital (Scoones, 1998; Farrington *et al.*, 1999). Poor rural people in Ghana are very much dependent on land resources for their livelihood and for all these types of land resources, the rights held by the poor are frequently their most fundamental livelihood asset (DFID, 2002). Thus, land tenure relations in rural communities have a significant effect on agricultural production and how rural people make and sustain their livelihoods.

The agricultural sector is the backbone of the Ghanaian economy, accounting for 34% of gross domestic product (GDP) and employing 55% of the economically active population (World Bank, 2010). Yet, the country is often unable to meet her domestic demand for staple foods such as rice with domestic production. The sector (in the case of both food and cash crops) is dominated by smallholders, who account for almost 90% of landholdings and approximately 80% of agricultural output (Chamberlin, 2008). Rural livelihoods in Northern Ghana is particularly fragile. Nyari (2008) reports that agriculture accounts for more than 90% of household incomes and employs more than 70% of the population in the area. He asserts that most of the agricultural production is by small-holders at subsistence level, reliant on seasonal rainfall which is unpredictable and sporadic. Erratic rainfall and occasional floods results in frequent crop failures which are having a serious impact on the livelihood of the majority of the population in Northern Ghana. With limited formal sector employment and very few private companies, the bulk of the population of the northern sector has no alternative sources of income, apart from their meagre farm produce. These circumstances make rural Ghana, and the Northern Region in particular, vulnerable to large-scale biofuel plantation development.

Status of biofuel investments in Ghana

Estimates of the state of biofuel developments in Ghana are mixed. In a study on the potential impact of large-scale land acquisitions, particularly, for biofuel feedstock expansion in Ghana, Schoneveld *et al.* (2010) identified a total of seventeen commercial biofuel developments in Ghana (names of companies not mentioned). Fifteen of the seventeen companies are reported to be foreign-owned and/or financed by the Ghanaian Diaspora, with all but one adopting business models that require large-scale feedstock plantations of more than 1,000 hectares. Also, thirteen of the foreign companies focus primarily on the cultivation of *Jatropha curcas*, one on cassava and another on oil palm and, by August 2009, these companies collectively had access to 1,075,000 hectares of land, 730,000 hectares of which is located in the forest-savannah transition zone of central Ghana's Brong Ahafo and northern Ashanti Regions.

Friends of the Earth (FoE) (2010) also identified seven biofuel companies operating in Ghana – Agroils, Galten Global Alternative Energy, Gold Star Farms, Jatropha Africa, Biofuel Africa, ScanFuel (now ScanFarm) and Kimminic Corporation. FoE asserts that these companies have grabbed a total of 779,000 hectares of land, equivalent to about 37 percent of Ghana's cropland, and are all engaged in industrial-scale plantation of *Jatropha*.

A more recent study on the socioeconomic implications of industrial biofuel plantations in Ghana by Antwi-Bediako *et al.* (2012) identified a total of nine commercial biofuel investments – *Jatropha* Africa, Biofuel Africa, Galten Global Alternative Energy, Kimminic Corporation, ScanFarm, Smart Oil, Integrated Tamale Fruit Company, Savannah Black Farming and Farm Management, and Anuanom Farms. The study found that seven of the companies were engaged in industrial *Jatropha* plantations and collectively controlling an estimated 83,478 hectares of land. Table 1 presents a list of Biofuel Companies operating in Ghana, location of their investments, size of land acquired, and the types of crops being cultivated.

Table 1: Biofuel investments in Ghana

Company	Country of origin	Location of investment in Ghana	Size of land acquired (ha)	Crop type	Operational model
Agroils	Italy	Yeji, Brong Ahafo Region	105,000 *	<i>Jatropha</i>	Industrial scale
<i>Jatropha</i> Africa	UK/Ghana	Kadelso, Brong-Ahafo Region	120,000 *	<i>Jatropha</i>	Industrial scale
Biofuel Africa	Norway	Kpachaa, Northern Region and	27,000 *	<i>Jatropha</i> and food crops	Industrial scale

		Lolito, Volta Region		(maize and groundnut)	
Galten Global Alternative Energy Ltd	Israel	Adidome, Volta Region	100,000 *	Jatropha	Industrial scale
Gold Star Farms	Ghana	Nkawkaw, Eastern Region	14,000 *	Jatropha	Industrial scale
Kimminic Corporation	Canada	Bredie No. 1 and Kobre, Brong-Ahafo Region	13,000 *	Jatropha	Industrial scale
Scanfuel (now ScanFarm)	Norway	Agogo, Ashanti Region	400,000 *	Jatropha and food crops (maize and soybeans)	Industrial scale
Smart Oil	Italy	Yeji, Brong-Ahafo Region	20 **	Jatropha	Test or experimental farm
Integrated Tamale Fruit Company (ITFC)	Ghana	Tamale, Northern region	10 **	Jatropha and Mangoes	Pilot Jatropha plantation; Mango outgrower scheme
Savannah Black Farming and Farm Management	United States	Ahenakom, Brong-Ahafo region	202 **	Jatropha	Industrial scale
Anuanom Farms	Ghana	Old Akrade-Juapong, Eastern Region	405 **	Jatropha	Industrial scale

Source: Compiled from Friends of the Earth (FoE) (2010)* and Antwi-Bediako *et al.* (2012)**

Prior to its introduction as a plantation crop, Jatropha, locally known in Ghana as “nkaneadua”, literally meaning “light tree”, was planted in Ghana as a hedge or fence plant around homes,

gardens and other cropping fields. Studies reveal that oil extracted from it was one of the main sources of fuel for lighting in Ghana before the advent of kerosene (Ahiataku-Togobo, 2008; CICOL, 2009). Now, the Government and private companies are encouraging *Jatropha* cultivation by farmers in Ghana on the premise that *Jatropha* farming (1) serves as a potential source of substantial employment for local people; (2) provides a solution to the long standing poverty of the country as *Jatropha* production will create a source of income for poor rural communities; (3) will decrease Ghana's dependence on fossil fuels, diversify energy supply and increase the country's energy security; and (4) will reduce the threat to the environment associated with the growth of the transport sector since biofuel is said to be a low carbon emitter (CICOL, 2009).

Effects of biofuel feedstock production on local livelihoods

In spite of the much touted positive element of the potential of biofuel plantations to reinvigorate Africa's rural areas through job creation and income generation, there are apprehensions about the negative environmental and social impacts of large-scale commercial biofuel production. Indeed, the 2007/2008 UNDP Human Development Report in its discussion of the situation in Malaysia and Indonesia, which have seen rapid expansion in oil palm plantation development for biofuels, cautioned thus: "the expansion of plantations has come at a high social and environmental price. Large areas of forest land traditionally used by indigenous people have been expropriated and logging companies have often used oil palm plantations as a justification for harvesting timber" (cited in CICOL, 2009: 7).

The rush for biofuels has been largely driven by three main issues: climate-change mitigation, energy security and agricultural development (Sulle and Nelson, 2009). The idea of producing energy from a reproducible source is readily appealing. However, biofuel production relying on large-scale adoption of intensive monoculture practices is almost certain to impact negatively on people and livelihoods. Shifting from fossil fuels to biofuels would exacerbate existing land problems and create particular challenges to food supplies for the poor due to a shift from food cropping to fuel cropping.

In Ghana, studies on the impact of large-scale/commercial production of biofuel crops on local livelihoods are very scarce. Few studies (Schoneveld *et al.*, 2010; Boamah, 2010; German *et al.*, 2010; Land for Life, 2010; CICOL, 2009; Nyari, 2008) attempt to assess the current and potential effect of commercial biofuel production on local communities. Even though the biofuel industry in Ghana is still in its early stages, these studies reveal that commercial biofuel production impacts significantly on the livelihoods of local people in Ghana. As German *et al.*, (2010) put it, "many of the purported ecological and rural livelihood benefits of the biofuel industry have not materialized. Widespread deforestation, the failure of many companies to deliver on promises, heavy reliance by companies on short-term employees, barriers to market entry, and risks borne by out growers have undermined the industry's promise...The losers tend to be customary land users whose livelihoods are undermined by plantation expansion and who face the greatest difficulty in capturing benefits" (German *et al.*, 2010:1).

Land grabbing and alienation

The rural economy of Ghana and many parts of sub-Saharan Africa is largely agrarian. Thus, throughout the region, land is a fundamental issue for economic development, food security and poverty reduction. Land is of crucial importance to the economies and societies of the region, contributing a major share to GDP and employment in most countries, and constituting the main livelihood basis for a large portion of the population (Cotula et al., 2004). Securing rights to land is therefore a central issue in rural parts of Ghana. Loss of rights over customary lands, and the way this negatively impacts local villagers' livelihoods is a major concern for local communities in Ghana. Achieving equitable land access is integral to the protection and enforcement of land rights for marginal groups. Without legally protected right to land, vulnerable low income households are unable to defend land claims. Greater tenure security strengthens income growth and asset status for the poor and ensures resilience of local livelihoods (FAO, 2006).

The most direct and immediate impact of biofuels production on local communities in Ghana relates to land loss. There are conflicts between biofuel investors, traditional authorities and local communities over rights to land. Indeed, several cases of land loss associated with commercial biofuel feedstock production exist in Ghana. For example, Schoneveld *et al.* (2010) report that, in all the biofuel plantations studied in the Brong Ahafo and Ashanti Regions of Ghana, households were required to relinquish landholdings for the purpose of plantation development. Directly affected households at the majority of plantation areas were not consulted by the biofuel company, nor did they formally assent to transferring their land. They maintain that, with the exception of one company that promised to pay approximately US\$ 1 per acre per year to those losing land, no formal compensation measures have been proposed by other companies or by the relevant Traditional Authorities. The high dependency on on-farm activities therefore creates high household vulnerability to external shocks of this kind.

Schoneveld *et al.* (2010) reveal one case in which an area of approximately 800 hectares was claimed by a company for *Jatropha* cultivation (from a 15,000 hectare lease) at the time of their research in July and August 2009. They indicate that an estimated 55% of the land area was formerly under usufruct rights, forming part of a system of shifting cultivation, with the remaining land under secondary forest cover. About 70 households from three communities were involuntarily evicted from their lands following the 2008 growing season without any form of restitution. For two of the villages this equated to between 40 and 50% of households. They report that, on average, nearly 60% of the total landholdings of those households that lost their land were acquired by the company. Only 20 percent of households were able to obtain some replacement land, with most households unsuccessful in recovering both the quantity and quality of land lost to the plantation.

Another study to assess the impact of biofuel plantations in the Kpachaa area in the Northern Region of Ghana by Land for Life (2010) reported that several households lost their land to the Biofuel Africa investment located in the area. The study found that the communities in the area are entirely rural in outlook, with very little non-farm activities. Hence, generally, the

opportunity of households in diversifying their sources of income and employment has largely remained very limited outside farming. As the prospects to earn a livelihood outside farming for these people are limited, they seemed to have over the years invested a large amount of their labour in maintaining their small plots of farmlands, rather than pursue other ventures. Thus, the loss of land to the biofuel investment impacts significantly on the livelihoods of people in this area (Land for Life, 2010).

Bakari Nyari, Vice Chairman of Regional Advisory and Information Network Systems (RAINS), and a member of Ghana and African Biodiversity Network Steering Committee, narrates a story of how a Norwegian biofuel company took advantage of Africa's traditional system of communal land ownership and the current climate and economic pressure to claim and deforest large tracts of land in the Kusawgu area in Northern Ghana with the intention of creating "the largest *Jatropha* plantation in the world". In this area, like most parts of Ghana, over 80 percent of the land is held under communal ownership and more than 70 percent of this land is managed by traditional rulers or chiefs on behalf of the members of their traditional areas. In the affected communities, livelihoods are primarily based on land resources for farming, shea nut collection as well as firewood and charcoal businesses. He reported that "bypassing official development authorization and using methods that hark back to the darkest days of colonialism, this investor claimed legal ownership of these lands by deceiving an illiterate chief to sign away 38,000 hectares of land with his thumbprint" (Nyari, 2008: 1). When the affected community came to realize that the plantation would mean extensive deforestation and the loss of incomes from gathering forest products, such as shea nuts, and that the promised jobs and incomes were unlikely to materialize, they successfully fought to stop the investors but not before 2,600 hectares of land had been deforested. In a community meeting with the Director of Land Acquisition of the biofuel company, one woman lamented:

"Look at all the shea nut trees you have cut down already...the nuts that I collect in a year give me cloth for the year and also a little capital. I can invest my petty income in the form of a ram and sometimes in a good year, I can buy a cow. Now you have destroyed the trees and you are promising me something you do not want to commit yourself to. Where then do you want me to go? What do you want me to do?" (Nyari, 2008: 6).

The response from the Director was to express regret and a promise not to repeat it. This is a clear case of land grabbing and community disempowerment. Such massive land alienations fail to appreciate the importance of land to local communities. For affected communities, it signifies an ominous future where the community's sovereignty, identity and their sense of community is lost because of the fragmentation that the community will suffer.

Similar land grabs are occurring elsewhere in Africa. Millions of hectares are being grabbed with little concern for the poor who are bound to face displacement and for the impact that this will have on family farms and other small-scale farms and food production on the continent. Citing Borger (2008), Bassey (2009) reports that a South Korean firm, Daewoo Logistics, plans to buy a 99-year lease over a million hectares of land in Madagascar for the production of 5 million tonnes of corn a year by 2023, and to use another 120,000 hectares for the production

of palm oil (cf. Klaver and de Roo, 2011). He indicates that the deal is estimated to cost the company about USD\$ 6 billion over 25 years and is acclaimed as the biggest of its kind in the world. He claimed that the land to be parceled off to Daewoo Logistics covers arable land about half the size of Belgium and, for a mostly arid country with three food crises situations in five years, this is a huge challenge indeed. Although the crops are said to be for food, the lesson for land and land rights is the same for biofuels. In Tanzania, there is a proposed plan to cultivate sugarcane on over 400,000 hectares of the Wami Basin by a Swiss Company in which it is estimated that more than 1,000 small scale rice farmers will be displaced (CICOL, 2009). Similarly, in Uganda, plans to clear off half of the Mabira Forest Reserve located at the edge of Lake Victoria was met with strong civil resistance in October 2007 (ibid.). That move would have destroyed the source of livelihood of several thousand households.

Impact on food production and security

Food security is defined in its most basic form as physical and economic access by all people at all times to the food needed for a healthy and active life (Hoddinott, 1999; Nawani, 1994; Maxwell and Frankenberger, 1993; Hoskins, 1990). Although national food security is important in providing a foundation, what is crucial is food security for each and every household, and every family member within it. Thus, household food security is defined as “access to food that is adequate in terms of quality, quantity, safety and cultural acceptability for all household members” (Gillespie and Mason, 1991). The World Bank (1986) also defined household food security as "the ability of households to ensure themselves sustained access to sufficient quantity and quality of food to live healthy and active lives, both now and in the future".

Ewing and Msangi (2009) report that several studies have identified linkages between the usage of feed stocks in biofuel production and international food price increases. These studies indicate that food prices are expected to continue to rise over the next decade in response to biofuel consumption targets adopted in the U.S. and the E.U. They report that despite these indications, some countries, for whom food security and poverty reduction are still an issue, have initiated crop-based biofuel development and set forth national blending targets for energy use within the transportation sector. Bassey (2009) also reports that the United Nation's Food and Agriculture Organization (FAO) advocates an urgent review of agro fuels policies and subsidies in order to preserve the goal of world food security, protect poor farmers, promote broad-based rural development and ensure environmental sustainability. He maintains that the head of the FAO, Jacques Diouf, has clearly warned that the controversial rise in land deals could create a form of 'neo-colonialism', with poor states producing food for the rich (and their machines) at the expense of their own hungry people.

The potential impact of biofuel production on the price of food crops in Ghana is a major concern. The impact of biofuels production on food production and security in Ghana is transmitted mainly through land loss. Schoneveld *et al.* (2010) revealed, through their study on the impact of large-scale land acquisitions for biofuel feedstock expansion in Ghana, that as a result of land loss, households resort to reducing the area they have under cultivation and

increasing cropping intensity – thus shortening the fallow period. Not only do these trends significantly reduce immediate household income levels and food security, but are also likely over time to lead to land degradation and reduced carrying capacity. They assert that while the impacts of the shortened fallow period are not yet manifest, almost three-quarters of households in their case study had already experienced a significant decline in their standard of living. Most of this change was due to a considerable drop in crop yields as fields were cleared for *Jatropha* and minor crops were destroyed, thereby reducing household incomes and availability of food.

Both Ends, a Dutch NGO, commissioned Land for Life, an NGO in Ghana, to undertake a study to provide insight into the environmental and social impact of *Jatropha* feedstock plantations on the local economy of the Northern Region of Ghana. The research team conducted field visits to the established farms of Biofuel Africa Ltd, a Norwegian biofuel company, between April and May 2010, and carried out a series of meetings with relevant stakeholders in the Kpachaa area in the Northern Region of Ghana. The study found that, even though it is the culture of the people to protect economic trees such as ‘Dawadawa’ (African locust bean, *Parkia biglobosa*) and Sheanut (*Butyrospermum parkii*) during land clearance for farming, the company carried out mass destruction of all trees on land meant for *Jatropha* cultivation. Such trees are a source of food and income and thus their destruction affects the food and livelihood security of the local people (Land for Life, 2010).

In contrast to the above studies that emphasize negative impacts of *Jatropha* plantations on local food security, Boamah (2010) used discourse analysis to assess the food security implications of a *Jatropha* biodiesel project in the Central Gonja and Yendi Districts of Northern Ghana and reported that, contrary to the crisis narratives that express dire food security implications of biofuels, the *Jatropha* project rather improved household food security through wages for plantation workers, improved petty trading, as well as increased food production on an otherwise abandoned farmland. He argues that, the extent of competition between biofuels and food depends on the local conditions and the investment strategy of biofuel investors.

Citing Fischer *et al.* (2009), Boamah (2010) maintains that biofuels are produced under a wide range of systems and conditions, including differences in feedstock used, varying production schemes and management practices, land ownership and land use systems. Whilst some biofuel investments are undertaken on publicly-owned land, others are undertaken on land belonging to village peasants. He asserts that, because of the differences in the above conditions under which biofuels are produced, biofuel investments by different investors with different local conditions and using different feed stocks, may have different implications on food security and livelihoods (*ibid.*: 11-12). Thus, analyses of the effects of biofuels on food security should be situated within specific contexts - the context that takes into consideration local variations in land use patterns, land availability, farming seasons, household composition, the resilience of livelihoods in biofuel producing areas, the strategy of biofuel investors, as well as the biological characteristics of the biofuel feedstock. This is because, these factors determine the

amount of resources diverted from food production to biofuel production which is in turn decisive of the extent of competition between biofuels and food (ibid: 109).

The impact of *Jatropha* feedstock plantations on livelihoods also relates to the contribution of by-products from *Jatropha* processing to food production. The CEO of Anuanom Industrial Bio Products Ltd., a biofuel company in Ghana, reported that the company has developed organic fertilizer from the *Jatropha* which improves the yield of crops fairly well. The organic fertilizers are rich in nitrogen, phosphorus and potassium (NPK). He maintained that these fertilizers, when produced in large quantities and supplied to all farmers, will improve the yield of agricultural crops and improve the agricultural industry's contribution to GDP in the country. This will go a long way to stabilize food prices and inflation, which will eventually affect the stability of the local currency in real terms since part of the foreign revenue earned by the country is consumed by food import (Amoah, *undated*).

Impact on employment and income generation

Large-scale agricultural enterprises can produce numerous benefits to affected communities. One of the most obvious is employment and income generation. As one *Jatropha* company puts it "...the creation of a biofuel industry in developing economies, like Africa, goes far beyond environmental concerns. Jobs are being created, economies are being impacted, infrastructure is being built, services provided, and lives profoundly changed..." (BioFuel Africa, 2008, cited in Boamah, 2010:5).

In a presentation entitled, "*Jatropha*: a catalyst for economic growth in Africa" (Amoah, *undated*), the CEO of Anuanom Industrial Bio Products Ltd. of Ghana described the potential economic and social benefits from *Jatropha* plantations and reported that the harvesting of fruits from the tree is done every month throughout the year and for over the forty years of the fruits bearing life of the tree. He estimated that one able bodied young man or woman will harvest about 1 hectare *Jatropha* farm per month. After harvesting, the dry nuts are sent to the purchasing centre for sale where purchasing clerks will be engaged to do the job. Then the carting of the nuts from the purchasing centres to the processing factory requires massive logistical activities that will involve a lot of labour. The processing factory will also need to engage machine operators and other skilled personnel. After processing the nuts into finished products, they also need to be conveyed to distribution and marketing centers. The value chain job creation is therefore very massive. He reported that, for one million hectare *Jatropha* plantation project, it is estimated that direct employment generation will be over 1 million working people (Amoah, *undated*).

Schoneveld *et al.* (2010) also report that, two large foreign companies involved in *Jatropha* plantations in Ghana estimate that 60 full-time employees will be required per 1,000 hectares under cultivation, representing 0.06 employees per hectare. At the case study plantation, approximately 120 persons (both part time and full time) were employed for an area of approximately 800 hectares (0.15 employees per hectare). However, they stated that as this plantation was still in the labour-intensive land preparation and planting phase, this number

would likely reduce. There is therefore significant risk that many employees will lose steady employment once trees mature and expansion ceases. They claimed that this had already occurred at one *Jatropha* plantation (100 hectares), where the original workforce of approximately 50 reduced to four within four years.

A study undertaken by Civil Society Coalition on Land (CICOL) to examine the social and environmental implications of biofuel plantations (especially *Jatropha*) in Ghana confirmed that the cultivation of biofuel crops has led to the creation of jobs in the communities where they have been started, however, such jobs are merely transient (CICOL, 2009). The study further revealed that livestock keeping has always constituted a major source of employment and livelihood for the people in the northern part of Ghana and has often been an important source of savings for the household. These animals, however, depend heavily on communal pastures and not on privately developed pastures. Thus, allocating the communal lands to companies for *Jatropha* feedstock cultivation restricts their grazing grounds and reduces their household income (CICOL, 2009).

In a study to assess the socioeconomic impact of industrial biofuel plantations in Ghana, Antwi-Bediako *et al.* (2012) found that when the *Jatropha* Africa plantations at Kadelso in the Brong Ahafo Region was in full operation in 2007, an average of 70 workers were employed. The monthly salary for permanent employees was between Gh¢70 and Gh¢90 while casual labourers received a daily wage of Gh¢3. They reported that, as at the time of the study, all the workers had been laid off because the project had come to a standstill. The same study revealed that Biofuel Africa's *Jatropha* plantation at Lolito in the Volta Region, which was established in 2007, also employed about 150 permanent workers including 48 women. Employees who were classified as managers were paid a monthly salary of Gh¢500, fieldworkers received Gh¢80 while mechanics and machine operators were paid between Gh¢100 and Gh¢200. However, after about a year, the company started making some people casual workers and sacked others until it was left with only 4 workers.

Describing the state of operation of BioFuel Africa in the Kpachaa area in the Northern Region of Ghana, Land for Life (2010) revealed that at its peak of operation, some 350 employees were engaged in all kinds of on-farm and off-farm activities, with at least five of the top workers provided with motorbikes by the company. Some young women were also trained to operate farm machinery. This benefit would have been an on-going programme that workers could take advantage of. However, at the time of their study, the company had only 17 employees made up of a site supervisor who managed the biofuel feedstock plantation, assisted by 16 others who were made up of field workers and operators engaged in the maintenance of the feedstock crop so far established and other farming activities. The farm was reported to be operating at between 18% and 20% of its peak (Land for Life, 2010).

Similarly, Boamah (2010) reported that, even though the *Jatropha* project of Biofuel Africa in northern Ghana created employment in the area, the global economic crunch coupled with negative publications by some interests groups in Ghana led to loss of funding sources for the

project and the subsequent lay-off of almost the entire workers. The sustainability of jobs created by biofuel investments is therefore a key issue.

Conclusions

The foregoing discussion clearly shows that biofuel investments in Ghana have had significant impact on local livelihoods. The case studies that have been reviewed point to the fact that land loss or loss of rights over land is the most direct and immediate impact of biofuel feedstock production on local communities. Several households have lost their land to biofuel investments leading, in some cases, to violent conflicts between biofuel investors, traditional authorities and the local communities. Loss of rights over land has affected households' food production and security as many households have resorted to reducing the area they have under cultivation leading to shortening fallow periods and declining crop yields. A key issue about biofuel-related employment relates to the sustainability of jobs provided by such investments. Many of the jobs that were created by biofuel investments were lost few years after the establishment of the plantations.

Even though the impact of biofuel feedstock production on local livelihoods in Ghana is largely negative, the burgeoning industry could be developed in ways that support local livelihoods in terms of land sovereignty, food security, energy security and overall economic development. The result will, however, depend on the production model employed and the governance conditions that are put in place. Biofuel production can be carried out by smallholder farmers as well as through outgrower or local contracted farmer arrangements. Community cultivation of biofuel crops in the African continent for local use may be a sustainable source of higher income for farmers. Thus, projects that aim at meeting community energy needs appears to have better prospects of bringing positive returns to the communities where they are implemented as has been demonstrated by similar community-focused projects in Mali.

References

- Ahiataku-Togobo, W. (2008). Exploring Sustainable Alternative Sources of Energy in Ghana. Ministry of Energy, Ghana.
- Amoah, O. (*undated*). Jatropha: a catalyst for economic growth in Africa.
http://www.unctad.org/sections/wcmu/docs/ditc_comb_Jatropha001_en.pdf
- Antwi-Bediako, R., Acheampong, E., Campion B. B., Eworyi, S., Timko, J. and Hoogland, M. (2012). Assessing the socio-economic implications of industrial biofuel plantations: Repercussions of *Jatropha curcas* on rural land use alienation and conflict escalation in Ghana. Report submitted to the Netherlands Organization for Scientific Research (NWO).
- Bassey N. (2009). Agrofuels: The corporate plunder of Africa. *Third World Resurgence* No. 223 (Mar 2009).

- Bassey, N. (2008). The Agrofuels Debate in Africa: Challenges and Opportunities. Paper presented at the conference on Ecological Agriculture: Mitigating Climate Change, Providing Food Security and Self-Reliance for Rural Livelihoods in Africa, held at the AU Headquarters, Addis Ababa, 26-28 November 2008.
- BioFuel Africa Ltd. (2008). Survey of the Communities surrounding the Jatropha plantation in the Yendi District. Biofuel Africa, Ghana.
- Boamah, F. (2010). Competition between biofuel and food? The case of a Jatropha biodiesel project and its effects on food security in the affected communities in Northern Ghana. MSc Thesis, University of Bergen, Unpublished.
- Borger, J. (2008). 'Rich countries launch great land grab to safeguard food supply'. The Guardian, London, Saturday November 22, 2008. (Available from <http://www.guardian.co.uk/environment/2008/nov/22/food-biofuels-land-grab>)
- Carney, D. (1998). Sustainable Rural Livelihoods: What Contribution Can We Make? DFID, London.
- Chamberlin, J. (2008). It's a Small World After All: Defining Smallholder Agriculture in Ghana. Discussion Paper 00823. International Food Policy Research Institute, Washington D.C.
- Chambers, R. and Conway, G. (1992). 'Sustainable Rural Livelihoods: Practical concepts for the 21st century'. *IDS Discussion Paper 296*, Brighton: IDS, Pp. 1-15.
- CICOL (Civil Society Coalition on land) (2009). Biofuel cultivation and its implication on rural households, land rights, livelihoods, food security and sustainable natural resource management in Ghana. Final Report, CICOL, Accra.
- Cotula, L., Toulmin, C. and Hesse, C. (2004). Land tenure and administration in Africa: Lessons of experience and emerging issues. International Institute for Environment and Development, London.
- DFID (2002). 'Better Livelihoods for Poor People: The Role of Land Policy', Draft Consultation Document, DFID, London.
- Dogbevi, E. K. (2009). Any lessons for Ghana in India's Jatropha failure? Ghana Business News (GBN), 23 May 2009. (<http://www.ghanabusinessnews.com/2009/05/23/update-any-lessons-for-ghana-in-india's-Jatropha-failure>).
- Dynes, M. (2008). 'Growing Up', *Africa Investor*, Issue 31, March 2008. (http://www.africa-investor.com/article_mag.asp?id=2725&magazineid=23).
- Ewing, M. and Msangi, S. (2009). 'Biofuels production in developing countries: assessing tradeoffs in welfare and food security'. *Environmental Science & Policy*, 12(4):520-528.

- FAO (2006). *Agrarian Reform: Land policies and the Millennium Development Goals: FAO's interventions and lessons learned during the past decade*. FAO, Rome.
- Farrington, J., Carney, D., Ashley, C. and Turton, C. (1999). 'Sustainable Livelihoods in Practice: Early Applications of Concepts in Rural Areas'. *Natural Resources Perspectives*, Number 42, ODI, London.
- Fischer, G., Hizznyik, E., Prieler, S., Shah, M. and Van Velthuis, H. (2009). *Biofuels and food security. A study by OPEC Fund for International Development (OFID) and International Institute for Applied Systems Analysis (IIASA)*.
- Friends of the Earth (FOE) (2010). *Africa: up for grabs. The scale and impact of land grabbing for agrofuels*. Friends of the Earth Europe, Brussels. Available online at www.foeeurope.org
- German, L., Schoneveld, G., Skutch, M., Andriani, R., Obidzinski, K., and Pacheco, P. (2010). *The local social and environmental impacts of biofuel feedstock expansion: A synthesis of case studies from Asia, Africa and Latin America*. CIFOR Infobriefs, No. 34, December 2010.
- Gillespie, S. and Mason, J. (1991). 'Nutrition-Relevant Actions: Some Experience from the Eighties and Lessons for the Nineties', *Nutrition Policy Discussion Paper*, No. 10, ACC/SCN, Geneva.
- Hoddinott, J. (1999). 'Operationalizing Household Food Security in Development Projects: An Introduction', *Technical Guide 1*, International Food Policy Research Institute, Washington D. C. pp 1-19.
- Hoskins, M. (1990). 'The Contributions of Forestry to Food Security', *Unasylva*, 41: 3-13.
- Klaver, D. C. and Roo, de N. (2011) *Good governance of land and natural resources: Balancing local and global interests*. Seminar Report, Centre for Development Innovation, Wageningen University & Research centre.
- Land for Life (2010). *Biofuel biomass crop farm/plantation initiatives in the Northern Region of Ghana*. Report of a study commissioned by BothENDS.
- Maxwell, S. and Frankenberger, T. R. (1993). *Household Food Security: Concepts, Indicators, Measurements. A Technical Review*. United Nations Children's Fund (UNICEF)/International Fund for Agricultural Development (IFAD), New York/Rome.
- Nawani, N. P., (1994). *Indian Experience on Household Food and Nutrition Security*. Regional Expert Consultation, FAO-UN, Bangkok (Thailand), 8-11 August 1994.
- Nyari, B. (2008). *Biofuel land grabbing in Northern Ghana*. (http://www.biofuelwatch.org.uk/files/biofuels_ghana.pdf).

- Sulle, E. and Nelson, F. (2009). *Biofuels, land access and rural livelihoods in Tanzania*, IIED, London.
- Schoneveld, G. C., Laura A. German, L. A. and Nutakor, E. (2010). *Towards Sustainable Biofuel Development: Assessing the Local Impacts of Large-Scale Foreign Land Acquisitions in Ghana*. Paper prepared for the World Bank Land Governance Conference, 26-27 April, 2010.
- Scoones, I. (1998). 'Sustainable Rural Livelihoods: A Framework for Analysis.' *IDS Working Paper 72*, Brighton: IDS, pp. 3-22.
- Shepherd, G., Arnold, M. and Bass, S. (1999). 'Forests and Sustainable Livelihoods: current understandings, emerging issues and their implications for World Bank Forest Policy and funding priorities'. Paper prepared for the World Bank Forest Policy Review (draft for discussion), World Bank, Washington D.C.
- World Bank (1986). *Poverty and Hunger - Issues and Options for Food Security in Developing Countries*, World Bank, Washington D.C.
- World Bank (2010). *World Development Indicators*. Available from <http://go.worldbank.org/6HAYAHG8H0>