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Assessing environmental and social impacts of the oil palm industry in Ghana: A project synthesis

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The oil palm industry has many positive benefits, particularly as a key source of livelihoods for rural dwellers, but it also has negative impacts on the society and environment. For instance, poorly planned oil palm cultivation can increase the rate of natural forest loss, and contribute to unfair labour conditions on plantations and processing mills. It is therefore important for sustainable oil palm project initiators to understand the environmental and social effects of the industry, to be able to design appropriate interventions. Using a survey method, questionnaires were administered to different stakeholders in selected oil palm plantations and processing mills to generate both qualitative and quantitative data for assessing the social and environmental impacts of the industry. The environmental and social impact assessment was done within the framework and guidelines of the Roundtable on Sustainable Palm Oil (RSPO). The assessment also applied a holistic approach by diagnosing the direct, indirect and sector-wide cumulative impacts. It was found that, in most cases, the social and environmental indicators assessed from the respondents do not comply with the guidelines of national legislation and the Ghana interpretation of the RSPO principles. It is prudent for sustainable oil palm projects to provide opportunities for plantation and mills owners and workers to acquire, and share knowledge on the effects of their activities on the society and environment. Project interventions must be formulated to mitigate negative impacts of the activities of production and processing to ensure sustainability of the oil palm industry.

Key words: Environmental, oil palm, mitigation measures, sustainable palm oil, plantations.

INTRODUCTION

Palm oil is profitable for many producers. It also offers livelihoods and provides social amenities for many rural dwellers in developing countries (Tan et al., 2009; Wilcove and Koh, 2010). Oil palm production, processing and distribution have important economic impacts through rural employment creation and poverty reduction (Henson, 2003). The high demand for palm oil and it products have resulted in a rapid expansion of oil palm

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cultivation across the world. Due to the lack of land availability in Southeast Asia, large expansion of the oil palm industry is expected in sub-Saharan Africa, particularly in West-Africa where land with suitable agro-ecological conditions is available (Rhebergen et al., 2016). The oil palm industry in Ghana has developed over the last two decades into an important industry in the agricultural sector of the economy (Kabutey et al., 2013). The industry plays a key role in enhancing the incomes of rural people (GoG, 2010), and especially provides livelihoods for 80% of smallholders. The activities of the industry however contribute also to environmental degradation. Most producers favour the economic gains from the industry over developing sustainable production (Koh, 2008; Basiron, 2007). This has led to environmental degradation, social unrest and water pollution in many oil palm growing areas. Sustainable palm oil production is thus needed if the country is to continue benefiting from the industry. Sustainability of palm oil implies cultivating and processing oil palm in an accepted economic, social and environment manner (Tan et al., 2009). By assessing the environmental and social impacts of oil palm production and processing, this article explores options for minimising the negatives and suggests how to maximise the positive impacts of the industry.

The oil palm industry has become one of the most intensely debated industries in recent times, not only because of its positive benefits but also the negative impacts it causes to society and the environment (Laurance, 2009). For instance, poorly planned oil palm developments can increase the rate of natural forest loss, create social and environmental problems and reduce local peoples' control over land in favour of large corporations (World Bank, 2010). The development of oil palm has caused deforestation, resulting in significant secondary external impacts such as water pollution, soil erosion, and air pollution (Obidzinski et al., 2012). These challenges in the industry must be addressed, but to design interventions that will be sustainable for and beneficial to the actors in the industry, it is important to understand the existing situation and perspectives, so as implement interventions that will provide appropriate solutions (Osei-Amponsah and Visser, 2016). Project designed with an objective to promote the production of sustainable palm oil, must therefore first understand the environmental and social impacts of the oil palm industry, and how best to mitigate them. There is an urgent need for environmental sustainability in the oil palm industry, in terms of producing oil palm fruits and palm oil, and also the capacity to absorb waste products in an environmentally and socially friendly manner. Thus, the environmental and social impact assessment is a laudable approach for decision-making in the oil palm industry (RSPO, 2016), and also enables stakeholders to design and implement sustainable production projects. This article provides insights on the environmental and social impacts of the oil palm industry in Ghana, within the context of the Roundtable on Sustainable Palm Oil (RSPO) guidelines. It also proposes mitigation measures to address the negative impacts to provide options for enhancing productivity and profitability of the oil palm industry.

The RSPO is an international non-profit association that aims to bring together multiple stakeholders to develop and implement strategies regarding the production of sustainable palm oil (RSPO, 2016). The RSPO defines sustainable palm oil production as a legal, economically, viable, environmentally appropriate and socially beneficial management and operations (RSPO, 2016). Within the context of RSPO, sustainability can be realised through the Principles and Criteria applicable to the management of oil palm plantations and mills. Under the RSPO Certification System (RSPO, 2007), there are eight principles that companies must comply with in order to be certified as a sustainable palm oil producer. This article dwells on Principle 7, which focuses on social and environmental impact assessment. The aim of this study is to investigate the nature and approximate scale of important environmental and social impacts of the oil palm industry in Ghana, which would form the basis for a sustainable production project to design appropriate interventions.

The next section presents the method used for the study, followed by the results of the environmental and social assessments. At the end, the conclusions are summarised in a tabular form (Table 2).

METHODOLOGY

A survey was conducted between February and March, 2013 with standard questionnaires addressing all possible environmental, health and safety and social sustainability issues. Sites purposively selected for the study are 33 mills- (3 large, 8 medium) and 17 small-sized Crude Palm Oil (CPO) mills and it associated oil palm plantations, as well as 5 small-scale Palm Kernel Oil (PKO) mills, all in the Ashanti, Eastern, Central and Western regions of Ghana.

The article applied a holistic approach to environmental and social impact assessment by analysing the totality of impacts (direct, indirect and sector-wide cumulative). Attention was also given to the interrelation between environmental, social and socio-economic impacts, and the actual, potential negative as well as positive impacts assessed (Table 1). Several of the themes listed were only surveyed for large and medium-sized mills because they are not relevant for small-sized mills.

The Ghana National Interpretation of the Principles and Criteria of the RSPO was adapted as a basis for assessing sustainability in the industry. The research team also used the value chain approach, by looking at the social and environmental impacts of the different components of the oil palm value chain. The analysis starts with the CPO mills, which are seen as the central unit in the value chain (Figure 1), as well as the different relations these mills have with the suppliers (e.g., outgrower schemes). However, the study does not look at the sustainability issues of the chain elements of transport and trade.

Data were collected through multiple choice questionnaires designed for each category of value chain actor. To the extent

Table 1. Themes applied in the study (Author's Compilation).

CPO/PKO Mills	Oil palm plantations
Environment	
Legal compliance	Biodiversity protection
EIA/EMP and environmental monitoring	Erosion
Waste management	Water pollution
Water use	Fire control
Energy use	Fertilizer use
Water pollution	Pesticide/herbicide use
-	Waste management
Health and safety	
Cleanliness	Cleanliness
Worker's health & safety management	Worker's health & safety management
Worker's health & safety training	Worker's health & safety training
Accident and emergency procedures	Accident and emergency procedures
Use of personal protective equipment	Use of personal protective equipment
Social issues	
Legal compliance	Legal compliance
Social impact assessment	Minimum wage
Minimum wages	Child labour
Housing and restroom facilities	Conflicts over land
Freedom of association	Local employment
Child labour	-
Sexual harassment and violence	-
Communication with workers	-
Communication with communities	-
Complaints and grievances	-
Conflicts over land	-
Local employment	-
	-
Food security	-
General description on how oil palm has influenced food production and food prices in a Region	-

Table 2. Summaries of environmental and social issues in oil palm mills and plantations.

Key issues	Mills				Plantations		
	Large	Medium	Small	PKO	Large	Medium	Small
Effluent discharge							
Organic waste and soil fertility management							
Air pollution/Smoke							
Energy efficiency/Firewood use							
Chemical waste management							
Health and safety awareness and training							
Use of personal protective equipment							
Child labour							
Organisation of workers/Users (association)							
Adequate housing and restroom facilities							
Land conflicts and conflict resolution							

Table 2. Contd.

Legend	Not a priority Moderate priority/Risk High Priority/Risk	

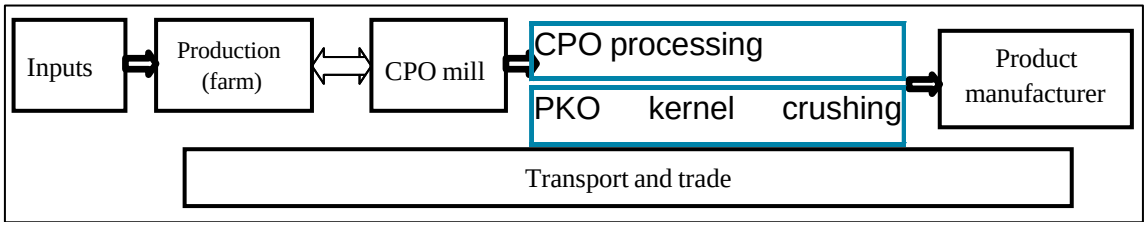

Figure 1. Value-chain model of oil palm (Author's own elaboration).

possible, each issue was given three possible answers which represent poor, medium and good practice. For each question, the enumerators also noted observations or specifics for the interviewee mill or farmer. There were also open questions for several subjects, including practices on the use of organic fertilizer, agro-chemicals, discharge of effluent. The subject of the effect of oil palm mills and plantations on local food security was mainly treated in a qualitative manner. The study also reviewed several national and international reports on environmental and social impact assessment on the oil palm industry.

RESULTS AND DISCUSSION

This section presents the findings of the study within the RSPO framework; it also discusses and proposes mitigation measures for the pertinent issues. The results of the environmental assessment (at mill and farm levels) are first presented, followed by the social impact assessment.

Environmental issues at the mill level

For the indicators of environmental laws and regulations, Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP), the RSPO requirements: Evidence of compliance with relevant legal requirements; a documented system, which includes written information on legal requirements, and a mechanism for ensuring that they are implemented. Within the Ghanaian context, the EIA and EMP require from the industrial actors, a documented environmental impact assessment, an EPA permit and compliance with the permit conditions (according to Environmental Assessment Regulations, LI 1652, 1999). The study found that, among medium and large-scale mills, there was a high awareness of the national environmental laws and regulations. The mills were aware of the existence of the RSPO principles through their interactions with sustainable palm oil projects. It was also evident that efforts are being made to comply with the national environmental laws and regulations, however, often in a non-systematic manner. Among small-scale mills, there was limited awareness, only 27% knew how to comply, the others were either not aware or did not know how to comply. Two large-scale mills had put in place the necessary measures to comply with the stipulated permitting conditions from the EPA and action plans in the EMP. Most of the medium sized mills (63%) had, however, not prepared these documents. For those that had been prepared (37%), there was no evidence that adequate measures were taken to implement the EMP. To improve on the situation, it will be necessary for sustainable palm oil projects in collaboration with EPA, to develop guidelines for large and medium-scale palm oil mills and plantations on the relevant environmental and health and safety standards in Ghana. Most small-scale mills are not aware of these measures. It will be important to raise awareness in order to improve the environmental and health and safety conditions.

The RSPO indicator on effluent disposal requires the monitoring and documentation of effluent parameters, which should be part of the quarterly monitoring returns to EPA; Appropriate treatment of mill effluent and regular monitoring of discharge quality, which should be in compliance with national regulations. Large mills were found to typically generate high volumes of palm oil mill effluent (POME). They treated the effluent prior to disposal, principally by using treatment ponds, and/or for land application. The effluent quality however did not meet the EPA's National Effluent Quality Guidelines (NEQG) for disposal into natural water bodies. The medium-sized mills also generated significant quantities of effluent, but this was often not adequately managed by about 75% of them (Figure 2). In these cases the effluent was discharged without sufficient treatment. In two cases, medium-sized mills discharged effluent into nearby water

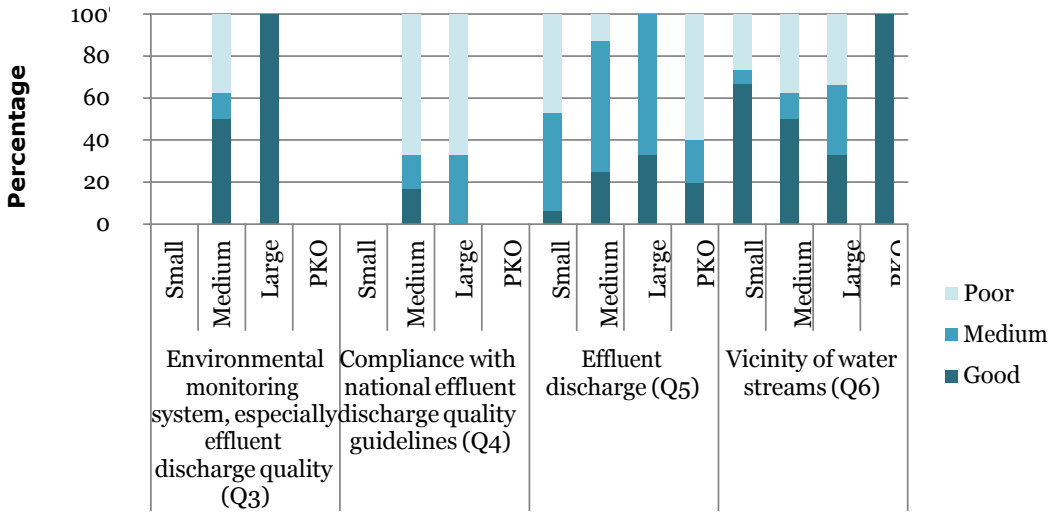

Figure 2. Effluent management at mills (Author's own elaboration).

streams, thus posing a serious risk to water pollution. In 25% of the cases, the effluent was managed but only in one case did it fall within the national norms. For small-scale mills, the effluent generated was in small quantities, this comprised liquid waste usually from the boiling of fruits. In 50% of the cases the remaining effluent was discharged on nearby land and/or in streams, rivers without any treatment. The PKO mills also generally did not take any adequate measures to dispose effluent.

Construction, operation and maintenance of multi-chambered oil traps/fat pits as an initial are proposed as a treatment measure for the POME. The oil to be recovered from this may be sold to soap manufacturers. The treated POME may also be applied directly onto land as organic fertilizer, or it can be composted with Empty fresh bunches (EFBs) and applied to the plantation. A study on POME also suggests ultrasonicated POME can be used as sustainable feedstock for dark fermentation-based bioH 2 production and MFC-based bioelectricity generation (Leaño et al., 2012). For small-scale mills, investment in more efficient oil extraction equipment to reduce the oil content and organic matter load of the effluent is required. A small temporary effluent retention facility/oil trap that permits the recovery and reuse of some of the oil from the effluent is also proposed.

For the management of organic wastes, RSPO requirements refer to nutrient recycling strategies that include EFB, POME, palm residues after replanting and any use of biomass for by-products or energy production. The results show that the largest volumes of organic wastes were recycled as organic fertilizer, but large volumes were also used as fuel for the mills. For small-scale mills, most organic wastes were used as fuel. The mills generated a lot of organic wastes (empty fruit bunches, fibres, kernel shells, palm kernel cake, boiler ash). All large-scale mills (100%) and most (75%) of the medium-scale mills generally had adequate disposal systems. One medium-sized mill used all organic wastes as fertilizer. One large-sized mill used 70% of EFBs as mulch and the remaining 30% as fuel, while another one used 100% as mulch. The large or medium-scale mills used all fibre and kernel shells as fuel for heating the water in the mill. Most medium-scale mills used all or part of the EFBs as mulch in the plantation, and the remaining is burnt. Small mills usually used the EFBs and fibres for boiling the oil palm fruits. Kernels or kernel cake is commonly sold to be used as feed for piggeries.

The RSPO requirement on management of toxic and hazardous wastes is the development and implementation of a waste management and disposal plan to avoid or reduce pollution. All large-scale and medium sized mills were found to collect toxic and hazardous wastes and dispose of them at approved sites or for reuse. Of the small-scale mills, most collected and reused toxic and hazardous waste (60%).

For energy or fuel use, RSPO requires regular monitoring and documentation of renewable energy use per ton of CPO or palm product in the mill; monitoring and documentation of direct fossil fuel use per ton of CPO. All the large-scale mills and most medium scale mills (88%) collected data on their energy consumption. In addition to the EFBs as sources of energy they used diesel generators or electricity as firewood (records indicated only around 1000 kg per month). There is also use of residual oil as fuel which generates hazardous air pollution and is illegal. The small-scale CPO mills were found to make use of limited quantities of firewood (in addition to the use of EFBs and fibers as fuel). All PKO mills made use of firewood, in slightly larger quantities than the CPO mills.

In the case of air pollution by smoke, the large and medium-scale mills had smoke stacks installed to take up

the smoke generate from the working environment. The stacks were sufficiently high to allow for adequate air dispersion. Although all large-scale mills still create some air pollutants, these are within the national ambient air quality norms. Most (62%) of the medium-scale mills produce air pollutants which are not within the standards. The issue of air pollution by smoke was significant among the small-scale mills, where the smoke generated was generally within the breathing zone of workers. None of the small-scale mills had taken any measures to install a chimney. More than half of the PKO mills (60%) did not take any measures against smoke pollution. The results indicated significant problems with air pollution, some studies elsewhere corroborate these findings (Dudgeon et al., 2006). The RSPO requires the identification and monitoring of all polluting activities, which include smoke, and compliance with national regulation on emissions. The national ambient air quality guidelines are sulphur dioxide emissions for 24 h within 150 mg/m^3. The large-scale mills are within this norm, but most medium-sized mills and small-scale mills do not meet this standard. Within this context it is proposed that sustainable production projects should formulate interventions that assist medium-scale mills to set up chimneys. The small-scale mills should also be supported to construct chimneys in the roof of their sheds.

The study identified that all large-scale mills collected data on their water consumption, but most of the medium-scale mills (70%) did not. Water was also used for irrigating seedling nurseries and most medium-sized mills have their own water wells but did not register water use. RSPO requires monitoring of mill water use per ton of FFB; it was not done by the majority of small and medium-sized mills.

Environmental issues plantations

The RSPO indicator on biodiversity protection requires the documentation on the status of rare, threatened or endangered species and high conservation value habitats, if any, that exist in the plantation or that could be affected by plantation management. If these are present, appropriate protection measures must be adopted (by group managers and for large-scale plantations in management plans). For most small and medium-scale plantations, there was limited awareness and no protective measures were taken. The study showed that all large-scale plantations take protective measures for biodiversity, while it was 43% in the case of the medium-scale plantations. This included biodiversity plots, buffer zones and no-hunting regulations. On the contrary, small plantations generally did not take such measures in their plantations, as discussed in other studies (Fitzherbert et al., 2008; World Bank, 2010). Of the medium-scale mills, 71% stated that they were planning expansion of their plantation, which is expected to take place on agricultural lands. Of the small mills, only 40% have plans for expansion of related plantations, but the size of the expansion is always very limited (less than 2 hectares). For medium-scale mills, the study proposes the creation of awareness on the need to maintain biodiversity plots and replant with forest trees at selected sites, e.g. along river banks. Sustainable production projects should also sensitize small-scale plantations to desist from encroaching on river banks and swampy areas to cultivate oil palm.

A study by Rhebergen et al. (2016) also found opportunities for large-scale oil palm plantation development is limited, however, and recommended smallholder production or yield intensification on land already planted as a feasible strategy for oil palm expansion in Ghana. This could also reduce the requirement for further land clearance for new plantations to meet the growing demand for palm oil.

For the indicator on erosion and other protective measures for sensitive areas, the RSPO requires management strategies for soil erosion on slopes between 17 and 30%. It also requires protection of local water courses and wetlands, including maintaining and restoring appropriate riparian buffer zones. The survey showed that for the protection of sensitive water areas (swamps, river banks), the reference to required buffer zones varies widely, from 4 to 30 m zone. About 30% of the medium-sized mills do not take such measures within their plantations. Almost all large- and medium-scale mills take erosion control measures in their plantations. The use of cover-crops like *Pueraria* or *Centrosima* was common with large scale plantations. The small-scale farmers shunned its use with the reason that it becomes a habitat for reptiles especially snakes. Large and medium-scale plantations also use palm fronds heaped along the slope, sub-soiling or construct terraces along the slopes. None of the small-scale plantations was found to take adequate anti-erosion measures in their plantations. Of the small-scale mills, 40% were aware of the requirements and took measures, 27% were aware but did not take measures and the remaining were not aware. Thus, many small-scale farmers did not establish sufficient protective measures as they utilized all the land available including swamps and the banks of water bodies. Buffer zones for water bodies were practiced by some small- scale farmers, not as a result of the rules and regulations but due to traditional practice to reserve water for use when they go to work on their farms.

The RSPO requires that no fire is used for preparing land for replanting. Only some small-scale plantations do occasionally use fire when preparing land.

All large and medium-scale plantation owners were found to take measures to avoid and control fire, as well as 80% of the small plantation owners. These measures are mainly a system to monitor fire incidence and having a fire belt. Only a few have firefighting equipment or a fire certificate. None of the large- or medium-scale plantation

owners used fire to manage wastes. Of the small plantation owners, 40% frequently used fire in their plantations.

The RSPO requires practices that maintain soil fertility, or where possible improve soil fertility to a level that ensures optimal and sustained yield. Some of these practices are recording of fertilizer inputs and application are maintained; documenting of periodic tissue and soil sampling to monitor changes in nutrient status; stacking of palm fronds along the contours in the farm. Of the large-scale plantations, 66% commonly used organic fertilizer in their plantations and 33% occasionally. Of the medium-scale plantations, 71% used organic fertilizer in their plantations, 14% occasionally and the remaining (14%) not at all. Of the small-scale farmers, only 33% used some organic fertilizer. As organic fertilizer, EFBs are commonly used as mulch and palm fronds are arranged between rows of palm trees to decay. The use of poultry manure (application once a year on mature palm 12.5 kg/tree and on young palm 6.5 kg/plant), was mentioned. In a similar environmental assessment of the oil palm industry in Thailand, 26 options were identified for reducing the environmental impact of palm oil production (Saswattecha et al., 2016). Their analysis showed that empty fruit bunch (EFB) combustion, wet scrubbers and pre-heating fiber are the most effective in reducing multiple impacts. Among these, EFB combustion resulted in the largest environmental improvement, but at relatively high costs. Several options were found to be not only effective, but also generate a positive net return. These included cover crops, mulching EFB, EFB composting, EFB pellets production, oil loss recovery from decanter cake and pre-heating fiber. The most paying options are mulching EFB, harvesting ripe fruits and cover crops.

All large-scale plantations surveyed used chemical fertilizer and of the medium-scale plantations, 29% used chemical fertilizers on their plantations. Use of organic or inorganic fertilizers was mainly done during the seedling and young stages of the plants (between 1 and 3 years). Of the small-scale plantations, 13% used chemical fertilizer, while 67% did not at all. While the large-scale plantations established nutrient management plans, medium and small-scale plantations lacked the basic knowledge on soil fertility management practices.

In addition to this indicator, the RSPO requires that agro-chemicals are used in a way that does not endanger the environment or human health. There is no prophylactic use of pesticides, except in specific situations identified in national best practice guidelines. There are specific requirements for the handling and storage of agro-chemicals. Most small and medium-scale plans did not comply with these requirements. All large-scale plantations were found to use agro-chemicals, mainly herbicides for young plants, and also had an integrated pest management (IPM) plan. The medium-scale plantations, 43% used of agro-chemicals while none has an IPM plan. Also, none of the small-scale plantation owners had such a plan. Of the small-scale plantation owners 80% did use herbicides, although in small quantities. Plantation owners, especially the medium-scale ones, commonly refer to the fact that more herbicides are used to control weeds because of the increasing cost of labour, especially in Eastern, Ashanti and Western regions. The most common type of herbicide used is Gramoxone (Paraquat). Other agro-chemicals used are Roundup (Glyphosate) and Dursban, which are both banned chemicals.

For waste management, the RSPO requires that: Producers develop and implement a waste management and disposal plan. The large plantations were found to collect wastes (plastics, empty containers) used in the plantations and dispose these in an appropriate way. About 50% of the medium-scale mills also disposed waste properly. The small-scale plantations on the other hand buried the containers in the plantations, burn them or leave them on the ground. To address this challenge, producers should be encourage by sustainable projects to create collection points for chemical wastes; and that instructions on manufacturer's labels are followed.

Occupational health and safety-mills and plantations

The RSPO requirements state that producers and processors of oil palm should have a health and safety policy, which is implemented and monitored. All precautions attached to products should be properly observed and applied by the workers. Accident and emergency procedures should exist and instructions should be clearly understood by all workers. Records should be kept of all accidents and periodically reviewed. Workers should be covered by accident insurance and calculation of Lost Time Accident (LTA) rate should be standardized. The results showed that all large-scale mills and their plantations had a safe and clean environment. They were aware of the national health and safety regulations, and had a plan for it. They also had an accident and emergency plan for the mill. Fifty per cent of the medium-scale mills had a health and safety plan and 25% had an accident and emergency plan. In the medium-scale mills, 38% signage can be improved, while in 50% of the cases there was no signage. Of the small-scale mills, generally, there was a moderate level of awareness on health and safety issues. Many are aware of the health and safety regulations but 45% did not know how to comply. All large-scale plantations gave frequent training in an organized way on health and safety issues. Of the medium-scale mills, 25% gave frequent training, 40% occasionally and 35% not at all (trainings may be provided by external agents, such as fire departments or health centres). Of small-scale mills and plantations, 43% occasionally underwent training. Occasional training usually refers to informally discussing health and safety

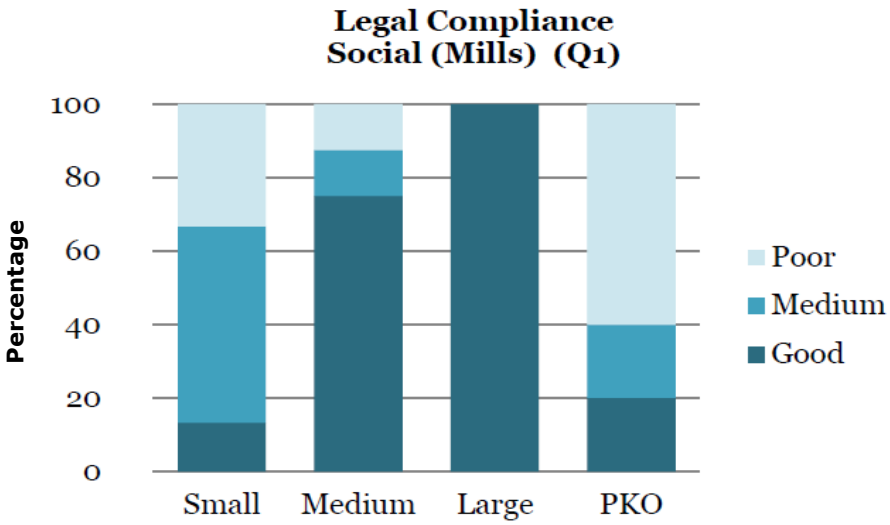

Figure 3. Legal Compliance in oil palm plantation mills (Author's elaboration).

issues and providing instructions during weekly meetings. The RSPO also requires that adequate and appropriate protective equipment be made available to all workers to cover all potentially hazardous operations, such as pesticide application, land preparation, harvesting and burning.

As part of their health and safety management systems, all large-scale mills surveyed, provide and enforce the use of PPEs. In the medium-scale mills however, 37% provided sufficient PPEs, while for the small-sized mills, 40% supplied some PPEs. To enhance the use of PPEs, the study proposes regular training on the use of the PPEs either by the mill owner or a designated health and safety officer.

Social-mills and plantations

The awareness of social and labour laws, regulations, social impact assessment and a social management plan is an important indicator; and the RSPO requires that labour laws, union agreements or direct contracts of employment detailing payments and conditions of employment (e.g. working hours, deductions, overtime, sickness, holiday entitlement, maternity leave, reasons for dismissal) are available in the languages understood by the workers or explained carefully to them by a management or union official. This is different from the focus of our survey which was oriented at the awareness of the employers or owners, rather than the workers.

As indicated in Figure 3, among large-scale mills and their plantations there were good awareness of the national social and labour laws and regulations. The large mills had prepared EIAs and an EMP, and had put in place the necessary measures to comply with the stipulated permitting conditions.

In addition to the legal compliance, RSPO requires that pay and conditions for employees and for employees of contractors always meet at least legal or industry minimum standards and are sufficient to provide decent living wages. All the three classes of mills and plantations were found to pay at least minimum wages. In most cases workers are paid more than GHS4.48 (which was the minimum wage until April 2013), the minimum wage has increased to GHS 5.83 and currently to GHS 7.00 (in 2015). Workers have so far been paid above minimum wage because if the contract workers are paid below minimum wage, they will leave the mill plantation for alternative activities. It is also important that_employers respect the right of all personnel to form and join trade unions of their choice and to bargain collectively. Where the right to freedom of association and collective bargaining are restricted under law, the employer facilitates parallel means of independent and free association and bargaining for all such personnel. The study found that all large-scale mills had high awareness on freedom of association. They encouraged workers to be unionized and belong to the Ghana Agricultural Workers' Union (GAWU) and other welfare groups present. For 62% of medium-scale mills, the workers were organized, while 38% there was only awareness. Small-scale mills generally did not encourage any formal type of organization by the workers or users.

It is suggested that the development of an association that unites in a certain locality the owners, millers and users of existing small-scale (CPO and PKO) mills be stimulated by interested sustainability projects. This organization could be the focal point for the projects to communicate and disseminate messages on environmental, health, safety and social issues and also

offer training services.

Within the RSPO framework, producers and mill owners have to provide adequate housing, water supplies, medical, educational and welfare amenities to national standard or above. Among the facilities to be provided for workers there is need for appropriate and sufficient (in quantity) sanitary, washroom and restroom facilities, with lighting, and these facilities should be clean. We found that 66% of the large-scale mills had such facilities for workers, including canteen and toilets. Among the medium-scale mills, 25% did not have any such facilities while 50% had some facilities and only 25% had adequate facilities. It is therefore important that medium-scale mills improve on facilities for workers, by at least providing appropriate and sufficient sanitary, washroom, restroom facilities with lighting.

Child labour, is a relevant indicator in the RSPO. It was found that, among the large-scale and medium-scale mills and their plantations there was good awareness of the child labour regulations and there was no evidence of any cases of child labour. This was also the situation in PKO mills (small or medium). However, among small-scale mills and plantations, the situation was quite different. While the owners were generally well aware (86% for mills and 70% for plantations), in some cases there was evidence of child labour (14% for mills and 38% for plantations). There was also good awareness of regulations on sexual harassment and violence and there was no evidence of any violations.

The RSPO requires open and transparent methods for communication and consultation between producers and/or mill owners, local communities and other affected or interested parties and well as mutually agreed and documented system for dealing with complaints and grievances, which is implemented and accepted by all parties. All the large-scale mills had fora for internal communication as well as regular fora or events for communicating with the surrounding communities. They also had in place formal mechanisms for complaints and grievances and these were fully resolved. Medium-sized mills generally had fora for internal communication (82%), e.g. a biannual meeting, where supervisors met workers. However, none of the medium-scale mills had regular fora or events for communicating with the surrounding communities, while most had occasional events (75%). In one case there was annual interaction with the chiefs of surrounding communities. Most also had in place formal mechanisms for complaints and grievances (64%), but some had informal mechanisms only (36%).

In the case of local employment, it was found that in the large-scale mills and plantations 75% of workers were from local communities. This was generally also the case for medium-scale mills and their plantations. For the small-scale mills, 14% did not have any local workers and labour was on contractual basis. Morin (2013), in a similar study suggested that to reduce the negative social impacts and trade-offs of oil palm plantations and maximize their economic potential, government decision makers need to restrict the use of forested land for plantation development, enforce existing regulations on concession allocation and environmental management, improve monitoring of labour practices, recognize traditional land use rights, and make land transfer agreements involving customary land more transparent and legally binding.

Food security

In the Ashanti Region, oil palm production has increased significantly over the last 20 years, especially following a Presidential Special Initiative (PSI) on oil palm production. However, cocoa has also increased over this period and some farmers are diversifying into cocoa production. For instance, in the Adansi area production of food crops has reduced significantly and food prices have increased over the period since farmers prefer the cultivation of oil palm and cocoa. There was, however, sufficient food being cultivated to serve the area. In the Juaben area, most respondents saw no relationship between food production and increase in oil palm development, since according to them, food was abundant and reasonably priced although most farmers seemed to prefer oil palm and cocoa farming.

In the Eastern Region, oil palm plantations have been in existence for over 30 years and have expanded over the years. There was still land available for food crop cultivation which had not been utilised because the farmers preferred oil palm plantation development as this gives more security of income. The income from the oil palm industry was enough to buy food. Whereas, food was initially exported from this Region, now food is largely imported and prices are higher. This may be partly due to the production of oil palm. In the Western Region the impact of oil palm expansion on the production of food crops was generally unclear. Farmers deferred the production of food crops to the production of cocoa, rubber and oil palm. Oil palm is now being replaced by rubber. Most youth were also engaged in ‘galamsey’ (illegal mining) and therefore not willing to engage in food crop production since they did not find it lucrative enough. There has been an increase in the prices of food as a result of the shortage of food in the area but this cannot be attributed to oil palm production only.

Oil palm development in the Central Region, started about 30 years ago. Plantation development has resulted in decrease in food production as farmers find oil palm cultivation a more lucrative and reliable source of income. Oil palm was usually intercropped with food crops up to about 4 years old, when the canopy was fully formed.

Food crops such as maize, cassava were produced locally and more exported, but these are now being imported into the Region. Now rice has become the staple crop (being imported). In the southern portion of the

Region, near the coastal areas, however, food crops did not thrive very well and therefore farmers preferred to grow oil palm. Some oil palm companies make available land to the workers to grow their own food crops. Overall, oil palm was seen as a lucrative crop as it provides regular incomes throughout the year. Oil palm has replaced food crops in the 4 different regions. From exporting local food crops (maize, cassava), the Eastern and Central regions have become food importers and the diet seems to have changed as well (more towards rice). Food prices have gone up in all regions. It is not possible to attribute these changes to oil palm only, as other crops have also expanded (cocoa, rubber) and there is an influx of people involved in mining activities (Western and Eastern region).

Conclusion

This article have assessed the environmental and social impacts of the oil palm industry in Ghana, in order for projects to have relevant insights and design evidence-based interventions to enhance sustainability in the industry. The article summarizes its conclusions in a tabular form (Table 2) to show which environmental and social issues constitute problems and risks for the producers and/or processors in the industry. In most cases, the current situation on the issues shows there is no compliance (particularly for small-scale enterprises) with national legislation and the Ghana interpretation of the RSPO criteria and principles.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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