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Community Awareness and their Response to Bio fuel Production in Tanzania: A Case of Kisarawe and Singida Districts

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ABSTRACT

The papers assess the community awareness and their responses to biofuel production in Tanzania. There is global concern in alternative source of energy as the consumption of fossils fuels increases with the decline of fuel reserves during the last two centuries and especially during the last two decades. It has been assumed that the marginal soils that have failed to support other food crop will support Jatropha farming and therefore improve community income and wellbeing. The in-depth interviews and Focus Group Discussions were employed to find out the reality and people`s perception on the biofuel production. Documentary search complimented the primary data in relation to global context. It was observed that in Kisarawe people were in need of income and alternative source of income though they were sceptical on its advantages. Singida showed it clear that biofuel production has no benefit to their community. Land dispossession with very limited or compensation is dominant with unfulfilled promises. It is concluded that the process of the project introduction was not participatory people were considered as recipient and therefore a lot of conflict have emerged and will continue to rise. There is need to adopt the bottom up cum top down approach with clear analysis of viability of the development project for sustainable development.

Keywords: Bio fuel, Community awareness, Response, Livelihood, Tanzania.

INTRODUCTION

The world is on the verge of an unprecedented increase in production and use of biofuels. This has been the result of the increase of consumption of fossil fuels in transportation for the past two centuries (Ajanovic, 2010). The consumption also signifies the decline in the production and supply of fossil fuels. It has attracted the increasing interest around the world over the past decade as a potential substitute of fossil fuels.

A major driver for increased production and demand of biofuels is the increase in oil prices. It has been a continuous rise of price of petroleum in the past decade and progressive declining of fossil fuel reserve (Magimbi *et al*., 2010). For instance the price increased at greater than $140 per barrel in June 2008. If the price remain higher at least $50 then biofuel will remain economically feasible. Second gearing factor is the global concern of climate change. Petroleum contributes enormously in Greenhouse gases emission in the atmosphere where biofuel will be best solution (Demirbas, 2008; Ajanovic, 2010). Africa witnesses a new and massive land scramble. The justification for land grabbing in one hand is supposedly climate change which threatens the entire world (Madoffe *et al*., 2009). It is claimed there are enormous areas of unused land in Africa. In relation to this claim European Union wants to change its energy consumption pattern from relaying on fossil fuel to at least 10% of the Energy used in transportation be biofuel (Ajanovic, 2010).

Tanzania has been experiencing a rapid increase in biofuel investment proposals and production in recent years (Sulle and Nelson, 2009). It is reported the application for land for biofuel production is more than 4 million hectares of land while 640,000 ha have already been allocated to different companies. More than 23 companies have proposed /started investing in biofuels in Tanzania.

Many studies have been carried relating to cost benefit analysis and potential of biofuels in Tanzania. Few studies have based on analysis of the livelihood impacts of the biofuel production in Tanzania.

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Studies show that sub-Saharan Africa and Tanzania in particular have great potential of producing and exporting biofuels (ESD, 2008; Wiskerke, 2008; WWF, 2008; Sulle and Nelson, 2009). The justification is derived from availability of land and labour resources. It is estimated that Tanzania has 44.5 million ha favourable for agriculture while among them 30 million ha are suitable for biofuel feedstock production (ESD, 2008; Broadhust, 2011). They further categorised it to production of sugarcane (570,000ha), cereals (24mill ha), and root crops like cassava (14mill ha). About 75% of land potential for sugarcane has been already requested by SEKAB BT – a Dutch company. The study has gone further showing crops for feedstock production to be cashew nuts, palm oil, Jatropha, sweet sorghum, coconut and sunflower. Africa is the poorest continent with highest population growth which is estimated to be 3.5% per annum.

In many cases when studies shows very little concern about the appropriateness of using feed crops as feedstock for biofuels production. The solution provided to sensitise people to produce more food while emphasis be put to non food feedstock crops like jatropha is seen to be hypothetical.

It appears in all the cases the interest is in maximising the profit at capitalistic system. In colonial, post-colonial and neo-liberal era profit matters regardless of somewhat. It is also shown in studies justifying the potentials and economic advantage of producing ethanol versus sugar biodiesel versus oil palm that food crop feedstock have capacity of producing much oil unlike non-food crops feedstock. Jatropha has very low capacity of producing biodiesel compared to sugar cane and other food crops.

Table1. *Feedstock Potential Yield of Biofuel*

Crop	**Yield (litre/ha)**
Sugarcane	4000-8000
Sweet sorghum	3000-6000
Cassava	1750-5400
Oil palm	2500-6000
Jatropha	400-2200

Source: *ESD, 2008*

Biofuel production has been opposed strongly all over Tanzania in different forms. It appears from these statistics that there is great probability of turning food crops to feedstock in order to maximise output. It is conceivably because of great opposition of such projects. Jatropha is probably an entry point so as in future turn to cereals and other food crops as source of feedstock for biofuels production. Tanzania which is seen to be potential and has comparative advantage of producing biofuel than many countries has more than quarter of her population (13 millions) malnourished. It is still questionable as how massive production of biofuels will sort out food insecurity problem.

Even though the policy and academic questions are not yet solved, the questions of national sovereignty have not yet been sought out. This is not just the matter of advantages/ opportunities versus setbacks and challenges. It is not only the matter of food and fuel but also it is for development of the people not things; it is an agrarian question and the question of sovereignty. As most cases the thinking is done in Washington and London and implementation is done by intellectuals in Dar es Salaam. Nothing is done in connection with the grassroots.

METHODOLOGY

The study was carried out in the Mzenga village in Kisarawe district and Ikiwu village in Singida district. The selection of such villages was due to their involvement in two biofuels companies' activities that are being established in these districts. Mzenga was under the Sun Biofuels Tanzania Ltd that was formed in 2005. The company was affiliated to UK Company of Sun Bio Fuels Plc. The company was later sold to 30 Degree east which is based in Mauritania. Diligent Tanzania Ltd was working in Ikiwu but they were using the out grower model. They encouraged people to cultivate jatropha by providing consultancy service, seeds and buy them later. The company had more than 5,000 farmers. They also ran pilot projects in Singida district. Later the company was sold to Eco Company.

Documentary review technique was employed to get what has already been done relating to biofuels in Tanzania and elsewhere. Focus Group Discussion (FGDs), interviews and public hearing

techniques were employed to get people's views relating to biofuels production. The tools were selected due to their powers proving freedom of expression to respondents. Observation technique was also employed in viewing the standards of their housing, planting of Jatropha for different purposes.

RESULTS AND DISCUSSION

Land Question in Tanzania

In order to understand well the issue of biofuel production and its status, there is need to understand the land tenure security in relation to global politics. It has been declared often that Tanzania has a vast land that is underutilised. This is supported by government officials to attract investors on land (Mwami and Kamata, 2011). In actual sense there is no piece of land without owner. This has gone hand in hand with establishment of agents that solicit investors and land. Among others include Tanzania Investment Centre that works all over Tanzania. RUBADA is another organ that search for investors in Rufiji River basin. This organ has changed its role from developing the valley to becoming the middleman (Haulle, 2014). This is the reason why Diligent, Biomassive, Kapunga and SEKAB AB that acquired land within the basin had to go through RUBADA.

All these have been easy due to nature of the land tenure system in Tanzania and Africa in general. According to Maghimbi et al., (2010) land question is the besult of globalised control of land, minerals and other natural resources as a reflection of incomplete independence and foreign investment within the neoliberal framework. The land resource in Tanzania is said to be owned by the public under the trusteeship of the President (Haulle, 2014). The meaning of the public in the strict sense is the state. Public interest therefore is the state interest (Shivji, 2006). Since 26th November, 1895 where the land of Tanganyika was treated as crown land after the establishment of the Imperial decree people of the land lost their land to date.

Through change of land tenure, citizens had a right of occupancy that expires after a certain time and for that matter the owner may decide anyhow on the use of the land (Kamata and Haulle, 2012). This has made decline of security of tenure and therefore, the eviction that is existing, attacking investors on land and other land uses that do not correspond and take on board other users cause conflict in different parts of Tanzania.

Livelihood Options

The study found out that residents of both villages of Mzenga and Ikiwu were mainly peasants. Moreover the peasants from Ikiwu were agro pastoralists. Their living depends much on farming, animal keeping, petty trade and labour hiring.

Ikiwu and Mzenga residents depend much on cassava, millet, maize, rice, and spinach production for food while cashew nuts, simsim, coconuts, and oranges were for commercial purpose. They practice intercropping in small plots of 1-3 acres per households. The study found out that they do not use pesticides, fertilizers or tractors due to their weak financial base.

Due to this their output is limited to the extent that they normally face seasonal hunger due to low output. It was also noted that the extended drought and unpredictable rain seasons intensify their farming problems and thus their food insecurity.

On the other hand proponents of food crops based biofuel argued that the increase of crop yields can increase as crop demand rises. In this view when food will be needed for biofuel production and food, it means that the production of food will be increase simultaneously to meet the market requirement. However, the reality is contrary for example USA where almost 50% of corn are used for ethanol production the increase is less than 2%. What will be the case in Tanzania where the population increase is high, no subsidies in farming like USA and low technology (Runge and Senaner, 2007). Moreover, if the demand could always trigger for high productivity then the malnutrition and food poverty could not be experienced in Tanzania becase of low productivity in agriculture.

Runge and Senaner has shown this threat as follows;

"Thanks to high oil prices and hefty subsidies, corn- based ethanol is now all the rage in US. But it takes so much supply to keep ethanol production going that the price of corn ..... and those of other food staples.....is shooting up around the world. To stop this trend, and prevent even more people

from going hungry, Washington must conserve more and diversify ethanol production inputs". (Runge and Senaner, 2007)

Table2. *Food/Feedstock Price Trend Worldwide*

Type of food/feedstock	Expected price increase by Year 2010	Expected price increase by Year 2020
Corn	20%	41%
Soya beans, rape seeds and sunflower seeds	26%	76%
Wheat	11	30
Cassava (In Africa)	33	135

Early 2007, the European commission published its Renewable Energy Roadmap. The roadmap proposes a mandatory target that biofuels must provide 10% of member state transport fuel energy (Oxfam, 2007). The 10% of transport fuel is not equivalent to 10% volume. This is because energy density in biofuel is low thus the volume is higher than 10%. This therefore poses great risk as land grabbing, exploitation, food insecurity and environmental degradation. In this situation, the environmental management approaches are at trial. This is because the main reason of opting for biodiesel is to conserve environment by reducing the emission of Green House Gases (GHG). On the other hand the policy will propel high demand for land and expand cultivation and therefore deforestation for biofuel crop cultivation. The expansion of farming activities will increase deforestation and therefore reduce the capacity of carbon sink. Cutting down of GHG emission will be in dilemma because people will observe the cost benefit analysis of either to involve themselves in carbon trading or feed stock production. Bearing in mind that all of these activities are intended o be done in developing counties while Africa is a priority.

These problems have impacted cash crops as well but on top of that the failure of cooperative unions in study area that were established in 1970s leads them to abandon cashew crops as source of income. Failure of Mzenga cooperative society and Kisarawe district cooperative union caused them to fall under private companies and brokers who sometimes took their produce without any payments. This made the community in Mzenga ward to be vulnerable to famine and climate change impacts.

Ikiwu village also depended on millet, sorghum and maize, as source of food. Sunflower was the main cash crop after the failure of cotton farming in late 1980s. Unlike Mzenga the households' income here is relatively high. The farm size of the family is at least 2 acres depending on the size of the household. The village officials are strictly to make sure that bylaws are adhered. All villagers have to produce at least 2 acres of food crops and an acre of commercial crops. Seasonal hunger is a rare case in this village even though it is located in semiarid region in Tanzania. Cattle provide them with food and cash when they sell.

Unlike Mzenga village, farming system in Ikiwu is more advanced. They normally use oxen and donkeys for ploughing and transporting produce and firewood. The area receives rainfall ranging from 500-650mm per annum (URT, 2008). It is evidenced that without improved technology the increase in demand of feedstock will not increase food crop production.

Something which is very important here is why the selected areas that are useful for feedstock production are also related to food crop that have high potential of producing feedstock that will yield a lot of oil per hactre. Good example of such areas with their potential crops include Coast region (cassava and millet), Singida (millet), Kigoma (palm oil and cassava) (URT, 2008). The use of food in production of biodiesel will be done and there are no laws that prohibit such change. Nevertheless, most of the companies were advised to cultivate food crops for their vicinity and labourers. It should be at least 5% of the land acquired for biofuel production. It will also be possible that the company will be producing in the name of feeding the labourers while production is for feedstock.

Awareness to Bio fuel Production

The Jatropha cultivation in Kisarawe employed a plantation model of cultivation (Broadhust, 2011). Sun Biofuel Company has been allowed to invest in Jatropha production in Kisarawe. This is the company that is known by the community in Kisarawe district. However the company was sold to 30 Degree East. The company has acquired 8211 ha from 11 villages including Ikiwu. The area affected both forest, agricultural and residential areas of the people. To date about 2000 ha are under cultivation employing 25 workers.

Local communities were found to be aware of the crop Jatropha as it is reported to be a traditional plant with different utility in our communities (TATEDO, 2008). The plant is popularly known as "*Mbono*" and "*Mbono Kaburi*" in Kiswahili. The residents of Mzenga identified it as "*Mkaranga*" while in Ikiwu it was identified as "*Mankale*" a name from their tribal language "*Nyaturu*". The plant is famous in traditional African communities to be used as grave mark because they were planted in the grave yard.

The FGDs also revealed that traditionally in Singida jatropha was used as a source of light. People could take Jatropha seeds and plug them into a thin stick and light them. To date the Jatropha are planted as fences for farm plots and in some cases as homestead fences. They are also planted in *mapitio,* a livestock path.

The study found out that even though the people in Kisarawe were aware of Jatropha, it was not popular to them. Communities in Singida knew it better as it is in use to date. They knew its advantages and disadvantages. The community members knew that jatropha is not edible by cattle and their stability provide strong protection of crops against livestock. This is possible because they use them for fencing to prohibit cattle from trespassing to the crop farm. Tha areas that they plant these jatropha for that purpose are known as *mapalio*, path of livestock.

Communities Response to Feed Stock Production

The two communities approach the Jatropha farming differently. Kisarawe community observed introduction of Jatropha by Sun Biofuel Company a large scale as a great opportunity. The project is expected to provide employment to jobless population in the district as it covers 15 villages. Also due to unrewarding farming activities that are on progress, the project will accommodate them as well.

"I thank the company (Sun biofuel) for their plan/ project; I think the plan will be a salvation to us. No jobs, No crops in farms, No food, No money how can we survive? The project will employ us and we will get money for our needs" contented one peasant in FGD at Mzenga village.

This hope has been constructed from the lip promises that are provided by the investors and land speculators agents like a state (Haulle, 2014). The evidence is clear now the company has only 25 workers. Out of more than 3,000 people who lost their land this means that less than 0.8% of the population was accommodated. This is the average of less than two people from each village were employed in jatropha farming project.

The study revealed that very few members of the household were sceptical with the project. Some explained that they once heard that the crop is harmful to soil, to water resource and other crops which is not good for humans. However nobody was able to reveal sources of their information. Contrary to this thinking, the interviews with workers of the sun biofuels noted these to be instigators. They explained the project is important to citizens and nation at large.

The study found out that some people were questioning how the project could be beneficial to them while the company failed even paying a reasonable compensation as they were taking land from people. Estimated compensation was 35,000 Tsh per ha (ESD, 2008). This problem of land acquisition has caused several social economic problems in other places. Such problems include disintegration of families (UNEP, 2014).

Kisarawe district officials on other hand showed scepticism. The district officials revealed that Sun Biofuel Company was granted that big chunk of land for as a pilot. The official plea the company not to mess up with the project. If that company will fail to deliver, then it will close the room for others companies because they will not allow any other company for Jatropha farming. However, to date after the failure of Sun Biofuel, they are still receiving applications and facilitate issuing of land.

Ikiwu is quite different from Mzenga. Dilegent Tanzania Ltd is working in Singida district already. The company is using the out growers model for Jatropha cultivation (Broadhust, 2011). The company encourages people to collect the Jatropha seeds from the *mapalio* and sell them to Diligent. The company also encourages people to plant Jatropha as fencing and wind breaker while providing income to them.

Diligent has been buying Jatropha seeds from people in about six villages in Singida. The price is ranging between 100-150 Tsh per kilogram.

People in this area had different views relating to the Jatropha. The study from public hearing revealed that Jatropha plant is not good for soil. It traps all the nutrients from soil. It was further noted that once planted no any other plant can grow around it because it produces poison that harm other plants. Jatropha may sequester about 750 kg C ha-1 yr-1 compared to cotton crops, which is significant in terms of Soil Organic Carbon Content (SOC) dynamics (Ndong *et al*., 2009). Taking into account this additional soil carbon sink made possible by growing Jatropha would dramatically reduce the life-cycle GHG emissions and actually turn this pathway into a net sink of greenhouse gases. On the other hand concentration of carbon in soil might have changed the pH of the soil therefore the previous crops that were supported could not be grown later. Moreover, according to Achten *et al*. (2007) *Jatropha curcas* is an exotic species. Some reports conclude that *it* shows invasive characteristics. In addition, the toxicity of the seed cake used as fertilizer might cause phytotoxicity expressed in a reduced Germination of local species. Soil erosion due to monoculture cannot be controlled. This is because jatropha normally shades leaves and they can regrow after the first rain of the following rainy season (Achten *et al*., 2007).

On the other hand it can be used as pesticides in conserving grains locally. The study found out that besides the advantages of using jatropha for fencing and pesticides, people were not willing to grow such crops.

One peasant was quoted saying

"You came up with caster seeds ***farming*** *in 1970s and early 1980s this is a medicinal plant that will bring you wealth, followed by* ***"Moringa oleifera- (milonge)"*** *to date you are preaching jatropha (Jatropha carcus) how can we understand such politics?"*

Further another peasant responded was noted saying

"What is that Rubbish? Mankale (Jatropha)!! It is poison how can you ask me to cultivate poison? By the way I do not care. It is school children who are collecting seeds in the exchange of Tshilling 100. It is not wealthy. I can't stop cattle keeping and farming in the expense of Jatropha" .. One old man commenting in interview at Ikiwu.



Figure1. *A pilot project for biodiesel plant for electricity production in Engaruka juu Village in Arusha. It has failed in its early stage of operation*

Contrary to Wiskerke (2008), the price is similar but Singida residents cannot count it as their source of income unlike Shinyanga where they acknowledge to be an additional income. This is probably so because of having alternative source of income and because of having such plant for so long time for different purpose. Moreover the role tha the plant is playing as poison in the community cannot be supported due to its adverse impact on the environment and other crops. According to Ndong et al. (2009) in West Africa, Jatropha was considered to be an alternative to cotton crops. It was observed cotton value dropped in the recent past. Many cotton growers have abandoned it and may be interested in alternative crops, among which Jatropha may be one. This finding does not reflect what is seen in the grassroots.

The two cases of Kisarawe and Ikiwu show that the people in Kisarawe are ready to stop producing food in order to be employed in Jatropha project while its return is still questionable. It is reported that 20 million hectares of corn can produce 1 million barrels of ethanol (BBC, 2008). The idea of using food to produce fuel is tragic, is dramatic. No one is sure how high the price of food will rise when

soy is being used for fuel" Fidel Castro in (BBC, 2008) there is a threat of war, environmental threats and food threats. Sun Biofuels have taken massive land about 11,226 ha in Kisarawe. How will the growing population be fed? What will be the price of food in relation to the standard of living of the people? (ESD, 2008; Broadhust, 2011).

In relation to the contention that Jatropha grow in marginal soils is against what Wiskerke (2008) explained. He explained it grows fast and yield higher in good soils of Arusha than in semiarid Shinyanga. Furthermore, the ESD (2008) report revealed that much of the land identified by Sun Biofuels in Kisarawe is miombo woodland. They also buy community managed forests to be cleared for Jatropha production.

Biodiesel which is a product of Jatropha is not economical as many propagators revealed in this study. It is reported that it is expensive to adopt generator for running Jatropha oil which is equivalent to USD 0.60 per KWH, compared to USD 0.10 per KWH for TANESCO rural electrification project (Wiskerke, 2008). It is also not economically viable for cooking at homestead. This is the reason why the generator that was established by TATEDO in Engaruka Juu in Monduli district, northern Tanzania has stopped to be run for years now despite their production of jatropha.

Tanzania which is said to be a potential exporter of Biofuel (ESD, 2008) Tanzania is the second country with high undernourished population (13 millions) after DRC (43 millions). To date about nine million people are living under hunger poverty (URT, 2014). With the displacement of population from their farm land in Kisarawe and deforestation the situation will be more tense and alarming. No any other consideration for pro-poor instead it is for the purpose of the meeting the EU target of 10% of fuel be biofuel by 2020 (Bailey, 2008).

Trend of the Bio fuel in Tanzania

The study found out that though there was a rush for land for biofuel production in Tanzania, most of the companies seem to be land speculators. They accumulated land for different purposes including collateral for bank credits and sometimes for lease. This is justified by the truth that many of the companies sold their land to other companies while others are not known on what they are doing with the acquired land. It is also evident that some of the companies left their farms unattended or with minimum attention after cultivation.

The trend for accumulation of land for biofuel has relatively stopped to day though the land demand has not stopped. This may not be caused by decline of the demand of biofuel globally, rather probably due to discovery of natural gas that seem to be cheap and reliable unlike biofuel. This may be related to the rise of high demand of plots for exploratory purposes. This situation justify also that the claim for the use of biodiesel for conserving the environment by cutting GHG emission is not reality (Maddofe *et al*., 2006). The main idea seems to be search for energy. While the OPEC seems to be controlling the fuel firmly, then alternative source of energy should be needed to meet the capitalist demands. This is evidenced by the states that supported the biofuel production are the same as those that support gas production, exploration and policy design and institutional set up which shows clearly the conflict of interest.

CONCLUSIONS AND RECOMMENDATIONS

The projects demand a lot of land of which the likelihood of causing conflicts is very high. This is possible because land is a fixed resource but population s increasing therefore competition in relation other land uses like settlements, food production, and environmental enhancement. The contradiction between biofuel production and carbon sequestration will also take place. On top of that the sovereignty of state is still questionable especially when foreign investors indirectly may own land and decide anyhow.

It is evident that these projects are top down. The mass is the recipient of the project. The community is forced to accept biofuel production due to nature of their standard of living. The poor community of Mzenga is aspiring to gain from the biofuel project because they have been pursued to accept the project while their experience is limited. The poverty status that prevail in the community of Mzenga has hastened the acceptance of the project in order to harness the assumed benefits that include employment, provision of health, water and school services that were to be provided by the state. Singida community is reluctant to biofuel project because their awareness is high. They know the crop

well; they know the price value of seeds and the impacts of the plant. The community of Singida has relative strong base of economy compared with Kisarawe. The general trend of selling these companies and to new owners, failure to compensate the land acquired from the people shows that there is something beyond what is happening o the ground. It suggests that land speculation is still happening in Tanzania. The economic development of any society depends much on the articulated economy. The existing trend will be threat to human, physical, economic and social environment.

It is recommended that let the mass be the bearer of the decision to be done in their community. It is important to establish economy that has the base within the community. There is need to establish a public debate that will discuss and decide on the land issue and fate of their state. Awareness on the threats posed by biofuel production is communicated to the mass in order to build national sovereignty and solidarity.

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