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The Food Security Status of Communities Adopting Pine Tree Plantations in the Kigezi Highlands of Uganda

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Abstract:

This paper examines the food security status, the major agronomical changes that have transpired and coping strategies for communities growing Pine Tree Plantations in the Kigezi Highlands of Uganda. The study shows how the Kigezi Highlands have faced agricultural changes over decades due pressure from Pine Tree Plantation adoption plus other resources. In addition to pine tree plantation adoption, several changes have occurred in densely populated area with relatively small pieces of land available for farming. The system of land inheritance has resulted into fragmentation of land holdings and widely scattered plots. Land shortage has been perceived to be the major constraining factor of food production for many years. Therefore, the study was meant to investigate the different agricultural changes over the years, the food security coping strategies and to examine mechanisms to enhance food security in the region. The study employed a descriptive cross-sectional survey design, in which both quantitative and qualitative approaches were employed. The respondents represented communities with pine plantations where the peripheral areas are usually exposed to several food security crises. Results indicate that there is increased dependency on food from the markets, decline hiring or borrowing of land, an increase in abandoned field hence neglecting the major local healthy and nutritious food crops and a decline in land fallowing practice for soil regeneration. The study recommends agriculture intensification, policy reconciliation, strengthening public and private partnerships and promotion of resilient food secure technologies in pine tree plantations adopting communities.

Keywords: Pine tree plantations, food security, coping strategies, adopting communities

1. Introduction

Uganda's food security depends on rural agriculture, which is predominantly subsistence farming. It is predominantly rain-fed as a result therefore; food supplies are susceptible to rainfall fluctuations. There is little, if any, stock holding at the household level. A situation that makes rural households find it difficult to go through off-season periods and times of poor harvest. This is also attributed to poor or lack of appropriate and affordable post-harvest technology at household level which leads to food losses that have been estimated at about 30 percent. FAO (2008) provides a useful basic concept of food security in relation to vulnerability. People who are already poor are vulnerable to hunger because they lack the resources to meet their basic needs on a daily basis. It's from this perspective that the World Food Summit adopted the definition that "Food security exists, when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preference for an active and healthy life". The four pillars of food security implicitly are identified as accessibility, availability, utilization and stability according to (FAO, 2002)

The Kigezi highlands Region has specifically experienced several challenges hindering food security outcome. For example, the unpredictable temperatures and rainfall patterns experienced over years. The current patterns do not permit growing of some crops in most parts in the region and crops are always sensitive to temperature increase (NEMA, 2015). This explains why there is food insecurity in communities adopting pine tree plantations, hence competition for land resources in the region. All this presents the vulnerability aspects faced by the farmers in regards to food security sectors in the Kigezi Highlands. Therefore this study was meant to investigate the agronomical changes plus farmers coping strategies in such a competitive environment and later recommended mechanisms to enhance food security in the region.

2. Problem Statement

There is a challenge of food insecurity brought about by land scarcity in the Kigezi highlands. Land is scarce in both Kabale and Kanungu which means the monoculture pine plantations have occupied the land that would have been used for food production. There is limited land for agriculture where households have to share the fragmented land and no

more fallows for land regeneration, which means there are low yields due to soil degradation and land degradation (Carswell, 2002). Population growth and high population densities have resulted in a drastic decrease in farm size and more intensive use of the land in the Kigezi Highland. Traditional inheritance protocols practiced in Uganda and specifically in Kabale, have contributed greatly to land fragmentation and degradation. Some have decided to shift to other areas, but still land is not enough. Many people have move to urban areas for jobs they need to be fed upon. The urban workers and the rich all need food, the question is, where will the food come from if there is limited land resource and where land has been occupied the pine tree plantations? Pine tree plantations are usually is usually planted on more than 3-5 acres of land. There is a food security dilemma over land resource management in the Kigezi Highlands. A community that depends on food from markets and its land is not productive automatically this food insecure.

3. Objectives of the Study

To investigate the food security status of communities adopting pine tree plantations in the Kigezi Highlands of Uganda

3.1. Specific objectives

- To investigate the major agricultural changes in the Region
- To examine the major coping strategies adopted by farmers for food security
- To recommend possible mechanisms to enhance food security in the Region

4. Theoretical Background

Boserup theory commends Agriculture intensification and intensive labour for high population communities that have been faced by food insecurity. The technology applied needs to be investigated if it can cater competitive livelihoods with the characteristics of crisis and risks of food insecurity. According to Darty (1997), boserup theory talks about switching to a more intensive technology. This is because as already explained this can lead to a fall in the output per man-hour but, presumably, is a temporary effect. It lasts until the community master the new approach. The community may stay with the new intervention until it is faced with a renewable onslaught on its standard as it rises in the size of the population that must be fed (Boserup, 2017).

Implicit in this argument is that, it must be the notion that there are diminishing returns associated with the given technology, so that there is an increased population in labour force to engage in in food production, the marginal contribution of each labour falls. Eventually the labour of diminishing returns for a particular technology falls. There is a possibility the force of diminishing returns for particular technology can become so great that, the population growth can once again cause difficulties in the communities' living standards. The response according to Boserup is to switch to another still more intensive technology. However, the researcher disagrees with the theory in that farmers might not always divert to a more intensive technology. Farmers will always find new mechanisms of survival as coping strategies due to competitive environment challenges they are faced with, agriculture is not the only alternative intervention. Farmer will always divert to other non-agricultural interventions like business, mining, construction to earn a living. Communities will always find means of survival but of course the marginalized group who are the poor will always suffer the consequences.

5. Literature Review

5.1. The Major Agricultural Changes the Kigezi Highlands Region

Mulindwa and Mukama (2005) describes the current status of food security in the Kigezi highlands as stunning because of the land being held under customary tenure systems. There has been increasingly divisions and subdivisions of land in Kigezi. This occurs when parents divide lands as marriage gift for newly married couples (Carswell, 2002). The challenge of limited land resources has been identified as a stressing factor in the region. In addition, there are food insecurity indicators, where farmers have migrated to other districts in search of food. For instance, farmers hire land for crop production, they also work for food to buy food. Since there is shortage food, they resort to coping strategies to food security because those who fail to get solutions always go hungry. These emergency solutions reflect the acuteness of food insecurity in the area.

According to Kabale and Kanungu District Profile (2013), most of the crops produced are consumed at household level; it is only the surplus that is put to market. Most of the crops are consumed in local markets although some of the food eventually finds its way to urban markets. There is no pricing structure, prices are controlled by the supply and demand of the food and transport to urban centres. Farmers normally hold part of the produce waiting for prices to go up. There are no organized agencies particularly handling the marketing of crops (Masahara and Negatu, 2016). The agriculture practiced in the district involves low capital inputs.

There is heavy dependence on family labour, most of whom are women. The terrain of the area and the way the land is fragmented does not favour the use of tractors. Labour remains a problem. The major agricultural equipment is a hoe, some farmers buy improved seed, spray chemicals and equipment but they are not readily available in a timely manner and some of them are fake product which discourage the farmer (Kabale District Profile, 2013). Therefore, major agronomical changes have occurred due limited resources for food production and the increasing population.

5.2. Food Security Copying Strategies for Communities Adopting Pine Tree Plantations

In connection to food insecurity, adaptation of new techniques or alteration of regular behaviors are usually executed and translated to coping strategies (Masahara, 2016). The Sustainability of Livelihood Approaches has been a concern just like Sen (1981) with the 'earning a living'. It is here that food security brings up issues of vulnerability, sustainability and the coping strategies. Vulnerability has been looking at risks, shocks, adverse trends and seasonality (Maxwell, 2008). These external shocks that can be caused by economic, political and ecological stresses. Sustainability is all about resilience to vulnerability and recovering now and in the future. The coping mechanisms are the steps that a household takes to address issues of food availability. The coping strategies derivative from the Sustainable Livelihood Approach was used accordingly, because it is a long term perspective to determine the gaps in the coping strategies and vulnerability in communities like the pine tree plantations adopting communities. The study was meant to investigate food security copying strategies within households adopting monoculture pine tree plantations in Kigezi Highlands Region. The coping strategies index tool was used to measure the food security status of pine adopting communities. The food security measure considered accessibility, availability, utility and stability. A likert scale was used to measure the responses presented as indicators to food security of each household. The characteristics of a person or group and their situation influence their capacity to anticipate, copes with, resist and recover from the impact of food insecurity (Eriksson & Juhl, 2012). It involves a combination of factors that determine the degree to which someone's life, livelihood, property and other assets are put at risk (Eriksson & Juhl, 2012). Therefore, the researcher captured data on the Household Food Security Status for both pine and non- pine tree plantation growers in the Kigezi highlands.

A number of different individual coping behaviors have been identified in each of these categories. This fall into four basic categories: these are dietary change, short-term measures, reducing the number of people having food and regulating the food to increase household food security. The Copying Strategy Index (CSI) has shown that, typically those food insecure households employ four types of consumption coping strategies. Usually, households may change their diet when there is food insecurity. For instance, households might switch food consumption from preferred foods to cheaper and less preferred substitutes. Secondly, the household can attempt to increase their food supplies using short-term strategies meaning that food used is not sustainable over a long period. For example borrowing or purchasing on credit. More extreme examples are begging or consuming wild foods, immature crops, or even seed stocks. Still, if food is inadequate to meet some households need they try to reduce the number of people that they have to feed by sending some of them elsewhere for example sending the kids to the neighbor's house or relatives. Lastly, households can attempt to manage the shortfall by reducing the food available to the household that is cutting portion size or the number of meals, favoring certain household members over others, or skipping days without eating according to Maxwell and Cadwell (2008).

6. Methodology

The study used a descriptive cross-sectional survey design, in which both quantitative and qualitative techniques were used to collect data from the competitive livelihoods that exist in pine tree plantation adopting communities. Mugenda and Mugenda (2003:164) noted that, survey research attempts to collect data from members in a population in order to determine, describe and further explain the relationship between variables. The survey research seeks to obtain information that describes existing phenomena by asking individuals about their copying strategies, attitudes, behaviors or values, in order to make descriptions. Kabale and Kanungu districts in the Kigezi Highlands were purposively selected because of they have the biggest percentage of pine tree plantations adopters in the region (SPGS, 2006). Therefore, study population comprised of pine tree growers and non-pine farmers having fields bordered by pine plantations. The population also included promoters of pine tree growing and government institutions representatives. Purposive sampling and simple random methods were used to select the participants from the districts of Kabale and Kanungu. The Krejcie and Morgan's (1970) table for sample size determination was used to determine the sample size of 384 respondents for this study. Primary and secondary data were used while documentary reviews were also used to review the scope of monoculture pine tree plantations adoption and food security. The questions tested the overall respondents' views on the concepts on food security status of pine tree plantations adopting communities. The respondents had a choice of either filling in the questionnaire or granting an interview depending on their preferences. The likert scale of 3 (3=Agree, 2=Disagree 1=Neutral) was used to measure the respondents views. The items below show the Copying Strategy Index applied in the study and illustrates the number of respondents who answered the respective questionnaires. The (CSI) mentioned above was applied in data collection, data analysis, interpretation and discussion to get the unit of measure as derived below. The unit of measure was derived from the Copying Strategies Index (CSI) mentioned below

6.1. Dietary Change

- Rely on less preferred and less expensive food
- Borrow food or rely on help from a friend or relative
- Purchase food on credit

6.2. Short- Term Measures

- Gather food stuffs or harvest immature crops
- Send household members to beg for foodstuffs
- Household members feed elsewhere

6.3. Number of People

- Limit portion size at mealtimes
- Restrict consumption by adults in order for small children to eat

6.4. Regulating the Food

- Feed working members of household at the expense of non-working members
- Skip entire days without eating
- SPSS was used in the analysis of data.

7. Results on the Food Security Status in the Kigezi Highland Region

From the findings of the study Pine Tree Plantations adopting communities presented issues that proved food insecurity in the communities. Table I above. The results showed that they agreed that 213(68.3%) of the population did not have enough food for the family: they agreed that they borrowed food, or rely on help from a friend or relative 210(40%).

Food Security Status	Agree	Neutral	Disagree
The population produced food not enough for the family	213(68.3%)	22(7.0%)	77(24.7%)
We rely on less preferred and less expensive food	108(34.6%)	35(11.2%)	169(54.1%)
Borrowed food, or rely on help from a friend or relative	210 (67.3%)	9(2.9%)	93(29.8%)
Purchase food on credit	136 (43.6%)	35(11.2%)	141(45.2%)
Gathered food staffs or harvest immature crops	152 (48.8%)	44(14.1%)	116(37.1%)
We at times consume seed stock held for next season	86(27.6%)	21(6.7%)	205(65.8%)
There moments we could send household members to beg for food staffs	149(47.8%)	25(8.0%)	138(44.2%)
We always Limit portion size at mealtimes	197(63.2%)	15(4.8%)	100(31.1%)
The family restrict consumption by adults in order for small children to eat	121(38.8%)	14(4.5%)	177(56.7%)
Would always reducing meals eaten in a day	185(59.3%)	7(2.2%)	120(38.5%)
There are moments when we skip entire day without eating	121(38.8%)	5(1.6%)	186(59.6%)

Table 1: Results Showing Food Security Status In Pine Tree Growing Regions

Source: Field Data (2016)

The respondents agreed that 136(43.6%) did purchase food on credit, 152(48.8%) gathered food staffs or harvest immature crops, 149(47.8%) could not send to beg for food staffs, they always limit portion size at mealtime 197(63.2%); family restricted consumption by adults in order for small children to eat 121(38.8%); they disagreed that there are no moments when they skipped the entire day without eating was disagreed upon with 186(87.3), 120(38.5%) were always reducing meals eaten in a day. The pine tree growing community had indicator of the crisis as far as how the results or percentages were presented. The farmers agreed that they relied on less preferred and less expensive food 108(68.3%), there was a disagreement that 205(65.8%) could not at times consume seed stock held for next season From the result percentages presented this is an indicator of food insecurity with in communities adopting pine plantation hence competition for the source of food. From the result percentages presented, we expect a few farmers especially the non-pine tree growers 99(31.7%) to be experiencing food insecurity, however, this indicates a bigger percentage from pine tree growers 213(68.3%) to be also food insecure. According to the results presented, the percentage trends seen are more than 99(31.7 %) experiencing food insecurity. This implies that a bigger percentage of pine tree growers experience food insecurity. Therefore, this community competes for the land resource for food production and growing of pine tree plantations. This is evidence of competitive live hoods.

Farmers were requested to identify other coping strategies adopted by communities in the Kigezi Highlands. They were presented as follows below:

8. Coping Strategies Or Mechanisms Applied By Communities Adopting Pine Tree Plantations

Major Indicators Food Insecurity	(Frequency)	Percentage (%)
Increased dependency on food from the Market (Okushaka)	267	85.6
Decline hiring or borrowing land (Okwatitira)	127	40.7
Increase in abandoned field (Wamutala) hence Abandoned crops (peas, millet, wheat, sweet potatoes)	112	35.8
Decline in Post harvesting and Storage of food (Ebitara)	126	40.4
Decline in land fallowing (Hinga raaza)	99	31.7
Labour is concentrated on cash crops not food crops (Obworo)	72	23.0
Decline Manure making for soil regeneration(okufumbira)	55	17.6
No more long day cultivation/labour shortage	32	10.3
Few Communal /Group cultivation	21	6.7
Labour from the elderly young look for white collar jobs and not working in fields	15	4.8

Table 2: Summary of Indicators (Coping Strategies) of Food Security in the Pine Tree Adopting Communities

Source: Field Data (2016)

This is in line with the coping strategies indicators of food insecurity in the area. The households had coping mechanisms which tend to decrease in their feeding habits indicating food insecurity the region. Farmers agreed that the 267(85.6%) depend on food from the Market (*Okushaka*), 127(40.7%) agreed that there was a decline hiring or borrowing land (*Okwatitira*) due to land shortage, 112(35.8%) for decline in abandoned field (*Wamutala*) hence neglecting crops like (peas, millet, wheat, sweet potatoes, 126 (40.4%) for a decline in post harvesting (*Ebitara*), and 99(31.7%) showing a decline in fallowing of land (*Hinga raaza*). This is in agreement with (Mulindawa, 2005), who explains the competitive livelihoods in the Kigezi Highlands and how they try to cope up with the agrarian crisis.

There are several studies about the agrarian crisis on the Kigezi Highlands as the colonial migration proceeded (Carswell, 2002). This nascent agrarian crisis initiated the solution to population pressure through resettlement. This was acclaimed as the main solution to agrarian crisis (Murindwa and Mukama, 2005). This acute crisis had reported wide spread of severe malnutrition, chronic under feeding, famine, food shortages, shortage of agrarian labour, gender imbalance, low literacy, wide spread on poverty, environmental degradation, civil strife and war. This attributed to food problems to high population and fragmentation from unproductive minuscule land. This showed that a big percent of the households owned less than two acres of land and cultivated it all continuously without rest. This indicated a competitive livelihood in the community. In reality, Kakitahi et, al (2014) talks about the coping strategy undertaken by the destruction of swamps attributed to high population pressure. The strategy was under the political guise underlying the colonial government of fighting off famine. However this ended up creating a propertized class or progressive farmers. This led to the spread of militant peasant resistance which created a competitive livelihood dilemma that has existed even with forms of policies applied to solve the crisis situations. Competitive livelihoods in our communities create pressures which are typically continuous and cumulative, therefore some stresses tend to be predictable, such as seasonal shortages, rising populations or declining resources.

All in all, developing communities will always find survival means so long as they are exposed the crisis of food insecurity. Coping strategies will always determine the food security in any community. The introduction of pine tree plantations created food insecurity in different communities.

Survival of human kind will always depend on the livelihoods that have been able to compete for the limited resources for mankind dependency. A gap will always be created where by the unprivileged communities suffer the consequences of limited resources at the expense those whose livelihoods are availed with the opportunity to access resources like pine tree plantation growing, hence what the researcher termed as a "dilemma".

This study shows the desire the researcher had to unearth the intricacies behind livelihood concerns as far as food security inand pine tree growing communities. The study therefore aimed at determining answers to questions of pine tree plantations influence on food security. The main aim of the study was to encourage pine plantation forestry among communities facing competitive livelihood challenges to the available resources for example land, food, and fuel wood extra. This is in line with the current Ugandan National Food Security and Nutritional Acton Plan and the current Sustainable Development Goals (SDGs). The goal presents SDG2 on "Zero hunger thus respectively strategizing to end poverty through livelihood protection. Zero hunger and the action on environmental challenges thus considering a food secure generation (Tumushabe, 2018)

9. Conclusion

Coping strategies will always determine the food security in any community. The introduction of pine tree plantations growing in the Kigezi Highlands communities brought about food insecurity. The communities had to resort to coping strategies for survival of any intervention adopted. The competition for resources will empower farmers to find other means of survival. These are both adequate and inadequate, some will survive food insecurity where as others don't, hence creating a gap in communal livelihoods.

The researcher employs an asset-based approach, emphasizing the promotion of people's access to and sustainable use of the assets upon which they rely on as central to poverty reduction. It stresses the need to understand the coping and adaptive strategies pursued by men and women.

Agriculture intensification will assist those with land holdings, those able to diversify to other investments; whereas others might migrate to new areas for virgin land to avoid competition extra. The community of the poor without resource will always suffer from food insecurity stress and shocks due inaccessibility to resources and pressure from the wealthy with resources. The study indicates the overall household nutrition conditions decline with the increasing reliance on cash crops especially in Kanungu District where tea growing is dominant. Production for cash crops led to increasingly depend on food from market as land is transferred from food production. Reliance on cash crops makes households dependent on the vagaries of market prices for these products: a drop in cash crop prices will mean a household has less with which to purchase food. In situations where the shift from food to cash crop production entails a shift in control of household income from women to men, household nutrition may be affected as women are most closely involved with provision of the household's food.

10. Recommendations

The Government of Uganda needs to strengthen partnerships with the private sector and civil society in implementing and reviewing policies and programmes to develop the agricultural and the forestry sector. Public private partnerships (PPPs) have been targeted for extension services, research and innovation development, and for agricultural mechanization. For example, PPP arrangements are usually initiated to rehabilitate the country's forests and food security, to increase production of timber and for developing new food supply chains. Food security and nutrition policies and programmes be must put into consideration, the specific needs and priorities for the marginalized groups and also target

interventions in a gender-responsive way that leaves no one behind. This will require interventions being developed based on a sound gender analysis and that the existing vulnerabilities and capacities be fully recognized, providing both men and women with the opportunity to be engaged in the whole process. Strengthen collaboration with research institutions and academia in measuring outcomes related to food security, to explore pathways such as building resilience to food insecurity, improving social cohesion, the role of institutions, or reducing the opportunity costs food security in the Kigezi Highlands.

There is need to attract the private sector agri-businesses to set up processing plants in zones of high food production especially in the Kigezi Highlands. This is enabled by government efforts to establish appropriate fiscal, investment and infrastructure policies for farmers. For example, the Agricultural Credit Guarantee Scheme Fund (ACGSF) for loans granted by commercial banks for agricultural production and processing. The government should identify extensive consultations with the national and international partners, and with technical assistance focusing efforts in the following areas: Strengthening smallholder farming productivity and competitiveness to reduce food insecurity and capacity building within agriculture plans and processes. Zoning for specialization purposes for example the staple crops production and processing. Zones scheme should be created to focuses on attracting private sector agri-businesses to set up processing plants in zones of high food production. This is enabled by government efforts to establish appropriate fiscal, investment and infrastructure policies. This can provide food security in agricultural production and processing in pine tree plantation adopting communities. Pine tree adopting communities can become not only food sufficient but also sustainably food secure, enabling them to join the Food Security Programme (FSP). They should focus on complementary interventions like the micro-credit for agricultural inputs, strengthening and establishing Rural Savings and Credit Cooperatives, and technical support for productive investments in agricultural products and other activities such as poultry, beekeeping and livestock production,

The Government of Uganda should place high priority on several national policies and programmes, which contribute to the common goal of raising nutritional levels, especially for the more vulnerable sections experiencing the pine tree plantation pressure. The set of policies include seeks to improve food security and nutrition in the country with the overall goal to attain universal and sustainable access to a minimum daily level of safe and nutritious food for a healthy, active and better life for all communities.

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