Effects of changing weather patterns in the agricultural sector: How has production and livelihood been affected?

Overview

Statistical analysis done on climate change in Uganda show that the mean annual temperatures have increased by 1.3^{o}C since 1960 with a more rapid temperature rise of 0.37^{o}C per decade (Ripel, 2014). The average number of 'hot' days and 'hot' nights per year have also increased since 1960. Recent reports from the Famine Early Warning Systems Network (FEWS NET) indicate that while there has been an increase in seasonal mean temperature in many areas in Uganda over the last 50 years, observations show that annual rainfall has been decreasing (IPCC, 2014).

Climate change is one of the internal factors that continues to undermine Uganda's economic performance. For instance, GDP from Agriculture decreased to Ug shs 3,110.66bn in the fourth quarter of 2017 from Ug shs 3,257.83bn in the third quarter of 2017 due to drought. Such a shock to agricultural production not only affected the basic livelihoods of majority of Ugandans but also reduced foreign exchange earnings of which the country is constrained to meet its import bills and external debt service obligations.

Weather and Climate change is caused by global warming due to accumulation of greenhouse gases (GHG) mainly carbon dioxide in the atmosphere from burning of fossil fuels. It has also been noted that the challenge of climate change is compounded by weak institutional capacity, lack of skills on climate change adaptation, inadequate management and above all the economy's dependency on exploitation of natural resources.

This **policy brief** discusses the effects of changing weather patterns in the agricultural sector and how production and livelihood have been affected.

Key Issues

- The country is facing increased frequency and severity of extreme climatic conditions such as landslides, floods, soil erosion, erratic rains and hailstorms.
- Farmer's crop production and productivity has been lowered due to vagaries of weather which also results in the buildup of emerging and re-emerging pests and diseases.
- There is increased food insecurity and poverty among those reporting crop /subsistence farming as their main source of food and income.

Introduction

The economy and wellbeing of the people in Uganda is highly dependent on climate. This is because over 80% of the population lives in rural areas and depends on rain-fed agriculture that is prone to impacts of climate variability. Climate change impacts on agricultural production in various ways. According to the Uganda Agricultural Census, 7% of the country's 3.95 million agricultural households were reported to be prone to flooding, with most incidences reported in the eastern region of the country. Furthermore, of the approximately 2 million agricultural households that experienced food shortages, 1.8 million (91.5%) experienced drought, and 1.3 million (66%) experienced pests or diseases.

This changing weather pattern is making it difficult for farmers in the country to plan using the traditional knowledge of the two planting seasons which seemed much easier to predict. Previously, the weather pattern indicated two good planting seasons, March to May and September to November which were timely and would enable farmers to follow the traditional trends of planting. However, this trend has since changed because sometimes there is continued rainfall during the dry seasons, and prolonged dry spell occurrences during

rainy seasons making it difficult for farmers to plan well. The onset of the rainfall pattern in the olden days was timely, and it was easier for farmers to follow the traditional planting trends.

Methodology

The paper used two sources of information. Primary data collected by the Budget Monitoring and Accountability Unit (BMAU), complimented by secondary data from Uganda National Meteorological Authority (UNMA), Uganda Bureau of Statistics (UBOS), and Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) for FY2013/14 to FY2017/18.

Manifestations of changing weather patterns

***Prolonged droughts*:** The agricultural sector, which is 90% rain-fed, has continued to thrive in the face of more unpredictable rains. In FY2016/17, Western Uganda suffered a prolonged dry spell in the summer, which reduced the growth rate of coffee, a major cash crop in western Uganda. Similarly, in FY2015/16 a farmer in Kikuba Village, Luwero Town Council received 420 coffee seedlings but about 100 coffee seedlings dried up due to harsh climatic conditions. Also in FY 2017/18, Cheretwo Joel, an irish potato farmer in Kween District reported to have experienced lower yield due to drought (i.e. expected a harvest of 200bags of irish potatoes, but only yielded 10bags due to the prolonged dry spells).

Frequent landslides: Changes in rainfall patterns are being observed as rainfall has become more unreliable and less evenly distributed, recent years have seen erratic arrivals and endings of rainfall seasons. In addition, rainfalls have been heavier and more violent, enhancing occurrence of landslides that have increased over the past years with enormous massive alterations in the lives of those affected. Extreme rainfall conditions are usually experienced in Eastern Uganda – the region is reported to have the highest occurrence of landslides, making this area challenging for agriculture production. In FY2013/14, the people of Bududa District on Mountain Elgon rose to a devastating shock, when unusually high and prolonged rainfall had led to the disintegration of parts of the mountain slopes. This affected farmers' livelihoods as the landslides prevent access to agriculture land for years and also destroy seed and food stocks, and commonly result in the loss of standing crops.

Frequent floods: Uganda's climate is naturally variable and susceptible to flooding, and events which have had negative socio-economic impacts in the past. For example, parts of Western and Southern Uganda faced severe flooding conditions as a result of heavy rainfall that happened in FY2016/17. Similarly, in FY2013/14 the same disaster hit areas in western Uganda. In Kasese District, floods destroyed 700 acres of crop - mainly maize, coffee, cassava and groundnuts among others, and around 40 heads of cattle, 70 goats and 700 domestic birds were killed by the fast running water and boulders from River Nyamwamba and Mubuku. This contributed to disruption of people's livelihoods and increased their vulnerability.

Effects of changing weather patterns on agricultural production and livelihood

Soil erosion: The impact of climate change is often associated with extreme weather events; this has become yet an added and more serious challenge triggering disastrous soil erosion, affecting livelihoods that are dependent on subsistence agriculture leading to intense tillage of land. Land pressures are therefore, extremely high, leading to high risks of encroachment on fragile areas and environmental degradation. The climate change driven El-Nino leads to devastating soil erosion countrywide, with a heavier toll taken on mountainous regions, leading to loss of life, arable land and property. For instance, disasters affected many mountainous and hilly areas in the west and south-western Uganda. In May 2010, an unusually high and prolonged rainfall led to disintegration on the mountain and hilly slopes in Kabale District, damaging prime agricultural land.

***Increased pests and disease prevalence*:** Pests and disease related attacks such as fall armyworm that is currently ravaging many parts of the country tend to follow periods of long dry spells. On average, 800,000 ha of crops are destroyed annually by climate related effects resulting into losses exceeding USD 47m. The fall armyworm lowered national crop production by 15-30% in FY2016/17 which affected cereals mainly maize, sorghum and cassava causing

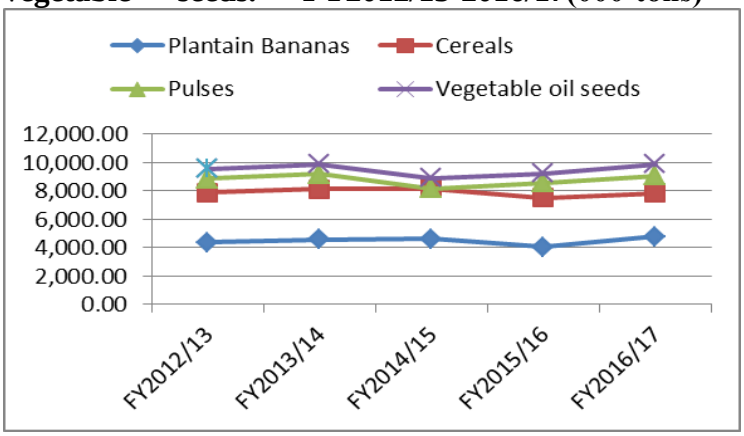
poor yield. Furthermore, some areas also suffered livestock disease outbreaks of foot and mouth disease, black quarter, tick borne diseases and lumpy which are associated with weather changes in districts like Kitgum, Agago, Pader and Lamwo among others that experienced economic losses (IPC, 2017). Other areas have also experienced changes in crop potential and an increase in pests and diseases depending on the changing weather patterns.

***Low production and productivity*:** Given that majority of the population in Uganda still derive their livelihood from rain-fed agriculture, in the event that drought and floods occur, people in the afflicted areas are disproportionately affected in terms of reduced crop and livestock production. The scorching heat has left millions of farmers in despair as their crops dry up. For instance, sugarcane production had increased by 27.2% from 2,640,000 tonnes in 2013 to 3,430,000 tonnes in FY2015/16. However, there was a 10.6% drop to 3,100,000 tonnes in FY2016/17, following the prolonged drought.

Similarly, according to a UBOS Report, in FY2016/17 there was a general reduction in production for most crops. There was a significant decline in production of plantains by 27%. Other crops with reduced production included; millet by 18%, maize by 12%, sorghum by 11% and beans by 25% among others which were all associated with weather changes among other factors.

Average agricultural production of cereals, vegetables, pulses, plantain bananas reduced from FY 2012/13 to FY 2016/17 due to a number of reasons, which include; prolonged drought, increased landslides, pests and diseases among others (Figure 1).

Figure 1: Production of selected annual food crops; plantain bananas, cereals pulses[1] and vegetable seeds. FY2012/13-2016/17(000'tons)



Source: MAAIF

Loss of food stocks: There has been a reduction in soil moisture which ultimately leads to serious crop yield losses. Intermittent and terminal drought is becoming very prominent in the country yet irrigation is unrealistic due to socio-economic constraints. Also, other calamities like hailstones induced by torrential rains destroy farmers' gardens, many that would be ready for harvest. In addition, climate changes brought about post-harvest losses-for instance harvesting of maize and sorghum coincided with heavy rains during the months of October and November 2017, thus causing high post-harvest losses due to poor drying conditions in Bududa in eastern Uganda.

Food insecurity: The FY2017/18 Integrated Food Phased Classification (IPC) report indicates that 13% of the total population in the country is facing stressed food insecurity (phase 2). Approximately 5.3 million people are experiencing acute food insecurity (phase 2 and 3), of which 440,821 (1%) are in a crisis situation (phase 3) and 4.8 million (16%) are stressed - this population has minimum adequate food consumption. According to IPC 2017 reports, all regions in the country have a stressed population, the highest being in Karamoja (35%), East Central (17%), Acholi (16%) and Central 2 (16%). The households in these

[1] Pulses: (Beans, Field Peas, Cow peas, Pigeon Peas) Cereals: (Millet, Maize, Sorghum, Rice, Wheat) Vegetable seeds: (Ground nuts, Soya Beans, Simsim, Sun flower).

regions all suffered the effects of prolonged dry spells that stressed most of the crops and reduced yields from both the first and second season. Data from the Uganda Bureau of Statistics indicates that food price inflation increased from 14.5% in January 2017 to 21.6% in April 2017 and was expected to continue rising in short run.

Increased poverty: Poverty can be induced by climate change. As farmers adapt to the changing climate, costs of production rise as they struggle to increase productivity, (with more expense on inputs such as labor for irrigation, use of fertilizers, and control of pests and diseases) a situation that cannot be achieved under low management (Rao, 2013). Lower yields mean less food and less income. For instance, in Western Uganda, there was an increase in number of people below the poverty line (24%) by three times (i.e. from 0.6 to 1.8) after the drought. Poverty increased from 23% to 36% among those reporting crop farming/subsistence farming as their main source of income, drought contributing 78% to this worsening situation. Similarly, poverty in Karamoja remains endemic which is associated with harsh weather conditions. An estimated 74.2% of the population lives below the poverty line compared to the Ugandan national average of 19.7% (UNHS 2016/17).

Conclusion

Weather and climate change have led to fluctuations in rainfall patterns causing more frequent and intense events such as floods, heat waves, landslides and droughts among others. These have resulted in soil erosion and increased pests and diseases that have affected Uganda's agriculture production and people's livelihoods. There are incidences of increased food insecurity and poverty among the affected communities.

Policy Recommendations

1) The National Agricultural Research Organization, and the National Agricultural Advisory Services should continue developing and distributing high-yielding, disease and drought resistant crop varieties and explore solar irrigation schemes for farmers across the country.

2) The National Environment Management Authority should promote environmental conservation including agro-forestry schemes to reduce food insecurity in the country.

3) The Ministry of Agriculture, Animal Industry and Fisheries, the National Forest Authority, and Ministry of Water and Environment should create awareness and implement the identified strategic interventions of the National Climate Change Policy and strategy.

References

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