Briefing Paper

Climate Change, Food Security and Trade: Evidence from the East African Community

Summary

This briefing paper explores the impacts of climate change on food security and trade in the EAC and proposes recommendations to better cope with the associated challenges. Several case stories illustrate the close linkage existing between the three issues and the need for coordinated policy action both at the national and regional levels. Possible mitigating strategies range from introducing flexibilities in the WTO TRIPs Agreement to increasing investment in agriculture to support a shift towards more climate-resilient practices.

Introduction

According to the UN IPCC, sub-Saharan Africa is likely to face above average global warming, leading to more droughts, less agricultural and food production, and changes in patterns of production given that conditions will be less supportive of the production of current staple food crops. As always the poor and marginalised, including subsistence farmers in rural areas and the poor consumers in urban areas are expected to face the worst consequences.[1]

Climate change impedes trade. Primarily and most apparently, climate change impedes trade in agricultural products. Although farmers are not necessarily involved in trade in the EAC, since they are mostly producers, a lower production diminishes surplus that could be traded. This is because climate change compromises food production which hampers farmers' abilities to produce enough and have surplus to trade.

If unfavourable climate persists for an extended period of time it can also ultimately discourage farmers, prompting them to either abandon agricultural activities altogether for extended periods of unemployment, or spur them to assume work in another sector. Climate change can also affect trade by altering the comparative advantage and input costs of a country's specific products. However, climate change does not necessarily entail a negative effect on food production; in some regions it may actually have a positive impact. From another perspective, climate change can also affect trade by disrupting transportation, supply chains, and logistics. Floods, landslides, and other extreme weather patterns may contribute to increased costs

and delays for both internal and international trade through exports and imports, not only hindering agricultural trade, but also other sectors that utilize geographically extensive supply chains.

Conversely, trade can also affect climate change. Most obviously, this occurs due to the increase in GHG emissions (especially through air transportation), and thus significantly contributes to climate change. However, this is not the only way through which trade can impact climate change as demonstrated in the ensuing section.[2]

Impacts of Climate Change on Food Security and Trade in the EAC

The aggregated impact of climate change in the EAC has a net negative on trade. In each of the EAC countries, particular cases of calamities demonstrate the disastrous effects of climate change on trade.

For instance in Burundi, the rainfalls of February 2014 in Bujumbura have been the heaviest experienced in the past 30 years, creating landslides and flash flooding destroying infrastructures in the country including bridges, roads and buildings[3]. Infrastructure is vital for trading purposes in the region: its destruction will impede supply chains, transportation and distribution related to trade. This will lead to increasing trade costs, which will negatively impact the economy of the entire country. It is too soon to observe macroeconomic repercussion of this loss of infrastructure, transport, etc. Other regions of Burundi have also been affected by climate change; in the Kirundo area of the Bugesera region that was knowned as the source for production and trade of beans and sorghum on which regions such as Bujumbura, Gitega, Mwaro, Ngozi, and Rumonge were dependent is no longer producing these crops in abundance. Absence of statistical data makes it difficult to quantify the extent of the drought's effects on the production and marketing of the beans and sorghum in the region. However, price increases are indicative of the decrease in production arising from climate-related reasons. The price/kg of ordinary beans has increased by 300% between 2000 and 2012, sorghum by 350%, and maize by 250%[4].

The negative effects of droughts can also be observed in Kenya, where the last good rainfall was in 2006-07. An interview with the pastoralists in Garissa indicated very disturbing realities of the impact of climate change experienced in this region. In the 60 days between March and April 2012, which is usually a long-rain season, Garissa District received rainfall for a period of only seven days. Moreover the down pour was very heavy and resulted in floods that caused huge losses estimated at around KES 670 million shillings[5]. The implications are diverse but one related to trade is the loss of market for livestock that were emaciated. During prolonged droughts livestock are usually sold very cheaply to avoid incurring full loss resulting from inevitable death from starvation. Given that livestock production is the main economic activity, such losses adversely reduce purchasing power of nearly all households in this region and their ability to access food[6].

As coastal states, sea-level rises and resulting coastal erosion is of particular concern for both Kenya and Tanzania. Due to the fact that highly productive ecosystems such as mangrove swamps, estuaries, deltas and coral reefs are located in the coastal zones, climate change also impacts the corresponding economic activities like tourism, mining and fisheries. In both Kenya and Tanzania, coral reef loss is a significant cause of coastal erosion and a major coastal management issue (Magadza, 2000). The economic impact of these climate-change-induced variations have not yet been quantified but in Kenya, for instance, losses for three crops (mangoes, cashew nuts and coconuts) were estimated to cost almost US$500 million for a 1 m sea-level rise in 2002 by the Kenyan government[7].

In the case of Tanzania, climate change's impact on infrastructure caused by sea-level rise affects economic development, including port infrastructure and tourism. It is predicted that sea-level rise of 70cm by 2070 would cause damages to port infrastructure in Dar-es-Salaam, Tanzania – a hub for international trade – exposing assets of US$10 billion, or more than 10% of the GDP. Such damage to the Dar-es-Salaam port would have larger economic consequences since it serves as the seaport for several of Tanzania's landlocked neighbours[8].

Among the other observed effects of climate change in Tanzania are unpredictable and irregular patterns of rainfall in the central part of the country (Dodoma region). This situation has been occurring for the past ten years resulting in reduced crop production since rains come late during the seasons, and last for very short periods. In most cases, these rains leave crops half grown and once the long dry season sets in, the crops dry out. As a protection against erratic rainfall and inaccurate predictions, local farmers rely on a tree known in their native language as Mgani. Once the tree starts blooming with flowers and they become green they know the rains are about to come. Crop and business loss was caused by sticking to this traditional knowledge despite changing rainfall patterns[9]. Declining rainfalls are also being experienced in other parts of the country, which has led to reduced flow of two important rivers. This has resulted in ecological and economic impacts such as water shortages, lowered agricultural production, increased fungal and insect infestations, decreased biodiversity and variable hydropower production. Due to high temperatures and less rainfall during already dry months in the Tanzanian river catchments, it is predicted that the annual flow to the River Pangani may reduce by 6-9% and that of River Ruvu by 10%. Considered as one of Tanzania's most agriculturally productive areas and an important hydropower production region, the Pangani Basin hosts approximately 3.7 million people. Climate change therefore threatens the productivity and sustainability of the entire region's resources[10].

Uganda is also experiencing negative effects of climate change, which impact food security and trade. Floods caused by heavy rains attributed to El Nino, swell rivers and inundate the relatively low-lying flat areas of the country. In November 2007, heavy rains led to flooding in the Teso region particularly affecting Katakwi and Amuria districts in eastern Uganda. That instance caused loss of livestock, destruction of crops, destruction of infrastructure and landslides in the eastern and south-western parts of Uganda[11].

Change in climatic conditions in EAC could partly be attributed to human activities such as measures to facilitate trade and to spur economic development, and efforts to diversify in agricultural production.

In Tanzania, exporting logging, lumber, and charcoal are attractive and remunerative activities. This has resulted in substantial loss of tree coverage, threatening sustainability of ecosystems, particularly in rainforests where biodiversity is huge[12].

Similarly the Uganda government's programme promoting the production of upland rice has resulted in deforestation and soil erosion due to change in land use. Similarly, in Eastern Uganda where the Dokho wetlands that have for centuries provided drainage and prevented flooding of Mbale the biggest town in the region, have been turned into rice fields which threatens to destroy the fragile wetlands. Decades ago the area was predominantly covered by papyrus and other shrubs. Now, over one thousand hectares of these wetlands have been reclaimed for rice production. Richard Mafabi, a Commissioner for Wetlands in the Government Ministry of Environment, says the action of farmers who clear and grow rice on the wetlands is making it harder for the country to cope with climate change. Floods have already become more regular, and the commissioner warns that unless rice farmers stop planting on wetlands, the country could be headed for an environmental disaster[13].

This quest for economic and trade development has not only affected the agricultural sector, but has also resulted in the degradation of the Lake Victoria, the second-largest freshwater lake in the world (shared by Kenya, Uganda and Tanzania). Its contamination is threatening trade and livelihoods in these EAC countries. Its basin, according to specialists, has the fastest-growing population in East Africa - more than 30 million people. Much of this population derives its livelihood directly or indirectly from the lake. A recent report by the UN Environment Programme listed Lake Victoria as among African water bodies whose water level is falling due to environmental degradation and climatic changes. Across the three East African nations, the lake had become a reservoir for excessive untreated effluents, including sewage, industrial waste and other chemicals. Fred Mukisa, Uganda's minister in charge of fisheries, told that apart from pollution, over-fishing was depleting the fish reserves, with the apparent decline in fish

harvests forcing some processors to close shop. Those remaining were operating at less than 50 percent capacity, due to reduced stocks. Meanwhile, earnings from fish exports keep declining. "We were earning over $150 million from fish exports in the past years but I don't think that we shall even earn $90 million this year," Mukisa added[14].

In some instances, climate change in the EAC region could potentially impact trade positively. A study, published in the Review of Development Economics 2012, shows that Tanzania has the potential to substantially increase its exports of maize and take advantage of higher commodity prices with a number of trading partners due to predicted dry and hot weather that could affect those countries' usual sources for the crop. The study co-author Noah Diffenbaugh, an assistant professor of environmental Earth system science at Stanford's School of Earth Sciences and a center fellow at the Stanford Woods Institute for the Environment[15] affirmed that: "Tanzania is a particularly interesting case, as it has the potential to benefit from climate change if climate model predictions of decreasing drought in East Africa prove to be correct, and if trade policies are constructed to take advantage of those new opportunities."[16]

More generally, the climate change in the region has benefited Tanzania's food production system. The country still has ample areas in the southern, western and lake zones with low risk, vulnerability hotspots and high climate change adaptive capacities. Thus, Tanzania has potential to be one of the leading food producers in the region. To do so, it should strengthen its comparative advantage in food production and strategically be better placed to increase the food supply in the region by strengthening its grains supply chain. Tanzania can actually produce food at a lower opportunity cost than other regional states and sell it at prices that are more competitive[17].

Climate change presents some opportunities to boost technology transfer, and at the same time enhance regional and international trade and exchange through the following means:

- An opportunity for agricultural production technologies and processing, such as low methane emitting rice varieties and cleaner/ green agro-processing technologies, processes and facilities with high eco-efficiency;
- An opportunity to develop and disseminate renewable energies technologies, such as solar, wind and geothermal energy;
- An opportunity to improve and disseminate efficient cook stoves to reduce the quantities of charcoal and firewood needed;
- An opportunity to develop and promote eco-friendly and low emission production processes in industries, including re-designing and re- engineering manufacturing processes to reduce emissions and waste, for example, pollution abating technologies in iron smelting and other extraction industries to be established in southern Tanzania; etc.

The challenge of implanting this low emission technology transfer remains due to lack of finance to procure, transfer, and facilitate the adoption of the appropriate proprietary technology held by private and public organisations, or accessing technologies in the public domain under special, negotiated arrangements[18].

According to the study "A global and spatially explicit assessment of climate change impacts on crop production and consumptive water use" published on the 27th of February 2014[19], in some African regions climate change could lead to increase in agricultural output and make farming become less dependent on water. The researchers, based in Canada, China and Switzerland, set out to predict the combined impact of climate change on food production and water levels globally, regionally and locally. Using eight climate scenarios, they estimated the yields of three staples - maize, rice and wheat - and water use for the short-term 2030s period and the long-term 2090s one. They then compared these with figures obtained in the 1990s. "Southern and eastern parts of Sub-Saharan Africa, along the Rift Valley, may profit in the short run from climate change regarding yields for the three staple food crops," says Christian Folberth, a co-author of the study. "Western and central parts, on the other hand, show a slight negative impact." In contrast, regions with insufficient water, including

most parts of Sub-Saharan Africa, will depend less on irrigation for water because of favourable temperatures. Folberth says that, until the 2030s, the increase in atmospheric carbon dioxide and modest changes in temperature may lead to yield increases in some regions if temperatures do not exceed crop temperature thresholds. By the 2090s, however, the thresholds may be reached resulting in low yields[20]. Richwell Musoma, an irrigation agronomist at Zimbabwe's Department of Irrigation Development, differs from the above observations, and says the study's findings are unlikely to be experienced in most African countries. He cites a 2011 Food and Agricultural Organization study that predicted yields from agriculture in Sub-Saharan Africa will decline by between 20 per cent and 50 per cent by 2050. Musoma also notes that, due to erratic rainfall patterns experienced in most African countries, irrigation has become important, and thus water use is likely to increase in the 2030s[21].

The way Forward

To counter the negative effects of climate change on trade and vice versa, and to take more advantage of the positive effects, stakeholders at all levels need to build their capacities on trade-climate change linkages; priority areas need to be defined for policy action in each EAC country; and coordinated responses need to be fostered at national and regional level, drawing on exchange of experience and greater interaction among relevant stakeholders.

It is imperative that the five countries implement policies that address climate, food security and trade holistically. Understanding of the interactions of these issues is important in order to develop effective policy responses. To this end, advocacy on the inter-linkages between climate change and trade should be done at both the regional and national levels, targeting all stakeholders including farmers so that they are equipped with the knowledge to adapt to the climate change and variability[22].

Focused efforts of awareness-raising among general populations can create the critical local ownership that is a must to effectively implement adaptation and mitigation interventions. There is an urgent need for a forum that brings together all stakeholders to share perspectives, as well as for knowledge and expertise development to establish and implement holistic mitigation and adaptation policies. The "Promoting Agriculture, Climate and Trade in the East African Community" (PACT EAC) project an initiative of CUTS International and partner organizations in EAC is a positive step towards achieving this need[23]. Another NGO, the International Institute for Sustainable Development, has also worked on capacity-building of the different stakeholders by supporting community-level adaptation actions that enhanced resilience to climate change in the short and long terms, and promoting integration of adaptation into policy- and decision-making at the national and sub national levels. The main objectives were to improve access to relevant climatic information at the local level, policy change by catalyzing local partnerships and embedding adaptation initiatives in existing programs, and to engage district and municipal officials in adaptation actions[24].

There is a need to set priority areas for policy action in each country so as to mitigate the effects of climate change on trade and inversely. Infrastructure development, adoption of effective weather forecasting technologies, implementation of reforestation and afforestation programs appear are critical action points.

More generally, there are sectors such as tourism, agriculture, fisheries, forestry and energy production that are very sensitive to the adverse effects of climate change. In this context it is imperative for all countries to diversify their economies either by expanding climate-resilient sectors and/or by promoting adaptation measures that increase resilience within the climate-sensitive sector. Taking the example of tourism, a key sector to address poverty reduction and foster economic growth in many EAC countries, there is an urgent need to prioritise actions in this sector and to adopt social, economic and climate responsive policies that will encourage sustainable tourism.

The agricultural sector needs also to be prioritised in the EAC region, and adaptive approaches to minimize the adverse effects of climate change on agriculture (include initiating reforestation

and afforestation activities, improving irrigation efficiency, conserving soil moisture through appropriate tillage methods, crop diversification, etc.) considered urgently. The energy sector should also be prioritized given that climate change is expected to affect both the supply of and demand for energy production. Energy diversification can be seen as an adaptation measure to increase resilience within the energy sector in responding to the anticipated impacts of climate change[25].

The effects of climate change on trade and the impacts of trade on climate change are a common challenge for the EAC region, but require different solutions at national (and even local) level. Implementation of regional policies, strategies and action plans at the EAC level to deal with climate change and trade within the region are mostly in place. However these need to be synchronized in order to tackle the issues of climate change and trade holistically. There is also a great need to harmonise and integrate the regional policies within individual Member Countries' national policies and action plans for their effective implementation. This calls for proper and clear institutional frameworks both at the national and regional level[26]. Moreover, establishing sound working relationship among the relevant ministries such as ministries of trade, agriculture, environment and EAC, water, irrigation- to name but a few, is imperative for policy coordination and coherence. Without substantial cooperation and coordination, policies will automatically result in conflicting and undesirable outcomes, rather than addressing the challenges at hand[27].

The initiative named the East African Community Climate Change Master Plan (EACCCMP) is a concrete example of regional coordinated actions to ensure the minimization of climate change effects on trade and vice versa. This 20-year plan (2011-2031) is an outcome of a consultative and participatory process for a unified regional approach to combat climate change. The overall objective of the Master-Plan is to strengthen regional cooperation to address climate change issues that concern regionally shared resources. To ensure that the prioritised sectors vulnerable to climate change (agriculture and food security, water security, energy security, tourism, infrastructure, trade and industry, etc.) become climate-resilient, the Master Plan has established key pillars to work on and develop: adaptation interventions ; mitigation interventions ; technology development and transfer ; capacity building ; education, training and public awareness ; gender, youth and marginalised groups ; climate risk management and disaster risk reduction; and climate finance[28].

Recommendations and conclusion

To achieve a win-win situation on trade and climate change issues, all the stakeholders at all level will need to change their patterns and adopt more sustainable way of thinking and doing. It is recommended that:

- Liberalisation of trade of environmental goods and services should be encouraged. The WTO should finalise the process of defining goods and services to be classified as environmental.[29]
- Flexibilities should be introduced in WTO TRIPs Agreement to facilitate countries, particularly developing countries, acquire and use climate friendly technologies. Countries should be incentivised to adopt climate-friendly measures, including through IPR laws for example. National policy efforts to support migration from fossil to renewable energy use should be allowed even in cases where they may counter conventional WTO regulations.[30]
- Subsidies to local firms operating in the renewable energy sector should be promoted.[31]
- Shift in agricultural practices needs to be a central part of a future strategy. Organic agriculture practices, use of organic inputs, availability of resilient seeds and plants, crops shifting and terrace agriculture can contribute to reduction of the impact on soil and improve the resilience of the agricultural sector. [32]
- Additional investment in agriculture infrastructure (irrigation and stock facilities), water management (for harvesting and drainage), road infrastructure maintenance, hedge risk schemes and insurance, and the introduction of climate change readiness systems will reduce impact of climate change over food security and trade. [33]
- Innovation and dissemination of new

technologies will be important for both adaptation and mitigation. Public as well as private research will be required to ensure that this can take place, especially given developing countries' limited capacity to fund new research in this area. At the same time, existing tools and knowledge can already be employed and should be encouraged via concerted extension services.

Endnotes

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CUTS International, Geneva

37-39, Rue de Vermont 1202 Geneva, Switzerland
Ph: +41 (0) 22 734 60 80 | Fax:+41 (0) 22 734 39 14
Email: geneva@cuts.org | Web: cuts-geneva.org
Skype: cuts.grc

This briefing paper is authored by Leslie Debornes, Intern, under the supervision of Julian Mukiibi, Senior Programme Officer, CUTS International, Geneva. CUTS briefing papers are to inform, educate and provoke debate on specific issues. Readers are encouraged to quote or reproduce material from this paper for their own use, provided due acknowledgement of the source is made.