Report on CCAFS Regional Scenarios Development

for East Africa

CCAFS Scenarios Team

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1. Background

Climate change represents an immediate and unprecedented threat to the food security of hundreds of millions of people who depend on small-scale agriculture for their livelihoods. At the same time, agriculture and related activities also contribute to climate change, by intensifying greenhouse gas (GHG) emissions and altering the land surface. Responses aimed at adapting to climate change may have negative consequences for food security, just as measures taken to increase food security may exacerbate climate change. This complex and dynamic relationship between climate change, agriculture and food security is also influenced by wider factors. Agricultural and food systems are heavily influenced by socio-economic conditions, which are affected by multiple processes, such as macro-level economic policies, political conflict, the spread of infectious diseases, etc.

Concerted action is urgently needed to address the complex and uncertain political and economic challenges of food security. A new research initiative is needed to inform this action – one that integrates and applies the best and most promising approaches, tools and technologies emerging from numerous disciplines. The involvement of farmers, policy-makers, researchers, donors and other stakeholder groups in the research process is key. Successful mitigation and adaptation will entail not only individual behavioural changes, but also changes in technology, institutions, agricultural systems and socio-economic systems. These changes cannot be achieved without improving interactions between scientists and decision-makers at all levels of society.

Methods are needed to help policymakers and resource managers evaluate the trade-offs between local benefits and global goods when addressing food, energy and water scarcity (among others) and planning land use options for resilience, given the uncertainties of the future. The goals and interests of stakeholders cannot be ignored, and reconciling these with global goods is essential.

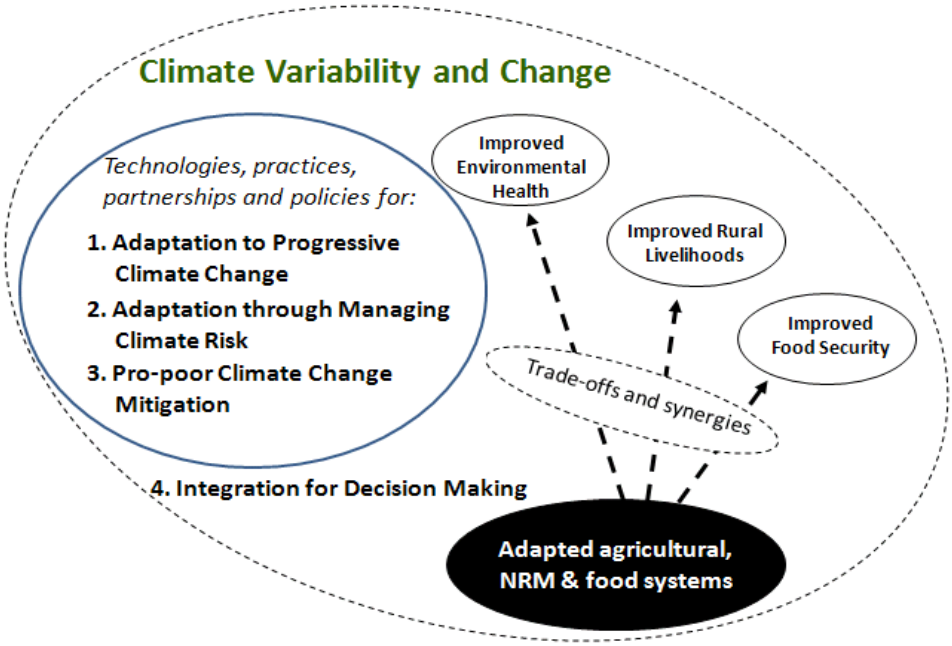
Greater adaptive capacity has to be fostered, allowing communities to draw upon a range of options to support their livelihoods. This, in turn, implies a greater adaptive capacity on the part of policymakers, decision makers and scientists. An enabling institutional and policy environment is needed, and sustained efforts to improve the links among and between research, the policy environment and stakeholders in developing countries are required.

Scenario analysis conducted at the regional level is an innovative approach to systematically explore the technical, institutional and policy options that these different sets of stakeholders have at their disposal in tackling this complex set of concerns.

Objectives of the CCAFS programme

1. Close critical gaps in the knowledge of how to enhance – and manage the trade-offs between – food security, livelihood and environmental goals in the face of a changing climate (see **Figure 1** below).
2. Develop and evaluate options for adapting to a changing climate to inform agricultural development, food security policy and donor investment strategies.
3. Enable and assist farmers, policymakers, researchers and donors to continually monitor, assess and adjust their actions in response to observed and anticipated changes in climate.

Figure 1. Climate Change, Agriculture and Food Security



2. Engaging stakeholders

Understanding vulnerability, identifying appropriate interventions, assessing their effectiveness, and leaving a sustained legacy of improved decision making, all depend critically on effective modes of *engagement* with a range of stakeholders at different levels. CCAFS is initially being implemented in three regions, viz. West Africa, East Africa and the Indo-Gangetic Plains.[1] Research within the focus regions will target scales ranging from the field and household to sub-regions. Local level questions – researched in case-studies at the sub-regional level - will be integrated into regional-level perspectives.

Within the '*Integration for Decision Making*' theme, CCAFS activities are oriented towards firstly, ensuring that climate variability and climate change issues are mainstreamed into national, regional and international agricultural development strategies and institutional agendas; and secondly, that innovative information products and communication processes

[1] Through scoping studies and regional consultations the following countries have been selected in each region for initial inclusion in the scenario development work in **East Africa** – Ethiopia, Kenya, Uganda and Tanzania.

are developed and maintained at local, national and regional levels. One of these processes to drive the articulation and integration of stakeholder voices and priorities at the regional level, is the development of regional scenarios.

3. Approach taken to Scenario development in East Africa

The approach adopted here is to develop scenarios for East Africa to 2030 using a qualitative, narrative approach that takes account of the three components of the CCAFS programme. Over the course of approximately 12 months, the outputs will be developed and refined through interaction with a wider group of stakeholders and through interaction with the quantitative modelling community, specifically in the agricultural modelling sphere. The practical steps for implementing this approach are outlined below.

3.1. Steps for developing regional Scenarios

Step 1: Identify key regional CC-Agric-FS practical and policy issues through stakeholder consultation workshops involving CCAFS Thematic researchers and regional stakeholders including scientists, policy-makers, the private sector and civil society;
Step 2: Once the key issues have been identified, engage in a strategic conversation with stake-holders in each region to define the range of questions to address in the scenarios exercises;
Step 3: Assemble regional scenarios teams to draft a set of prototype regional scenarios;
Step 4: Describe and systematically assess developments per scenario for each key food security determinant;
Step 5: Plot and compare each assessment of food security outcomes. The analysis is likely to use at least one common axis for all regional analyses;
Step 6: Facilitate interactions and learning between the three regional scenarios teams;
Step 7: Institute procedures to evaluate and learn from the scenario analysis process.

3.2. Important considerations for the CCAFS Scenarios development activity include:

(i) Identify the key stakeholders to ensure appropriate participation;
(ii) Maximise stakeholder engagement to engender buy-in;
(iii) Decide on the main areas of uncertainty to identify the focal questions;
(iv) Agree on the main drivers of change to 2030 to determine the nature of the narratives;
(v) Agree on the optimum combination of qualitative/quantitative analysis to decide the degree of quantification;
(vi) Explore the implications of the scenarios to point to appropriate adaptation options;
(vii) Plot strategies that will optimise communication and learning to ensure impact.

4. Developing prototype scenarios in the East Africa region

4.1. Scenario Development Workshop 1: Nairobi

Working in close collaboration with CCAFS' regional partner, ASARECA, key stakeholders were identified and invited to the first workshop (Scen WS1). This workshop was held in

Nairobi, Kenya during 25-26 August 2010. Annex 1 lists the workshop participants. The Scen WS1 objectives were:

(i) To familiarise the participants with the concepts, purpose and methodology to be followed in developing qualitative scenarios for East Africa
(ii) To discuss and agree on the main drivers and their uncertainties for the region in respect of Climate change, agriculture and food security
(iii) Based on these drivers, to derive a set of four or more 'future worlds' that will provide the framework for developing the prototype scenario narratives
(iv) To identify writing teams to undertake the work of expanding these narratives and to ensure that ownership of the scenarios begins to emerge from within the region

It was envisaged that by the end of the first day of the workshop, all participants would have a basic familiarity with scenario development, and be in a position to work in groups to map out three to four scenarios for East Africa in 2030. It was made clear, however, that this workshop was the *start of a process*, and not a one-off event which would deliver a polished product. There would be a follow up meeting as well as a period of work in between. By the end of this workshop, however, the facilitators hoped to establish a strong outline for plausible futures for food security and agriculture in East Africa, as well as identify individuals who would take the process forward, to develop the narratives and thereby to begin to take full ownership of the process.

During Day One of the workshop, participants identified and prioritised the drivers that are important in this region for agriculture and food security to 2030. They were charged with addressing the following question: What are the major driving issues and their uncertainties for EA food security and agriculture/land use? Identify a set of 3 to 5 key drivers that are also uncertain. The **key drivers** with the greatest uncertainty to 2030 as identified and agreed upon are listed in Table 1:

Table 1: Key drivers in East Africa and their uncertainty

	Key Drivers	Uncertainty
1.	Globalisation	How globalisation will play out in East Africa (including the rate of uptake of new technologies)
2.	Regional integration in East Africa	The impact on political stability and the capacity to implement change in the region
3.	Environmental management (including of land and water resources)	Whether the region will take a proactive or reactive approach to environmental management
4.	Markets – the influx of foreign investment, trade and influence from the East (and West)	The impact of markets and especially of the investments by emergent world powers

Two additional drivers were identified as critically important, but their degree of uncertainty was more limited and they were assumed to be constant across all narratives to 2030. These are:

- Climate change (1 deg + to 2030), [but with increased climate variability]
- Population increase up to 360 million in East Africa [but with increased population mobility and therefore varying population densities in rural and urban areas]

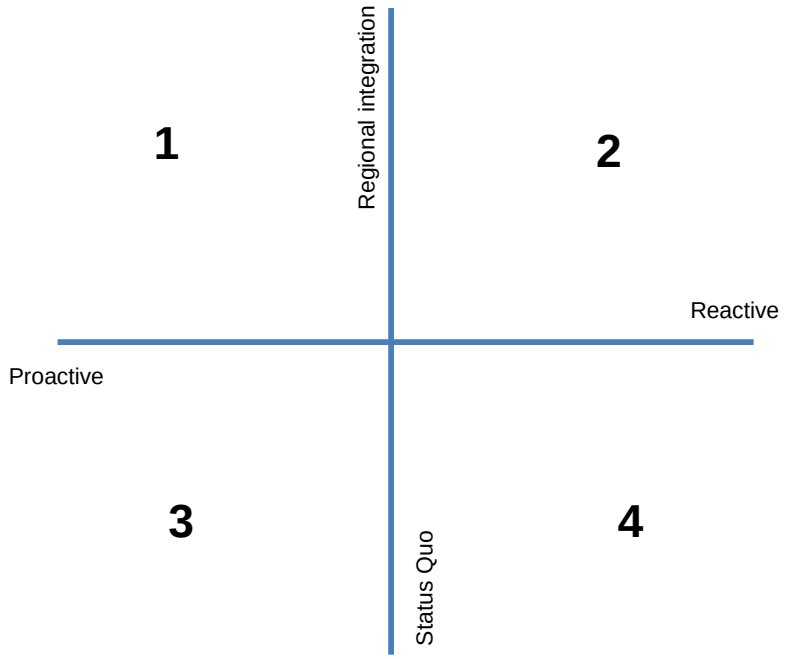
The impact of these two drivers emerges in each of the narratives.

Break-out groups were then charged with imagining two or more plausible future worlds that were shaped by these key drivers and with outlining their essential features. During the subsequent plenary report-back and discussion, consensus emerged around the commonalities in the various plausible future worlds. Participants agreed on two critical 'organising' uncertainties:

(i) the *extent of regional integration* (both political and economic) anticipated by 2030
(ii) the *proactive/reactive stance* of governments (and other regional actors) *at the regional level* in relation to environmental management and food security.

This analysis provided the structure for a 'two-axis' schema that could underpin the plausibility of the prototype scenarios (see Figure 2 below).

Figure 2: The 'two-axis' schema for drivers in East Africa to 2030



Through an iterative process of further group work and plenary sessions, four 'zero-order' narratives were developed, and their key assumptions and logically consistent features were briefly explored. These were:

1 = Regional integration and proactive stance (towards environmental management and food security)
2 = Regional integration and reactive stance
3 = Status quo and proactive stance
4 = Status quo and reactive stance

Note that '*Status quo*' does not imply or indicate stagnation, but rather than the slow and uneven rate of integration that characterises the present situation in East Africa. A process for further development of the narratives for each scenario was elaborated. This involved a group of participants volunteering to expand the 'zero-order' narratives for each scenario. Fourteen people, comprising four groups of up to four writers and reviewers each, had a period of six weeks to expand these narratives in preparation for the second Scenario workshop (Scen WS2) and were provided with detailed guidelines to assist with this task.

5. Essential features of the four narratives

	Narrative	Essential features
1.	**Regional integration and proactive**	Regional integration has led to political stability, major investments in regional infrastructure and telecommunications, and sustained economic growth in the region. A proactive, strategic focus at the regional level on agriculture-led development has paid dividends in respect of greater agric commodity and value-added exports. Although governments in the region have been proactive in improving food security and reducing poverty, pastoralists, small-scale farmers and fishers are the big losers: a drop in rangeland productivity coincident with a more efficient, export-led but concentrated (in terms of ownership) livestock production sector; more efficient agriculture pushes peasant farmers out; and the use of water for agriculture means that the needs of fishing communities are not adequately considered. Environmental management is proactive – an already-agreed afforestation programme is implemented and, although under considerable pressure from all users, the management of regional water resources improves.
2.	**Regional integration and reactive**	Regional economic and political integration has realised substantial gains and trade is booming in the region. Regional growth is based on investment in export-led industrial development, infrastructural development and agro-processing, but the region is reactive to shocks, so growth has been at expense of the environment and food security. The water situation in the region is particularly dire: water shortages are common and key water sources are badly polluted. Soil erosion has also reached alarming proportions. Populations have shifted *en masse* to urban areas. It is left to NGOs, civil society organisations and foreign donor governments to pressure the EA Federation to alleviate poverty and introduce a climate-sensitive environmental management regime.
3.	**Status quo and proactive**	A lack of progress on regional integration *and* on internal governance is a feature of this scenario in 2030. The competitive interests of individual states prevail at the expense of the region as a whole. However, investments in transport infrastructure – led by Asian superpower countries and companies – have been significant. Excellent progress has been made in proactively managing the region's water resources, with this work largely funded by the Global Climate Change Mitigation and Adaptation Fund. However, smaller countries with weaker and often more corrupt governments, and the urban poor, remain water insecure. Some growth has been the norm, progress has been slow in relation to

		poverty reduction and it is NGOs that are most proactive in this respect. Other than in the water sector, many countries in the region has been 'proactive on paper' in respect of environmental management: some have made good progress, others have not progressed at all. The Asian investments in the economy and the environment are very noticeable, with both positive and negative impacts. In 2030, most EAC countries still fail to achieve food security.
4.	**Status quo and reactive**	This scenario depicts East Africa in 2030 as a region that is characterised by poor governance, corruption, a lack of integration, widespread political instability, conflicts over natural resources and continued exposure to the negative effects of globalisation. Furthermore, there is limited planning of initiatives directed towards addressing poverty, food insecurity, livelihood diversification, markets access and environmental degradation. In this 'do-it-yourself' situation, economies have contracted. Predatory investments by multi-nationals from Brazil, Russia, India, China or South Africa (BRICS), as well as the existing (Western) ones, provides further pressure that is dealt with reactively, and as it arises by individual countries. Agriculture remains the mainstay of the region's economy, but remains underfunded and hunger stalks the land. Environmental resources suffer because governments react to environmental crises only once ecosystems collapse and human suffering becomes critical. Nearly everyone loses, but pastoralists are among the biggest losers.

6. Scenario Development Workshop 2: Dar es Salaam

Scen WS2 was hosted by the Pan-Africa Office of ESSP-START at the Institute for Resource Assessment at the University of Dar es Salaam, Tanzania. It was held in Dar es Salaam during 5-7 October 2010. Twenty-four people attended, including most of the core writing team.

6.1. The **objectives** of the Scen WS2 were to:

- Present and then refine a draft set of four East African scenario narratives based on the work done at and since the first workshop
- Agree on a viable set of Food Security, Environment and Livelihoods (FSEL) synergy/trade-off variables of interest to CCAFS (*cf.* Figure 1, p 4)
- Identify synergies and trade-offs between FSEL variables to 2030 and analyse changes in FSEL variables, given the logic of each scenario.
- Plan follow-up activities in the region

6.2. **Headings to use to discuss the narratives**:

- The global situation in this narrative (= introduction)
- Integration (of governance and markets)
- Infrastructural development
- Agricultural development
- Natural resource management
- Food security
- Livelihoods

The writing teams were asked to consider how the narrative played out if struck by a devastating drought across the region that lasts for 3 years (around 2020-2022) and seriously affects food security. They were also asked to give more thought to:

- energy provision and use
- Conflicts (especially over natural resources)
- Who provides food for urban populations?
- Who would be the winners and losers in their narrative?

Once the narratives reached a level of coherence and plausibility (see below), the FSEL variables became the focus of group work and plenary sessions. Thirteen FSEL variables were identified and agreed upon during plenary discussion:

Box 2: Thirteen FSEL variables that contribute to food security, environmental and livelihood outcomes (Each of these variables has a number of constituent elements –see Table 1 below)

1. **<u>Variables that contribute to Food security outcomes</u>**
   - affordability of staple foods
   - regional production of staple foods
   - effectiveness of distribution mechanisms
   - nutritional value of staple foods
2. **<u>Variables that contribute to Environmental outcomes</u>**
   - water quality
   - soil quality
   - forest cover
   - biodiversity status
   - water sufficiency for agriculture
3. **<u>Variables that contribute to Social/livelihood outcomes</u>**
   - financial wealth of individuals (includes income and assets)
   - social capital at community level
   - health
   - knowledge and skills necessary to ensure that the whole food system operates efficiently and innovatively

Changes in the FSEL variables were then analysed for each of the four narratives by

(i) **describing** how the commonly-agreed constituent elements for each FSEL variable would change, and why
(ii) **systematically assessing** the changes using a semi-quantitative method (++ = strongly +ve; + = weakly +ve; 0 = no change; - = weakly -ve; -- strongly -ve); and then deriving an overall "net" change for the FSEL variable (see below).
(iii) Net changes for the FSEL variables for each narrative were then **plotted** on a spider diagram

Table 1: The constituent elements for each FSEL variable in the EA narratives:

FSEL Variable	Key Factors
FOOD SECURITY: Affordability of staple foods	Employment levels and certainty (= incomes)
	Agricultural productivity (= food prices)
	Government intervention and subsidies (= food prices)
	Extent of urbanisation (= affordability through economies of scale)
Regional production of staple foods	Use of latest technologies, varieties, breeds (= levels of production)
	Costs of production (= levels of production compared to other agric products)
	Farmers' preferences (= food vs. cash crops, bio-fuels)
	Sustainable farming and thus productivity over time (= sustained yields)
Effectiveness of distribution mechanisms	State of infrastructure (= cost of transport)
	Grain storage and grain reserves (= better response times)
	Trade and tariff regimes (= cost of cross-border transfers)
	Opportunities to process raw foods (= longevity)
Nutritional value of staple foods	Use of pesticides and other chemicals (= level of harmful practices in agriculture)
	Use of fortified varieties (= nutritional value)
	Availability of staple foods during crises, eg. droughts (= maintenance of calorie intakes)
ENVIRONMENTAL: Water quality	Intensification of agriculture (= pollution of water sources)
	Common policies to manage water (= improved quality)
	Improved Soil and Water Conservation (= less erosion, improved water quality)
Soil quality	Intensification of agriculture (= breakdown of soils)
	Deforestation and use of marginal lands (= erosion)
	Adoption of technologies to enhance soil fertility (= improved soil quality)
Forest Cover	Conversion of forests to agricultural use (= reduction)
	Common policies to protect forests (= increased cover)
	High demand for forest timber products (= poor management of old forests)
	Adoption of afforestation programmes (= increased cover)
Biodiversity	Change in proportion of mono-cropping (= reduced agro-biodiversity)
	Economic contribution of wildlife and tourism (= protection of biodiversity)
	Availability of funds from Mitigation and Biodiversity Conventions/programmes (= greater/less protection)
Water sufficiency	Agreements to manage transboundary water resources (= greater likelihood of sufficient water)
	Increased temperature (= increased evapotranspiration)
	Competing demands for water (= price increases)
	Improved water management technologies (= less wastage)
	Wetland and water table management

	(= better management)
LIVELIHOODS: Financial wealth	Improve conditions of employment in agriculture (= improved incomes)
	Higher commodity prices (= greater investment)
	Privatisation of social services (= fewer safety nets)
	Access to financial services (= ability to respond to economic opportunities)
Social capital	Changes in incomes (= status in community)
	Consumerism (= weaker social networks)
	Political instability (= social conflicts, inclu over natural resources)
	Extent of agric commercialisation (= the poorest into urban slums)
Health	Effective structures and institutions of governance (= provision of public health)
	Government investment in health (= equitable health)
	Regionally integrated, intensive agriculture (= increased threat of disease outbreaks & pandemics)
	Donor funding for special projects, eg. malaria (= health indices shift)
Knowledge & Skills	Improved ICT infrastructure (= greater market opps.)
	Market innovations (= higher demand for diverse skills)
	Strengthened Early Warning Systems (= reduced risk)
	Farmer Support agencies (= increased productivity)
	Science and Technology products (= productivity)
	Utilisation of traditional knowledge (= market uniformity and greater vulnerability)

In describing and systematically assessing the changes in each variable, the four narrative writing teams were asked to refer - as far as possible - to these constituent elements for each FSEL variable.

7. Analysis of FSEL variables

SCENARIO 1 : REGIONAL INTEGRATION AND PRO-ACTIVE: Analysis of FSEL variables

FSEL variables	Description of change	Net effect (2030)
Food security outcomes		
Affordability of staple foods	Greater employment opportunities resulting from free movement of labour, higher agricultural productivity & export demand, and increased economic growth of the region lead to increased in-farm and off-farm incomes. (+) Food prices increases due to increase in demand (locally and globally), increase in income and consumptions and increase in labour and input costs. (-) Strong regional and national governments through appropriate interventions (subsidies, price control, import/export policies) stabilise prices and make food available by the local people. (+) Increased income and urbanisation will lead to diversification of food choices (crops and livestock based). (+)	++
Regional production of local foods	The impacts of one degree increase in temp will start to reduce regional food production by 10% by 2028. (-) In the 18 years to then, however, regional food production has increased by a total of 50% due to increased use of improved technologies, such as irrigation, fertilisers, improved crop varieties and livestock breeds. (+ +) The migrations of youth and educated out of agriculture will reduce labour availability for agriculture leading to increased wages and use of mechanisation resulting to increase cost of production. (-) Farmer's preference to grow crops for cash income (including bio-fuels) results in reduced production of food crops locally. (-) Intensive use of limited available lands especially in Rwanda, Highland s of Ethiopia, central and western provinces of Kenya results in low productivity. (-)	– –
Effectiveness of distribution systems	The improved infrastructure (roads, railways, storage structures) access to market information and market integration facilitates effective movement of agricultural produce in the EAC region in a cost effective manner. (++) The region has created enough grain reserves to moderate the prices and meet the short falls during droughts. (+) Flexible trade and tariffs in the region led to produce moving to urban areas where prices are high making	+

	food for local pope expensive. (-) Increased opportunities to process and store perishable food produce contributed to increase in the prices of most of staple foods. (-)	
Nutritional value of staple food	Intensive cultivation using pesticides and chemicals has adversely affected the quality of foods. (-) Growing realisation of the value of local foods and use of fortified varieties improve the nutritional value of staple foods. (+) Increased urbanisation has led to increased consumption of junk foods with negative impacts on health. (-) Increased availability and accessibility of the foods even during the stress periods has improved general level of nutrition among the member countries. (+)	**0**
Environmental outcomes		
Water quality	Intensification of agriculture using agricultural chemicals increases pollution of surface and sub-surface water resources. (--) New policies and mechanisms of managing water sheds have led improvement of quality of water and protection of water resources. (+) Improved soil and water conservation practices coupled with establishment of riparian buffer strips between agricultural land and water bodies reduces sediment loads and contamination of water bodies and hence improved overall water quality of many water bodies in the EAC region. (+)	**0**
Soil quality	Intensification of cultivation led to the decline in the productivity potential of the soil requiring additional investments in inputs to maintain productivity (--) Increased deforestation and use of marginal lands for agriculture increased erosion from agricultural lands (-) Extensive promotion of technologies and good practices that restore/enhance soil fertility by NGOs and CBOs helped to some extent slow down degradation (+)	**– –**
Forest cover	Increased demand for agriculture , biofuels has led to conversion of forest lands to agricultural use (-) The Laws and policies related to forest management and tourism have resulted in improved management of national parks and other protected areas (+) High demand for forest products from increased urbanisation, and industry led to excessive logging and destruction of forests (--) Proactive afforestation programmes and se of agroforestry helped in restoring forest cover lost with agriculture, urbanisation, industry and other infrastructure (+)	**–**

Biodiversity status	Both intensification and extensificaton of agriculture for mono-cropping has led to loss of agro-biodiversity and biodiversity more broadly (--) The economic importance of wildlife conservation and tourism has led to improved implementation of conservation laws and polices that contributed to conservation of most of the threatened and endangered species of plant and animals (+) Additional finances made available through climate change mitigation programmes helped in conserving biodiversity to limited extent (+)	**0**
Water sufficiency	Agreement on sharing trans-boundary water resources led to more equitable distribution and access to available water resource (+) Increased evapotranspiration due to increased temperature and changes in rainfall has reduced the available water (-) The demand for water for agriculture, industrial and domestic purposes has increased (-) Adoption of improved agricultural water management technologies and practices helped in improving the water use efficiency of crops and livestock systems (+) New water resource governance , policies and laws on abstraction and use of water has increased the cost of water for industrial and domestic purposes (-) Despite good management of water sheds, the area under wetlands has declined (-)	**–**
Social/Livelihood outcomes		
Financial wealth	Increased employment opportunities due to increased industrialisation has improved incomes (+) Increased commodity prices and increased productivity has contributed to increased income from agriculture (+) Increased privatisation of social services has resulted in making public services expensive (-) Access to financial services by rural people continue to be a constraint (-)	**0**
Social capital	Increased household incomes from agriculture, trade and value addition, have enhanced access and control of resources by both men and women in the society. (+) However, the commercial and consumer-oriented lifestyles deriving from the regional trade opportunities weaken the traditional social networks. (-) Conflict over resources is minimised due to good political stability. (+) Small farmers are unable to compete in high value chains, with outmigration the result, which sees their rural social networks crumble. (-) There is a strengthening of regional civil society organisations in the various sectors in the region.(+)	**+**

Health	Strong regional and national governance structures provide for and facilitate access to better health services that lead to a healthier workforce in the agriculture sector. (+ +) In spite of massive donor funding for government campaigns mounted in the EAC region against the spread of malaria to new areas due to warmer temperatures prove to be ineffective. (-) Regional and national governments invest in more equitable healthcare. (+) There are serious risks posed by new pandemics like swine flu and H1Ni because of more regionally integrated and export-oriented agriculture. (-)	**+**
Knowledge and skills for the whole food system	The improved communication infrastructure in the region (ICT development) has enhanced information dissemination leading to expanded marketing opportunities for agricultural commodities. (+) The level of knowledge and skills of people involved in agriculture in relation to market opportunities and innovations has been enhanced. (+) Strengthened Early Warning Systems have reduced risks and improved performance in the line sectors. (+) Farmer support agencies have been empowered through better access to ICTs to provide better advisory services leading to a steady increase in productivity. (+) The region has gained tremendously from new Science & Technology products such as Biotechnology. (+) Indigenous traditional knowledge in agriculture will be eroded. (-)	**+ +**

SCENARIO 2: REGIONAL INTEGRATION AND REACTIVE: Analysis of FSEL variables

FSEL variables	Description of change	Net effect (2030)
Food Security		
Affordability of staple food	In 2030, there are more established agribusiness industries and the region is exporting most of the processed and raw food and the region sustained economic growth of 10% which led to increased sources of and levels of house hold income. (++) So even though there is food security in the region, locally produced food prices are quite high and because of inequity in distribution of the wealth in the region, 40% of the population (rural poor & unskilled labourers in the urban areas) are still poor and are unable to afford locally produced food. (--) As a result the governments imported cheaper and substandard food of which is affordable by the poor. (+) Due to increased urbanisation, the region experiences a shift in food consumption habits with the urban population dependent more on processed food while the rural population depends largely on fresh and unprocessed staple foods. (+)	+ +
Regional Production of local food	The region experienced an increase in temperature by 1 C by 2030 and this led to a decline of staple food crops by 5%. (--) The private sectors increased investment in mechanization, application of agro-chemicals, GMOs, agricultural intensification, agribusiness, extension and advisory services between 2015-2030. (++) Over this period there was an increase in the number of people moving from the rural areas to urban centres and this led to a decrease in labour availability rural/production areas. At the same time there was an increase in learning education enrollement.(-) Farmers shifted to grow drought resistance crops with high values like bio-fuel crops for earning cash.(-) With the commitment of governments in the region to promote economic growth (to at least 15%) there was diversification of land uses particularly non-agricultural activities like industries, mining and urbanization.(-) However the region was still a major food exporter with 60% of the food imported by the Arab world sourced from East Africa.(-)	– –
Effectiveness of distribution mechanisms	There is improved and interconnected infrastructure with better roads, railways, energy, telecommuni-cations, food storage facilities, ports, air transport, water and coastal inland navigation.(++) However, due to the high food prices and the lack of attention the reserves will not be inadequately stocked (-).	+ +

	Despite efforts for regional integration there was limited flexible trade and tariffs for regional movement of food items due to political reluctance.(-) Increasing urbanisation was a major driver in the processing and value addition of most perishable food products.(++)	
Nutritional value	The tendency in the region to increase food production saw an increase in the use of agro chemicals which reduced food quality and some cases of food poisoning eg. Aflotoxin for local food.(--) The introduction and acceptance of region biosafety policy regime between 2010-2030 led to production of fortified food crops and livestock for both local and export market.(++) There will be access and use of diversified agricultural commodities due to free movement of people within the region and led to increase of nutritional staple crops.(++) During the periods of stress/prolonged drought (2017, 2022, 2027) the governments imported substandard food products.(-)	+
Environmental outcomes		
Water quality	Due to agricultural intensification and inadequate environmental governance, there is increased in environmental degradation, water contamination and pollution. (--) Improper management of agro-chemicals by peasant and commercial farmers near the lake shores, as well as improper management of effluents from the industries have increased lake and river pollution by 30% and by 2024 have affected 60% of the ecosystems in the region. (-). The eventual response from governments is to focus on regulation of key watersheds and make concerted efforts to rehabilitate these. (+)	– –
Soil quality	Improper management of agro-chemicals and unregulated cultivation of crops has led to soil contamination and degradation. (-) The opening up of new land for agriculture has exacerbated soil erosion. Monoculture, mechanisation and reduction in fallow periods has reduced the quality of soils. (-) But the regional body tasked with soil management reacts to this situation and by 2030 is working with CBOs and farmers, making made great strides in implementing soil conservation programmes (+)	–
Forest cover	Deforestation and land clearing is widely practiced as the need for land grows every year for agriculture, infrastructure development, industry and urbanization/settlement and hence the rate of	– –

	deforestation is still increasing.(--) Each of the countries in the region has a forest conservation policy and legislation although with poor implementation.(-) The region is still on discussion on the application of REDD plus as a response towards climate change impact.(+)	
Biodiversity status	Encroachment into biodiversity hot spots is common practice as the need for land grows every year for agriculture, infrastructure development, industry and urbanisation/settlement and hence the rate of degradation and loss of biodiversity is increasing.(--) Each of the countries in the region has a biodiversity frame work and are all parties to the convention of biological diversity and there is some efforts on regional biodiversity conservation approach due to the pressure from international and local based private sectors.(+) The region is still on discussion and formulating a regional financing mechanism.(+)	**0**
Water sufficiency	Water is one the common resources that binds countries in the region together for eg. Lake Victoris, Lake Tanganyika, Mara river, River Kagera and Lake Turkana. In recognition to the importance of this trans boundary resources the region has formulated policies, strategies and regulations on the conservation management and funding.(+) Due to reactive nature of the governments the region has experienced a reduction on water availability from these sources.(--) Changing and variable climate has reduced water sufficiency and this is exacerbated by inadequate climate mitigation response from the region.(--) With the focus to enhance economic growth there has been an increase in competing use of water in all sectors.(-) The expansionist approach to agriculture production in the region compromise on the sanctity of wetland and watershed as important waters towers in the region.(--)	**– –**
Social/ livelihood outcomes		
Financial wealth	Increase in industrialisation and commercialisation of agriculture sector led to an increase in urban population, levels of employment and distribution of assets (and therefore income), although unevenly. (+) Increase in agricultural productivity and profitability from trade and value addition led to increase in the cost of living, in community / household incomes, and have implications on the level of marginalisation of the poor by the rich.(-) Governments in the region pay sufficient attention to social services due to economic growth.(++)	**+ +**

	There are increase in the affordability and access to financial services by farmers (supplied by private sector/govt).(+)	
Social capital	Increase in household incomes from agriculture, trade and value addition, have led to a increase in access and control of resources by both men and women in the society.(++) Commercial and consumer-oriented lifestyles deriving from the regional trade opportunities have a negative impact on the traditional social networks.(-) Conflict over resources and continued political instability affect social capital negatively.(-) There is an increase in migration of people looking for employment opportunities and resources (old networks are threatened but new social networks are created). (+)	**+**
Health	Improvement of regional and national governance structures development of regional health programs and access to health services. (++) The increase spread of malaria and other related diseases to new areas due to warmer temperatures and reactiveness of the region posed a challenge to government in the region.(-) There are increase in access to private health care, increasing the disparity in health between the rich and the poor. Heavy investment by the Asian powers and European countries enables the middle-classes to pay for healthcare.(+) There are serious risks posed by new pandemics like swine flu and H1N1 because of more regionally integrated and export-oriented agriculture or weaker government disease surveillance systems.(-)	**+**
Knowledge and skills for the whole food system	The increase in communication infrastructure in the region (ICT development) has led to changes in information dissemination and marketing opportunities for agricultural commodities. (++) There are increase in the level of knowledge and skills of people involved in agriculture, in relation to market opportunities and innovations, such as processing, etc.(++) Increase in the applications of Early Warning Systems had influenced the level of risks management and performance in the various sectors.(++) There were increase in the level of support to farmers agencies and advisory services.(++) The increased level of adoption of new Science & Technology products such as Biotechnology influenced the agricultural productivity.(++) Decrease in Revitalisation and conservation of indigenous/traditional knowledge in agriculture.(--)	**+ +**

SCENARIO 3: STATUS QUO AND PROACTIVE: Analysis of FSEL variables

FSEL variables	Description of change	Net effect (2030)
Food Security		
Affordability	Decrease in level of income in relation to the projected economic growth especially for the rural people who depend on agriculture as their source of income. (-) Increase in the price of staple foods due to changes in demand for food locally and globally. (- -) The gap between rich and poor widens, making food expensive. (-) Affordability goes down by 20% for most people, including the urban poor. (- -) In an attempt to increase food availability, governments in some countries use foreign earnings to increase food imports to make food available at reasonable prices. (+)	**– –**
Regional Production	Decrease in agricultural labor due to migration, education, and urbanisation, so production of staple foods declines by 30%. (- -) Decrease in availability of land for agricultural production due to changes in land use dynamics that include non-agricultural activities like industrial, mining, urbanisation, forestry. (-) EAC has improved agricultural strategies in place and some movement on the Maputo resolution on investment in agriculture, but none of the countries has attained the set target. (0) Donor community/CS/NGOs/Private sector are proactively and strategically promoting agricultural production. (+) Regional production by foreign companies is high, but in cash crops for export. (-) Farmer prefer to grow cash and/or food crops (including bio-fuel) for export. (-)	**– –**
Effectiveness of distribution mechanisms	Transport infrastructure in the region has improved markedly (roads, markets, market information etc) to move goods freely within the region from areas suitable for growing different crops and also from areas with plenty to deficit areas), as Asian Powers have contributed to building infrastructure. (+ +) Some governments are proactive in trying to ensure food distribution to areas of high need, but effective demand is weak especially in rural areas. (0) Ability of the member countries to create buffer stocks of staple crops remains stagnant.(-) Donor organisations proactively help individual countries to overcome the food gap through loans and aid. (+)	**+**
Nutritional value	There is less access to nutritious food, because cash-cropping for export increases. (-) For both the rural and urban poor, meal frequencies	**– –**

	decline and nutritional status deteriorates. (-) On the whole, people in the region are more concerned with food quantity at the expense of quality food. (-) Food quality goes down for example because of widespread importing of low quality foods. (-)	
Environmental outcomes		
Water quality	The quality of water for agriculture and for the rural poor declines as a result of agricultural intensification, deforestation and the use of agro-chemicals. (-) There is an increase in provision of potable water and sanitation due to urbanisation in the region, matched by investments in efficient water purification systems. (+) The proactive efforts ensure the enacting of policies and strategies on water quality and access. (+)	**+**
Soil quality	There is a decrease in area under forests and other cover, and thus soil productivity and fertility decline due to erosion. (- -) Regional and individual governments are aware of the problem and proactively address the issue through putting appropriate plans in place. (+) Regional alliances of NGOs and CS are proactive in encouraging the rural population to adopt technologies and good practices that restore/enhance soil fertility and ensure sustainable agriculture (+)	**0**
Forest cover	There is some increase in forest area in some of the countries, as a result of afforestation programmes in response to climate change from mitigation funds. (+) But across the region, there is a net decrease in forest cover in the region due to land use changes as a result of expansion of agriculture, urban sprawl and settlements, and the expansion of industrial infrastructure. (- -) There are forest conservation laws and policies in each country (management and harvesting/logging), but individual countries are slow to implement these. (-) CS and NGOs proactive encouraging better management of hot-spot forest reserves through community based environmental protection efforts. (+)	**–**
Biodiversity status	There is a decrease in biodiversity due to increase in temperature, drought, floods, and change in land use as a result of agriculture expansion, urbanisation / settlements, industries, infrastructure and water pollution. (- -) Regional and individual countries are proactive in revising the strategies to renew and conserve the loss of biodiversity by 10%, there is an increase in financing biodiversity programs under pressure of climate change. (+)	**–**
Water sufficiency	Decrease in overall , water availability by 20% due to	

	changing climatic patterns (decrease in rainfall and increase in temperature), increased human populations and other competing uses of water, including irrigation, industrial, domestic, livestock, urbanisation and power generation. (-) EAC strive to increase the level of agricultural intensification through use of new practices and technologies (water intensive crops, water use efficiency, water harvesting strategies/systems.(+) Individual governments, supported by Asian superpower technology and global funds are proactive in introducing and promoting irrigated agriculture. (+) There are changes in water resource governance i.e policies, laws on abstraction, uses, pricing, conservation of wetlands and watersheds, improving soil cover. (+)	**+**
Social/ livelihood outcomes		
Financial wealth	There is a decrease in income levels among rural and urban informal dwellers by 30%, because of constrained income sources. (- -) The EAC strives to increase agricultural productivity and profitability from trade and value addition to reduce the cost of living, and increase community / household incomes (+) EAC countries strive to increase the level of industrialisation and commercialisation of agriculture sector to create employment and therefore income levels (+) However, governments in the region do/do not pay sufficient attention to social services e.g. minimum wage, social security, public services etc. (-) There is a decrease the affordability and access to financial services by farmers, which are supplied by private sector. (-) Individual governments, CSOs/NGOs are active in propping up livelihoods through welfare efforts. (+)	**–**
Social capital	The decrease in household incomes from agriculture, puts strain on the relations between men and women, and between the rich and the poor in the society. (-) The increased migration of people to urban centres looking for employment opportunities, weakens kinship-based social networks. (-) There is an increase in conflict over resources and continued political instability. (-)	**– –**
Health	Because of changes in climate, EAC countries experience more frequent and widespread disease epidemics like malaria and Rift Valley Fever. (-) Because of private sector control of export agriculture, new pandemics like swine flu and H1N1 pose a serious risk. (-) EAC in collaboration with donor community and the	**0**

	private sector proactively take measures to control epidemics like cholera through better water management (+) Health-care provision in general improves, because economic growth allows for investment in vaccinations and primary health care facilities (+)	
Knowledge and skills for the whole food system	The improvement in communication infrastructure and in the adoption of biotechnology in the region has led to improved productivity, information dissemination and marketing opportunities for agricultural commodities. (+) But there is a divide between the hi-tech sector and the low-input sector, where stagnation is serious. (-) NGOs and donor countries have campaigns to support, mobilise and educate organisations and communities in the region on the food system (+)	**+**

SCENARIO 4 : STATUS QUO AND REACTIVE: Analysis of FSEL variables

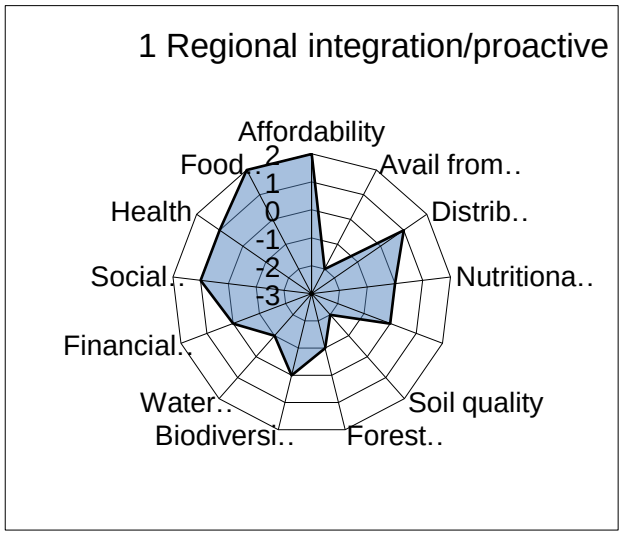
FSEL variables	Description of change	Net effect (2030)
Food security		
Affordability	Because the Asian powers control 30% of the land, employment opportunities have increased for many involved in the agricultural sector. Consequently, incomes have gone up in line with these employment opportunities.(+) Food prices have increased because the Asian powers are exporting food and there is an increase in international demand. (-) The weak institutional and governance framework (no price control, subsidies, no good import policies) has lead to price increase. (-) Climate shocks have led to lower supply and hence increased food prices. (-)	– –
Regional Production	Low regional economic integration and political instability resulted in low aggregate regional production because governments are more concerned with solving internal political problems rather with improving regional production.(-) Weakened common markets result in low incentives for increasing production. (-) Local people gain from opportunities to learn skills and modern technologies from the strong Asian economies to improve their production efficiency. (+) The private investments promote urban migration which robs the rural area of labour leading to decline in agricultural productivity. (-)	– –
Effectiveness of distribution mechanisms	Most governments focus more on giving their countries a total urban facelift in terms of communication and transport infrastructure, creating a conducive environment for private sector investments and foreign direct investments. This increases the movement of goods within the individual countries from areas suitable for growing different crops and also from areas with plenty to deficit areas. (+) The absence of transparent and democratic systems in the region has negatively affected the ability of individual country to create a buffer stock of staple crops.(--) Due to growing hunger and poor distribution of food especially in arid and semi-arid areas, civil society movements increase the pressure on governments to improve food distribution.(+) By 2030 there is still no agreement on a common market, currency or political leadership in the region. This impedes the movement of goods and services including food items. (-)	–

Nutritional value	Greater employment opportunities in agriculture, has led to increases in income among agriculture workers who are now spending more on nutritional food**.** (+) The weak credit institutions compel the smallholders to depend on savings from their low incomes, which in turn curtails their use of fertilisers, modern seed varieties and other farming inputs. They end up practicing more of low-input, vegetables and other healthy foods. (+) Lack of implementation of good food policies including biosafety policies leads to production of unsafe foods.(-) Famine and drought undermine purchasing power and cheap imported grain affects the nutritional value of food. (-)	**0**
Environmental Outcomes		
Water quality	Intensification of agriculture by Asian superpowers and foreign MNCs leads to eutrophication and silting. (- -) By 2030, Uganda and Tanzania have joined forces to revisit the Lake Victoria Basin Management Memorandum of Understanding to make it more binding. This results in less pollution and runoff. (+)	**–**
Soil Quality	Intensification by MNCs means more nutrient mining.(-) Increased use of agro-chemicals leads to leaching and higher soil salinity.(-) Extensification driven by marginalised population leads to soil erosion on steep hillsides.(-) Sustainable agricultural practices and technologies by environmentally and socially responsible corporations maintain soil quality in some areas (+).	**– –**
Forest cover	Extensive demand for increased food by population growth and foreign investors reduces forest cover.(-) High demand of forest products and uncontrolled forest harvest reduce forest cover. (-) There is an increased forest cover due to participation in REDD agreements and programmes by 2030. (+) Civil society movements puts a continuous pressure to governments to respond to climate change and address issues that will increase forest cover (+)	**0**
Biodiversity status	Urbanisation and expansion of roads have cut through National parks, affecting the biodiversity status. (-) Agriculture extensification has diminished the level of biodiversity.(-) Involvement and financing of the governments in actions that increased forest cover that led to greater conservation of biodiversity, especially in biodiversity hot-spots.(+)	**– –**
Water sufficiency	Climate change make dry areas drier, lowering water	**– –**

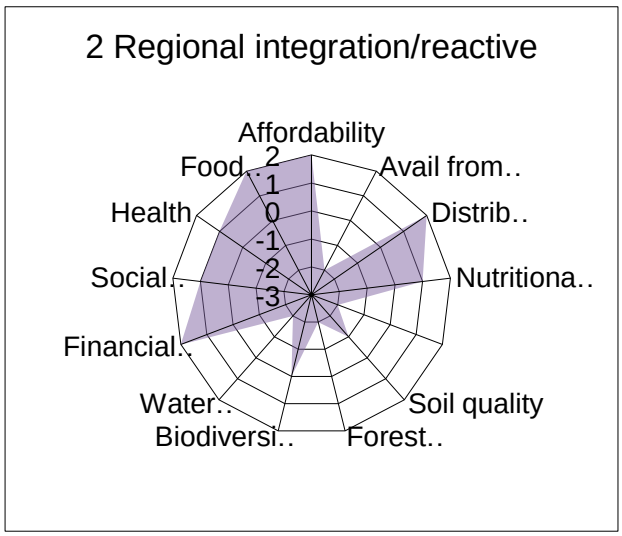
	tables. (--) The increased interest by Uganda and Kenya to improve water quality in Lake Victoria has lead to policies that promote better distribution among states around Lake Victoria.(+) Political instability and population growth has increased conflict between end users and undermined water supply.(--)	
Social/Livelihood outcomes		
Financial wealth	Because MNCs invest heavily in agriculture, access to credit and crop insurance is more prominent for politicians and big farmers, but everyone else is poorer.(-) Low productivity due to weakened common market, climate variability, political instability and poor governance leads low household/ community income, employment and limited access to assets to the small scale farmers. (-)	**– –**
Social capital	Low household/ community incomes due to low productivity limited access and control of resources by smallholder farmers. (-) People/communities are more divided/fragmented due to political instability. (-) There is strengthening of the existing regional civil society organisations as a result of them making common cause in the various sectors in the region.(+) The private investments in agriculture promote urban migration which threatens established social networks but promotes the creation of new networks (0)	**–**
Health	The situation in countries – famines, political crises, insecurity – all result in deteriorating health for the majority of people. (- -) Heavy investment by the Asian powers and European countries enables the middle-classes to pay for private healthcare. (+) Donors provide more funding on health (malaria, HIV/AIDS) especially by 2015 when MDG targets were set to be revisited.(+)	**0**
Knowledge and skills for the whole food system	Improved knowledge and skills on food production systems as a result of investments by Asian powers, Brazil, Russia and South Africa, but this is confined to a relatively small group.(+) The initiative by IGAD to establish Early Warning Centres reduces the levels of risk and increases performance in the production systems. (+) The low public expenditure on agriculture is a grave concern given the inadequacy of rural infrastructure technology and the need for functional extension services. (-)	**+**

8. Plotting the Spider Diagrams

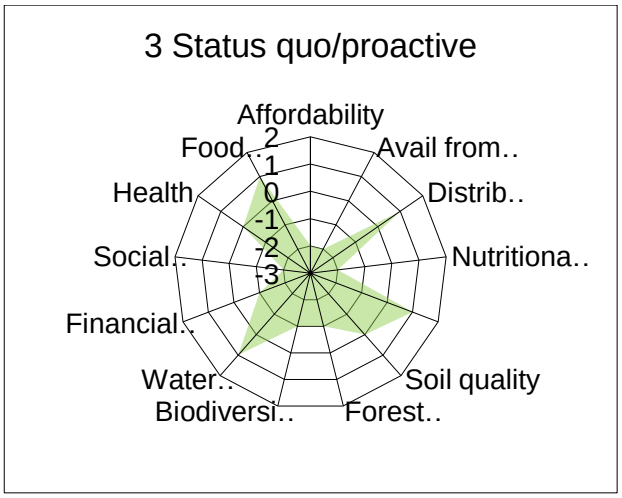
Scenario 1



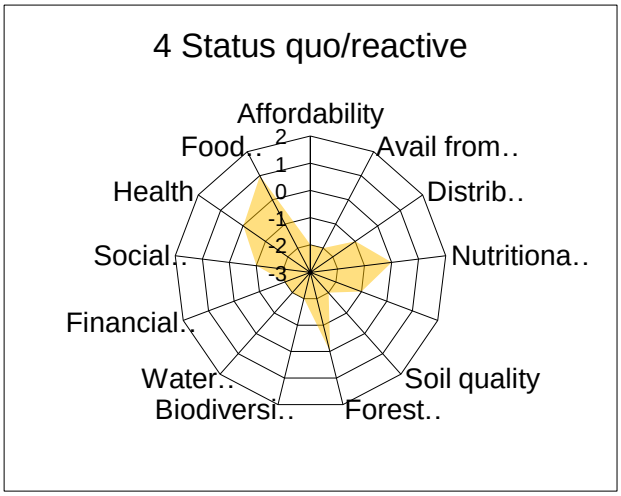
Scenario 2



Scenario 3



Scenario 4



The position on each axis represents the change in that variable by 2030 from current, which is represented by the zero line.

9. Some thoughts on the pros and cons of using this approach

Scen WS2 was designed to help structure the discussion of a highly complex topic and as such, extensive 'Health Warnings' are required when engaging critically with these preliminary outputs. In relation to the *spider diagrams*, it should be noted that:

- The choice of which statements to make for each cell (how you unpack each of the 13 FSEL outcomes) was not standardised across scenarios;
- The assigning of +tive and –tive to each statement was achieved through consensus within scenario working groups, not between the groups;
- The overall values on the axes are 'net' values of the 3-4 statements in each cell, each of which were assigned a +tive or –tive;
- The derivation of the net value was also by consensus within the groups, i.e. not through a standardised procedure: these net values are not arithmetic means and at this stage do not accurately reflect the different weightings of each statement. This will require more quantification;
- The axes are all very different 'currencies' (i.e. they are not directly comparable to each other);
- The position along the different axes are not proportional (i.e. a '+2' on one axis is not twice '+1' on another axis);
- The overall shape of the polygon is dependent on the order in which one positions the axes.

It should be remembered that these are the outputs of a mere 4.5 days of intensive work by a small group of participants, the vast majority of whom had never been involved in scenarios development before. Nevertheless, these scenarios, the narratives that underpin them and the analysis of FSEL variables that inform the spider diagrams, represent the focused efforts of a group of committed regional stakeholders in East Africa. As such, it is worth noting that:

- This type of analysis is indicative, not absolute and the narratives will be subjected to further checks for internal consistency and plausibility;
- The diagrams and the scenarios they represent are based on expert opinion, not quantitative modelling input;
- They do not represent what **will** happen, but rather what **could** happen given a range of agreed assumptions about future uncertainties.
- The quantitative modelling of the FSEL variables may be challenging in that they represent composites of a range of factors, but not impossible.

While the shapes and values of individual diagrams should not be taken as an absolute measure or statement of change from the baseline (2010) to 2030, there are a number of benefits to this approach. By comparing of the diagrams, both in terms of overall area and shape and axis-by-axis, (e.g. how food affordability differs between scenarios), one gets a visual indication of how:

1. the outcomes differ overall between scenarios

2. trade-offs between the 13 FSEL outcomes differ **within** a given scenario
3. trade-offs between the 3 groups of FSEL outcomes differ **between** scenarios

More importantly, the process for developing these prototype scenarios allows a wide-ranging discussion by varied stakeholders of what will affect developments of interest to CCAFS and thereby promoted creative thinking "outside the box". It also led to the group developing a sense of joint ownership and commitment to collaborate which can be built-upon in taking forward the CCAFS agenda in the region.

10. Conclusions

It is through intense discussion with each other and sustained engagement with the scenarios development process that the foundation has been laid for key stakeholders from different sectors in East Africa to begin to explore common understandings of the future, to test their own assumptions and those of others and, in the process, to find ways to work effectively together. Their capacity to take an active part in future policy processes in the region, to have the tools discuss viable future adaptation options and to assist with building the capacity of the many other stakeholders in the food system, have all been enhanced. Indeed, a key objective of the process of developing these scenarios has been to build a dialogue and a network that radiates outwards from the initial core group of people to eventually encompass all the key stakeholders in the regional food system in taking the CCAFS agenda forward.

One key *outcome* of the scenario development process thus far is enhanced communication to help the policy community understand how climate change will interact with other drivers in a future East Africa. Another outcome is the provision of innovative tools to help decision-makers, operating under conditions of uncertainty, to explore future trajectories of change.

The next steps in the development of the regional scenarios in East Africa are to:

- Refine the narratives, checking for internal consistency; and re-develop the spider diagrams using a common set of elements within each outcome variable across each scenario;
- Hold a high-level stakeholder engagement workshop involving key EA stakeholders – including both policymakers and the private sectors and CCAFS Theme Leaders to discuss (Scen WS3);
- Undertake an iteration of the scenarios through discussions and critical feedback from a wider range of regional expert group and institutions;
- Engage the quantitative modelling community to explore ways of modelling the FSEL variables in ways that are useful to CCAFS research priorities (Scen WS4).

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Annex One: List of participants in Nairobi (Scen WS1)

No	Name	Title	Organisation	Country
1	Wilfred Mariki	Principal Agriculture Research Officer	SELIAN ARI	Tanzania
2	Charles Lyamchai	Principal Agriculture Research Officer	SELIAN ARI	Tanzania
3	Geoffrey Onyango	AFOLU Advisor	CARE International	Kenya, regional
4	Menghestab Haile	Policy Advisor	UN WFP	Regional
5	Eldad Tukahirwa	Deputy Executive Director	ASARECA	Regional
6	Kidane Georgis	Researcher	EIAR	Ethiopia
7	Habatamu Admassu	CC Researcher	EIAR	Ethiopia
8	Caroline Kilembe	Principal Agricultural Officer	Min of Agriculture, Food Security & Cooperatives	Tanzania
9	Anna Mwangamilo	Agricultural Engineer	Min of Agriculture, Food Security & Cooperatives	Tanzania
10	Michael S.Z. Nkalugo	Commissioner for Meteorology	Min of Water & Environment	Uganda
11	Mponda Malozo	Agricultural Officer	Min of Agriculture, Food Security & Cooperatives	Tanzania
12	Christine Jost	Consultant	CCAFS	Regional
13	Andrew Ainslie	Scenarios Officer	CCAFS	CCAFS
14	Kevin Coffey	Science Officer	IRI Columbia	CCAFS
15	Patrick K. Ketiem	Researcher	KARI	Kenya
16	Kennedy Okello Were	Research Officer	KARI	Kenya
17	Moushumi Chaudhury	Social Scientist	ICRAF	CCAFS
18	Sarah Mubiru	Programme Assistant, L/stock & Fisheries Program	ASARECA	Regional
19	Hezron Mogaka	Manager, NRM & B	ASARECA	Regional
20	Jacqueline Nyagahima	Head, Info & Comm Unit	ASARECA	Regional
21	Joseph Methu	Head, Partnership & Capacity	ASARECA	Regional
22	Polly Ericksen	Senior Scientist	ILRI	Regional
26	Mercy Mwangi	Junior Professional Officer	Forest Action Network	Kenya
27	John Ingram	Executive Officer	University of Oxford GECAFS	CCAFS

28	Pauline Nantongo	Executive Director	ECOTRUST	Uganda
29	Geletu Bejiga	Country Manager	ICARDA	Ethiopia
30	James Kamunge	Programme Officer	UN-WFP	Regional
31	Kinyangi Kevin Kinusu	Programme Officer Climate Change	KENFAP	Kenya
32	Saikoba Ahmed	Programme Advisor	UN-WFP	Regional
33	Jafari Chobo	Meteorological Supervisor	Tanzania Meteorological Agency	Tanzania
34	Philip Thorton	Theme Leader	CCAFS ILRI	CCAFS
35	Tilahun Amede	Nile Basin Leader	ILRI/WMI/CPWI	Ethiopia/Regional
36	K.P.C. Rao	Principal Scientist	ICRISAT	Regional
37	Robinson Ngugi Kinuthia		University of Nairobi	Kenya/Regional
38	Cromwel Lukorito	Lecturer/Researcher	UON/ ICPAC	Kenya/Regional
39	Harun Warui	Coordinator, Environment	KARI	Kenya
40	Kristoffer Welsien	Programme Officer	UN-WFP	Regional

Annex Two: List of fifteen narrative writers

Narrative 1	Narrative 2	Narrative 3	Narrative 4
Patrick Ketiem	Mponda Malozo	Caroline Kilembe	Kevin Kinyangi
Cromwel Lukorito	Anna Mwangamilo	Habtamu Admassu	Hurbert Lyimo
	Jacqueline Nyagahima	Tilahun Amede	Kennedy Were
	Hezron Mogaka		Harun Warui
	Pauline Nantongo		
	Sarah Mubiru		

Annex Three: List of participants in Dar es Salaam (Scen WS2)

No.	Name	Title/Designation	Organisation
1.	Wilfred Mariki	Principal Agri Research Officer, Conservation Agric	SELIAN ARI, Arusha,
2.	Habtamu Admassu	CC Researcher	EIAR, Ethiopia
3.	Hurbert Lyimo	Co-ordinator, Livestock Feed Resources Research	Min. Of Livestock Dev & Fisheries, Tanzania
4.	Prosper Makundi	Agricultural Officer	Min. Of Livestock Dev & Fisheries, Tanzania
5.	Caroline Kilembe	Principal Agric Officer	Min of Agric. Food Security and Cooperatives, Tanzania
6.	Anna Mwangamilo	Agricultural Engineer	Min of Agric. Food Security and Cooperatives, Tanzania
7.	Patrick Ketiem	Environmental Researcher	KARI, Mombasa, Kenya
8.	Moushumi Chaudhury	Social Scientist, CCAFS	ICRAF, Nairobi, Kenya
9.	Hezron Mogaka	Manager, NRM &B Programme	ASARECA, Entebbe, Uganda
10.	Jacqueline Nyagahima	Head, Info and Comm Unit	ASARECA, Entebbe, Uganda
11.	Pauline Nantongo	Executive Director	ECOTRUST, Kampala, Uganda
12.	Kevin Kinyangi	Programme Officer, Climate Change	KENFAP, Nairobi, Kenya
13.	K.P.C. Rao	Principal Scientist	ICRISAT, Nairobi, Kenya
14.	Cromwel Lukorito	Researcher	Univ of Nairobi, ICPAC, Kenya
15.	Farai Kapfudzaruwa	Doctoral researcher	UCT, Cape Town, South Africa
16.	Philip Thornton	CCAFS Theme Leader	ILRI, Nairobi, Kenya
17.	Mario Herrero	Researcher/Modeller	ILRI, Nairobi, Kenya
18.	James Kinyangi	CCAFS Regional FAcilitator	ILRI, Nairobi, Kenya
19.	Chipo Mubaya	START-Fellow	IRA-Univ.DSM, Tanzania
20.	Chimwemwe Chamdimba	Regional Co-ordinator, AU-Nepad	Nairobi and Pretoria
21.	John Ingram	CCAFS Scenarios Team	ECI, Oxford, UK
22.	Polly Ericksen	Senior Scientist, CCAFS Scenarios Team	ILRI, Nairobi, Kenya
23.	Andrew Ainslie	CCAFS Scenarios Officer	ECI, Oxford, UK
24.	Pius Yanda	Director	IRA-Univ.DSM, Tanzania
APOLOGIES for WORKSHOP, BUT CONTRIBUTED TO POST-WORKSHOP WRITING			

1.	Harun Warui	National Coordinator of Environmental Research Programme Kenya Agricultural Research Institute (KARI) Coordinator, Climate Change Unit, KARI	KARI, Nairobi, Kenya
2.	Tilahun Amede	IWMI/ILRI	Addis Ababa, Ethiopia
3.	Kennedy Were	Research Officer	KARI, Nairobi, Kenya
4.	Mponda Malozo	Scientist	Min of Agric. Food Security and Cooperatives, Tanzania

Annex Four: The prototype East African scenarios

Scenario 1: Regional Integration and Proactive: Narrative

The global situation (Introduction)

By 2030, the world is increasingly interdependent and countries in regional blocs have become more united. Common economic and political policy formulation that spread the benefits of economic growth as widely as possible, have become the norm. This is evidenced by the emergence of effective regional groupings such as the East African Community (EAC). Numerous interventions have been put in place at regional level to develop and replicate appropriate strategies that ensure resilience of national as well as regional economies.

The reinvigorated World Trade Organisation (WTO) effected a major economic breakthrough in 2015, by overseeing the removal of trade-related barriers in developed countries, notably the EU, and increasing trade subsidies to developing regions. This led to increased competitiveness for the agricultural output from African countries. Consequently, global food demand and prices increased by 10% and 20% respectively, expanding the market for agricultural commodities sourced from the EAC. However, although the high food prices on the international markets help EAC producers and exporters, they limit food access by local people who are not yet part of the global economy.

Integration

This narrative depicts a vibrant East African regional bloc in 2030 that has a combined population of more than 320 million and a regional economy that has grown at an average of 6% per annum for the past 12 years. The EAC is reaping the benefits of nearly two decades of intense focus on strengthening the ties between member states through a common market, a common customs tariff and a range of public services so as to achieve balanced economic growth within the region. Political and economic unification has bolstered the capacity of the EAC to stand its ground in international negotiating forums. As a result of these initiatives, the quality of life of the people of the East Africa Community has improved through the increased competitiveness of their agricultural commodities, value added production, expanded trade and considerably greater domestic and foreign investment within the region.

The political union of the 8 member states of the EAC happened incrementally to form a unified bloc in 2030. In 2011, five member states, namely, Kenya, Tanzania, Uganda, Republic of Rwanda and Republic of Burundi had completely acceded to the EAC Treaty. The referendum held in Sudan in January 2013 created a new independent state, the Southern Sudan. Kenya had spearheaded the long mediation process between Northern and Southern Sudan, which led to the signing of the Comprehensive Peace Agreement (CPA) in Nairobi. The close relationship of the new state (Southern Sudan) with Kenya enabled Southern Sudan to join the EAC as early as 2016. Owing to earlier disagreements over the utilisation of some natural resources (in particular, water) with neighbouring countries such as Kenya,

Ethiopia delayed joining the EAC until 2020, when all agreements and policies relating to the resources had been agreed upon and harmonised. Somalia, the most unstable country (with civil strife lasting over two decades) was the last country to join the EAC in 2029, after the establishment of strong mechanisms by the EAC and the international community to guarantee lasting peace in that country.

The governance of EAC continued to strengthen, in proportion to the consolidation of internal democracy and governance within member states. Member states carried out internal constitutional reviews to align the governance requirements/expectations of the region. Kenya successfully completed its constitutional review in 2012, while other member states had completed similar reviews in succession by 2020. The high transparency and accountability requirement in leadership in the region has been reflected in regular, free and fair elections where the internal democratic processes and human rights of citizens are guaranteed and universally respected. The independent regional judicial system established in 2018, with the High Court of the EAC situated in Arusha, has come to underpin regional as well as national economic integration and growth. The freedom of the press and of association as anchored in the respective country constitutions, is assiduously monitored and upheld by the High Court. No discrimination on the basis of sex, race, religion, or state of origin in matters between persons and states is countenanced. The effective governance in the EAC incorporates a disciplined security system in which professionalism and good remuneration packages for the military and police services were entrenched by 2017. This facilitated the free movement of goods and services within the EAC region in an efficient manner, because corruption was cut to a minimum.

In December 2015, the new integration agenda saw the creation of a monetary union with the East African shilling as common currency. By December 2022, the common market was extended to a political union, with an East African Federation brought into being and the election of the first, common East African President.

Success breeds success, and member states - with the backing of their populations and the international community - continued allocating evermore resources to building the EAC as the benefits of integration noticeably improved people's livelihoods. In 2024, strong commitments to poverty reduction were voiced by all member state governments as their number one priority.

Regional integration, common markets and a common currency helped open borders with fewer trade barriers and tariffs on goods. The same was true of the lifting of restrictions on employment and the movement of labour. The strong trade-related phytosanitary regulations adopted by the EAC in 2020, although very costly to institute and to manage, ensures that the free movement of food and food products did not spread diseases, pests, viruses and weeds across the region, a move that could have otherwise jeopardised efforts geared towards attainment of food security, wealth creation and poverty reduction. Regional Trade Agreements with other regional blocs became instruments of choice for the EAC in the 2020s, as it sought to reduce trade barriers, encourage investment and improve transparency in the market for goods and services. Regional integration also alleviated the market constraints by buffering producers against production constraints and severe price shocks, by improving access to market intelligence.

Economic integration has allowed for the establishment of uniform trade tariffs for all imports into the EAC. This has resulted in significant increases in the volume of goods traded in the region that in turn led to cumulative GDP growth. These tariffs are reviewed from time to time in accordance with the economic growth achieved within EAC and in individual member countries. At the same time, business operators benefit greatly from the easier and faster trade opportunities across borders.

Travel between countries in the EAC is hassle-free as citizens are free to travel without visas. In 2030, the free movement of labour and absence of work permits for nationals of member states has meant expanded employment opportunities and improved household incomes and quality of life, especially for the better educated households within the EAC. The harmonised social security benefits across member states mean that people had little incentive to move from one state to another for reasons other than work. All these benefits cost money, however, and the EAC is continually trying to raise more funds from its member countries and through higher taxation. The free movement of labour has resulted in an uneven distribution of educated professionals in the EAC region, with a concentration of doctors, teachers and scientists in urban centres like Nairobi, Dar es Salaam and Addis Ababa. This threatens the stated policy of balanced socio-economic development in the region, but does support the emergence of an East African identity among the professional classes. Tanzania, for example, has benefited tremendously from the influx of better-educated Kenyan professionals and workers.

Financial integration was expanded in 2025 to include the listing of publically traded companies on a regional stock exchange in Kampala. With regard to foreign investments, common policies on the influx, trade and other investments from the East were developed and harmonised by 2015 to take full advantage of the beneficial aspects of the investments by Asian powers especially in the area of production and processing technologies, and communication and information technology. During the 2020s, trade agreements were signed with several countries with fast growing economies including Brazil, Russia, India, China and South Africa.

In 2030, twenty years of regional integration of the East African Community (EAC) and the proactive approach of the regional leadership has fostered both co-operation and competition. It has led to institutional subsidiarity, access to wider markets via trade, larger and diversified investments and efficient production systems. It has translated into socio-economic improvements, far greater political stability and increased bargaining power for the member countries and the region. The benefits of the integration are broad and include free movement of goods and services, capital and labour across borders, centralised socio-economic policy development, significant harmonisation and coordination, infrastructure development. Further, investments in environmental management, and reforms in other vital public goods, such as governance, peace, defence and security, have been impressive.

Most notably, the regional Agriculture and Rural Development Strategy, introduced in 2019, outlines the strategic interventions needed for the acceleration of agricultural sector development in the region that focused on improving food security; accelerating irrigation development; strengthening Early Warning Systems; strengthening research, extension and

training; increasing intra- and inter-regional trade and commerce and physical infrastructure and utilities, that all to make the EAC a revitalised and flourishing economic bloc in 2030.

Globalisation

By 2018, all EAC member countries had fully embraced the idea of globalisation. As agriculture became more specialised in the 2020s, owing to the removal of long-term barriers and disruptive mechanisms such as export subsidies by the EU, the US and other major economies, fewer people were engaged in commercial farming. Even in high potential farming areas the expansion of existing farm operations often meant structural changes in agriculture, which displaced more labour than it generated. In marginal farming areas that were unable to compete in the global markets, the changes were more severe, and land transferred to other users or was abandoned by those unable to cope, with governments forced to take over the environmental rehabilitation of vast areas.

Infrastructural development

Infrastructural development was accelerated in the region by 2020 to facilitate fast flow of goods and services between borders based on the forces of demand and supply. Modern road and railway networks were built and existing ones upgraded or reconstructed by member states to connect major cities within the EAC region. Substantial investments were made in harbour and port infrastructure to facilitate trade. In 2018, the East Africa railway was re-established and upgraded to meet the challenges of modern transport. These infrastructural improvements hastened globalisation processes and significantly improved people's livelihoods through enhanced trade, capital flows and information technology. Based on the principles of comparative advantage, by 2020 the total outputs by trading partners had increased markedly. The modernised infrastructure in the region attracted foreign direct investments through the expansion of multinational companies from the developed or rich countries hence boosting livelihoods in the EAC region by 2030.

A revolution in information technology through the adoption of fibre optic cable technology led to a sharp reduction of communication costs by 30% in the EAC region by 2015. Many cross-border television broadcasting stations such as the EATV were established by 2013, contributing to expanded trade opportunities in the EAC region. The introduction of efficient information systems and the firm establishment of e-commerce by 2020 had spurred greater economic growth in the EAC region in 2030. However, although the young, educated city dwellers are finding work in call-centre type opportunities in the digital age, millions of people in the rural areas and urban slums have been all but left behind as the 'digital divide' has deepened in the region.

In respect of energy provision, by 2020 the EAC had established a common grid for power supply in the region and all major towns and cities were on the grid. But the source was new generation coal-fired power stations and the electricity was expensive. By 2030, two regional renewable energy supplies (i.e. wind power and hydro-power) have been established and are feeding electricity onto the grid. The rising demand of bio-fuels led to the establishment of two pilot bio-fuel refineries (in Kenya and Ethiopia) and this had adverse influence on food security. The consumption of energy by the agricultural sector increased by 10% due to adoption of mechanization, increased use of fertilizers and establishment of agro-based industries.

Agricultural development

Agricultural-led development has remained fundamental to reducing hunger and poverty, generating economic growth, reducing the burden of food imports and opening the way to expanding exports. In 2030, the far more efficient agricultural sector contributes over 50 per cent of the Gross Domestic Product (GDP) and provides 60 per cent of all employment in East Africa. Some sixty per cent of the total population lives in rural areas and is dependent mainly on agriculture for its livelihood (this is down from 70-80% in 2010), although not all these people are producers anymore. The young and skilled population in rural areas migrates to urban areas in search of employment in the newly established industries meant that the old and less skilled population are left in villages managing agricultural production. The lower availability of labour leads to increased dependency on mechanization.

With regard to livestock based livelihood systems, availability and carrying capacity of pastures has declined from 2010 to 2030 by between 10% and 25%. This has pushed the majority of pastoralists out of livestock production and into a more vulnerable existence in towns and cities. Nevertheless, with more efficient technology and a concentration of ownership in the sector, livestock trade and marketing has strengthened its position as the essential component of the agricultural production sector in the EAC region with exports to the Arabian peninsula and North Africa booming. A regional livestock market information system was developed and operationalised in 2018. In 2020, a regional livestock trade and marketing committee was formed to provide guidance on the matters of trade and marketing that saw returns from livestock sales increase by 20% year on year in the period 2022-2027. To further support livestock development initiatives in the EAC region, an EAC Regional Steering Committee on Transboundary Animal Diseases was formed in 2020 that contributed to improved livestock health and productivity.

Climate in the EAC has warmed by 1 degree centigrade by 2030 with a wide range of adverse impacts on both ecosystem survival and productivity. For example, the area covered by arid and semi-arid lands in the region increased from 70% of the land mass in 2010 to 85% in 2030. This has put water and grazing resources under extreme pressure. Also, the area devoted to food crops and productivity of diversified crop agriculture in the EAC region increased by 2015 owing to the adoption of more competitive and commercially oriented technologies by the agricultural sector. Worryingly, the frequency of droughts in the region has increased to 1 in 5 years in 2010 to 1 in 4 years in 2030. Investments in intensive rain water capture and storage activities have reduced pressure on the available water resources for hi-tech, export agriculture. The improved regional capacity to control agricultural pests and livestock diseases is difficult to maintain: frequent outbreaks of (previously undetected) diseases that now require livestock to be destroyed cause localised social upheaval and engender opposition to the EAC and its policies. Pastoralist groups have been the biggest losers over the past 20 years and they still frequently clash with police and the military in many of the drier regions and the towns of the EAC.

Agricultural productivity (food crops) gains have been registered in highland areas due to the warmer temperatures, but productivity losses were registered in the ASALs due to enhanced evapotranspiration. The duration (length of growing period) of most crops was reduced by 4 to 5 days in 2030, leading to loss of yield in the ASALs of the EAC region.

The marketing opportunities for agricultural produce (cereals, vegetables and fruits) increased by 30% in 2015 as more states acceded to the EAC treaty. Generally, the cultivated area in the region increased from the current 50 million hectares in 2010 to about 65 million hectares in the 2030 due to expanded markets and better market prices. Consequently, more land was opened up and devoted to cereal and horticultural crops. This placed new pressures on environmental resources, particularly on soil, water and forest management systems. This was partly because peasant farmers have been forced to expand into less productive areas with poorer soils. Crop failure in this sector had become more common, despite the investments in agriculture research and extension.

By 2015, most of the countries in the region had invested 10% of their national budgets in agriculture in line with the "Maputo declaration". Farmers sought and adopted improved production technologies that were competitive and commercially oriented in an endeavour to meet the EAC regional market as well as global market demands. In 2020, the EAC formulated and implemented a policy that encouraged through subsidies the export of value added major cash crops such as coffee, tea, cashew, coconuts, and sugarcane. By 2030, these initiatives have attracted higher market prices that generated impressive foreign exchange earnings that have increased the purchasing power of the commercial farmers in the EAC region. The processing of agricultural commodities has created more employment opportunities for the people, so that many have come to enjoy better food and livelihood security. Of course, these gains depend heavily on the stability and increase in demand in global markets which, given the totally integrated nature of the global economy and the worldwide political pressures to institute 'free trade' everywhere, remain unpredictable. Periodic collapses in specific markets to date have been offset by overall gains, but farmers in the affected sectors have suffered losses. A too narrow focus on maize production led in 2014 to a situation where a failure of the maize crop and a shortage of white maize spelled hunger for the population and caused tremendous social upheaval across the region.

Agricultural investments in the EAC region increased by 15% to 2015 and have increased, albeit at lower rates, year on year thereafter. These investments have gone into technological inputs, increased access to affordable credit and to markets, investments in irrigated agriculture, the establishment of value addition industries and the strengthening of regional agreements for extension, research and innovation, credit, agro-processing and marketing.

The devastating drought that occurred between 2020 and 2022 had far reaching impacts on the regional economy and food security. The established regional grain reserves in 2018 with assistance from the WFP and the FAO enabled the region to effectively manage the difficult situations in the first and second years. During the third year the region was highly dependent on external supports/food aids and imports from the global market. The member countries were able to avoid severe malnutrition and deaths. This strained the economy of the countries in the region leading to a near zero growth in GDPs. Subsequently, more regional grain reserves (of esp. cereals such as maize and wheat) were established in 2023 to offer protection against future droughts of longer duration more than 3 years. High levels of support from the Global Climate Change Fund for carbon-neutral 'conservation

agriculture' development has seen agricultural productivity increase by 10% every year in the decade to 2030. But to date the main benefits from this increase in productivity are enjoyed by farmers and consumers in Kenya, Uganda, Tanzania and the DRC.

By 2024, increased returns to farming had caused the cost of agricultural land in high potential areas to escalate. This locked the majority of peasant farmers out of expanding markets and encouraged specialisation in cash crop and livestock production that met the standards of the globalised market. The peasant farmers in the high potential areas and ASALs had no choice but to take poorly paid, often seasonal labour on the specialised farms. However, increased taxes from the vibrant business sector resulted in more state investment and generally improved the quality of life of the majority of people of the EAC region. Rural poverty started declining in 2020, but mostly because of a steady migration of people to the cities and towns.

Natural resource management

Attention was paid proactively to sustainable management strategies of natural resources by 2018, because these were seen as critical for propelling economic development and livelihoods. The EAC oversaw protracted negotiations to harmonise policies regarding common natural resource policies addressing forestry, energy, water and mining. Regional initiatives to increase the area of land under forest, to promote soil and water conservation and to control of striga weed and transboundary human and livestock diseases were all in motion by 2018. The EAC had afforested 15% of the previously forested areas in 2025, resulting in substantial transfers from global mitigation funds.

With regard to shared water resources in the EAC region, the management of Lake Victoria and its environs was established on a firm footing by 2015 and by 2025, the Nile Basin Management Agreement was implemented. Member countries of the EAC continued to abstract water from big lakes in the region and expanded the acreage under irrigated agriculture by 30% in the 20 years to 2030. This resulted in more production of cash crops for export and improved livelihoods for farmers, but negatively affected fisherfolk. In addition, by 2024, the sustainable management of the East African coastline had become a focus of donor attention, in an attempt to secure the future of fishing for coastal areas as both income and food security options. The instability along the Somalian coastline and ongoing disputes with Mozambican and Asian superpower fishing companies resulted in a hostile environment for law enforcement agents, so that the marine fish resources of EAC were severely plundered.

Food security

National food security strategies in the development plans of EAC member countries have enjoyed a high priority since about 2015, but this has not always translated into radical changes on the ground. Biosafety and food safety standards in the EAC have improved with effective measures being put in place to curb the incidence of aflatoxins in grains and cases of unsafe meat and meat products. In addition, more social safety nets were introduced to cushion especially the poor against the adverse impacts of climate change in relation to food security, but these proved to be very costly and subject to rent-seeking by local officials. Nevertheless, it is clear that these measures have saved many vulnerable rural people from destitution.

Livelihoods

Although uneven, EA has made significant improvements in livelihoods due to increased investment in the economy, production, improved infrastructure and market availability. The opening of more industries, farms, and infrastructure improvements has increased employment opportunities in urban areas and therefore the level of income has increased. However, the governments in the region still do not pay sufficient attention to social services e.g. minimum wage, social security, health services etc. The lack of political attention to the needs of the poor has created wide gaps between services available to the poor and the rich. There is inequality in the distribution of the wealth in the region. Although the income levels have gone up by 10%, the cost of living has also gone up by 20% and the increase in income for the poor does not match the escalating cost of living.

The availability of employment opportunities in different places has resulted in migrations with more people on the move, looking for employment opportunities and resources. This coupled with the difference in economic status has broken down the social ties and reduced the social cohesion of communities and groups.

The commercial farmers have invested in health facilities for their employees and generally speaking rural people are able to access these facilities. There is improved access to private health care for some due to investments in the health service provision by the private sector. However, the urban poor cannot afford private health care and the state-managed hospitals are understaffed and poorly equipped. The commercial farms invest in knowledge and skills for their employees. Generally speaking, East Africa will have improved knowledge and skills for the whole food system, with better integration into the global economy, but many urban consumers are spectators.

Scenario 2: Regional Integration and Reactive: Narrative

EA region in the Context of the Global situation

Currently global trends are largely focused on country groupings to address economic, political and social challenges and opportunities. Grouping such as European Union (EU), G7 Nations and NATO have emerged over the years. Similarly East Africa with it's overflowing potential - from agriculture to minerals to tourism to energy sees itself making great strides as a bloc. It had a huge combined population of more than 160 million and a young, skilled and enterprising labour force. What was required was a means for the EAC countries to cooperate in harnessing their potential to cause economic growth and development. EA integration was driven by the need to establish an export-oriented economy for its member states in which there would be a common market with free movement of goods, persons, labour, services, capital, information and technology; the need to acquire international market access and have strong bargaining power in negotiating trade agreements as one bloc; the need to cooperate in investment and industrialisation - expansion of manufacture and export of industrial and agro-processed goods from EA states. This would transform the economy and foster overall socio-economic development in the member states.

Integration of East Africa

The year is 2030. The East African federation has been operational for nearly 8 years. It has a revolving presidency; a regional judiciary and legislative body that resolve integration related conflicts within the region; it also has a joint regional peace keeping force. The Federation, also known as the East African Community (EAC), comprises 8 countries. The countries are Tanzania, Kenya, Uganda, Rwanda, Burundi, Southern Sudan, Ethiopia and DR Congo. The Integration of the EAC bloc began to take effect in 2010, starting with 5 countries - Tanzania, Kenya, Uganda, Rwanda and Burundi. The 3 other countries, having followed the positive developments taking place, applied to join the community. Southern Sudan joined in 2013, Ethiopia in 2017, and finally DR Congo in late 2022.

The EAC formed a free trade area and a customs union in 2010, thus removing trade barriers within the community. The common market, which allowed for the free movement of businesses, people, goods and capital across borders, became fully functional in 2012. The bloc moved to a common currency, the East African pound, in 2015. But reaping the benefits of the federation took longer than earlier anticipated. This is because the member states had issues to sort out particularly regarding democracy/political instability and internal security problems. As the challenges to joining the Community were being sorted out, the EAC was making progress in the harmonisation of laws, trade policy, regulations, procedures and standards, financial and investment policies, tariffs and agreement on sharing resources.

Infrastructural Development

The countries have developed the regional infrastructure facilities - railways, roads, air transport, inland and coastal waterways, and telecommunications. In 2030, there is an efficient EA railway network that links 2 main lines- one that connects Mombasa (Kenya) to Kasese (Uganda) and the line that connects Rwanda and Burundi to the Tanzanian railway system. The Kenya-Uganda railway line was revamped in 2012. The respective countries then built extensions to other parts of their countries. The new railway line connecting Rwanda and Burundi to the Tanzanian railway system was completed in 2016. In 2012, work to link the 2 railway routes began and this was completed in 2022.

ICT infrastructure is highly developed in 2030. The 3 undersea fiber optic cables that were separately laid out to connect East Africa to high-speed internet - Seacom, Teams and Eassy that reached the east are now interlinked. The interlinking of all cables was finalised in 2015. The EAC no longer suffers from intermittent internet downtime. Also between 2010 and 2017, the respective EAC countries laid out their national networks of fibre optic cable. By 2018, there was 80% connectivity in all the cities and major towns in the EAC region and e-commerce picked up exponentially. By 2020, 35% of trade in the region was electronic and by 2030 the 70% of business, management and administrative transactions in the region was done online.

In 2030, many local companies are regional, that is, they have branches in the different EAC states. On average, 50% of business enterprises in the EAC are regional. The EAC economy is booming. The level of industrialisation has grown by 50% from the previously low levels in 2010. There is a thriving private sector driven by domestic and foreign direct investments in the region. There is, for instance, thriving business in the minerals, forestry and tourism sectors.

Agricultural Development

There has been a 120% increase in the production of cash crops, bio-fuels and livestock for export, but much of this output is increasingly directed to the agro-based industries within the region. As much as 60% of the food imported by the Arab world is from the EAC. Because of the employment opportunities now available, the purchasing power of the EA population is up – 60% of the population are above the poverty line. However, the population of city dwellers in the EAC has also risen to 80% of the national population. Also, the EA governments have not been paying attention to urban planning, so the cities are sprawling with slums with poor sanitation conditions.

In 2030 however, while EA integration is performing very well with regard to economic, trade and political issues, it is being reactive on implementation of policies relating to food security, climate change and environmental management. The EA integration does not pay attention to the EAC treaty terms related to environment and environmental management, livelihoods and poverty and food security. It is international NGOs and civil society organisations that are proactive on aspects of environmental management and food security within the region, but they still work independently. As a result, their actions have no significant impact over a wider area within EA. Also, with the investments in agriculture focused on the export market, limited attention is paid to environmental management. This focus does not prepare East Africa for environment-related shocks in the market. In effect,

the trade systems lack the resilience to withstand surprises that emanate from environmental variability. The responsible institutions do not have the capacity to assess or respond to the uncertainty of the export/import environment in light of the changing climate.

In the light of changing climate the region faced devastating drought which lasted between 2020-2022 and affected productivity to minimum. In this situation the government reverted to food reserve as a short term solution to combat the problem, followed by importation of food and giving aid to severely affected regions. In the medium term solution the government shifted severely affected communities to unaffected areas as well as emphasized on food production within the regions which were not badly hit. Livestock keepers were also adviced to reduce their stock by selling their livestock for them to be able to purchase food products rather than lose the livestock due to water and feed stress.

Futhermore, East African integration is frequently affected by changes in the world market, making its economy susceptible to crisis whenever there is any change in the world market.

Environmental/Natural Resource Management

The East African region's economic and livelihood fabric is highly dependent on its natural resource endowment which includes water, land, soils of different types, forests and biodiversity. Although sustainable environmental conservation and management are recognised in all major development plans and other national strategies across the region, action and implementation remains below expectation. Recognising the role of environmental resources in the East Africa in political stability, economic growth and general security, the East African Community in 2010 formulated a comprehensive Regional Natural Resource Management Strategy. The Strategy spelt out key intervention areas which included watershed management, water management, and protection and rehabilitation of fragile lands. In addition, in 2018, the emerging Community formally recognised the need to mainstream climate variability and climate change in all development activities. At the national level, countries continue to formulate specific policies and strategies to address what appeared to be seriously degrading ecosystems. Despite evident efforts by the various governments in the region to formulate strategies, policies and even legislation to address environmental degradation, there was no attention to building the capacity of responsible institutions to implement the required actions. These policies and strategies thus remain on paper. The work of the relevant institutions revolve around reactive interventions and thus popularising disaster response plans at the expense of clearly thought-out preparations based on region-wide, integrated early warning systems.

Availability of adequate water is a major determinant of agricultural productivity in the region. In 2030, water is a major constraint to attaining food security. Although existing legislative frameworks are strong, because of poor implementation of these laws, the region has witnessed considerable decline of water quantity and water quality. In 2020, it became evident that the water level of most lakes in the region, including Lakes Victoria, Baringo, Nakuru, Tanganyika, Edward, Albert and Naivasha was steadily declining. In effect, between 2010 and 2020, water levels in Lake Victoria declined by approximately 2.5 meters while 50% of Lake Nakuru remained dry over a period of 8 months per year in moderately dry years. Water pollution from both point and non-point sources showed an increase over the

period 2010 and 2025. Eutrophication levels in Lake Victoria as well as suspended matter recorded a significant increase. Water pollution due to poor sanitation facilities, misapplication of fertilisers, and destruction of watersheds continue to be a major concern on water resources management and this could stare conflicts among the countries which shares the water. Other sources of water pollution include improper disposal of industrial waste as well agro-chemicals and inadequate domestic sanitation systems. This is evidenced by the massive death of fish in Lake Naivasha in Kenya in 2010 and again in 2018. It is estimated that the level of water pollution across the region has increased by about 30% with about 60% of the remaining ecosystems being under threat despite increasing government allocation to develop and manage water resources. The governments will then tender to put emphasis n solving the emerging conflicts around the water rather than addressing long term solution to the circumstances undermining the water resources.

Depleted and fragile soils have over the years come to characterise the region. This is taking place under the watch of governments and line ministries. All the regional plans list milestones for achieving enhanced soil fertility through sustainable farming, but these have not been adequately resourced or rolled out. Improper management of agro-chemicals and unregulated cultivation of crops has lead to soil contamination and degradation. Deforestation and land clearing is widely practiced as the need for land has increased with every passing year. The opening up of new land for agriculture has exacerbated soil erosion and soil degradation. Monoculture, mechanisation, improper management of agro-chemicals and reduction in fallow periods have reduced the quality of soils. The emerging voice from the civil society and environmental NGOs during the period 2015 – 2020 forced governments in the region to enact specific laws to enhance soil fertility. However, these are still not well implemented.

Although there has been improvements in the use of renewable energies, the cost of energy is still high due to increase in demand and 60% of the population are still be dependant on fuelwood. This translates into a still increasing rate of deforestation, even though the impacts of deforestation on climate are now well understood.

Over the years, there has been limited attention to conservation of biodiversity by the governments. Expansion of agricultural land, mechanisation, the use of GMOs and destruction of catchment areas has led to loss of biodiversity. Although indigenous plant species have become a valuable source of remedies for health disorders for the population, there is indiscriminate harvest due to costly health services. Conservation measures are highly dependent on the work of international NGOs. However, the scarcity of financial resources will limit the focus to key biodiversity hotspots.

Environmental action is very limited and mainly in form of response to crises such as competition over strategic water resources with potential to cause civil strife. There is watershed destruction throughout the region. The poor planning for water management coupled with the unpredictability of the rains will reduce water available for industry, agriculture, livestock, fisheries.

Food Security

In 2030, many agribusiness industries are established and the region is exporting most of its agric outputs and processed foods. This has been the result of improved and interconnected infrastructure with better roads, rail networks, energy, telecommunications, food storage facilities, ports, air transport, water and coastal inland navigation. Similarly, heavy investment in mechanisation, application of agro-chemicals, genetically modified (GM) crops, commercial farming and agribusiness between 2015 and 2020, encouraged a small group of farmers to produce more, and increased land for agriculture.

The region has become a major food exporter. However, land degradation and other environmental factors such as unreliable rains have affected agricultural activities and thus food security of the small scale landholder farmers. They produce too much food during the good rains and nothing during the dry spells. These are poorly resourced small-holder farmers who still do not have good storage facilities and are forced to sell all of their products to avoid spoilage.

The high value foods are meant for the rich and the export market. The high value indigenous crops such as local vegetables are grown for a niche market and are thus expensive. Even though there improved food security in the region compared to 20 years ago, local food prices are high and because of inequity in distribution of wealth in the region, the poor are still food insecure. Although there are regional phyto-sanitary and food safety standards, these are only being applied to the export products. Furthermore, there is limited attention paid to the nutritional value of food crops meant for the local market.

Forty percent of the population (comprising the rural poor & unskilled labourers in the urban areas) is still poor and unable to afford locally produced food. Some national governments – responding to EAC directives - have established food reserves, but the farmers prefer to sell their produce to the open market where they are offered better prices. The high food prices coupled with the lack of government support, has led to the reserves being inadequately stocked. National governments and the EAC are mainly involved in crisis management in times of disaster. The governments have been forced to import cheaper food of inferior quality, which is affordable to the poor, but in the process, sacrificing hard-earned foreign exchange.

By 2019, improper management of agrochemicals and unregulated cultivation of GMO crops has led to soil contamination and soil degradation, resulting into poor yield and loss of capital to most of the investors and small scale farmers. This culminated in declined food security in most agro-ecological zones in the region. By 2025, a small percentage of small-holder farmers in each member country have been empowered through training offered by NGOs and research and extension centres in ‘conservation agriculture’, i.e. the proper use of agrochemicals and GMOs and in the five years to 2030, this has led to higher levels of sustainable production. There is increased access to financial services for the commercial farmer but a reduction is small scale financial systems available to small farmers and cooperatives and here too, NGOs are forced to step in and make up the shortfall.

Livelihoods

Although uneven, EA has made significant improvements in livelihoods due to increased investment in the economy, production, improved infrastructure and market availability.

The opening of more industries, farms, and infrastructure improvements has increased employment opportunities in urban areas and therefore the level of income has increased. However, the governments in the region still do not pay sufficient attention to social services e.g. minimum wage, social security, health services etc. The lack of political attention to the needs of the poor has created wide gaps between services available to the poor and the rich. There is inequality in the distribution of the wealth in the region. Although the income levels have gone up by 10%, the cost of living has also gone up by 20% and the increase in income for the poor does not match the escalating cost of living.

The availability of employment opportunities in different places has resulted in migrations with more people on the move, looking for employment opportunities and resources. This coupled with the difference in economic status has broken down the social ties and reduced the social cohesion of communities and groups.

The commercial farmers have invested in health facilities for their employees and generally speaking rural people are able to access these facilities. There is improved access to private health care for some due to investments in the health service provision by the private sector. However, the urban poor cannot afford private health care and the state-managed hospitals are understaffed and poorly equipped.

The commercial farms invest in knowledge and skills for their employees. Generally speaking, East Africa will have improved knowledge and skills for the whole food system, with better integration into the global economy, but many urban consumers are spectators.

Scenario 3: Status quo and Proactive: Narrative

Introduction

East African countries depend on agriculture. However, this sector is largely rainfed dependent and hence frquently suffers the impacts of climate variability. Thus agricultural production in the region doesnot provide enough food for the growing population. Thus food insecurity is felt by larger majority especially the rural poor. Recent climate change has emerged as an added challenge.

Global situation

Like other developing regions, the East Africa region is under very strong global and regional pressure from the forces of globalisation, the economic dominance of the Asian superpower states, and from crises brought on by climate change. Other challenges that states in the region still grapple with are population pressure, resource degradation, national and regional conflicts, rocketing fuel prices and fluctuating markets. These challenges agricultural production and productivity, and vast majority of the population are food insecure. Hence, the livelihoods of the people are at risk.

Politically and economically, the EA region is in a difficult position: on the one hand, there is a drive to strengthen the regional economy and collective action of EA countries through the well established mechanisms of the East African Community (EAC). On the other hand, countries seek to maintain the status quo (national sovereignty) in key areas of policy, such as natural resource use and management and the forging of bilateral linkages with now 'emerged' powers like India and China and the waning economic blocs in the West. On the whole, in 2010 there is a predominance of national self-interest in relation to economic, political and military agendas, over regional cooperation and the collective benefits that such cooperation could deliver.

Integration (Governance and markets in the EAC region = Economic)

There is proactive efforts towards integration made during the past 5 years in 2015. Starting in 2016, the East African Community (EAC) worked hard to proactively increase cooperation in socio-political and economic issues, mainly within and between the five original EAC member countries. This brought significant economic benefits and foreign investment. As this cooperation strengthened and benefits thereof began to emerge in 2020, Ethiopia, with their large populations and growing economies moved to join the EAC by 2024. Although the cooperation opened up access to significantly larger markets and to vastly more natural resources like minerals and water that drive economic growth in the region, the reality in 2030 is that the rigidity of individual countries, bilateral agreements with Asian superpower states and foreign companies, and the power struggles among member governments for control of the EAC, regional and national economic and social progress was still not as high as anticipated in 2020. The reality is that political divisions undermined the collective implementation of effective regional policies and weakened the negotiation power of the region on the global stage. Although the prevailing situation by 2030 allows economic development in the region. However, there is continued instability, poor governance, corruption and some degree of poverty within and among the member states. As a result, conflicts in some countries within the region remain unresolved without 'outside' help. The competitive interests of individual states that prevailed at the expense of others and of the

region as a whole allowed external actors to manipulate governments and play the countries in the region off against each other when it comes to critical investments and policy decisions.

Infrastructural development

By 2030, there is stronger cooperation and linkages among member countries in certain sectors, where despite national foot-dragging for regional cooperation, proactive policy makers working with Asian superpower countries and companies, have made substantial progress. This is particularly noticeable in respect of regional infrastructure development: regional road and railway networks that have been totally revamped so that these systems are recognisable from those of 2010. The regional power grid have been overhauled and ports and harbours in the region have also enjoyed huge investments. However, many of these developments serve the interests of the Asian powers themselves who need efficient transport networks and systems to be able to repatriate agricultural produce and mineral resources to India, China, South Korea and Japan.

In the decade since 2020, excellent progress has also been made by the EAC in managing the region's water resources more sustainably for the benefit of all member countries. Again, foreign investors have been key here: new water-saving technologies have been introduced in areas of high agricultural potential and most cities in the region are supplied with world-class water supply and reticulation systems. The numbers of highly efficient hydro-electricity schemes, developed through investments by the Global Climate Change Adaptation and Mitigation Fund, have proliferated in the region, powering economic development and enhancing environmental sustainability. But, these benefits are not shared by all – on the whole, rural people are still water-insecure and in 2030, actually have less access to potable water than 20 years before. Also, some of the smaller countries have suffered in relation to water access: economically dominant, downstream countries dominate the use of the region's water resources, undermining the stated commitment to the principles of equitable sharing and efficient utilisation. Because potable water is supplied to cities at cost, it is the poor and rural dwellers who are water insecure. This is reflected in the reduction of water access per capita by 20% in 2030, reaching crisis proportions in the countries were the governments are weak and/or corrupt. This gives rise to social conflict and unrest which threatens regional cohesion.

Investments by Asian powers/Globalisation

In 2020, the EAC signed and started to implement a regional economic and market cooperation network, where amongst others there are no tariffs in market transactions amongst the countries. However, implementation remains challenging as member states continue to act in their own best interests. This meant that the Asian powers continued to take advantage of the discord in the region to further exploit the public goods like mineral resources, land and cheap labour.

In 2030, regional markets still do not operate as well as they could, because of the disconnect in policies and market linkages. The Asian powers are able to draw off the key resources to benefit their own economies. Less competitive countries in the region experience foreign currency depletion as the price of economic co-operation with the Asian powers. This is because the many infrastructural and economic investments are on the basis

of loans not grants. Investment by local populations in the region is down due to increased poverty. The Asian powers influence government leaders at the expense of the public, in some cases through corrupt practices, including bribery. With trade tariffs removed in the EAC, local consumers exchange more or less the same goods with little profit. Even though they emphasise food security, many countries continue to experience food shortages, especially in the areas far from the new transport infrastructure.

It is noticeable, however, that the 'Asian Tigers' have had positive impacts through increases in human capital, and through investment in physical capital, which has risen sharply in the decade to 2030. After 2020, there has been considerable migration to urban areas, so that by 2030, some 60% of the people in the region are resident in cities and bigger towns. Despite the rise in human capital, the increase in human capital migration to cities and also out of the region by 2030, has resulted in low-to-medium technological advances in sectors that are not core interests of foreign investors.

Environmental/Natural resource management

Development partners of EA region fail to increase their financial assistance for investment in water resources. At a local level, civil society groups that are working closely with communities strengthen and enhance their investment in the water sector. These groups build and strengthen the capacities of communities in conflict prevention and resolution, by building on local conflict resolution mechanisms and strengthening the culture of dialogue.

EA Governments are the key institutions in the region. They carry the ultimate responsibility to provide sustainable livelihoods for their citizens and address issues related to war, internal strife, and resource management and use. However, the region's governments will not coordinate their efforts to preserve and protect the environment, and ensure the sustainable use of resources. They will continue to bypass the need to harmonise national strategies and policies, for example by strengthening meteorological and hydrological services and monitoring networks. Furthermore, they will continue to countout the need to make access to water a human right and fail to establish legislation for minimum service levels. They will not draw up sound national strategies for NR management and fail to agree on transboundary water resources discussions for shared basins, for example the Juba-Shebelle and Omo-Turkana basins, and hence will not be able to finalise the Nile cooperative framework.

EA regional problem of water is further aggravated by a number of emerging threats. These include climate change, as well as an increasing population and the subsequent increase in demands for environmental resources especially water. There is severe water scarcity or water stress. Climate change has the potential to impose severe pressures on water availability and accessibility.

Food security is directly linked to environmental resources such as water availability and accessibility. This plagued the desire to improve agricultural productivity and attain regional food security is. With climate change, increasing water scarcity increases the potential for conflict within and between EA countries. The Darfur dispute in western Sudan stems in part from competition over water, mainly between different resource users; nomads and farmers share water and land in the region, but these are both getting meagre due to climate variability and expanding desertification.

The increasing severity and scale of impacts on environmental resources resulting from climate change is lead to severe socio-economic and environmental impacts and require costly adaptation effortsbwhich many of EA countries will not be able to manage.

Under the statusquo, current environmental management practices in EAfrica are unlikely to be adequate to cope with the projected negative impacts of climate change for example on water availability and distribution. EAfrica needs a much greater focus on increasing people's adaptive capacity to climate variability and climate change over the long term. Although key to improving future adaptation efforts is the incorporation of current climate variability into development planning and management, EA countries do not have clear adaptation response strategies.

In 2010, countries in EA (e.g. Djibouti, Ethiopia, Eritrea, Kenya, Somalia, Sudan and Uganda) were under severe water stress. Water scarcity leads to conflict. In February 2009, tens of thousands of people were reported to have fled their homes as a result of fighting between rival groups in southern Ethiopia. Reports suggest 300 people may have been killed and more than 100,000 displaced. Armed conflicts, particularly over water, are not unusual in southern Ethiopia. They have been increasing in recent years because drought has made control over wells and water points even more critical. This has constrained food production, ecosystem maintenance and economic development by 2030.

However, countries in EA region have a very low capacity to address current and impending water scarcity and environmental insecurity: They are most affected by political instability, governance problems, activities of liberation movements, post-election disturbances and wars between and within countries in countries of EA region.

Negotitiations on transboundary water cooperation among EAC are lengthy, except in Ethiopia, there are no visible efforts to develop long term water resources development plans for the region. Although National and regional organsations continue to poorly assess the sustainability of their environmental resources, they will not be getting out of the routine annual planning exercise and engaging in long term assessment of the environmental security of their citizens and the wellbeing of their environment.

However, strongly encouraged by foreign donors and international NGOs, and with resources made available from the Global Climate Change Adaptation and Mitigation Fund, the EAC proactively recognised early on both the urgency and the benefits of dealing land degradation, drought and flood effects and other impacts of climate change regionally. In 2015, the region developed an comprehensive EAC Climate Change Policy (EACCP), which addressed specific issues that challenge the region such as water resources, agriculture, energy, transport, health, forestry, wildlife, land and infrastructure. The EACCCP was consistent with the provisions of the East African Treaty, the EAC Protocol on Environment and Natural Resources, the Protocol on Sustainable Development of Lake Victoria Basin as well as the United Nations Framework Convention on Climate Change (UNFCCC). However, because of political horse-trading, the first implementation of these policies did not take place until 2018, while the management of all cross-boundary resources except water remained a challenge into the 2020s.

In the decade 2010-2019, governments made their own policies that work nationally, but there was disagreement with other countries regarding the most appropriate regional policies. These sectoral policies within the respective countries effectively undermined development of the region and weakened institutional arrangements and collective decision. By 2020, however, EAC members, prompted by the commercial interests of foreign investors, realised that this mode of operating prevented them from making progress and began to adjust selected policies for the regional cooperation in resource use and management. In contrast, in areas where policy changes were not realised, civil society organisations identified problems and self-organised as pressure/ management groups around public goods that they regarded as important. These included flagship regional resources such as the Nile, Lake Victoria, Mabera Forest, Mao Forest and the Green Belt Movement. This helped to slow down the decline in forest cover per year In the period 2023-2030, but the lack of joined up regional-level policy-making and institutional integration has undermined progress and continues to test the patience of donors and international partners. This is also reflected in poor forests governance and a poor record on managing the movement of pastoralists across national borders. In 2030, the capacity of institutions of individual states and the region to respond to emerging environmental challenges remains weak.

In this scenario, there is a proliferation of NGOS and growth of civil society, so that these groupings take on the roles normally played by the public sector and global institutions. They are active in fields of development as broad as food aid, soil conservation, afforestation, conflict resolution, disarmament. In the period 2020 to 2030, the number of NGOs – many working regionally - increases by 40%, but they struggle to work cooperatively and are thus not very effective in holding the EAC and respective governments to account. In 2030, there is still inefficient use of resources and skills in the region and most of the civil society organisations and NGOs continue to rely on external support and expertise.

Although the EAC does not make progress on regionalisation, there are others that have an impact on the region, such as the (Asian) Asian powers, the EU and Brazil. Their economic needs in relation to the resources in EAC member countries actually hampers further regional integration.

Agricultural production/development

In 2010, the EAC's region agricultural productionwas a key sector in the economies of the member states. Estimates showed that 70 to 80 percent of the labour force in EAC was involved in this sector. These numbers changed progressively to 2030. By 2020, the number of people active in the food production in the region had decreased to 65 percent and by 2030, it stood at 60%, although with regional fluctuations on a country-by-country basis. In 2010, between 24 and 48 percent of the GDP in member countries, was attributed to the agriculture sector. By 2025, there was a proliferation of bilateral agreements on critical issues like cattle branding and disease and weed control without delivering the benefits of full integration of policies, so that issues still did not get tackled properly at regional level. In 2030, agriculture made up 40% of the GDP of the region, but this proportion was more

variable and depended on shocks, such as devastating droughts and floods. Factors that contributed to low and unstable agricultural production are like hi-tech cash-cropping for export markets by private sector players and production and productivity occasioned by over-reliance on rainfall in low-input farming areas in the EAC widespread consecutive occurrences devastating droughts and frequent crop failure. The situation is compounded by poor or no access to affordable agricultural credit by resource poor producers, low producer prices making agriculture less remunerative and relatively high inflation rates, a situation which accelerate high degree of food insecurity and malnourishment, especially among the rural poor in the region.

Agricultural production is divided into commercial, hi-tech cash cropping and concentrated animal feeding operations (CAFOs) for export, and low-input cropping and livestock farming at the margins for local consumption. This subsistence production is augmented by temporary employment in construction and maintenance sectors.

Contract farming for horticultural crops like flowers, sugarcane, pineapple and citrus farming has boomed, but this benefits a small number of selected farmers. Staple crops like maize continue to be purchased soon after harvest when prices are low by businessmen who hold the stock in store and sell back to farmers at high price during lean periods. Additionally, businessmen sell staples across the borders with significant profit margins that add nothing to farmers' incomes.

Furthermore, regional market access (and access to global markets) falls into the hands of a few large players at the expense of farmers, most of small-holder farmers. Farmers are faced with reduced income due to high transaction costs in the value chains benefiting middlemen and large market players.

Food Security

The year 2010 marked the establishment of the EAC Food Security Action Plan (FSAP) which aimed at achieving sustainable food security and rational agricultural production. It was envisaged that the FSAP would guide coordination and implementation of the joint programmes and projects emanating from this plan under the EAC cooperation. In 2030, the majority of EAC member countries still failed to achieve individual and collective food security status. Due to the inability or refusal of member countries to implement the Food Security Action Plan, the scenario for food security in the region is uncertain and little sustainable food security in the region is expected.

In 2030, even though there is the firm intention on paper (the policy is there, the funds are not) of establishing the EAC Strategic Grain Reserve, this opportunity is unrealised. Instead, several bigger countries have established their own food banks rather than wait for bureaucrats and politicians to create a regional food bank. Commodity-based private sector actors in the region self-organise to take advantage of market opportunities, but because of fragmentation/ competition they cannot gain good market access across the region.

Livelihoods

Whereas the EAC economy in 2030 looks very encouraging with annual growth averaging 8% over the past seven years, progress has been much slower in relation to poverty reduction and social advancement. The gap between the ruling classes and the general populations of countries in the region – as well as the gap between rural and urban has widened significantly. There are many millions of urban poor people in the region who are locked out of the benefits of economic growth. The wealthy have access to sufficient and high quality food, and luxurious motorcars to drive on the new highways and can afford to pay for electricity and clean tap water, but lives of the majority are still a daily struggle for survival: relying on fuelwood for their energy needs and exposed to the vagaries of climate variability. Fuel wood supplies are geopardised by deforestation, and fuel prices have escalated and thus dependence on remaining forest resources continued leading to further degradation. Education and welfare has stagnated, except where it is in the interests of the private sector to deliver these to their employees and their customers. There is huge list of food assisted people in both urban and rural areas.

Grain traders in some parts of EAC take advantage of the food shortfalls and would have benefited. By 2030, massive public riots in most of the countries EA and widespread civil unrest broke out that led to overthrow of leaders. Some active opposition's tookover governments and started putting up new democratic governances.

Scenario 4: Status Quo and Reactive: Narrative

Governance and Political Stability

In terms of governance, East Africa in 2030 is a world where agriculture remains the mainstay of the region's economy, yet governments spend more on other sectors of the economy (e.g. national security) relative to agriculture. The share of agriculture in governments' total expenditure seldom surpasses 10%. This is contrary to the pledges made at the meeting in Maputo, Mozambique, by the African Union's heads of state and government in July 2003 to invest at least ten per cent of their national budgets in agriculture and increase productivity by at least six per cent. The low public expenditure on agriculture is a grave concern given the inadequacy of rural infrastructure (power, roads and water supply), technology and the need to develop efficient input and output markets, and functional extension services. Ethiopia, however has kept this promise, while Kenya still spends less than five per cent. This failure to implement both regional and international agreements has been a common feature in the region between in the 20 years to 2030.

Corruption is a major impediment to effective governance, especially the delivery of government services in the region. However, every newly-elected government is anxious to develop firm regulatory frameworks to combat the menace that is still stalks the higher echelons of public administration and politics in their countries. The effort is demonstrated by having national organisations mandated to regulate, prevent and investigate corruption, like the Kenya Anti-Corruption Commission and Prevention and Combating of Corruption Bureau of the United Republic of Tanzania. The organisations are members of the East African Association of Anti-Corruption Authorities (EAAACA).

Corruption has moved from bad to worse in the region in 2030. This has forced the respective governments to continuously spend colossal amounts of public funds in self defence mechanisms like setting up of one commission of enquiry after another at the expense of economic development. Where corruption remains uncontrolled, a few rich, powerful and politically-correct individuals (the so-called big fish) plunder the scarce public resources meant for infrastructural development (e.g. hospitals, markets and schools) or misallocate them (e.g. channel the funds to uneconomic high profile projects instead of vital infrastructural projects) with impunity. These lead to a contraction of opportunities for foreign direct investments and increases in the costs of production, which make it even harder for entrepreneurs and farmers to thrive in the highly demanding global economy. This with time retards economic growth in the East African countries.

Besides corruption, there is some autocratic tendencies in the governance systems. The ruling elite scheme to hang on to state power indefinitely at all costs even when the stability of the country is shaken, and are averse to radical reforms that would enlarge the democratic space, improve governance, and guarantee human rights as well as ensure free and fair elections in their countries. This phenomenon endures till 2025, when increased level of political awareness among the citizens, and pluralism and participatory democracy begin to emerge in key countries like Kenya and Ethiopia, leading to improvements in the whole region. However the status quo curtails openness in administration, accountability and hence economic development.

The harmonisation of policies is further complicated by inter- and intra-regional conflicts, the emergence of new challenges such as the international and regional terrorism ('the Al-Shabaab factor'), the spread of HIV/AIDS pandemic and the distraction of adopting new development programmes at the continental level, e.g. the New Partnership for African Development (NEPAD).

At the individual country level there are excellent policies, often driven by donor agendas (e.g. national poverty alleviation program, national economic reforms, agricultural sector development programme, environmental investment, etc), in place but these are not fully implemented mainly due to political incompetence and vested interests. Unfortunately, these policies also do not allow the smallholder farmers (and even the large-scale farmers who are linked to the smallholders) to seize the opportunities that globalisation offers, or protect the group of smallholders who are adversely affected by the negative impacts of globalisation.

In the absence of regional agreements on the best and sustainable strategies to manage the trans-boundary natural resources (e.g. waters of Lake Victoria and Nile River) for the benefit of East Africans, the *do-it-yourself* approach persists. In 2030, this reality is a driving force for resource-related conflicts. Tension among the countries such as Kenya and Uganda that share water resources and between Tanzania and Kenya that share rangelands for grazing, intensifies, and fishermen/pastoralists from each country for instance, are strictly prohibited from fishing/grazing beyond the bounds of their national waters/grazing lands. This results in violent conflicts in some instances but, ultimately provokes the call for a fully regional approach to the management of resources across national borders in 2025. By 2030, some progress has been made to mediate these conflicts.

The power-sharing struggles at regional level and the unilateral protocols between and within countries undermine economic growth for the whole region. This prompts the AU, UN, the US and the EU to come to its rescue but no breakthrough to the regional political stalemate is realised. Moreover, the civil war e.g. in Somalia goes on despite efforts by the AU to restore peace or establish a government of national unity, regional terrorism in the form of constant attacks increasing (the destabilising actions of the Al-Shabaab militant group intensify) as does piracy on the East African coastal waters. These actions interrupt the movement of people, goods and services across the regional borders whereas the civil wars instigate the influx of refugees from the east of the Democratic Republic of Congo (DRC), Sudan and Somalia to the more stable East African countries. Here, they exceed the carrying capacity of the designated refugee camps and accelerate environmental degradation.

In similar fashion, countries continue to hold general elections regularly (Tanzania 2010, Kenya 2012, Uganda 2011, etc. every five years) which makes the political environment more fragile and violence-prone, because most of these elections are patently not 'free and fair'. The ensuing violence had economic repercussions throughout the region. This prompts the AU, UN, and powers to seek to step in but, in nearly every instance, a breakthrough to the political stalemate comes when considerable damage has already been done. People coalesce to form movements and associations including CBOs, Faith-based Organisations (FBOs) and youth movements in the struggle for improved governance and democracy.

The instability also increases the smuggling of arms through the porous East African borders, which jeopardises security, pollutes the economic environment and, ultimately, coerces governments into spending more of their scarce resources on national security and humanitarian assistance.

In summary, East Africa in 2030 is characterised by poor governance, coupled by political instability, and consequently is a poverty dominated region. The Global Hunger Index (GHI) calculated from three factors -the proportion of undernourished people in a country, the preference of underweight children, and the child mortality rate. A score of 20 indicates "alarming" levels of hunger and higher than 30 "extremely alarming" levels of hunger. In 2030, six countries in the East African region - Sudan, Tanzania, DRC, Burundi and Rwanda featured among the 25 countries with "alarming" levels of hunger, while Somalia and Eriteria fall under those with "extremely alarming" levels of hunger.

Regional integration and economic development

Some individual governments continue to be sceptical of integration to the EAC despite enormous effort to revive it. Thus realisation of full regional integration is not reached until 2025 when most of these countries accede to most of the clauses that ensure economic cooperation. In effect though, by 2030 there is still no agreement on a common market, currency or political leader in the region; the anticipated progress in integration process and socio-economic development is hampered by political conflicts, famine and strains from the national structural adjustments programs (NSAPs), paucity of resources to finance the identified development projects in addition to, lack of capacity building to formulate and harmonise regional policies.

Operationally the Common Market for Eastern and Southern Africa (COMESA) and Inter-Governmental Authority on Development (IGAD), though with limited impact, are thus the only existing 'regional blocs'. The members of IGAD continue to contribute to the organisation's administrative budget, attend meetings and summits regularly, progressively establish technical expert platforms for discussing and working on regional issues, and monitor the political environment in order to prevent both intra- and inter-state conflicts. One major achievement within the region is the Regional Conflict Early Warning Centre and Peace-keeping Initiative.

The absence of well-functioning market institutions hinders producers from taking advantage of incentives emanating from the global markets because positive changes in international prices cannot be transmitted to producers at the farm gate. This also restricts market reforms, such as reduction of market costs, which could give impetus to the production of cash and (some) food crops. The weak credit institutions compel the smallholders to depend on savings from their low incomes, which in turn curtails their ability to expand their mechanisation, or increase their use of fertilisers, modern seeds and other farming inputs.

Although the inflation rates across the region have largely been kept in a band of around 9% since 2010-11, climate change and rainfall variability have made poor households progressively more vulnerable to economic shocks in 2030. The local markets in East Africa

are inundated with cheap imported products from China and elsewhere. This affects the local industries and smallholder farmers who are unable to cope with the competition created by importation of cheap products. To counter this, the East African countries forge alliances of convenience at various regional and international meetings and negotiations (e.g. negotiations within the ACP-EU framework and the World Trade Organisation). But they are unable to consistently speak with one voice on issues regarding market access, domestic support, export subsidies and other pertinent issues for agricultural products.

The governments in East Africa react to environmental crises only when the negative impacts culminate into disasters or become more evident e.g. ecosystem collapse, degradation of water catchments areas, desertification, disease outbreaks or deaths caused by water contamination, thus causing panic in governing political circles.

In 2030, food is mainly produced from agriculture activities which are predominantly rain-fed. Most economic activities rely on natural resources, mainly water bodies, forests and the soils which are very sensitive to climate change. Climate change is manifested through increased climate variability and increased frequency of extreme conditions like droughts and floods. These lead to overall reduction in agriculture productivity and yields, including rangelands and livestock production, threatening food security and heightening the risk of famine.

Development policies are well written but hardly implemented. The existing socio-political structures are to tackle events as they happen (through declaring 'states of emergency') rather than by preventing them from happening. This situation continues to be costly in terms of people's lives and welfare while building more dependence on the outside world for disaster relief. Where the dictates of the global economy and global agreements on climate change and the like are honoured in East Africa, this is done with little or nor consideration as to the compatibility of such intiatives with the existing regional policy environment.

Most EAC member countries and prospective members each want to please the international community and win concessions and investments at the expense of other member countries. In this situation, the level of importance of the Asian powers during the 20 years leading up to 2030 increased tremendously. The Asian powers (and BRICS in general) step up their efforts to penetrate the region, especially the countries where governance is improving and moving towards political stability. They are awarded land for agricultural production and development projects, such as mineral exploration and exploitation, construction and refurbishment of roads and hospitals etc, at the expense of local enterprises (e.g. the road contractors). These projects are executed by expatriates who show little regard to the environmental regulations leading to negative impacts such as water contamination, pollution, increased greenhouse gases emissions, displacement of persons thus locking them out of land use and fuelling conflicts over land and other scarce resources, among others. In some countries (e.g. Ethiopia), the Asian powers and other multi-national companies even gain control of natural resources (e.g. forests) and convert them to agricultural land for production of biofuel (e.g. *Jatropha carcus*) and food crops. With economic profits taking precedence over all the other issues including environmental resource management, the ecosystem health deteriorates, due to degradation and

overexploitation by the foreign investors. However, local people gain from opportunities to learn some skills and modern technologies that they apply to improve their production efficiency.

The economic forces operating in the international oil markets ensure that oil prices maintain a high price of between $120 and $130 a barrel in the decade leading to 2030. This affects food security, transportation of crops, purchase of fertilisers as well as, the use of energy for irrigation in the East Africa by smallholder farmers and the poor. In response to the escalating oil prices, some governments and investors in the East Africa region divert their attention and scarce resources to the production of biofuels at the cost of food crops and continue to import food. Food prices retain an upward trend in the global markets, which triggers macro-economic instability (e.g. high inflation) and increases poverty and hunger levels in East Africa. In this regard, Kenya and Uganda are the most vulnerable in 2030, while Tanzania and Ethiopia are the least vulnerable. As a corollary, production costs rise and the smallholder farmers in most of East Africa reduce the proportion of land that they commit to crop production. On the other hand, the rising food prices also present opportunities for East African countries to promote agricultural and rural development. This opportunity remains hampered by inadequate infrastructure, weak institutions and lack of political will to implement supportive policies. In the international arena, the occurrence in 2015 of another financial crisis similar to the 2008 credit crunch only worsens this volatile situation.

Environmental management

By 2030, changes in land biogeochemistry and biogeography in the region mean an increase in tropical woody vegetation over the region at the expense of grasslands, regional increases in net primary productivity and total carbon storage compared with the present-day. Conversely the trend for the total land with permanent vegetation has begun to decrease because of increased human population using the land as a factor of production of other goods and services beside agriculture.

East Africa, a populous and economically poor region, thus experiences some ecosystem service benefits through increased precipitation, river runoff and fresh water availability, resulting to enhancements in net primary productivity that lead to improved crop yields in some areas. Temperature increases pose some possible negative impacts for agriculture, biodiversity and other ecosystem services. Civil society movements have put pressure on governments to address REDD and increased forest cover that has led to greater conservation of biodiversity, especially in biodiversity hot-spots. High demand for forest resources and agriculture extensification has diminished the level of biodiversity. Due to participation by key countries in REDD+ agreements and programmes, there is an increase in forest cover.

The increased interest shown by the governments of Kenya and Uganda to improve water quality in Lake Victoria has lead to policies that promote better distribution among states around Lake Victoria. Political instability and population growth has increased conflict between end users in water supply. Improved water technology has provided water to areas that previously suffered from scarcity. Climate change make dry areas drier and has resulted in the lowering of water tables.

Food security

Countries in the region are forced to depend on food aid and development projects implemented in piecemeal fashion and with little consideration for sustainability.

In 2030, East Africa is still characterised by widespread poverty. Local coping mechanisms entail changes in eating patterns, an increase in migrations by the pastoral communities, increase in urban migration, and exhaustive use of natural resources (water sources, arable land, forests and grazing lands). Rainfall variability makes water a major constraint to crop and production. Water harvesting has increased in importance for availing domestic and agricultural water, either through local based innovations or new technology. But advanced technologies are usually neither affordable nor available to farming communities.

EA governments direct more efforts towards urban development than to rural and agricultural development. Most governments focus more on giving their countries a total urban facelift in terms of communication and transport infrastructure, aiming at only one thing; attracting foreign direct investment. The Asian powers take advantage of the grid and give the countries in the region what appear to be mouth-watering deals, which most countries succumb to, but this increases the debt burden of countries in the region.

In the years leading up to 2030, it is the livestock-based systems which predominate in marginal areas that are most affected by the limited rainfall and increased desertification. This leads to low productivity and reduced numbers of animals. This low income leads in turn to further impoverishment of the livestock keepers. The result being overgrazing, land degradation, soil erosion and resource use conflicts in a downward spiral that sees livestock numbers diminish further. Livestock keepers' coping mechanism to drought entails moving the animals to areas with available water and forage within the region. However, such uncontrolled inter regional and country movement, means increased incidences of environmental degradation, land conflicts and the spread of disease.

Given the risk-averse situation the permeates the region, even the limited opportunities for embarking on intensive production in agriculture are not taken up. As a result, livelihood security and coping mechanisms are placed under considerable stress. Each country takes its own route to control, mitigate and adapt the effects of climate change. In such a situation, developed countries take the advantage of weakened situation to bring in individual trade policies, which are detrimental to the regional development. Research and development efforts are constrained by limited resources and technology. When it comes to the question of climate change mitigation and adaptation, the limited baseline data are a challenge and funded programmes to mitigate global climate change remain few in number. Consequently, people in the region continue to rely on local knowledge that does not yield much. However there is emerging interest from within and without in supporting adaptation and mitigation policy in the region. Existing policies, though well written, are not implemented due to a lack of capacity, accountability and sometimes ignorance of the political and technocrats in power.

East African countries face evermore devastating food crises. Wet season failures follow periods of flood, leading to poor harvests that regularly see the region plunged back into

crisis. The East African region, including Ethiopia, Kenya, Uganda and Tanzania, has spent the past 20 years to 2030 at great risk of repeated famine. However, state actions over the past decade have not reflected this urgency: there is too much talk and deliberation on the seriousness of the issues, but no substantial policy development and no programmatic efforts to address the challenge.

Livelihoods

In 2030, informal and formal cross-border trade in the region is important. Formal cross-border trade within the East Africa region improved in 2010, with the signing of the East Africa Market Protocol and has generally improved since then. However, because of poor governance and polarised borders there is an increase in informal cross-boundary economic activities that have led to conflicts among neighbouring countries in the region.

Despite improving conditions in some parts of the East African region, conditions of acute food insecurity persist and the number of people in need of assistance increases in conflict-affected regions. Recurrent conflict, civilian displacement, and market disruptions continue to affect access to food and income for Internally Displaced Persons (IDPs) and market dependent poor urban households in those regions.

The situation in countries – famines, political crises, insecurity – all result in deteriorating quality of life and health for the majority of people. Heavy investment by the Asian powers and European countries enables the middle-classes to pay for healthcare. Donors provide more funding on health (malaria, HIV/AIDS) especially by 2015 when MDG targets were set to be revisited.