Engaging stakeholders in using future scenarios to analyse the potential impacts of agricultural development in the Lake Victoria Basin

Regional policy review and harmonization workshop report

17-19th August 2016
Chez Lando Hôtel, Kigali, Rwanda
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1. INTRODUCTION TO THE PROJECT

This report presents the proceedings from the second workshop for the project “Engaging stakeholders in using future scenarios to analyse the potential impacts of agricultural development in the Lake Victoria Basin”. During this workshop, stakeholders from Rwanda, Uganda, Burundi, Tanzania and Kenya met to review and harmonize national policies and plans in the Lake Victoria Basin (LVB).

The two year project (2015-2017) aims to support land-use related decision-making in the LVB so that it takes into consideration biodiversity and ecosystem services and is based on sound information and on the consideration of trade-offs between food production and conservation goals. The long-term outcome of the project will be a reduction in the adverse impacts of agricultural commodity developments on biodiversity, ecosystem services and human well-being in the LVB.

This is a joint project between the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and the Albertine Rift Conservation Society (ARCOS). The project builds on earlier activities carried out in the Great Lakes Region (GLR) in 2014 as part of a John D. and Catherine T. MacArthur Foundation funded project “Commodities and Biodiversity” that assessed key agricultural and extractive developments in the region and resulting impacts on biodiversity and ecosystem services, as well as the "Oil governance in Uganda and Kenya" project which aims to catalogue and analyse existing baseline indicators on the impact of the oil sector in Uganda and Kenya. The Commodities and Biodiversity project mapped the potential impacts of future commodity developments on biodiversity and ecosystem services in the wider region’s watersheds based on future socio-economic scenarios developed by the CGIAR programme on Climate Change, Agriculture and Food Security (CCAFS).

In an effort to maximise both the validity and the usefulness of this work for regional stakeholders, the current project builds on these results. With stakeholder input, it seeks to further develop the analysis, deliver results at a finer scale and assess how this can benefit existing policy and planning processes in the region. It will do so by working on actual policies and plans in the region, reviewing them in the light of future uncertainty and implications for biodiversity, ecosystem services and human well-being in the LVB. The intended output of this project is to propose five improved national policies/plans that are both robust and flexible in the face of future uncertainty, and that take into account the transboundary character of environmental problems and anthropogenic influences.

This report first gives a summary of the project’s inception workshop, which took place in Kampala in March 2016. It then sets out the steps and results of the follow-on regional policy review and harmonization workshop held in Kigali in August 2016.

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2. SUMMARY OF THE INCEPTION WORKSHOP

An Inception Workshop was organized in March 2016 in Kampala, Uganda and was attended by representatives from government sectors of environment, agriculture, planning and finance, as well as representatives from academia, national and regional NGOs.

This Inception Workshop allowed for the dissemination and validation of results from the previous MacArthur Foundation funded ‘Commodities and Biodiversity’ project to LVB stakeholders. The workshop aimed to identify gaps in understanding of key developments and ecosystem services as well as determine current capacity, information needs and current management policies. During the workshop, preliminary model results of the potential impacts of land use change in the LVB on areas of biodiversity importance and ecosystem function were presented. Participants were given the opportunity to comment on the results and suggested additional factors to consider.

The specific objectives of the workshop were to:

1. Introduce the project and the workshop, and invite comments and feedback.
2. Illustrate how mapping, modelling and scenarios can be used to support land-use related policy review and development.
3. Identify policy and planning processes that could benefit from scenario-based support and capacity building activities to be held in the following two workshops.
4. Map key high impact developments in the Lake Victoria Basin and the affected ecosystem services.
5. Identify data and knowledge gaps for effective assessments to support more informed decision-making on agricultural development planning.

The first three objectives were addressed on the first day of the workshop through a series of presentations, discussion and feedback sessions and an exercise to identify policy and planning processes. The second day included practical mapping exercises in country groups to identify and map developments and their impacts on biodiversity and ecosystem services, as well as identifying the knowledge and data gaps around decision-making.

The outputs achieved through the workshop, include:

1. Maps per country of ecosystem services, biodiversity and development in the Lake Victoria Basin.
2. A list per country of policy and plans that influence the Lake Victoria Basin, with links to biodiversity and ecosystem services.
3. A list per country of data gaps and needs relating to understanding the impacts of development in the Lake Victoria Basin on ecosystem services and biodiversity.

Visit [http://wcmc.io/commodities](http://wcmc.io/commodities) for a copy of the full workshop report (under Latest Outputs).
3. INTRODUCTION TO THE REGIONAL POLICY REVIEW AND HARMONIZATION WORKSHOP

One of the objectives of the project is to support better harmonization of national policies within the LVB region, to address the problem of transboundary environmental issues more adequately. During the inception workshop in Kampala, workshop participants first produced a list of relevant policies and plans per country. Then, as a next step policies and plans that are in the revision phase or about to be revised were identified.

During the policy review and harmonization workshop, the selected policies and plans were subjected to a scenario-guided review. Each of the policies and plans were compared to policies and plans on the same policy theme from the other LVB countries to enhance regional harmonization. For this workshop, we invited policy makers responsible for the selected policies as well as representatives of civil society, the private sector and academia from all five countries. The workshop consisted of the following steps:

1. For each policy theme, a combined document consisting of the focus policy/plan and related policies/plans from the other countries was prepared. Four mixed groups of participants from each country were formed, each looking into one of those four policy themes. The groups analyzed the focus policy/plan, using a set of guiding questions. Subsequently, they visualized the relationship between their focus policy theme and the other policy themes.

2. The groups reviewed the policy sub themes of all five countries, using the four CCAFS East Africa scenarios. Each group performed four scenario-guided reviews, one for each of the four scenarios. The mixed country groups allowed for transboundary dialogue during the policy review process, thereby forming a first step towards policy harmonization within the LVB region. During this session, policy recommendations were formulated with specific focus on transboundary aspects, ensuring policy harmonization.

3. During the final session of the workshop, the groups summarized and integrated the scenario-guided recommendations and presented the most important findings. Moreover, they came up with a plan for the next steps.
The first day started with a warm opening speech by Dr. Sam Kanyamibwa (Director of ARCOS) welcoming the participants back together again for a second regional project workshop. He also thanked the John D. and Catherine T. MacArthur Foundation for their continued support to the Lake Victoria Basin, specifically welcoming John Watkin as a representative of the Foundation at the workshop. The opening speech was followed by presentations summarising the previous workshop and project progress to date (Andy Arnell, UNEP-WCMC), the scenarios work of the CCAFS team (Joost Vervoort, CCAFS) and the objectives for the workshop (Lucas Rutting, CCAFS).

After the opening and introductory presentations, participants were subdivided into four mixed-country groups for session one, the initial policy analysis. Each group focused on a specific policy theme and focus policy/plan as identified during the inception workshop in Kampala.

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<thead>
<tr>
<th>Group</th>
<th>Policy theme</th>
<th>Focus policy/plan</th>
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<tbody>
<tr>
<td>1</td>
<td>Food and nutrition security</td>
<td>National Food and Nutrition Strategic Plan (Rwanda)</td>
</tr>
<tr>
<td>2</td>
<td>Agriculture</td>
<td>Ministry of Agriculture, Livestock and Fisheries (MoALF) Strategic Plan (Kenya) Plan National d’Investissement Agricole (Burundi)</td>
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<tr>
<td>3</td>
<td>Livestock</td>
<td>National Livestock Policy (Tanzania)</td>
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<td>4</td>
<td>Water</td>
<td>National Water Policy (Uganda)</td>
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</table>

During this session, each group analysed their focus policy theme through a regional lens. Each group received summaries of other policies/plans from the other LVB countries that fit into the theme. So, for example, the group analysing the Kenyan Ministry of Agriculture, Livestock and Fisheries Strategic Plan and the Burundian Plan National d’Investissement Agricole, also received summaries of the Ugandan Agricultural Sector Strategic Plan, the Tanzanian National Agricultural Policy, and the Rwandan Strategic Plan for the Transformation of Agriculture.

They asked themselves the following questions:

- Which elements from the other countries’ policies/plans are missing (relevant) for the focus policy/plan, but could improve the respective plans, and vice versa?
- How can these elements be translated into objectives in the focus policy/plan? And, additionally, which objectives can be formulated for the other countries’ policies/plans?
- Which objectives for the focus policy can be formulated to improve regional collaboration, and vice versa?
- How can the national policies/plans harness regional initiatives within this policy theme? (EAC engagement process)

The results of this session are described in Appendix 2.

In addition, each group received summaries of all other selected focus policies/plans, and similar documents from other countries. So, for example, the group focusing on the Kenya Ministry of Agriculture, Livestock and Fisheries (MoALF) Strategic Plan and the Burundi Plan National
d’Investissement Agricole received summaries of the Uganda Draft National Water Policy and similar documents from the other countries, etc. They asked themselves the following question:

- How do the different policy themes relate to each other? For example, how do water issues relate to agriculture? How does agriculture relate to food and nutrition security?

To make these relationships more explicit, the groups drew conceptual maps displaying the interactions between the different aspects (see Appendix 3).

5. DAY TWO: SCENARIO-GUIDED REVIEW

During this session, which was the core of the workshop, the four breakout groups reviewed the policy themes and recommendations made during the first day, using the four CCAFS East Africa scenarios.

Before each review, participants read a background document containing both the regional scenario narratives and the LVB narratives that were produced during the inception workshop (Appendix 6). Participants noted additional implications for the LVB region which were discussed and grouped using five scenario domains. In this way, the scenarios were re-imagined by the groups themselves.

Participants then reviewed the recommendations made during the first day using the following questions:

- How will these recommendations for the policy theme work in this scenario? Are there barriers, challenges or enablers?
- How can the recommendations be changed/adjusted to make them successful in the scenario?

Participants also answered questions about regional harmonization:

- What cross-country dynamics are characteristic of this scenario and how can the recommendations be harmonized to address related problems?
- How can we ensure that regional policy harmonization will be successful in this scenario?

This session yielded a large amount of scenario-guided policy recommendations which were then prioritised during day three of the workshop.

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On the last day, priority recommendations were chosen under each scenario for discussion in both mixed-country groups and country groups. Groups prioritised the most important insights from the scenario-guided review, using these questions:

- What are the most important insights per scenario for the policy theme?
- What are common insights across all scenarios?
- How do these insights translate into policy recommendations?
- How are the insights from the scenario-guided review reflected in policy harmonization across the LVB region?
- How are we going to take this forward, who is going to do what? Next steps?

Each group prepared a short presentation highlighting the answers to these questions. After each presentation, participants from the same country got together to think about concrete next steps for the policy formulation process in their respective country. The results of this exercise are presented in Appendix 5.

Discussions during day three were informed by the results of a pre-workshop capacity assessment using the Capacity Development Assessment Tool (CDAT)\(^6\). The CDAT was used to assess institutional capacity within the LVB to achieve the project objective: to support agricultural development planning that seeks to balance a growing demand for food and other commodities with sustaining biodiversity and ecosystem services that support economic development and human wellbeing. Baseline results (shown in Appendix 4) show that it is mostly easy to develop sufficient organisational capacity in elements relating to competency and the enabling environment and that existing capacity is partial/sufficient to meet the project objectives. On the other hand, participants thought it is difficult to develop sufficient capacity in elements relating to resources and existing capacity is low/partial. This project aims to build on the existing capacity in the region through the provision of materials and information, promoting regional experience sharing around resource mobilisation, and supporting organisations to use the methodology base developed under the project.

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7. CONTRIBUTING ORGANIZATIONS

The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) is the specialist biodiversity assessment centre of the United Nations Environment Programme (UNEP), the world’s foremost intergovernmental environmental organisation. The Centre has been in operation for over 30 years, combining scientific research with practical policy advice.

ARCOS is the only regional conservation organization with the sole focus on the Albertine Rift biodiversity conservation. Its overall goal is to enhance conservation of critical ecosystems and promote sustainable development in the Albertine Rift through collaborative actions between various partners in the region.

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) seeks solutions to help the world’s poorest farmers become climate resilient. CCAFS is a strategic collaboration between CGIAR and Future Earth, led by the International Center for Tropical Agriculture (CIAT).

8. ACKNOWLEDGEMENTS

The “Engaging stakeholders in using future scenarios to analyse the potential impacts of agricultural development in the Lake Victoria Basin” project would like to thank our donors, the John D. and Catherine T. MacArthur Foundation, and the workshop participants for making the workshop a great success.
## APPENDIX 1. WORKSHOP PARTICIPANTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
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<tbody>
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<td>International Institute of Tropical Agriculture, Uganda</td>
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APPENDIX 2. INITIAL POLICY ANALYSIS

KENYA – Ministry of Agriculture, Livestock and Fisheries (MoALF) Strategic Plan 2013-2017 (Revised 2015)

Whilst the group discussion focused on the MoALF Strategic Plan, it is worth noting that this plan is guided by several national policies and legislations (see the Strategic Plan for a list of policies/legislation by sub-sectors: crops, livestock and fisheries). The most relevant for these is the Food and Nutrition Security Policy (2012), the implementation plan of which is in draft. It is also worth noting that Kenya recently adopted a new constitution and is currently designing implementation of the constitution which will likely affect the current policies. The new constitution requires the existing 44 ministries to be reduced to 14-22 and 131 legislations to 4. A review is underway to harmonise agricultural policy.

Comparable plans in the LVB region

Tanzania: National Agriculture Policy (2013)
Rwanda: Strategic Plan for the Transformation of Agriculture in Rwanda – Phase III
Regional: Agriculture and Rural Development Strategy for the EAC (2005-2030)
Agriculture and Rural Development Policy for the EAC (2005)

A. Which elements from the other countries’ policies/plans are missing (relevant) for the focus policy/plan, but could improve it?

The group highlighted a number of key thematic areas present in the agriculture policies/plans of other countries in the region but missing from the Kenya MoALF plan. These include cross-cutting issues such as sustainability, environment, gender, health, land use planning, water management etc. Other country plans include specific sections on cross-cutting issues and it is recommended below that Kenya also mainstreams the issues included in other agriculture-related policies/plans into the MoALF plan to encourage harmonisation.

In light of the new constitution, it was also suggested that the objectives/recommendations below should include a county-level implementation framework as this is where a lot of the implementation ‘bottlenecks’ occur.

The enabling environment is not mentioned in the current plan, whilst Uganda and Tanzania plans have sections on this. Specifically, a section on trade was discussed which would focus on shortening the value chain so there is more control over the distribution of subsidies (e.g. the Rwanda plan is a good example of this).

No specific issues were raised from the Kenya plan which are missing from other relevant country plans but this is largely because these issues are covered by other agriculture-related policies for Kenya.

B. How can these elements be translated into objectives in the focus policy/plan?

1. Mainstream cross-cutting issues in the policies and policy implementation frameworks e.g. environmental sustainability (natural resource management), gender etc. NB. The current policy harmonisation review would be a good starting point for this action
2. Strengthen coordination between sectors (e.g. environment, health, planning, gender)
3. Strengthen the enabling-environment for better implementation of the MoALF Strategic Plan
4. Enhance community participation in policy formation and implementation
5. Review existing policies to include climate-smart agriculture components
6. Develop a county-level policy implementation framework
7. Develop appropriate value chains for different agricultural commodities (e.g. as in Rwanda strategic plan)
8. Ensure appropriate compatibility of crop production and land use types to increase productivity
9. Promote systems to reward good environmental management (including water)
10. Implement the Maputo Declaration at national level – 10% national budget to agriculture NB. Kenya’s budget allocation to the agriculture sector ministries has been rising in response to the Maputo Declaration.

C. Which objectives for the focus policy can be formulated to improve regional collaboration?

This discussion focused on issues that should be included for both the Kenya MoALF Strategic Plan and the EAC agriculture-related policies. It was decided that in addition, the above objectives are also relevant at the regional level, with the exception of the country-level implementation framework which is specific to the new constitution in Kenya.

1. Include livestock corridors and fly-ways for birds in the policy as these are regional issues
2. Better coordinate objectives/actions around crop disease in all LVB policies
3. Review all regional policies to include climate smart agriculture components in relevant policies
4. Enhance participation of difference sectors in the EIA process
5. Improve structures to better coordinate trade across the region as food security is a transboundary issue
6. Improve regional lessons sharing around PES schemes
7. Increase agricultural investment in line with the Maputo Declaration – 10% of national budget into agriculture

D. What can be learned from the policies/plans on different themes which is relevant for the group’s focal policy theme?

The group reviewed the Kenya MoALF Strategic Plan alongside the food security and nutrition, livestock and water policies in the region. Additional objectives were added to the lists above based on these discussions. In addition, the group suggested that climate change and PES could also be considered for inclusion in the Tanzania Water Policy. For the food and nutrition security policies, the group thought that the Rwanda policy could include a resource mobilisation plan, the Tanzania policy had good coverage of transboundary and cross cutting issues, the Uganda water policy could better address post-harvest loss and look in more depth at the levels of food security from grassroots to national levels.
The agriculture thematic group reviewed and discussed recommendations for the Burundi agriculture policy alongside the Kenya Ministry of Agriculture, Livestock and Fisheries Strategic Plan. As such, many of the recommendations are relevant to both country policies/plans.

**Comparable plans in the LVB region**

Tanzania: National Agriculture Policy (2013)
Rwanda: Strategic Plan for the Transformation of Agriculture in Rwanda – Phase III
Regional: Agriculture and Rural Development Strategy for the EAC (2005-2030)
          Agriculture and Rural Development Policy for the EAC (2005)

A. **Which elements from the other countries’ policies/plans are missing (relevant) for the focus policy/plan, but could improve it?**

Some general points which are relevant to the Burundi policy that are missing currently included: better mechanisms to coordinate between ministries on agriculture-related issues e.g. waste management (pesticides), an implementation plan at sub-national levels and the inclusion of relevant stakeholders in the formation of the plan, and environmental impact assessments.

B. **How can these elements be translated into objectives in the focus policy/plan?**

1. Enhance coordination between ministries on agriculture-related issues e.g. waste management (pesticides)
2. Develop sub-national implementation frameworks
3. Ensure relevant stakeholders are included in the formation of the agriculture plan
4. Include issues surrounding environmental impact assessments

*Questions C and D were addressed during the discussions relating to the Kenya MoALF Strategic Plan. The regional recommendations were considered the same for both countries.*
A. Which elements from the other countries’ policies/plans are missing (relevant) for the focus policy/plan, but could improve it?

- Research and monitoring (Kenya and Tanzania)
- Climate change and early warning system (Uganda and Kenya)
- Irrigation and food security (Kenya)
- Storage and processing (Kenya and Uganda)
- Food market and trade (Kenya and Uganda)
- Food supply & access (Kenya and Uganda)
- Gender and food security (Uganda)
- Socio-cultural issues/t taboos around governance (a gap throughout the region)
- Soil conservation/fertility (a gap throughout the region)

And vice versa?

- To strengthen nutrition education in schools (Kenya).
- Key words for food security and nutrition (Tanzania).

B. How can these elements be translated into objectives in the focus policy/plan?

1. To build capacity of institutions for research in food and nutrition security.
2. To establish and early warning system for monitoring the food insecurity under Climate change.
3. To create awareness about gender and socio-cultural issues in food production system.
4. To promote irrigation and soil conservation for food production
5. To establish and maintain the appropriate storage facilities at different levels.

C. Which objectives for the focus policy can be formulated to improve regional collaboration?

1. To include all dimension of food security in the Rwanda food and nutrition strategic plan: From access, availability, affordability to quality.
2. To harmonise the institutional frameworks with other EAC countries in regards to implementation of the food and nutrition strategic plan.
3. To ensure the effective transboundary marketing, trading and standards.

D. What can be learned from the policies/plans on different themes which is relevant for the group’s focal policy theme?

- To improve on Water quality, availability and access
- To enhance the sustainable soil management and climate change adaptation
- To promote fortification of the foodstuff including maize meal cassava floor.
- The promotion of aquaculture.
- To ensure the effective transboundary marketing, trading and standards.
Comparable plans in the LVB region

Rwanda: Strategic Plan for the Transformation of Agriculture in Rwanda (2014)
Regional: not available

A. Which elements from the other countries’ policies/plans are missing (relevant) for the focus policy/plan, but could improve it?

- Scope of what is livestock (conventional vs non-conventional). Lack of promotion of non-conventional (donkeys etc.).
- Lack of promotion of non-mainstream livestock (changed term from non-conventional to non-mainstream)
- Tanzania lacks promotion of indigenous species of livestock. Kenya has considered it under genetic resources. Tanzania are however, in process of co-opting the Kenyan strategy.
- Nutrition not emphasised – it was recognised that this was more about the headings of different sections as the content was there.
- Recast mission and vision statements (vision – future, mission – the means to deliver).
- Missing legal framework in some the policy statements – not properly elaborated for the difference sections. This is cross-cutting for all EAC policies.
- Re-assess self-standing status of policy documents (should they have references?)
- In addition to NEMC (National Environmental Management Council) list other stakeholders in the environmental and conservation sector (in section 4.3.2.a) e.g. Vice President’s Office (VPA), forestry organisations, ministry of natural resource use. This is in order to minimise natural resource use conflicts. This is backed up by the understanding that modifying the natural environment impacts the trade in livestock

B. How can these elements be translated into objectives in the focus policy/plan?

Various elements were removed due to being captured in the policy already. These remain:

- Identify and promote the non-mainstream livestock for improved livelihood (rabbit, donkeys, quails, kanga etc.).
- Develop an act to regulate and support animal breeding to enhance livestock productivity and adaptation to climate change.
- Promote links between the Tanzanian livestock policy and the environmental policy which is also currently under review.

C. Which objectives for the focus policy can be formulated to improve regional collaboration

Although the group didn’t focus on EAC policies (which were unavailable at the time), the lists look at common cross-cutting aspects:

- Re-assess self-standing status of policy documents (should they have references?)
- In addition to NEMC (National Environmental Management Council) list other stakeholders in the environmental and conservation sector (in section 4.3.2.a) e.g. Vice President’s Office (VPA), forestry organisations, ministry of natural resource use. This is in order to minimise natural resource use conflicts.
Vice versa – other countries

- Which elements from the countries’ policies/plans are missing (and relevant) in other policies/plans, but could improve it?
  - Rangelands missing in the Rwandan policy
  - Too many policies for Ugandan livestock (could be brought together into one comprehensive strategy).

D. How can these elements be translated into objectives in the other policies/plans?

- Other countries to adapt the promotion of indigenous species of livestock and genetic diversity. Rwanda – develops a standalone livestock policy
- Refer to rangelands in the Rwandan policy.
- Bring livestock policies in Uganda into one cohesive policy.
- Adapt the promotion of indigenous species of livestock and genetic diversity.
- Standardise themes and headings across all countries, including key issues for the development of the sector.
Recognizing the different layouts and design of policy documents that vary for the LVB countries, the group suggested a criteria to follow in the water policy review/analysis. The criteria highlighted key policy elements that should be captured in the different water policies, these included; a) Access and Allocation, b) Utilization c) Conservation, d) Stakeholder participation, e) Approaches to water resource management, f) water quality and g) quantity and variability. The group reviewed the different water policies to identify whether and how the above policy issues were addressed.

Comparable plans in the LVB region

National Policy for Water Resources Management (2011)
Burundi: Stratégie Nationale de l’Eau

A. Which elements from the other countries’ policies/plans are missing (relevant) for the focus policy/plan, but could improve it?

- Water quantity and variability were not explicitly captured in the draft water policy for Uganda this can be enriched with lessons from the Tanzania water strategy.
- One of the approaches to water resource management- Integrated Water Management is captured in the draft water Policy for Uganda but can be further strengthened learning from the long experience of Tanzania using the same.
- Emerging issues of climate change, oil and gas, mining, disaster management, gender/vulnerable communities, science and technology are not explicitly capture in the draft policy.

B. How can these elements be translated into objectives in the focus policy/plan?

- Determine the status of water resources based on sound scientific and technical information in terms of quantity and quality for surface and ground water.

C. Which objectives for the focus policy can be formulated to improve regional collaboration?

- The group identified that water policies across the LVB already have policy objectives to enhance regional collaboration, this was attributed to the existing regional frameworks like NBI, LVO etc. that are focused on policy harmonization at a regional level.

D. What can be learned from the policies/plans on different themes which is relevant for the group’s focal policy theme?

The group identified linkages between water, agriculture, livestock and food and nutrition security themes as follows:

- Water is a critical resource for livestock and agricultural production and productivity. However, poorly managed livestock systems can negatively impact the natural resources/environment, including water resources. Additional policy objectives to include are as follows:
A policy objective to cater for increased access and utilization of water for livestock and crop production and productivity should be reflected in the water policy.

A policy objective aimed at mitigating the negative impacts of poorly managed livestock and agriculture systems on the water in terms of quality (pollution from agro-chemicals, land use practices etc.)

A policy objective on management of water related disasters (floods, drought, etc.) that affect both livestock and agriculture.

The overarching linkage between the policy themes was that water is crucial for agriculture and livestock production which are also aimed at food and nutrition secure communities. This nexus should be implied in these policies.

### Water Policy Analysis across the LVB

<table>
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<tr>
<th>Key policy elements for the Water Policy</th>
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*EA – explicitly addressed, NEA – not explicitly addressed*
APPENDIX 3. CONCEPTUAL MAPS

Figure 1. Conceptual map for policy theme: agriculture

Figure 2. Conceptual map for policy theme: livestock. Meat, milk and eggs ← water quality and quantity. Meat, milk and eggs → positive for nutrition. Meat, milk and eggs ← fodder.
Figure 3. Conceptual map for policy theme: food and nutrition security

Figure 4. Conceptual map for policy theme: water
### APPENDIX 4. CAPACITY DEVELOPMENT ASSESSMENT TOOL RESULTS

#### A. Competencies

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APPENDIX 5. SCENARIO-GUIDED RECOMMENDATIONS AND NEXT STEPS

KENYA

Scenario-guided policy recommendations

*Industrious Ants*

- Strengthen coordination between and within sectors and the East African Community (EAC) through improved communication strategies and policy harmonisation
  - Increase budgetary allocation in line with the Maputo Declaration of 10% investment in agricultural sector
  - Include cross-cutting issues currently missing from the MoALF Strategic Plan (but present in the Food and Nutrition Security Policy) e.g. environment

*Sleeping Lions*

- Provide incentives to encourage collaboration between various stakeholders
- Empower local communities through better access to information and resources e.g. access to seeds and establishment of community seed banks

*Herd of Zebra*

- Sensitise stakeholders on the interdependencies between economic, social and environmental contributors to GDP
- Enhance a value chain approach for both commercial and community priority enterprises to meet both government and community interests

*Lone Leopards*

- Develop a roadmap for harmonisation of existing sector policies and strategies and regional initiatives
- Ensure equitable distribution and trade of resources and food at regional level
- Decentralise finance to be managed by local institutions

NEXT STEPS

1. Prepare a presentation on this workshop and the resulting recommendations to national and county government officials within all agriculture and agriculture-related ministries
2. Project to support in development of booklet/brochure for awareness creation among policy makers and other stakeholders
3. Identify complementary scenario initiatives going on in Kenya
4. Conduct capacity building activities at county-level. There is currently a lack of capacity at country level and the government needs to rationalise the staffing based on technical competence.
5. Develop a communication strategy to raise awareness of the MoALF strategic plan and enhance extension services
6. Enhance synergies between EAC secretariat and parliamentarians so that the recommendations from this workshop are included in policy formulation/ agenda
7. Hold a resource mobilisation stakeholders forum to focus specifically on the objective of this project
8. Bring on board counties during development of implementation strategies for buy in
**BURUNDI**

**Key Policy Recommendations**

The policy recommendations for Burundi were considered to be the same as for the Kenya MoALF Strategic Plan with the exception of “include cross-cutting issues currently missing from the MOALF Strategic Plan but present in the Food and Nutrition Security Policy” which is specifically relevant to Kenya.

**NEXT STEPS**

1. Prepare a presentation on this workshop and the resulting recommendations to national and county government officials within all agriculture and agriculture-related ministries
2. Project to support in development of booklet/brochure for awareness creation among policy makers and other stakeholders
3. Enhance synergies between EAC secretariat and parliamentarians so that the recommendations from this workshop are included in policy formulation/agenda
4. Hold a national stakeholder workshop to focus specifically on the outcomes of this workshop (it was noted that this would require additional support to mobilise finances)

**TANZANIA**

**Key Policy Recommendations**

**Objective 1:** Identify and promote the non-mainstream livestock (NML) for improved livelihoods (Rabbits, Quails, Kanga, donkeys etc.)

*Industrial Ants*

No major issues but the scenario provides for more optimistic recommendations for improved livelihoods

*Sleeping Lions*

Difficult to promote non-mainstream livestock. There are opportunities to develop strategies on the promotion NML by focusing on awareness creation, marketing and extension services.

*Herd of Zebra*

Promotion of conducive business environment for NML. Marketing is critical and research will play a significant role.

*Lone leopards*

People working together: there is a need to promote NML farmers to form associations for collective bargaining, marketing and easy provision of extension services.

**Objective 2:** Develop and act to regulate and support animal breeding to enhance livestock productivity and adaptation to climate change

*Industrious Ants*

Opportunities exist for improvement of animal quality through breeding and enforcement of standards.

*Sleeping Lions*
Resource mobilization (human, financial and technology) for implementation of animal breeding programmes.

**Herd of Zebra**

Reactive governance: take advantage for existing markets and exploring new ones due to increasing demand of livestock products.

**Lone Leopards**

Competition calls need for standardization, inventory of livestock genetic resource and geographical mapping of agro-ecological areas for maximization of benefits.

**Objective 3: Promote links between livestock and environment policy**

**Industrious ants**

No major concern as there are initiatives in place.

**Sleeping Lions**

Ensure adverse impacts of livestock on environment are integrated into the environmental policy.

**Herd Zebra**

Expansion of environmental management priorities in livestock policy and benefits arising from ecosystem services.

**Lone Leopards**

Proactive approach focusing on sustainable practices, integration of indigenous knowledge into livestock production systems.

**NEXT STEPS**

1. The Tanzania livestock policy is due to be reviewed and there is need to engage respective decision-makers to ascertain the status. There is a need to confirm exactly when and if the policy will be renewed. Assessment of implementation status to identify gaps, strength and weaknesses which will help to identify the need for revision. The contact person for future consultation is the permanent Secretary - Livestock
2. Organise meetings/workshops to share findings. Engagement of stakeholders in this process (multi-sectoral: environmental NGOs, policy makers, CBOs - Community Based Organisations, local communities) is necessary but also costly.
3. Agree way forward on how new ideas will be incorporated in the respective policies/plans etc.

**RWANDA**

**Industrious ants**

- Effective collaboration between research and academic institutions and other stakeholders
- Enhanced funding
- Establish regional working groups on food security
- Improve infrastructure developments to enhance food security.
• Incentives to improve food production.

**Sleeping Lions**

**Overall strategy to achieve our objective under this Scenario will be to work with private sector and CSO**

• Promote PPP
• Embracing indigenous knowledge in food & nutrition security

**Herd Zebra**

**Overall strategy to achieve our objective under this scenario will be to work with private sector and CSO while investing in activities that benefits at the same time local communities and increase the country’s GDP**

• Lobbying and advocacy
• Promote high value crops.
• Organise farmers into coops and associations, groups
• Value addition

**Lone Leopards**

**Overall strategy to achieve our objective under this scenario will be to promote collaborative action between stakeholders including government institutions. The idea will be that together we can achieve bigger goals and everyone can get his success.**

• Forums and networks for joint actions
• Promotion of regional and international trade in food stuffs
• Early warning systems to monitor food security trends.

**NEXT STEPS**

Mechanisms to ensure these move forward points to be considered in next policy formulation processes

• At country level: Engage in ongoing review processes of Rwanda policies including the EDPRSII
• At EAC level: Engage EAC and LVB Institutions (LBVC & LVFO).

**UGANDA**

**Objective:** Develop a water resources data management strategy based on sound scientific and technical information

**Industrious ants - achievable**

Harmonized data collection methods and tools and one-stop data center that is networked across the region

**Sleeping Lions – not achievable**

Need for enforcement and monitoring, real time data collection, knowledge generation and awareness creation, good governance systems

**Herd Zebra – not achievable**

• Economic proofing for sustainable development
• Emphasis on real time economic data on water resources to guide economically viable use of water for development

**Lone Leopards**

Coordination strategy for the different players (government, CSOs, private sector) clarifying roles and mandates.

**Way forward proposal**

- Identify a Champion of the process – Water Policy
- National Environment – Scenario review (development & strategy)
- Build the scenarios capacity at national level to adopt the approach for all strategies for development.
  - Imbedding the approach into institutions like Universities (trickle down) and Ministry departments responsible for planning and development of policies
- Design capacity building strategy for organizations to achieve sustainable results
  - Policy brief to create awareness

For regional inclusion

• Engaging /involvement of the EAC, LVBC, NBI to how the Scenario approach can be integrated in the regional plans/ policies.
  - Mapping relevant regional projects and other stakeholders to harmonize approaches.

Proposed steps to advancing the recommendations from the workshop:

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<td>Members to prepare briefs to the respective departments for buy-in and</td>
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<tr>
<td>Identify champion of the scenarios process – Water Policy</td>
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<tr>
<td>Domesticate – through a Local meeting to get ownership and buy-in on the</td>
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APPENDIX 6. BACKGROUND DOCUMENT: CCAFS SCENARIOS FOR EAST AFRICA

This background document features short summaries and quantitative results from the CCAFS-led scenarios created for East Africa. The CCAFS scenarios will be used as a starting point to develop scenarios for the Lake Victoria Basin (LVB) scenarios – they will be re-imagined and discussed in terms of LVB-specific and policy priorities.

What are scenarios?

The Climate Change, Agriculture and Food Security program includes a project on scenario-guided policy formulation that is active in East and West Africa, South and Southeast Asia, the Andes and Central America. Scenarios are used in an intensely participatory process for policy development; successful agricultural, climate change and development policy formulation processes have been conducted with many governments – particular success stories are Cambodia, Honduras, Bangladesh, Colombia, Uganda, Tanzania and Ghana.

The development and use of scenarios originates in the military and in the private sector. Scenarios are ‘what if’ stories about the future, told in words, numbers (models), images and other means. Rather than attempting to forecast a single future in the face of broad future uncertainty, scenarios represent multiple plausible directions that future drivers of change take (figure 1). The CCAFS scenarios process focuses on contextual drivers of change for agriculture and food security – climate change and socio-economic changes (e.g. in markets, governance, broad economic developments, infrastructure).

![Figure 1: Rather than providing a single “most likely” forecast, multiple scenarios explore multiple concrete, plausible futures and what these would mean for food security, environments and livelihoods. This way, the set of scenarios engages with broad future uncertainty for the testing of policies, investments and research innovations.](image)

Scenarios are used to test and develop policies, plans and investments. Each scenario offers different future challenges and opportunities. Therefore, for each scenario, planners can ask the question: how well will our plan work under the specific conditions of this scenario? What needs to be changed? When recommendations for improvement from a range of different scenarios...
are integrated, the plan has a better chance of being effective in the face of an uncertain future – for instance by having strategies that are expected to work under all scenarios, or by including a range of different options that can be used depending on the specific scenario. Scenarios can also be used before a plan exists, by starting with the challenges and opportunities that different scenarios offer, coming up with ways to approach those issues, and then combining them in a new, robust, plan.

Both approaches are summarized in figure 2.

Figure 2: using scenarios to develop and test plans and policies in different stages

Scenario development for East Africa in the CCAFS program

Within the CCAFS program, multi-stakeholder regional scenarios have been developed for the East African region and 5 other global regions in order:

1. to explore key regional socio-economic and uncertainties for food security, environments and livelihoods under climate change through integrated qualitative-quantitative scenarios describing futures up to 2050;
2. to use these scenarios with regional, global and local actors for strategic planning and research to explore the feasibility of strategies, technologies and policies toward improved food security, environments and livelihoods under different socio-economic and governance conditions.

Globally, the CCAFS scenarios program works with 240 partner organizations who through the use of scenarios have identified 81 policy impact pathways. The scenarios program is supported by global partners such as FAO, UNEP-WCMC, Oxfam GB and by regional economic bodies and national partners in its regions.

Within the CCAFS program, combined regional socio-economic/climate scenarios have been developed with a wide range of stakeholders in East and West Africa, as well as South Asia, Southeast Asia and Latin America. For East Africa, a set of qualitative scenarios up to 2050 was developed in close collaboration with regional stakeholders. Subsequently, these scenarios have been quantified using two agricultural economic models: GLOBIOM, developed by IIASA, and IMPACT, developed by IFPRI. The CCAFS scenarios project focuses strongly on the use of scenarios for decision making to achieve better policies and investments. In East Africa,
government policies and action plans have been tested and developed to be feasible in the face of the challenges posed by the combined socio-economic and climate scenarios. Subsequently, maps on land use, ecosystem services and biodiversity have been developed in collaboration with UNEP WCMC. These maps were used by regional decision-makers to start to review and propose improvements to strategies.

The CCAFS scenarios for Eastern Africa were developed in 2010 and 2011 at four workshops attended by a range of stakeholders from different backgrounds but with a shared interest in food security, environments and livelihoods. One of the main steps was to identify the key drivers of change.

Two drivers were considered both highly relevant and relatively certain over the 2010–2030 period:

- **Population**: the levels of human population growth assumed in the scenarios are those projected by the United Nations Population Division for the region’s various countries (United Nations Population Division, 2010). These levels reflect ’intrinsic’ growth based on fertility, but do not include change due to immigration or emigration.
- **Climate change**: since climate models do not diverge strongly until after 2030, a 1°C global average temperature rise by 2030 and increased climate variability were used as a certain driver across the four scenarios (IPCC, 2007). Future rainfall, though highly uncertain for Eastern Africa, was not chosen as a key uncertainty because the scenarios focus on socio-economic change and regional adaptive capacity rather than being climate scenarios. Instead, increased periods of drought were assumed as part of the single climate scenario (IPCC, 2007).

Two drivers were considered highly relevant for future food security, environments and livelihoods in Eastern Africa, but with high levels of uncertainty attached to them:

- **Regional integration**: Will the countries of Eastern Africa integrate politically and economically, or will a fragmented status quo be maintained?
- **Mode of governance**: Will governance – the rules, regulations, institutions and processes affecting the behaviour of individuals and groups – be characterized by a reactive or proactive stance of governments, the private sector and civil society?

These two ‘uncertain’ drivers were used to structure four scenarios. An artist impression of these scenarios by Mauvine Were is displayed in figure 3. On the following pages, the individual scenarios are described in greater detail. In addition, implications for the LVB region are described, as identified by participants during the inception workshop held in March 2016, in Kampala, Uganda.
Figure 3: Cartoon representation of the scenarios, by artist Mauvine Were

Industrious Ants

Figure 4: Industrious Ants
This scenario is characterized by the slow but strong economic and political development of East Africa and proactive government actions to improve regional food security; however, there are costly battles with corruption and security is fragile as the region has to deal with new international tensions resulting from its assertion in the global political and economic arena. The region’s focus away from export-only commercial crops causes some challenges to compete on the global market – and the region’s dedication on regional self-reliance proves to be challenging when the great drought hits in the early 2020s – though by that time many state and non-state support structures are in place to help mitigate the worst impacts. Governments and non-state actors struggle to mitigate the environmental impacts of growing food and energy production.

**Implications for the LVB region**

The group thought that under this scenario, which describes a proactive government, early-warning systems and other climate and natural disaster prevention and mitigation measures would be in place. They also believed regional cooperation – already happening to some extent – would continue to grow, with stronger regional markets and a regional approach to combating illegal wildlife trade. Food security issues would be considered at the regional level, but the global economy and international markets would still affect food and agricultural development in the LVB region. The challenge of protecting biodiversity and natural habitats while also providing enough land for agricultural development is expected to continue. An increase in demand of different crop varieties is expected. The participants also expected government to work together to design common policies to protect biodiversity and ecosystem services, although corruption could have a negative effect on policy implementation. The high regional integration described in this scenario could be reflected in collaborations between scientific bodies, organization, universities and research institutions to share outcomes and information to improve the protection of biodiversity and ecosystem services across the region. The group also projected movement of population from rural to urban areas, but were undecided on the environmental impact of this. A regional focus and interconnection within the energy sector and natural resource management is also expected.

![Figure 5. Industrious Ants: “In general, the quality of life for many East Africans has improved as a result of the larger regional market for agricultural commodities.”](image-url)
Figure 6. Industrious Ants: “Advances in information technology, including the installation of fibre optic cables, have reduced communication costs, while regional TV stations now advertise and create demand for products among a wider audience than ever before.”

Figure 7. Industrious Ants: “Urbanization and foreign investment have led to a growth in the consumption of processed food, with an increasing number of junk food restaurants linked to rising levels of obesity and diabetes among wealthier urbanites.”
In this scenario, governments and the private sector push strongly for regional development, but mainly through industry, services, tourism and export agriculture, with limited action on food security, environments and livelihoods. East African economies boom, but the region suffers the consequences of its vulnerability to global market forces and unsustainable environmental exploitation. Only when food insecurity becomes extreme, following rocketing food prices during the great drought of the early 2020s, is action taken to improve the management of water resources and invest in climate-smart food production for regional consumption.

Implications for the LVB region

The group thought that under this scenario the benefits of strong regional cooperation and links to international markets would allow science and technology to be mainstreamed into all sector activities. This would include a notable growth of importing agricultural technologies and an increase in research into, and production of, early yield food crops. However, regionalization could lead to marginalization of local communities. Communities will feel excluded as economic development leaves them out and undermines their livelihoods due to ecosystem degradation. There may be tension between political will at the community level and the regional block due to each community having its own background interests. Biodiversity will decline in this scenario from unsustainable resource use (including overfishing) and exasperated by those populations affected by the famine invading protected ecosystems. Wetlands and the ecosystem...
services they provide are especially vulnerable and likely to be targeted for conversion into cropland.

From a cultural perspective, a loss of community identity and values from increased regionalisation is possible. There is likely to be inequality in the distribution of resources and food insecurity and poverty impacting health. There will be high costs from food importation especially during and after the famine (part of this scenarios narrative). There will be an increase in rural-urban migration that decrease the labour force and affecting food productivity. The group did feel that some positive impacts on society will come from the wider availability of consumer goods brought about by stronger external links. The group also thought that the famine would lead to improved institutional coordination formation of new structures to respond to such disasters in future.

Figure 9. Herd of Zebra: “There is a thriving private sector, driven by domestic and foreign direct investment, particularly in the areas of mining, forestry, construction, manufacturing and tourism.”

Figure 10. Herd of Zebra: “Together with supporting regional government policy, better road and rail links and other infrastructural improvements have attracted investment from foreign private sector companies, creating employment, new towns and industrial estates.”
Lone Leopards

In this scenario, regional integration exists only on paper by 2030. In reality, government and non-government institutions and individuals are busy securing their own interests. In terms of food security, environments and livelihoods, the region initially seems to be heading for catastrophe in the 2010s. However, after some years, national and international as well as government and non-government partnerships become more active and, unburdened by strict regional regulations and supported by international relations, are able to achieve some good successes by the 2020s. Unfortunately, because of the lack of coordination, this is a hit-and-miss affair, with some key issues ignored while on others there are overlapping or competing
initiatives. The inability of governments to overcome regional disputes and work with one another becomes untenable when a severe drought hits in 2020. This pushes civil society, bolstered by international support, into a demand for radical change in governance. In many cases, the resulting change is long lasting and for the better.

Implications for the LVB region

Participants envisioned an East African region under this scenario where national and regional institutions fail to coordinate development interventions. As a result most of these interventions appear to be ineffective of conflicting with one another. Moreover, actions towards development tend to be benefiting solitary political interests. Cultural identities of local peoples are on the decline, as foreign influences continue to enter the region and little is done to maintain East African cultural heritage.

As a consequence of a highly uncoordinated and therefore ineffective mode of governance, there is a higher disparity in incomes than during the 2010s. Lack of livelihoods in rural areas is causing an ever increasing rural-urban migration trend. Especially youth is massively moving to the cities in search of employment and social services. Additionally, local small-scale issues that were starting to emerging and sometimes flourishing throughout the 2010s are having a hard time competing with cheap imports. This leads to further economic decline and unemployment.

National resources are barely managed sustainably in this scenario, and where efforts are made, management is selective and mainly serving interest of the companies exploiting the resources. Conflicts over utilization of natural resources are abound, and mostly aggravated by local and national authorities.

Technological progress is moderate, and mainly non-relevant technologies are being promoted. Exploitative technologies are increasingly available for the rural poor, who lack knowledge on how to use them sustainably.

Figure 13. Lone Leopards: “National self-interest trumps regional cooperation almost every time … The competitive interests of individual states have prevailed at the expense of collective strength.”
Figure 14. Lone Leopards: “Improved communication technology, especially mobile phones, was a key factor in the successful outcomes, especially in the more remote areas where they proved indispensable in linking farmers with buyers and with new forms of support, such as banking services.”

Sleeping Lions

Regional integration

Proactive governance

Reactive governance

Fragmented status quo

Figure 15. Sleeping Lions

This scenario is all about wasted potential and win-lose games. Governments in 2030 act only in response to serious situations and in ways to further their own self-interests, thereby allowing foreign interests free rein in the region. Their actions – or lack of them – have devastating consequences for East Africans’ food security, livelihoods and environments.
Conflicts, protests and uprisings are common, but each time reform is promised, it fails to materialize. The lack of coordinated effort on climate change and its impacts means that a severe drought occurring in 2020–2022 results in widespread hunger and many deaths among the region’s poor and vulnerable. It is only the adaptive capacity and resilience of communities, born out of decades of enforced self-reliance based on informal economies, collaboration and knowledge sharing that mitigates the worst effects of this disaster. The first signs of better governance emerge only in the late 2020s, but the region’s population still faces a very uncertain future.

**Implications for the LVB region**

Participants outlined country-level and LVB-specific scenarios where corrupt and ineffective governance structure led to ineffective or harmful policies with lack of implementation and weak enforcement of the degradation of natural resources. Unethical private sector investors buy their rights to developments (often through corrupt deals with government institutions) which have negative impacts e.g. water pollution, deforestation etc. This leads to short term economic boom but long term environmental impacts. The group thought that under this scenario local people would still value biodiversity and the environment and have experience in sustainable management practices but lack of social structures and disregard for local knowledge by the government means they are largely ignored. This results in a lack of public participation in policy formation. Population growth booms lead to high demand for natural resources, fueling large scale land use change and agricultural expansion. This increasing demand leads to deforestation, rivers dry leading to livelihoods disasters, famines and water scarcity. Unsustainable spread of infrastructure to harvest natural resources also has negative impacts, especially on biodiversity loss. Ethnic conflicts over natural resources are also seen. They envisaged a lack of innovation and new ideas around environmental technology. There is also poor or no dissemination of research findings both within countries and across the region leading to slow advancement in things like agricultural productivity. Technology research is also not mainstreamed into government leading to a lack of evidence based decision making. Resource intensive and unsustainable technologies are encouraged by governments to meet increasing demand for natural resources.

Figure 16. Sleeping Lions: “While some countries have attracted strong foreign investment, agreements have been made in such a way that they have benefited only the elites in society and foreign companies, and have undermined local enterprise.”
Figure 17. Sleeping Lions: “Corruption has led to the misallocation of funds, with money channelled to uneconomic high-profile projects rather than to the provision of roads, hospitals and schools for the broader population.”

Figure 18. Sleeping Lions: “Governments have little capacity to respond to climate extremes and, as a result, deaths from starvation and disease were high.”
Quantitative analysis of the scenarios

Stakeholder inputs have been used for full quantification of the scenarios through 2 global agricultural economic models IMPACT (Rosegrant et al. 1995, Rosegrant 2012) and GLOBIOM (Havlik et al. 2011). These models have been used to generate information about select long-term consequences of the stakeholder-generated scenarios. They also allow stakeholder assumptions about regional socio-economic change to be put against top-down, long-term global socio-economic projections such as future global food demand.

Drivers used as inputs into both models were based on interactions with diverse regional stakeholders involved in the CCAFS scenarios process, who provided semi-quantitative assessments of these drivers of change and the assumptions behind those assessments.

- Population
- Gross domestic product
- Production costs
- Crop yields
- Crop production systems
- Livestock numbers, yields and production systems
- Land use change emissions tax

Figures 19 to 25 show examples of the drivers and outputs of the two models. Explanations of the results can be found in the figure descriptions. All results are averaged for Uganda, Tanzania, Kenya, Ethiopia, Rwanda and Burundi.

Figure 19. GDP per capita up to 2050 for all CCAFS East Africa scenarios up to 2050, compared to the global set of Shared Socio-economic Pathways developed by the IPCC community – indexed to the present. GDP per capita is highest in the Industrious Herd of Zebra scenario because of a strong focus on industrial development; however, this overall figure hides large inequalities in income. In Industrious Ants, the number is lower, but there is more equality. Sleeping Lions has the lowest GDP per capita, not just because GDP is low, but also because population growth is the highest in this scenario.
Figure 20. Crop yields (gigacalories per hectare) for all CCAFS EA scenarios, average for all commodities. Industrious Ants sees the highest investments in agricultural yields, while Sleeping Lions sees the lowest. In Herd of Zebra, investments fall largely outside of the agricultural sector, with the exception of high value crops.

Figure 21. Combined impacts of climate change and socio-economic scenarios on yields for Maize and Cassava. The graph shows a "high climate change" scenario (RCP 8.5), as simulated by four different climate models, as well as a "no climate change" scenario to be compared to the others. The results show that the different climate models interpret high climate change differently – in some cases, yields for these crops go down, in some cases, they go up. However, the four socio-economic scenarios result in stronger differences in yields, whatever the climate scenario is.
Figure 22. Calories produced (gigacalories per hectare) for all four CCAFS EA scenarios, compared to average numbers for the rest of the world. In the best case scenario for yields, Industrial Ants, we still see a substantial yield gap compared to the rest of the world.

Figure 23. Calorie availability per capita per day for all scenarios, compared to SSP2 (middle of the road). Industrous Ants sees the highest increase, while Sleeping Lions sees the lowest increase.
Figure 24. Sources of calorie availability for different scenarios, indexed to the present. Overall, numbers are different but patterns are similar between scenarios, though different tendencies can also be seen – for instance, consumption of monogastrics (chickens) is relatively high in Lone Leopards because of an urban-focused meat industry.

Figure 25. Land use change in the different scenarios, without simulation of land use policies. In all CCAFS EA scenarios, primary forest disappears if there are not land use policies – including in Industrious Ants, where economic and productivity growth results in deforestation. Alternative versions of these scenarios that simulate land use change policies based on the scenario narratives show that in Industrious Ants and Lone Leopards there is a degree of protection against deforestation. This leads to some minor ‘leakage’ of deforestation outside of EA.