



Project: 603864 – HELIX

Project full title

High-End cLimate Impacts and eXtremes

Deliverable 8.1

Stakeholder Engagement Workshop on User Information Needs
Northern Hemisphere Sub-Sahara Africa: East and West Africa

Version 1.0

Original Due date of deliverable: 31/10/2014

Actual date of submission: 30/10/2014

**Stakeholder
engagement
workshop:
Northern
Hemisphere Sub-
Saharan Africa**

October 31

2014



Table of Contents

Acronyms	4
Executive Summary	5
Introduction	6
Helix East Africa Stakeholder Engagement workshop, Raddison Blu Hotel, Ethiopia, 4- 8 August 2014	6
Stakeholder Keynote presentations on information needs and applications	7
Sector presentations on Information and data needs.....	8
Overview of HELIX project.....	8
African Academy of Sciences -AAS: Scientific Advisories and climate programmes	9
Role of knowledge sharing on climate change	11
End climate change extremes and information needs for water resources.....	12
How Climate Change Affects Agricultural Sector and Information Needs	13
The Early Climate Based Malaria Epidemic Prediction Models.....	14
Climate Change Impacts and Information needs for Livestock Sector in the GHA.....	15
Higher End Climate Information Needs at NMHSs and Inputs to UNFCCC	17
Communicating Uncertainties in Climate Science.....	18
Breakout Parallel Sessions during HELIX East Africa Workshop	20
Group 1: Food Security and Livelihoods.....	21
Group 2: Crop, Livestock, and Fisheries production	22
Group 3: Natural resources Management including Water and Forestry.....	23
Group 4: Innovative economic, markets and trade systems	24
Group 5: Scientific Advisory Bodies, Research and Academic Institutions, NGO/CBOs and Policy makers	25
HELIX Engagement with Farmers in West Africa: Senegal event	26
Summary of Stakeholder Engagement, Information needs, and Recommendations	27
Annexes.....	29
The workshop concept note	29



The Workshop Communique released by IGAD on Friday, 8, August 2014 36
Ethiopian TV news Clip with HELIX and C-ADAPT event in local language 38
List of participants 38

Acronyms

AAS	Africa Academy of Sciences
ANACIM	Agence Nationale de l'Aviation Civile et de la Meteorologie
C-ADAPT	Climate Adaptation, Management and Innovation Initiative
CCAFS	Climate Change Agriculture and Food Security
COFs	Conference of Parties
EA	East Africa
ESCAPE	Past, present and futureE (a partner project in Senegal)
EU	European Union
GHA	Greater Horn of Africa
GHACOFs	Greater Horn of Africa Climate Outlook Forums
HELIX	High End cLimate Impacts and eXtremes
ICPAC	IGAD Climate Prediction and Applications Centre
IDDRSI	IGAD Drought Disaster Resilience and Sustainability Initiative
IGAD	Inter-Governmental Authority on Development
IPCC	Intergovernmental Panel on Climate Change
IRD	Institu de Recherche au Developpement
NHSSA	Northern Hemisphere Sub-Sahara Africa
NMHSs	National Meteorological and hydrological Services
ROFs	Regional Climate Outlook Forums
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WFP	United Nations World Food Programme
WMO	World Meteorological Organization



Executive Summary

Extreme climate changes are likely to occur with adverse implications on sectors like food security, water resources, alongside other socio-economic sectors. Anticipating these impacts requires cutting edge climate change research closely undertaken with participation of users and stakeholders to ensure that the research products fulfill specific user and stakeholder needs. HELIX recognizes that users and sectors most vulnerable to extreme climate change have not been provided with internally consistent information products of known certainty to support critical decisions, especially adaptation choices. It is in addressing this need that HELIX project in partnership Climate Adaptation Management and Innovation Initiative (C-ADAPT) under the auspices of World Food Programme (WFP) jointly organized stakeholder engagement work for Eastern Africa. Climate change risks are likely to increase with increased global warming. HELIX specific focus is impacts of warming of 4°C and 6°C with respect to pre-industrial revolution, addressing how will those “manageable future worlds” would look like in Northern Hemisphere Sub-Sahara Africa (NHSSA) and what “internally consistent change information” is necessary for policy and cost effective decision making, and for adaption choices. Major users targeted by HELIX include policy makers, scientific advisories, vulnerable sectors and researchers alongside other climate sensitive socio-economic activity managers in both East and West Africa.

In implementing its scientific research, HELIX is committed to participatory stakeholder engagement and involvement to ensure uptake and fulfillment of user needs. Users and stakeholders in turn provide HELIX with feedback towards reformulation and tailoring of its knowledge products in accordance with user need. It is for this reason that a core HELIX regional focus regional workshops to listen, capture and determine how best to enhance two way feedback during the project.

This report provides details of regional stakeholder engagement following East Africa workshop held in Addis Ababa, Ethiopia from 4th to 8th August 2014. The workshop had two themes, namely status of knowledge, principles and tools for informing food security activities for both C-ADAPT and HELIX, and listening to user needs for other vulnerable sectors, especially water resources, livestock, research for crop productivity and human health among others as provided in this report. The report is divided into three sections, namely key messages on information needs from vulnerable sectors and stakeholders, consensus messages following focused breakout sessions. Summary of user needs well as recommendations for HELIX are given in the last part of the report.

Introduction

Helix East Africa Stakeholder Engagement workshop, Ethiopia, 4- 8 August 2014



The HELIX regional stakeholder engagement work for Eastern Africa was held in Addis Ababa from 4 – 8 August 2014. The first three days of the workshop was devoted to food security status of knowledge and analysis principles within the frame work of C-ADAPT, initiative under World Food Programme (WFP). Days 4 and 5 of the workshop focused on Helix stakeholder information needs and engagement, namely listening and capturing climate change information needs for various application sectors as well deliberations adaptation strategies to high-end climate change impacts and adaptation strategies. East Africa including the Nile Basin is one of the most vulnerable regions to extreme climate change. It is a region internally known for frequent climatic impacts such as the 2011 Horn of Africa drought and famine crisis. These climatic impacts are likely to become more severe with extreme climate warming. Provision of internally consistent and actionable climate change information by Helix research can be used to inform resilience programming activities/ strategies and policies on critical sectors including food security, water resources, and public health issues in the region.

It is for this reason that ICPAC- HELIX and WFP C-ADAPT held the workshop under the auspices of the Intergovernmental Authority on Development (IGAD). IGAD is an intergovernmental body of the member countries within East Africa extending to the Horn of Africa, also referred to as the Greater Horn of Africa (GHA) or simply IGAD region (<http://www.igadregion.org/the-igad/>).

The workshop was facilitated by Prof F M Mutua of the University of Nairobi, Kenya. The picture below is Prof Mutua initiating break-out session of the workshop in the afternoon of 7th August 2014.



The Helix stakeholder engagement workshop for region was held to listen and capture extreme climate change information needs and feedback with helix. Helix stakeholder engagement activities were conducted on days 4 and 5 of the workshop following the following program and structure.

Stakeholder Keynote presentations on information needs and applications

Part 1 of the workshop consisted of stakeholder presentations. In this section, the sector stakeholders and users were the Africa Academy of Sciences (AAS), Water Resource Sector, Crop and food security, Health, Meteorological Services and UNFCCC focal point among the wider participants in the C-ADAPT workshop whose sole focus was climate change for informing food security in the IGAD and Eastern Africa region. The following were the major messages on climate information needs for each of these vulnerable sectors, starting with an overview of HELIX project itself.



Sector presentations on Information and data needs

Overview of HELIX project

The first presentation was on what HELIX is and its core objectives by the Sub-Sahara Africa regional work package leader, Dr Mutemi.

Title: HELIX Northern Hemisphere SSA Regional Focus and stakeholder engagement interface (What it is, for what purpose by who, give when and receive feedback when) - J Mutemi of ICPAC and University of Nairobi, Kenya.

Dr Mutemi gave presentation on HELIX project. It is a European Union (EU) climate change project seeking to provide internally consistent climate change information of known certainty for decision support, funded under the Seventh Framework Programme.

The HELIX climate change research is motivated by the realization that climate warming bigger than previously thought is likely to happen at much faster rate. Climate warming is likely to be higher than 2°C warming relative to pre-industrial average temperatures. Such climate warming threatens societal welfare and we must prepare the necessary adaptation strategies and adaptation choices. Climate science and modeling has provided lots of projects of different future worlds which is very confusing to decision makers and managers of climate sensitivity social-economic sectors and even private business. The climate change information which is accurate and coherent at global and regional scale; information which also known certainty must be provided for policy making, decision support and guidance of management of vulnerable socio-economic sectors. Vulnerable sectors cannot be guided by a myriad of conflicting climate change scenarios. Rather, decisions are based on robust-clear evidence. As a research project, these issues form the core HELIX objective. HELIX will provide clear-coherent climate change information on how will future worlds at 4°C warming and 6°C Warming look like over Northern hemisphere Sub-Sahara Africa (NHSSA). Focus of the workshop is Eastern Africa region of NSSA. The other areas regional focus for HELIX are Europe and parts of Asia.

HELIX research will provide information and knowledge in answer to questions including:

- What will future worlds at 4°C warming and 6°C Warming look like over E.A region of NHSSA?
- How faster can these “High-End Climate Change Impacts and Extremes (HELIX)” happen?
- What are the potential implications and impacts of these extreme climate changes in policy advisory, long term planning, and planning of mitigation and adaptation strategies for socio-economic sectors?
- What are the consequences of various adaption strategies?



In his HELIX overview, Dr Mutemi highlighted that working with stakeholders is of critical importance. Stakeholders have many roles and can span a wide range of categories. In particular, HELIX wishes to listen, capture and provide user needs for higher-end climate extreme information for effective application in the specific sectors. HELIX commits to work with users/stakeholders to provide consistent climate change knowledge best applicable to the user/ sector. In turn, the user/stakeholder is strongly encouraged to provide feedback. Stakeholder will be engaged by HELIX in providing feedback to re-focus research and knowledge for better product applicability.

In this East Africa/GHA HELIX stakeholder engagement, you are all stakeholders. In particular, we have managers and practitioners in food security and agriculture, water resources, scientific advisory bodies and research institutions, providers of weather and climate data services like National Meteorological and Hydrological Services (NMHSs) among others as we shall see in the Keynote presentation on higher-end climate change extremes and information needs.

In making Keynote presentations and subsequent outcomes of the stakeholder engagement, Dr Mutemi requested the sector presenters to indicate how sectors are impacted by extreme climate change and bring out the following:

- i. How climate change affects your activities of your sectors.
- ii. Suggest what might happen to your sector if global warming is 4°C, and 6°C.
- iii. Suggest what climate change information your sector needs to be able to mitigate and adapt to these climate changes.
- iv. Indicate how your organization or yourself will link-up and use HELIX knowledge products, e.g. use of HELIX web tool connection with your organization, social media, and any other dissemination platforms.
- v. Indicate how often your sector wishes to obtain and use HELIX knowledge during the period 2015 to mid 2017.
- vi. Indicate when or how often your organization will provide feedback to HELIX towards improvement of the information products in support of your sector during the above period of 2.5 years.
- vii. Any other items you might wish to insert or recommend to HELIX.

Dr Mutemi concluded his introductory overview of HELIX to the audience informing that the whole NSSA regional focus, ICPAC is work package leader for all activities as the IGAD technical institution.

African Academy of Sciences -AAS: Scientific Advisories and climate programmes

Dr Benjamin Gyampoh of Africa Academy of Sciences (AAS): Potential AAS engagement with HELIX project and role in providing climate change sensitive advisories.

In his presentation, Dr Gyampoh of the Africa Academy of Sciences (AAS) indicated the potential AAS engagement with HELIX in provision of climate change sensitive advisories. He indicated that AAS has Africa wide scientific advisory mandate, following its endorsement by the African



Ministerial Conference on Science and Technology (AMCOST) at its 5th Ordinary Session in Brazzaville, Congo, 2012. AMCOST recommended and urged the African Union Commission (AUC) to work closely with AAS, specifically to tap from the pool of expertise by making AAS serve as a think-tank and also set up panel of experts to conduct reviews and foresight studies for the AUC, and (ii) Assist in running competitive prizes/awards. While developing an enabling scientific environment for Africa, AAS works with national academies and institutions, for example Ethiopia, Ghana and Kenya.

He highlighted that Africa wide strategic-sectors which AAS is mandated to provide advisories and policy are (i) Water and Sanitation Sustainable Energy, (ii) Food Security and Nutritional wellbeing, (iii) Healthcare and Wellbeing; (iv) Science, Technology, Engineering and Mathematics (STEM); and (v) Climate Change.

In Climate change, AAS recognizes Africa's increasing vulnerability to impacts of climate change in all sectors. There is need to build human resource capacity and expertise for the Africa to effectively address Climate Change vulnerability, adaptation and mitigation challenges. Capacity and expertise can be enhanced by building on initiatives like the African Climate Change Fellowship Programme (ACCFP).

Dr Gyampoh discussed the AAS Climate Change Programme circle, which will run for a 5 year period starting 2013. The AAS climate change thrust of activities are targeting impacts research capacity development and leadership enhancement. It is funded by DfID. Activities include fellowships in climate change impacts research in Africa at post-MSc and post-Doctoral levels. The hosts must be home institution in Africa in partnership with an institution outside Africa. There are opportunities for early career Africa Scientists through experimental learning. Focus is on five thematic areas, namely water, Agriculture, health and livelihoods, sustainable and clean energy, and policy.

He discussed how AAS is aligning its climate change work with other climate change initiatives in Africa and beyond. These include climDev-Africa under the auspices of AUC and Africa Development Bank (ADfB) Africa Climate Policy Centre (ACPC) and the HELIX initiative which is aiming at assisting decision-makers and research community in making adaptation to climate change more understandable and manageable by providing a set of credible, coherent, global and regional views of different worlds at 2°C, 4°C and 6°C.

Dr Gyampoh concluded his keynote presentation by indicating that AAS will engagement with HELIX in dissemination of scientific messages and work package major outcomes as activities progresses. On this regard, AAS requests regular updates including Key climate change messages from HELIX for AAS news and articles. Further, HELIX science will inform critical AAS activities like the CIRCLE visiting Fellows (CVFs) on climate change focus themes like specific warming levels, assessment and impacts. AAS' climate change programme and CIRCLE running for the next 5 years will greatly benefit from this mutual engagement with HELIX. Valuable details can be obtained from Dr Gyampoh presentation availed to HELIX.



Role of knowledge sharing on climate change

Dr Abebe Tadege: The Role of Knowledge Sharing on Climate Change

In his key note presentation, Dr Tadege noted that climate is a resource base and extreme events cause disasters to communities. There is need to reduce risks associated with climate variability and extremes. Climate change impacts have potential to undermine socio-economic welfare of nations. By making reference to key messages from the 5th IPCC assessment report, he noted that climate change impacts are happening faster than previously predicted, with more frequent and extreme weather events. With respect to HELIX objective of impacts global warming above 2°C (namely 4°C and 6°C), Dr Tadege concurred that business-as-usual will lead us far beyond 2°C global warming, which has dangerous implications. Therefore cutting down CO₂ emissions is the most urgent imperative for global climate action.

Dr Tadege discussed the international climate change intervention processes starting with the 1992 UNFCCC treaty, 2009 Copenhagen accord to recent Conference of parties (COF) road maps like the 2011 Durban renewal of Kyoto Protocol and road maps to the outcomes/recommendations of the 2014 conference of parties in Warsaw (COF19). Notably, progress in implementation of international commitments to climate change “is very slow and it is unlikely that internally binding agreement will be during 2015”. On this regard, Dr Tadege was consistent with HELIX project thrust of providing NHSSA with higher-end climate change information extremes at 4°C and 6°C to guide sensitive socio-economic decisions. This is most needed for climatically vulnerable East Africa sub-region.

In discussing the role of knowledge sharing, Dr Tadege observed that, the challenge of climate change is enormous and “everybody” is contributor to the problem. The solution requires engagement at every level. The demand for information (and knowledge) on climate change is growing as stakeholders take steps toward operational climate smart development activities, for example the low carbon climate resilient development. There seems to be a diverse supply of climate change information, but of unknown user value. On this point, Dr Tadege was quite consistent with HELIX objective that climate change Information and sources "out-there is driven by open-source supply" and “it is numerous and of unknown user attributes like limitations, accuracy and un-known relevance when applied to inform decisions across a range of space and time scales. Thus HELIX objective of providing information which is robust, internally consistent and of known user relevance will go along way guiding climate change applications, adaptation choices and pathways.

The aspects of knowledge sharing required for climate change range from observed climate patterns and trends, projections, impacts of the change, and responses at international, regional, national, and sub-national scales. Information on mitigation and adaptation technologies, climate finances and climate negotiations should be shared. He noted that HELIX should make accessible its products and disseminate implications of its activities as they progress. Among the issues he raised for discussion were HELIX virtual platform for knowledge sharing and exchange, identification of what knowledge products are appropriate for various sectors and which are the most ideal means of dissemination. He added that media like narratives, videos, photos, and

documentaries can be very effective. He also noted that capacity building activities on information gathering, development and uploading of content can also be under taken.

In his recommendations to HELIX, Dr Tadege noted more/ higher impacts climate change is likely in the future, which is not good for vulnerable areas of Sub-Sahara Africa like Eastern Africa. Information sharing is critical for informing decision and policies for combating adverse climate change impacts, for example resilience building activity programme at regional scale, for example the IGAD Drought Disaster Resilience and Sustainability Initiative (IDDRIS) strategy.

There should be strengthened networking, for example between developed and developing economic regions for technical cooperation and capacity transfer to developing countries. There is need for increased awareness on consequences of higher end climate change impact extremes to help decision makers with identification of mitigation and choices of adaption pathways.

End climate change extremes and information needs for water resources

Dr Alfred Opera: Higher End climate change extremes and information needs for water resources.

In his key note discussion on higher-end climate change information needs for water resources, Dr Opera stated that climate change affects water balance, especially the runoff and recharge, all of which determine water usage by man and ecosystem processes. Implications of higher end climate change on water resources will differ in various parts of the world. According to IPCC 2007 prediction (of decreased rainfall and droughts), the Greater Horn of Africa (GHA) is likely to be under increased scarcity of water in the future. In the region, hydrological cycle is changing due to man's activities such as the conversion of wetlands to cultivated areas and grazing as well as land degradation which results in increased surface runoff and reduced infiltration. This has negative implications on both surface and groundwater. Water resources in the region are limited and catchment degradation is a major problem undermining sustainable use of water resources for improved regional socio-economic welfare. Other activities contributing to catchment degradation include poor farming methods, population growth and its pressure on land use, overgrazing and deforestation.

Dr Opera indicated that model projections of future climate are crucial sources of information giving scenarios for precipitation, evaporation (and temperature), transpiration, and evapotranspiration. These are the major inputs necessary for water resources modeling under higher ends climate change impact extremes. Climatic extremes and storm events as a result of higher end global warming could have severe implications on societies.

Dr Opera noted that variability of the hydrological cycle due to climate change could increase with changes in precipitation under changing climate. Notable impacts include higher intensity of local storms. These in turn are likely to have significant implications on attributes like timing and magnitude of runoff, which cascades to implications on water availability in river systems (like the trans boundary Nile System) and other sources. Dr Opere illustrated pictorial impacts of climate extremes in the region for both floods and droughts, all of which have significant



implications not only on water resources but livelihoods; ranging from destruction of property and displacement of communities, to water scarcity for domestic consumption, and to lack of water for hydropower generation. It was interesting to note from Dr Opere's keynote presentation the citation of decreasing snow cover over Mt Kilimanjaro and declining trends of river flows. These are good indicators of increasing regional water stress as the degree of global climate warming and regional change signal increases.

In concluding with climate change information needs for regional water resources from HELIX science, Dr Opere indicated that rainfall is most important for the hydrological cycle and impacts on water resources. It is rainfall which replenishes water resources. It is rainfall which sustains water resources based utility services like hydro-power generation and hydro-based industries in the region. HELIX climate research can therefore provide "up to date", internally consistent and robust hydro-meteorological conditions to enable anticipation, mitigation and adaptation pathways with respect to regional water resources challenges.

How Climate Change Affects Agricultural Sector and Information Needs

Dr E Komutuga: How climate change affects agricultural sector and higher end climate change information needs

In her keynote presentation on climate change in agriculture, Dr Komutuga indicated that extreme events have adverse implications on agriculture. High rainfall variability in aspects like date on onset, frequency of dry spells during crop growing season, cessation dates of rainfall, and overall length of crop growing season are all very important.

In agricultural productivity, these climatic aspects have implications on crop yield, diseases and pest, management practices at all stages crops from planting up to post harvest handling; soil and water management. For livestock, climate has linkage with pasture and fodder availability as well as livestock diseases and pests.

In illustrating climatic trends in her area of research, Dr Komutuga demonstrated evidence of decreasing rain days over station Namulonge (in Uganda) during the years 1950 to 2008, for which the month of April shows the most notable decrease in rain days as well as rainfall amounts. Given that April is the wettest month in equatorial East Africa, results like these are good basis for validation and downscaling of HELIX climate change products at user locations in East Africa locations like this particular location. Such locations have additional advantage of application data sets like crop/ productivity, which will be available through agricultural researcher collaborations. Dr Komutuga indicated participatory partnership with HELIX science in running and verifying crop models for parts of Uganda under good quality and consistent climate change scenario projection.

In her presentation, she continued to discuss the implications of climate change on livestock diseases and treatment costs with an example from Mbarara in Uganda. In making suggestion as to what might happen upon global warming of 4°C and 6°C, Dr Komutuga showed results for crop



yield and GDP for both Kenya and Uganda, with Kenyan result tending to suggest a decrease in yield, consistent with rainfall variability. The discussion included illustration of climate change implications for cassava suitability for various parts of Uganda, modeled under future a warming scenario of 1.5°C by 2030.

In her conclusions, she observed that there is a myriad of climate change model products available from a wide range of supply sources. Such lots of information is which is quiet confusing to users, for example different models project very different future world climates. No modeling centre provides users with guidance on which model to use and how to address the aspect of highly variable futures in models. Therefore HELIX should strive to provide consistent climate change data and/or information for the future with known level of certainty. This will fulfill the uncertainty knowledge gap and provide modeling agricultural applications and adaptation pathways for crop conditions in vulnerable areas.

HELIX climate change model and data for the East Africa region and local areas if consistently downscaled will be included current NARO crop modeling work to determine most consistent future implications. This is critical for informing food security at both national and regional levels. Also current agricultural modeling work based on historical data at NARO would help in validation of HELIX outputs alongside other projects running at this national research institution of Uganda.

The Early Climate Based Malaria Epidemic Prediction Models

Ms Ednah Ototo: The Early Climate Based Malaria Epidemic Prediction Models

In her keynote discussion on climate change information needs for health sector, she indicated that climate change affects disease transmissions. She cited examples of cholera, Rift Valley Fever (RVF) and malaria. With respect to malaria, she noted that climate variability can increase malaria cases by 100 to 700% and mortality by 500%. Ms Ototo illustrated a schematic evolution of malaria epidemics, from which it was evident that air temperatures and rainfall and important climatic elements in malaria problem. Malaria epidemics is a serious health problem over all countries of East Africa, affecting people in both low lands and highlands in all the countries Kenya, Uganda, Tanzania, Rwanda, Burundi and Madagascar in the south.

The presentation illustrated an example of malaria early warning and prediction model developed and used in the year 2001 for the whole of East Africa countries Kenya, Uganda and Tanzania. The model is based on climatic predictors (mainly rainfall and temperature anomalies).The model can be used to provide information for epidemic prediction and prevention with lead times of 2 to 3 months.

For the highland areas, the malaria model works detection of changes in mean monthly temperature and rainfall, because it is the changes in these climate elements that can initiate malaria epidemics.



Therefore with respect to annual cycle of rainfall and temperature, it is possible to determine threshold anomalies for malaria epidemic evolution.

The presentation illustrated two example of epidemics prediction for Western Kenya in Kakamega for 1997 and 1998 where a 4°C temperature change alongside rainfall increase lead to more than 140% and 330% increase in cases. Similar results where shown for the highland areas of Kericho in Kenya for which malaria epidemic case increases triggered by 4°C temperature anomaly exceeded 700% during early months of the year.

With respect to HELIX information for malaria as a regional health challenge, the 4°C temperature change in the malaria prediction model is of particular interest. She noted that other drivers of malaria include topography, drainage, land use and immunity. To illustrate these, the presentation showed examples of malaria prevalence in u- and v- shaped topographical areas, for which u-shaped areas (due to poor drainage contribution to mosquito breeding) had highest cases.

In her conclusion and indication of HELIX information needs, Ms Ototo stated that climate model predictions of elements like sea surface temperature (SST) anomalies of 3°C can predict epidemic risks malaria up to 5 months in advance. From knowledge of regional climate association with Pacific SST anomalies, these type of results can only be best when regional rainfall is strongly driven by the El Niño/ Southern Oscillation (ENSO) mode of the climate system, in harmony with favourable influence of the Indian Ocean on East Africa regional rainfall for the impact to be significant.

In addition to internally consisted temperature change information at 4oC for the malaria model, the Health sector will also need climate variability data sets including SST anomalies/information for both Pacific and Indian Oceans, and air temperature changes for the period 2015-2017 on a monthly basis. These HELIX data sets will be used in climate and human health unit research/modeling and HELIX will be provided with written feedback on usefulness of these knowledge products in informing health challenges not only in the Climate and human health Research Unit Centre for Global Health Research within KEMRI-Kenya, but also Ugandan MOH, and Tanzania NIMR, as well as ICIPE and WRP.

Climate Change Impacts and Information needs for Livestock Sector in the GHA

Ms Caroline Agosa Kirungu: Climate change impacts and information needs for the livestock sector in the GHA

In her keynote presentation and climate change information needs for livestock sector in the Greater Horn of Africa (GHA), she started by indicating the sensitivity of livestock productivity to climate extremes. The GHA/IGAD region is dominated by large livestock holdings and there is pressure for search of pasture and water. Climate extremes like increasing droughts in the region is a cause of problems like communal conflicts within the countries and across-the national boundaries as communities search for pasture and water, thus climate change may exacerbate security situation in the region.

On climate change impacts on livestock, she cited heat stress, outside the livestock comfort zone range of 10°C to 30°C as being a factor of low productivity in animals (due to decreased fertility, metabolic and immunity issues). Livestock feed availability and quality is also climate sensitive and increased temperatures such as the HELIX 4°C and 6°C warming may have negative implications. There may be some gains in productivity especially in the C₃ crops e.g. legumes due to carbon dioxide enrichment. But these gains may be negated if temperatures continue to increase. It is important to understand the complex interactions between climatic variables and subsequent interaction with crops/ pastures. Climate change driven ecosystem changes like vegetation species changes and elimination of others may have profound implications on livestock types, for example feeding style of camels (which are browsers) is distinctly different than that of cattle (which are grazers). Therefore climate change may force shift in types of livestock which induce societal issues related to cultural and preferences attached to some animals by certain communities.

Climate change has implications on livestock diseases and vectors, for example development of vectors due to higher temperatures (4°C, 6°C). Extreme rainfall in the region and consequent flooding has been associated with outbreaks of Rift Valley Fever (RVF), incidences of the so called market sensitive diseases like RVF may lead to disruption of livestock product trade between the GHA and critical markets like the Middle East. Increasing heat stress with climate warming lowers immunity of livestock.

Water is essential for livestock. With changing climate, water un-availability likely to be a major problem. Higher temperatures imply more water intake by livestock in addition to water required for pasture and fodder production. On this point, it is worthwhile to note that climate change model rainfall projection for Eastern is most confusing and probably most inconsistent (the so called East Africa climate change paradox). Thus providing internally consistent projection of future rainfall (and therefore water) with linkage to livestock sector needs will be a powerful HELIX support to GHA livestock sector needs.

On livestock trade, Ms Kirungu noted that livestock and livestock product markets are a business opportunity. Livestock products demand is quite high and on the increase locally and internationally. Higher-end climate change extremes and impacts seem to suggest that Sub-Saharan Africa livestock and products will become uncompetitive, and hence reduction of essential income for communities and regions like the GHA. Livestock sector is in dire need of mitigation and adaptation options. These include selection of faster growing livestock breeds and locally tolerant species among other options. It is apparent that grazing on pasture helps reduce emissions attributed to activities like manure storage. It is therefore apparent that proper rangeland management has implications on the issue of carbon, hence climate change. For example introducing grass species and legumes into grazing lands tends to enhance carbon storage in soils.

Therefore some of the major gaps and needs for livestock sector include that fact that data for livestock sector, and to inform the sector is poor. There is need to improve it spatially and temporally. Weather observations in livestock areas are quite minimal and should be enhanced and improved in quality. Climate prediction and downscaled products for livestock areas will go a long way in decision support for the sector. Over the Arid-and-Semi-Arid lands (ASALs), there is need



to collect livestock specific data sets like records of calving, mortality rates, market related data like prices. Climate change information products to inform livestock and livestock products at sub-seasonal, seasonal and interannual variability are essential knowledge products which can be within the scope of HELIX research support to the SSA livestock sector.

Higher End Climate Information Needs at NMHSs and Inputs to UNFCCC

Mr Magezi-Akiiki: Higher End Climate Information Needs at NMHSs, inputs into the UNFCCC and knowledge products in support of regional/national climate negotiators

Mr Magezi started his keynote presentation by giving a brief on the world wide climate change engagements leading to the 1992 adoption of United Nations Framework Convention on Climate Change (UNFCCC). Climate change is the world's most urgent environmental problem facing humanity. International efforts towards legally binding treaties on climate change such as the conference of parties (COFs) have sole objective of stabilizing green house emissions and concentrations in the atmosphere, and thus contain global warming levels which allow ecosystems to adapt naturally to the climate change; and to ensure that crucial activities like food production are not threatened and that economic development can proceed sustainably. The other role of UNFCCC engagement is development of strategies to cope with negative impacts of climate change.

Mr Magezi indicated that crucial aspects of climate negotiations is driven by scientific information especially the Intergovernmental Panel on Climate Change (IPCC), climate monitoring, detection and attribution of change, prediction and projections as well as vulnerability analysis. Within the framework of climate change, adaptation and mitigation should be opportunities and UNFCCC activities involve these as well as awareness creation and mobilization of climate funding. Mr Magezi concluded his overview of UNFCCC by citation of the IPCC reports from 1st assessment report of 1990 to 4th report of 2007 and some highlights of the forthcoming 5th assessment report to be released during later 2014.

In discussing facts on climate change, Mr Magezi noted that frequency of severe weather and climate events in form of droughts, floods, lightning, heat waves and associated diseases will increase with higher levels of global warming like the HELIX 4°C and 6°C warming. Higher end climate change extremes are likely to increase natural disasters, 90% of which are weather and water related.

Meteorological services role is data collection and processing of weather and climate information to help societies with protection of life and property as well as management of weather/ climate sensitive activities. Thus adaptation, mitigation and sustainable development (in view of adverse impacts of climate change) cannot be possible without weather and climate information provided by meteorological services. This role of the National Meteorological and Hydrological Services (NMHSs) is essential source of national and regional scale communications to UNFCCC. For this purpose, the World Meteorological Organization (WMO) regional associations and Regional Climate Outlook Forums (ROFs) initiatives like downscaling of regional climate predictions to



national and local scales, NMHSs enhance climate information delivery and dialogue with users, especially on climate risks and vulnerability.

MNHSs play critical role in climate science. It is the NMHSs who collect and quality control weather data. Using these data sets and modeling, the meteorological services provide weather forecasts, early warning on weather and climate extremes with likely adverse impacts as well as climate advisories. Research and outreach are necessary for meteorological services. Climate monitoring (for example monitoring of floods, droughts), detection and attribution of trends and extremes as well as prediction are core mandates of meteorological services. The strongest resource for meteorological services to do this effectively is the systematic observations and fast exchange of weather data for both national and international weather services and timely dissemination of information to end users.

NMHSs observational networks range from ground-based data collection platforms to satellite monitoring systems, all of which enable creation of historical data sets which are subjected to analysis to study and identify important characteristics and processes. All these lead to more understanding and better information at local, national, regional and global levels. It is meteorological data sets which reveal climate change aspects like trends and pattern shifts and therefore makes it possible for attribution of change, including the signals of "human fingerprints" in extreme weather events as well as magnitude and rate of climate change with factors like levels of greenhouse gas concentrations in the atmosphere due to man's activities. The use of computer modeling in meteorological climate work enables future projection as well as better understanding of the changes.

In concluding his keynote address, Mr Magezi pointed out that meteorological services have little funding from national governments. Observational networks are inadequate and there are data gaps. Equipment in many countries is old (Probably unserviceable). Human expertise is inadequate and in general there is poor perception by communities. Therefore one need which HELIX research can provide for meteorological services is improved capacity of local and national scale climate change research, for exempling downscaling higher-end extreme climate change for specific applications within identified areas of the countries of East Africa areas of HELIX focus.

Communicating Uncertainties in Climate Science

Mr Patrick Luganda: Communicating Uncertainties in Climate Science

In his keynote presentation on communication of uncertainties in climate science, Mr Luganda started by noting that about 20 years ago, climate change information was only a concern to meteorologists. Nowadays, increasing and improving end user involvement in climate change has made dissemination and communication increasingly important. In communication of climate change, both meteorologists, media, and consumers of the information are in harmony. Indeed, the rapid demand for climate change information requires realigning of the means of communication. The speaker observed that uncertainty in climate science is creeping into public domain and its



communication is challenging, requiring timely dissemination.

The choice to address proper communication of uncertainty requires a multidisciplinary undertaking. Weather and climate information is by nature uncertain and therefore climate news have to be dealt with very carefully, the message must be clearly communicated. Whenever possible, simple facts and numbers should be used to express the message much better. To emphasize this point, Mr Luganda gave an example of sign-post messages namely “Welcome to Climate Change: Droughts this Way, Floods this other Way”, and other, "In Uganda 320 people die of malaria everyday". Explicit messages contextualized by means like this enable better reception and realization of the message content for decision making.

Decision and policy makers at all levels base their actions on information of weighted certainty implications. In the context of HELIX climate change information for decision support, minimal uncertainty of products for cost-effective adaptation pathways is one strategy to improve update of the information by various sectors.

Mr Luganda discussed the benefits of communicating climate change with known level of uncertainty. These include creation of awareness of impacts and sanitization to take actions towards solving climate related problems (challenges), and strengthening collaborations including building of global efforts to address the climate challenges. It is only climate science which can inform the future. Mr Luganda noted that decision makers can still make important and useful decisions knowing the level of uncertainty contained in that information, and this one core objective of HELIX, namely provide higher-end climate change knowledge of robustly worked out certainty level for adaptation choices and pathways. Establishment of the user level of certainty is critical, e.g. some users might be satisfied with general content "wet season" while others could be details like onset and cessation of the rainfall, amounts expected and distribution. The clarity of communicating climate change should be as clear as a signpost, for example explicit indication of which direction is "drought" and which direction is "flood".

On communication process, he noted that the quality and extent of reporting on climate in the media and other public domain varies from different parts of the world. It also varies within the same region. It important to take this into account when developing communication strategies and general information packages. Strengthening and expanding the means of dissemination, involvement of both users and media and partnerships increases acceptance and user confidence.

Breakout Parallel Sessions during HELIX East Africa Workshop

The second part of the engagement workshop was breakout sessions. The break out groups were to discuss and come up with consolidated needs for the sectors following questions as indicated below.

14:15 – 16:00	HELIX STAKEHOLDER BREAK OUT GROUPS				<i>Facilitator: Prof Mutua Chair: J Mutemi Rapp. A. H.Gaba Maki</i>
	“Capturing Information Stakeholder Needs & 2-way engagement with Helix”				
	Guiding questions for HELIX break out group discussion Qn1: What are your sector high-end climate change <u>data</u> and <u>information</u> needs? Qn2: Which of these products can HELIX provide your sector/organization with? Share data with HELIX? Qn3: At what frequency would you like HELIX the products during 2015 to early 2017 (e.g. Seasonal, or Annual). Qn4: At what frequency would you give HELIX feedback during 2015 to early 2017 . Qn5: Will your organization be user HELIX on-line knowledge. Qn6: Any other suggestions you might wish to make to HELIX to enhance 2-way interaction?				
	Group1: Food security livelihoods/resilience/food access/utilization Convener: Abdel M Suliman	Group2: Crop, Livestock and fisheries production Convener: Sarah M Achola	Group3: Natural resources management including water and forestry Convener: Abdourahman Gaba Maki	Group4: Innovative economic, markets and trade systems Convener: Jeanne Coulibaly	Group5: Scientific Advisory Bodies, Research & Academic Institutions, NGO/CBO, etc. Convener: Kirsty Lewis
16:00 – 16:30	Health Break				
16:30 – 18:00	HELIX Break out Group Reports and Plenary discussion (Recommendations and way forward (HELIX-stakeholder 2-way engagement strategy, time lines, indicators of engagement & feedback)				
18:00	Close for day 4				





Following the group discussion, the following are the highlights group outcomes.

Group 1: Food Security and Livelihoods

On information needs, the group indicated that sector needs food insecurity hotspots, local vulnerability (sensitivity, exposure and adaptive Capacity), numbers of people affected, vulnerability priorities, match between long term and short term needs for decision making, cost benefit for long term investments and development pathways.

On Data needs, the group indicated that they need more data on temperature should be provided by Helix and/or by the Greater Horn of Africa Climate Outlook Forums (GHACOFs) to enable correlations between climate factors and impact on overall consumption patterns; more data to increase linkages between production and nutritional value, e.g. analysis done in Cost of Diet exercise; HELIX to identify data needs management, including capacity building in streamlining and archiving through improved database; country specific impact analysis for phenomenon like El Niño. The data needs to be created (collected/generated), quality controlled and communicated/shared early enough. The data sets should be user-friendly and user-relevant according to needs and context.

- Within the perspective of this group, climate forecasts seem to be a data, rather than information.

On the question of which products can HELIX provide the sector, the group suggested analysis type of products, namely the following:

- Impact analysis of climate change on food security and livelihoods
- Back-forward linkages between 4 and 6 degrees – connect forward scenario with past and present scenarios
- Research to be done on the variety created by breeders or by natural development caused by increase in temperature
- ICPAC and the National Met Services to share data with HELIX for their modeling
- Relation needs to be a two-way street, going beyond mutual exchange of information, and moving towards working together, through open technology and no “black box”.

On the question how often can HELIX provide these products (Analysis products), there suggestion was seasonal and annual.

- This is achievable since most outputs will be products already being provided within the framework of GHACOFs and additional products will be included towards meeting the wider user categories within framework of HELIX.

On the questions (4&5) on how often can the sector provide HELIX with feed back during 2015 to early 2017, and if sector can benefit from on-line HELIX knowledge, the group indicated feedback can be ad-hoc and on-line knowledge if relevant to the sector will be used.

On other suggestions to HELIX, towards enhancing two-way interaction, the group suggested

- Include local modelers



- More focus on local and regional, to understand the specific implications
- Explore factors that affect food productivity which are catalyzed by climate (e.g. health)

Group 2: Crop, Livestock, and Fisheries production

On the question of change data and information needs, the listed important climate elements

- Rainfall,
- Temperature, Wind and
- Humidity are most climate elements.

In providing these, HELIX can consider dimensions like:

- Inter- and intra- seasonal variability
- Changes in bimodality patterns
- Extremes
- Trends

In discussing which of these the above can the sector share with HELIX, the group requested HELIX to share information with the sector based on the above list. Within the group were stakeholder organizations which made the following additions:

- World Food Programme (WFP): socio-economic data from household food security surveys
- National Meteorological and Hydrological Services (NMHSs): Weather information (depending on specific protocols and special agreements)
- ICPALD: From IGAD-level, weather data, conflict data, livestock data
- PREPARED: data from different sectors- agriculture, livestock, water

- The group indicated strongly that it needed more information from HELIX on the type of products/data sets which could be provide for improved climate change analysis for impacts on crop, livestock and fisheries production.

From the discussion of frequency of provision, the group indicated decadal (10days), monthly, seasonal and annual as good regularity of provision. Seasonal information will be useful for planning activities for improving or informing crop, livestock and fisheries, while monthly information will be useful for monitoring.

- Seasonal is achievable since these products can be generated as sector products within framework of GHACOFs during 2015 to early 2017.

In discussing question of feedback to HELIX and on using HELIX on-line knowledge, the sector indicated to get products every season and will give HELIX feedback seasonally.

In giving additional suggestions to HELIX towards improved 2-way interaction, there was suggestion that HELIX should provide more information on the work it aims to do, strengthen linkages organizations within IGAD and East Africa and help with data and climate change knowledge sharing for better inform to vulnerable sectors. Climate change information tailored to



specific sector applications is the most ideal means of ensuring that HELIX products are useful to various users and stakeholders.

- This point is noted with interest as we implement HELIX research (accuracy of climate change extremes, known certainty for sector applications, etc are our commitment to users and EU as project financier)

Group 3: Natural resources Management including Water and Forestry

On the question of high-end climate change data and information needs, the discussion led to needs list

- Change in temperature (daily, monthly, annual), including percentages
- Change in rainfall (daily, monthly, seasonal annual), including percentages
- Evaporation
- Downscaled climate levels at local scales
- Thresholds of climate elements for sector modeling and planning
- Frequency and duration and magnitude of climatic parameters
- Climate indices (wet spells, dry spells)
- Carbon sinks
- Issues of carbon market and trading
- Information on land used and land cover change
- Sea surface temperature
- Sea level rise and inundation
- Wind information (direction and speed)
- Sunshine hours and radiation intensity
- Humidity

In discussing questions 3, 4 and 5, the group indicated that HELIX can consider providing as many of above outputs as possible of the above on a daily, decadal, monthly, seasonal and annual during the period 2015 to early 2017. In turn feedback can be provided after usage of outputs and will be users of on-line HELIX knowledge products provided the information is customized for natural resources management including Water and Forestry Resources in the GHA.

In making additional suggestions to HELIX, they indicated that enhanced interaction should be strengthened, including:

- Openness and engagement
- More communication and awareness about the project at regional and country level activities Documents about the project should be put on line so that stakeholder can use it in a user
Data sets from HELIX and information should be in friendly formats
- Need for national focal points
- More presence at local levels
- Helix should also need to give feedback to stakeholders (two way interaction)
- Pilot application targeting different sector



- Creating Partnership and collaboration with other players
- Helix to give us an overview of already available initiatives (completed and ongoing)
- Harmonization and standardization outputs
- HELIX should serve as a fascinator to access satellite data

Group 4: Innovative economic, markets and trade systems

On the question of data and information needs for the sector, it was suggested that

- Natural disaster occurrence and type are necessary to inform insurance and financial sectors. Historical data is needed for developing products for these sectors
- Information on occurrence of extreme events such as droughts and floods is needed
- Indication of the would be likelihood effect of extreme - global warming (4°C – 6 °C) at scales e.g. regional to national down to local levels should be provided.
- Sectors needs information on the implications at local level of extreme temperatures and precipitation. These sectors include agriculture, food nutrients, tourism, water resources, insurance, infrastructure, economy and finance
- Information on adaptation measures by sector (agriculture, food production, tourism, water resources, insurance, and infrastructure) is necessary.
- Information on methane and CO2 emission for carbon trade market should be available

In answering to product availing and feed back to HELIX, the discussion came up with the following:

- On GHGs Methane, CO2, and others, information can be given seasonally and annually.
- On natural disasters, information can be given seasonally and annually. Additional information can include rainfall, temperature, disaster occurrence, extreme events occurrence, economic cost of previous years, trends of different sectors, and emissions of/from different sectors.
- They noted that authentic data sources include meteorological institutions, disaster departments (ministry), reports from ministries of environment, national institutes of statistics, and World Bank databases.
- On extreme events, information can be given seasonally and annually
- On likelihood effects of extreme events, information can be given seasonally and annually.

In discussing the information provision and feedback, it was suggested that seasonal data is sufficient for agricultural sector while annual data could be fine for other sectors. It was indicated that the climate change information should be valid / relevant to the organizations' mission and user friendly, and easily accessible from different countries within the region. In making additional suggestions to HELIX, the group noted that capacities are different in each country and there is need for a coordinated system and technology for sharing and collecting information.

Group 5: Scientific Advisory Bodies, Research and Academic Institutions, NGO/CBOs and Policy makers

On the question of information and data needs the group came up with the following

- On data needs, the needs for each category are as follows.

Scientific Advisory Bodies	Research Institutes and Academia	NGOs / CBOs	Policy Makers
Raw data	Raw data / Verified data	Seasonal and annual Variations	Regular updates and briefs
Verified Information	Data Gaps	Socio-economic impacts information	
	Spatial and temporal patterns		
	Models used and performance		

- On Information needs, the various came up with the following

Scientific Advisory Bodies	Research Institutes and Academia	NGOs / CBOs	Policy Makers
Clear messages about uncertainties and confidence levels	Clear messages about uncertainties and confidence levels	Publications	Accurate Briefs
Publications	Publications	Updates	
Updates	Updates		

In discussing which products HELIX can provide, the group indicated data sets and processed products, the discussion led to the wish list:

- Formats: GIS, NetCDF, Excel, Graphs, Maps,
- Raw data
- Maps of projections and impacts
- Verified Information
- Disease outbreak, fisheries, flooding, etc
- Processed information / publications
- Inputs to models of other researchers
- Engaging with local researchers

On the questions of frequency on product reception and feedback provision, it was indicated that this be ad-hoc, with regular updates from HELIX as soon as new products become available. Progress reports will be very useful as well as a focal point of contact in HELIX to provide



stakeholders with updates at frequency like twice a year. HELIX products should be linked to GHACOF for more formal stakeholder engagements/feedback. The group agreed to be users of HELIX on-line products whenever available.

In making additional suggestions to HELIX, suggestions included generation of climate change products like graphics comparing various projections for robust assessment of impacts in social economic sectors health, agriculture, and socio-economics to show combined impacts. Engagement with Meteorological Services to enable access to historical data was also emphasized. Also virtual data collection centre where stakeholders could go and download needed information was recommended to HELIX.

- On this last point, it is worthwhile emphasis on the HELIX commitment to avail its higher-end extreme climate data sets for impacts modeling applications is a major commitment of HELIX to stakeholders.

HELIX Engagement with Farmers in West Africa: Senegal event



To launch HELIX initiative in West Africa, Agence Nationale de l'Aviation Civile et de la Meteorologie (ANACIM) partnered with two other EU projects namely Environmental and Social Changes in Africa: Past, present and futurE (ESCAPE) and Institut de Recherche au Developement (IRD) which also organise a training workshop with local farmers under the theme: "Use of climate information to cope with extreme events and food insecurity in Niakhar" during 07 and 08 June 2014, in Toucar village, in Niakhar district, Fatick region in Senegal.

The objectives of the West Africa engagement event were to: (i) train farmers representatives, extensions services, local journalists and authorities on the basis of seasonal forecast, (ii) discuss with them the use of climate information in their agricultural decision system, (iii) document local knowledge and their relationship with modern forecast (iv) put in place a local multi-disciplinary group to downscale climate information for local famers in Niakhar during the rainy season.

The targeted participants were from six villages: Ngayohkéme, Toucar, Sob, Bary ndol, Kothioh et Diahine. These villages were chosen in common accord with IRD.

To demonstrate the added value of climate service and better convince farmers a farm experiment was put in place. In this experiment a farmer was chosen to manage two farms one using only climate information and another one doing business as usual, i.e. implement management activities best he thinks fit.



The project also funded a local working group having all government local services to meet at 10 days time to monitor the agricultural activities, interpret climate forecast the y receive from met service and produce a 10 days bulletin which is a summary of advices.

The project is working closely with IRD, ECAPE and CCAFS for the time being. We are looking forward to work with ACASIS project which is a National Research Agency of France and we will attend the 18-19 November national inception meeting in Dakar.

HELIX also will link to AMMA2050 proposal if it gets funding as we work on the same time frame. AMMA2050 target 40 years and plus time scale variability.

List of institution partnering in West Africa under coordination of ANACIM

Government Representative
Farmer’s organisation and individual from the villages of: Ngayohkéme, Toucar, Sob, Baryndol, Kothioh et Diohine
National Civil Aviation and Meteorological Agency (ANACIM)
Projet HELIX
Projet CCAFS (Changement climatique, agriculture et sécurité alimentaire)
SDDR (agriculture)
Livestock services
Center d’Appui au Développement Local (CADL)
World Vision
Agence Nationale de Conseils Agricoles et Rural (ANCAR)
Direction de l’Environnement et des Etablissements Classés (DEEC)
Institut de Recherche et de Développement (IRD)
Amicale des chefs de village
Communication: RTS, Sud-FM, Walf, radio rurale de Sine et Ndéfleng FM

Summary of Stakeholder Engagement, Information needs, and Recommendations

Higher-ends climate change extremes impacts have adverse impacts on food security (crop, livestock, and agro- pastoral livelihood activities), water resources and health sectors in the Eastern Africa/GHA region. Extreme climate change information such as the impacts of 4°C and 6 °C downscaled at Climate change information is necessary for informing of regional and national policies for mitigation and adaptation choices as well as applications in vulnerable sectors including crop research, health and water resources.

The numerous amount of climate change model information of unknown certainty level is a source of confusion for users of climate information running their sector impacts. It is therefore necessary to provide climatically-vulnerable sectors with robustly assessed and internally consistent climate change information, tailored and downscaled for the specific applications and decision support. Thus all sectors represented in the East Africa stakeholder workshop indicated if HELIX delivers on this, the products will be used and feedback provided within the period 2015 to early 2017 (i.e. before HELIX ends).



Within the content of both HELIX regional focus for Eastern Africa and C-ADAPT projects, in addition to the above information needs, there main recommendations were:

- ✓ Enhancement of capacity development in resilience programming; risk assessment and development of thresholds for the livelihood systems in the region.
- ✓ Develop Standards, codes and baselines (Climate Change (CC) and livelihoods) for the region. Review and validate tools and methods for monitoring and mainstreaming CC shocks in the livelihood systems -Identify models with good skill over the region.
- ✓ Partnerships, Working Groups (WGs) and coordination to increase synergy in efforts to mainstream CC shocks in the livelihood Early Warning Systems (EWS) at both institutional and systemic levels. IGAD to organize an Experts (youth and women groups and Consensus forums) meeting to define these partnerships.
- ✓ Develop innovative methods of developing and communicating EW products to users.
- ✓ Need to have an HELIX dedicated forum for users
- ✓ In addition, HELIX was requested to consider a dedicated user workshop within the region once users and stakeholders have had some hands-on experience on applying HELIX science to share experiences, lessons learned and creation of synergy towards further improvements before the project ends.

Annexes

The workshop concept note



Concept Note on the Climate Change and Food Security Analysis workshop for IGAD and WFP OMN Region

Organized by IGAD (IDDRSI), ICPAC and WFP

A. Context

Future climate change¹ in Eastern and Central Africa region could result in an increase in the frequency and intensity of extreme weather events, leading to more intensive flash floods and more recurrent dry spells and water scarcity. Climatic risks impacting on the livelihoods and food security situation of pastoralists and agro-pastoralists are also increasingly associated with resource-based conflicts in countries such as Kenya, Somalia, Ethiopia, Uganda and South Sudan that could lead to a further deterioration in vulnerability of affected population in the region.

The climate change drivers, such as greenhouse gas emissions that is exacerbating temperatures increase, shifting precipitations patterns and growing seasons, suggest that certain level of change will continue to occur at various rates in the future. In turn, adaptation activities and decisions must be informed by climate change information availed well in advance with specific consequences addressed. The accelerating pace of high impacts climate change, combined with global population and income growth, threatens food security and other resources everywhere². Climate change could exacerbate existing threats to food security and livelihoods through a combination of factors such as increasing magnitude of climate³-related hazards, diminishing agricultural yields, impact on rangeland and reduced production in vulnerable regions, rising human health and sanitation risks, increasing water scarcity, crop and animal diseases, intensifying conflicts over scarce resources and a wide range of adverse impacts on regional and national economic welfare.

¹ Climate change is characterised by high rainfall variability at seasonal, inter-annual and multi-decadal scales, and is one of the key contributors to food insecurity in the sub-Saharan Africa.

² East African Agriculture and Climate Change – A comprehensive Analysis, IFPRI, 2013

³ "Climate is often defined as 'average weather.' Climate is usually described in terms of the mean and variability of temperature, precipitation, and wind over a period of time, ranging from months to millions of years (the classical period is 30 years)" (Le Treut et al. 2007, 96)- IFPRI, 2013.



With the international target of limiting global warming to 2°C increasingly difficult to achieve, it is also worth considering the implications of 4°C and 6°C of warming “worlds” on climate sensitive activities. Some of the extreme impacts of climate change might arise due to increase in the frequency and intensity of extreme weather events such as flash floods and more recurrent dry spells. Consistent information on climate change can provide decision support on regional and national policies and contingency planning for informing adaptation choices. A target of both the C-ADAPT and HELIX initiatives is to produce user-tested climate change information for adaptation decisions across sectors.

In east and central Africa, adaptation to climate change supported by ground breaking research information is of interest to a number of institutions. Notably, IGAD Drought Disaster Resilience and Sustainability Initiative (IDDRSI) Strategy aimed at addressing the effects of drought and related shocks in a sustainable and holistic manner has incorporated under one of the seven pillars (pillar 4) climate change related issues. Furthermore, USAID together with partners such as East African Community (EAC), Lake Victoria Basin Commission (LVBC), Regional Centre for Mapping of Resources for Development (RCMRD), IGAD Climate Prediction and Application Centre (ICPAC) and FEWS NET have set up a project ‘Planning for Resilience in East Africa through Policy, Adaptation, Research, and Economic Development (PREPARED)’. The project has as one of its core objectives, climate change adaptation technical capacity, policy leadership, and action readiness for the Lake Victoria basin. Some work on climate change analysis has been started under these initiatives. Hence, synergies needs to be built with IDDRSI, PREPARED, Disaster Risk Reduction (DRR), the Climate Change Agriculture and Food Security (CCAFS) and the recently formed Resilience Analysis Unit (RAU) in ensuring that climate risk analysis provides information required for policy and programme decision making. To augment the ongoing initiatives in the region, two additional projects to strengthen climate change and fill in the gaps are underway. These are Climate Adaptation, Management and Innovation Initiative (C-ADAPT) and the “High End cLimate Impacts and eXtremes” (HELIX). The projects will also inform the National Adaptation Plans for Action (NAPAs) for their respective countries.

The C-ADAPT, funded by the Swedish Government’s fast-track climate finance, provides WFP and partners with a strategic opportunity not only strengthen its capacities in adaptation planning and climate risk management, but also to bring stakeholders interested on climate change analysis and adaptation together within the east and central Africa region. The project will run over three years from 2013 to 2015 with three components namely:

1. *Analysis of climate risk and food security*, at the regional and country-level: developing methods to incorporate climate risk analysis into food security and vulnerability analyses (i.e. identifying climate trends, and assessing how they may impact food security and livelihoods).
2. *Applying the outputs of these analyses* to guide the design of WFP’s resilience and adaptation-related policies and programmes.
3. *Identifying and documenting best practices* and innovations in food security-related adaptation/ climate change programmes (community, national and regional scale).

Under this project, there is also need to convene a workshop of stakeholders to share information related to climate change risk analysis and impact on food security.



HELIX on the other hand is a multi-disciplinary multi-stakeholder⁴ project with an objective of providing actionable climate change information and knowledge which is clear, coherent, internally-consistent and accurate on a manageable number of 2°C, 4°C and 6°C “future worlds” under higher levels of global warming achieved under a range of socio-economic circumstances, with information tailored for users and stakeholders. This will be delivered through groundbreaking scientific research across a range of physical, natural and social science disciplines, in close engagement with experienced users of climate change information in order to ensure appropriate focus, clarity and utility. HELIX project is regionally implemented in Northern Hemisphere Sub-Saharan Africa, Europe and South Asia. It is a 48 months collaborative project funded by European Union (EU) with ICPAC leading Work Package 8 on regional focus for northern hemisphere Sub-Sahara Africa. HELIX emphasis is on the impacts of higher-end scenarios that require coherent information on future climate conditions and the consequences of different adaptation actions. Since international climate policy often frames climate change in terms of levels of global warming, HELIX focuses on addressing the questions on what 4°C and 6°C “future worlds” would look like compared to 2°C and the consequences of different adaptation choices on major socio-economic sector activities, decision making and future security and welfare.

Within east and central Africa, both HELIX and C-ADAPT projects are being implemented in-line with doing business differently by running climate sensitive socio-economic activities in an informed and supported climate smart manner. It also aims at leveraging and bringing together existing critical tools and data to generate a global public good of resources available to all actors to support coordination, early warning and early action, policy and adaptation together with resilience programming using the best available science. Stakeholders interested in C-ADAPT and HELIX are likely to have similar needs and so this workshop is creating synergy and common interest while expanding the dissemination potential for each project. The workshop will improve coordination, coherent and alignment of various climate risk analysis tools used by different partners, as well as focus on fulfilling stakeholder needs. This will enable more robust analysis with user focus, accountability and comparability of results across different countries, actors, areas and application sectors alongside providing better information for decision making across the region.

B. Workshop Scope and Objectives

The C-ADAPT workshop was envisaged from consultations done with stakeholders at the end of 2013 during the formulation of the C-ADAPT proposal. Stakeholders indicated that there was need

⁴ Partners are the University of Exeter, Met Office, University of East Anglia, Stichting Vu-Vumc, JRC – Joint Research Centre – European Commission, World Food Programme, University De Leige, Centre National De La Recherche Scientifique, Sveriges Meteorologiska Och Hydrologiska Institut, Potsdam Institut Fuer Klimafolgenforschung, University College London, Technical University of Crete, IGAD Centre for Climate Prediction and Application, Bangladesh University of Engineering and Technology, Foundation for Innovation and Technology Transfer and Agence Nationale De La Meteorologie Du Senegal



to bring together agencies and persons working on climate risk analysis and climate change analysis so as to share knowledge and experiences. The workshop will therefore allow different stakeholders to identify and share best practices, tools and methods to develop a common framework for climate change and food security analysis that can be adapted across the region for comparability of results to inform decision making.

With the start of HELIX project, stakeholder consultation for production of knowledge is an essential component of its methodology. A total of eight global scenarios are being developed, emphasising climate change impacts on land and coastal resources, and their biophysical and socio-economic consequences impacts, including implications on food security and agricultural productivity, water resources, health, conflict risk, and biodiversity. HELIX is providing more in-depth analysis for three focus regions of Europe, Sub-Saharan Africa (Northern Hemisphere only), and South Asia. HELIX's East and Central Africa component is run by ICPAC in partnership with WFP. The first deliverable is to undertake a regional stakeholder workshop, to assess what regional stakeholders see as the priorities for information that includes food security and long-term and high-end climate change impacts demonstration on their specific activities in order to guide research that informs decision making.

The HELIX and C-ADAPT stakeholder engagement workshop is envisaged to assess user needs, analytical tools and methods used in climate change analysis to inform bio-physical and socio-economic impacts including food security and other vulnerabilities. The workshop will take stock of remote sensing information used in understanding climate change, tools and methods that have been used to incorporate climate change in food security analysis and other sectors, and how the results have helped to inform programme and decision making. This will be alongside identification of the gaps that users face in successful implementation and how HELIX will be able to fulfill such gaps and obtain feedback during the project period. The workshop will look at how to mainstream climate risk management into sustainable development activities and food security. Understanding climate change uncertainties and how to manage them; and how C-ADAPT and HELIX analysis and knowledge could better inform mitigation and adaptation practices, are core outcomes of the regional workshop. This workshop is aimed specifically at:

- i) Agreeing the common principles for climate change impact analysis on food security and other vulnerable sectors.
- ii) Taking stock of various climate change analysis initiatives
- iii) Identify stakeholder climate change information needs, which can be addressed within framework of HELIX and C-ADAPT.
- iv) From the existing analytical tools and methods used in climate change analysis, create synergies and identify standardized approaches to climate and food security analysis to feed into an integrated system that can be applied across east and central Africa for comparison of outputs.



- v) Identify key opportunities for climate change with linkage to food security and other vulnerable socio-economic activities, for which impact analysis can be used to strategically inform climate adaptation and resilience programming.
- vi) Discuss how to effectively disseminate and communicate the high and extreme climate change implications to decision and policy makers and end user stakeholders.
- vii) Discuss and recommend when user specific products can be availed and how users will provide feed-back for HELIX.

C. Expected Outputs

The workshop is expected to arrive at the following outcomes:

- (i) The basic principles for climate and food security analysis set
- (ii) Establish an integrated framework of analysing climate change and food security
- (iii) Identify potential opportunities and shortcomings of the analysis to inform adaptation and resilience programming
- (iv) Identify information needs and products of HELIX and agree timelines with stakeholders

Reports presenting the principles of analysis, examples and their application will be produced as an output of the workshop.

D. Structure and Format of the Workshop

Presenters/participants would be asked to send examples of their analyses, experiences, and information gaps and needs prior to the workshop.

The workshop will be structured into sessions, with each focusing on a key presentation followed by breakout discussion and plenary sessions.

Session 1: Introduction and scope of the workshop objectives within the framework of the two projects and expected outcomes.

Session 2 a): The different tools used in climate change and food security analysis, from C-ADAPT, FEWS NET, WFP analysis to inform seasonality, IFPRI, CCAFS, HELIX, examples of integrated Context Analysis; Shock modelling building in climate change analysis and climate vulnerability indices. This will be followed by breakout sessions looking at a) modelling and b) how climate change can be incorporated into the integrated context analysis, developing an agreed framework for analysis.

Session 2 (b): Discuss stakeholder's needs, priorities and concerns that assess long term impacts of climate change (by 2100) on socio-economic activities, bio-physical and food security, as well as possible analytical tools (e.g. vulnerability indices) and parameters (e.g. priority regions/ livelihood groups etc) that could be used. This will be followed by breakout groups by thematic



area (agriculture, water, energy, food security, health, etc) to discuss the information needs and priorities for programme decision making and policy.

Session 3: Based on the review of available tools (session 2), this session will discuss the principles of climate change impacts and vulnerable sectors including food security analysis. It will look at the analytical frameworks, opportunities of incorporating climate change into food security, water resources, agriculture, health and economic development, citing relevant examples from the region and across the world. It will also look at how climate change can be linked to resilience analysis based on the FSIN resilience measurement methodologies and indicators. This is followed by breakout groups which will define the specific principles for particular sectors and/or category of users.

Session 4: Building partnerships for the analysis of climate change impact on socio-economic and bio-physical impacts including food security. The session will look at what individual partners and initiatives will bring on board, areas of operation and how information on climate change impacts for various sectors can be harmonized and successfully shared. It will further deliberate on the working arrangements with partners.

Session 5a: Identify the adaptation and resilience programming opportunities that can come from the climate change and vulnerability analysis implications for food security and other sectors. WFP and other partners will be expected to present prototypes of better adaptation practices and programmes currently being implemented across the globe. The session will brainstorm models that could be used for the documentation of best adaptation practices and strategies. The session will also focus on how information can be communicated and how to get feedback from stakeholders on project developments.

Session5b: We will define indicators that could be used in the monitoring and evaluation of the HELIX project within this region.

Session 1 and 2 will be covered on day 1 of the workshop. Session 3 will be covered in day 2 and 3 of the workshop. The last 2 sessions will be covered on day 4 of the workshop.

E. Organization

The workshop will be organized jointly by WFP and IGAD, with the IGAD IDDRSI and ICPAC being the Lead Units within IGAD. WFP and ICPAC will provide all the logistical support for the workshop. It is expected that most stakeholders that will participate in the workshop will fund their airfares and accommodation as limited funds are available to cover all participants. Those participants funded to attend the workshop will be covered by through HELIX and C-ADAPT projects under ICPAC and WFP respectively. WFP and ICPAC will cover the lunches and other related workshop costs. Facilitators of sessions will be drawn from institutions involved in climate change as it relates to socio-economic activities and performance, bio-physical and food security



analysis. The workshop will be co-chaired by ICPAC and WFP as implementing units of HELIX and C-ADAPT.

F. Expected Participants

Participants will be focal points from agencies and organizations:

i. Government institutions

- Meteorological Services within IGAD and OMN regions
- Ministries and organizations involved in Agriculture and food productivity activities including research
- Ministries and organizations responsible for water resources management and utilization
- Organizations involved in forestry resources management and utilization
- Regional and National Disaster Risk Reduction organizations and contingency planners

ii. Academic, Advisory and Research Institutions

- Specialized institutes within public universities in the region,
- International Development Research Centre (IDRC)
- Advisory bodies including regional and/or national chapters of African academy of sciences.
- National Councils for Science and Technology,
- Climate Change Agriculture and Food Security (CCAFS)
- International Research Institute for Climate and Society (IRI)
- International Food Policy Research Institute (IFPRI)
- University of Exeter in the UK
- International Livestock Research Institute (ILRI)
- National Council Science and Technology

iii. UN, NGOs and Non-NGOs

- WFP – Regional Bureau (VAM & DRR);
- C-ADAPT Officers from OMB, OMC; VAM HQ;
- Climate Resilience for Food Security Unit in HQ;
- World Vision International
- Gesellschaft für Internationale Zusammenarbeit (GIZ)
- United Nations Office for Disaster Risk Reduction (UNISDR)
- Food and Agricultural Organization (FAO)
- Environment, Water and Natural Resource (climate change secretariat)



- UNEP

iv. **Others**

- UK MET
- FEWS-NET
- USGSS/NOAA
- African Union / African Centre for Policy and Climate Change
- IGAD Climate Prediction and Applications Centre (ICPAC) and IDDRSI
- East African Community (EAC) - Climate Change Coordinating Unit
- Lake Victoria Basin Commission (LVBC),
- Regional Centre for Mapping of Resources for Development (RCMRD)

G. Planned Dates for the Workshop

4 - 8 August 2014. The venue is Addis Ababa, Ethiopia

H. Convener

The workshop is co-hosted by IGAD IDDRSI, ICPAC and WFP Regional Bureau for East and Central Africa

The Workshop Communique released by IGAD on Friday, 8, August 2014

I G A D

INTERGOVERNMENTAL AUTHORITY
ON DEVELOPMENT



AUTORITÉ INTERGOUVERNEMENTALE
POUR LE DÉVELOPPEMENT

**Communiqué on Regional Food Security and Helix Stakeholders Engagement to Support
Adaptation to Extreme Climate Change**

The IGAD Drought Disaster Resilience and Sustainability Initiative (IDDRSI) Strategy is aimed at addressing the effects of drought and related shocks in a sustainable and holistic manner. As a way of bringing stakeholders together to contribute to the implementation of the IDDRSI Strategy, the IDDRSI Platform, IGAD Climate Prediction and Applications Centre (ICPAC) and the World Food Programme (WFP) Regional Bureau held a stakeholders consultative meeting on “Climate

Change Adaptation and Food Security Analysis workshop for Policy and Programme response planning” in Hotel, Addis Ababa, Ethiopia from 4 to 8 August 2014.

Participants at the workshop included experts in climate change, disasters, natural resources, forestry, water resources, agriculture and food security; economists, climate scientists and scientists from research institutions and the academia. The workshop was supported jointly by the European Union (EU) and the Swedish Government through ICPAC - **H**igher-**E**nd **c**Limate change **I**mpacts and **e**Xtremes (HELIX) and WFP Climate Adaptation (C-ADAPT) projects respectively.

The stakeholder’s engagement deliberated on the following areas;

- i. The basic principles of, and information needs for, climate variability and change and livelihoods and food security analysis
- ii. Identification of the potential opportunities and shortcomings of climate change analysis to inform adaptation and resilience programming
- iii. Establishment of an integrated framework for analysing climate change and food security
- iv. Identification of information needs and products for analysis of extreme climatic events and their impact

In this regard, the workshop:

Having recognized the important role of weather and climate information in food security and other socio-economic sectors; and having further noted the lack of an integrated framework for analysing climate change and food security in the region;

1. **Appreciates** the need for a framework that requires an interactive process of all food security stakeholders and climate experts to closely link the climate information to agriculture, health, and water and food security and produce a consensus of periodic outputs to better inform programme responses and policy. The workshop further notes that this should be part of strengthening the ongoing activities in the region such as the Greater Horn of Africa Climate Outlook Forum (GHACOF) process.
2. **Urges** the use of appropriate integrated tools and methodologies in a multi-stakeholders participatory approach for the analysis of data sets to meet the food security information needs for adaptation to climate variability and change at regional and local scales.
3. **Calls upon** all climate and food security experts to validate the tools and methodologies being used in the analyses.
4. **Reiterates** the necessity for enhanced collaboration and partnerships between stakeholders globally and regionally, across member countries and amongst the various disciplines, in order to create synergies and tackle the challenges of extreme climate change.
5. **Stresses** the need to provide regional policymakers and managers with a clear, coherent and internally-consistent future information on extreme climatic events. This will support regional and national scale adaptation, resilience program planning and policy formulation.
6. **Underscores** the need for linking the knowledge products from the scientific advisories with the information from the community of practitioners and users to support the implementation of the IDDRSI Strategy, including plans for sustainable development of water and forestry resources and information to support the regional position in International climate negotiations.
7. **Recommends** establishment and expansion of feedback mechanisms between information providers and users of climate information including food security and other vulnerable sectors.



8. **Recognises** the need for annual events of stakeholders be held to review the progress made and discuss the way forward.
9. **Expresses** gratitude to **the Swedish Government** and **the European Union (EU)** for the financial support provided to various on-going initiatives in climate variability and change analysis, which inform adaptation and resilience programmes and policy.

Issued this 8 August 2014 in Addis Ababa, Ethiopia.



Ethiopian TV news Clip with HELIX and C-ADAPT event in local language

HELIX and C-ADAPT event in local Ethiopian TV at 9PM on 8th August 2014 (in Amharic local language: The news item of relevance is towards the end of the video)

<http://www.ethiopian.tv/news-friday-august-8-2014/>

List of participants

No.	Name	Organization /Country	E-mail Address
1	John Kabayo	IGAD Djibouti	john.kabayo@igad.int
2	Adan Bika	ICPALD, Nairobi	adan.bika@igad.int
3	Dismas Mwikila	EAC	dmwikila@eachq.org
4	Kamariza Claudine	Burundi	kamaclau7@yahoo.fr
5	Yin Peng Li	climsystems	yinpengli@climsystems.com
6	Peter Urich	climsystems	peter@climsystems.com
7	Francis Mutua	UoN	fmutua@uonbi.ac.ke
8	Jully Ouma	UoN	jully.ouma@gmail.com
9	John Kevin	NARL/Uganda	johnkevin067@gmail.com
10	Rogério BONIFACIO	WFP HQ	rogerio.bonifacio@wfp.org
11	Philip Omondi	WFP OMN	philip.omondi@wfp.org
12	Elliot Vhurumuku	WFP OMN	elliott.vhurumuku@wfp.org

13	Giulia Polidori	WFP OMN	Giulia.polidori@wfp.org
14	Coulibaly Jeanne	ICRAF	I.Coulibaly@cgiar.org
15	Fiona Guy	WFP – HQ	tania.osejo@wfp.org
16	Catherine Kafeero	Uganda	catherinekafeero@gmail.com
17	Abdel Moneim Suliman	IGAD	moneim.elhoweris@igad.int
18	Bedru Muzein	IGAD	bedru.muzein@igad.int
19	Priscilla Amiri	ECHO	Priscilla.Amiri@echofield.eu
20	Tesfaye Fantaye Kindie	CGIAR/CIMMYT	K.TesfayeFantaye@cgiar.org
21	Alain Olive	WFP - Cairo	oscar.ekdahl@wfp.org
22	Alemtsehai ALEMU	WFP Ethiopia	alemtsehai.alemu@wfp.org
23	Tania Osejo Carrillo	WFP – HQ	tania.osejo@wfp.org
24	Amit Singh	WFP- S. Sudan	amitsinghgkp@gmail.com
25	Sarah Murabula Achola	ICIPE	sachola@icipe.org
26	Ayalneh Bogale	AUC/REA	AyalnehB@africa-union.org
27	Michael Waithaka	ASARECA	m.waithaka@asareca.org
28	Chucri SAYEGH	GIZ / IDDRSI	chucri.sayegh@igad.int
29	Lakemariam Y. Worku	Ethiopia	mistrelake@yahoo.com
30	Samsom Kahsay	Ethiopia	sam.kahsay@gmail.com
31	Kirsty Lewis	Exeter	kirsty.lewis@metoffice.gov.uk
32	Joseph Mutemi	UoN/ICPAC	jnmutemi@yahoo.co.uk
33	Mathews Hunde	AUC/DRR	
34	Borjas Santos	WFP / Ethiopia	Borjas.Santos@wfp.org
35	Kassu Kebede	WFP / Ethiopia	Kassu.kebede@wfp.org
36	Kenton Sankei	WFP / Ethiopia	
37	Bekelu Gullema	WFP/Ethiopia	Bekelu.gullema@wfp.org
38	Hailselassie Tesfay	WFP/Ethiopia	hailaiselasiet@gmail.com
39	Antony Awira	IGAD	Awira.antony@igad.int
40	Dominique De Bonis	WFP/HQ	dominique.debonis@wfp.org
41	Tesfaye Besnah	FAO	Tesfaye.Asfaw@fao.org
42	Daniel Diamond	WFP/Ethiopia	daniel.diamond@wfp.org
43	Boaz Blackie Keizire	AU	KeizireB@africa-union.org
44	Bizoza Alfred R	Rwanda	alfredbiz23@gmail.com
45	Evans Njewa	UNFCCC	njewae@yahoo.com
46	Animesh Kumar	UNISDR Nairobi	Animesh.Kumar@unisdr.unon.org
47	Girma Eshetu	Ethiopia	girma.eshetu@ymail.com
48	James Magezi	Uganda Met Services	mageziakiikibj@yahoo.co.uk
49	Caroline A. Kirungu	ICPALD	caroline.kirungu@igad.int
50	Ednah N Otto	KMRI	ednaototo@gmail.com
51	Evaline Komutunga	NARO-Uganda	komutungae@gmail.com
52	Tadege Abebe	Ethiopia	atadege@icpac.net



53	Benjamin Gyampoh	African Academy of Sciences	b.gyampoh@aasciences.org
54	Paul Ombai	ICPAC	pombai@icpac.net
55	Alfred Opere	UoN	aopere@uonbi.ac.ke
56	Babra Olwande	ICPAC	bolwande@icpac.net
57	Abdourahman Houmed-Gaba Maki	ICPAC	ahgmaki@icpac.net or abdogaba@yahoo.fr
58	Patrick Luganda	Uganda	patrick_luganda@yahoo.com
59	Barak Okoba	FAO	barrack.okoba@fao.org
60	Peter Muhangi	IFRC	peter.muhangi@ifrc.org.
61	Leah Naess Wanambwa	AUC/Climate Change	
62	Gideon Gallu	FEWSNET	gideon.galu@gmail.com
63	Arega Yirga	WFP / Ethiopia	Arega.yirga@wfp.org
64	Anna Nkeza Hakuza	Uganda	maaifewu@yahoo.co.uk
65	Joshua Nagaina	UoN/WMO	jngaina@gmail.com
66	Wanja KAARIA	WFP	wanja.kaaria@wfp.org