# Proceedings of the IPCC Fifth Assessment Report Outreach Activity:

# What does it mean for Kenya?

**Nairobi, Kenya; 31 July - 1 August 2014**

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# Foreword

The adverse impacts of climate change are a major challenge to socio-economic development globally. The African continent, including the East African region, is particularly vulnerable to impacts of climate change, affecting key economic drivers such as water resources, agriculture, energy, transport, health, forestry, wildlife, land and infrastructure. The impacts include water stress and scarcity, food insecurity, diminished hydropower generation potential, loss of biodiversity and ecosystem degradation, increased disease burden, destruction of infrastructure, and high costs of disaster management as a result of increased frequency and intensity of droughts, floods and landslides.

The most vulnerable members of society to impacts of climate change are the elderly, physically challenged persons and the youth. In Kenya, the youth constitute the bulk of the population, and are therefore important stakeholders in the environmental and sustainable development decision-making processes. Being the majority, they are therefore the greatest consumers, producers, victims as well as beneficiaries of environmental resources. This is the category of people that will be impacted by today's decisions.

Climate change will impact on the future lives of today's young people in countless and unimaginable ways; so they have much to gain from efforts to tackle climate change, and the most to lose if climate change is allowed to escalate. Decisions made today should aim at creating a future world that will be safer, healthier and more peaceful than the world of the 20th Century.

The information in the IPCC-AR5 is very useful for the youth who, besides being the majority, are also the most vulnerable in society. The recommendations herein need to be translated into policies that would benefit our communities and trigger the process of active involvement in factoring climate information into relevant activities on the basis of the already developed structures in the country.

The time for action is now if we are to respond to the challenges posed by climate change. If we don't respond now, it will be very difficult to do so in future.

**Honourable Professor Judy Wakhungu**
**Cabinet Secretary,**
**Ministry of Environment, Water and Natural Resources**

# Acknowledgement

Kenya acknowledges that changes in the earth's climate system and its adverse impacts are a common concern to humankind. Weather shocks are devastating in the country, as they greatly hamper food security. The obvious signs of global warming are the receding snow-caps on Mount Kenya, bleached and dying coral reefs at the coast, and the ever increasing frequency of extreme climate events, particularly drought and floods. Epidemics such as cholera and other waterborne diseases, all of which are related to climate variability and change, have claimed hundreds of lives. Across Kenya, therefore, the effects of Climate Change are wreaking havoc not only on human and animal health, but also on agriculture, water supplies, transport, tourism, and energy supplies.

Organisation of the IPCC Fifth Assessment Report (AR5) Outreach Activity is a demonstration of the commitment of the government, through the Ministry of Environment, Water and Natural Resources to enhance coordination of activities related to climate change in the country, with a view to ensuring a climate-proof socio-economic development.

This report is based on deliberations made during the referenced AR5 Outreach Activity for Kenya that was attended by stakeholders across a wide spectrum of economic activities. The report therefore captures the aspirations of a majority of citizens as far as climate challenges are concerned. In addition to the other relevant reports already developed by this Ministry, it is my sincere hope that the report will be found useful in delivering the country out of the vicious circle of poverty exacerbated by the changing climate which is often associated with severe impacts on livelihoods of societies.

Organizing an Outreach Activity of this magnitude and the development of a report from the deliberations of the same, would be impossible without financial resources. In this regard, my gratitude goes to the UK Department for International Development (DFID) for the financial support through the Climate and Development Knowledge Network (CDKN). The Ministry of Environment, Water and Natural Resources (Climate Change Secretariat and the Kenya Meteorological Service) co-hosted the event together with CDKN.

**Dr. Richard L. Lesiyampe (PhD), MBS.**
**Principal Secretary,**
**State Department of Environment and Natural Resources**

# Statement by Kenya's IPCC Focal Point

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by two United Nations organizations, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), to assess "the scientific, technical and socio-economic information relevant for the understanding of the risk of human-induced climate change." Review conducted by experts and governments is an essential part of the IPCC process. The first task of the IPCC was to prepare a report on all aspects relevant to climate change and its impacts and to formulate realistic response strategies based on available scientific information. Since then, the IPCC launches its Assessment Reports on climate change every 4-6 years. The unique features of the reports are two-fold in that they are policy relevant but not policy prescriptive; they also emphasise scientific integrity, objectivity, openness and transparency.

Kenyan scientists have been contributing to the authorship of some chapters of the three parts of the IPCC reports: the Working Group I (Physical Science basis), Working Group II (Adaptation, Impacts and Vulnerability) and Working Group III (Mitigation).

Since 1990, the IPCC has provided regular and unbiased assessment reports with useful information about the changing climate system. To date, five assessment reports have been produced. Each subsequent report has more and new information on the findings with regard to the science compared to its earlier assessment reports. The current Assessment Report (AR5), therefore, has the most recent and updated information on the climate system.

In Kenya, a number of signals of climate change are apparent. The evidence for these signals is anchored on decades of analyzing data from systematic observations by a network of meteorological stations. These signals include, but are not limited to, the general increase in temperature, shifts in rainfall seasons (onset and cession dates), increasing frequency and intensity of extreme climate events—especially droughts and floods, general decreasing trends in seasonal rainfall amounts, and receding of mountain glaciers. All these have impacted and continue to impact negatively on many of the country's socio-economic activities, hence the reason for concern.

**Dr. Samwel N. Marigi (PhD)**
**IPCC Focal Point for Kenya**

# ABBREVIATIONS

| | |
|---|---|
| AFOLU: | Agriculture, Forestry and Other Land Use |
| AGEP: | Africa Green Economy Programme |
| AMCEN: | African Ministerial Confenrence on the Environment |
| AR5: | Fifth Assessment Report |
| ASALs: | Arid and Semi-Arid Lands |
| CBO: | Community Based Organization |
| CEEC: | Center for Energy Efficiency and Conservation |
| CDF: | Constituency Development Fund |
| CDKN: | Climate and Development Knowledge Network |
| CFAs: | Community Forest Associations |
| CIC: | Climate Innovations Centre |
| COPs: | Conference of Parties |
| CSOs: | Civil Society Organizations |
| DANIDA: | Danish Development Agency |
| FBOs: | Faith Based Organizations |
| GHGs: | Green-House Gases |
| ICCA: | Institute for Climate Change and Adaptation |
| ICRAF: | International Centre for Research in Agroforestry |
| IOD: | Indian Ocean Dipole |
| IPCC: | Inter-GovernmentalPanel on Climate Change |
| ITCZ: | Inter-Tropical Convergence Zone |
| KCCWG: | Kenya Climate Change Working Group |
| KEMRI: | Kenya Medical Research Institute |
| KEPSA: | Kenya Private Sector Alliance |
| KIPPRA: | Kenya Institute for Public Policy and Analysis |
| KMS: | Kenya Meteorological Service |
| LDC: | Least Developed Countries |
| LPG: | Liquefied Petroleum Gas |
| MAM: | March April May season |
| MEWNR: | Ministry of Environment, Water and Natural Resources |
| MJO: | Madden Julian Oscillation |
| NCCAP: | National Climate Change Action Plan |
| NCCRS: | National Climate Change Response Strategy |
| NEMA: | National Environment Management Authority |
| OND: | October November December season |
| PANERECC: | Parliamentary Network on Renewable Energy and Climate Change |
| RANET: | Radio and Inernet Network |
| RFP: | Regional Flagship Programmes |
| UNFCCC: | United nations Framework Convention on Climate Change |
| WRUA: | Water Resource Use Associations |

# EXECUTIVE SUMMARY

IPCC-AR5

The fifth assessment report (AR5) of the Inter-Governmental Panel on Climate Change (IPCC) indicates that global mean surface temperature will continue to rise during the 21st century. This was the main highlight of the IPCC outreach activity held on 31 July and 1 August 2014 at the Safari Park Hotel, Kenya by the Ministry of Environment, Water and Natural Resources in collaboration with Climate and Development Knowledge Network (CDKN) and the Climate Innovation Center (CIC).

The objective of the outreach activity was to disseminate the findings of the IPCC, AR5. The theme was IPCC's Fifth Assessment Report – What does it mean for Kenya's development? The main thematic areas were climate change trends, impacts and vulnerability, adaptation and climate resilience, Kenya's low carbon climate resilient development opportunities, how to pay for climate actions, and the place of policy and practice. Issues regarding climate change and the appropriate measures to counter impacts were also addressed.

The main findings of IPCC-AR5 indicated that Equatorial Africa (including East Africa) is projected to warm less than either southern Africa or northern Africa with the tropics generally getting wetter and the subtropics drier. However, there is medium confidence in model projections for little change in mean annual precipitation over East Africa. Rainfall is likely to increase during the short rains season but there is low confidence in projections for the long rains. ENSO will remain the dominant mode of natural climate variability in the 21st century, though changes in intensity are uncertain. The Indian Ocean Dipole (IOD) is very likely to remain active throughout the 21st century, coupled with enhanced warming in the western Indian Ocean, and will affect climate extremes in East Africa in particular, with increased precipitation during the short rains season.

During discussions the following questions were raised:

1. What are the opportunities for Kenyan stakeholders with respect to the IPCC-AR5 findings?
2. What are the best practices by different stakeholders (agencies, communities, organisations) in Kenya?
3. What should be done better and what further support is required, if any?

Among the concerns raised were how to:

1. Pay for climate action given that AR5 does not address it;
2. Unlock domestic resources towards the climate change cause;
3. Generate domestic funds for climate action;
4. Develop policies and incentives that could help address climate change;
5. Provide incentives to attract the banking industry in the climate change campaigns;
6. Create risk-taking entrepreneurs;
7. Remove complications in the system;
8. Review the regulation that limits the countries that qualify for European Union carbon credits to Least Developed Countries (LDCs) as it locks out other deserving countries (like Kenya);
9. Develop a greenhouse gas inventory;
10. Establish institutions that can help enhance resilience;
11. Address uncertainty by the various players.

Rainfall is the most important climate parameter as socio-economic activities are closely linked to its space-time distribution. It is highly variable both in space and time. Temperature is another important climate parameter in Kenya. It affects evapo-transpiration, soil moisture and water availability, among other effects. Temperature is less variable compared to rainfall. Projections indicate a decrease in rainfall and a rise in temperature in Kenya.

The IPCC-AR5 recommends that causes of climate change be addressed to create a richer, more vibrant and secure future. It is also worth noting that the report focuses a lot on the direct impacts of climate change on people. The report also addresses uneven development processes, inequalities within societies, direct and indirect impacts of climate change on poor, marginalized and vulnerable people. The report further warns that human security will be progressively threatened as the climate changes.

It was observed that people living in violence and conflict-prone areas are more vulnerable to climate change. When large-scale violent conflicts occur, untold harm on assets such as infrastructure, institutions, natural resources, social capital, and livelihood opportunities is always inevitable.

Research gaps identified include data management, climate, and hydro-climate monitoring systems to address climate change impacts in the different sectors. Other research gaps discussed are improved methodologies to assess and quantify the impact of

climate change in different sectors and systems; and strong interlinkages between adaptation and development pathways with special focus on building resilience to the impacts of climate. The key strategies to address the gaps include improving social protection, social services and safety nets; implementation of better water and land governance and tenure of security over land and vital assets; enhancing water storage, water harvesting and post-harvest services; and enhancing inclusivity in the planning process while paying more attention to urban areas that are heavily affected by migration of poor people.

Based on very high confidence, the AR5 indicates that a range of biophysical, institutional, financial, social, and cultural factors constrain the planning and implementation of adaptation options and effectiveness. It was noted that climate change interacts with economic development, demographic change, ecosystem alteration, and technological innovation. Implementation of mitigation and adaptation measures requires knowledge and capital. Limits to adaptation, defined as "inability to avoid an intolerable risk to an actor's objectives and/or to the sustainability of a natural system" have been found to emerge as a result of the interactions between climate change and biophysical and socio-economic constraints. Even though there is little empirical evidence to quantify magnitudes of climate change that would constitute adaptation limits, economic development, technology, cultural norms and values can change over time. Investing in this area would therefore be one way of changing capacity in order to avoid limits.

It was observed that the selection and implementation of specific adaptation options would have ethical implications. Decision-making involves reconciliation of legitimate differences about how adaptation resources are distributed, and the values that adaptation seeks to protect. Existing inequities generate ethical questions regarding who is advantaged or disadvantaged by adaptation actions.

The conceptual framework for low carbon development opportunities has four key components: Cleaner production, climate change strategy and action plan, identified sectors and their Green House Gases (GHG) abatement potentials, and the Green Economy strategy and action plan. The Africa Green Economy Programme (AGEP) is one of the key priority Regional Flagship Programmes (RFPs) for the implementation of the Rio+20 outcomes in Africa. It was adopted at the 5th Special Session of African Ministerial Conference on the Environment (AMCEN) held in Botswana (October 2013), and AU Summit in Ethiopia (January 2014). RFPs are

expected to facilitate synergy and cooperation between national and regional actors and organizations that provide support to African countries.

Kenya has established a number of awards that have helped enhance compliance with environmental regulations. The Kenya Green Awards include the National Environment Trust Fund; Energy Efficiency Awards: Kenya Association of Manufacturers and Ministry of Energy and Petroleum; National Environment Management Authority Green Industries Awards; National Cleaner Production Centre—which in turn recognizes (1) Textiles, Sugarcane, Tea processing industries (2) Women Entrepreneurs enterprises (Women and climate change project by Soroptimist International and DANIDA support and (3) Green Schools.

The participants were informed that mitigation requires major technological and institutional changes, which include the upscaling of low- and zero-carbon energy. It also requires changes throughout the economy, and this in turn calls for robust institutions, policies, investment and international cooperation. Since efforts in one sector may determine mitigation efforts in others, significant changes in investment patterns are required for GHGs reductions to be realized. The AR5 also cautions that delaying mitigation may increase the difficulty and narrow the options for limiting warming to 2°C.

Several mitigation opportunities have been identified in the energy supply sector. Decarbonization of electricity generation is proposed as a key strategy towards achieving low stabilization levels. A large assortment of electrical technologies available today provides us with heating, illumination, refrigeration, and information. Some of the technologies at our disposal use fuel more efficiently, while others need no fuel, proving that there is potential for the generation of electricity with low or no carbon.

On renewable energy technologies, the IPCC-AR5 highlights the ability for Africa to scale up energy services, given its endowment with huge renewable energy resources. It is puzzling, however, that the costs of renewable energy are still higher than the existing energy prices. It is recommended that pricing be part of the mechanism deployed in the management and regulation of renewable energy technologies.

This is a critical moment for Kenya in deciding the future of its energy in particular—how to make it 'climate compatible.' The Kenya Government's long-term, Vision 2030 development blueprint aims to transform Kenya into "a newly industrializing, middle-income country providing a high quality of life to all its citizens in

a clean and secure environment." The National Climate Change Action Plan (NCCAP) is geared towards helping meet Vision 2030 by reducing vulnerability to climate change and to improve the country's ability to take advantage of the opportunities arising from climate finance.

Any meaningful reductions in emissions require substantial changes in investment patterns. The general trend of emissions associated with Agriculture, Forestry and Other Land Uses (AFOLU) for the last four decades (1970-2010) indicates that Asia has been in the lead owing to the use of nitrogen fertilizer compounds on its huge agricultural sector. Some of these emissions have been transferred to Africa. The factors that pose challenges in AFOLU include financing, poverty, institutional, ecological, and technological development. Lack of proper systems for feedbacks to adaptation and conservation has constantly hampered the potential for GHG mitigation, especially in Africa.

Competition between different land-uses, often without much consideration about the suitability of the land to some of the uses, has also contributed to the strain. Land-related mitigation strategies (agriculture, forestry, bio-energy) were projected to contribute 20 to 60% of total cumulative abatement by 2030, and 15 to 45% by 2100. Delaying mitigation efforts beyond those in place today through 2030 is estimated to substantially increase the difficulty of the transition to low longer term emission levels. Such delays also pose the risk of narrowing the range of options available for maintaining temperature change below 2$^{o}$C. Additional risks include potential implications for biodiversity, food security and other services.

Food security is one of the areas that are likely to be highly impacted upon by continued GHG emissions. The IPCC report points out that part of Africa's vulnerability lies in the fact that recent development gains have been in climate-sensitive sectors. Growing populations will increase the demand for water and food but prolonged droughts are likely to put additional pressure on already scarce water resources, thereby reducing crop yields.

Technology will not be sufficient for the necessary transitions to low GHG. The AR5 also indicates the damage done is such that even if the global society was to instantly cut down on greenhouse emissions, it would not make a big difference in terms of climate change in the next few decades. Emissions are expected to persist, driven by growth in global population and economic development.

# SESSION ONE

# Climate change trends, impacts and vulnerability

***Prof. Chris Reason, Lead Author, IPCC Working Group I (Physical Science and Climate Change)***

Rainfall over the East African region is controlled by seasonal movements in the Inter-Tropical Convergence Zone (ITCZ). This is the convergence of easterly trade winds from the northern hemisphere (north-east trades) and the southern hemisphere (south-east trades) in a zone of low pressure. Two rainfall peaks are concentrated close to the equator because the ITCZ passes overhead twice each year, giving rise to a bimodal system with rain during March to May (Long Rains) and October to December (Short Rains). East African highlands and gaps (e.g. Turkana) exert strong influences on rainfall in the region.

Latitudinal circulation is a consequence of intense solar radiation per unit area at the equator and decreases as the latitude increases, reaching its minimum at the poles. It consists of two primary convection cells, the Hadley cell and the polar vortex. Longitudinal circulation, on the other hand, comes about because water has a higher specific heat capacity than land and thereby absorbs and releases more heat, but the temperature changes less than land. Longitudinal circulation consists of two cells, the Walker circulation and El Niño/Southern Oscillation (ENSO). The Extent of Hadley and Walker cells are important for tropical circulation and rainfall. The tropical Walker circulation is expected to weaken.

The Hadley Cell is projected to shift polewards. The tropics are expected to generally get wetter while the subtropics get drier. There is medium confidence that an increase in seasonal mean rainfall on the equatorward flank of the ITCZ will occur by the end of the century.

The AR5 indicates that it is very likely that all of Africa will continue to warm during the 21st century. Equatorial Africa (including East Africa) is projected to warm less than either southern Africa or northern Africa. In general, tropics are expected to get wetter and subtropics drier. However, for East Africa, there is medium confidence in model projections for little change in mean annual precipitation. Increased rainfall is likely for the short rains but there is low confidence in projections for the long rains.

There is high confidence that ENSO will remain the dominant mode of natural climate variability in the 21st century but changes in intensity are uncertain. The Indian Ocean Dipole (IOD) is very likely to remain

## Quotes from Key Guest speakers

- ENSO to remain the dominant mode of natural climate variability in the 21st century – *Prof Chris Reason, Lead Author, IPCC Working Group I (Physical Science and Climate Change*
- Rainfall changes in East Africa likely to be more than changes in temperature– *Prof. Chris Reason, Lead Author, IPCC Working Group I (Physical Science and Climate Change*
- The IPCC fourth and fifth assessment reports (AR4 & AR5) indicate climate change is no longer a speculation – *Dr. Samwel Marigi, IPCC Focal Point for Kenya*
- Climate change presents a lot of investment opportunities – *Dr. Alice Kaudia, MEWNR*
- Effective and inclusive climate change adaptation can help build resilience – *Dr. Maggie Opondo, UON*
- Lack of literature is often construed as lack of climate change impacts, especially in Africa – *Dr. Maggie Opondo, UON*
- Climate Change is giving Africa a chance to rethink its priorities – *Dr. Maggie Opondo, UON*
- Climate change is a call for better planning, like Joseph of old whose planning skills and advice to Pharaoh saved Egypt from famine – *Mr. James Kongoti, Director, KMD*
- Climate action must be now; adaptation cannot be postponed – *Dr. Elija Mukhala, Programme Officer, WMO sub Regional Office for Eastern and Southern Africa*
- The rate of climate change interacts with rates of economic development, demographic change, ecosystem alteration and technological innovation – *Dr. Ama Essel, Korle-Bu Teaching Hospital, Ghana*
- Kenya's vulnerability to climate change cannot be gainsaid, as its economy largely relies on climate sensitive sectors – *Dr. Richard Lesiyampe, Principal Secretary, State Department of Environment and Natural Resources*
- The youth must participate in climate action, as they have more to lose, being the greatest consumers of environmental resources – *Prof Jacob Kaimenyi, Cabinet secretary, Ministry of Education*

active throughout 21st century – this together with enhanced warming in the western Indian Ocean affects climate extremes in East Africa and increases precipitation during the short rains season.

Madden Julian Oscillation (MJO) which has a variability of 20-70 day time scale are not well represented in models so it is difficult to project changes.

# Indicators of climate change in Kenya

***Dr. Samwel Marigi—Kenya Meteorological Service and IPCC Focal Point for Kenya***

It is now evident that some climate change signals are already making themselves apparent in the country. The change signals that have been observed include temperature rises, indications of changes in seasonal rainfall patterns (Onset and cessation dates), general decreasing annual rainfall trends at many locations, melting and retreat of mountain glaciers, and increasing frequency of ENSO events (extreme climate events).

**OBSERVED TEMPERATURE AND RAINFALL PATTERNS IN SELECTED LOCATIONS OF KENYA**

Rainfall is the most important climatic parameter in Kenya. Space and time distribution of many natural resources as well as socio-economic activities are closely linked to the space-time distribution of the total rainfall. Rainfall is also ranked as the number one climatological parameter that has the highest degree of variation in both space and time.

The other important climatic parameter in Kenya is temperature. It affects evapotranspiration, soil moisture and water availability, among other effects. Temperature is less variable compared to rainfall. Studies of the trends of the two parameters a decrease in rainfall over the western and central highlands, as well as the northeastern and coastal parts of Kenya. Temperature trends indicate rising temperatures all over the country.

## Questions and areas of concern

**Question:** *Does ENSO have any effect on the length of the growing season and on the variability within the rainy season?*

**Answer:** There is a strong correlation between the number of wet and dry spells and ENSO, especially at shorter time scales. ENSO affects the number and duration of wet and dry spells experienced within a season. Projections on the effect of climate change on the Onset and Cessation of the rains are not as clear as the frequency of wet and dry spells.

**Question:** *What method was used in the Statistical downscaling?*

**Answer:** Statistical relationships between the large scale circulations simulated modes and rainfall, in particular, stations are used.

## Questions and areas of concern contd.

**Question:** *Is there a link between Madden Julian Oscillation (MJO) the Indian Ocean Dipole (IOD) and El Niño Southern Oscillation (ENSO)?*

**Answer:** Yes, there is a correlation between these modes of variability; and research on the subject is ongoing. A relationship exists also, between MJO and monsoons.

**Question:** *The global scale projections depict rainfall as increasing. The paradox is that up to now we are seeing decreased rainfall. How can the discrepancy be explained?*

**Answer:** Yes, there is evidence of decreasing annual rainfall over Kenya. As the seasonal trends vary, OND rainfall shows an increasing trend while MAM shows a decreasing trend. The net effect with regard to annual rainfall may be a negative or positive trend, depending on the rate of change of the seasons.

**Question:** *If the temperatures are rising and there is an increase in precipitation, has any analysis been done on the net effects of these variations, for example on agriculture?*

**Answer:** Percentage increase in precipitation is higher than those observed about temperatures. There will be net effects of climate change on many other sectors, including agriculture. The current analysis of future changes in rainfall and temperature will lead to analysis of impacts on other socio-economic sectors. Impacts on agriculture will also be done.

**Question:** *What are practical ways to address climate change, especially to the affected public in the rural areas?*

**Answer:** The answer is found in dissemination of information in a language that is understandable to all, and to ensure timeliness of the information.

**Question:** *How do you account for the scenario that the coastal belt is rainy and temperatures are low, yet the ITCZ should be northwards (in the Northern Hemisphere)?*

**Answer:** Apart from the Northern and Southern migration of the ITCZ, other large circulations influence rainfall distributions over East Africa. Rains along the Kenyan coast may be as a result of other influences such as Indian Ocean SSTs.

## Questions and areas of concern contd.

**Question:** *How are you linking climate change adaptation to social growth without compromising growth?*

**Answer:** The response strategy implemented by the Gogovernment of Kenya, through the Kenya Meteorological Service observes, monitors, predicts and then relays the information to relevant arms of government, who act accordingly.

**Question:** *Climate change science is regarded by the public as complex, how well will you communicate these findings to the public?*

**Answer:** The public is now aware of changes in the climate system as opposed to the past ,when there was a shortage of relevant information.

**Question:** *What are the practical ways to adapt to the climate change phenomenon?*

**Answer:** Climate change adaptation will depend on how well climate change is communicated to the public and policy makers.

**Question:** *Do you plan to have  a county breakdown on rainfall and temperature projections?*

**Answer:** Yes, after analyzing and studying climate change projections at country level, projections for the counties will be done.

**Question:** *What is the government advocating regarding climate change scenarios? How do you link economic growth and climate change?*

**Answer:** Climate change information has been used in developing both the National Climate Change Response Strategy (NCCRS 2010) and the National Climate Change Action Plan (NCCAP 2013). The information is also used in the climate change strategy. Climate variability and change affect economic growth, and have already been mainstreamed into economic planning.

***Prof. Kaimenyi, (top picture) Cabinet Secretary for Education and Dr. Burton (British High Commission) follow the workshop proceedings with other participants.***

# SESSION TWO

# Adaptation and climate resilience: Best practice lessons from Africa

***Summary from presentation by Dr. Maggie Opondo, ICCA University of Nairobi and IPCC Author***

The participants were informed that the mandate of the IPCC is to assess what the scientific literature says about the state of climate change. The AR5 involved literature assessment by more than 309 scientists. The AR5 entailed holding one scoping meeting to outline 30 chapters, making 1217 author nominations representing 92 nationalities, putting together 242 lead authors and 66 review editors from 70 countries, as well as 436 contributing authors from 54 countries. The entire publication has more than 12,000 scientific references.

**What is new in AR5?**

Compared to past WGII reports, the WGII AR5 assesses a substantially large knowledge base of relevant scientific, technical, and socio-economic literature. The additional literature from all regions has facilitated comprehensive assessment across a broader set of topics and sectors, with expanded treatment of human systems, adaptation, and the ocean coverage. The AR5 also contains much more details on the regional aspects of climate change than previous assessments have done.

**Key findings**

The key issue that stands out in the report is that climate change is already causing harm. The more we warm the climate, the more risks we will face. Given that the factors causing climate change are largely anthropogenic, it is up to us to create a richer and more vibrant and secure future by addressing the causes of climate change.

The IPCC-AR5 has a stronger focus on the direct impacts of climate change on people than in the past. It also addresses uneven development processes, inequalities within societies, direct and indirect impacts of climate change on poor, marginalized and vulnerable people. The report also warns that human security will be progressively threatened as the climate changes.

It is instructive to note that people who are socially, economically, culturally, politically, institutionally, or otherwise marginalized are especially vulnerable to climate change and also to some adaptation and mitigation responses. This heightened vulnerability is the product of intersecting social processes that result in inequalities in socioeconomic status and income, as well as in exposure. Such social processes include, for example, discrimination on the basis of gender, class, ethnicity, age, and

(dis)ability.

**Risks of climate-related impacts on human health, wellbeing and security**

Climate change has the potential to multiply existing threats to human security including food, health and economic insecurity in Africa. It is also an important factor in threats expressed through undermining livelihoods, compromising culture and identity (for example, the Nganyi rainmakers of Western Kenya), increasing migration that people would rather avoid, challenging the ability of states to provide the condition necessary for human security.

**Climate change and human health**

Human health is fundamentally affected by changing weather and climate patterns. A healthy population is considered a prerequisite for sustainable development, since only a healthy population is capable of contributing to the social, economic, political and environmental development of a country.

***"Effective and inclusive climate change adaptation can help build a richer more resilient world in the near term and beyond"***

Extreme weather events associated with climate change may affect human health directly and may influence morbidity and mortality rates. Indirect impacts from environmental and ecosystem changes or shifts in patterns of disease vectors. There are also indirect impacts on health expressed through societal systems such as malnutrition due to increased food insecurity. Other indirect impacts on health, mediated through societal systems, such as undernourishment and mental illness, may be attributed to altered agricultural production and food insecurity. Violent conflict caused by population displacement, economic losses due to widespread "heat exhaustion" impacts on the workforce, or other environmental stressors, and could cause damage to health care systems.

Climate change is an impediment to continued health improvements in many parts of the world. It is therefore predicted that impacts on health will be reduced, but not eliminated, especially in populations that benefit from rapid social and economic development, particularly among the poorest and least healthy groups. If economic growth does not benefit the poor, then the health effects of climate change will be exacerbated The most effective adaptation measures for health in the short-term are programs that implement basic public health best practices, such as enhanced surveillance and installation of early warning systems.

**Conflict and Climate Change**

People living in places affected by violent conflict are particularly vulnerable to climate change. Large-scale violent conflict harms assets such as infrastructure, institutions, natural resources, social capital, and livelihood opportunities that would have otherwise facilitated adaptation. Lack of such assets influences vulnerability to climate change impacts.

**Livelihoods and poverty**

Climate change is already causing harm upon rural and urban Africans living in poverty. The face of poverty in Africa usually means multi-dimensional deprivation in the form of hunger, illiteracy, unclean drinking water and poor sanitation, lack of access to health services, and other basic social services. This mainly affects the poor as they are more dependent on natural assets and more sensitive to price changes. Climate change will therefore hit the poor hardest because climate-related hazards exacerbate other stressors, often with negative outcomes.

**Direct impacts on livelihoods and poverty**

In urban areas, low-income groups face climate risks because of poor quality housing and flood exposure. The most extreme form of erosion of natural assets is the disappearance of land. Settlements of the poor are more often located in vulnerable zones such as the slums in parts of Nairobi.

**Indirect impacts on poverty and livelihoods**

Even well-intentioned adaptation projects may have detrimental impacts on poverty. Biofuel production, for example, sometimes displaces small landholders and contributes to food price increases. Mitigation efforts focused on land acquisition for biofuel production show preliminary negative impacts on the lives of the poor. Biofuel schemes may also harm poor people through declining biodiversity or reduced grazing land. The flipside of this comprises the opportunities created by the biofuel industry and its potential to improve livelihoods. In addition, insurance schemes, social protection programs, and disaster risk reduction may enhance long-term livelihood resilience among poor and marginalized people, if policies address multidimensional poverty.

**Poverty climate change nexus – dynamic and multi-causal**

Climate change is not the only factor that affects poverty dynamics. It is a threat multiplier at the intersections of among others policies, power structures, gender, age, class and ethnicity. In order to reduce emissions, foster adaptation and mitigate impacts there will be need to address the Climate Change-poverty nexus by addressing the organization of our societies.

**Implications of climate change for poverty alleviation**

Climate change threatens to slow down the pace of poverty reduction, jeopardize sustainable development, and undermine food security. The implication of this is that the currently poor and food insecure regions will continue to be disproportionately affected. Poorer countries will experience declining adaptive capacity, which will hamper development. Therefore, it is necessary to take into account the complexity of livelihood dynamics, multi-dimensional poverty, and existing inequalities to successfully chart out climate-resilient development pathways.

# Overview of the Africa Chapter : Key Findings

Strengthened inter-linkages between adaptation and development pathways and a focus on building resilience would help to counter the current adaptation deficit and reduce future maladaptation risks.

***Dr. Ama Essel, Korle-Bu Teaching Hospital, Ghana***

**Key Vulnerabilities and Impacts**

There is consensus, based on high confidence, that climate change will amplify existing stress on water availability in Africa. Climate change will interact with non-climate drivers and stressors to exacerbate vulnerability of agricultural systems. Progress has been achieved on managing risks to food production; but it is also noted that these will not be sufficient to address long-term impacts of climate change, which has been found to be a multiplier of existing health vulnerabilities. Research gaps and insufficient data constrain decision making in processes that are designed to reduce vulnerability, build resilience and implement adaptation strategies at different levels in Africa.

**Research gaps**

The research gaps that need to be addressed include data management and monitoring of climate and hydroclimate parameters, as well as monitoring systems that have been affected in the different sectors. There is also need for improved methodologies to assess and quantify the impact of climate change on different sectors and systems.

***"Mean annual temperature rise over Africa, relative to the late 20th Century mean annual temperature, is likely to exceed 2° C by the end of this century"***

There are socio-economic consequences of the loss of ecosystems and also of economic activities as well as of certain choices in terms of mitigation (biofuels). Other areas that require consideration include emerging issues such as migration and urban food security. Part of the solution to this may be in developing tools to aid decision making, putting into consideration the issues of gender, age and the local people.

**Addressing vulnerability and impacts**

Addressing vulnerability and impacts requires a sectoral approach so that the issues arising from sectors like agriculture and water resources are properly highlighted. On agriculture, a collaborative, participatory research that includes scientists and farmers would be appropriate. A key requirement in this area is the strengthening of communication systems for anticipating and responding to climate risks. Conservation agriculture provides a viable means for strengthening resilience in agro-ecosystems and livelihoods that also advance adaptation goals.

On water resources, formulation of strategies that integrate land and water management, and disaster risk reduction, within a framework of

emerging climate change risks should be encouraged. Examples in this regard include agroforestry and farmer-managed natural tree regeneration, conservation tillage, contouring, terracing and mulching.

**Adaption**

It is noteworthy that in all regions of the African continent, national governments are initiating governance systems for adaptation and responding to climate change, but evolving institutional frameworks cannot yet effectively co-ordinate the range of adaptation initiatives being implemented. Despite the observed implementation limitations, Africa's adaptation experiences nonetheless highlight valuable lessons for enhancing and scaling up the adaptation response, including principles for good practice and integrated approaches to adaptation.

**Principles for adaptation**

(i) Supporting autonomous adaptation through policy that recognizes the multiple stressor nature of vulnerable livelihoods;
(ii) Increasing attention to the cultural, ethical, and rights by increasing the participation of women, youth and poor and vulnerable people in adaptation policy and implementation;
(iii) Combining 'soft path' options and flexible and iterative learning approaches with technological and infrastructural approaches and blending scientific, local and indigenous knowledge when developing adaptation strategies;
(iv) Focusing on building resilience and implementing low-regrets adaptation with development synergies;
(v) Building adaptive management and social and institutional learning into adaptation processes at all levels.

**Addressing vulnerability and impacts**

The need for a strategy aimed to strengthen inter-linkages between adaptation and development pathways with focus on building resilience to the impacts of climate change was discussed at length. The key components of the strategy will include improving social protection, social services and safety nets; implementation of better water and land governance and tenure security over land and vital assets; enhancing water storage, water harvesting and post-harvest services; and enhancing inclusivity in the planning process while paying more attention to urban areas that are heavily affected by migration of poor people.

There is growing understanding of the multiple interlinked constraints on increasing adaptive capacity that indicates potential limits to adaptation in Africa. All stakeholders are therefore called upon to participate in order to address the root causes of poverty and vulnerability, and focus on new development trajectories that place climate resilience, ecosystem stability, equity and justice at the centre of development efforts. This calls for well coordinated governance at all levels.

# Adaptation, opportunities, constraints and limits

**Adaptive capacity**

Adaptive capacity is influenced by not only the actors' abilities to capitalize on available opportunities that ease the planning and implementation of adaptation, but also by the constraints that make adaptation processes more difficult for both human and natural systems. Opportunities and constraints are unevenly distributed among global regions, communities, sectors, ecological systems, and species and across different time periods.

***Prof. GF Midgley, Stellenbosch University***

**Leveraging opportunities**

Opportunities exist to enable adaptation planning and implementation for actors across all sectors and geographic regions (very high confidence). Adaptation guidance, information, and tools are increasingly available to practitioners operating in different sectoral, regional and organizational contexts. Development of tools for risk assessment and decision-support tools and early warning systems helps actors prioritize adaptation needs and identify options.

***"Risk-based approaches to decision-making provide a useful foundation for assessing the potential opportunities, constraints, and limits associated with adaptation of human and natural systems. Adaptation planning and implementation are therefore contingent on actors' perceptions of risk."***

**Confronting constraints/Barriers**

A range of biophysical, institutional, financial, social, and cultural factors constrain the planning and implementation of adaptation options and reduce effectiveness. The rate of climate change interacts with rates of economic development, demographic change, ecosystem alteration, and technological innovation. Implementation requires knowledge and capital; real and perceived lack of access constrains adaptation efforts.

**Limits to Adaptation**

Limits to Adaptation is defined as "inability to avoid an intolerable risk to an actor's objectives and/or to the sustainability of a natural system". Limits to adaptation can emerge as a result of the interactions among climate change and biophysical and socioeconomic constraints. There is little empirical evidence to quantify magnitudes of climate change that would constitute adaptation limits. Economic development, technology, cultural norms and values can change over time; investing in this area is one way of changing capacity in order to avoid limits.

Mitigation reduces the rate and magnitude of future climate change, and therefore the likelihood that limits to adaptation will be exceeded. The empirical evidence needed to identify limits to adaptation of specific sectors, regions, ecosystems, or species that can be avoided with different greenhouse gas mitigation pathways is lacking.

**Ethical considerations**

The selection and implementation of specific adaptation options has ethical implications. Decision-making involves reconciliation of legitimate differences about how adaptation resources are distributed, and the values that adaptation seeks to protect. Existing inequities generate ethical questions regarding who is advantaged or disadvantaged by adaptation actions.

"Successful adaptation requires not only identifying available options and assessing costs and benefits, but also expanding the adaptive capacity of human and natural systems.

Complex governance challenges may necessitate new institutions and institutional arrangements to effectively address multi-actor, multi-scale."

## Questions and areas of concern

**Question:** *Noting that many organizations do a lot of work in adaptation but do not end in published literature, is there a possibility that IPCC would be more open to the use of grey literature in their reports?*

**Answer:** Though the IPCC cannot make a statement based purely on grey literature, the same literature may be used to support findings. Such statements result in low-medium confidence if there is no support from published literature. An alternative would be to issue special reports. Better linkages between research and application in climate science would allow use of such literature.

It may also be recalled that some grey literature was mistakenly listed in the IPCC 2007 report and resulted in a lot of problems. It is advisable to use the systems of the United Nations Framework Convention on Climate Change (UNFCCC) to filter grey literature, so they can be used in the next IPCC report.

**Question:** *What steps should be taken to reduce inequalities that result in increased vulnerability?*

**Answer:** While climate change opportunities give room to reduced inequality, political and ethnic perspectives pose additional challenges. Other efforts such as poverty reduction and capacity building are aimed to reduce inequality.

## Questions and areas of concern contd.

Redistribution of tasks and policies such as the UNFCCC development agenda can have positive impacts on inequality reduction. Adaptation and development must go hand-in-hand for effectiveness in inequality reduction.

**Question**: *How can indigenous knowledge be tapped and made useful in adaptation strategies?*

**Answer:** Create a platform for scientists and indigenous people to share their practices and learn from one another. They can identify practices that are relevant to adaptation.

**Question:** *How do we ensure the minority and marginalized rights are secure in private sector investments?*

**Answer:** Though there may be goodwill in the private sector, it is advisable not to take anything for granted; follow the procedure when seeking services.

**Question:** *The majority of people in the African population is under 35 years old; is it possible to allocate and ensure that a significant amount of resources is spent on young people to develop their resilience?*

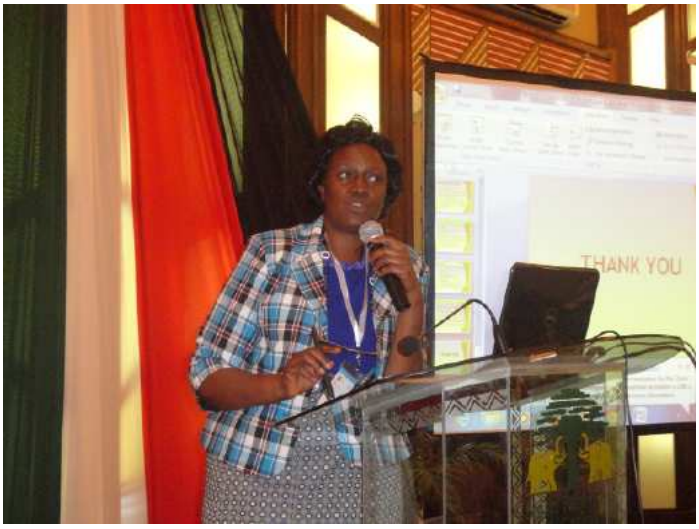
**Answer:** There are significant resources towards adaptation. Implementing agencies should be encouraged to be more creative. In southern Africa, for example, grants are given to people at the grassroots for programmes aimed at enhancing community resilience.

**Question:** *Are there practices that are known to weaken adaptive efforts and undermine community resilience?*

**Answer:** It is difficult to identify bad practices for fear of being judgmental. Ways should be found to communicate better ways that are beneficial. In general, “Yes, people do things that are not beneficial to adaptation”.

**SESSION THREE**

# Kenya's low carbon climate resilient development opportunities




***Dr. Alice Kaudia***
***State Department of Environment and Natural Resources, MEWNR***

The focus on climate change has gained impetus from emerging concepts that encourage all to use less in order to produce more, to consume less, and to share equitably and support development without destroying the environment so that current and future generations can lead quality life. These discussions ride on the crest of earlier campaigns that emphasized land-use intensification and diversification for food security, agroforestry, renewable energy, geothermal wind, solar and biogas exploration; and use of energy efficient cook-stoves and charcoal production kilns.

The conceptual framework for change to low carbon development opportunities has four key components: Cleaner production, climate change strategy and action plan, identified sectors and their GHG abatement potentials, and the Green Economy strategy and action plan.

The Africa Green Economy Programme is one of the key priority Regional Flagship Programmes for the implementation of the Rio+20 outcomes in Africa. It was adopted at the 5th Special Session of African Ministerial Conference on the Environment held in Botswana (October 2013), and AU Summit in Ethiopia (January 2014). RFPs are expected to facilitate synergy and cooperation between national and regional actors and organizations that provide support to African countries.

The key milestones in this process are formation of Climate Change Secretariat, presence of Focal Points in all ministries, National Climate Change Response Strategy, National Climate Change Action Plan, Climate Change Policy and Bill, and the Green Economy Strategy and Implementation Plan.

There are Climate Change driven investment opportunities in the:

- Energy sector — in the form of renewable energy, energy efficient devices, energy audit services;

- Agriculture sector — where organic farming for niche markets, and the economic value in soil carbon can be tapped;
- Forestry sector — where growing trees and bamboo has been commercialized since 7th December 2013;
- Transport — to exploit public and non-motorized transport, water and rail transport;
- Infrastructure and housing — to invest in environment friendly housing, as well as extensive road networks;
- Service sector — to integrate climate change in county development plans, e-procurement, dissemination of climate information such as RANET under the Kenya Meteorological Service.

Kenya has established a number of awards that have helped enhance compliance with environmental regulations. The Kenya Green Awards includes the National Environment Trust Fund; Energy Efficiency Awards: Kenya Association of Manufacturers and Ministry of Energy and Petroleum; National Environment Management Authority Green Industries Awards; National Cleaner Production Centre—which in turn recognizes (1) Textiles, Sugarcane, Tea processing industries (2) Women Entrepreneurs enterprises (Women and climate change project by Soroptimist International and DANIDA support and (3) Green Schools.

## Questions and areas of concern

**Question:** *What message do you have for the bus owner that is emitting pollutants that are harmful to the environment?*

**Answer:** The government lacks a strong programme for communicating information on environmental issues. However, the Air Pollution bill, which is aimed to, among other things, strengthen the motor vehicle inspection unit is currently in parliament. It should also be noted that there has been a switch to the consumption of low-sulfur diesel. Further information for the bus driver and owner can be obtained at the environment ministry. Kenya has approved membership to Climate and Clean Air Coalition that aims to reduce pollution from short term pollutants.

**Question:** *There exists lots of expectation on carbon trading. What is your take on this?*

**Answer:** Volatility of carbon markets makes it risky for investment, as such it is not an option currently.

**Question:** *Are we ready for more methane emissions from livestock?*

**Answer:** Methane emissions from livestock can be processed to biogas using biodigestors. This reduces emissions and dependency on non-renewable energy.

# IPCC WG III: Key Messages from the Report and the Energy Chapter

***Dr. Yacob Mulugetta***
***Reader in Energy Systems, Climate & Development***
***Faculty of Engineering & Physical Sciences, University of Surrey, UK***

Green-House Gas (GHG) emissions continue to rise, and this in spite of reduction efforts. The IPCC-AR5 indicates that the emissions growth is mostly carbon dioxide from fossil fuels combustion. It has also been observed that cumulative $CO_2$ emissions have more than doubled since 1970. Regional patterns of GHG emissions are shifting along with growth in GDP and population as well as changes in the world economy.

Mitigation requires major technological and institutional changes, including the upscaling of low and zero carbon energy. It also requires changes throughout the economy, which calls for robust institutions, policies, investment and international cooperation. Since efforts in one sector may determine mitigation efforts in others, significant changes in investment patterns are required, if reductions are to be realized. The report also cautions that delaying mitigation may increase the difficulty and narrow the options for limiting warming to 2°C.

Effective mitigation will not be achieved if individual agents advance their own interests independently. Mitigation measures should therefore focus beyond individual technologies and sectors. It should, however, be appreciated that existing and proposed international climate change cooperation arrangements vary in their focus and degree of centralization and coordination. Issues of equity, justice, and fairness arise with respect to mitigation and adaptation. These are intertwined with ethical and cultural considerations. Climate policy may be informed by a consideration of a diverse array of risks and uncertainties, some of which are difficult to measure, notably events that are of low probability but which would have a significant impact if they occur.

Several mitigation opportunities have been identified in the energy supply sector. Decarbonization of electricity generation is proposed as a key strategy towards achieving low stabilization levels (30% to 80% share). A large assortment of electrical technologies available today provides us with heating, illumination, refrigeration, and information in virtually endless variety. Some of the technologies at our disposal use fuel more efficiently, while others need no fuel. Hence it is possible to get electricity with low or no carbon.

Renewable energy technologies – improvements, cost reductions, and a growing number of RETs are mature technologies and can now be deployed at significant scale. The Report highlights the ability for Africa to

scale up energy services, given its huge renewable energy resources endowment. It is to be noted that renewable energy costs are still higher than existing energy prices but in various settings renewable energy is already competitive.

Nuclear energy is a mature low GHG emission source that could contribute towards low-carbon energy supply; but a variety of barriers and risks exist. These include operational risks and the associated concerns, uranium mining risks, financial and regulatory risks, unresolved waste management issues, nuclear weapon proliferation concerns, and adverse public opinion. Other options include the replacement of world average coal-fired power plants with modern natural gas combined-cycle power plants.

This is a critical moment for Kenya in deciding its energy future, and how it will aim to make it 'climate compatible.' The Kenya Government's long-term development blueprint (Vision 2030) aims to transform Kenya into "a newly industrialising, middle-income country providing a high quality of life to all its citizens in a clean and secure environment." The National Climate Change Action Plan (NCCAP) is geared to help meet Vision 2030 by reducing vulnerability to climate change and to improve the country's ability to take advantage of the opportunities arising from climate finance.

The NCCAP was developed with the aim of implementing the National Climate Change Response Strategy that was launched in 2010. The National Energy Policy, Feed-in Tariff Policy, Energy Act, Updated Least Cost Power Development Plan and Power Purchase Agreement Policy are aimed to ensuring affordable, sustainable and reliable supply, energy efficiency and promotion of renewable energy and diffusion of low-carbon technologies in Kenya. Technology options for the energy sector include solar home systems, energy-efficient bulbs, geothermal power generation, wind power generation and improved cook stoves.

***The ultimate objective of this Convention … is stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner (Article 2, UNFCCC)***

# Implications of the AR5 findings in the AFOLU sector in Africa

***Dr. Cheikh Mbow, ICRAF, Lead Author on AFOLU-Chap11***

Agriculture, Forestry and Other Land Use (AFOLU) is unique among the sectors in WGIII. This chapter addresses the enhancement of activities towards the removal of GHGs, as well as reduction of emissions through management of land and livestock. It should be noted that even though agriculture is central to the livelihoods of many social groups, the AFOLU sector is responsible for less than 25 % (~10-12 Gt $CO_2$eq/yr) of anthropogenic GHG emissions globally. These emissions are mainly from deforestation and agricultural emissions from livestock, soil, biomass burning and nutrient management.

Any meaningful reductions in emissions would require large changes in investment patterns. The general trend of emissions associated with AFOLU for the last four decades (1970-2010) indicates that Asia has been in the lead owing to the use of nitrogen fertilizer compounds on its huge agricultural sector. Some of these emissions have been transferred to Africa.

**Barriers and challenges in AFOLU**

The factors that pose the greatest challenges in AFOLU include financing, poverty, institutional, ecological, and technological development. Lack of proper systems for feedbacks to adaptation and conservation has constantly hampered the potential for GHG mitigation especially in Africa. Competition between different land-uses, often without much consideration about the suitability of the land to some of the uses, has also contributed to the strain.

**What are the challenges for Africa?**

Food security is one of the areas that are likely to be heavily impacted upon by continued GHG emissions. The IPCC report points out that part of Africa's vulnerability lies in the fact that recent development gains have been in climate-sensitive sectors. Growing populations will increase the demand for water and food but prolonged droughts will put additional pressure on the already scarce water resources, thereby reducing crop yields.

Technology will not be sufficient for the necessary transitions to low GHG. The AR5 also indicates that even if the global society was to cut greenhouse emissions sharply now, it would not make a big difference in terms of climate change in the next few decades. Emissions growth is expected to persist, driven by growth in global population and economic

activities.

**AFOLU and Low Emission Development Pathway**

The AFOLU sector has a variety of mitigation options and a large, cost-competitive mitigation potential. Some of the options that make economic sense even without the benefit of carbon finance are organic restoration, use of geothermal technology, grassland management, reduced pastureland conversion, reduced slash-and-burn agriculture conversion, degraded land restoration, degraded forest restoration, pastureland afforestation, and use of electricity from landfill gas.

Looking into the future, land-related mitigation strategies (agriculture, forestry, bioenergy) were projected to contribute 20 to 60% of total cumulative abatement to 2030, and still 15 to 45% in 2100. Delaying mitigation efforts beyond those in place today through 2030 is estimated to substantially increase the difficulty of the transition to low longer term emission levels. Such delays also pose the risk of narrowing the range of options available for maintaining temperature change below 2$^{o}$C. Additional risks include potential implications for biodiversity, food security and other services.

## Questions and areas of concern

**Question:** *Areas with least forest cover have been observed to have high deforestation rates, what should we do on the ground due to lack of alternatives to wood fuel?*

**Answer:** The solution is in tapping agro-forests rather than natural forests. We should increase the number of trees on farm land, thus increasing the potential of biomass and using it as an alternative to wood fuel. Another alternative is use of improved cooking stoves which improve by 30-40% and reduce emissions. Hydrocarbons, LPGs, electricity — if produced at a cheaper rate, solar cookers are additional solutions to this problem.

**Question:** *What is the future of AFOLU while biofuel is gaining popularity?*

**Answer:** Whether a country has food security or not, the priority should be food production on fertile land! Food crops should be grown on the best land available.

**Question:** *What are we doing to make green energy cheap for the masses?*

**Answer:** Efforts are being made to convert seeds that could be used for fuel rather than being discarded, as is the trend. Seed trees have a lot of oil potential for heating, cooking within the household. This is being encouraged by ICRAF.

SESSION FOUR

# How do we pay for climate action?

## Mainstreaming Climate Change into National Planning Framework

***By Dr. Nyangena—KIPPRA***

The participants were informed that mainstreaming of climate change into national development programmes was one of the key milestones in Kenya. Building a case for mainstreaming, as explained, entailed awareness building, targeted communication, piloted investments, and mainstreaming. The exercise in Kenya was reported to have involved considearble of engagement with different people and stakeholders.

Mainstreaming instruments include environmental policies, taking cognizance of the implications of climate change for economic development and the targets of Vision 2030. Recognizing climate change as a development concern makes it possible to mainstream it into the Medium Term Plan of Vision 2030. In addition, the T21 integrated planning model includes climate change modules. This is a dynamic macro-economic model designed to support comprehensive, integrated long-term development planning. It was introduced in Kenya to help understand and analyze the multi-sectoral impacts of climate change, develop institutional and systemic capacity to manage climate change risks, and facilitate development of adaptation and mitigation policies. It incorporates crop and climate models, economic policy models, and trade analysis model.

**Recommendations**

It is highly recommended that country development frameworks and economic models be reviewed and integrated to factor in climate change.

**Barriers encountered**

The main barriers encountered included lack of institutional framework, lack of standardized methodologies, and the huge gap between policy and climate scientists. Sectoral dominance and inadequacy of funds for incremental cost of climate change were also cited as impediments.

# Climate Change and the Budget Planning Process

***By Dr. Adano Wario—Treasury***

The participants were informed that the national Treasury was working on a mechanism that would help isolate and highlight climate activities so that their budgets would be within a specific framework unlike the situation in the past. In the agriculture sector, it was noted that Kenya had already introduced a crop insurance facility. Climate budget codes would also be launched soon with regard to the main players at both national and county governments in matters related to climate change. The National Treasury was also reported to be preparing a carbon tracking mechanism, noting that the carbon market was now very low.

## Concern areas

There are many unanswered questions in this area. Among the concerns raised in the whole question of how to pay for climate action, given that AR5 does not address it, were:

- Inability of individual countries, especially in Africa, to unlock domestic resources towards the climate change cause to generate domestic funds for climate action
- Lack of policies and incentives that could help address climate change
- Lack of incentives to attract the banking industry in the climate change campaigns
- Inability to create risk-taking entrepreneurs
- Too many interlocuters in the system, hampering the process
- Limiting the countries that can draw European Union carbon credits to only LDCs locks out others (like Kenya)
- Lack of a greenhouse gas inventory
- Lack of institutions that can help enhance resilience
- Uncertainty of the commitment by the various players [Suppose all the dollars sought came, are we ready to stay the course?]
- Priorities: How can we make policy makers see the opportunities?

SESSION FIVE

# Policy and Practice Forum

*Dr. Andrew Githeko, KEMRI*

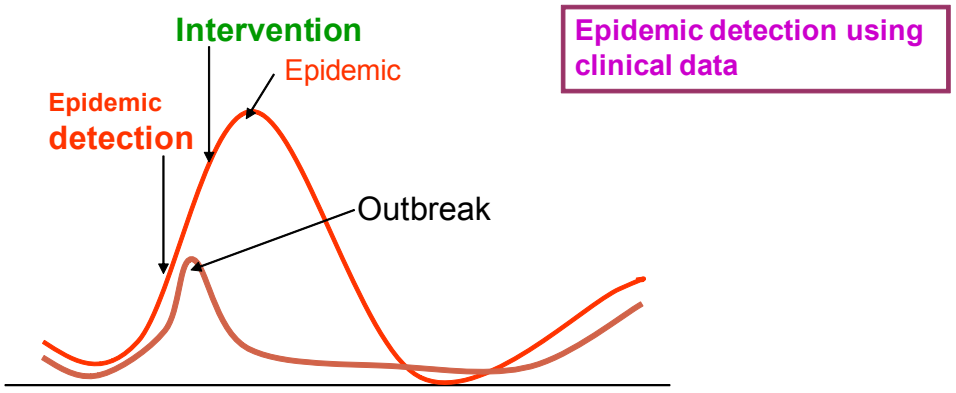
## Climate Change and Health — A case study of malaria by the Kenya Medical Research Institute

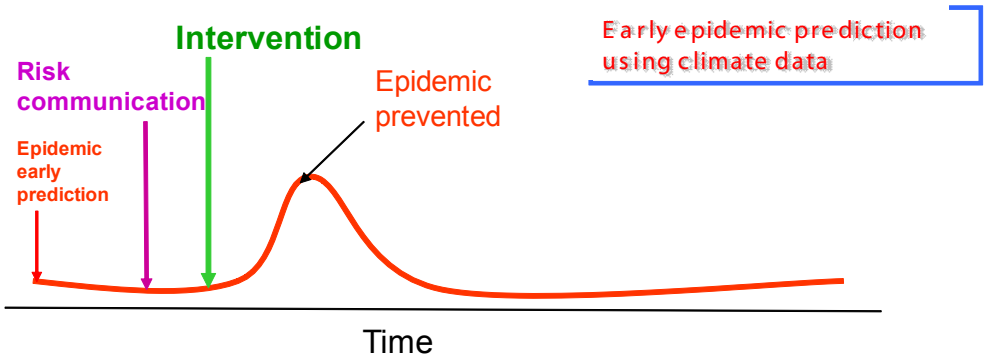
The case study was presented by Dr. Andrew Githeko of the Kenya Medical Research Institute (KEMRI), who described malaria as the most climate sensitive vector-borne disease, and noted that climate variability can increase the number of malaria cases by 100-700% and mortality by 500%. The participants were informed that the areas most affected by malaria epidemics in the eastern Africa region are the highlands of Kenya, Uganda, Tanzania, Ethiopia, Rwanda, Burundi and Madagascar.

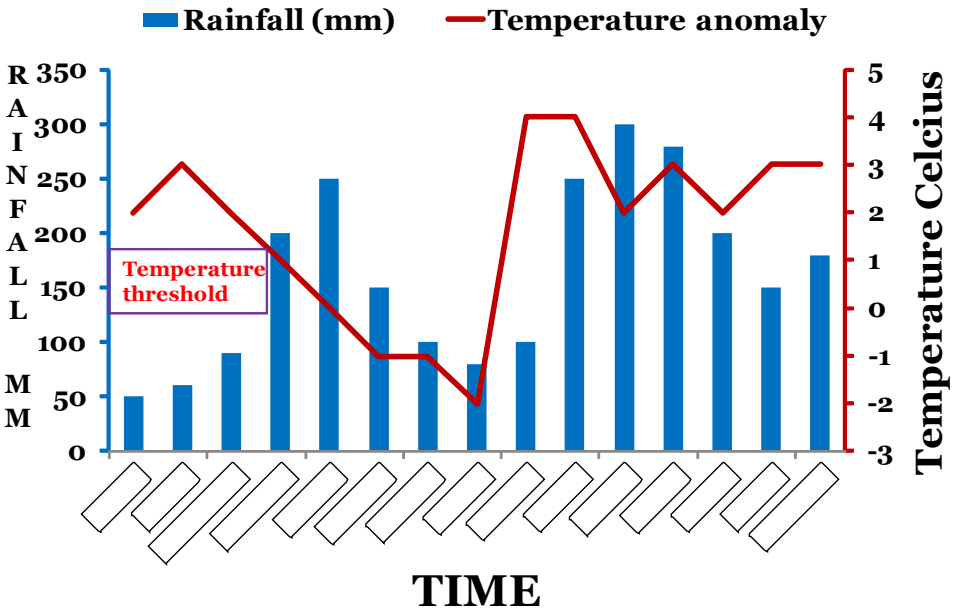
To address these outbreaks, an early epidemic warning system was developed for early prediction and prevention of the epidemics. The new climate based early warning system of epidemic prediction has a window of two to three months between the climate signals and the epidemic. This system provides ample time for intervention and epidemic prevention. The system is comprised of models that are suited to the various ecosystems that characterize the eastern Africa region. The models detect changes in mean monthly temperature anomalies and rainfall that can initiate malaria epidemics in the highlands.

The study also takes cognizance of other drivers of malaria, such as topography, drainage and immunity. Malaria prevalence was found to be influenced by the ecosystems forming the habitats of the vectors. The prevalence was found to be higher in U-shaped valleys than in the relatively better drained V-shaped valleys. The V-shaped and plateau ecosystems have high vulnerability of malaria epidemics due to low transmission and low immunity among the population.These ecosystems require high rainfall for epidemics to occur because of their good drainage.

El Niño events are associated with malaria epidemics in Western Kenya highlands. Human populations in the “V” shaped valleys are less immune to malaria due to lower transmission rates and low immunity. Heavy rains are required to precipitate epidemics in the “V” shaped ecosystems. Plateau ecosystems have a similar response to malaria as the “V” shaped ecosystems.




***The two charts depict the components of the malaria prediction model.***
[Source: Githeko, 2014]

# How is the private sector responding to climate change?

## The example of Kenya Association of Manufacturers

***By Martha Cheruto,***

Formed in 1959, the Kenya Association of Manufacturers (KAM) brings together 750 organizations, which include associate members and consultants. Its key services are policy research and advocacy, energy audits, capacity development, and trade facilitation at international and regional levels. KAM participates in climate change adaptation and mitigation activities driven by the urge to keep the planet habitable and understanding of the consequences of failing to take responsibility. It is therefore actively involved in sensitizing business with a view to helping companies incorporate climate change strategies in their production processes. The main message KAM gives to its members is to "promote growth and at the same time protecting the environment in response to sustainable development."

On energy services, CEEC has been funded by Ministry of Economic Planning and DANIDA since 2006. It has carried out more than 300 energy audits for members and non-members. The regional technical assistance program initiated by KAM promotes programs in renewable energy. KAM is also a member of the Green Economy Committee, which promotes adaptation, mitigation and mainstreaming of climate change in member's programs.

## Kenya Climate Change Working Group

***By Frank Msafiri***

The operations of the Kenya Climate Change Working Group (KCCWG) are geared towards answering the question: *Who is affected by climate change?* It is a national network of CSOs, uniting voices and action with the aim of creating synergies in response to impacts of climate change. KCCWG is divided into 11 thematic areas 10 energy, agriculture, live-

stock and fisheries, 3) water, 4) Tourism 5) urbanization.

Its major activities include advocacy — lobbying at national and county level for inclusion of gender-sensitive and coherent climate change laws and policies. It also Lobbies parliamentarians (through the Parliamentary Network on Renewable Energy and Climate Change (PANERECC)) for representation in national and international processes such as UNFCCC, NCCAP, and COPs. KCCWG has also engaged in grassroots mobilization in seven county level climate hearings, awareness and sensitization for communities, television and radio breakfast shows, writing of articles, and production of training manuals on climate change. KCCWG has worked in partnership with CAFOD, TrROCARE, ACT, and OXFAM.

In its networking and collaboration, KCCWG also engages county governments at community level in adaptation and mitigation programmes. It also provides rewards to communities that have best practice programmes aimed towards climate change adaptation and mitigation.

## Pan-African Climate Justice Alliance

***By Robert Muthama***

Other organizations that participated in the workshop included Pan-African Climate Justice Alliance. The alliance consists of 800 organizations that include Faith Based Organizations (FBOs), farmers and pastoralists' groups, Community Based Organizations (CBOs), NGOs, trusts, and foundations. The organization works through national platforms and with specific focal points where no national platforms exist. Its goals include climate change awareness creation at county level where it works with CBOs.

# National Climate Change Framework Policy and Bill

***As presented by Fatuma Hussein, State Department of Environment and Natural Resources, MEWNR***

The Kenya Constitution of 2010 elevates environmental issues and development as human rights. This lays the foundation for work on climate change so as to address the country's vulnerability. The Constitution requires that all existing laws, policies, and other instruments are aligned to it. The government has developed the National Climate Change Response Strategy (NCCRS 2010) on climate change adaptation and mitigation as well as the National Climate Change Action Plan (NCCAP 2013) to implement the strategy over the period 2013 - 2017. The NCCAP details scenarios of climate change, impacts of climate change on Vision 2030, low carbon resilient development path, legal policy framework, and has identified specific priority adaptation and mitigation actions to build resilience. The NCCAP enables technology transfer, performance and benefits measurements, knowledge management and capacity building, and finance mobilization.

**Towards a coherent climate change policy and law**

The Legal Preparedness Assessment Report (LPAR) has identified 90 policies related to climate and environment in different sectors. It has identified gaps, contradictions and opportunities. It has proposed that climate change policy should be specific and a stand-alone, a law on climate change, miscellaneous amendments to the existing sector laws, and institutional reforms. The National Climate Change Framework Policy and Legislation are priority actions for the Government of Kenya. Climate Change Bill 2014 was private member sponsored with the MEWNR being tasked to provide input. The draft National Climate Change Policy provides an overall framework from which different sectors can operate.

The overall objectives of the policy are to address low carbon climate resilient development, mainstreaming climate change response into national and county planning processes, reconstruction of the desk offices in the different ministries, and to establish a specific climate change fund. The Climate Change Bill 2014 is already in Parliament and was reported to have gone through its Second Reading. The Bill proposes a climate change council to be chaired by the Cabinet Secretary in charge of the Environment Ministry; and the climate change secretariat to become a directorate at the ministry. It also proposes other eight members from the government, civil society and the private sector.

# SESSION SIX

# GROUP DISCUSSIONS: How should Kenya respond to IPCC's findings?

The Groups break out session, coordinated by Prof. Nzioka J. Muthama, was directed to discuss specific thematic areas guided by the following questions:

- What are the opportunities for Kenyan stakeholders with respect to the IPCC's findings?
- With regard to Climate change, what are the current best practices by different stakeholders (agencies, communities, organisations) in Kenya?
- What could they do better and what further support is required, if any?

Group I was instructed to focus their discussions on the first two sessions covered in the Workshop. These were:

(i) ***Climate Change Trends, Impacts and Vulnerability***
(ii) ***Adaptation and Climate Resilience: Best practice lessons from Africa***

Group II was to discuss ***How do we pay for climate action?*** while Group III was required to discuss ***Policy and Practice***.

GROUP I

**Topics**

(i) ***Climate Change Trends, Impacts and Vulnerability***
(ii) ***Adaptation and Climate Resilience: Best practice lessons from Africa***

Question 1. *What are the opportunities for Kenyan stakeholders with respect to the IPCC findings?*

**Concensus**

Innovations to address climate change adaptation, mitigation and sustainability will be the way to go. Kenya has an opportunity to move towards green economy in sectors such as manufacturing, production in agriculture for adaptation and mitigation. The current devolved government structure provides an opportunity to reach the grassroots as it makes it possible to address the long term impacts of climate change.

*Group discussions on the theme: How should Kenya respond to IPCC's findings?*

This is also a chance to deal with marginalization and equality issues, and at the same time set up more resilient institutions.
Significant reduction in global warming could also be realized by embracing green energy. This is the opportune moment for the county and national governments to promote trade in methane and renewable energy. Since the national grid has limitations, county governments should set up mini grids relying on local resources.

It is clear that coordinated climate change activities promote synergies and value addition among the different players, and affords better linkages between technical experts in ministries, departments, and development partners. The IPCC findings are a good basis for governments to create and establish training mechanisms for training in matters related to climate change. Climate change funds should therefore be sourced and appropriated with long term goals in mind. This calls for consideration of introducing the subject as early as the primary school stage of education.

Question 2. *With regard to climate change, what are the current best practices by different stakeholders (agencies, communities, organizations) in Kenya?*

**Consensus**
The government has been at the forefront in the campaign on energy saving, as demonstrated during the issuance of energy saving bulbs in Kenya. Geothermal power generation has been proven to be the fairly efficient as opposed to thermal power generation. The group observed that a good number of good practices at work in Kenya today are as a result of changing perceptions on climate change.

Question 3. *What can be done better and what further support is required if any (Recommendations)?*

**Consensus**
The group was unanimous on the need for County governments to enhance the network of meteorological stations in their respective counties in order to improve on the accuracy of climate predictions. Restoration of arid and semi-arid lands (ASALs) would be a step towards greening of dry areas. Efforts in this direction would entail, among other factors, community education and involvement, identification of trees that survive the ASALs, and soil analysis.

Other considerations include building capacities of county governments by improving on their technical expertise in environment,

climate, meteorology and related services. Setting sustainable development goals such as intensified agriculture, enhanced tree planting and creation of an adaptation fund were seen as good practices. Engaging different people in government according to technical expertise in regard to climate change, specifically in the light of the discussions on AR5 would be a major milestone.

GROUP II
Topic: ***How do we pay for climate action?***

Question 1: *What are the opportunities for Kenyan stakeholders with respect to the IPCC's findings?*

**Consensus**
The group observed that the IPCC-AR5 does not address payment for climate action. Opportunities, however, are many. These include public spending budget codes through which the government gets directly engaged in development activities. This is an opening suitable for activities that are geared towards addressing climate change. The private sector requires incentives such as concessional bank loans. Switching from environmentally harmful biofuels can be enhanced by zero rating the alternative technologies, such as solar cookers and use of LPG.

Other opportunities include joining insurance schemes already in existence locally in recognition of the reality of climate related risks.

Question 2: *With regard to Climate change, what are the current best practices by different stakeholders (agencies, communities, organisations) in Kenya?*

**Consensus**
On best practices, it was observed that some institutions had already initiated adaptation mechanisms that could be strengthened for maximum output. A good example is NEMA which was reported to have developed environmental economic instruments, incentives and punishment. The Kenya Meteorological Service (KMS) was also cited as an example to emulate in light of partnering with insurance companies on crop insurance. Besides this, KMS was also involved in participatory scenario planning activities that relate to future weather and climate projections.

The climate change message also requires regular and well planned awareness creation, education and sensitization. For farmers, for

example, these sessions could be categorized into conservation agriculture, agro-forestry, and promotion of organic farming. ICRAF and Kenya Organic Agriculture Network were cited as examples of those already engaged in similar activities.

The introduction of award schemes and strengthening of those already in existence may attract more practitioners into the fray. Recognition of those doing well in their climate and environment-friendly enterprises enhances the impact of the award schemes.

The devolved government system in Kenya now makes it possible for the rural people to access climate change adaptation funds. Busia County was cited as such example where environmental related projects give priority to women and youth groups. It is notable also that two percent of the Constituency Development Fund (CDF) is allocated to environmental conservation. Other innovative activities include the "One million tree planting campaign" within a project dubbed *Changieni rasilmali.*

Question 3: *What could they do better and what further support is required, if any?*

**Consensus**

On what could be done better and in better ways, the group members were in agreement on the need for training at grassroots level. The multiplier effect associated with training would improve the dissemination of information regarding climate change countrywide. For enhanced effectiveness of these efforts, the government should be urged to consider raising the CDF allocation from 2% to 3%.

The banking sector plays a key role in national development. Efforts should be made to sensitize this sector to see value of creating climate sensitive products. Communities should be encouraged to organize themselves in order to push their climate agenda. This would also enhance policy advocacy and lobbying. Green entrepreneurship among the youth should also be encouraged.

GROUP III :

Topic: ***Policy and Practice Forum***

Question 1: *What are the opportunities for Kenyan stakeholders with respect to the IPCC's findings?*

**Consensus**
This group discussed opportunities, best practices and areas of improvement with regard to policy and practice. The members viewed the National Climate Change Action Plan (NCCAP) as a road map to the implementation of the National Climate Change Response Strategy (NCCRS) as it gives an outline on how the Strategy would work if well implemented. The Climate Change Bill, currently at committee stage in parliament gives room for more consultations and engagements amongst various stakeholders.

With the academia and research institutions having consistently provided convincing evidence of climate change, the gap that remains is partly to do with behavioral change in order to enhance adaptation mechanisms. Once in place, the adaptation programmes would attract more funding with implementation of the climate change policy framework.

Question 2: *With regard to climate change, what are the current best practices by different stakeholders in Kenya?*

**Consensus**
Implementation of the NCCAP certainly constitutes good practice. Other important steps include the establishment of the Community Forest Associations (CFAs), and the Water Resource Use Associations (WRUA) which is associated with sustainable land management. Other areas include the modernization of business facilities by county governments (such as  kiosks) and inception of new waste management and recycling practices. Use of energy only when necessary contributes to the efficiency theme.

Question 3: *What can be done better and what further support is required if any (Recommendations)?*

**Consensus**
For purposes of sustainability, it was recommended that players consider moving from projects to programmes that can be sustained for a longer period. Communication of climate related issues between the governments and private sectors should also be improved upon. With regard to environmental conservation, the need for enforcement of policies such as the Air pollution policy was emphasized. Also recommended was the need to embed climate change in the training curriculum at lower levels.

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