

CLIMATE AND HEALTH IN AFRICA 10 Years On

Workshop Report



UNECA Conference Center Addis Ababa, April 4-7, 2011



Acknowledgements

Organizing Host

Climate and Health Working Group (CHWG) of Ethiopia/Anti-Malaria Association (AMA)

Steering Committee Members

UN Economic Commission for Africa-African Climate Policy Centre (UNECA-ACPC)

World Health Organization, Africa Regional Office (WHO-AFRO)

United Nations Development Programme, Africa Adaptation Programme (UNDP-AAP)

UK Met Office

University of Exeter

Climate and Health Working Group (CHWG) of Ethiopia/Anti-Malaria Association (AMA)

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Authors of this Report

Judy Omumbo, IRI

Barbara Platzer, IRI

Abenet Girma, CHWG

Stephen J. Connor, IRI

Meeting Rapporteurs

Hiwot Teka, United States Agency for International Development (USAID)
Miriam Musa, UNECA-ACPC
Atkeyelsh Persson, Food Security and Sustainable Development Division/UNECA
Arame Tall, Johns Hopkins University
Dan Bloomfield, UK Met Office/University of Exeter
Felicity Liggins, UK Met Office
Natasha Chamberlain, University of Exeter
Lauren Smith, University of Exeter
Rose Mwebaza, UNDP-AAP
Judy Omumbo, IRI
Barbara Platzer, IRI

Additional Meeting Support

Kidist Belayneh, UNECA-ACPC
Atkilt Getahun, UNECA-ACPC
Aloysius Fomenky, UNECA-ACPC Press Office
Sana'a Abdu, CHWG/AMA
Girma Assefa, CHWG/AMA
Senait Desta, CHWG/AMA
Abonesh Kebede, CHWG/AMA
Bethlehem Teshome, CHWG/AMA
Fetsoum Eshet, UNECA Conference Centre

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Acronyms

AAU	Addis Ababa University
ACMAD	African Centre of Meteorological Applications for Development
ACPC	African Climate Policy Centre
AfDB	African Development Bank
AFENET	African Field Epidemiology Network
AGRHYMET	Centre Régional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle
AMA	Anti-Malaria Association, Ethiopia
AMMA	African Monsoon Multidisciplinary Analyses
AUC	African Union Commission
CCAA	Climate Change Adaptation in Africa
CDC	Centers for Disease Control and Prevention, USA
CSE	Centre de Suivi Ecologique, Senegal
CHWG	Climate and Health Working Group
CIESIN	Center for International Earth Science Information Network, Columbia University
CILSS	Permanent Inter-State Committee for Drought Control in the Sahel
CIPHA	Climate Information for Public Health Action
CIPHAN	Climate Information for Public Health Action Network
ClimDev-Africa	Climate for Development in Africa Programme
CRM	Climate Risk Management
DfID	Department for International Development, UK
ECOWAS	Economic Community of West African States
EPA	Environmental Protection Authority
EHNRI	Ethiopian Health and Nutrition Research Institute
EU	European Union
FELTP	Field Epidemiology and Laboratory Training Program
FMoH	Federal Ministry of Health
FSSDD	Food Security and Sustainable Development Division
GCOS	Global Climate Observing Systems
GEO	Group on Earth Observations
GIZ	Gesellschaft für Internationale Zusammenarbeit, Germany
HCF	Health and Climate Foundation
ICPAC	IGAD Climate Prediction and Applications Centre
IFRC	International Federation of Red Cross and Red Crescent Societies
IFPRI	International Food Policy Research Institute

IGAD	Inter-Governmental Authority on Development
IHR	International Health Regulations
ILRI	International Livestock Research Institute
IPCC	Intergovernmental Panel on Climate Change
IRI	International Research Institute for Climate and Society, Columbia University
IRTSC	Inter-Regional Technical Support Component (of UNDP AAP)
IWMI	International Water Management Institute
JRC	European Commission Joint Research Centre
KEMRI	Kenya Medical Research Institute
KMD	Kenya Meteorological Department
MACEPA/ PATH	Malaria Control and Evaluation Partnership in Africa/Program for Appropriate Technologies in Health
MDGs	Millennium Development Goals
MRTC	Malaria Research and Training Centre, Mali
MERIT	Meningitis Environmental Risk Information Technologies
MoH	Ministry of Health
MoU	Memorandum of Understanding
NAPA	National Adaptation Programme of Action
NECJOGHA	Network of Climate Journalists in the Greater Horn of Africa
NGO	Non Governmental Organisation
NIEHS	National Institute of Environmental Health Sciences, USA
NMA	National Meteorological Agency
NOAA	National Oceanic and Atmospheric Administration, USA
NTD	Neglected Tropical Diseases
SADC	Southern Africa Development Community
SI	Summer Institute on Climate Information for Public Health
UNDP-AAP	United Nations Development Programme - Africa Adaptation Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Program
UNICEF	United Nations Children's Fund
USAID-PMI	United States Agency for International Development- Presidents Malaria Initiative
WCC-3	World Climate Conference-3
WHA	World Health Assembly
WHO	World Health Organization
WHO-AFRO	WHO Africa Regional Office
WHO-TDR	WHO Tropical Diseases Research
WMO	World Meteorological Organization

Executive Summary

Background

One of the defining challenges of the 21st century is increasingly recognised to be the world's changing climate. The health consequences of climate variability and change are linked inextricably to poverty, equity and development choices. Protecting health from climate impacts is now a priority for the public health community. The need for this is greatest in developing countries, where vulnerable people do not have the basic economic choices and infrastructure to cope with the varying climate. These communities bear a disproportionately large burden of infectious diseases and climate related disasters while having the poorest access to effective public health services. Climate change will exacerbate this inequity.

Over the past decade, the public health community has committed itself to scaling up awareness, action and responses to the challenges posed by a varying climate. In 2008, several high-level policy recommendations were made on the importance of climate and environmental change and their potential impacts on health. Among these was a special resolution on climate and health passed at the 61st World Health Assembly.¹ The public health sector's ability to adapt will rely on the generation of accurate and reliable data and capacity building among research and disease control communities to build resilience and support of observation and monitoring systems.

New opportunities exist for better management of climate related health risks and a body of knowledge has been built over the past decade on the shared experiences of the public health and climate communities. These opportunities are made available through advances in climate science, improvements in communication technology (that impact on data and knowledge sharing), changes in policies on sharing of climate data and a new global focus on effective management and even elimination of certain infectious diseases.

Critical to this process are collaborations between health sector users of climate products with climate sector producers. While it is clear to both sectors that this would be beneficial, experience has shown that such collaborations are hampered by gaps in policies, practice, data and services and research that is not prioritised to meet the needs of African adaptation programmes.

In 1999, the International Research Institute for Climate and Society (IRI) led a collaborative training course in Bamako, Mali on *Climate Prediction and Diseases/Health in Africa*. Convened by the Faculté de Médecine, de Pharmacie et d'Odonto-Stomatologie and by the Direction Nationale de la Météorologie du Mali, it was one of the first interdisciplinary workshops of its kind to address the challenges of and opportunities around climate and health in Africa. This multi-disciplinary

¹ World Health Assembly, 2008: Climate and Health. 61st WHA Assembly, 24 May 2008, Geneva. Report No. WHA61.19. http://apps.who.int/gb/ebwha/pdf_files/A61/A61_R19-en.pdf.

initiative was co-sponsored by the African Center of Meteorological Applications for Development (ACMAD), the World Meteorological Organization (WMO), the Institut de Recherche pour le Développement (IRD) and the National Institutes of Health (NIH), USA. Since the Bamako workshop, awareness around the risks of climate has risen considerably and significant lessons have been learned through multiple initiatives and partnerships.

The “Climate and Health in Africa: 10 Years On” workshop was planned as a forum to present, debate and evaluate lessons learned and to elaborate on newly emerging perspectives and opportunities for managing climate and health risks in Africa. Over 100 stakeholders, representing critical thinkers from multiple disciplines, participated in the 3-day meeting. Participants examined examples of best practice in climate change adaptation in health and deliberated on how to bring key African partners in adaptation together to focus on common demand-driven objectives around an African led agenda. Key outcomes of the workshop include a consensus agreement on priorities for policies, practice, services and data and research and education for the integration of Climate Risk Management into Africa’s health sector. With this as a first step, it was underscored that **Africa** will be **taking the lead in Climate and Health** in the future.

Organisation and Sponsorship

The Ethiopian Climate and Health Working Group (CHWG), along with a steering committee comprised of the United Nations Economic Commission for Africa-African Climate Policy Center (UNECA-ACPC), the World Health Organization-Africa Regional Office (WHO-AFRO), the United Nations Development Programme’s Africa Adaptation Programme (UNDP-AAP), the UK Met Office, University of Exeter, UK and the IRI, convened the “Climate and Health in Africa: 10 Years On” Workshop at UNECA in Addis Ababa, Ethiopia from April 4-6, 2011. Additional sponsorship for the meeting was provided by: Columbia University, Google.org, Health and Climate Foundation (HCF), National Oceanic and Atmospheric Administration (NOAA), National Institute of Environmental Health Sciences (NIEHS) and the Government of Japan.

The meeting was organised around four theme areas namely: Policy, Practice, Services and Data, Research and Education. The agenda included panel presentations, discussion and parallel working groups on each of the four themes. In addition to the three-day workshop, the steering committee met on April 7 to convene a targeted partnership meeting that included representation from the donor community and Ethiopian based foreign embassies. The partnership meeting, presided over by Dr. Youba Sokona (UNECA-ACPC) and facilitated by Dr. Michel Jancloes (HCF), aimed to review recommendations from the meeting and to agree on contributions towards a ‘Road Map’ for relevant climate services in support of health development in Africa. The meeting also defined consensus next steps leading to COP17 in Durban, South Africa and beyond. Following were the key areas of discussion:

- Overview of the workshop recommendations and issues raised;
- Discussion on how to move forward on or implement the recommendations of the “10 Years On” Workshop;
- Opportunities within Africa to present the workshop outputs (including key messages for delivery at COP17 and other regional meetings);
- How to ensure that concrete actions for implementation of the recommendations are obtained;
- Defining the level of participant and steering committee commitment in the future either individually or *via* the institutions represented.

Workshop Goal, Objectives and Method of Work

Goal: To reduce societal vulnerabilities to climate variability and change in Africa with a particular focus on implications for public health policy and practice.

Objectives of the workshop:

- To recognise:
 - Improvements in the understanding of climatic impacts on public health.
 - Policies and programmes implemented in Africa to date that address climate and health adaptation needs.
 - Capacity development to date and priority needs going forward.
 - Policy needs for integration of data across sectors, services and best practice.
- To identify:
 - Changing perspectives and priority issues related to the intersection of climate and health.
 - Priority research and research capacity strengthening needs and define appropriate strategies to meet these needs in the immediate future.
 - Mechanisms for provision of research and/or technical support.

Method of Work:

- The secretariat for the workshop was provided by the steering committee membership.
- Four working groups were identified to lead discussions on the following four thematic areas of the workshop:
 - Policy – facilitated by UNECA-ACPC and WHO AFRO
 - Practice – facilitated by UNDP AAP
 - Services and Data – facilitated by the UK Met. Office
 - Research and Education – facilitated by University of Exeter, IRI and WHO/TDR.

Theme leaders were tasked with identifying and inviting relevant speakers for their respective thematic areas and developing the agenda for breakout sessions.

- Recommendations emerging from plenary and thematic panel sessions were discussed and carried through to reporting on the last day of the workshop (April 6, 2011).

- A half-day partnership meeting was convened on April 7, 2011 to discuss the development of a provisional 'road map' based on recommendations from the workshop and avenues for implementation of the recommendations.

Outcomes and Recommendations

Following an opening address by FSSDD-UNECA and keynote addresses by WHO-AFRO, the Ethiopian National Meteorological Agency (NMA) and the Africa Union Commission (AUC), over 100 participants engaged in presentations and discussions of experiences to date and opportunities and challenges in climate and health in Africa. Participants included a wide range of policy-makers, practitioners, researchers, donors, advocacy groups, and development organisations, members of the media, as well as providers and users of climate information.



Dr. Youba Sokona (UNECA-ACPC) and Mr. Kidane Asefa (Ethiopian NMA) concluded the workshop with a vote of thanks, following closing remarks by Dr. Madeleine Thomson (IRI).

A press conference was also held, immediately following the closing ceremony.

Photo credit: Barbara Platzer

Members of the steering committee address the press following the workshop

"I will make a commitment that each of these recommendations from the workshop and that those at the heart of this discussion, will have a voice at the October ClimDev Africa stakeholder meeting in Addis preparing for COP17 in Durban."

Dr. Youba Sokona, Coordinator, UNECA - African Climate Policy Centre

Following are the consensus recommendations of the workshop participants:

Theme 1: Policy

Support effective implementation of the Joint Statement on Climate Change and Health in Africa adopted by African Ministers of Health and Environment in Luanda, 2010, as an overarching platform for addressing climate and health issues to:

- **Bridge the gap between policies and practices** through legislation and guidelines, appropriate planning, including relevant vulnerability assessments, programmatic support and multi-sectoral and participatory processes that are gender sensitive.
- Support countries to establish **integrated health surveillance and climate observation and processing systems**.
- **Strengthen health systems** using climate information tailored to decision needs at all relevant levels and time scales.
- Make evidence-based, sound climate-informed decisions to implement a set of **preventive actions** to reduce population vulnerability and lessen the additional burden imposed by **climate-sensitive diseases and health issues** according to their respective epidemiological circumstances.
- **Anticipate, prepare for and respond** to the health consequences of **extreme weather events**, particularly by strengthening the functioning of health systems and other relevant sectors.
- **Multilateral partners** to consider the significant co-benefits of environment integrity, population health and consequent economic development that can result from mitigation and adaptation policies in the climate and health sectors and to support African countries in gaining **access to resources under the various climate-related funds**.

Theme 2: Practice

- Integrate climate health risk management into **cross-sector planning and practice for adaptation** to climate variability and change by developing climate services and products that address disease prevention at end-user level.
- **Create a human resource center/virtual hub** where expertise is shared in order to develop the capacity of African health and climate communities, institutions, practitioners and negotiators to understand/integrate climate change challenges into policy, socio-economics, planning and programming by identifying institutions and organisations in Africa that can deliver **training courses and conduct research on “Climate, Health and Prevention”**.
- **Strengthen community-based organisations** by liaising, in a gender-sensitive fashion, with their leaders to develop locally owned **sustainable strategies for adaptation to climate change and/or variability** in their communities taking account of local knowledge rooted in social history and disseminated by appropriate channels, including the mass media.
- **Define the different levels and needs (including learning outcomes) of health practitioners and stakeholders** across different geographic scales, specifically researchers and teachers, graduate and undergraduate students, practitioners in the public health system, community opinion leaders, traditional healers, impacted communities and other special interest groups and **develop appropriate curricula for adaptation to climate change and/or variability** in the health sector.
- **Promote a gender-sensitive approach to interventions** on climate and health in cross-sectoral disaster risk reduction and preventive health strategies.

Theme 3: Services and Data

- **Develop tailored services** in partnerships with weather/climate and health organisations. These should recognise that health forecasts, which are different from weather forecasts, should be well designed and understood by all. They should act as early warnings to users of differing types, that assist in the prediction of future health outcomes.
- **Improve existing data**, for example through: the digitisation of historical health and climatic data; the increased use of metadata analyses and validation tools; the inclusion of aggregated health data at appropriate spatial and temporal scales; and the enhanced awareness of, and use of, observational and processed data, appropriate satellite, and climate model data sources.
- **Access and use data in a systematic manner** in order to identify vulnerable groups and areas. This needs to involve: employing data strategically within and across sectors; considering trend and seasonality issues; using data to evaluate the success of interventions; and, importantly, understanding how communities cope.
- **Incorporating other data into these health forecast services**, for example population, rural vs. urban residence, migration, nutritional status, environmental and poverty data.
- **Collaboration +: new, multi-disciplinary initiatives** that involve communities beyond health and climate/ weather; build upon existing initiatives and progress; aim to meet emerging challenges; and communicate with end-users in appropriate ways.
- **Commitment at all levels** that brings climate and health communities together, clarifies responsibilities, builds capacity in the climate and health sectors to achieve these services, facilitates joint initiatives and ensures resources such as data are shared in a suitable way.

Theme 4: Research and Education

- **Understand the relationships between climate and climate-sensitive diseases and health issues** under different environmental conditions through interdisciplinary, multi-sectoral and multi-centre research.
- **Ensure that climate change mitigation and adaptation strategies are informed by multi-disciplinary research.**
- **Develop capacity within Africa** for the generation, interpretation and use of climate, health and other interdisciplinary data enabling informed, evidence-based decision making.
- **Standardise and quality control** data collection and storage, ensuring data are available on relevant temporal and spatial scales.
- **Enhance knowledge transfer and communication** of information across disciplines and communities through existing networks, encouraging the introduction of climate and health into the curriculum at all levels of education.
- **Strengthen existing partnerships and collaborations** while developing new groups and building links across disciplines.

Additionally, contributions were agreed towards a 'Road Map' during a steering committee and partnership meeting on April 7, 2011 including next steps leading to COP17 in South Africa and beyond. An Expert Group (EG) or consortium chaired by UNECA-ACPC and a secretariat based in Addis Ababa would be set up to facilitate immediate activities of the workshop recommendations. Judy Omumbo (IRI) would serve as secretary for the EG. Such a consortium would provide a framework for the ownership of the recommendations and also to facilitate the continued participation of WHO AFRO. Membership would include partners from UNDP AAP, UNECA-ACPC, WHO AFRO, WMO, University of Exeter and IRI.

UNDP AAP will also contribute towards grass roots participation in developing materials for the UNFCCC Nairobi Work Programme (NWP) and COP17 both through technical support, defining the key messages and in sourcing funds for this activity. AAP have already committed \$22,000 for developing grass roots level case studies and meeting materials towards this activity.

Additional Partnerships

A five-year memorandum of understanding was signed between the Ethiopian CHWG and ACMAD during the workshop. This partnership will aim to combat and mitigate the effects of climate variability and change on climate sensitive diseases, extend lessons learned as well as best practices and training.

The Ethiopian CHWG also proposed a Pan-African Climate and Health Working Group and solicited initial membership from workshop participants.



Photo credit: Judy Omumbo

Alhassane Diallo (ACMAD) and Abere Mihretie (CHWG/AMA) sign a memorandum of understanding

Welcome Address

Dr. Josué Dioné, Director of Food Security and Sustainable Development Division, UNECA

- Her Excellency Mrs Rhoda Peace Tumusiime, Commissioner for Rural Economy and Agriculture, African Union Commission,
- Mr Kidane Asefa, Director General of the Ethiopian National Meteorological Agency,
- Dr Diosdado-Vicente Nsue-Milang, Director of Health Promotion, WHO-Africa Regional Office,
- Excellencies,
- Distinguished participants,
- Ladies and Gentlemen,

On behalf of the UN Economic Commission for Africa (ECA) and the Steering Committee, which is comprised of the UNECA-African Climate Policy Centre, the Ethiopian Climate and Health Working Group, WHO-Africa Regional Office, the UNDP

African Adaptation Program, the UK Meteorological Office, and the International Research Institute for Climate and Society, I welcome you all to this important workshop on Climate and Health in Africa. For the duration of this meeting, over 100 researchers and practitioners of climate and health will be given the opportunity to present, debate and assess what has been



Photo credit: Dayan Berhe

Participants at the opening session of the workshop

learned in the field of climate and health in Africa. Moreover, the participants in this workshop include specialists in policy, practice, climate services and research, which will provide a constructive interdisciplinary approach as we work to elaborate on emerging priorities, perspectives and opportunities in relation to managing climate-related health risks in Africa.

Over the past 10 years, since the 1999 workshop in Bamako on Climate Prediction and Diseases/Health in Africa, awareness around the risks of climate has risen considerably and many significant lessons have been learned through many

initiatives and many partnerships. We expect this meeting to provide even more opportunities in learning and in developing newer initiatives and partnerships in climate and development work in Africa.

As the Director of the ECA Food and Sustainable Development Division, I am particularly aware of the sensitivity of all the three – economic, social and environmental -- dimensions of sustainable development to climate. Indeed, climate change is an inescapable challenge that represents one of the greatest threats to economic growth, social development and cohesion, and ecosystem integrity and productivity in Africa. And, obviously, the link between climate and health includes not only environmental dimensions, but also social and economic dimensions. As direct impact, we know that warmer temperatures will expose many areas in Africa, especially the Sahel, Southern and Eastern Africa to increased outbreaks and severity of vector-borne diseases such as malaria, cholera, yellow fever, meningitis, trypanosomiasis and rift valley fever. Indirectly, climate change also affects human health through its impacts on the quantity and quality of water resources, food, energy and human settlements.

The compounding effects of climate-induced food insecurity on health are particularly dire in Africa, given the significant economic and social costs of hunger and malnutrition. And such effects are caused by climate variability and change not only at the local, but also at the global levels, as can be illustrated by the well-known situation where a country's harvest fails in Africa due to drought or flooding, while food prices spike internationally due to climatic events in Russia, the USA or Australia.

Hence, the risks posed by climate change to health are complex. This is a good reason why this meeting is important, as it strives to help define Africa's climate and health priorities.

*Excellencies,
Distinguished Participants,
Ladies and Gentlemen,*

The goal of this workshop is to develop a "Road Map" for reducing climate risk and enhancing climate services in order to improve health gains across Africa. Given the weight of **climate** and **health** in the future of Africa's development, this workshop, as it marries these two important themes, is commendable. We therefore expect each of you, participants to discussions of the next three days, to bring your best to the table, in order to achieve the highest possible quality of outcomes. We must all be mindful that we are working against time with climate change and that Africa, given its particular vulnerabilities, is in need of urgent adaptation action to build resilience against the risks of climate change.

I trust that, with the calibre of the over 100 researchers and practitioners in attendance at this workshop, we will fully meet our goal of developing a sound Road

Map with a clear set of the necessary next steps for managing climate-related health risks in Africa.

For our part, rest assured of ECA's full commitment to working with all partners in addressing climate change for sustainable development in Africa. In this regard, you are certainly aware of our major joint initiative with the African Union Commission and the African Development Bank, namely the Climate for Development in Africa (ClimDev-Africa) Programme, which sets out to scale up the capacities of key institutions and stakeholders with a view to improving climate-related data and observation, information services, policies and risk-management practices in priority climate-sensitive sectors such as agriculture, water, energy, health and human settlements. Within this context, we have established the UNECA-African Climate Policy Centre to help generate and harness knowledge, develop capacity, and provide relevant technical advisory and cooperation services to African member States and their sub-regional and regional organisations.

ECA is therefore pleased and honoured to host this significant event. Once again, I welcome all of you, and wish you the most fruitful deliberations and a pleasant stay in the capital of Africa, Addis Ababa.

Thank you.

Keynote Addresses

Dr. Diosdado-Vicente Nsue-Milang, Director of Health Promotion Cluster WHO-AFRO.

- Honorable Minister of Health, Federal Democratic Republic of Ethiopia,
- The Representative of African Union Commission,
- The Director of Food Security and Sustainable Development Division, UNECA,
- The Director of African Development Bank,
- The Director of the African Climate Policy Center,
- Representatives of UN Agencies and other International Organisations,
- Distinguished Experts and Participants,
- Distinguished Guests,
- All protocols observed,

Ladies and Gentlemen,

I am delighted to address this important meeting on Climate and health in Africa on behalf of Dr. Luis Gomes Sambo, WHO Regional Director for Africa who could not attend due to previous commitments. In so doing, I would first of all like to convey my sincere gratitude to the Government of Ethiopia for accepting to host this important event.

Distinguished Participants, Ladies and Gentlemen,

As we all know, global climate change is now a reality. Earth's increased average temperatures have led to extreme weather such as floods, droughts, and heavier and more frequent storms.

There is no doubt that climate change affects human well-being through its effects on water resources, food production and the transmission of disease. The negative health consequences to climate variability include higher levels of certain air pollutants, increased transmission of diseases from poor water quality, increased vector-borne diseases, sanitation and hygiene problems, and the additional adverse health consequences of extreme weather events.

As an illustration, it is well established that climate change accelerates the spread of disease primarily because warmer global temperatures enlarge the geographic range in which disease-carrying animals, insects and microorganisms as well as the germs and viruses they carry, can survive.

Dear Participants

Climate-sensitive diseases are among the largest global killers. Diarrhea, malaria and protein-energy malnutrition alone caused more than 3.3 million deaths globally



Photo credit: Judy Omumbo

Dr. Allen Chia-En Lien (CDC), Dr. Magaran Bagayoko (WHO AFRO) and Dr. Diosdado Nsue-Milang (WHO AFRO)

in 2002, with 29% of these deaths occurring in Africa. As we are all aware, mosquitoes and the diseases they carry (including malaria, dengue fever, Ross River virus, and West Nile virus), are especially sensitive to temperature changes and land elevation. Rates of insect biting and the maturation of microorganisms they carry are temperature-dependent, and increase when the air warms, enhancing the chances for disease transmission. Today, both insects and insect-borne diseases are being reported at higher elevations in Africa, Asia, and Latin America.

In Africa, Highland malaria is becoming a problem for rural population living in highland zones that were previously classified as malaria free.

Extreme weather events such floods, storms, and droughts can be devastating for health. Floods spread bacteria, viruses, and chemical contaminants, foster the growth of fungi, and contribute to the breeding of insects. Recent floods in number of African countries were accompanied by outbreaks of malaria and various water-borne diseases, such as typhoid, hepatitis A, bacillary dysentery, and cholera.

Prolonged droughts interrupted by heavy rains, favor explosion of vector population in arid and semi-arid zones such as desert fringe of Africa.

According to the World Health Organization (WHO), climate change is estimated to be responsible for 3% of diarrhea cases, 3% of malaria mortality and 3.8% of dengue fever deaths worldwide, with a total attributable mortality of about 0.2% of deaths; of these, 85% were child deaths.

Developing countries, which currently experience high burdens of climate-sensitive diseases and include highly vulnerable populations, are already experiencing significant negative impacts of climate change. Furthermore, these countries are ill prepared to cope with the negative consequences of climate change, particularly on health due to their unstable socio-economic conditions and weak and overwhelmed health systems.

Ladies and Gentlemen,

In order to address health consequences of climate variability and change, African governments have made firm commitments in various fora to tackle climate change, emphasizing adaptation in general and health adaptation measures in particular.

I would like to briefly highlight as examples: the **World Health Assembly Resolution WHA61.19** which requests the Director-General of WHO to work with other partners to develop capacity to assess the risks from climate change for human health and to implement effective response measures; the **Bamako Declaration on Environment and Sustainable Development** that commits ministers of environment to sustain an effective implementation of the Framework Convention on Climate Change; the **Libreville Declaration on Health and Environment in Africa** in which African countries committed themselves to inter alia, supporting knowledge acquisition and management in the area of health and environment, particularly through applied research at local, sub-regional and regional levels, while ensuring coordination of scientific and technical publications so as to identify knowledge gaps and research priorities and to support education and training at all levels.

I would also like to point out the **recent Joint Statement made in Luanda, Angola by the ministers of health and ministers of environment on climate change and health in Africa** in which African governments committed themselves to implement an essential public health package to enhance public health resilience to impacts of climate change, which prompted the development of the **Pan African Programme for Public Health Adaptation to Climate Change** which is intended to provide a scientific and evidence-based coordinated response to climate change

adaptation needs of African countries, that supports the commitments and priorities of African governments, and spearheads the Cancun Adaptation Framework for the health sector in Africa.

Ladies and Gentlemen,

Although, significant attention is being paid to the anticipated public health consequences of long-term climate change, many key challenges still lay ahead. Currently in many African countries, there are no formal mechanisms to coordinate health and environment linked issues. The existing coordinating mechanisms have been operating on ad-hoc basis mainly to address adverse incidences related to health as a result of environmental imbalance.

It is of paramount importance that current changes in our environment be tracked and related to changes in the epidemiological patterns of diseases. Currently, WHO has developed and rolled out the integrated disease surveillance and response system, but unfortunately, surveillance in public health, (largely focused on disease mortality and morbidity) remains disconnected from environmental early warning, monitoring and assessment.

Another key challenge remains the effective participation of local communities in the response system. Recent analysis of National Adaptation Programmes of Action (NAPS) carried out by WHO revealed that the extent to which countries currently understand the health effects of climate change on local populations is inadequate and insufficient.

While there has been considerable work to develop adaptive responses that will help communities cope with food and agricultural production losses associated with climate variability, very little work has been conducted on the development of strategies to help communities adapt their health conditions and disease prevention strategies in response to climate variability.

Dear Participants,

Given the quality and expertise of scientists and managers in this room, coupled with the pertinence of the various items on the agenda, I am strongly convinced that this workshop will lead to **sound decisions** and **concrete action points** for addressing the adverse effects of climate variability and change on human health.

I would urge the public and private sector, international organisations, civil society, to build a strong partnership at national and international levels in order to make tangible contributions to climate change adaptation.

I wish to encourage the scientific community to support countries to develop sound, realistic and time-bound research agenda on various aspects of climate and health with particular emphasis on two major objectives: (i) to better understand the local health effects of climate change; and (ii) to generate and disseminate knowledge on appropriate local adaptation measures.

Ladies and Gentlemen

As I conclude, I wish to call upon all the stakeholders on health and environment to join their effort in implementing the Pan African Programme for Public Health Adaptation to Climate Change in the context of the Cancun Adaptation Framework.

I wish you successful deliberations.
Thank you for your attention.

Opening address by Mr. Kidane Asefa, Director General of Ethiopian National Meteorological Agency

- Your Excellency
- Dr. Josué Dioné, Director, Food Security and Sustainable Development Division, UNECA,
- Mrs. Rhoda Peace, Commissioner for Rural Economy and Agriculture, AUC,
- Distinguished Participants,
- Ladies and Gentlemen,

It is a great pleasure for me to deliver a keynote address on climate and health in Africa focusing on national experience. It is worth recalling that it was in Mali, Bamako in a training organised by IRI in 1999 that paved way to link climate and health in Africa for the first time. This gave birth for the climate and health working group of Ethiopia, Kenya and Madagascar. Ethiopia is one of the pioneers of climate and health working groups in Africa, officially established in 2008.

Excellencies, Ladies and Gentlemen,

During the last three years, the major landmarks in the strengthening of the link between professionals of climate and health are:

- Increased meteorological/climate awareness with health professional is achieved
- Promoted the link between climate and health both at national and regional level
- Stimulated MSc students to work their dissertation in Climate related diseases
- Incorporated satellite data in our database by using the merged, gridded rainfall satellite data.
- The experts are familiarised with new techniques of climate prediction.

The National Meteorological Agency (NMA) has been involved in collaborative works with Ministry of Health for strengthening Capacity Building in early warning and preparedness for malaria outbreak. Particularly, the global fund project of Ministry of health has strengthened third class meteorological stations (measuring rainfall and temperature).

Based on the research output of IRI, NMA has been rendering health bulletin, monthly basis, advisories since 2006 for ministry of health, focused on climate suitability map for the breeding of mosquito (spreading of malaria) both at national and regional level. Feedbacks revealed that the products are significant input for early warning activities of malaria epidemic. Apart from this, the Agency has commenced an experimental seasonal prediction of climate suitability for the breeding of mosquitoes using seasonal climate prediction, which strictly follows the analogous method approach with four months lead time. These and other rational efforts will be further strengthened and enhance.



Photo credit: Dayan Berhe

Mr. Kidane Asefa (NMA, Ethiopia) and Dr. Youba Sokona (UNECA-ACPC) address guests and participants during the opening ceremony

Excellencies, Ladies and Gentlemen,

As a result of the induced human activity, the climate of the earth is changing. Research revealed that the earth's surface temperature increased by 0.6°C for the last century. This, in turn, increases extreme events such as droughts and floods in various parts of the globe. The developing countries of Africa are the most vulnerable to the extreme events because they do not have the capacity to adapt the changing climate. Moreover, the climate of Africa is not well understood because of the poor meteorological stations network and trained manpower.

Studies from NMA showed that the average temperature of the country increased for the second half of last century, mainly due to climate variability and change.

This may have an impact on the spread of malaria of the Highlands and will increase other climate sensitive diseases such as meningitis and cholera. In this regard we urge the Negotiations of the UNFCCC Process need to be concluded soonest, so that meaningful interventions to minimise the impact of climate change to the human health could start, implementation.

Excellencies, Ladies and Gentlemen,

The government of Ethiopia has begun five year growth and transformation plan. Due to the expected high demand of meteorological information, the Agency will expand its services and improve the quality of the services on support of different sectors including health. The Agency has planned,

- To increase the surface meteorological stations from current 1157 to 1220 (each district will have a station), fulfilling the meteorological minimum network density requirement of WMO
- To increase the upper air meteorological stations from current 3 to 8
- To increase the automatic weather stations from current 20 to 200
- To establish two air pollution station in Addis
- To render weather and climate services, at Federal, Regional and meteorological station level

The Agency is in the process of finalizing to make available grid based merged ground and satellite data within a couple months in collaboration with IRI and Reading University. This can greatly solve the problem of data availability for different parts of the country in strengthening the improvement of climate information for the health sector. These planned activities will contribute for the government of Ethiopia to achieve its GTP and MDGs Targets. The strong collaboration and support between NMA and our partners such as IRI and Reading University and other partners are indeed very critical, in the successful implementation of the five-year plan.

Despite the government's commitment to finance the proposed plan, a lot is expected from our partners. That is why the Agency has a strong interest to collaborate nationally and internationally with our partners in development.

It is also worth mentioning that the Agency has completed the Business Process Reengineering study and has recognised the need of the health sector and thus through the BPR is organizing a Bio-meteorological case team constituting of staffs dedicated to the services of the health sector both at national and regional level. This will focus the Agencies effort in providing services to the health sector and will study the relationship between climate and a member of diseases.

Excellencies, Ladies and Gentlemen,

Finally during the last ten years a great deal had been learnt in the health-climate collaborative engagement. There are two issues that I would like to mention that were extremely important factors in the success of the joint effort.

1. The strong political will and commitment that was expressed by the highest level leaders of the health sector in supporting the climate service of the country was indeed commendable and need to be strengthened further, to sustain the joint efforts.
2. The vital backstopping and large support that was provided by the IRI and all of our partners must be commended as without that support, we would not have reached where we are today. Again this effort needs sustaining in the coming years, so the efforts can bear fruit.

With regards to NMA, I would like to reassure, Excellencies, the Minister of Health and our partners that the Agency will do everything in its capacity to support the climate-health collaborative engagement.

I thank you for your attention.

Opening address by Her Excellency Rhoda Peace Tumusiime, Commissioner of Rural Economy and Agriculture, Africa Union Commission

I thank you, Dr. Josué Dioné, Director for Food Security and Sustainable Development and also who is hosting this important Workshop; I would like to thank you particularly for the partnership you are promoting.

- Mr. Kidane Asefa, Director General of Ethiopian National Meteorological Agency,
- Dr. Diosdado-Vicente Nsue-Milang; Director of Health Promotion WHO-AFRO,
- Representative of the Ethiopian Climate and Health Working Group,
- Representatives of Partner Organisations,
- Delegates, Ladies and Gentlemen,

On behalf of the African Union Commission, I thank you for having invited me to address this Workshop. I wish to convey a message of appreciation for the cumulative, collective and collaborative work that culminated in the focus on climate-sensitive sectors. This inter-disciplinary Workshop underscores the role of multisectoral collaboration in addressing development challenges on the continent.

The Commission is also pleased to be associated with you the researchers, practitioners, policy makers and other stakeholders in addressing ourselves to this shared concern. This again highlights the importance of drawing from several fields (including agriculture, economics, climate sciences, climate services, politics, and so on to enrich our understanding and strengthen our pursuit for solutions. And, especially to the United Nations Economic Commission for Africa (UNECA), the

Commission treasures our constructive partnership ever-growing strong; and, I thank you for hosting this important meeting.

I would like to reaffirm the Commission's commitment to support this initiative as it complements other efforts by the Commission, other pan African institutions and, indeed, AU Member States, together with our development partners in identifying challenges as well as opportunities presented by climate change, and laying out strategies for adapting to and/or mitigating against the challenges as well as tapping opportunities arising there from.

The 2011 Economic Development Report launched on 29th March shows that Africa's GDP growth rate was 4.7% in 2010 while it was 2.3% in 2009. Much as it showed rising economic growth in Africa, the highest rate of child mortality is still found in much of Africa; and many of our countries experience an increase in maternal mortality rates.

Drawing attention to the impact of climate and health is commendable and timely. The timeliness is in relation to the 10 years anniversary of the Abuja Commitment of 16% of national budgetary allocations to the health sector. But it is also in time to be able to inform the 5th Session of African Union Conference of African Ministers of Health (CAMH5) due to take place in Namibia mid this month on the Theme: The Impact of Climate Change on Health and Development in Africa. Also, the outcomes and recommendations of this workshop could contribute to Africa's common position for the COP17 that will be hosted in Africa. It will be important to ensure that whichever resources will be mobilised for addressing climate change challenges, part of it should go to the impacts on health. This necessitates laying clear strategies for tapping this kind of support once it materialises. This workshop is also timely as it takes place just after the AU Summit that focused on the theme of shared values which include health. Further, this workshop is also relevant to the Malabo AU Summit expected to address itself to the Theme of Youth empowerment and sustainable development, as health is a key contributor to sustainable development.

Indeed, some health hazards are occasioned by climate-related phenomena. The most valuable asset of any society is human capital. Human capital is a prerequisite for the creation of wealth, employment, knowledge and skills, technology transfer for overall economic and social development. When health is undermined, nearly all human endeavours are affected adversely. An unhealthy man or woman cannot work or produce for the economy and society as a whole. An unhealthy child may not go to school and if at all he or she manages to go to school, he or she may not concentrate, and will, therefore, not get far but drop out, or perform poorly. Without an educated population, there cannot be innovation and progress. This simply illustrates how climate-related risks can adversely affect health and how ill-health affects everything else.

The Inter-Governmental Panel on Climate Change has well studied and documented the effect of climate change on health. For Example:

Unpredictable rainfall patterns compromise the availability of clean water, increasing risks of water-borne diseases such as cholera, typhoid and diarrhea.

Climate change affects biodiversity thus posing a risk of food insecurity and malnutrition arising from reduced food production as a result of variation in rainfall patterns, prolonged droughts and periodic floods expose the population to food insecurity and malnutrition.

Vulnerable regions such as the Nile delta in Egypt face the risk of rising waters and hence population displacement. I am sure you are aware of the current catastrophe in Namibia caused by floods. Even a state of emergency has had to be put in place.

Changes in climate are likely to lengthen the transmission seasons of important vector-borne diseases, and to alter their geographic range, potentially bringing them to regions which lack either population immunity or a strong public health infrastructure. So is the risk of increasing water pollution and poor sanitation especially in cities where urbanisation has led to congestion thereby impacting pressure on limited utilities.

Therefore, public health depends on safe drinking water, sufficient food, secure shelter, and good social conditions all of which are affected by climate change.

With respect to agriculture, for instance, when droughts hamper cultivation or decimate livestock; or when floods wash away fields of food and cash crops, these occurrences result into famine, hunger and malnutrition. The dignity and future of communities and nations is jeopardised because stunted and unhealthy people cannot be productive. This speaks for the importance of climate for development which we are all engaged in at different levels.

Having said that, I would like to commend all of you who put together thoughts and energies to highlight climate-sensitive sectors including health.

This emphasis has, indeed, also featured in the Continental Climate Change Strategy which is being developed under the leadership of the African Union Commission in collaboration with a number of key stakeholders and partners some of whom are present here. It is, therefore, imperative that a multi-sectoral approach emphasises the nexus amongst different fields and thus the relevant players taking advantage therein. This conscientisation paves the way for collective actions to address the multi-dimensional challenges posed by climate change.

It is, therefore, encouraging that researchers and practitioners are getting together to bring up evidence-based information and data, thereby leading society in the direction of according climate change the attention it deserves, preventing or confronting its negative impacts and exploiting the emerging opportunities.

The programme of work which you have set for the next three days, which I have looked at and appreciated, will definitely enrich our understanding of the challenges

associated with climate change. And, as we prepare for CoP17 and Rio+20, there is need to work together for realisation of a meaningful effort.

The Commission will also be pleased to work with all of you researches and practitioners in taking forward the relevant Pan African programmes and projects including, but not limited to:

ClimDevAfrica to provide, analyse and advise on climate information for the continent;

AMESD for providing, upgrading and maintaining meteorological equipment in AU Member States facilitated to access and utilise earth observation data, and training relevant experts;

The Great Green Wall for the Sahara and Sahel, which is promoting agro-forestry and sustainable livelihoods while seeking to halt and reverse the advancement of the Sahara Desert.

The Programme for Disaster Risk Reduction in Africa, including making cities resilient to shocks of climate change. Most of the previous speakers alluded to the need for having strong urban climate proofing programmes.

In these and other programmes and projects, information and data are critical not only for policy makers but also for the general populace who often fall victim to challenges engendered by climate change and climate variability.

Once again, I would like to thank the Steering Committee and all those who have been involved in this Workshop, the researchers, practitioners, policy makers and



Photo credit: Judy Omumbo

H.E. Rhoda Tumusiime, Commissioner of Rural Economy and Agriculture, Africa Union Commission (right) with Dr. Sheba Gitta (AFENET)

partners that have dedicated themselves to this cause and to encourage you to keep it up and rest-assured of the keen interest and support of the African Union Commission.

I would like to end by wishing you productive deliberations.

Thank you.

Summary of Panel Presentations and Discussions

A Decade of Progress: Advances in Climate and Health Research in Africa

For abstracts of presentations, see Appendix 6.

Building a Climate Smart Community of Practice: Lessons Learned
Judy Omumbo, IRI

The Pan African Programme on Health Adaptation to Climate Change
Margaran Bagayoko, WHO AFRO

Climate Data, Forecasting and Tools
Ousmane Ndiaye, National Weather Service of Senegal/IRI Adjunct

Climate Risk Management
Stephen Connor, IRI



Photo credit: Barbara Platzer

Dr. Ousmane Ndiaye (National Weather Service, Senegal) presents on lessons learned since the IRI Climate Prediction and Health training in Bamako, 1999

Key Points from Session:

Presenters during this session provided perspectives on developments in Climate and Health from their experience as alumni of IRI's first Climate Prediction and Health Workshop, held in Bamako in 1999.

- The first Climate Prediction and Health workshop in Bamako, Mali (1999) had broad objectives to expose African climate and health professionals to climate and health sciences, to explore the linkages of climate with disease epidemics, to foster the application of climate information for decision making and provide a platform for exchange of ideas and best practices.
- Since then these priorities are increasingly more often defined by the health sector and specific initiatives for climate services in Africa have been put in place, including a Gap Analysis for the Implementation of the Global Climate observation systems programme (2006)², the Libreville Declaration in 2008 that was signed by ministers of health and environment of AU member states and recently, the establishment of the African Climate Policy Center (UNECA-ACPC) in Addis Ababa.
- Capacity building efforts at the IRI have grown and the vision of these is to build a climate community that produce demand led services for management of climate risks in health and that proactively participate in public health decision making processes.
- The Pan African Programme for Health Adaptation to Climate Change, which aims to provide an evidence-based coordinated response to Climate Change adaptation needs of African countries, is supported by the commitments and priorities of African Governments.
- Towards this, WHO has performed an analysis of the health aspects of National Adaptation Programmes of Action (NAPAs). 41 NAPAs were assessed, among which 29 are from Africa. The findings showed that although most included health as one component, most of the NAPAs lack comprehensiveness in addressing health issues. Specificity is lacking in setting health protection objectives; discrepancies exist between proposed interventions and identified potential impacts of climate change and funding is inadequate.
- Six core interventions to tackle these challenges have been proposed. These include comprehensive assessments of the risks, strengthening of human and institutional capacities, integrated environment and health surveillance, delivery of preventive and curative interventions; preparedness for, and

² A Gap Analysis for the Implementation of the Global Climate Observing System Programme in Africa. 2006 (reprinted in 2008). The International Research Institute for Climate and Society (IRI), Global Climate Observing System (GCOS), Department for International Development (DfID) UK and UN Economic Commission for Africa (ECA). IRI TECHNICAL REPORT NUMBER IRI-TR/06/1. <http://iri.columbia.edu/publications/search.php?id=658>.

response to, the public health consequences of extreme weather events, and research.

- The aim of the global climate observing system is to ensure the accessibility of data, identify and manage data problems, address gaps in data generation and analysis and identify new tools in the climate sector for use in other sectors including public health.
- The past decade has seen a change in the way of thinking in the climate sector that will ensure that climate products are more tailored to client demand and looking in to the impacts and added values from the climate products that are produced.
- There are several mechanisms in which climate may pose risks to health,
- Improved knowledge in climate and health science and observations is of benefit to the health sector through development of early warning systems to better management risk and inform climate change adaptation.
- Using malaria as an example: the relationship of climate with malaria's seasonality, endemicity and epidemicity is well recognised. Climate information could therefore be used to inform decisions and thus contribute to the overall achievement of the Millennium Development Goals.
- Opportunities exist through multi-sectoral collaborations for the control of climate sensitive disease and such partnerships help to build a "Climate Smart" public health sector that will inform surveillance/health systems to help focus international and national health investments.



Photo credit: Dayan Berhe

Dr. Josué Dioné, (Director FSSDD, UNECA) and Dr. Judy Omumbo (IRI)

Theme 1: Policy

For abstracts of presentations, see Appendix 6.

Regional Climate Outlook Forums, the Role of the African Regional Climate Centres and the Need to Improve Climate Data Availability
Adama Alhassane Diallo, ACMAD

The ClimDev-Africa Programme and UNECA-ACPC
Youba Sokona, UNECA-ACPC

Implementation of Libreville Declaration, Health and Environment: Ethiopian Issues and Challenges on Policies and Partnerships
Waltaji Terfa, WHO Ethiopia

Climate Vulnerability, Adaptation and Health Policy in Africa
Jeremy Webb, UNECA-ACPC

Key Points from Session:

- The concept of regional climate outlook forums was born in Africa and then adopted by other regions.
- Observation networks in general across Africa vary widely and are poorly maintained; furthermore the data are poorly organised and there are discrepancies between the terms and conditions of access to data.
- The general role of regional climate centres is to support the capacity building and integration/cooperation of various actors and stakeholders in the field of climate information, in addition to providing support to improve the quality, capability, accessibility and usability of climate models and data.
- ClimDev Africa is a programme that aims to improve climate information for Africa and the use of such information for decision-making. It has three key complimentary structures: the ClimDev Africa Special Fund (out of the AfDB) and the Climate Change and Desertification Programmes Coordination Unit (out of the AUC), and UNECA-ACPC. UNECA-ACPC has been operational since November 2010 while the other two are in the process of being established.
- UNECA-ACPC, an integral part of ClimDev, is supported by multilateral donors. Its three broad areas of activity include: knowledge generation, sharing and networking; advocacy and consensus building; and advisory services and technical cooperation.
- This workshop will inform UNECA-ACPC's work programme by defining 'Climate and Health' priorities in Africa.
- Ethiopia has made significant progress in the implementation of the Libreville Declaration, however technical constraints have inhibited the implementation of policies. The challenges and issues with policies and partnerships include:

fragmentation between sectors, a lack of financial and human resources, vacuums, conflict between sectors and limited capacity and knowledge base to carry out appropriate policy making. The way to address the above listed challenges and issues is through the application of a multidisciplinary, multi-sectoral approach combined with partnerships and cooperation, as there is significant overlap between the needs of the health and environmental sectors.

- Climate vulnerability, development and underdevelopment, mitigation and adaptation and health are all very interrelated.
- In the absence of evidence, principles guide policy. Therefore in areas of climate and health where, empirical evidence is lacking, we need to ask: what principles should be applied when addressing climate and health?
- When policies are proposed it is necessary to consider the costs and benefits of the policies and prioritise them accordingly.
- This meeting is a timely opportunity to address such questions and inform climate and health policy priorities for Africa.

Theme 2: Practice

For abstracts of presentations, see Appendix 6.

Health and Vulnerability to Climate Change: A Challenge to Social Resilience

Lawrence Flint, UNDP-AAP Consultant

Protecting the Health Development Agenda Through Effective Practice: Effectively Managing Climate Change, Risk and Health Issues

Keith Cundale, UNDP-AAP

Climate Training Opportunities within African Schools of Public Health: The FELTP Programme

Richard Luce, FELTP, and Dr. Sheba Gitta, AFENET

National CHWGs- Lessons from Ethiopia

Abere Mihretie, Ethiopian CHWG/Anti-Malaria Association (AMA)

Key Points from Session:

- Climate Change is not a novel concept, local communities in Africa have been contending with climate-related stresses for millennia. The pertinence of our efforts will lie in our ability to accompany communities in adopting new ways of addressing climate-stressors, in a manner compatible with current trends in climate change and emerging and detected by climate science and by communities, particularly in the field of health. (Lawrence Flint, UNDP-AAP Consultant)
- Vulnerability is not essentially climate-related, but a product of historically produced, human-mediated processes. Inserting our actions in the framework of vulnerability reduction ought to be the aim of our practice in Climate and Health. (Lawrence Flint, UNDP-AAP Consultant):
- Knowledge is also a central issue: how is it received at community level? How is it shared within the community? Who should be the messengers to act as conveyors of climate information at the community level?
- Three factors make for effective practice: (Keith Cundale, UNDP-AAP)
 - Capacity development focussed on protecting development agenda (reducing poverty, achieving MDGs) rather than achieving climate change adaptation per se (as this is not an end goal in itself)
 - Establishing the right institutions and processes
 - Transforming leaders and building leadership
- A priority in Africa is training of the next generation of health practitioners in climate challenges (Dr. Sheba Gitta, AFENET/FELTP)
- Creating an Africa-wide CHWG could be a useful outcome from this workshop. (Abere Mihretie, Ethiopian CHWG/AMA)

Theme 3: Services and Data

For abstracts of presentations, see Appendix 6.

Defining the Services We Need/WCC3

Wayne Elliott, UK Met Office

Public Weather Services and Health in Africa

Haleh Kootval, WMO

Developing 10-day Temporal Resolution Climatologies for Ethiopia

Kinfe Hailemariam, NMA Ethiopia



Photo credit: Judy Omumbo

Haleh Kootval (WMO) gives a presentation on Public Weather Services

Key Points from Session:

During this session we heard from three meteorological organisations - WMO, the UK Met Office, and the Ethiopian NMA. A number of common themes emerged between them which laid the foundations for further discussion around data and service issues later in the workshops. These points of commonality included:

- The need to design and create weather and climate services that derive, in the first instance, from the needs of users. This was emphasised in the Global Framework for Climate Services that emerged from WCC3, and was backed up from experience over recent years in developing weather and climate services in the UK.
- That this demand-led approach itself required full, open, reciprocal communication between meteorologists, health professionals and user groups, in order to collaborate meaningfully and achieve new services together. The needs of users therefore had to be understood fully; some agencies called this 'market research', others termed it user community engagement; however, these different terms describe common objectives.
- Absolutely key are the service or user group and the quality of the data that form its foundation. All three agencies described how a common understanding of the data, as well as common acknowledgement of their strengths and weaknesses and a jointly held commitment to improve those data, from both meteorological and health communities, were all vital common starting points.
- Amongst the most pressing needs were the development of more extensive observation stations, especially in areas of poor coverage in Ethiopia and elsewhere.
- The fact that climate services, over the longer timescales, themselves needed to be based upon shorter-term weather forecasts and meteorological observations to ensure a cohesive overall system that can be based upon hind casts as well as forecasts.

Theme 4: Research and Education

For abstracts of presentations, see Appendix 6.

Thoughts on Connecting Climate and Health

Bradfield Lyon, IRI

WHO-TDR Work Plan for Research and Capacity Building in Climate and Health

Yeya Touré, WHO-TDR

Challenges in Communicating Climate and Health

Patrick Luganda, Network of Climate Journalists for the Greater Horn of Africa

Key Points from Session:

Key words emerging from the theme

Partnership; capacity development; multi-disciplinary; multi-sectoral; scale; communication

The importance of scale

- Research feeding into evidence-based decision making in the field of climate and health is reliant on quality data available on relevant time and spatial scales.
- Over time, outliers from the average climate can become the norm and it is only through recognising the importance of scale – global, regional and local – that these trends can be analysed and fed into policy and practice.
- Natural climate variability, experienced on regional or local scales, can have a significant influence on the perceived climate change of an area – exacerbating the negative effects of a changing climate or masking a climate change signal.
- Communications on climate and health need to be targeted at relevant audiences and framed appropriately



Photo credit: Judy Omumbo

Dr. Yeya Touré gives a presentation on the capacity building aspects of the work plan for WHO Tropical Diseases Research

The importance of interpretation

- The value of combined climate and health data are often in their interpretation rather than in the raw data themselves.
- Climate change adaptation is fundamentally climate adaptation – reacting to the challenges faced in the past and today as a result of variations in climate.
- The media has a vital role to play in the dispersal and interpretation of climate and health messages; it shapes culture, influences attitudes and allows solution-driven communication.
- Communication of research needs to be an inherent part of all projects from the beginning as this can bring significant benefits to all participants.

The importance of quantifying relationships

- It is vital that communities across sectors and disciplines talk to determine what can be provided now, what is required and then what research is required to fill in the gaps.
- It is only through quantifying relationships between weather and health that effective, evidence-based decision making is possible – in the words of TDR we need to ‘understand, prevent and mitigate’.
- Production of decision support tools for practitioners is fundamental to building capacity and capability within country – but only when based on relevant data.
- By quantifying relationships, communication of climate and health messages can be framed in a relevant way to the target audience, rather than using more abstract concepts.

Integrating the Sectors- Building Effective Partnerships

For abstracts of presentations, see Appendix 6.

Fostering Collaboration between Regional Institutions

Joseph Intsiful, UNDP-AAP

Partnerships for the Control of Meningococcal Meningitis

Madeleine Thomson, IRI

Climate, Environment and Health: Recent Achievements in Senegal

Jacques André Ndione, Centre de Suivi Ecologique

Climate, Water Resources and Malaria in Ethiopia

Solomon Kibret, International Foundation for Science

Climate Change, Air Quality and Urbanisation in Africa

Michael Gatari, University of Nairobi

Climate, Population Health and Environment Integration in Ethiopia

Negash Teklu, PHE Ethiopia Consortium

Key Points from Session:



Photo credit: Judy Omumbo

Dr. Joseph Intsiful (UNDP AAP) and Dr. Jacques-André Ndione, (Centre de Suivi Ecologique)

During the final session of the day, the workshop heard from six presenters who described a range of different partnerships and projects that had all set out to address weather/climate effects on health issues. They included: the UNDP, who described continuing efforts under the auspices of the Japanese-funded Africa Adaption Programme; IRI, and its work focusing on meningococcal meningitis within the MERIT

programme; recent work that the Centre de Suivi Ecologique had been collaborating upon in Senegal, especially around the use of data from space; work looking at establishing in more detail the relationship between enhanced water security and

the prevalence of malaria vectors in Ethiopia, from the International Foundation for Science; an analysis of the relationship between air pollution, urbanisation and climate change from the University of Nairobi; and a review of the integration of population health and climate issues across Ethiopia, from the Population Health Environment Ethiopia Consortium.

Even when looking at the range of scales, topics and countries contained within these six, some very strong common themes emerged, including:

- Collaboration is not an ideal; it is a requirement. Full, long-term collaborative efforts - particularly between sectors - are necessary in order to pool data and other resources, and to create the scales of efficiency required to allow projects to deliver upon such complex agendas. Collaboration consolidates evidence.
- Such collaboration needs to be both technologically enabled and enabling.
- There was a very great, and largely latent, capacity to learn from each other. Only by recruiting and supporting centres of excellence, by building on synergies, and by seeking to create and use 'networks of networks' and 'partnerships of partnerships' wherever they are appropriate, can climate and health communities hope to come together fully, in regions and across the continent.
- Collaborative partnerships of this kind are particularly needed to cope with diseases that have especially dynamic epidemiologies, such as meningococcal meningitis. We needed to consider data from a full range of sources, such as from different satellite products, and to build relationships with as many sectors as we felt had something to contribute – such as infrastructure investment and planning – in order to build the kinds of robust early warning systems that are ultimately required.
- We must aim to contribute, ultimately, to the preventative health agenda. To achieve this, we need to be aware of, and to look for, feedbacks between health and climate. For example, climate change forces migration and urbanisation; as a result of which greater air pollution results in worsening health impacts and a deepening of climate change at the urban, heat-island level. Another example is the ways in which population and ecology relate to each other through mitigation and adaptation strategies.

Developing a Plan for Action

An overview of the method of work and expected outcomes of the parallel session discussions was provided by Michel Jancloes, HCF.

Today's sessions focus on defining action items for a consensus 'Road Map' for climate services in support of health development in Africa. Based on the IRI-led **Gap Analysis for the Implementation of GCOS³** and lessons learned from over 10-years of experience, 4 working groups were tasked with identifying 6 key recommendations each for developing informed decision making and risk management for climate sensitive diseases. Following were some considerations for the break out sessions to define the recommendations for the plan for action:

Defining action items for the "Road Map": with the goal of reducing the burden of climate sensitive disease the following points should be focused on:

- How to market climate information services to climate sensitive sectors with an emphasis on public health
- How to promote sustainable development through responding to health sector needs with tailored services
- How to improve the effectiveness of the relationship and dialogue between climate and health communities and to clarify the responsibilities and deliverables for decision-making.

Defining key messages for COP17 and other regional processes: Emphasis should be on identifying key messages under each theme that are **action oriented**. Crosscutting messages across the themes should also be put forward for discussion. These messages will also be used to inform discussions during other relevant regional and international meetings.

Research grants and project funding opportunities including applications for joint proposals to EC resources/potential UNDP-AAP etc: Climate and health communities should collaborate and proactively be involved in developing joint proposals. These partnerships should not be limited to climate scientists and epidemiologists but also include immunologists, sociologists and entomologists.

Assigning responsibilities: each team will appoint presenters, a chair and a rapporteur. The presentations will give an overview of issues related to respective theme areas, the chairperson will lead and facilitate the discussions and present

³ IRI/GCOS/DfID/UNECA (2006). A Gap Analysis for the Implementation of the Global Climate Observing System Programme. IRI Report No. IRI-TR/06/1.
http://portal.iri.columbia.edu/portal/server.pt/gateway/PTARGS_0_2_2806_0_0_18/GapAnalysis.pdf

priority recommendations while the rapporteur will minute the major points from the discussions and draft six recommendations with the chair for presentation during a plenary session on the next day.

Drafting meeting recommendations: Each theme area made 6 recommendations reflecting the discussions of the break away sessions. The recommendations took into consideration policies and programmes already in place and services and research already available for informing policy and practice. The 6 bullet points were then discussed with the broader participation during a plenary session on the following day.

Summary of Parallel Working Group Sessions

Theme 1: Policy

Discussion Leader: Magaran Bagayoko, WHO-AFRO

Rapporteurs: Miriam Musa, UNECA-ACPC and Atkeyelsh Persson, UNECA-FSSDD

For abstracts of presentations, see Appendix 6.

Regional Climate Centres and Climate Data
Girmaw Gezahegn, Ethiopian NMA

Population Factors to Consider in Climate Policy Making
Hassan Yousif, African Center for Gender and Social Development, ECA

Needs for Effective Policy Implementation and Immediately Possible Policy Actions
Dereje Mamo, Federal Ministry of Health, Ethiopia



Photo credit: Barbara Platzer

Jeremy Webb (UNECA-ACPC) gives a presentation on climate and health policy issues

Session Objectives and Scope

- How can we move forward with policy implementation strategies based on the aims and commitments that came out of the Joint Statement on Climate Change and Health in Africa adopted by African Ministers of Health and Environment in Luanda, 2010?
- What impediments are there in managing public health outcomes in relation to climate, given the state of understanding of the linkages between climate and health and the available climate and public health data?
- How can we improve the knowledge and understanding of climate and health issues in Africa?

Summary of Discussion

The group agreed that the aims and commitments listed in the Joint Statement on Climate Change and Health in Africa (Luanda, 2010) are sound and that rather than re-inventing the wheel by trying to come up with necessary policy actions, they (as well as others in other forums) should work at *how* to implement the policy actions outlined in the document.

One of the first and most recurrently raised issues in the discussion is the fact that there is a significant gap between policy and action that needs to be bridged. Another recurrent emphasis made was that in dealing with climate-related health policy, we must apply a system wide focus, as with all health policy. Climate and health policy should be influenced by all actors and stakeholders at all levels, ranging from government bodies to households and individuals.

It was expressed that given that the health system in Africa is an area of obvious and urgent concern, climate change issues should be mainstreamed into the health system. Furthermore it was emphasised that climate and health policy should be country owned, while supported by development partners such as WHO and UNDP. Inter-country coordination in mitigating the health impacts of climate change would also be very useful, however countries' command and control of their respective climate and health concerns are primary.

There was consensus across the group that research and understanding in the *linkages* between climate and health seriously needs to be improved. **The group suggested policies that set an interdisciplinary research agenda to look at climate and health simultaneously and holistically.** This sort of framework is needed to ensure that climate and health scientists agree on what needs to be researched in the field of climate and health. Furthermore, this is of particular importance because currently there is an abundance of climate research and climate data as well as public health research, however the research is fragmented within and between the two fields of climate and health. The holistic dimension to the proposed interdisciplinary research agenda is highly important in order to move

policy actions forward, because policy actions may otherwise be held back if points of contention exist in the interdisciplinary research.

It was agreed among group members that both climate surveillance and public health surveillance across Africa are inadequate and need to be improved. They agreed **it would be useful to have policies that support countries in establishing integrated health and climate surveillance systems**. Furthermore, the tools and methodologies that exist to observe climate and health vulnerability in Africa, such as Vulnerability and Risk Analysis and Mapping (VRAM) from the WHO, need to be reviewed and perhaps revamped in order to ensure their applicability to the different countries across Africa.

The point was raised that developing policy frameworks for climate change overall are difficult given the need for long-term observations of climate trends. However as a factor of climate change, climate variability gives us an opportunity to develop policy frameworks based on lessons learned from recurrent climate events, which are expected to increase in frequency with overall climate change. Furthermore, because **the timelines for policy aims are often short term (unless we are referring to long-term development policies such as infrastructural development)**, most climate-related health policy needs to deal with the **climate variability aspect of climate change**.

Toward the end of this session, the participants in the group agreed that good climate and health policy would be most efficiently applied across Africa through the **dissemination of documented best practices** - for example the Ethiopian Ministry of Health's mainstreaming of climate change adaptation to their system wide approach to solving public health problems.

Theme 2: Practice

Discussion Leaders: Michael Wilson, Noguchi Memorial Institute for Medical Research/
Robert Cheke, University of Greenwich

Rapporteurs: Arame Tall, John Hopkins University/Rose Mwebaza, UNDP-AAP



Photo credit: Barbara Platzer

Arame Tall (Johns Hopkins Univ.) shares a perspective on capacity development

For abstracts of presentations, see Appendix 6.

Adaptation Training Centres: Opportunities and the Need to Factor in Health to Capacity Development

Lawrence Flint, UNDP-AAP Consultant

Developing Curricula for Practitioner Training

Robert Cheke, Natural Resources Institute, University of Greenwich, UK

Michael Wilson, Noguchi Memorial Institute for Medical Research, University of Ghana

Leadership Transformation: An Example of Strategic Interventions for Helping Countries to Meet the Challenges of Climate Change

Keith Cundale, UNDP-AAP

Gender, Climate Change and Health

Rose Mwebaza, Gender Specialist, UNDP-AAP

Socio-Economics of Adaptation to Climate Change

Isaac Osei-Akoto, Institute of Statistical, Social and Economic Research, University of Ghana/UNDP-AAP Consultant

Climate Change and Public Health Challenges and the Way Forward

Ama Essel, University of Ghana Medical School

Session Objectives and Scope

- Discuss opportunities in the area of practice, including:
 - Capacity building needs: education about increased health risks among poor vulnerable communities, more support in terms of up skilling and provision of simple clinics for health workers (training of health practitioners), build/strengthen synergies between different stakeholders
 - Opportunities at the regional level: WMO education and training programmes, increased sharing/pooling of knowledge and resources between different countries
 - Opportunities at the national-level: Climate Vulnerability Assessments at the national level, support needs to national adaptation projects.
- Identify key messages for COP17
- Identify how to build a critical mass of local, national and continental leadership in CCA and ensure the agenda for CCA (in the health sector in particular) is defined, motivated, inspired and driven by Africans (people driven).

Summary of Discussion

Who should lead the Health and Climate agenda in Africa? Who should the fundamental drivers of the process be? Should the new agenda we are developing to meet the priorities of adapting health service provision in an age of climate not in practice be Africa-led, innovated, owned and driven, and respond to an Africa agenda?

These questions raised by Lawrence Flint sparked off the discussion, and it was agreed by the end of the “Practice” session that whatever we come up with, we should think about African research centers, African community-leaders and African institutions as the drivers of the Africa CCA agenda in general, and CCA in the health sector in particular (reflected in our Recommendation 2 from this session).

The idea of creating reservoirs of adaptation practices, at all geographic scales (from the local, to the sub-national, national and continental levels) was devised by the group as an adequate strategy to ensure that new techniques for adaptation are in practice attempted with very low risk, discussed and adopted into current health practices, at all levels (from the community healer, to the district health practitioner, on to the public health planners and national decision-makers).

The issue of bridging different geographic scales to access the key end-users who are most in need of accessing climate information for adapted health practices and disease prevention was also emphasized.

Furthermore, the importance of mainstreaming climate-adapted health practices at the local level (into plans of local authorities, traditional authorities) was highlighted, putting the issue of adaptation on the agenda at the local level as well.



Photo credit: Judy Omumbo

Parallel session discussions on integrating climate risk management into health development practice

Finally the need to ensure that in practice gender issues are taken into account as it is crucial to differentiate between the specific needs of men and women in addressing vulnerability, and local vitality and capacities are made use of was brought to the forefront with full force.

The full exposition of the conclusions that emanated from the group's discussion is given in the recommendations for Theme 2 Practice

Theme 3: Services and Data

Discussion Leader: Wayne Elliott, UK Met Office

Rapporteur: Dan Bloomfield, UK Met Office/University of Exeter

For abstracts of presentations, see Appendix 6.

Session 1:

Spatial Dimension: Health Data and GIS Issues

Clive Sabel, Department of Geography, University of Exeter, UK

Case Study: Towards a Leishmaniasis Early Warning Model in East Africa

Dia-Eldin A Elnaiem, Department of Natural Sciences, University of Maryland Eastern Shore

Climate Information for Meningitis Early Warning and Control in Burkina Faso: Duties and Achievements

Pascal Yaka (Met Directorate, Burkina Faso)

Session 2:

Barriers to Creating a Broad-based Information System across the Greater Horn of Africa Region

Christopher Oludhe, University of Nairobi/ICPAC

Data and Services from an Ethiopian Perspective

Kinfe Hailemariam, NMA Ethiopia

Data and Services in ACMAD

Tinni Seydou, ACMAD

Satellite Based Rainfall Monitoring in Africa - the TARCAT Project

David Grimes, TAMSAT, University of Reading

Data and Services – An Overview of the Key Issues

Wayne Elliott, UK Met Office

Session Objectives and Scope

- Gain a common understanding of the needs of the health sector, broadly defined, in terms of the data and products to be received from the meteorological sector.
- Gain a common understanding of the abilities of the meteorological sector to provide these data and services.
- Explore the strengths and weaknesses of the available data, and gain an understanding of how they can be improved.

- Through case studies, identify new opportunities for collaboration between the sectors.
- Understand the opportunities and possibilities offered by the technological context.



Photo credit: Judy Omumbo

Participants making recommendations for relevant climate services and data

Summary of Discussion

During the parallel session on the theme of ‘data and services’, a group of some twenty-five participants addressed the complex issues concerning data, and the use of those data, in order to produce a coherent set of recommendations.

Recognising that data are a key issue in moving forward, we recommend that commitment be made to the following:

- 1 **Improve the existing data:** This is fundamental. Numerous ways were identified as to how this could be done; including:
 - the enhanced digitisation of health and climate/weather data
 - the increased use of meta analyses of extant data
 - the greater use of validation tools
 - using health data carefully aggregated at the appropriate spatial and temporal scales
 - increasing the availability and use of observational data
 - incorporating data from satellites and climate models, where appropriate

- 2 **Access and use data in a systematic manner:** It is vital to do this in order to identify vulnerable groups and areas. Again, there are different ways to contribute to this, including:
 - Employing data strategically within and across sectors
 - Considering trend and seasonality issues
 - Using data as a tool to evaluate the success of interventions
 - Understanding in more detail how communities cope with weather and climate variation

- 3 **Incorporate other data into health forecast services:** As we build services upon data, a range of other types of data needed to be built into the work. These include, but are unlikely to be restricted to, data and statistics on:
 - Population
 - Residence (rural versus urban)
 - Migration
 - Nutritional status
 - Environmental factors
 - Poverty

- 4 **Securing commitment at all levels:** At the same time as addressing data issues, it is vitally important that the governance system provides the right context for developing services. Commitment is required in order to:
 - Bring climate and health communities together
 - Clarify responsibilities
 - Build capacity into both climate and health sectors to achieve the services needed
 - Facilitate joint working
 - Ensure resources – including data – are shared in a suitable way.

- 5 **Collaboration*:** This was consistently part of the theme, and of the entire workshop, was to develop a step-change in collaborative efforts in this area. We need to see new, multi-disciplinary initiatives that:
 - Involve communities beyond climate/weather and health
 - Build upon existing progress and initiatives
 - Aim to meet emerging challenges
 - Communicate with end-users in appropriate ways

- 6 **Develop tailored services:** The ultimate purpose is to create effective services, as partnerships between the weather/climate and health sectors. These should:

- Recognise that health forecasts differ from weather and climate forecasts in a number of ways
- Be designed in such a way as to be understandable to all
- Act as early warning systems to users of different types
- Assist in the prediction of future health outcomes.



Photo credit: Judy Omumbo

Lauren Smith (University of Exeter) answers questions during her presentation on mapping of respiratory diseases



Photo credit: Judy Omumbo

Dr. Pascal Yaka, (National Met. Office, Burkina Faso)

Theme 4: Research and Education

Discussion Leader: Yeya Touré, WHO-TDR

Rapporteurs: Natasha Chamberlain, University of Exeter/Lauren Smith, University of Exeter

For abstracts of presentations, see Appendix 6.

Session 1:

Sensitivity of Dengue Risk to Climate Variability and Potential for Developing an Epidemic Early Warning System (A Case Study from Brazil)

Trevor Bailey, University of Exeter

Mapping Respiratory Diseases

Lauren Smith, University of Exeter

Research Opportunities for Collaboration with African Bio-Medical Research Centres

Daniel Adjei Boakye, Noguchi Memorial Institute for Medical Research, University of Ghana

Experiencing Climate: Time Scales and Decisions

Bradfield Lyon, IRI

Session 2:

WHO-TDR Research Capacity Strengthening Activities

Yeya Touré, WHO-TDR

Communicating Research: Peer-Reviewed Publication and the Media

Patrick Luganda, Network of Climate Journalists for the Greater Horn of Africa

Pulling Together Research, Capacity Building and Communication

Felicity Liggins, UK Met Office

Session Objectives and Scope

- Research Priorities
- Training and Capacity Building

Summary of Discussion

A topic of significant discussion was the necessity of studying diseases at an appropriate spatial and temporal scale, and the need for digitisation of health data in order for the relationship between climate and health to be correctly established. The modelling required to understand this relationship is usually mathematical and sophisticated, and it was suggested that statisticians could be incorporated into

future collaborative research teams. There should be a development of capacity amongst national meteorological offices in order to improve the quality control of data, and an increase in the use of combined methods of climate data collection, including both satellite and station gauges. When calibrated together these can assist in reducing uncertainty in readings from thinly dispersed stations.

When recording diseases amongst populations, health authorities should begin to systematically record their specific serotypes rather than simply their generic names, in order to allow for a better understanding of the spread of the disease and its relationship to climatic factors. It was also emphasised that there could be a need for a new paradigm in modeling climate and health – systems epidemiology – as systems biology has a major impact on epidemiology, but as yet has not been significantly considered. Collaboration should be supported and increased between and across disciplines, in addition to across institutions, countries and regions.

Regarding which health issues to address, neglected tropical diseases (NTD), non-communicable (including respiratory) diseases and indirect health issues including socio-economic (deprivation) and mental health aspects of climate and health, should be the focus of increased research. There should also be calls for funding for health interventions to not only target a single specific disease, but rather to more holistically include all diseases within a geographical location, as they do not occur in isolation and effective responses are needed to address them all simultaneously.

It was also stressed that research in this field should not necessarily focus on climate *change* and health, but rather on a broader understanding of the current relationship in order to establish baseline conditions, which can in the future be adapted in response to a changing climate. There is a need for improved dissemination and communication of technical meteorological and forecasting data to end users and local communities. The language utilised should be non-scientific and jargon-free, and there needs to be a development of methods to rapidly and effectively communicate extreme climatic events to large proportions of the population in order to allow for maximum opportunities to prepare for and limit the impacts of disasters.

There is a need for multi-disciplinary and trans-disciplinary training in order to jointly build capacity in both climate and health research. This could be undertaken through exchanges between employees of different institutions, and/or the development of multi-disciplinary, or even multi-centre, undergraduate and postgraduate degrees. In order to improve the dissemination of research in these fields, there should be an increased rate of publication of African health and climate research in international, as well as African, peer-reviewed journals. The African Journals OnLine (AJOL) provides users with access to all African peer-reviewed publications, as well as a means of uploading articles for review and publication.

Summary of Wrap-up Sessions and Recommendations

Theme 1: Policy

Discussion Leader: Magaran Bagayoko, WHO-AFRO

Rapporteurs: Miriam Musa, UNECA-ACPC and Atkeyelsh Persson, UNECA-FSSDD

Summary of Session

Dr. Magaran Bagayoko, the discussion leader for Theme 1: Policy, presented the 6 recommendations that came out of the Theme 1 breakaway session to the plenary group and explained that these recommendations are meant to use the Joint Statement on Climate Change and Health in Africa, adopted by African Ministers of Health and Environment in Luanda, 2010, as an overarching platform for addressing climate and health issues.

One of the main concerns from the plenary group was that policy recommendations, in this workshop as well as in general, are often very broad and this translates to lack of action with regards to the implementation of policy, as specific areas of concern to act as guidelines are not clarified. Some of the specific areas of concern that the plenary group felt should be explicitly stated in policy recommendations include, mitigating pollution and enhancing climate and health research in Africa. The response to this concern was that the specific policy action needs of the various countries across Africa should be identified by the specific countries based on their respective needs and thus policy recommendations should be framed in a broad way that allows for the insertion of country-specific concerns. Country-specific concerns can be adapted to policy frameworks at the planning stage. The presenter, Dr. Bagayoko, explained that 10 priority climate and health action items for Africa, which include the areas of concern mentioned by the plenary group, have been outlined in the African Ministers of Health and Environment Joint Statement on Climate Change and Health and we can apply the broad policy recommendations to these specific priority areas.

A number of individuals in the plenary group explained that a major factor that inhibits the implementation of policies after they have been formulated is that policy makers often lack a clear understanding of the significance and severity of climate impacts on health outcomes. The group acknowledged that their job in this workshop is to ensure that policies are well understood and actionable. Therefore policies directed at improving society wide understanding of the various effects of climate change, including elementary level education, are necessary. Furthermore, the group continuously emphasised the importance of improving understanding among professionals in this field through improving research initiatives.

In addition to the limited understanding of climate and health issues among policy makers, many in the group explained that the gap between policy and practice is

also due to a lack of integration between government ministries, lack of advocacy and human resources as well as a lack of resources.

Overall, no significant changes were made to the Theme 1 recommendations as there seemed to be consensus that the African Ministers of Health and Environment Joint Statement on Climate Change and Health is a sound document that should be referred to when considering climate and health policy in Africa.

Recommendations:

Support effective implementation of the Joint Statement on Climate Change and Health in Africa adopted by African Ministers of Health and Environment in Luanda, 2010, as an overarching platform for addressing climate and health issues to:

- **Bridge the gap between policies and practices** through legislation and guidelines, appropriate planning, including relevant vulnerability assessments, programmatic support and multi-sectoral and participatory processes that are gender sensitive.
- Support countries to establish **integrated health surveillance and climate observation and processing systems**.
- **Strengthen health systems** using climate information tailored to decision needs at all relevant levels and time scales.
- Make evidence-based, sound climate-informed decisions to implement a set of **preventive actions** to reduce population vulnerability and lessen the additional burden imposed by **climate-sensitive diseases and health issues** according to their respective epidemiological circumstances.
- **Anticipate, prepare for and respond** to the health consequences of **extreme weather events**, particularly by strengthening the functioning of health systems and other relevant sectors.
- **Multilateral partners** to consider the significant co-benefits of environment integrity, population health and consequent economic development that can result from mitigation and adaptation policies in the climate and health sectors and to support African countries in gaining **access to resources under the various climate-related funds**.

Theme 2: Practice

Discussion Leader: Robert Cheke, University of Greenwich

Rapporteurs: Arame Tall, John Hopkins University/Rose Mwebaza, UNDP-AAP

Summary of Session

The session commenced with a background presentation on the link between climate change and disaster risk reduction. This was followed by a brief presentation on the socioeconomic impacts of extreme weather events and the need to incorporate them in all national frameworks for climate change adaptation strategies. Following this brief background presentation, Professor Robert Cheke presented the recommendations from the break-away session on practice. A vibrant discussion followed the presentation that generally focused on the proposed human resource centre/virtual hub. The major questions arising from the presentation on the hub focused on the nature and form of the hub. Participants wanted to know: What will the virtual hub be? An information platform or an action platform or would it incorporate a little bit of everything

The majority of the plenary discussants believed that the virtual hub presented an important opportunity for linking different organisations and institutions involved in climate and health and also presented an opportunity for networking and information sharing. The hub would also be an important knowledge management forum that could be used by independent researchers and university faculty to develop curricula on climate and health, improve learning and up date their knowledge base. As such, the hub would be an important resource centre on climate and health in Africa.

In order to fulfill this crucial role, it was suggested that the hub could establish regional networks with each regional network nominating a focal person to act as the focal node. It was further recommended that the stakeholders to be involved in the hub should be expanded to include WHO, Ministries of Health, the media, IDRC, IFRC, AFENET and the several other organisations working on climate and health on the continent. The University of Reading volunteered to support the establishment of the hub based on a similar model it had already engaged in.

The other important issues emerging from the discussion focused on the importance of climate data. Participants noted that data in itself is not very valuable unless it is made available for analysis to support the development of appropriate responses from the health sector. The challenge has been the continuous controversy over the ownership of historical data, which countries own, and which they sometimes refuse to release. Emphasis was therefore placed on the importance of transferability and access to data as well as co-learning between health professionals and climate scientists.

Finally, participants emphasised the important role that WHO can play in supporting mainstreaming of climate change in the health sector. They noted that the WHO

through its Africa and Global Health Observatories could develop and present climate and health data that could support the efforts of African countries to mainstream climate change in the health sector.

Recommendations:

- Integrate climate health risk management into **cross-sector planning and practice for adaptation** to climate variability and change by developing climate services and products that address disease prevention at end-user level.
- **Create a human resource center/virtual hub** where expertise is shared in order to develop the capacity of African health and climate communities, institutions, practitioners and negotiators to understand/integrate climate change challenges into policy, socio-economics, planning and programming by identifying institutions and organisations in Africa that can deliver **training courses and conduct research on “Climate, Health and Prevention”**.
- **Strengthen community-based organisations** by liaising, in a gender-sensitive fashion, with their leaders to develop locally owned **sustainable strategies for adaptation to climate change and/or variability** in their communities taking account of local knowledge rooted in social history and disseminated by appropriate channels, including the mass media.
- **Define the different levels and needs (including learning outcomes) of health practitioners and stakeholders** across different geographic scales, specifically researchers and teachers, graduate and undergraduate students, practitioners in the public health system, community opinion leaders, traditional healers, impacted communities and other special interest groups and **develop appropriate curricula for adaptation to climate change and/or variability** in the health sector.
- **Promote a gender-sensitive approach to interventions** on climate and health in cross-sectoral disaster risk reduction and preventive health strategies.

Theme 3: Services and Data

Discussion Leader: Wayne Elliott, UK Met Office

Rapporteur: Dan Bloomfield, UK Met Office/University of Exeter

Summary of Session

The session emphasised just how central the issue of data management is - especially the quality and exchange of data. It became very clear that governance is a major issue. Determining what data sets are needed, and how they are to be maintained and managed, are tasks requiring top-level commitment and collaborative effort. All stakeholders including governments, their departments and agencies need to work together to define the parameters and methods to be used.



Photo credit: Judy Omumbo

Michael Gatari (Univ. of Nairobi), Kidane Asefa (Director NMA, Ethiopia), Kinfe Hailemariam (NMA, Ethiopia) and Girmaw Gezahegn (NMA, Ethiopia)

It was also the view of workshop participants that data, following the WMO/WHO guidelines, needs to be freely available to those with a clear demand. Ultimately, the goal is to reach a situation whereby data sets are sufficiently compatible and accessible for them to provide the basis not just of reactive health alert services, but also of proactive policy and planning interventions. The endpoint needs to be held clearly in mind at all times; data are more useful if used to develop understanding and develop services that change behaviour. **The aim is high quality, tailored and targeted services that are effective for the audiences and users involved.**

Recommendations:

- **Develop tailored services** in partnerships with weather/climate and health organisations. These should recognise that health forecasts, which are different from weather forecasts, should be well designed and understood by all. They should act as early warnings to users of differing sectors, that assist in the prediction of future health outcomes.



Photo credit: Judy Omumbo

Dr. Agnes Kijazi, Director of the Tanzanian Meteorological Agency

- **Improve existing data**, for example through: the digitisation of historical health and climatic data; the increased use of metadata analyses and validation tools; the inclusion of aggregated health data at appropriate spatial and temporal scales; and the enhanced awareness of, and use of, observational and processed data, appropriate satellite, and climate model data sources.
- **Access and use data in a systematic manner** in order to identify vulnerable groups and areas. This needs to involve: employing data strategically within and across sectors; considering trend and seasonality issues; using data to evaluate the success of interventions; and, importantly, understanding how communities cope.
- **Incorporating other data into these health forecast services**, for example population, rural vs. urban residence, migration, nutritional status, environmental and poverty data.
- **Collaboration +: new, multi-disciplinary initiatives** that involve communities beyond health and climate/ weather; build upon existing

initiatives and progress; aim to meet emerging challenges; and communicate with end-users in appropriate ways.

- **Commitment at all levels** that brings climate and health communities together, clarifies responsibilities, builds capacity in the climate and health sectors to achieve these services, facilitates joint initiatives and ensures resources such as data are shared in a suitable way.

Theme 4: Research and Education

Discussion Leader: Yeya Touré, WHO-TDR

Rapporteur: Felicity Liggins, UK Met Office

Summary of Session

The importance of interdisciplinary research that feeds into evidence-based decision making was fundamental to Theme 4. Bringing together expertise and data, not only from the climate and health sectors, but also from other physical, social and political sciences, is vital to understanding how climate variability and change can influence climate-sensitive diseases and health issues – alongside how communities cope with the risks – both today and into the future.



Photo credit: Judy Omumbo

Wayne Elliott (UK Met Office), Dan Bloomfield (Univ. of Exeter) and Mike McCarthy (DfID, Ethiopia)

Interdisciplinary research, both quantitative and qualitative, conducted in centres across Africa and beyond could help us understand:

- how past climate trends have influenced health outcomes;
- the mechanisms by which some diseases and climate interact; and
- prioritise diseases that are known to be sensitive to climate but have so far been overlooked by climate and health researchers for a variety of reasons.

There is existing capacity within the continent to deliver such interdisciplinary research. However, this should be enhanced to both improve the research and retain scientific expertise on the continent. For example, climate researchers could undertake secondments in the health sector or multi-centre, African-based training programmes could offer formal qualifications in climate and health. Also vital is the integration of the relationships between climate, health and other sectors within educational curricula for all ages and disciplines – from the secondary school student to public health practitioners.

The organisations involved in developing and delivering this research would be many, e.g. WHO, WMO, UNECA-ACPC, IRI and African universities. It is also likely that new coordinating bodies will need to be established, a suggestion of such was a continental-scale climate and health working group (CHWG), reflecting the success of existing national CHWGs.

Interdisciplinary research is worthless without appropriate communication of the results. Throughout Theme 4 discussions, and within the wider workshop, suggestions were made to improve methods of communication. These included:

- an inventory of climate and health-related expertise/data/curricula/training;
- better use of existing communication networks to both disseminate information to users and influence the future direction of research through multi-way communication;
- a climate and health newsletter providing a forum to communicate across disciplines and identify research gaps and funding opportunities;
- a comprehensive, tailored tool for practitioners to access health and climate-related information;
- increased publication of research findings in multi-discipline, African-based peer reviewed journals while acknowledging the constraints of publishing in low-impact factor journals;
- more community-level engagement through the use of both traditional and new media; and
- instigation of an annual or bi-annual conference on climate and health, bringing together all relevant sectors.

Discussions around these areas are reflected within the Theme 4 recommendations.

Recommendations:

- **Understand the relationships between climate and climate-sensitive diseases and health issues** under different environmental conditions through interdisciplinary, multi-sectoral and multi-centre research.
- **Ensure that climate change mitigation and adaptation strategies are informed by multi-disciplinary research.**
- **Develop capacity within Africa** for the generation, interpretation and use of climate, health and other interdisciplinary data enabling informed, evidence-based decision making.
- **Standardise and quality control** data collection and storage, ensuring data are available on relevant temporal and spatial scales.
- **Enhance knowledge transfer and communication** of information across disciplines and communities through existing networks, encouraging the introduction of climate and health into the curriculum at all levels of education.
- **Strengthen existing partnerships and collaborations** while developing new groups and building links across disciplines.



Photo credit: Judy Omumbo

Felicity Liggins (UK Met Office), Clive Sabel*, Trevor Bailey*, Natasha Chamberlain* and Lauren Smith* (*University of Exeter)



Photo credit: Judy Omumbo

Climate journalist, Patrick Luganda , Samuel Waweru (KMD), Christopher Oludhe (KMD) and Assefaw Getachew (MACEPA)

Closing Ceremony Remarks

Closing remarks by Dr. Madeleine Thomson, Senior Research Scientist at the IRI

A journey of a thousand miles starts with a single step.

The IRI's vision is to improve the wellbeing of poor people by reducing the risks that climate poses to their lives and livelihoods. We do this through climate science innovation, demonstration of the value of climate information, informing policy dialogues and education and training. Central to our engagement anywhere is partnership.

This meeting represents an important staging point in the engagement of the IRI's health and regional programme in Africa. We have had the honour and pleasure to work with many of you over the years. Someone even described this meeting as a high school reunion! What was particularly exciting to me was to see old friends invited through completely independent mechanism. It was also exciting to see new

partnerships formulated such as the signing of a memorandum of understanding between ACMAD and the Ethiopian Climate and Health Working Group.

Partnership – the Steering committee includes CHWG, WHO AFRO UNDP, UNECA-ACPC, University of Exeter, UK Met Office – each member has been responsible for framing and delivering a particular session – bringing together an incredibly rich contribution of ideas and expertise and most significantly practical experience. Also the Health and Climate Foundation that has provided additional support and advice to the process. Nothing can be achieved without resources and for this we would like to thank Google.org, NIEH USA, UNDP, UNECA-ACPC, UK Met and University of Exeter.

It is no error that this meeting takes place in Ethiopia. A country that has demonstrated considerable innovation in health policy, in climate services, in the initiation of the concept of climate and health working groups, in government and community based support to an integrated approach to reducing climate related risks in public health.

The future is not what it was. The meeting in Bamako in 1999 was before the commitment to the MDGs, before 9/11, before climate change was considered important by the representatives of health – WHO, before we started to meet virtually *via* email, Facebook, *etc.*

We know now that 10 years ago climate change was already underway but our capacity to even think how we might begin to manage the health risks or incorporate the new science which could predict the climate a season ahead was infantile. It is not only the scientific and technological landscape that has changed. New knowledge, new processes, new partnerships, new resources, network development, have all occurred since the meeting in Bamako.

What we have learnt in the last 10 years could fill volumes but can be summed up in three simple words: Development, Data and Delivery.

We should not waste time. In ten years from now, we must be in a dramatically different place. Yes, the climate challenge may be more severe than the situation now, but we should have a broad community of individuals, communities and institutions that are ready to respond, to intervene, to plan based on a solid understanding of actual current and future climatic risks. The recommendations that you have helped to prepare will now be used to drive the discussion through partner processes and to inform potential donors of opportunities to radically strengthen Africa's capacity to manage climate related health risks especially through the use of tailored climate information.

Each journey of a thousand miles they say begins with the first step – from myself and colleagues at IRI we are thrilled to have the opportunity to walk with you on this journey.

Our thanks go to:

AMA and the Climate and Health Working Group for their phenomenal organisational capacity, Mr. Abere and Ms. Abenet with the AMA team working in the background.

Steve Connor who was a facilitator in Mali who conceived of the opportunity that this meeting might bring.



Photo credit: Judy Omumbo

Abenet Girma (CHWG Ethiopia) and Barbara Platzter (IRI)

Steering Committee member teams that have funded and shaped this meeting and, in particular ACPC and their host institution ECA, who have provided logistical support to this meeting. I would like to mention Miriam Musa in particular, an intern in UNECA-ACPC she was thrown in at the deep end and is clearly showed herself to be competent swimmer! I also have to mention the wonderful support team we have had led by Abenet, Miriam and Barbara also supported by a community of dedicated and expert rapporteurs and of course Judy Omumbo – our superb chair who has supported our deliberations throughout the meeting. Judy, Barbara, Abenet and Miriam have been working intensively on this meeting for months and deserve our special thanks.



Photo credit: Judy Omumbo

Miriam Musa (UNECA-ACPC) taking notes during the workshop

and build on them through your own mechanisms and to be ready to support this community as we build momentum to the first staging point in the 10-year vision - COP17.

Finally our thanks go to you all for your presence, participation and sharing of your rich experiences and ideas going forward. I am personally thrilled with the quality of the discussion and the strength of the recommendations. The work however cannot stop here, first of all we expect you to receive the draft version of this report within two weeks and ask for you to respond within two weeks. We expect you to take the recommendations



Photo credit: Judy Omumbo

Dr. Stephen Connor (IRI) and Dr. Madeleine Thomson (IRI)

Additionally, Dr. Youba Sokona of UNECA-ACPC, Mr. Kidane Asefa of the Ethiopian NMA and Dr. Judy Omumbo of the IRI concluded the workshop with a vote of thanks.

- Dr. Youba Sokona offered the services of UNECA-ACPC to the meeting as an African policy implementation instrument with influence from the grass roots to the highest policy levels and encouraged participants to make use of UNECA-ACPC's influence.
- He also noted that the workshop recommendations have implications beyond health and will be applicable in other sectors including agriculture, water etc., all areas with common challenges around data, institutional capacity *etc.*
- On behalf of UNECA-ACPC he made the commitment that through the recommendations, the workshop would have a voice at a stakeholder meeting in October this year that will be preparing for COP17.
- Finally he thanked the participants for wanting to be a part of this challenge.
- Mr. Kidane Asefa also delivered a vote of thanks to the IRI for convening the workshop and for elucidating to him and colleagues in his sector the demand for relevant climate services in the health sector. The perspectives presented were new to him and the guidelines will help inform service provision in the future.
- Dr. Judy Omumbo closed the ceremony thanking participants for their contributions to the discussions and commitments going forward.

Appendices

Appendix 1: Agenda



Climate and Health in Africa: “10 Years On” Workshop

UNECA, Addis Ababa, 4-6 April 2011

Theme 1: Policy – Conference Rm 5
Theme 2: Practice – Caucus Rm 6
Theme 3: Services and Data – UNCC Briefing Room
Theme 4: Research and Education – Caucus Rm 10

Agenda

Sunday 3rd April 2011

All day	Arrival - Intercontinental Hotel, Addis Ababa Tito Street, Kazanchis Area Addis Ababa Ethiopia Tel: +251-115-505-066
06:00 pm	Welcome Dinner at Finefine Restaurant Meet in the Intercontinental Hotel Lobby at 6:00 pm FineFine Restaurant, Tel. 551 4711 Located 10 minutes from Intercontinental on Yohanis Street Ethiopian cuisine

Monday 4th April 2011

08:00 am - 09:00 am		REGISTRATION - United Nations Conference Centre (UNCC) Photo identification is required for access to UNECA complex The meeting will be held in UNECA Conference Room 5 (Coffee/tea served)	
09:00 am - 09:40 am	Conference Room 5	OPENING CEREMONY <ul style="list-style-type: none"> Welcome addresses: <ul style="list-style-type: none"> Opening remarks and introduction of guests of honor - Dr. Josué Dioné - Director, Food Security and Sustainable Development Division, UNECA Minister of Health, Federal Democratic Republic of Ethiopia - Dr. Tedros Adhanom Ghebreyesus - TBC Keynote Addresses: <ul style="list-style-type: none"> Director of Health Promotion WHO-AFRO - Dr. Diosdado-Vicente Nsue-Milang, Director General of Ethiopian National Meteorological Agency - Mr. Kidane Asefa H.E. Rhoda Tumusiime, Commissioner of Rural Economy and Agriculture, Africa Union Commission - TBC 	<i>Rapporteur:</i> Hiwot Teka
09:40 am- 09:50 am	GROUP PHOTOGRAPH Outside Conference Room 5		
09:50 am - 10:50 am		A decade of progress: Advances in climate and health research in Africa Plenary Session: 10 minutes each <ul style="list-style-type: none"> Capacity Development “10 Years On” Alumni. Climate Prediction and Health: Where Since Bamako? <ul style="list-style-type: none"> Building a climate smart community of practice: Lessons learned - Dr. Judy Omumbo (IRI) The Pan African program on health adaptation to climate change - Dr. Magaran Bagayoko (WHO AFRO) Climate data and forecasting - Dr. Ousmane Ndiaye (National Weather Service of Senegal) Climate Risk Management - Dr. Stephen Connor (International Research Institute for Climate and Society) 	<i>Rapporteur:</i> Hiwot Teka
10:50 am -11:00 am	Conference Room 5	Setting the scene: Presentation of workshop theme areas <ul style="list-style-type: none"> Workshop aims and objectives Method of work and expected outputs Reflections on opportunities and constraints 	<i>Led by:</i> Judy Omumbo
11:00 am - 11:20 am	<i>Coffee Break</i>		

11:20 am - 12:00 pm	Conference Room 5	Presentation of theme areas led by panel speakers Theme 1: Policy- Led by UNECA-ACPC/WHO AFRO <ul style="list-style-type: none"> - Regional climate outlook forums, the role of the African regional climate centres, and the need to improve climate data availability in Africa - Mr. Adama Alhassane Diallo (ACMAD) - The ClimDev-Africa program - Dr. Youba Sokona, UNECA-ACPC - Policies and partnerships for implementation of the Libreville Declaration at the country level - Mr. Waltaji Terfa (WHO Ethiopia) 	<i>Rapporteur:</i> Miriam Musa/Kitty Persson
12:00 pm - 12:40 pm	Conference Room 5	Theme 2: Practice - Led by UNDP-AAP/FELTP <ul style="list-style-type: none"> - Health and vulnerability to climate change: a challenge to social resilience - Dr. Lawrence Flint (UNDP-AAP). - Examples of practice to date - Dr. Joseph Intsiful (UNDP-AAP). - Leadership and institutional capacity development - Keith Cundale, (UNDP-AAP). - Climate training opportunities within African Schools of Public Health: The FELTP programme - Dr. Richard Luce (FELTP)/ Dr. Sheba Gitta (AFENET). - National CHWGs- Lessons from Ethiopia - Mr. Abere Mihretie, Ethiopian Anti-Malaria Association (AMA). 	<i>Rapporteur:</i> Arame Tall
12:40 pm - 02:00 pm		<i>Lunch Break</i>	
02:00 pm - 02:40 pm	Conference Room 5	Theme 3: Services and Data - Led by UKMet Office/ NMA Ethiopia <ul style="list-style-type: none"> - Defining the services we need / WCC3 - Wayne Elliott (UK Met. Office) - Public Weather Services and Health in Africa - Ms. Haleh Kootval (WMO) - Developing 10-day temporal resolution climatologies for Ethiopia - Kinfe Hailemariam (NMA Ethiopia) - Summary of session - Dan Bloomfield (UK Met. Office) 	<i>Rapporteur:</i> Dan Bloomfield
02:40 pm - 03:20 pm	Conference Room 5	Theme 4: Research and Education -Led by University of Exeter / IRI <ul style="list-style-type: none"> - Thoughts on connecting climate and health - Dr. Bradfield Lyon (IRI) - WHO-TDR work plan for research and capacity building in climate and health - Dr. Yeya Touré (WHO/TDR) - Challenges in communicating climate and health - Patrick Luganda (NECJOGHA) 	<i>Rapporteur:</i> Felicity Liggins
03:20 pm - 03:40 pm		<i>Coffee Break (Optional)</i>	

03:40 pm - 05:30 pm	Conference Room 5	Integrating the sectors - building effective partnerships <ul style="list-style-type: none"> • Fostering collaboration between regional institutions - Dr. Joseph Intsiful (UNDP/AAP) • Partnerships for the control of meningococcal meningitis - Dr. Madeleine Thomson (IRI/MERIT) • Climate, environment and health: recent achievements in Senegal- Dr. Jacques André Ndione (Centre de Suivi Ecologique, Sénégal) • Climate, water resources and malaria in Ethiopia - Solomon Kibret (International Foundation for Science) • Climate Change, air quality and urbanization in Africa - Dr. Michael Gatari (University of Nairobi) • Climate, Population Health and Environment integration in Ethiopia - Mr. Negash Teklu (PHE Ethiopia Consortium) 	<i>Rapporteur:</i> Dan Bloomfield
6:00 pm onwards		ICE -BREAKER COCKTAIL Intercontinental Hotel - Roof top swimming pool bar	

Tuesday 5th April 2011

08:30 am - 09:00 am	UNECA Conference Room 5 (Coffee/tea served)			
09:00 am - 10:20 am	Developing a Plan for Action Objectives of the parallel sessions: <ul style="list-style-type: none"> • Define action items for the “Road Map” • Define key messages for COP17 and other regional processes. • Research grants and project funding - applying for joint proposals (NIH grants)/EC resources/potential UNDP AAP funded projects • Assign responsibilities • Draft meeting recommendations 			<i>Led by:</i> <i>Michel Jancloes</i> <i>Rapporteur:</i> <i>Hiwot Teka</i>
10:20 am - 10:40 am	Coffee Break			
Break-out session meeting rooms	Theme 1 POLICY <u>UNCC Briefing Room</u>	Theme 2 PRACTICE <u>Caucus Room 6</u>	Theme 3 SERVICES & DATA <u>Caucus Room 10</u>	Theme 4 RESEARCH & EDUCATION <u>Conference Room 5</u>
10:40 am - 12:30 pm	Panelists: <ul style="list-style-type: none"> • Presentation of session objectives - Magaran Bagayoko • Dereje Mamo (Ministry of Health, Ethiopia) • Population factors to consider in policy making - Ms. Rose Aderolili - (African Gender and Social Development Division (ECA) • Girma Gezahegn (Ethiopian NMA) • Mr. Ali Mohamed (Ministry of Environment and Mineral Resources, Kenya) - TBC 	Panelists: <ul style="list-style-type: none"> • Adaptation training centres: opportunities and the need to factor in health to capacity development- Dr. Lawrence Flint (Consultant AAP) • Developing curricula for practitioner training - Prof. Robert Cheke (Greenwich Univ.)/Prof. Mike Wilson (UNDP AAP) • Gender and socio-economics of health (Dr. Rose Mwebaza (Consultant) /Dr. Isaac Osei-Akoto (Univ. Ghana) • 'Climate change and public health challenges and the way forward - Dr Ama Essel (Korle-Bu Teaching Hospital/ University of Ghana Medical School) 	Panelists: Session 1 <ul style="list-style-type: none"> • Introduction and overview; scope and aims - Dan Bloomfield (UK Met Office) • Geographic and health data needs for GIS analysis - Prof. Clive Sabel (Univ. Exeter, UK) • Case study: Towards a leishmaniasis early warning model in East Africa - Dia Elnaiem, (University of Maryland Eastern Shore) • Case study: Data and meningococcal meningitis in Burkina Faso - Pascal Yaka (Met Directorate, Burkina Faso) 	Panelists: Session 1 <ul style="list-style-type: none"> • Introduction - Felicity Liggins (UK Met Office) • Understanding the current climate: Forecasting, modeling disease and climate interactions - Prof. Trevor Bailey (University of Exeter) • Mapping respiratory and infectious diseases - Lauren Smith (University of Exeter) • Research Opportunities for Collaboration with African Bio-Medical Research Centres - Dan Boakye (Noguchi Memorial Inst. for Medical Research) • Experiencing climate: time scales and decisions - Dr. Bradfield Lyon (IRI) • Seasonal forecasting - Ousmane Ndiaye (IRI/Senegal Met. Service)
12:30 pm - 02:00 pm	Lunch Break			

02:00 pm - 03:30 pm	Feedback and discussion <i>Discussion leader:</i> Magaran Bagayoko <i>Rapporteurs:</i> Miriam Musa & Kitty Persson	Feedback and discussion <i>Discussion leader:</i> Prof. Mike Wilson <i>Rapporteur:</i> Arame Tall	Panelists: Session 2 <ul style="list-style-type: none"> Barriers to creating a broad-based information system across the Greater Horn of Africa region - Christopher Oludhe (ICPAC) Data and services from an Ethiopian perspective - Kinfe Hailemariam (NMA Ethiopia) Data and services in ACMAD -Tinni Seydou (ACMAD) RFE in Africa: The TARCAT project and rainfall ensembles - Dr. David Grimes (TAMSAT, Univ. of Reading) Data standards (WMO and health), and how they feed into the development of weather-related services that work - Wayne Elliott (UK Met. Office) 	Panelists: Session 2 <ul style="list-style-type: none"> WHO-TDR research capacity strengthening activities - Yeya Touré (TDR) Communicating research: peer-reviewed publication and the media - Patrick Luganda (Network of Climate Journalists for the Greater Horn of Africa) Pulling together research, capacity building and communication - Felicity Liggins (UK Met. Office)
03:30 pm - 03:40 pm	Coffee Break			
03:40 pm - 04:40 pm	Preparation of draft of parallel session recommendations			
	Feedback and discussion (contd.) <i>Discussion leader:</i> Magaran Bagayoko <i>Rapporteur:</i> Miriam Musa	Feedback and discussion (contd.) <i>Discussion leader:</i> Prof. Mike Wilson <i>Rapporteur:</i> Arame Tall	Feedback and discussion <i>Discussion leader:</i> Kinfe Hailemariam (NMA) <i>Rapporteur:</i> Dan Bloomfield	Feedback and discussion <i>Discussion leader:</i> Ousmane Ndiaye <i>Rapporteurs:</i> Natasha Chamberlain & Lauren Smith
04:40 pm - 05:40 pm	Conference Room 5 Feedback from parallel sessions led by rapporteurs and discussion leaders			

Wednesday 6th April 2011

08:30 am - 09:00 am	UNECA Conference Room 5 (Coffee/tea served)	
09:00 am - 09:20 am	<ul style="list-style-type: none"> Summary feedback from previous day - <i>led by Judy Omumbo and discussion leaders</i> Background and objectives of action plan for the “Road Map for Climate Services for Health Development 	<i>Rapporteur:</i> Hiwot Teka
09:20 am - 10:20 am	Theme 1: Integrating Climate Risk Management into Health Development Policy. <i>Discussion leader - Magaran Bagayoko</i> <ul style="list-style-type: none"> Methodologies to address current gaps in adaptation policies and strategies for Climate Change and variability in the health development sector. Multi-partner collaborations: Action items including engaging the regional climate centers, National Meteorological Agencies, WHO policy and Ministries of Health. Policies for adaptation funding and investments. Priority issues/areas for COP17. 	<i>Rapporteur:</i> Miriam Musa
10:20 am - 11:20 am	Theme 2: Integrating CRM into Practice: Discussion leader- Prof. Mike Wilson <ul style="list-style-type: none"> Priorities for implementing current climate change adaptation programmes in the health development sector (<i>e.g.</i> Libreville Declaration, WHO-GEF pilot projects, CCAA, AAP). Priorities for capacity building at regional, national and local level. Key action items for capacity building. Priority issues/areas for COP17. 	<i>Rapporteur:</i> Rose Mwebaza
11:20 am - 11:30 am	<i>Coffee Break</i>	
11:30 am - 12:30 pm	Theme 3: Services and Data: Discussion leader - Kinfe Hailemariam <ul style="list-style-type: none"> Standards for data collection, storage and seamless sharing between sectors. Seamless integration of regional and national climate services with the health development sector. Availability of baseline climate information analyses for multi-sector applications at national level - <i>e.g.</i> gold standard national climatologies, downscaled seasonal forecasts, criteria for customer services. Key messages for COP17. 	<i>Rapporteur:</i> Dan Bloomfield
12:30 am - 01:30 pm	Theme 4: Research and Education: Discussion leader - Ousmane Ndiaye <ul style="list-style-type: none"> Priority areas for future research and investment - economic research, program and impact evaluation. Graduate capacity development. Curriculum development and educational needs. Potential for collaborative competitive research grants and multi-centre projects. Research dissemination considerations- peer reviewed publishing for African research and the role of African media. Key messages for COP17. 	<i>Rapporteur:</i> Felicity Liggins
01:00 pm - 02:30 pm	<i>Lunch Break</i>	
02:30 pm - 03:30 pm	Wrap up and summary of action items	

03:30 pm - 04:30 pm	CLOSING CEREMONY (Conference Room 5)
	<ul style="list-style-type: none"> • Vote of thanks and introduction to guests of honour - Madeleine Thomson (IRI) • Guest of Honor - His Excellency Mr Girma Wolde-Giorgis, President of the Federal Democratic Republic of Ethiopia -TBC • Towards COP 17 - HE Major-General Lungile C Pepani, Ambassador of the Republic of South Africa to Ethiopia
04:30 pm	PRESS CONFERENCE

Appendix 2: Participant List

	Affiliation	Country Based	Last Name	First Name	Email
1	African Centre of Meteorological Applications for Development	Niger	Diallo	Adama Alhassane	dgacmad@acmad.org ; a2diyal004@yahoo.fr
2	African Centre of Meteorological Applications for Development	Niger	Kane	Cheikh	ckane@acmad.org ; tawenafa@gmail.com
3	African Centre of Meteorological Applications for Development	Niger	Seydou	Tinni Halidou	seydoutinni@yahoo.fr
4	UNECA-African Climate Policy Centre	Ethiopia	Fomenky	Aloysius	AFOMENKY@uneca.org ;
5	UNECA-African Climate Policy Centre	Ethiopia	Musa	Miriam	MMUsa@uneca.org
6	UNECA-African Climate Policy Centre	Ethiopia	Sokona	Youba	YSokona@uneca.org
7	UNECA-African Climate Policy Centre	Ethiopia	Webb	Jeremy	JWebb@uneca.org
8	Addis Ababa University	Ethiopia	Mengistu	Gizaw	gizaw_mengistu@gmx.net
9	African Field Epidemiology Network	Uganda	Gitta	Sheba	sgitta@afenet.net
10	African Union Commission	Ethiopia	Tumusiime	Rhoda Peace	TumusiimeR@africa-union.org
11	African Union Commission	Ethiopia	Kagamba Singoma	Julius	SingomaJ@africa-union.org
12	CDC Taiwan, Liason Office South Africa	South Africa	Chia-En Lien	Allen	allenlientw@gmail.com
13	Centre de Suivi Ecologique	Senegal	Ndione	Jacques-André	jacques-andre.ndione@cse.sn
14	Christian Aid	Ethiopia	Haile G/Mariam	Abebe	AHaile@christian-aid.org
15	Climate and Health Working Group- Ethiopia	Ethiopia	Girma	Abenet	abenetgirma@gmail.com
16	Climate and Health Working Group- Ethiopia	Ethiopia	Mihretie	Abere	AMihretie@uneca.org
17	Climate Change Forum-Ethiopia	Ethiopia	Jember	Gebbru	gebru_j@yahoo.com
18	ClimDev Africa Consultant	Tunisia/France	Boulahya	Mohammed Sadeck	msb_africa@yahoo.com ; climdevafrica@gmail.com ; msboulahya@yahoo.fr
19	Department for International Development	Ethiopia	McCarthy	Mike	m-McCarthy@dfid.gov.uk
20	Embassy of Portugal	Ethiopia	Pires	Maria Guerra	embportaddis@gmail.com
21	Embassy of the Netherlands	Ethiopia	de Jong	Marius W.	marius-de.jong@minbuza.nl
22	Ethiopian Health and Nutrition Research Institute	Ethiopia	Gemeda	Adugna Woyessa	adugna.wayessa@gmail.com ; adugnaf@yahoo.com
23	Ethiopian Red Cross Society	Ethiopia	Aragie	Yimer	yimeraragie@yahoo.com
24	European Union Delegation to the African Union	Ethiopia	Nilsson	Susanna	Susanna.NILSSON@eeas.europa.eu
25	Federal University of Technology, Minna	Nigeria	Matazu	Mansur	mbmatazu@futminna.edu.ng ; environmentalcare@yahoo.com

26	Food Security and Sustainable Development Division, UNECA	Ethiopia	Dioné	Josué	JDione@uneca.org
27	Food Security and Sustainable Development Division, UNECA	Ethiopia	Persson	Atkeyelsh	apersson@uneca.org
28	Food Security and Sustainable Development Division, UNECA	Ethiopia	Emiru	Nega	nemiru@uneca.org
29	GIZ	Ghana	Hammond	Maxwell	Maxwell.hammond@giz.de
30	GIZ	Ghana	Till	Holger	holger.till@giz.de
31	GIZ	Germany	Wolf	Lena	lena.wolf@giz.de
32	Health and Climate Foundation	Switzerland	Jancloes	Michel	michel.jancloes@gmail.com
33	Health Limited	Ethiopia	Iyasu	Dagmawi	iyasud@phcdtss.com
34	Health Protection Agency	UK	Cichowska	Anna	Anna.Cichowska@hpa.org.uk , Barbara.Wilde@hpa.org.uk
35	ICF MACRO	USA	Ye	Yazoume	YYe2@icfi.com , Yazoume@gmail.com
36	IGAD Climate Prediction and Applications Centre	Kenya	Oludhe	Christopher	coludhe@icpac.net
37	International Food Policy Research Institute	Ethiopia	Asenso-Okyere	Kwadwo	K.Asenso-Okyere@CGIAR.ORG
38	IFRC-East Africa	Tanzania	Waruhiu	Judy	Judy.waruhiu@ifrc.org
39	International Livestock Research Institute	Ethiopia	Gérard	Bruno	b.gerard@cgiar.org
40	Institute of Biodiversity Conservation	Ethiopia	W/Tenssay	Zelege	otense2002@yahoo.co.uk
41	International Research Institute for Climate and Society	US	Connor	Stephen	sjconnor@iri.columbia.edu
42	International Research Institute for Climate and Society	US	Lyon	Bradfield	blyon@iri.columbia.edu
43	International Research Institute for Climate and Society	US	Omumbo	Judy	jomumbo@iri.columbia.edu
44	International Research Institute for Climate and Society	US	Platzer	Barbara	bplatzer@iri.columbia.edu
45	International Research Institute for Climate and Society	US	Thomson	Madeleine	mthomson@iri.columbia.edu
46	International Water Management Institute/ International Foundation for Science	Ethiopia	Kibret	Solomon	s.kibret@gmail.com
47	Kenya Medical Research Institute	Kenya	Githoko	Andrew	githoko@yahoo.com
48	Kenya Met Department	Kenya	Waweru	Samuel	waweru59@yahoo.com
49	MACEPA/PATH	Ethiopia	Getachew	Assefaw	Agetachew@path.org
50	Ministry of Agriculture, Ethiopia	Ethiopia	Getachew	Makonnen	makjinka@gmail.com
51	Ministry of Health, Ethiopia	Ethiopia	Berhane	Frehiwot	frehiwot.berhane@gmail.com

52	Ministry of Health, Ethiopia	Ethiopia	Mamo	Dereje	derejem2005@gmail.com
53	Ministry of Health, Kenya	Kenya	Nzioka	Solomon	nziokas@afro.who.int ; nzioka_sm@yahoo.com
54	Ministry of Health, Madagascar	Madagascar	Nivoarisoa	Vololoniaina	zafymanou@hotmail.com
55	Malaria Research and Training Centre	Mali	Sogoba	Nafomon	nafomon@mrtcbko.org ; Nafomon@icermali.org
56	National Met Agency, Ethiopia	Ethiopia	Asefa	Kidane	kidaneasefa@gmail.com
57	National Met Agency, Ethiopia	Ethiopia	Gezahegn	Girmaw	girmaw.bogale@gmail.com
58	National Met Agency, Ethiopia	Ethiopia	Hailemariam	Kinfe	kinfe_hm@yahoo.com
59	National Met Agency, Ethiopia	Ethiopia	Wudneh	Hailu	forhailuwpro@yahoo.com
60	National Met Agency, Swaziland	Swaziland	Shongwe	Mxolisi	me_shongwe@yahoo.com
61	National Met Office, Burkina Faso	Burkina Faso	Yaka	Pascal	Pascal_yaka@yahoo.fr
62	National Met Office, Madagascar	Madagascar	Raholijao	Nirivololona	niriraholijao@gmail.com
63	National Met Office, Madagascar	Madagascar	Ramiandrisoa	Anna Voahangy	voahangy_ramiandrisoa@yahoo.com
64	National Weather Service, Senegal	Senegal	Ndiaye	Ousmane	ousmane@iri.columbia.edu
65	Network of Climate Journalists for the Greater Horn of Africa	Uganda	Luganda	Patrick	patrick_luganda@yahoo.com ; necjogha@yahoo.com
66	Noguchi Memorial Institute for Medical Research	Ghana	Wilson	Michael	MWilson@noguchi.mimcom.org ; miki.mo000@gmail.com
67	Noguchi Memorial Institute of Medical Research	Ghana	Boakye	Daniel	DBoakye@noguchi.mimcom.org
68	Oxfam America	Ethiopia	Fikiru	Nazreth	nfikru@oxfamamerica.org
69	Packard Foundation	Ethiopia	Haile	Sahlu	shaile@packard.org
70	Population, Health, and Environment Ethiopia Consortium	Ethiopia	Teklu	Negash	pheethiopia@gmail.com
71	PMI/USAID	Ethiopia	Teka	Hiwot	HTeka@usaid.gov
72	School of Public Health, Addis Ababa University	Ethiopia	Deressa	Wakgari	deressaw@yahoo.com
73	School of Public Health, Addis Ababa University	Ethiopia	Mitikie	Getnet	getnetmk@gmail.com
74	Sus-Dev Africa	Senegal	Flint	Lawrence	lawrence.flint@gmail.com ; lawrencesflint@yahoo.com
75	Tanzania Met Agency	Tanzania	Chang'a	Ladislaus	changa60@hotmail.com
76	Tanzania Met Agency	Tanzania	Kabelwa	Hamza	hkabelwa@meteo.go.tz
77	Tanzania Met Agency	Tanzania	Kijazi	Agnes	kijazi@meteo.go.tz ; met@meteo.go.tz
78	UK Met	UK	Elliott	Wayne	wayne.elliott@metoffice.gov.uk

79	UK Met	UK	Liggins	Felicity	felicity.liggins@metoffice.gov.uk ;
80	UK Met/University of Exeter	UK	Bloomfield	Dan	dan.bloomfield@metoffice.gov.uk
81	UNDP AAP	Senegal	Cundale	Keith	keithc@unops.org
82	UNDP AAP	Senegal	Intsiful	Joseph	josephi@unops.org
83	UNDP AAP	Ghana	Mwebaza	Rose	mwebazarose@gmail.com
84	UNDP AAP	Senegal	Wilson	Dale	DaleW@unops.org
85	UNECA, African Center for Gender and Social Development	Ethiopia	Yousif	Hassan	hyousif@uneca.org
86	University of Botswana	Botswana	Chimbari	Moses	mjchimbari@gmail.com
87	University of Exeter	UK	Bailey	Trevor	T.C.Bailey@exeter.ac.uk ;
88	University of Exeter	UK	Chamberlain	Natasha	nac204@exeter.ac.uk
89	University of Exeter	UK	Sabel	Clive	C.Sabel@exeter.ac.uk
90	University of Exeter	UK	Smith	Lauren	lts202@exeter.ac.uk
91	University of Ghana	Ghana	Osei-Akoto	Isaac	ioseiak@ug.edu.gh ; iokwame@yahoo.co.uk
92	University of Ghana Medical School	Ghana	Essel	Ama	amakwessel@yahoo.co.uk
93	University of Greenwich, UK	UK	Cheke	Robert	robert.cheke@btinternet.com
94	University of Johns Hopkins	Senegal	Tall	Arame	arametall@gmail.com
95	University of Maryland	US	Elnaiem	Dia	dialnaiem@gmail.com
96	University of Nairobi, Inst-CAE	Kenya	Gatari Gichuru	Michael James	mjgatari@yahoo.com ; mgatari@uonbi.ac.ke
97	University of Reading	UK	Grimes	David	d.i.f.grimes@reading.ac.uk
98	WHO- Ethiopia Country Office	Ethiopia	Terfa	Waltaji	waltajit@et.afro.who.int
99	WHO- Ethiopia Country Office, National Malaria Control Prg	Ethiopia	Olana	Dereje	derejeo@et.afro.who.int
100	WHO/TDR	Switzerland	Touré	Yeya	tourey@who.int
101	WHO-AFRO	Congo	Bagayoko	Magaran	bagayokom@afro.who.int
102	WHO-AFRO	Zimbabwe	Katikiti	Samson	katikitis@zw.afro.who.int
103	WHO-AFRO	Congo	Nsue-Milang	Diosdado-Vicente	nsuemilangd@afro.who.int
104	WMO	Switzerland	Kootval	Haleh	HKootval@wmo.int

Appendix 3: Steering Committee Members

Ethiopian Climate and Health Working Group

The Ethiopian CHWG was established in February 2008. The CHWG aims at fostering stronger collaboration between the climate and health community so that climate information is effectively used for protecting the Ethiopian people from climate-related health problems such as malaria, meningitis and acute watery diarrhea. Developing effective and functional means for the health sectors to routinely use appropriate climate information for prevention and control of climate-sensitive diseases is among its primary objectives.

Since its establishment, the Ethiopian CHWG has accomplished activities ranging from the organisation of technical meetings and workshops (e.g., MERIT workshop in December, 2008; Stakeholders workshop on Weather and Climate Impact on Community Health and Public Health Services in June 2010), the implementation of trainings (e.g., Google Earth/Maps Training in November 2009; Training of Professionals on Climate and Health in November-December 2009), the support of a Masters student from Jimma University whose theses was on climate and malaria, February 2010), to the establishment of the MERIT-Ethiopia case study and the associated development of four project proposals on; risk assessments for meningitis epidemics, assessment of the socio-economic burden of meningococcal meningitis in Ethiopia, education, training and research on meningitis, and strengthening surveillance and database system of meningitis.

The United Nations Economic Commission for Africa - African Climate Policy Centre

UNECA-ACPC is a hub for demand-led knowledge base on climate change in Africa. We are an African centre addressing the need for greatly improved climate information for Africa and strengthening the use of such information for decision making, by improving analytical capacity, knowledge management and dissemination activities. UNECA-ACPC is an integral part of the Climate for Development in Africa (ClimDev- Africa) programme, which is a joint initiative of the African Union Commission (AUC), the United Nations Economic Commission for Africa (UNECA) and the African Development Bank (AfDB).

UNECA-ACPC has three broad activity areas around which its current work programme is arranged including: 1) knowledge generation, sharing and networking that consist of research, knowledge management and peer learning, and outreach activities; 2) advocacy and consensus building; and 3) advisory services and technical cooperation, which comprise capacity mobilisation, capacity building and technical assistance.

World Health Organization- Africa Regional Office

The WHO is the specialized United Nations agency for global health matters. The mandate of the Organization, defined by its Member States in the Constitution adopted in 1946, determines the objectives and functions of the organization, its membership and its organs.

The WHO African Region is one of the six regions of WHO. The mission of WHO AFRO is the attainment by all peoples of the highest level of health. As defined by the WHO Constitution: "Health is a state of complete physical, mental and social well-being and not merely the absence of diseases and infirmity."

The core functions of WHO-AFRO are:

- To provide leadership on matters critical to health and engaging in partnerships where joint action is needed;
- To shape the research agenda and stimulating the generation, translation and dissemination of valuable knowledge;
- To set norms and standards, and promoting and monitoring their implementation;
- To articulate ethical and evidence-based policy options;
- To provide technical support, catalyzing change, and building sustainable institutional capacity; and
- To monitor the health situation and assessing health trends.

UNDP- Africa Adaptation Programme

The Africa Adaptation Programme (AAP) was launched in 2008 by UNDP, in partnership with UNIDO, UNICEF and WFP, with funding of US \$92 million from the government of Japan. It is a strategic initiative to foster more informed climate adaptation decision-making and more effective implementation of those decisions in each of the 20 participating countries. The AAP supports countries in their development of capacities to identify climate-related risks to their national development priorities, and design and implement holistic climate-resilient adaptation and disaster risk reduction plans to address these risks. Support for engagement with the AAP is provided by UNDP's country office in each of the participating countries: Burkina Faso, Cameroon, Congo, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Malawi, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Tanzania and Tunisia. Africa-wide management and coordination of the AAP is provided by the Inter-Regional Technical Support Component (IRTSC) located in Dakar, Senegal. Backstopping the

entire operation is the AAP's cross-practice approach integrating UNDP expertise from its key practice areas – including poverty reduction, gender mainstreaming, governance, knowledge management, and policy and planning – to deliver a comprehensive suite of technical assistance to the 20 AAP countries.

The Inter-Regional Technical Support Component (IRTSC) provides a package of support to the country teams to link the country projects together. All countries benefit from and contribute to a much wider knowledge base founded on best practices. The support extends to both UNDP geographic regions involved: sub-Saharan Africa, led by the Regional Bureau for Africa (RBA), and the Arab States bordering the Mediterranean Sea, led by the Regional Bureau for Arab States (RBAS). The technical support package is a key mechanism to deliver expertise, training, and tools to countries as they develop and implement their country projects. The IRTSC has the following key strategic foci:

1. Facilitate country access to best available data and information on climate variability and impacts each country.
2. Support institutional and leadership development through structured and specific interventions that are responsive to the unique circumstances and needs of each country.
3. Make available to countries best practices, experiences and technologies for facilitating the implementation of climate resilient policies in priority sectors.
4. Provide countries with information on innovative financing options and facilitate key partnerships.
5. Create a region-wide knowledge and learning mechanism to raise awareness, engage stakeholders, inform decision makers and promote exchange and cooperation between countries.

The programme objectives of the AAP aims to enhance the adaptive capacity of vulnerable countries to climate change risks, promoting early adaptation through evidence-based solutions and initiatives for action. Further, the AAP aims to lay the foundation for long-term investment to increase resilience to climate change across the African continent. In approaching this goal, AAP provides technical support and services to countries through strengthening long term planning to enable countries to manage both existing and future risks associated with climate change, building effective leadership and institutional frameworks for enhanced coordination and cohesion of programmes, supporting the piloting of adaptation initiatives in the field, identifying a range of financing options for sustained adaptation, building knowledge management systems and promoting information sharing.

UK Met Office

The Met Office is the UK's National Weather Service and is one of the world's leading weather forecast centres, with an international reputation for scientific excellence. The Met Office provides both the public weather service for the UK government and a commercial service of value-added met products to UK and overseas businesses. Through the provision of weather forecasting services to the public and to critical government operations such as health and defence, the Met Office carries out activities of strategic national and international importance.

Met Office forecasts are generated 24 hours a day, 365 days a year and guide the day-to-day decisions of the general public as well as playing a crucial role in enhancing the protection of life, property and UK national infrastructure against the effects of severe weather events. It delivers essential services to front line defence customers and many parts of government, as well as to many private sector customers. It is a science led institution with a global reputation for excellence and has impressive links with international academia.

The Met Office is also at the forefront of climate change research, playing a key role in helping determine the national and international response to climate change through involvement in the most significant collaborative projects globally including the Intergovernmental Panel on Climate Change (IPCC).

University of Exeter

The University of Exeter has campuses in Devon and in Cornwall, in the south west of the United Kingdom. In 2010, it was placed as the 62nd fastest growing business in Europe, and the 23rd in the UK. Its mission is to help shape the future by extending the boundaries of knowledge for the benefit of individuals, society and the environment. In 2010 the University was placed 6th nationally amongst 'full service' universities in the 2010 National Student Survey, and it was ranked 12th and 13th in the latest Times and Guardian league tables respectively.

A key element of its strategy is investment in science, through an investment of £230 million. The Science Strategy is a new way forward for science at the University of Exeter. Its interdisciplinary approach is breaking down barriers between academic schools and bringing staff together to tackle some of the big issues of our time, through five key themes of activity, which include Climate Change and Sustainable Futures, and Translational Medicine, personalised healthcare and public health.

International Research Institute for Climate and Society

The mission of the IRI is to enhance society's capability to understand, anticipate and manage the impacts of climate in order to improve human welfare and the environment, especially in developing countries. The IRI conducts this mission through strategic and applied research, education, capacity building, and by providing forecasts and information products with an emphasis on practical and verifiable utility and partnership.

The IRI was founded in 1997 on the belief that scientific breakthroughs in our understanding of climate can help developing countries defeat persistent and often devastating problems. Climate has an impact on health, water, agriculture and most other vital sectors, giving us the opportunity to help societies confront a whole range of hardships-from malaria epidemics to food shortages. Population growth, changing livelihoods, rapid urbanisation, and climate uncertainty put pressure on resources and ecosystems. Under these heightened stress conditions even minor climate fluctuations are significant.

The IRI is a catalyst for the creation and provision of science that meets the needs of the developing world. We collaborate with partners in Africa, Asia and Latin America, with local institutions that understand local needs and capacity. Our research and tools are "demand-driven" in that they help solve specific development, adaptation and research management issues.

Facilitation of Partnership Meeting

Health and Climate Foundation

The Health and Climate Foundation is a non-governmental organization (USA 501c)) that bridges the health and climate communities to catalyze new opportunities to reduce the impact of climate sensitive diseases. The HCF focuses on practical outcomes and achieves its mission by leveraging public and private partnerships, facilitating dialogue and building capacity to deliver solutions in vulnerable communities around the world.

Appendix 4: Agenda for Partnership Meeting

Partnership meeting for steering group, donors and targeted participants Chaired by Dr. Michel Jancloes (HCF) (Coffee provided in meeting room)		
09:00 am – 10:00 am	Steering committee and partner meeting to discuss workshop recommendations - report <ul style="list-style-type: none"> Review of recommendations from the workshop- Judy Omumbo What is needed leading to COP17 South Africa - Dr. Youba Sokona Open discussion 	Rapporteur: Abenet Girma
10:00 am – 11:00 am	Roundtable contributions towards “Road Map” for Reducing Climate Risks for Public Health in Africa” <ol style="list-style-type: none"> 1. Identification of needs-driven climate and health priorities for Africa: Action items from workshop recommendations and other sources 2. Potential areas of work including: <ul style="list-style-type: none"> A dialogue on climate and health needs Knowledge generation, sharing and networking (e.g. gathering and evaluating evidence for policy and practice) Advocacy and consensus building Capacity mobilization, building and technical support Research strengthening 3. Identification of natural synergies around specific sets of priorities and recommendations and identification of gaps. <ul style="list-style-type: none"> Alignment and coordination of projects and activities 4. Identification of scale of action (global, regional, national, local). 5. Prioritization of recommendations in terms of an action plan <ul style="list-style-type: none"> Immediate activities going forward (e.g. reviews and reporting for COP17) Timetabling Evaluation Towards funding. 	Rapporteur: Judy Omumbo
11:00 am – 12:30 pm	Expected Immediate Outcomes <ul style="list-style-type: none"> Meeting report (contributions, coordination mechanism, immediate resourcing for Road Map feeding into COP17). Linking climate and health priorities with activities and funding. 	Rapporteur: Judy Omumbo
12:30 pm – 2:00pm	<i>Lunch Provided</i>	
<i>(The UNCC Briefing Room is available in the afternoon if necessary)</i>		

Appendix 5: Partnership Meeting Participants List

	Affiliation	Country Based	Last Name	First Name	Email
1	African Centre of Meteorological Applications for Development	Niger	Kane	Cheikh	ckane@acmad.org ; tawenafa@gmail.com
2	UNECA-African Climate Policy Centre	Ethiopia	Musa	Miriam	MMUsa@uneca.org
3	UNECA-African Climate Policy Centre	Ethiopia	Sokona	Youba	YSokona@uneca.org
4	UNECA-African Climate Policy Centre	Ethiopia	Webb	Jeremy	JWebb@uneca.org
5	Food Security and Sustainable Development Division, UNECA	Ethiopia	Persson	Atkeyelsh	apersson@uneca.org
6	CDC Taiwan, Liaison Office South Africa	South Africa	Chia-En Lien	Allen	allenlientw@gmail.com
7	Climate and Health Working Group-Ethiopia	Ethiopia	Girma	Abenet	abenetgirma@gmail.com
8	Climate and Health Working Group-Ethiopia	Ethiopia	Mihretie	Abere	AMihretie@uneca.org
9	Health and Climate Foundation	Switzerland	Jancloes	Michel	michel.jancloes@gmail.com
10	International Research Institute for Climate and Society	US	Connor	Stephen	sjconnor@iri.columbia.edu
11	International Research Institute for Climate and Society	US	Omumbo	Judy	jomumbo@iri.columbia.edu
12	International Research Institute for Climate and Society	US	Platzer	Barbara	bplatzer@iri.columbia.edu
13	International Research Institute for Climate and Society	US	Thomson	Madeleine	mthomson@iri.columbia.edu
14	International Research Institute for Climate and Society	US	Lyon	Brad	blyon@iri.columbia.edu
15	UK Met	UK	Elliott	Wayne	wayne.elliott@metoffice.gov.uk
16	UK Met University of Exeter	UK	Bloomfield	Dan	dan.bloomfield@metoffice.gov.uk
17	University of Exeter	UK	Liggins	Felicity	felicity.liggins@metoffice.gov.uk >; felicity2.liggins@live.uwe.ac.uk >
18	UNDP AAP	Senegal	Intsiful	Joseph	josephi@unops.org
19	Sus-Dev Africa/ UNDP AAP	Senegal	Flint	Lawrence	lawrence.flint@gmail.com ; lawrencesflint@yahoo.com
20	University of Ghana	Ghana	Osei-Okoto	Isaac	ioseiak@ug.edu.gh ; iokwame@yahoo.co.uk
21	WHO-AFRO	Congo	Bagayoko	Magaran	bagayokom@afro.who.int
22	WHO-AFRO	Congo	Nsue-Milang	Diosdado-Vicente	nsuemilangd@afro.who.int
23	WHO-CO Ethiopia	Ethiopia	Terfa	Waltaji	waltajit@et.afro.who.int
24	EU Delegation to the African Union Commission	Ethiopia	Nilsson	Susanna	susanna.nilsson@eeas.europa.eu
25	Embassy of Portugal in Ethiopia	Ethiopia	Guerra Pires	Maria	embportaddis@gmail.com

Appendix 6: Abstracts

Monday 4th April 2011

A Decade of Progress: Advances in Climate and Health Research in Africa

Building a Climate Smart Community of Practice: Lessons Learned

Judy Omumbo, IRI

The past decade has seen an increased interest in and understanding of the impacts of climate variability and trends on health and the recognition that these impacts are likely to worsen in Africa's with climate change and an increasing likelihood of extreme climate events. Today, climate is central to Africa's development agenda making the need for improved climate informed policies, adaptation practices, climate services, data and research to support decision making for climate resilience. Building the capacity of the health and climate communities of African countries to understand and to use climate/health information for making decisions is a key component of building resilience to climate's negative impacts in the future.

This presentation describes the IRI's past decade of experience of the decade and programmes that are aimed towards building a "Climate Smart" community of practice in climate and health from the perspective of an alumnus of IRI's first Climate Prediction and Health training that took place in Bamako, Mali 1999.

The Pan African Programme on Health Adaptation to Climate Change

Margaran Bagayoko, WHO AFRO

Global climate change is directly affecting public health in the WHO African region. Climate-change health impacts are translated by increased vulnerability to air, water and vector borne diseases, as well as malnutrition. It has been demonstrated that the majority of African countries are ill-prepared to cope with the negative impacts of climate variability and change. African governments have made firm commitments in various forums to tackle climate change with an emphasis on health adaptation. The Pan African Programme for Health Adaptation to Climate Change is proposed to provide a scientifically and evidence-based coordinated response to climate change adaptation needs of African countries that supports the commitments and priorities of African Governments. The main objective of the Programme is to contribute to the minimisation of the adverse public health effects of climate change in Africa. The Programme will facilitate implementation of essential public health and environment interventions for the management of both acute and long term health risks resulting from climate change. The Programme interventions are grouped in 6 components as follows: baseline risk and capacity assessment; capacity building; integrated environment and health surveillance; response; research, and monitoring and evaluation. The minimum required investment for the Programme has been estimated to be US\$ 0.15 per capita per year.

Climate Data, Forecasting and Tools

Ousmane Ndiaye, National Weather Service of Senegal/IRI Adjunct

Today in Addis, April 2010, as we look back to 1999, we can say with assurance that over the past 10 years many things have been achieved relating to climate information, including improved data availability and enhanced forecasting systems, capabilities and tools. In the observing system, despite continued gaps in coverage and the loss of some stations, the overall trend is an increase in the number of observing stations as has been seen clearly within the WMO GCOS program. Evenly distributed remote sensing data from satellites now covers more than 30 years, which allows for an improved analysis of many atmospheric phenomena. Climate forecasts have also evolved considerably and we have a better understanding of the climate system, thanks in part to field campaigns (e.g. AMMA). Today we even have the luxury to run complex climate models on our laptops. Today there are also many groups, which provide support for the use of climate models, including training and the availability of numerous tutorial materials. Today many weather services in Africa have the capacity of receiving numerical model outputs four times a day from many centers throughout the world through the internet (e.g. puma). Some African meteorological services have also moved from just providing information for aviation, evolving into agencies which provide broader services to society. Nowadays they are increasingly accepting the challenge to provide relevant climate information to the population as well, not just weather information. Most importantly, a new paradigm of providing climate services has emerged with climate professionals now eager to 'sell' their products to the user community and are more demand driven. New tools are making climate data processing and analysis easier to better meet tailored user needs (e.g. CPT). Several training courses on climate and health are now taking place like the "Global Climate Change and Health" course at the Liverpool School of Tropical Medicine and the "Summer Institute on Climate Information for Public Health" at the IRI at Columbia University in New York.

Climate Risk Management

Stephen Connor, IRI

Climate may impact on health through a number of direct and indirect mechanisms, these include: heat or cold stress, aggravating respiratory and circulatory conditions; infectious disease, air quality, water quality, food security; and extreme events can lead to humanitarian disasters. The lay public is often confused by terms climate change, climate variability and weather extremes. While any of these may impact on health they refer to impacts at different time scales and it is important for policy makers and public health practitioners to be aware of this when considering the risks, or opportunities for use of climate information in decision making. A Climate Risk Management approach (CRM) aims to demonstrate where and how climate science and observation can improve decision-making in climate sensitive development sectors - including public health.

Theme 1: Policy

Regional Climate Outlook Forums, the Role of the African Regional Climate Centres and the Need to Improve Climate Data Availability **Adama Alhassane Diallo, ACMAD**

Seasonal forecasts fill the gap in climate data for decision-making by providing refined information on climate and weather, particularly on hazards, for impact mitigation and adaptation to climate variability and change. They contribute to the capacity building of the National Meteorological and Hydrological Services (NMHSs) and arose as a regional response to the major 1997-1998 El Nino event. The concept of the Climate Outlook Forums (COFs), borne out of Africa, is supported by many international institutions and is an important component of the United Nations Framework Convention on Climate Change (UNFCCC) for adaptation to climate change. It is conducted now on all the continents. In Africa, each sub region elaborates a seasonal forecast and hosts a COF: the PRESAO, PRESANOR, PRESAC, GHACOF and SARCOF respectively for West, North, Central, Eastern and Southern Africa. The COFs and the process of seasonal forecasting includes two parts: the first one (5-10 days) is devoted to NMHS staff capacity building in seasonal forecasting, followed by the forum itself (1-2 days), during which the consensus seasonal forecast is elaborated and then disseminated. During this part of the forum, the previous year's seasonal forecast is also assessed. The consensus regional seasonal forecasts are probabilistic with 3 categories of rainfall (Above Normal, Normal and Below Normal). Many institutions use the forecasts to plan their activities. The development of consensus seasonal forecasts requires climate data provided by NMHSs, as well as by global climate centres. Unfortunately, in Africa, the meteorological observations are sparse and networks obsolete and not well maintained. As a consequence, data are not well organised and insufficient. Access to data is also variable, negotiated individually with each country. The disparity in capacity of the different NMHSs in Africa requires support from regional centres to build institutional, organisational as well as technical and scientific capacity building frameworks to allow the provision of reliable and targeted services and to enhance their use by beneficiaries.

Les fora régionaux de prévision saisonnière: besoin d'amélioration de la disponibilité des données et rôle des centres régionaux [FRENCH] **Adama Alhassane Diallo, ACMAD**

La prévision saisonnière comble les insuffisances des données climatologiques pour la prise de décision par la fourniture d'informations élaborées sur le climat et le temps, notamment sur les aléas, pour la réduction et l'adaptation à la variabilité et au changement climatiques. Elle contribue au renforcement des capacités des SMHN nationaux et constitue une réponse régionale à l'évènement majeur, El Niño (1997-1998). Le concept de prévision saisonnière, né en Afrique, a le soutien de nombreuses institutions internationales et constitue une composante importante

des outils de la CCNUCC pour l'adaptation au changement climatique. Elle est conduite sur tous les continents. En Afrique, chaque sous-région conduit une prévision saisonnière: PRESAO, PRESANOR, PRESAC, GHACOF et SARCOF respectivement pour l'Afrique de l'Ouest, du Nord, du Centre, de l'Est et Australe. L'exercice de prévision saisonnière comporte 2 phases : la 1ère phase de 5 -10 jours est consacrée à la formation du personnel des SMHN et la 2ème qui dure 1-2 jours est véritablement le forum au cours duquel la prévision saisonnière consensuelle est élaborée et disséminée. C'est aussi à cette phase que l'évaluation de la prévision saisonnière de l'année antérieure est évaluée. La prévision régionale consensuelle est exprimée comme une prévision probabilistique avec 3 niveaux (Humide, Normal et Sec). Elle est utilisée par de nombreuses institutions pour planifier leurs actions et activités sur le terrain. L'élaboration de la prévision saisonnière consensuelle nécessite des données climatologiques fournies par les SMHN ainsi que des données issues des centres mondiaux. Malheureusement les réseaux d'observation en Afrique de très faible densité sont obsolètes et mal entretenus. La conséquence est que les données sont mal organisées et insuffisantes. Leur accès est régi par des conditions et modalités variables mises en place par chaque Etat. La disparité des capacités des SMHNs en Afrique nécessite que les centres régionaux appuient les SMHN pour la mise en place de cadres institutionnels, organisationnels et de renforcement de leurs capacités techniques et scientifiques tant pour la fourniture de services fiables et adaptés que pour une meilleure utilisation de ces services par les bénéficiaires.

The ClimDev-Africa Programme and UNECA-ACPC
Youba Sokona, UNECA-ACPC

The ClimDev Africa Programme is a joint initiative formed between the African Development Bank, the African Union Commission and the UN Economic Commission for Africa, which aims to improve climate information for Africa and the use of such information for decision-making. The African Climate Policy Centre, based in the UNECA, is the first up and running structure of the three key complimentary structures of the ClimDev Africa Program. Many factors of development in Africa affect health, including such things as the provision of clean drinking water, sanitation facilities as well as urbanisation. Furthermore good health across Africa is essential for development. Similarly climate change has major implications on development, through it's effects on such things as to food security and nutrition, our livelihoods and employment, and our social structures and culture. Altogether, climate change both directly and indirectly affects public health and understanding of the interrelationship of the two is essential to development. UNECA-ACPC intends for this workshop to inform its work programme for climate and health in Africa.

Implementation of Libreville Declaration, Health and Environment Ethiopia Issues and Challenges on Policies and Partnerships
Waltaji Terfa, WHO Ethiopia

The country constitution article 44 states that every citizen of the country has the right to live in healthy environment. Although, health and environment linkage is at embryonic stage, health and environment are addressed separately by many policies. With implementation of the Libreville Declaration on Health and Environment Linkage, Ethiopia has moved forward and produced a country Situation Analysis and Needs Assessment (SANA) including priorities needs using the established Strategic Alliance lead by MoH and EPA and brought together 16 government sectors including universities. The same team has currently planned to work on preparation of a Health and Environment Joint Action Plan for identified priority needs. The major challenges and issues identified with respect to policies and partnership were fragmentation, gaps, vacuum, conflict and limited capacities. For realisation of health and environment linkage implementation ownership (commitment and accountability), coordination/partnership/networking (harmonisation), resource mobilisation, Capacity building (institutional /system, technical and financial and technical) and feasibility area of linkage (identified through research) are very crucial. It is only through the above building blocks that all working together can be realised since the two sectors are very much dependent of one another.

Climate Vulnerability, Adaptation and Health Policy in Africa
Jeremy Webb, UNECA-ACPC

Climate vulnerability, development/underdevelopment, mitigation and adaptation and health are all very interrelated. Climate vulnerability affects the development prospects of a country, while a country's level of development or underdevelopment influences it's degree of vulnerability to climate. Furthermore, this influences the country's ability to mitigate and adapt to climate change. All of these three important factors have serious implications on the health of the population. Policies, which are exercised through plans, programs, legislation and administrative processes, govern the interplay of the above mentioned factors and ultimately, influence the health of the population. Proactive adaptation policies give offer the opportunity to turn adaptation from a response to climate change, into a development opportunity. Mitigation policies also present opportunities for improving the health of the population, through such things as the use of clean energy. The presentation asks: in order to go forward with climate and health policy, what are the implications of current research for such policy? and what principles shall we use to guide climate and health policy.

Theme 2: Practice

Health and Vulnerability to Climate Change: A Challenge to Social Resilience

Lawrence Flint, UNDP-AAP Consultant

A brief contextual review of how increasing climate change and variability poses risks to lives and livelihoods in rural and urban Africa with a focus on how human health is intertwined with a complex web of socio-ecological resilience yet is a largely overlooked aspect in the discourse on climate and development and adaptation planning to date. The talk will pose questions as to how to share knowledge between vulnerable communities, researchers and decision/policy makers and why health should be factored into proactive cross-sectoral adaptation planning and practice. Issues surrounding appropriate knowledge, basic skills, institutional capacity, financial resources and other barriers to mainstreaming health will be raised.

Leadership Transformation: An Example of Strategic Interventions for Helping Countries to Meet the Challenges of Climate Change

Keith Cundale, UNDP-AAP

Abstract not available.

Climate Training Opportunities within African Schools of Public Health: The FELTP Programme

Dr. Sheba Gitta, AFENET, and Richard Luce, FELTP

Africa, compared to other continents is likely to suffer most from climate change. Climate sensitive diseases and other public health threats are on the rise, hence the need for public health professionals who can exploit the opportunities which climate information provides to improve sustainable management of these events. Field Epidemiology and Laboratory Training Programmes (FELTPs) have been in existence in Africa since the early 1990s. FELTPs offer competency-based public health training that addresses local needs. Trainees learn by doing and gain hands-on experience through field practice which accounts for 70% time of the two year program. The African Field Epidemiology Network (AFENET) is a not-for-profit organisation and networking alliance of FELTPs with presence in over 16 African countries. It is dedicated to helping Ministries of Health in Africa build strong, effective and sustainable programmes and capacity to improve public health systems.

Opportunities for climate training

Since FELTPs are jointly owned by Ministries of Health and local universities, they offer a perfect forum for incorporation of climate health knowledge & skills into national health systems while universities can provide academic accreditation for the training. Climate information can be incorporated into the 2 year FELTP

postgraduate course, or 2 week-long Outbreak Investigation short course, or packaged as a standalone 'Climate for Health' short course. Short courses provide in-service training to frontline health workers and also offer continuous professional education.

FELTP graduates assume leadership positions in ministries of health, non-governmental organisations, and other health agencies. At the introduction of Integrated Disease Surveillance and Response (IDSR) in Africa, many of the persons who steered its implementation were FELTP graduates. Currently, FELTP graduates and trainees are involved in strengthening national surveillance systems and promotion of International Health Regulations (IHR). Therefore, they can be used to champion- the use of climate information and skills in public health decision making. As such, FELTP alumni associations serve as another point of entry to introduce use of climate information and skills for public health decision making.

African FELTPs have a high graduate retention (85%) in their respective home countries, with a majority working with MOH and local governments. This will result in a quick buildup of a critical mass of public health practitioners to drive use of climate information for public health planning and decision making. AFENET has a partnership with the International Research Institute for Climate and Society (IRI) at the Earth Institute of Columbia University to champion climate training for health in Africa. In the past, 22 African professionals have attended the IRI Climate summer course, 7 of whom were from Ethiopia and Kenya FELTPs. These can serve as trainers during the piloting of IRI's 'Climate Information for Public Health' curriculum in Africa. AFENET has strong relationships with Ministries of Health and can therefore engage them to gain buy-in for use of climate information for health.

In conclusion, FELTPs are well positioned to move climate training for public health from policy to practice; AFENET has the willingness, capacity and commitment to help make this a reality in Africa.

National CHWGs- Lessons from Ethiopia

Abere Mihretie, Ethiopian CHWG/Anti-Malaria Association (AMA)

This presentation aims to highlight the work of the Ethiopian Climate and Health Working Group (CHWG). The CHWG was established with the aim of bringing together the health and climate sectors so that the health community can make use of climate products and services for planning and decision-making. Through various workshops and meetings organised, the CHWG has contributed its part to raise the awareness of the health community with respect to utilizing climate information. In response to an identified need to build the capacity of health professionals, a training aimed at building the capacity of decision makers to analyze, interpret and integrate climate information into decision making was organised in collaboration with the IRI. Similarly, a workshop/training designed at examining the association between malaria transmission and climate variability over the last 6 years in Ethiopia was organised in collaboration with IRI. This innovative initiative is

important in a country like Ethiopia where inter-sectoral collaboration is lacking or at best poor. The equal and committed engagement of the two sectors has been identified as a difficulty to the progress of the CHWG. A better and strengthened partnership between key sectors and stakeholders deserves to be forged in the future. Increased attempts are expected from the Federal Ministry of Health in integrating climate related risk at institutional level into planning and decision making in the health sector.

Theme 3: Services and Data

Defining the Services We Need/WCC3

Wayne Elliott, UK Met Office

In Geneva in 2009, the World Meteorological Organisation (WMO) set out a framework for developing services relating to climate that could be used internationally. Since then, there has been much debate about how this should progress. This session will:

- introduce the context;
- challenge the health community to be proactive in articulating its needs;
- discuss how to develop health-relevant services that are demand driven.

Public Weather Services and Health in Africa

Haleh Kootval, WMO

The WMO PWS Programme was established in 1994 and has the role of bringing into focus the users of NMHSs' services through emphasis on communication, consultation and collaboration with the users to determine their requirements and then responding to those requirements to deliver services in support of safety of life, protection of property, and welfare and convenience. Health is an important user sector for PWS, with a growing awareness of the linkages between human health and weather and climate. However, there is a number of issues to consider in establishing relationships between the health sector (users) and NMHSs (providers) of meteorological services. These include: inadequate understanding of user needs by providers of the services, lack of awareness by users of available and potential services, and lack of capacities by some NMHSs to deliver timely and relevant services. These issues present important challenges to effectively deliver services.

To respond to these issues, the PWS Programme adopted Learning Through Doing (LTD), a capacity building approach to sustainable and long-lasting effect by maximizing the existing capabilities of WMO Members to deliver services. This is achieved through: improving communication with users and, working with them to develop and deliver an improved range of products and services suiting to their needs. The LTD approach was used by the PWS Programme to launch in partnership with a number of organisations notably WHO and IRI, several projects to start

dialogue, collaboration and partnership between NMHSs and public health sectors in Africa (Madagascar, Ethiopia, Burkina Faso, Mali, Mauritania, Niger, and Nigeria) and Latin America (Peru and Panama). In Madagascar, the project has led to the establishment of the Madagascar Climate and Health Working Group with the potential of creating similar working groups in West Africa. The projects have shown that the investment by WMO coupled with national dedication and enthusiasm have resulted in the delivery of better services to the health sector.

Developing 10-day Temporal Resolution Climatologies for Ethiopia **Kinfe Hailemariam, NMA Ethiopia**

Climate data are major inputs to study past and future climate variability and change and many other applications. Unfortunately, high quality data are rarely available in Africa. Stations are located only in accessible areas of town and cities. Station data also suffer from data gaps and quality. Different sources produce gridded and satellite climatologies. However, they are mostly on monthly basis and have coarse spatial resolution. In this work, an attempt is made to produce a 10 daily climatology at 10km spatial resolution for rainfall and temperature of Ethiopia. For the rainfall, more than 600 and for temperature more than 300 stations data has been used. Both rainfall and temperature station data has been gridded using Regression Kriging interpolation method. Satellite rainfall estimation for 1983-2010 has been produced using TAMSAT algorithm from TIR data. A combined product of satellite rainfall and gauge data is produced in 27 years. Validation of rainfall products shows that the products are of high quality. For temperature, MODIS satellite products since 2002 are available. However, the calibration and using of these data to merge with station data is yet to be done. The whole process involves extensive data quality control, satellite data generation, calibration, gridding and merging of satellite and station data, which was carried in a collaborative work of International Research Institute for Climate and Society, the Earth Institute at Columbia University, USA; Department of Meteorology, University of Reading, UK and National Meteorological Agency, Ethiopia. All the products will be available on National Meteorological Agency of Ethiopia website with geo-statistics tools to view and process the data.

Theme 4: Research and Education

Thoughts on Connecting Climate and Health **Bradfield Lyon, IRI**

This presentation lays out some overarching concepts/questions such as:

- Distinguishing weather from climate and why it matters.
- Climate variations on different time scales and climate "change",
- Types of data that are needed to identify linkages.

WHO-TDR Work Plan for Research and Capacity Building in Climate and Health

Yeya Touré, WHO-TDR

Overall objective: To undertake interdisciplinary research towards the understanding, prevention and mitigation of the impact of climate and environmental change on vectors and vector-borne diseases.

Specific objectives:

- To assess the relationships between the effects of climate and environmental change and health for various vectors and vector-borne diseases and under a range of eco-climatic and environmental conditions
- To develop practical decision-support processes and tools that can enable policy and decision makers to manage climate and environment-related risks associated with vectors and vector-borne diseases
- To build capacity in developing countries for the creation of evidence, products and tools for use in public health decision-making for disease control initiatives that are adaptive to climate and environmental changes.

Priority considerations for the workshop

- Develop a strategy for continuous assessment of country needs
- Promote multidisciplinary and multi-sectoral research for assessment of impact of climate change on health and development of adaptation/mitigation strategies
- Strengthen capabilities for generation, interpretation and use of climate and environmental change-related health data for informed policy decision making for adaptation/mitigation strategies
- Build and enhance partnerships between the different stakeholders for addressing health adaptation to climate variability

Challenges in Communicating Climate and Health

Patrick Luganda, Network of Climate Journalists for the Greater Horn of Africa.

Defining the role of the media in weather, climate and health is crucial in understanding the importance of the media in light of the future enhancement of adaptation, mitigation, public awareness and impact reduction of the negative impacts of Climate and weather globally.

This understanding also helps set the stage for closer collaboration between stakeholders seeking action for public reaction to weather, climate and health information.

The Role of the media can best be articulated by understanding what the media is able to achieve, influence, control, determine. Let us consider the following simple questions to better understand the issues at hand.

- What is this media?
- Who controls the media?

- What is the impact of the media?
- Where do we find the media?
- Why should we use media?
- When is it appropriate to use the media?
- How do we use the media?

For instance, let us demonstrate the role of the media from the statement below:

The past 12 years have been the hottest ever recorded on earth and communities all over the world have been hit by unprecedented floods, wildfires, droughts and tropical storms.

Integrating the Sectors- Building Effective Partnerships

Fostering Collaboration between Regional Institutions

Joseph Intsiful, UNDP-AAP

The relationship between climate and health is well established but the extent of climate change impact of on our health management systems is not well understood. The fact that climate is regional in nature implies climate-induced health impacts, to a large extent, are also regional in nature. Therefore, addressing the challenges that climate change and its impacts pose to health require a regional collaborative approach in developing appropriate adaptation strategies to manage health impacts. More importantly, growing resource and budget constraints have increased the need for, and willingness of, institutions to work together. This presentation discusses how fostering collaboration between regional institutions will enable African governments to better prepare and manage climate-induced health impacts.

Partnerships for the Control of Meningococcal Meningitis

Madeleine Thomson, IRI

As established in 2007 and led by the World Health Organization (WHO) the Meningitis Environmental Risk Information Technologies (MERIT) project is a collaborative initiative between public health, environmental (including climate) research and operational communities; oversight provided through a steering committee comprising WHO, WMO, GEO, IFRC, HCF, IRI. MERIT partners work to combine environmental and social, economic and demographic information with public health data to strengthen decision-making and preparedness for epidemic meningococcal meningitis in Africa.

MERIT has been instrumental in establishing a broad research coalition involving scientists in research institutes across the meningitis belt, from Europe and from the US. With WHO leadership research is designed to serve the decision-making needs. National MERIT initiatives have developed in Ethiopia Niger and Nigeria.

Conducting this effort is increasingly important to support the current reactive vaccine strategy of Ministries of Health as well as the introduction of the new conjugate vaccine by the Meningitis Vaccine Project against *Neisseria meningitidis* serogroup A. This presentation will focus on the opportunity created by the partnerships developed as well as some of the challenges in terms of delivering operational products and services that can affect health outcomes.

Climate, Environment and Health: Recent Achievements in Senegal
Jacques-André Ndione, Centre de Suivi Ecologique

We can mention that since the beginning 2000 decade, the thematic “Climate, Environment and Health” has become an unexpectedly a great topic of interest thanks to a lot funds brought by Donors, Decision makers and also the Scientific community, mainly focused on climate change issue and its impacts... In fact, climate and health is an ancient struggle, already highlighted in past, and tackled at various scales (from household (e.g. indoor air pollution) to neighborhood (domestic refuse), to community (urban air pollution), to regional (acid rain) to global level (climate change)).

Before 1999, in Senegal, we cannot say this issue has not been tackled by scientists. But, regarding bibliography on climate and health topic, it seems that often climate issues are highlighted by people coming from the health sector (epidemiologists, medical entomologists, etc.) themselves without interactions with climate and meteorology community. After the “Bamako Health and Climate Workshop” led by IRI in 1999, things changed drastically. Thanks to French Space Agency (CNES), the consortium S2E (*Surveillance Spatiale des Epidémies*) has been set up and some Senegalese institutions have taken part in this initiative. This is how the EMERCASE project has been set up and DIREL, ISRA, University Cheikh Anta Diop and the National Meteorological Service have been involved as full partners. Later, CSE will join the consortium. The French Space Agency has developed a programme on tele-epidemiology divided into 4 components: (i) Improving access to healthcare (treating patients at remote and mobile sites), (ii) Environment-Climate-Health, (iii) Crisis Management (better management of major humanitarian crises) and (iv) Education and Training (improving healthcare and learning thanks to Space). The second component of this approach has been implemented in Senegal, and has leaded major environment, climate and health projects during the last decade.

Tele-epidemiology consists in monitoring and studying the propagation of human and animal diseases (water, air and vector borne diseases) which are closely linked to climate and environmental changes, based on space technology. The French Space Agency (CNES) has thus developed a concept based on a deterministic approach of the climate-environment-health relationships and on an original and really adapted space offer. Thanks to Multidisciplinary approach based upon the study of the key mechanisms good deed emergence and propagation of infectious diseases linking disciplines like environmental sciences, epidemiology, climatology, entomology,

hydrology, microbiology, etc. The analysis of those processes is a key step in the development of new and original risk mapping using space technology, and it's an ongoing process based on different steps: (1) Experimental design mainly field studies, (2) Obtaining well adapted products from Space and (3) dedicating modelling *towards an operational Health Early Warning System (HEWS)*.

In Senegal, Tele-epidemiological conceptual approach applied to Rift Valley Fever (RVF) Monitoring in Ferlo area and Malaria in urban zone (Dakar). Regarding RVF in Ferlo area, effective scientific results can be mentioned:

- brand-new index for detecting of small and temporary ponds has been set-up using high-spatial SPOT-5 images;
- coupling in-situ measurements and remote-sensing data (optic and radar) helped to obtain adapted spatial products that conducted to model dynamic ZPOM (Zone potentially Occupied by Mosquitoes) combining mechanisms linking rainfall variability, dynamic of ponds and density of aggressive vectors;
- crossing dynamic ZPOM (vector hazard) and cattle park localisation (hosts vulnerability), allows to appreciate environmental risk maps.

Today, one major outcome is that a Health and Environment Observatory has been dedicated to this issue, and its 15x15 km (225km²) centered over the village of Barkedji, with a high concentration of *in situ* measurements covering various sectors: climate, hydrology, water quality, vegetation, land use and land cover changes, veterinary (herds concentration, sero surveys, ruminants parks), malaria incidence, entomological, viral surveys and investigations of social pastoral practices. This site has hosted the WP 3.4 (Health impacts) of AMMA project (African Monsoon Multidisciplinary Analysis, founded by EU-FP6 project), AdaptRVF project (*Impacts of Climate change on Rift valley fever vectors emergence in Senegal: adaptation and strategies for a better pastoralism management in Sahel*, founded by GICC programme) and QWECI (*Quantifying Weather and Climate Impacts on Health in Developing Countries*, founded by EU-FP7 project). Senegalese teams involved in the area of study are: UCAD (University Cheikh Anta Diop), IPD (Institut Pasteur de Dakar), CSE (Ecological Monitoring Center), DSV (National Livestock Service) and the NMCP (National Malaria Control Programme). In the same way, this site is built on a strong international partnership (France, United Kingdom, German, Italy, Spain and Kenya). Since 2001, relevant publications and strong scientific results have been achieved thanks to collaborative projects, based on pluridisciplinary and multidisciplinary approaches, and they are available in the REDGEMS web site (www.redgems.org).

Climate, Water Resources and Malaria in Ethiopia
Solomon Kibret, International Foundation for Science

Investment in hydraulic infrastructure is crucial for economic growth and poverty reduction in sub-Saharan Africa. Water storage has also been recognised as a key player in adaptation to climate change. However, inadequate consideration of public health aspects can undermine the benefits from such investments. Key among the potential negative effects is the impact of water resources schemes on malaria transmission. By creating numerous mosquito vector breeding sites on the reservoir shoreline and in irrigated fields, dams and irrigation schemes, respectively, have intensified malaria transmission in reservoir and irrigation communities in Ethiopia. This paper presents research results that indicate that reservoir management (i.e. regulating reservoir water-levels) and irrigation canal water management can potentially help in mitigating malaria transmission around dams and irrigation schemes

Climate Change, Air Quality and Urbanisation in Africa
Michael Gatari, University of Nairobi

Air quality is commonly assessed in terms of concentrations of six air pollutants (CO, NO_x, SO₂, O₃, PM = PM₁₀ and Pb) over a given period of time. Studies in the developed North show the major sources of these pollutants as energy and heat production, and road transport (Smith et al., 2004; EEA, 2008; Vestreng et al., 2009) and through the few studies which have been carried out in Africa the same scenario is replicated (Maina et al., 2006; Zakey et al., 2008; Gatari et al., 2007 and 2010; Boman et al., 2010; Kinney et al., 2011). Other than Pb and adverse effects on human health, the pollutants have a marked contribution to climate change through chemical and physical activities in the atmosphere while the weather system determines pollutants dispersion and transport. The green house gases (GHG) absorb infrared radiation from the Earth's surface, Black Carbon absorbs the solar radiation with consequences of atmospheric warming while particles (primary and secondary) play the direct and indirect role of reflecting sunlight back to space and being centers of cloud formation. The clouds enhance solar radiation reflection as well as determining the amount of precipitation besides playing a role in perturbing the Earth's radiation budget. Climate change impact includes agricultural production (heart of many African economies), ecosystem stability, fresh water supplies and disease patterns. These contribute most of the factors that are driving the rural population to urban centers especially poverty and hope for better life in the cities yet the air quality is generally poor and deteriorating. For a long time Africa was believed to be a non problem area in the perspective of climate change and air sourced human health effects. Of the 20 defined megacities in the world (Mage et al., 1996) only Cairo from Africa is included. However, despite the population defining parameter of a mega city, per capita urban emission of criteria pollutants or average concentrations would include more Africa cities. Most of the cities have poor infrastructure and when combined with poorly maintained vehicles which may also be fueled with poor quality petroleum products the levels of

pollutant concentrations are aggravated. There is substantial scientific evidence of strong links between climate change, air quality and urbanisation that calls for combined studies in our efforts of searching for solutions to the many uncertainties in our understanding of the problems we face.

Climate, Population Health and Environment Integration in Ethiopia
Negash Teklu, PHE Ethiopia Consortium

Climate change impacts in Ethiopia are aggravating the vulnerability of the people in an alarming rate that needs a comprehensive approach of development. Population Health Environment (PHE) interventions in Ethiopia are a holistic, participatory development approach where by issues of environment, health and population including climate change impacts are addressed in an integrated manner for improved livelihoods and sustainable well being of people and ecosystems. This approach is contributing to building the resilience of communities through the intervention of implementing member organisation of the consortium, in different parts of the country that can be taken as learning experiences, locally and internationally.

Tuesday 5th April 2011

Theme 1: Policy

Regional Climate Centres and Climate Data from a Policy Perspective
Girma Gezahegn, Ethiopian NMA

In Africa there are about five regional centers which mainly focused on seasonal climate prediction and monitoring, climate data archiving of the region and climate modelling. In line with this, regional centers are also rendering malaria outlook for the health sector. However, the meteorological stations network in Africa is poor to understand the climate variability and change of the continent. Furthermore, the importance of climate information is poorly understood in the society even in well educated health professionals and policy makers to integrate weather and climate information with their respective utility.

Regional climate centers require polices like mainstreaming weather and climate information for climate sensitive diseases, improve climate observations network, promote integrate research between the health and climate sector and promote to include the meteorological education in school curriculum. Eventually strengthening the habit of working in multi-disciplinary environment especially in early warning activities of climate sensitive diseases will improve the utilisation of climate information.

Population Factors to Consider in Climate Policy Making

Hassan Yousif, African Center for Gender and Social Development, ECA

Population and climate change interact through two mechanisms that are crucial for policy making and actions. The first mechanism is through human activities, which are largely determined by population factors, among others. Intensive human activities driven by factors such as high population growth and density often are associated with increasing greenhouse gas emissions and climate change. Studies have shown that, controlling for economic growth and technological change, a 1% increase in population growth will lead to 1% increase in carbon emissions. However, when population growth declines and when societies achieve demographic transition, people tend to live in small size households and to consume more energy. Therefore, population policy must be equally matched with energy policies to reduce carbon emission.

The second mechanism is through human vulnerability to climate change impacts. Human vulnerability is determined by population factors, including population size and growth, population distribution, gender, and changing age structure. The pattern of population distribution in Africa exposes the great majority of people to the variable impacts of climate change. Particularly people who live in coastal areas, dry lands and in landlocked countries are exposed to differential impacts of climate changes, such as increasing sea level, frequent droughts and heavy rains. Rapid urbanization in Africa is also an important process that link population factors to climate change. It is well established in literature that per capita energy consumption is higher in urban than in rural areas. Therefore, rapid urbanization is associated with higher use of energy, and higher per capita emissions. Also urban poverty is a main contributor to degradation of the urban environment. Especially, slum populations are rapidly increasing in Africa. They are marginalized and excluded in the development process, and are highly vulnerable to the impacts of climatic changes

Africa is a youthful continent and is characterized by rapidly increasing working age population. An increase in the working age population is positively correlated with increasing energy consumption and higher emissions of greenhouse gasses. Also, young age structure is associated with high propensity to migrate internally and internationally. Climate change may affect human mobility in four major ways:

- a) Intensification of natural disasters that force people to move
- b) Impacts of drought and warming on agricultural production
- c) Rising sea levels that destroy livelihood in coastal settlements
- d) Competition and conflict that lead to migration

Needs for Effective Policy Implementation

Dereje Mamo, Ministry of Health, Ethiopia

Climate change has been linked to diverse hazards, ranging from increased risks of extreme weather conditions, such as more intense floods and droughts, to less dramatic but potentially more serious long-term effects, such as changes in infectious disease dynamics and shifts to persistent drought conditions. Since many of the most important global killers (such as malaria, diarrhoea and protein-energy malnutrition) are highly sensitive to climatic conditions, health impacts of climate change are potentially huge and call for reconsideration of health policies. This is particularly important in Ethiopia, a drought-prone country with high burden of infectious diseases. In the Ethiopian health sector the needs for effective policy implementation have been addressed in an integrated manner, including mobilizing resources, building capacity, strengthening surveillance and response and improving monitoring system.

Efforts done in Ethiopia can be summarised as follows:

- Develop evidence based participatory planning at community level;
- Organise discussion forum through community capacity enhancement through community conversation;
- Build capacity for early detection and management of climate-related health problems;
- Mobilise resource for interventions at community level/strengthening community-based health insurance;
- Facilitate procurement of environmental risk monitoring equipment;
- Enhance locally available appropriate technologies;
- Identify and disseminate best practice;
- Institutionalize the Monitoring and Evaluation System;
- Enhance applied research on health protection from climate change; and
- Strengthen inter-sectoral collaboration.

Immediately Possible Policy Actions

Dereje Mamo, Ministry of Health, Ethiopia

Climate change requires improved epidemiological surveillance and response system integrated with monitoring of climate change and other environmental conditions that favour increased disease burden. Of note is the fact that many of the projected impacts of climate change on health are avoidable, through a combination of public health interventions in the short and long-term terms. Therefore, the challenges of climate change and policy development are inextricably linked and together demand immediate action. The most effective responses are likely to be strengthening of the key functions of surveillance and response and environmental management with full involvement and participation of the concerned communities. Immediately possible policy actions may be summarised as follows:

- Identify and prioritise highly vulnerable areas and segments of the population to climate change in the country;
- Identify climate change-sensitive diseases and adverse public health events;
- Develop evidence-based preparedness, response and recovery plan;
- Strengthen the health system in order to respond to climate change vulnerability with special focus on the priority areas;
- Strengthen advocacy, social mobilisation, communication and education to facilitate the climate change adaptation; and
- Strengthen and enforce regulatory systems related to climate change in health and health-related sectors.

Climate and Health: 10 Years On: Policy and Information Dimensions

Jeremy Webb & Miriam Musa

Policy is often guided by principles where evidence is unavailable. However, where relevant climate observations and health surveillance is available it may be possible to develop integrated climate and health systems (e.g. epidemic early warning systems etc). Such integrated climate and health systems, may in turn influence policy. Climate and health policy may also be informed by case studies that demonstrate the linkage between climate and health. Analysis of policy informed by case studies, needs to take into consideration such things as whether the policy can be scaled up to be applied at the national level, for instance, and what the overall costs and benefits of the policy are. Every country's climate and health policy needs are different, therefore the country should identify and prioritise its custom policy needs. UNECA-ACPC believes strongly in this and therefore pushes a demand-led agenda, where it supports the implementation of climate policies according to the needs identified and outlined by individual African countries. There is a gap between climate and health policy and practice in Africa; this can be addressed through careful prioritisation of policy needs by African countries. There has been progress in terms of setting broad policy directions for example the Libreville Declaration and the Joint Statement of African Ministers of Environment and Health in Luanda. It is important that we build on what has already been achieved in these documents while increasing research to understand the uncertainties in the connection between climate and health in Africa.

Theme 2: Practice

Adaptation Training Centres: Opportunities and the Need to Factor in Health to Capacity Development

Lawrence Flint, UNDP-AAP Consultant

Multi-faceted Adaptation Training Centres are a response to demands from communities who are isolated from resource centres and services (often based in

large towns and cities) where land is set aside and buildings erected that are owned and managed by special committees appointed by local communities. The logic is that government extension officers and workers in addition to NGOs/INGOs may be prepared to visit these often physically remote and disconnected centres and train local people in new tools, methods and approaches to enhance lives and livelihoods subject to climate related vulnerabilities. Health issues are constantly at the fore of community concerns and thus, become a staple component of the capacity building at these centres.

The talk presents two case studies from Ethiopia and Zambia and uses this base and lessons learned to go on to discuss capacity building on a more general level.

Developing Curricula for Practitioner Training

Robert Cheke, Natural Resources Institute, University of Greenwich, UK

Michael Wilson, Noguchi Memorial Institute for Medical Research, University of Ghana

Curricula for practitioner training in climate change and health depend on the activity level of the practitioners involved and their previous experience. Climate scientists need to know how best to present their outputs such that those in the health sector can understand and use them for adaptation measures at the appropriate spatial and temporal scales. They also need information from health specialists on which variables are relevant for forecasting effects on particular diseases. Health practitioners need to be informed on the principles governing the climate scientists' model outputs and gain appreciation of the degrees of uncertainty involved to gauge the likelihoods of a particular disease increasing or decreasing and, on the basis of forecasts, suggest practical adaptation measures. The presentation will not be prescriptive but will provide a brief introduction to what is needed for developing curricula at different levels (postgraduate degree to short course), using the experience of investigating effects of climate change on the epidemiology of onchocerciasis in Ghana as an example, to set the scene for discussion on how best to prepare curricula and make recommendations for COP17.

Gender, Climate Change and Health

Rose Mwebaza, Gender Specialist, UNDP-AAP

There is now a general recognition that gender equality and women's empowerment are both an end and a means to attaining the MDGs and promoting development in general. It is for this reason that gender equality and women's empowerment are defined in goal three of the eight MDGS. The MDGs note that gender equality is both a goal in itself and a condition to combat poverty, hunger and disease and to achieve all other goals.

An analysis of development from a gender perspective makes it clear that as with poverty, hunger and disease, the impacts of climate change will be closely linked to gender equality and women's empowerment because of the socially constructed gender roles. Although location specific patterns are key factors in assessing risks

and threat levels relating to the impacts of climate change, social inequalities, in particular have serious repercussions on many women's lives, limiting their access to health care and participation in policy making and decision making – in other words, limiting their human freedoms and options.

While the link between gender, climate change and health has not always been obvious, there is now sufficient evidence to demonstrate that societies with more gender equality are less likely to suffer the brunt of climate change particularly those related to the health sector.

The presentation will focus on the link between gender, climate change and health. It will analyze the gendered impacts of climate change on health and emphasise the need for gender sensitive approaches. It will argue that gender equity in health policy, planning and delivery encompasses rights based, effectiveness and sustainability considerations and that for this reason, any interventions relating to the impacts of climate change on health need to be undertaken within the context of a gender sensitive lens.

Socio-Economics of Adaptation to Climate Change

Isaac Osei-Akoto, Institute of Statistical, Social and Economic Research, University of Ghana/UNDP-AAP Consultant

Even though a number of countries in Africa are yet to develop up-to-date risk assessment of climate change, there is a general acceptance that global climate is changing, that humans and most living species are affected or will be affected. It is also fairly well known that vulnerable societies will be forced to mitigate and/or adapt to new conditions. This makes it imperative for an understanding of the full array of mitigation and adaptation options, including institutional and policy changes to prioritise the most effective strategies. The presentation will discuss methods that will assist practitioners in Africa to better understand and assess the risks posed by climate change and to better design strategies to mitigate and adapt to climate change. This requires participatory articulation of the social dimensions and economic costs, and the identification of strategies, costing, and the appropriate approaches to integrating robust strategies into development plans and budgets. Lessons will be drawn from the preparation of pilot district human development reports and the experience of investigating effects of climate change on the epidemiology of onchocerciasis in Ghana.

Climate Change and Public Health Challenges and the Way Forward

Ama Essel, University of Ghana Medical School

Climate Change will have impact on Human health, Health Infrastructure and Health Systems. The Public Health challenge includes understanding these relationships, strengthening already existing health interventions and developing new interventions to address these impacts. The health system will not be able to

adequately address these issues alone since they are interlinked with other sectors. This will require a lot of inter-sectoral collaboration and advocacy.

The challenges will have to be addressed from the international level, regional levels spiraling to national and even local levels.

Internationally, the health community will benefit if these issues are clearly articulated and reflected in the ongoing Climate Change negotiations. Health issues although acceptable to many negotiators and policy makers as a climate change issue have not been well represented in the ongoing negotiations. Health practitioners and researchers especially in Africa, should collaborate and develop strategies to address the gap.

Theme 3: Services and Data

Session 1:

Spatial Dimension: Health Data and GIS Issues

Clive Sabel, Department of Geography, University of Exeter, UK

This talk will attempt to briefly introduce the unique opportunities and data requirements of spatial data analysis. Firstly, the unique possibilities that geographic visualisation offers will be presented, before we explore a series of questions that geographical analysis needs to address, such as scale and resolution. Alternative forms of spatial data will then be considered, from vector to raster data, and individual to aggregated data before moving on to consider temporal change. Throughout the talk, examples will be taken from infectious, and non-infectious disease epidemiology, noting where Climate Change mitigation and adaptation strategies might be impacted.

Case Study: Towards a Leishmaniasis Early Warning Model in East Africa

**Dia-Eldin A Elnaiem, Department of Natural Sciences,
University of Maryland Eastern Shore**

Climate sensitive vector-borne diseases present major challenges to health and economic development in Africa. Climatic factors affect prevalence and incidence of these diseases through their influence on vector habitat, duration of pathogen life cycle and the nutritional status, immunity and exposure of susceptible human populations. Visceral Leishmaniasis (VL, kala azar) is a fatal vector-borne disease caused by the protozoan parasite *Leishmania donovani*, transmitted through bites of infected sand flies. The disease is endemic in several countries in East Africa including Ethiopia, Kenya, and Northern and Southern Sudan. In this region the main vector of the parasite causing kala azar is *Phlebotomus orientalis* in vast areas in eastern Sudan, Southern Sudan and Ethiopia and *P. martini* in small foci in Ethiopia, Kenya and Southern Sudan. Throughout history, East African kala azar has

occurred in severe epidemics that resulted in high mortality and morbidity rates. In the 1980s, a kala azar epidemic in a relatively small area in the Western Upper Nile Province in Southern Sudan claimed the lives of approximately 100,000 people of a total population of 300,000 people. Similarly epidemics of kala azar in Eastern Sudan and Ethiopia affected thousands of people. Currently a severe outbreak of kala azar is raging in Southern Sudan in places where disease activity remained silent for several years. The poorly understood cyclical nature of Kala azar outbreaks contributes to the complexity of disease diagnosis, treatment and control because of its impact on resource allocation and preparedness. This problem is of special importance in Southern Sudan where an estimated 2.5 million people have returned to this newly formed country. There is an urgent need to develop climate-based models that will help predict occurrence of kala azar both in space in time and thus assist in planning human settlement and suitable intervention plans. Using this approach we have previously developed working models for prediction of distribution of the vector of kala azar in Southern and northern Sudan. We also developed models that predicted both presence and incidence of kala azar in eastern Sudan. Suggestions are provided on how these models and currently available climate data can be used to provide an Early Warning system for kala azar outbreaks in Southern Sudan and other places in East Africa. Discussion will also cover climate data needed for these models and possibility of producing a combined climate based Early Warning System for a number of vector-borne diseases.

Climate Information for Meningitis Early Warning and Control in Burkina Faso: Duties and Achievements

Pascal Yaka (Met Directorate, Burkina Faso)

Every year, West African countries are afflicted with Meningococcal Meningitis (MCM) disease outbreaks. Although the seasonal and spatial patterns of disease cases which occur mostly during winter in the “meningitis belt” are closely linked with climate variability, the mechanisms responsible for these observed patterns are still not well identified. This is particularly true for the linkage between epidemic intensity from year to year and climate variability.

A spatio-temporal analysis of annual cases of MCM reported from 1966 to 2005 in African countries provided by World Health Organization, Burkina Faso health ministry and several climatic variables from NCEP reanalyses has been performed to highlight the relationships between climate and MCM disease at the interannual scale. First, we computed correlation maps of atmospheric variables likely to influence MCM disease outbreaks (e.g. moisture, wind, pressure, temperature...) and annual cases of MCM in two afflicted countries, e.g. Burkina Faso and Niger. Then, the results of these correlations enable the selection of relevant climatic variables for construction of generalised linear models Generalised to forecast MCM intensity from year to year at national level.

These models have been experienced and evaluated by Burkina General Direction of Public health of Faso health ministry during 2009 and 2010.

The encouraging results of such simple models and different analysis enable the development of a survey and an early warning integrate system of MCM epidemics in African Sahelo-Soudanian countries.

Session 2:

Barriers to Creating a Broad-based Information System across the Greater Horn of Africa Region

Christopher Oludhe, University of Nairobi/ICPAC

Climate can impact human health through a number of ways that could either be through direct or indirect mechanisms. Climate-sensitive diseases such as malaria, malnutrition, diarrhoea and pneumonia are among the major causes of death in Africa. Understanding the climate of an area or region could significantly contribute in decision making and management of the overall burden of climate-sensitive diseases. The IGAD Climate Prediction and Applications Centre (ICPAC) have developed the capability of providing services on climate information for risk management through the COF process but gaps and challenges still exist with the provision of such information.

National Meteorological and Hydrological Services (NMHSs) do provide climate information at national scale but the challenge has been in accessing and managing relevant climate in a way that could be useful for decision-making purposes. Meteorological data sets have in the recent times been prohibitively expensive due to cost recovery policies. Climate data are a resource for development. Good quality homogeneous climate data are the cornerstone of good research, good policy and good practice. A “one-stop shop” for the health sector is missing in the GHA where users can access data to meet all their user specific needs. This paper briefly discusses some of the barriers that could be associated with creating broad-based information system across the GHA subregion.

Data and Services from an Ethiopian Perspective

Kinfe Hailemariam, NMA Ethiopia

NMA decentralised its service through its eleven branch offices distributed throughout the country. NMA collects data using over 1150 conventional surface observational stations of different categories, one upper air station, 20 automatic weather stations and a satellite receiving station. Data from those stations are transferred to its 11 branch offices using postal carrier for climatological and research purposes. 150 of the above stations are also equipped with radio communication to transmit near-real time data for operational purposes. Data quality control, data digitisation and data arriving is carried at the 11- branch offices. Then, both the soft copy and a copy of the hard copy sent to the head quarter for a national data archive and a national database. Further quality control is also carried at the head quarter using spatial quality control and other tools for

consistency and homogeneity checks. Data processing carried at branch offices, which include chart processing, converting analog data to digital form and basic climatic analysis. Branch offices use MS-Excel to handle data while head office uses Clidata. Data delivery service is provided at branch offices, at the head office and by email. On special cases data could be delivered to users directly from stations. Major problems which hinder quality data service to users includes: historical data are not fully digitised, manual data processing, manual quality control, lack of complete metadata, full of missing data, lack of dependable climate database management system and poor data exchange facilities. NMA in a collaborative work with IRI and Reading University produced 10-daily gridded rainfall and temperature data at 10km spatial resolution, rainfall satellite estimate and combined satellite-gauge products of similar time and space resolution. These new data will be available for users with a data processing tools online on NMA website, which is believed to add significant value to NMA data service. Further, NMA planned to give grass root climatological and data service at 200 first class stations. This will have immense service to rural community at large.

Data and Services in ACMAD

Tinni Seydou, ACMAD

The African Centre of Meteorological Applications to Development was created since 1987 by the ECA and WHO and established in Niamey with a mandate for 53 African countries. To achieve its missions the centre needs data. The institution have in his data bank some meteorological/climatic data derived from various sources, some archived products and have access to some partners data base.

ACMAD as reference center for meteorological and climate applications to socio-economic aspects elaborate some products and services at short, medium, and long ranges times scales and disseminate theme by e-mail and the web site. The institutions also provide some specific trainings and capacities building. There is some perspective to upgrade the centre to Regional Climate Centre that will have some specific functions in climate monitoring, data services and training.

Satellite Based Rainfall Monitoring in Africa - the TARCAT Project

David Grimes, TAMSAT, University of Reading

Scarcity of raingauge data and almost complete lack of radar makes satellite information essential for rainfall monitoring in Africa. Over the last 20 years, the University of Reading TAMSAT⁴ group has developed a methodology of satellite based rainfall monitoring for Africa based on calibration of Meteosat thermal infrared (TIR) imagery with local raingauge data supplied by African national meteorology services. Various validation experiments suggest that the local calibration that this methodology is at least as good, and usually better than, other

⁴ Tropical Applications of Meteorology using SATellite data

more complex approaches. Recent funding by the European Commission Joint Research Council has meant that we have been able to complete calibration for the whole of Africa and generate a rainfall time series at dekadal (~10 day) time step from 1983 to the present - the TARCAT data set (TAMSAT African Rainfall Climatology and Time-series). Because the methodology is based entirely on TIR data with a one-off calibration, the time series is temporally homogeneous (unlike all other comparable data sets) and therefore provides a valuable tool for analysing climate trends and variability. A pilot project with IRI and the Ethiopian National Meteorology Agency has given promising results and we are now looking to work with other meteorology services to improve the product and with end users to find applications for the time series.

Another project which may be relevant to the health sector is the application of geostatistical techniques to generate an ensemble of possible daily rainfall fields from the satellite imagery. The ensemble is such that the spread of values for each pixel, and the spatial distribution of rainfall within each ensemble member matches that predicted from analysis of raingauge data. The ensemble can be used with downstream models to quantify the uncertainty of the modelled outcomes.

Data and Services – An Overview of the Key Issues **Wayne Elliott, UK Met Office**

In this session, we will review the issues presented by previous speakers and will examine how effective services can be developed using weather and health data. The weather community has a strong focus for international data standards through WMO, but this is not the case for the health community at national or international level – is this a realistic ambition? This session will lead into the agreement within the theme of the main issues in the field of data and services.

Theme 4: Research and Education

Session 1:

Sensitivity of Dengue Risk to Climate Variability and Potential for Developing an Epidemic Early Warning System (A Case Study from Brazil) **Trevor Bailey, University of Exeter**

The transmission of many infectious diseases can be affected by weather and climate variability, particularly for diseases spread by arthropod vectors. Previous epidemiological studies have demonstrated statistically significant associations between the incidence of certain infectious diseases and climate variability, and have highlighted the potential for developing climate-based early warning systems for disease epidemics. To establish how much variation in disease risk can be attributed to climatic conditions, non-climatic confounding factors must also be considered in the model formulations so as to avoid reporting misleading climate-

disease associations. In this talk, we consider modelling spatio-temporal variation in disease risk at a regional level, using climate and non-climate information. The modelling framework is developed in the context of dengue fever; one of the most important emerging tropical diseases at the beginning of the 21st century in terms of morbidity and mortality. A negative binomial generalised linear mixed model is adopted which makes allowances for unobserved confounding factors through a combination of structured and unstructured spatio-temporal random effects. The resulting spatio-temporal hierarchical model is implemented via a Bayesian framework using Markov Chain Monte Carlo (MCMC). Using a Bayesian approach, posterior predictive distributions for disease risk can be derived at each spatial location for a given month or season. This allows probabilistic forecasts to be issued and forecast uncertainty to be quantified. Brazil is used as a case study to assess the potential of the model to provide early warnings of future increased and geographically specific risk of dengue. Using the model, successful dengue epidemic alerts would have been issued for 60% of the microregions in South East Brazil, including highly populated areas, during the 2008 epidemic.

Mapping Respiratory Diseases

Lauren Smith, University of Exeter

There is evidence that climate-induced hazards such as drought and deforestation can affect vector-borne epidemics, and poor air quality associated with forest fires can also be harmful to the (respiratory) health of a population. This presentation introduces phase one of PhD research focusing on spatial variation of the main respiratory diseases within the Brazilian Amazon. GIS analysis shows spatial distributions of one such respiratory disease, asthma, during extreme events and this is discussed together with the way in which climate can influence respiratory diseases.

Research Opportunities for Collaboration with African Bio-Medical Research Centres

Daniel Adjei Boakye, Noguchi Memorial Institute for Medical Research, University of Ghana

Africa is endowed with excellent institutions such as the Noguchi Memorial Institute for Medical Research, Ghana; KCCR, Ghana; MRTC, Bamako, Mali and KEMRI in Kenya conducting research into diseases of Public health importance. These institutions work on diseases that require input from climate change researchers on the environmental components yet little collaborative effort exists between the research communities studying climate change and those studying major diseases within countries as well across regions. Opportunities exist for collaboration since Africa has some of the highest burden of the neglected tropical diseases (NTDs) most of which such as onchocerciasis, schistosomiasis and leishmaniasis are vector borne. The respective vectors are influenced by environmental factors such as temperature, rainfall, wind movements and water quality and man-made developmental activities for example the creation of dams. For effective control of

these diseases and others such as asthma and allergies there is an urgent need for climate change research to partner with bio-medical researchers.

Experiencing Climate: Time Scales and Decisions

Bradfield Lyon, IRI

This presentation emphasises the following:

- Different time scales of climate variations.
- The need for historical information i.e. understanding the past before considering the future.
- Identifying relevant variables.
- Seasonal climate predictions and are these useful?
- Moving forward: access to relevant data
- Quality controlled historical time series
- Quantifying relationships between climate variations and health indicators.

Session 2:

WHO-TDR Research Capacity Strengthening Activities

Yeya Touré, WHO-TDR

The overall goal of TDR's Empowerment unit is to build capacity at the individual, institutional and national levels to empower health researchers in developing countries to effectively engage in the infectious diseases of poverty. TDR supports the following research capacity strengthening activities:

- Individual research training grants such as PhD training grants for potential health researchers within the country, the region or abroad and Re-entry grants for returning trainees after PhD in health research
- Institutional research training grants such as Institutional strengthening grants, grants from the Multilateral Initiative for Malaria in Africa and Small grants awards in WHO regions (EMRO, AMRO, SEARO, WPRO, AFRO)
- Regional Training Centers in WHO regions for short training in good research practices (proposal writing, bioethics, project planning and management)
- Fellowship programmes such as Leadership development fellowship for personal development of established researchers and Career development fellowship in clinical research to strengthen product development capacity for diagnostics, drugs and vaccines
- Functional networks across Africa, Asia and Latin America.

Communicating Research: Peer-Reviewed Publication and the Media
Patrick Luganda Network of Climate Journalists for the Greater Horn of Africa/CEO,
Farmers Media Link Centre

There is a scarcity of information regarding health and climate that is available to the media in Africa. In particular peer reviewed material is hard to come by. Despite the well-known adage 'Publish or perish' scientists in Africa find it difficult to access scientific journals to publish their work. They often have to link with partners in developed countries to have work published. This compromises the quantity, quality and frequency of peer-reviewed materials. Specialised categories such as climate and health have limited contributions.

In the media realm, it is not easy to build science sources and getting to know about the published materials is challenging. African research papers have been under-utilised, under-valued and under-cited in the international and African research arenas. Currently the main information resources, published journals and journal articles available to and used by researchers, librarians and students and to a lesser extent the media in Africa are the same as those used in Europe and America. This is because information from the developed world is usually more readily available than that of developing countries. However, it does not adequately reflect the research output of Africa and is not always relevant or appropriate for higher education in Africa. It is neither appropriate for public awareness, education and general knowledge sharing. That said, it is recognised that accessing global information resources is essential but equally important and essential is access to the local research output from the continent.

Despite the wide range of capacity and resources within and between African countries, a legitimate generalisation is that strengthening research and research publishing are crucial priorities for improving higher education in Africa. Today the growing high technology and rapidly evolving information hungry and rapidly globalizing world, higher education, academics, researchers and the media in Africa needs technological tools to share and build on its own research output within Africa and with the rest of the world. If this is achieved the work of researchers as well as any peer reviewed materials will become relevant and useful

The mission of the African Journal Online -AJOL is to support African research and counter the "North-South" and "West-East" inequality of information flow by facilitating awareness of and access to research published in Africa. Information from developed countries should be enriched from relevant information generated from within Africa. AJOL provides an online system for the aggregation of African-published scholarly journals and offers global access to and visibility of the research output of the continent. This and other such initiatives will make peer reviewed publications out of Africa more readily available to the media. (Website: www.necjogha.org).

Pulling Together Research, Capacity Building and Communication

Felicity Liggins, UK Met Office

Across the whole debate surrounding Theme 4 (Research and Education), some common priority themes can be identified. These include: the importance of appropriate quality data; the relationships between weather, climate and health; and the vital roles communication and evaluation play in assessing and managing current and future climate risk.



The UK Met Office's Climate Impact Risk Framework, © Crown Copyright 2011

One way to bring these topics together is through a climate risk assessment and to do this, the UK Met Office has designed a climate impact risk framework (CIRF – see figure). The CIRF is a 7-step process that provides a flexible guide used when assessing risk, either qualitatively or quantitatively, in any sector including health.

When considering the risk to health from weather or climate variability/change using the CIRF, *risk* is a combination of *hazard*, that is the weather or climate that negatively influences health outcomes, and *vulnerability*.

Vulnerability is a measure of the resilience and/or exposure of the population to the hazard under consideration. Without adaptation or mitigation actions, the vulnerability may remain the same into the future whereas the hazard could increase, hence increasing the overall risk.

The first 2 steps in the CIRF require those taking part in the assessment to define the scope and outcomes of the process and understand the data required to undertake the assessment. Here, as this workshop identified, some projects may find that more research and/or data are needed to progress further (see Theme 3 recommendations). Step 3 is to define the baseline climate risk. In the health context, this is about quantifying the weather/climate/health relationships, one of the recommendations from the Theme 4 discussions. It is only when these relationships are understood that you can go onto Step 4 where future climate risk is considered.

By understanding the baseline and future hazards and vulnerabilities, incorporating data and expertise from other sectors if required, evidence-based adaptation and

mitigation strategies may be proposed or implemented. Following this, it is important that any outcomes are appropriately communicated and that the effectiveness of policies and interventions are evaluated. As can be seen in Figure 1, and as identified in the workshop, good communication at all stages is key to successfully assessing and managing weather/climate/health risk.

Gaps in Community Outreach: Bridging the Gap through Community Early Warning-Early Action Clinics

Arame Tall, Johns Hopkins University PhD Candidate/Consultant, CCA-DRR in Africa

This talk will address the following three areas:

1. There is an urgent need to bridge the gap in community outreach through:
 - Two-way dialogues, such as the Community Early Warning-Early Action clinics shown in the 5-min video of the Senegal experience: a pre-requisite to begin to close the disconnect between communities, policy makers and science, centered around the needs of community end-users.
 - New communication media identified as relevant:
 - SMS: believe it or not.
 - Phone calls (not fax).
 - SIEMENS telecommunication project.
 - Mass SMS outreach system for Senegal National Met Office.
2. Most of all, user-driven research is a must: it is time to listen:
 - Opens space for the production of climate information that is tailored, timely, salient to address the decision-making needs of communities at risk and organisations that accompany these communities in their efforts to cope with rising extreme events and CC stressors.
 - 2 way communication, NOT Dissemination.
 - EW-EA clinics, just one way to reach out to communities: whichever outreach method we use, need for 2-way dialogues with community end users to identify what products we can develop to best support their decisions.
3. The community-level is the crucial battlefield for adaptation: If we are to be relevant, we need to address the specific needs of community-level stakeholders:
 - Climate information relevant for communities only insofar as it reduces their socio-ecological, historically produced, non-climate related vulnerability and supports their every day decision-making under uncertainty (adaptation is not about climate, but about reducing vulnerability).
 - Partnerships with community organisations are essential (*e.g.* the International Federation of the Red Cross, state extension services).
 - Keeping a service-oriented mindset: making the Global Framework for Climate Services WCC-3 a reality at the national level.
 - No other alternative today, or else we disappear, turn into dinosaurs.

Omumbo J.A., Platzer B., Girma A. and Connor S.J. (2011): Climate and Health in Africa: '10 Years On' Workshop. Addis Ababa, Ethiopia. IRI Technical Report 11-01, International Research Institute for Climate and Society, Palisades, NY, 112 pp.

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