CLIMATE INFORMATION FOR DEVELOPMENT NEEDS: AN ACTION PLAN FOR AFRICA

REPORT AND IMPLEMENTATION STRATEGY

Addis Ababa, Ethiopia | 18-21 April 2006

A joint initiative of the:

Global Climate Observing System | UN Economic Commission for Africa | African Union Commission

With the support and contributions of:

UK Department for International Development | UN Development Programme | Global Environment Facility | International Research Institute for Climate and Society

DFID Department for International Development

UNDP

Global Environment Facility

IRI The International Research Institute for Climate and Society

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CLIMATE FOR DEVELOPMENT IN AFRICA

A Strategy for Mainstreaming Climate Information in Planning for Achievement of the Millennium Development Goals

FOREWORD

The African Union was pleased to be associated with the historic meeting on "Climate Information for Development Needs: An Action Plan for Africa" held in Addis Ababa on 18-21 April 2006 and with the formulation of a strategy for "Climate for Development in Africa."

It is a recognized fact that Africa, because of widespread poverty and consequential limited adaptation and coping capabilities, is one of the most vulnerable regions of the world to the projected impacts of climate change. It is also a known fact that most of Africa's disasters are meteorologically related. These disasters pose a serious threat to the continent's ability to attain the Millennium Development Goals and sustainable development. While it is projected that some parts of Africa, especially in the Sahel region, may experience an increase in rainfall, and others in southern Africa may experience a reduction over the next forty to fifty years, overall the African continent is likely to suffer unless adequate preparations are made and sufficient mitigation as well as risk reduction measures are put in place against the anticipated droughts and sea-level rises.

As a prevention measure against the negative economic and livelihood impacts of climate change, Africa needs to intensify its agricultural diversification programme in a way that would ensure food self-sufficiency and sustainably contribute to food security in years of unprecedented climatic eventualities. Climate observation could potentially play an important role in informing government policy decisions in this respect. However, Africa's efforts have to be linked to the global processes and be informed by them in a way that would further enhance the continent's capacity to observe climate systems and analyze and apply climate information to development.

The Environment Initiative of the New Partnership for Africa's Development and its related Action Plan took cognizance of the economic importance of climate change and variability in its programme area on combating climate change in Africa. The African Union Commission wishes to see the outcome of the Addis Ababa meeting coordinated with the Action Plan of the NEPAD Environment Initiative for a harmonious implementation of climate change and variability as well as vulnerability reduction initiatives in the continent.

On behalf of the African Union Commission, I wish to congratulate and thank the United Nations Economic Commission for Africa (UNECA) and the sponsors and Secretariat of the Global Climate Observing System (GCOS) for their important joint initiative in organizing the Addis Ababa meeting and guiding the preparation of the Strategy and Implementation Programme for "Climate for Development in Africa" (ClimDev Africa).

We welcome donor support and believe that if effectively implemented in conjunction with the NEPAD Action Plan, ClimDev Africa will achieve the essential mainstreaming of climate information and services into planning for achievement of the Millennium Development Goals. We wish to assure you of the African Union's commitment to this and to the coordinated and effective implementation of the Programme.

Alpha Oumar Konare
Chairperson of the Commission of the African Union

CLIMATE FOR DEVELOPMENT IN AFRICA

A Strategy for Mainstreaming Climate Information in Planning for Achievement of the Millennium Development Goals

PREFACE

Drought and flood and other climatically induced disasters have exacted a heavy toll on Africa over the past century. The impact of such natural disasters is expected to become even greater in the decades ahead as a result of human-induced climate change. Moreover, both the natural variability of climate and human-induced climate change pose serious threats to achievement of the Millennium Development Goals (MDGs) by 2015. A comprehensive, continent-wide strategy will be needed to manage these threats and help ensure achievement of the MDGs.

Fortunately, there is scope for substantially increasing the use of climate information and services in planning to reduce the threat of climate variability and change to the achievement of the MDGs. The more effective use of climate information and services will enable the many climate-sensitive sectors of African society to cope better with the natural variability of climate and thus reduce losses due to natural disasters, increase agricultural and other productivity, improve health, and advance the general welfare of all Africans.

In this context, the need to improve climate-observing networks, through implementation of the Global Climate Observing System (GCOS) in Africa, must now be seen as a pan-African imperative if the needs for climate information for achievement of the MDGs are to be met. The needed improvements fundamentally underpin effective climate services in support of agriculture, water resources, health, natural disaster reduction and other sectoral strategies for the reduction of poverty, hunger, disease, and environmental degradation.

Many have recently reached similar conclusions about the importance of improving climate data, information, and services. The members of the African Union Commission (AUC) have done so through their endorsement of the climate strategy of the New Partnership for Africa's Development (NEPAD), and the G8 group of nations has offered its strong support following the 2005 Gleneagles Summit hosted by the Government of the United Kingdom. As a result, the United Nations Economic Commission for Africa (UNECA) and the joint Secretariat established by the international sponsoring agencies of GCOS (the World Meteorological Organization (WMO), the United Nations Environment Programme (UNEP), the Intergovernmental Oceanographic Commission (IOC) of UNESCO, and the non-governmental International Council for Science (ICSU)) were pleased to convene an historic meeting on "Climate Information for Development Needs: An Action Plan for Africa" in Addis Ababa, Ethiopia on 18-21 April 2006.

The purpose of the meeting was to bring together a wide cross-section of the users and providers of climate information to identify the gaps and needs for climate observations and services to support efforts to achieve the MDGs. Participants considered several documents: a Gap Analysis, prepared from a user perspective, that assessed needed improvements in the provision of climate information and services to sectoral users and decisionmakers leading to better management of climate risks; and two Regional Action Plans prepared over the period 2001-04 (one for the countries of Eastern and Southern Africa, the other for countries of Western and Central Africa) which identify priority initiatives for observing system and related data management improvements.

We are pleased to present the outcome of the meeting, which is a strategy for ensuring the full and effective contribution of climate information and services to achievement of the Millennium Development Goals in Africa.

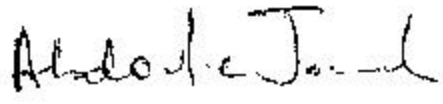
We wish to thank all those who have contributed to the development of this strategy, especially:

- The Director of the Sustainable Development Division of UNECA, Dr Josué Dioné, and other UNECA staff, especially Dr Johnson Oguntola and Dr Abdoulaye Niang;
- The Director of the international GCOS Secretariat in Geneva, Dr David Goodrich and his staff, especially Dr William Westermeyer, who carried the main burden of preparation for the meeting;
- The United Nations Development Programme (UNDP), which provided support for the GCOS Regional Workshop Programme through which the Regional Action Plans were produced and for GCOS consultants Dr Mohammed Boulahya and Dr Jim Williams; the UK Department for International Development (DFID), which provided funds to support the meeting and for the preparation of the Gap Analysis by the International Research Institute for Climate and Society (IRI) team lead by Dr Madeleine Thomson;
- The Director of Rural Economy and Agriculture of the AUC, Dr Babagana Ahmadu, and other staff of the AUC, in particular Mr Foday Bojang; and
- The many session speakers, rapporteurs, and other participants at the meeting, including the Chairs and Co-chairs of the Breakout Groups, Dr Johnson Nkuuhe, Dr Anthony Nyong, Dr Bwango-Apuuli, and Dr Abdoulaye Kignamon-Soro; the Chief Scientific Advisor for DFID, Sir Gordon Conway; the Director General of IRI, Dr Steve Zebiak; and the Executive Secretary of the Sahara and Sahel Observatory (OSS), Dr Youba Sokona.

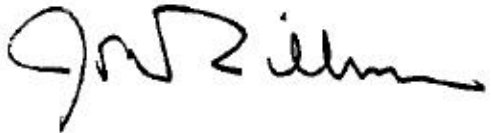
We commend this Report and Strategy for adoption and coordinated follow-up action by all those who carry responsibility for achievement of the Millennium Development Goals in Africa. In particular we recommend:

- Endorsement of the strategy at the highest political level through the African Union and the Regional Economic Communities of Africa;
- Strong implementation support from the principal governmental and non-governmental user communities, especially national Ministries for agriculture, water, health, the environment, and other climate sensitive sectors;
- Coordinated implementation action, through the WMO Regional Association for Africa and the individual National Meteorological and Hydrological Services (NMHSs); other African climate observation and service providers, including regional development centres, such as the African Centre for Meteorological Applications for Development (ACMAD), the Drought Monitoring Centres, and the OSS.

Finally, it is our privilege to commend this report, and the implementation strategy and plans it presents, for consideration by the many international development assistance agencies who are committed to support for the Millennium Development Goals and the effective use of climate for development in Africa.



Abdoulie Janneh
Executive Secretary, UN
Economic Commission for Africa



John W Zillman
Chair of the WMO-IOC-UNEP-
ICSU Steering Committee for GCOS

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Climate Information for Development Needs: An Action Plan for Africa was a joint initiative of the Global Climate Observing System (GCOS) Secretariat,[1] which took the lead in organizing the meeting, and the UN Economic Commission for Africa (UNECA), which hosted it. The US-based International Research Institute for Climate and Society (IRI) provided an analysis identifying gaps in the use of climate information. The meeting took place at UNECA headquarters in Addis Ababa, Ethiopia from 18-21 April 2006. The United Kingdom's Department for International Development (DFID) provided substantial support for the meeting and for the IRI Gap Analysis. The UN Development Programme (UNDP)/Global Environment Facility (GEF) provided additional backing through its support of the GCOS Regional Workshop Programme.

Approximately 100 people attended the Addis Ababa meeting, including senior representatives from a cross section of African regional institutions and political bodies (the African Union Commission (AUC), the African Development Bank (AfDB), the Southern African Development Community (SADC), and the Indian Ocean Commission); potential development partners (the United Kingdom, Ireland, the Netherlands, Sweden, Denmark, Finland, Canada, UNDP, UNEP, and the European Commission (EC)); the user community (with strong representation from the health, water, agriculture, food security, disaster management, and marine sectors in particular); and the climate community (including, in particular, the GCOS Secretariat and the Secretariat and African Regional Association of the World Meteorological Organization (WMO), the IGAD Climate Prediction and Applications Centre (ICPAC), ACMAD, OSS, and a number of Africa's National Meteorological Services).

The objectives of the meeting were to bring together stakeholders—providers and users of climate information, the development community, and representatives of African political institutions—to discuss key gaps in the use of climate information from the perspective of users and decisionmakers, to identify starting points on demand-led integrated climate information tools, to develop plans jointly with the African regional cooperation structures, and to agree among all stakeholders on an integrated strategy for launching a climate and development programme for Africa.

The first day of the meeting was devoted to a series of presentations demonstrating the links between climate and sustainable development. The presentations helped to provide a common understanding of problems and a common vocabulary with which to discuss them.

The second day was devoted to consideration of the IRI Gap Analysis. The participants considered gaps in integrating climate into policy, gaps in integrating climate risk management into development practices, gaps in climate services, and gaps in climate observations and data management as perceived by the various user communities. The participants also considered ways to eliminate the gaps and identified selection criteria for inclusion of projects in an integrated strategy for addressing climate and development. Possible selection criteria for near-term projects included gap-bridging projects that would allow for early progress, pilot projects that could be scaled up at a later date, and activities that could be incorporated into existing initiatives (e.g., in the health and food security sectors). Integrated projects that would address gaps at multiple levels (e.g., central government, local government, and community levels),

[1] GCOS is sponsored by the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC), the United Nations Environment Programme (UNEP), and the International Council for Science (ICSU).

and/or that would promote sharing of acquired knowledge regionally were considered to be of particular importance.

On the third day of the meeting, prospective development partners expressed their views. The greatest challenge, as seen by some, is to have the climate experts work with sectoral development experts in a way that influences both policy and practice to provide what poor people need. An additional challenge is to engage governments and donors in dialogue on the likely impact of climate change on national poverty reduction strategies and on planning for the adaptation that inevitably will be necessary. Development experts seek to be able to add a new tool, climate risk management, to their planning toolboxes and thus help ensure that the development gains they have helped foster will not be lost as a result of climate change. All agreed on the need for a common framework for action based on the Gap Analysis, the Regional Action Plans, and expressions of support for the process by the G8 countries.

Identification of a common framework for action was thus the subject of the last day of the meeting. The participants considered, revised, and reached consensus on an overall strategy for a programme to help deliver and sustain those Millennium Development Goals (MDGs) that are climate sensitive. The programme, to be known as "Climate for Development in Africa," or ClimDev Africa, involves four inter-related thrusts or Result Areas:

- Policy: awareness raising, accountability, and advocacy;
- Climate risk management;
- Climate services; and
- Climate observations, data management, and infrastructure (based on priorities and projects proposed in the GCOS Regional Action Plans).

It was agreed that implementation of the Strategy should proceed via a set of clearly defined, focused, and costed projects in each of the four Result Areas coordinated through, or in close consultation with, the various responsible regional and national organizations. In the case of the Result Areas focused on Policy and Climate Risk Management, it was proposed that the responsible regional organizations begin by commissioning a rapid audit of action already completed or underway at regional and national levels with a view to formulation of a set of initial projects for addressing the highest priority needs. In the case of the Result Areas focused on Climate Services and Observations and Data Management, it was proposed that implementation proceed, within the overall framework of GCOS Africa, on the basis of an integrated set of updated, elaborated and re-costed priority projects from the Regional Action Plans and including, in the case of Climate Services, additional projects based on an initial audit of existing climate service capabilities under the overall framework of the World Climate Applications and Services Programme (WCASP).

All four programme thrusts should be implemented in 3 phases over a 10-year period in order to assist in achieving the MDGs by 2015. Phase 1 should initiate several demonstration projects, focusing on a limited number of countries. Phase 2 should focus on scaling up demonstration projects, and Phase 3 should undertake full-scale implementation on a continent-wide basis.

The essential conditions for successful implementation of the strategy for "Climate for Development in Africa" will be adequate donor funding in line with the G8 Gleneagles commitment and strong commitment from the responsible regional and national organizations in Africa. This will involve the following 'Next Steps,' as agreed at the Addis Ababa meeting:

- DFID and GCOS will help identify additional funding partners;

- UNECA, AfDB, and the AUC will jointly endorse letters to the G8 countries for assistance with implementation of the Strategy;
- GCOS will approach the Africa-Caribbean-Pacific (ACP) Secretariat with a view to securing European Commission (EC) funding for Phase 2;
- The National Meteorological and Hydrological Services (NMHSs) of Africa will develop a coordinated approach, with WMO assistance, to improve climate observations and services necessary for achieving the MDGs;
- The IRI will prepare a document on best practices for demand-led climate information services for development in Africa, for use as an information and advocacy tool.

I. INTRODUCTION

Poverty reduction and national development in much of Africa are being held back by the variability and extremes of climate. The livelihoods of many millions of people, especially in Africa's least developed countries, are critically dependent on a climate that is not only highly variable and unreliable in the short term but is also expected to change in the longer-term as a result of human activity. Achievement of the Millennium Development Goals (MDGs) will be possible only if the countries of Africa are far better equipped to manage the impacts of both natural climate variability and human-induced climate change.

Effective management of climate variability and change requires that climate information be used effectively in planning and that climate risk be incorporated routinely into development decisions. In order for this to happen, the National Meteorological and Hydrological Services (NMHSs) and other climate service providers in Africa must greatly strengthen their observational networks and greatly enhance their capacity to deliver the full range of climate services in support of sustainable development. Users of climate information - in fields as diverse as agriculture, health, energy, water resources management, and natural disaster prevention - need to identify their needs and work closely with the service providers to ensure that, together, providers and users of climate information can substantially improve development decisionmaking.

The global and regional framework for mainstreaming climate into development in Africa is already largely in place. Following widespread recognition, in 1997, that climate observing networks were deteriorating in many parts of the world, the Conference of the Parties to the UN Framework Convention on Climate Change encouraged the international sponsors and Secretariat of the Global Climate Observing System (GCOS) to organise a programme of Regional Workshops to identify priority climate observing needs in developing regions. This programme led to the development of Regional Action Plans (RAPs) in ten distinct regions to address these priority needs. In Africa, separate workshops were organised for the countries of Eastern and Southern Africa (in 2001) and Western and Central Africa (in 2003), which developed Regional Action Plans containing some twenty-four projects whose effective implementation would largely meet the priority needs identified at that time. In addition, the Africa Regional Strategy for Disaster Risk Reduction was published in July 2004 by the African Union/NEPAD, UNECA, and the African Development Bank, with response to floods and droughts as major, if not dominant concerns. Clearly the climate community has major contributions to make in these areas, and implementation of climate and disaster risk reduction agendas must proceed jointly.

In 2005, the G8 countries recognised that urgent action was required to help African countries adapt to climate change. Improving access and capacity to use climate information in planning was noted as a key concern. In the Gleneagles Plan of Action, the G8 countries committed themselves to support efforts to establish or upgrade observing systems to fill data gaps, expand capacity for analysing and interpreting data, develop decision-support systems and tools for local needs, and strengthen existing African climate institutions. Sectoral users of climate information and the international development assistance community emphasized that if Africa was to benefit from improved climate information, more than just improving observing systems was required. An integrated strategy was needed, encompassing observations, climate services, climate risk management, and policy development.

In light of the G8 commitment, the GCOS Secretariat initiated action to bring the key stakeholders together to discuss how to implement the commitment consistent with the

international focus on poverty reduction and the MDGs. The goal was to convene a broadly-based meeting, involving all important stakeholders, to identify an overall strategy and implementation framework for mainstreaming climate information into development for Africa. The Secretariat thus began working with its partners to organize the meeting "Climate Information for Development Needs: An Action Plan for Africa." The overall objectives were to initiate a process leading to:

- The strengthening of climate observations in Africa in support of both the UNFCCC-related and development-related objectives of GCOS; and
- The full use of the potential of climate science and services to contribute to the achievement of the MDGs in Africa.

The meeting benefited greatly from the leadership of the United Kingdom (UK) Department for International Development (DFID) in bringing together the MDG-focused user communities and climate service providers under the joint auspices of the WMO-IOC-UNEP-ICSU GCOS Secretariat and the Sustainable Development Division of the UNECA. The purpose of the meeting and its modus operandi were developed through an initially *ad hoc,* and later progressively more formal, Steering Committee co-chaired by the Chairman of the GCOS Steering Committee (GCOS SC) and the Director of the Sustainable Development Division of UNECA. The Director and staff of the Geneva-based GCOS Secretariat led organizational efforts. These were supplemented by the on-site expertise of UNECA staff.

Given that the primarily provider-based assessment of what needed to be done to upgrade climate observations and services in Africa had already been prepared through the GCOS Regional Workshops and Regional Action Plans (RAPs), it was agreed that the UNECA-GCOS meeting should look at the requirements primarily from a user perspective. To assist in focusing on the user perspective, DFID commissioned a 'Gap Analysis' as a basic input to the meeting. This analysis, prepared by a team from the United States Columbia University-based International Research Institute for Climate and Society (IRI) focused on the gaps as perceived by a selected group of users of climate information—gaps in the provision of usable products, gaps in getting information to the right people, and gaps in awareness of decisionmakers on the value of such information to sustainable development. A small group of representatives of the provider community participated to ensure that the two perspectives could be brought together to produce an integrated and coordinated overall strategy.

On this basis, the UNECA-GCOS Addis Ababa meeting of 18-21 April 2006 was charged with developing an overall strategy for 'Climate for Development in Africa,' in full recognition that its achievement, on the time scale of the MDGs, would require a coordinated Africa-wide effort by both the provider and user communities and substantial support from the international development assistance agencies.

The meeting was co-chaired by the Chair of the GCOS Steering Committee, Dr John Zillman, and the Director of the Sustainable Development Division of ECA, Dr Josué Dioné. It consisted of:

- An Opening Ceremony, steered by Dr Dioné, including addresses by:
    - The Executive Secretary of the UN ECA, Mr Abdoulie Janneh (Appendix A);

- The Commissioner for Rural Economy and Agriculture of the AUC, Ms Rosebud Kurwijila, represented by the Director of the Rural Economy and Agriculture Department, Dr Babagana Ahmadu, (Appendix B);
- The Deputy Director of the Division of Environmental Conventions of UNEP, Mr Alexander Alusa, on behalf of UNEP as one of the four international co-sponsors of GCOS (Appendix C);
- The President of the WMO Regional Association I (Africa), Dr Mohammed Mhita, on behalf of WMO as another international co-sponsor of GCOS, and on behalf of the African climate services provider community (Appendix D);
- The Chair of the GCOS Steering Committee, Dr John Zillman, who added the endorsement of the other two co-sponsors of GCOS (the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the International Council for Science (ICSU)), and set out the objectives and intended outcomes of the meeting (Appendix E); and
- The Minister of Water Resources of the Federal Democratic Republic of Ethiopia, HE Ato Asfaw Dingamo, who officially opened the meeting (Appendix F);

- Introductory plenary sessions on 'Sustainable Development: Gaps and Needs for Climate Information' and 'An Overview of Global Action Towards Adaptation to Climate Change';
- A plenary session on 'Climate and Development: Gaps, Sectoral Needs, and Challenges,' followed by detailed discussion of the results of the Gap Analysis and of strategies and measures for bridging the gaps in separate Breakout Groups for 'Eastern and Southern Africa' and 'Western and Central Africa';
- A plenary session for reporting the detailed results from the Breakout Groups;
- A plenary session for presentation of the perspectives of potential international development partners;
- A plenary session for presentation, from the provider perspective, of the already established Regional Action Plans for enhanced climate observations and services for development; and
- A plenary session to reach consensus on the way forward and to provide guidance for detailed drafting of the Strategy and Implementation Programme.

Background on GCOS and on events leading to the meeting is given in Appendix G, while the final programme and the list of attendees are reproduced in Appendices H and I respectively.

Following the introductory background presentations, the Breakout Group discussions of the Gap Analysis, and the plenary review of the Breakout Group results on needs and gaps and strategy for addressing them, the meeting reviewed the extent to which the already-developed Regional Action Plans would meet the identified needs and fill the gaps. This formed the basis for a first draft outline of an integrated strategy, which was introduced at the end of the third day and revised, elaborated, and endorsed, in all its essential aspects, on the final day of the meeting. This Report, which has been reviewed and endorsed by the Meeting Co-chairs with the assistance of the Breakout Group Chairs and Vice-chairs, the Meeting Secretariat, and the consultants, consists of:

- A summary of the conclusions of the meeting on the needs to be met and the gaps to be filled based on Breakout Group discussion of the IRI Gap Analysis (Chapter II);

- The agreed overall strategy for filling the gaps and meeting the identified high priority needs (Chapter III);
- A synthesis of projects already identified by the GCOS Regional Workshops to meet priority needs for climate observations and services (Chapter IV); and
- A summary of next steps for follow-up to the meeting and implementation of the strategy (Chapter V).

II. NEEDS TO BE MET AND GAPS TO BE FILLED

In view of the importance attached by the sponsors and funders of the meeting to the identification of the needs for climate information and services in Africa from the user perspective, the first two days of the meeting focused on the development of a shared understanding of user needs and especially of the major gaps in the present capability to meet those needs. The following sections summarize, in particular, the key findings of the IRI Gap Analysis and the additional needs and gaps identified through plenary and Breakout Group discussions.

Introduction to Breakout Groups / Gap Discussion

The second day of the meeting focused on the Gap Analysis commissioned by DFID and prepared by IRI. The types of gaps considered, to be discussed in more detail below, included gaps in integrating climate into policy, gaps in integrating climate risk management into development practice, gaps in climate services, and gaps in climate data. An opening presentation by Dr. Madeleine Thomson and Dr. Menghestab Haile highlighted the purpose of the Gap Analysis, which was to assess gaps in the use of climate information from the perspective of the decisionmaking community. Gaps were assessed at household, community, district, national, and regional levels and for a range of sectors including health, agriculture, and water resource management. A panel discussion followed this introductory presentation. This discussion provided an initial opportunity for discussants and meeting participants alike to express either support for, or reservations about, the Gap Analysis, to identify gaps not yet assessed by the analysis, to present specific examples of gaps personally experienced, and/or to introduce what has been done to overcome some gaps.

The initial session was followed by two breakout sessions, the first in which the Breakout Groups focussed on assessing the gaps as presented in the Gap Analysis and the second in which the groups focussed on how to bridge the gaps identified. One Breakout Group was formed for participants from Eastern and Southern Africa and the second for those from Western and Central Africa, in each case corresponding to the regions covered by the two GCOS Regional Action Plans. The chairs were encouraged to focus on gaps as considered by the various user or stakeholder communities. Participants were encouraged to expand on the outcome of the initial panel discussion, and, in particular, to consider the needs of users not represented as well as those represented, to present examples of gaps in which they had special knowledge, and to propose specific activities to address gaps that could be incorporated in revised versions of the GCOS Action Plans. The afternoon session was designed to give participants an opportunity to identify, prioritize, and discuss bridges that need to be built. Participants thus considered ways to eliminate gaps, identified ideas for the first phase of implementation, and sought selection criteria for inclusion of projects in the framework implementation programme. Possible selection criteria included gap-bridging projects that would allow for significant contribution to MDG achievement at an early stage and/or pilot projects that could be scaled up at a later date and activities that could be incorporated into existing initiatives (e.g., in the health and food security sectors). Integrated projects that treat

gaps at the level of the central government, the local government, and the community and/or that share acquired knowledge regionally were also considered to be of particular importance.

Gaps in Integrating Climate into Policy

During meeting discussions, participants agreed with the Gap Analysis that the principal gaps in integrating climate into policy included: gaps in communication between the development and climate communities, gaps in understanding policy constraints, lack of understanding by many policymakers of how climate variability and change might impact achievement of the Millennium Development Goals, and lack of understanding by policymakers of the utility of climate information for reducing the negative impacts of climate variability and climate change. Participants explored the factors that have led so few African nations to consider climate issues and information routinely in economic planning, noting that the effectiveness of planning depends on sound analysis of policy options, which in turn depends on access to quality information.

Problems

Given the many pressing problems confronting African countries, there has been a tendency for governments and policy makers to focus on short-term policy interventions and solutions to problems. With the exception of South Africa and a few northern African countries, climate is not systematically integrated into longer-term planning and investment decisionmaking. In part, this is because the need for climate information to serve *current* development needs has been buried in the discussion about policies to deal with uncertain, scenario-based *future* impacts of human-induced climate change. The National Adaptation Plans of Action (NAPAs) established in the Ministries of Environment have had problems engaging decisionmakers from other Ministries, involving their NMSs, and addressing the management of natural climate variability today as an essential step toward a strategy for managing human-induced climate change tomorrow.

There has been a lack of institutional coordination (horizontal coordination) to facilitate the systematic integration of relevant climate information with other pertinent information in a form that planning and operational agencies can use. A part of the problem is that, within different sectors, there may be a very wide range of institutions working at different administrative scales that are generally poorly coordinated. For example, Ministries of Agriculture generally comprise a number of relatively independent units all working on their own specific problems. Reform of agricultural institutions, decentralization of service delivery, and increased participation of civil society (e.g., farmer associations) and the private sector have led to a complex organizational environment. The resulting fragmentation does not lend itself easily to coherence in policy or to coordinated institutional approaches to assisting farmer risk management practices or responding to droughts. It also makes it difficult to share capacity to analyze climate data or develop crosscutting approaches to support risk management.

Vulnerability monitoring for food security responses tends to be duplicated by multiple institutions. Evidence suggests that the importance of international organizations in determining policies and programmes and the constraints within which these international and regional organizations work impose constraints on national-level decisionmaking. Such considerations need to be carefully assessed so that climate and other information can be integrated effectively and used by all organizations together for planning a coherent early response.

Opportunities

In order to initiate the routine integration of climate information into development activities, a critical first step is effective and compelling presentation of data, analyses, and policy options to those who set priorities and allocate resources. Given accurate and adequate data on climate and development outcomes, convincing climate models, and compelling analyses, development policymakers will have the opportunity for properly informed decisionmaking rather than, as now, relying on the scant information that is readily available.

Improved institutional coordination is essential, but where should it reside? Possibilities include within the institutions that serve development in specific sectors, in the Regional Climate Centers or NMHSs, in universities, and/or in national or regional "boundary institutions," such as the Centre Regional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle (AGHRYMET) and OSS, which serve to link agriculture, hydrology, and meteorology in order to deliver specific services to dryland countries. Engaging boundary institutions in the development of demand-led climate information may assist in generating an increased user focus and improved linkages with the service providers.

For sectors such as health, research that quantifies the economic impacts of climate variability and change can improve strategic planning. It also provides justification to policy makers for integrating climate into economic planning and can be a first step in developing demand for climate information and services.

The lack of a strategic lead from central governments is often reflected in weak sectoral planning and policies. The opportunity exists to assist strategic planning, both centrally and sectorally, through raising the awareness of development advisers and others and augmenting their ability to respond efficiently by means of appropriate training and support. This will facilitate integration of NAPAs into Poverty Reduction Strategy Plans (PRSPs), and will assist short-term policy and planning convergence based on integrated climate risk management for coping with climate variability today and climate change in the future.

The water sector is probably the most advanced in terms of incorporating climate into strategic planning, at least in the more water-scarce countries. This is partly because of the critical importance of this resource to wealth creation and quality of life, but also because of (a) the major dependence of water resources on climate variability, (b) the high cost and long timescale for building dams, and (c) the extent of political support and awareness from Integrated Water Resource Management initiatives. Planning in water resources management, however, can be complicated by the need to consider transboundary watershed management and the weaknesses of information services and decisionmaking at regional scale. Essential requirements for planning long-term regional water management, which is so sensitive to large scale climate variability, are regional policies and agreements, equitable allocation of benefits from available resources, integrated water resources management, implementation of environmental flow requirements, and unified information services providing the best possible information on both climate and water demand trends. Institutional complexities lead to delays, confusion, and the consequent lack of credibility in messages disseminated to communities concerning changes in climate risk.

Both during and immediately following the Addis Ababa meeting, representatives of the UN Economic Commission for Africa (UNECA) expressed strong interest in helping to champion the goal of raising awareness among policymakers of the importance of integrating climate into policy. Among other things, UNECA indicated that it would promote enhanced contact and collaboration with the African climate community at regional and continental levels through the

revamped UNECA-AUC-AfDB joint secretariat. UNECA, for example, stated its willingness to highlight the importance of climate information for development at the meeting of the Council of African Ministers of Finance of the African Union.

Gaps in Integrating Climate Risk Management into Development Practice

An important message from the discussion at the meeting was the need to identify, learn from, and replicate successful climate risk management activities. Thus, the meeting participants proposed that a document compiling "best practices" be prepared and disseminated. They noted that several examples of best practice are found within Africa and proposed that they be included in the document, but they also wished to learn from best practices from other parts of the world. Participants recognized that best practices would need to be adapted to the specifics of each climate-sensitive problem as well as to the institutional and policy context within each country.

The IRI noted that many "best practices" display some or all of the following characteristics for organizing and sharing approaches and experiences among institutions for rapid and effective uptake: (a) they define and frame the problem to be addressed via collaboration between knowledge users and knowledge producers; (b) they tend to be end-to-end systems that link user needs to basic scientific findings and observations; (c) they are often anchored in "boundary organizations" that act as intermediaries between nodes in the system – most notably between scientists and decisionmakers; (d) they feature flexible processes and institutions that can be responsive to what is learned; (e) they use funding strategies tailored to the dual public/private character of such systems; and (f) they employ people who can work across disciplines, issue areas, and the knowledge-action interface.

One key element in integrating climate risk management into development practice is reaching community–level stakeholders. Rural communities that depend on farming and other primary production activities are the ultimate stewards of much of the natural resource base and the segment of society that is most affected by climate. Integrating climate information into the risk management strategies of communities with climate-sensitive livelihoods depends on effective use of communication infrastructure and networks to support dialogue with users, to facilitate awareness and education campaigns, and to receive feedback so that users can influence the services they receive.

Communications are improving rapidly in most urban areas in Africa. Five years ago, only a handful of countries had local Internet access or mobile telephones. Now, services are available in virtually every major city. However, in many countries, such services focus only on high-income, population-dense corridors and fail to reach rural populations and areas where climate information is crucial. Community radio systems offer immense potential to support climate information services and a range of other information needs across multiple sectors. Radio can broadcast during the hours most appropriate for sub-user groups (e.g., women's listening groups) and provide an opportunity for local ownership and voice. Community access to complementary national, regional and global information and knowledge—fostered through the most appropriate information and communication technology (ICT) and satellite communication platforms—is of considerable extra benefit. Traditional radio, TV and print media, which often disseminate information in local languages, can also be effective. Where government extension services or their alternatives (e.g., agricultural development NGOs, agribusiness) are functioning, the resulting human interaction can build trust; communicate quantitative, location-specific information; foster mutual learning; and provide feedback to information and service providers in a manner that is difficult with ICT alone.

Communication systems (institutional and ICT-based) that enable access and use of weather, climate, and water services are an essential investment in development, even though initial demand may be low. Availability of useful information increases the demand for information. Expanding equitable communication channels is a long-term development commitment, requiring years of investment, but one that can address multiple development objectives.

The IRI participants noted that a continental-scale "knowledge systems initiative" could develop and sustain capacity through programmes that adapt best practices and share experiences and methods as widely as possible. They suggested that accounts of successful integration of climate into risk management need to be conveyed with reliable information on the current state of the climate and its likely future evolution. They noted that reference web sites would be useful, together with comprehensive sets of e-learning course modules and research, development, and policy toolboxes for building an Africa-wide knowledge base sufficient for all requirements. Also, sharing of experience-based knowledge must be underpinned by relevant university research, research at national and international research centers, and research at national and regional climate centers. The meeting welcomed an offer by IRI to prepare a best practices compendium for wide distribution.

Gaps in Climate Services

A number of issues were raised in the Gap Analysis that were subsequently discussed in both the Breakout Groups and in plenary. These included issues of data policy, the role of the NMSs as service providers, regional and sub-regional integration, building capacity for climate services, and utilizing climate information for development.

With respect to climate data policy, user representatives noted the difficulties that they often experience in obtaining climate information. The reasons suggested include policies against disseminating data freely, (for reasons that include pressures for privatization and institutional cost recovery), inadequate resources due to low prioritization in national budgets, and a non-service culture where data restrictions are perceived as a means of enhancing commercial value. While the factors that have led to restrictive data policies may be understandable, the consequences for development have not been helpful.

It was noted that weather forecasting is the mainstay of many NMSs because of its importance to a range of stakeholders, including air and marine transport, commercial agriculture, and the general public. However, climate information, such as historic variability, real-time monitoring and seasonal forecasting, has greater value than weather forecasts for many other stakeholders, including those responsible for management of infectious diseases and food crises. Climate information is also of great value for economic and social development in rural Africa, where the majority eke out livelihoods from smallholder agriculture or pastoralism in an environment where the climate determines basic survival. User representatives suggested that climate services need to be greatly strengthened if the NMSs are to serve this important component of the population effectively.

Participants agreed that the NMSs have great potential to improve the services they offer to decisionmakers and in support of the development agenda. For instance they could:

- Provide an enhanced range of useful climate risk management services;
- Assist with delivery of the MDGs and adaptation to climate change;
- Contribute useful services for integrated water resource management;

- Assist with hazard early warning and disaster risk reduction; and
- Contribute productively to real time environment monitoring.

Aligning climate services to the needs of development requires strong leadership and a partnership approach among national and regional institutions and the international climate community. NMSs, when working effectively, are multi-sectoral information service providers. As such, they may have no obvious home within government ministries. Their mandates and influence are often constrained by their position within, for example, Ministries of Transport, Environment, or Defense. In some countries, the NMSs are part of the national hydrological or water resources agencies, giving them a strongly applied perspective. Consideration should be given to strengthening this organizational approach, emphasizing new needs in hydrology, early warning, environmental monitoring, and future trends.

Some participants proposed the creation of development units within NMSs. The responsibilities of such units would be to focus on how the resources of the Services could contribute to the national development agenda and to coordinate the Service's contribution to national development. Development units could:

- Represent NMSs on national and regional issues related to climate and development;
- Identify research areas relevant to the country's development agenda and to particular sectors and communities;
- Evaluate the NMSs own resources so that it has a clear understanding of what it can and cannot deliver;
- Assess the value of meteorological (especially climatological) services to the national economy; and
- Take steps to foster demand for climate information by actively identifying, engaging, and raising the awareness of potential users, and then supplying climate information to meet this new demand.

Considering the generic nature of weather and climate services and the global or regional scale of much climate modeling work, there is considerable scope for regional integration and for developing shared responsibilities, especially where small countries exist in close proximity to larger ones. It was noted that it could be cost effective to adopt a version of the European Satellite Application Facility model, whereby stronger Services take on regional roles, such as Kenya has done with the Institute for Meteorological Training and Research (IMTR) and the Inter-Governmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC). However, to be effective, users noted that regional centers need (a) a wider range of development partners, (b) stronger direction towards regional development through the Regional Economic Communities (RECs) and financing partners, and, most importantly, (c) an appreciation of a demand-led process.

The need to build the capacity of NMSs to address the development agenda was a prominent issue. Some proposals for building capacity included:

- Awareness raising within NMSs and the climate community of the MDGs, national development priorities, roles of PRSPs and NAPAs, and rural community information needs;
- Management training in the participatory process of developing a strategic plan;
- Working with development partners and the media on the dissemination of climate information to a variety of users;

- Technical training to decentralize services, adopt best practices, and to deliver information services needed by local development stakeholders; and
- Training in resource mobilization and management of interdisciplinary projects for development.

Having trained staff in rural locations is a key element of development strategy, along with strong leadership and a committed headquarters team. There is also a need for training observers and data analysts who handle volunteer networks. They are simultaneously both providers and users of climate information.

The meeting participants noted that climate information products are becoming increasingly important for development in a number of diverse areas. The following summarizes five of these areas, introduced in the Gap Analysis and discussed at the meeting.

The Usefulness of Archives of Daily Observations. Complete, quality-controlled archives of historic daily observations are central to many development applications. They provide the basis for understanding trends, deriving climate statistics of interest, and placing current observations into historical context. Agricultural planning and engineering design (e.g., of dams and coastal protection structures) rely on climatologies derived from historic observations. Climatic time series are particularly important for water resource management. Levees, dams, and reservoirs are often engineered on the basis of inadequately short records of flood levels, with dramatic examples of inadequate flood or drought protection. Historic data are the basis for downscaling and calibrating forecast products, and calibration of satellite data. Food aid and insurance applications use historic observations with statistical or simulation models to quantify agricultural production risk.

Near-Real-Time Observations for Operational Management and Early Warning Systems. Near-real-time climate observations serve as a useful proxy for climate-sensitive variables, such as soil moisture and habitat for disease vectors, which can be more difficult to measure. Crop and forage production, disease vector populations, and risk of flooding and landslides are all sensitive to the recent history of rainfall. Operational systems for forecasting these impacts for management or early warning derive at least some of their predictability from near-real-time observations. One important technical gap that was noted is a perceived lack of understanding as to how best to use the satellite data services to which NMSs have privileged access as part of the global meteorological community. This may be rectified to some extent by the impending European Commission programme, African Monitoring of Environment for Sustainable Development (AMESD), but this programme still has much under-exploited potential.

Prediction for Operational Management and Early Warning Systems. Where proven to have skill, forecast products at different time scales (short-range, medium-range, seasonal) may contribute to operational management (e.g., timing of water release from a dam), hazard management (e.g., malaria early warning), and longer-term planning (e.g., agricultural planning for temperature sensitive crops) when integrated into an appropriate decisionmaking framework. Given the relatively long history of their availability, the direct use of daily weather forecasts is generally well established. The value of seasonal forecasts derives largely from the ability to forecast impacts such as disease risk, reservoir inflow, or crop or forage production, often using models that incorporate historical and near-real-time observations and climate forecasts.

Climate Change Scenarios for Infrastructure, Policy Development, and Investment. Managing climate variability today is an essential, but not a sufficient, step toward adapting to

climate change tomorrow. General Circulation Model-based climate change scenarios are generally consistent in indicating temperature rise across Africa but show considerable variation in both the magnitude and direction of changes in precipitation. Appropriate use of a range of scenarios, combined with analysis of trends in historic data, can contribute to the understanding of future trends and uncertainties that are crucial for long-term infrastructure planning and many policy and investment choices. Participants noted that it is important that countries take a strategic view on likely climate change impacts and start to adapt accordingly. Infrastructure has long lifetimes and pay-back periods (typically 25-30 years) and is therefore particularly vulnerable to climate change.

Spatial Information. For many development applications, a particularly useful way to integrate climate information with other information relevant to decisions is to use a Geographical Information System (GIS) to explore relations and create maps. Maps depicting agroecological zones, disease risk, etc., based on statistical or rule-based decision models and informed by climatology (and often a wide range of other non-climatic information) help indicate what policies are appropriate, what investments should be made, and where research and intervention should be targeted. Similar maps and models can be used operationally as indicators of the current status of the season or as indicators of changes in risk, e.g., when they incorporate near real-time weather and possibly climate forecast data. For example, crop models driven by near real-time daily weather and historic climate information are incorporated into food security models, and malaria early warning models are driven by seasonal changes in weather-related risk.

Throughout the meeting, and in particular during the gap analysis discussions that focused on user priorities, the representatives of the NMSs agreed that there is much unrealized potential to contribute to their countries' development agendas. They expressed enthusiasm for developing a coordinated approach—through WMO's Regional Association I (Africa)—to improve climate observations and services necessary for achieving the MDGs. Likewise, regional institutions, including the African Center for Meteorological Applications for Development (ACMAD), the IGAD Climate Prediction and Applications Center (ICPAC), and the Sahara and Sahel Observatory (OSS) expressed strong support for helping to close gaps in the provision of climate services in support of sustainable development. Finally, it was noted that WMO's World Climate Programme (WCP) has an important role to play in helping to develop the capacity of African NMHSs to process and deliver climate information and to pass on the benefits of the improved climate services to the user community. Regarding future collaboration, the World Climate Applications and Services Programme (WCASP), the Climate Information and Prediction Services Programme (CLIPS), and the Agricultural Meteorology Programme, all within WMO/WCP, are of special relevance.

Gaps in Climate Observations and Data Management

The user-community participants in the Breakout Group discussions recognized that basic observations and data are an essential prerequisite for meeting all the other needs identified above, and, if the gaps in the use of climate information for policy, risk management, and climate services provision are to be filled, it would be essential also to fill the major current gaps in observations and data management.

Gaps in climate observations and data management had been extensively considered in the two GCOS Regional Workshops, and priority projects to address these gaps had been formulated in the Regional Action Plans. The information provider community had the greater impact in drafting projects for the Regional Action Plans. Nonetheless, users of climate information who

attended the GCOS Regional Workshops contributed their perspective and greatly influenced the projects that were selected for inclusion in the Plans. For example, users emphasized observational needs in the agriculture sector and, in particular, for the challenges of the semi-arid tropics. In the Sahel, up to 80 percent of the population is reliant on agriculture and, given high variations in rainfall and the absence of irrigation in the region, it is subject to grave risks to its food supply. Users drew attention to the need to measure both physical and biological parameters on a variety of scales at agroclimate stations in order to address issues related to crop growth status, disease, etc. Users noted that national operating budgets were currently inadequate to support agroclimate networks, with many stations now being inoperative due to lack of equipment and consumables. They pointed out that climate information to inform adaptation options for drought (whether as a result of natural climate variability or longer-term climate change) will be important in the future, for example, related to adjusting planting dates and crop densities, fertilizer rates, irrigation, selection of crop species, cultivar traits, etc. A number of projects in the RAPs support agricultural needs, including, for example, a project to support local decisionmaking by developing a climate information partnership and a project to improve hydrological observations and hydrological data management.

In the health sector, users of climate information drew attention to the impacts of climate on nutritional status, economic performance, and diseases such as meningitis and malaria. They noted that unusual rainfall patterns were associated with malaria epidemics among the vulnerable populations of the Sahel and that meningitis outbreaks also had a relationship to climate. As a result, the application of climate information to provide early warning for malaria and meningitis epidemics was considered to be especially important. To provide quality information, users noted that it would be essential to improve climate observing networks and related data management, data analysis and exchange, and climate services activities. Users noted that the World Bank had funded climate-observing stations in Ethiopia in association with efforts to control malaria there. They were especially concerned to improve communication between the climate and health communities and, in effect, to institutionalize their relationship in order to address a full range of climate-health issues.

Another focus of users is observational needs for early warning and monitoring of extreme events, such as droughts and floods. Climate information is required for creating formal and informal early warning systems, especially for providing indicators, thresholds, vulnerability maps, and famine early-warning products. However, users are concerned about shortcomings in observational networks, notably in low station density and obsolescent equipment, in collection and analysis of data, and in the communication and dissemination of information and products. In the Regional Workshop for Western and Central Africa, users highlighted the urgent requirement for investments in improved observational networks, data analysis, and database management systems, and for development of indicators and enhancement of hydrometeorological services in the region. They also stressed the vital importance of capacity building and the development of stakeholder networks.

The IRI Gap Analysis offered some additional important observations. The IRI analysis found little evidence that climate data were used well locally except in particular instances. Thus, there appears to be little concern at the local level in the decline of observations and data. Users who participated in the analysis noted that this situation needs to be changed by greatly improving climate services to communities and policy and resource managers while maintaining and improving global services. They would like to see local observations for local development that comprise community-owned systems producing user-friendly information of relevant parameters (in particular, rainfall). Wherever possible and consistent with the maintenance of essential instrument and observation standards, these local observations should be supported

by user-friendly technology and energy-efficient systems, local manufacture of equipment to sustain the networks, and local maintenance and production of spare parts to ensure continuity in operation. Mali, for example, incorporated local rainfall observations in television and radio reports and in so doing generated pride and a greater feeling of ownership.

The Gap Analysis also noted that observations for national and/or global purposes require networks owned and supported in partnership, with standardized databases and appropriate arrangements to ensure sustained collection of both environmental data and socio-economic indicators. Specified data analysis and compatible archiving systems are necessary for climate, water, and other environmental variables. Integrated regional centers (possibly virtual) are also required to organize and share knowledge required for multi-disciplinary products and services for development stakeholders in cost-effective and sustainable ways. In order to maximize the development benefits of new investments in national and global observing systems, the users who participated in the Gap Analysis recommended that such investments prioritize, in order: data rescue, management, and dissemination; renovation of recently quiet stations such that the archived data from those stations may be used in conjunction with new data; and new stations that combine future benefits (i.e., once the station has been running for many years) with immediate benefits such as calibrating satellite data or cross referencing with other data sources (e.g., streamflow).

III. STRATEGY FOR FILLING THE GAPS AND MEETING THE NEEDS

Participants in the Addis Ababa meeting concluded that, in order to fill the identified gaps and meet the urgent needs for the effective use of climate information and services for development in Africa, an overall strategy and implementation programme, based on priority initiatives in the four key areas identified in the Gap Analysis, was needed. An outline of a draft strategy and implementation programme was presented to participants on the evening before the final day of the meeting and substantially modified during plenary discussion on the final day. It was then subsequently elaborated in light of the guidance provided by the meeting. The final text of this strategy and implementation programme is given in Appendix J. Its essential features are summarized below.

Purpose of the Programme

The purpose of the programme is to guide the effective integration of climate information and services into development planning for Africa and to ensure the mainstreaming of climate considerations in achievement of the Millennium Development Goals (MDGs). The programme seeks material progress in achievement of the MDGs and will focus initially on the contribution of climate services to health and food security through improved management of climate variability and change.

Main Components of the Programme

In order to achieve its purpose, the Programme will focus on achievement of the following outcomes in four key Result Areas:

- **Policy:** Awareness of politicians, central planners, and the public raised sufficiently to achieve broad political ownership, political support, and leadership and to demonstrate commitment to adaptation to climate variability and change;

- **Climate Risk Management:** Climate risk management practices incorporated in: a) strategic MDG development planning, b) sectoral management, c) pro-poor livelihood strategies, and d) disaster risk reduction programmes;
- **Climate Services:** Climate information and support services developed and used by MDG decisionmakers in government, the private sector, and civil society to help meet priority needs in operational climate risk management and overall social and economic development; and
- **Climate Observations, Data Management, and Infrastructure:** Observation networks and support infrastructure upgraded and enhanced to provide data essential for climate services, climate risk management, and policy development.

Geographical Coverage

The programme is designed for needs across Africa. Since climate issues in development are considered reasonably similar in much of Africa, and examples of best practice are relatively scarce, it was agreed that one programme should be designed to cover the needs of all Africa in order to optimise inter-regional knowledge sharing. Arrangements will be made to ensure that francophone and Portuguese-speaking partners are not disadvantaged.

Implementation Timeframe

It is proposed that the programme be implemented through activities undertaken in three phases as follows:

- **Phase 1: Demonstration and planning:** Development of best practices for Climate Risk Management (and of ways to measure their impact on society) and establishment of necessary infrastructure: 3 years and approximately $50 million required.
- **Phase 2: Scaling up to meet MDG requirements:** Testing scaled-up approaches: 3-5 years and approximately $50 million required, plus engagement with governments to obtain contributions from national budgets.
- **Phase 3: Large scale implementation to meet requirements for MDGs and adaptation to climate change:** 3-5 years and $100+ million required, possibly leveraged through country strategy papers, requests from individual countries, and national budgets.

Implementation Actions

In view of the different stages of preparatory work already completed in the four Result Areas, implementation should proceed on a somewhat different basis in each area as follows:

Policy: Awareness Raising, Accountability, and Advocacy (Result Area 1): The key proposed actions are:

1. Commission a rapid audit of work already completed in related domains, then;
2. Invite tenders for actions to advance policies, leadership, and public awareness of adaptation to climate variability (CV) and climate change (CC), especially at the highest levels, both regionally and nationally (and possibly also in local government decisionmaking);
3. Distill lessons and best practices and disseminate them via the communication strategy, with particular emphasis on reaching national and regional leaders.
4. Build capacity in public understanding of climate change and variability;

5. Improve regional climate predictions and climate change scenarios; and
6. Coordinate with the Africa Regional Strategy for Disaster Risk Reduction.

Climate Risk Management (Result Area 2): For the foreseeable future, the best strategy for addressing the long-term problem of climate change in Africa is to enable societies to cope better with climate variability today. A progressive approach to managing climate risk will help: a) to improve food security today, b) to deliver the MDGs tomorrow, and c) to sustain MDG achievements gained through greater resilience to future climate change. This win-win-win approach requires that climate considerations be fully incorporated in development decisions (along with pertinent social, economic, and environmental factors) to help guide policy, planning, investment, and management decisions from farm to continental scales. This process is known as Climate Risk Management (CRM). The key initially proposed actions are:

1. Commission an audit of actions already undertaken in this domain;
2. Invite tenders for actions to advance a) current best CRM practices, b) new CRM partnerships, and c) understanding of CV and CC at the scale of the MDGs;
3. Distil lessons and best practices and disseminate them widely through a dedicated communication strategy; and
4. Develop capacity for the assessment of societal vulnerability and adaptation to climate change and variability.

Climate Services (Result Area 3): The important challenges will be to fully engage the National Meteorological and Hydrological Services (NMHSs) and other climate service providers in an accelerated effort, under the auspices of the World Climate Applications and Services Programme (WCASP), to identify a set of priority projects that will lead to effective climate services in support of the identified needs. The initially proposed actions are:

1. Audit current practices and unmet needs;
2. Undertake targeted capacity building and institutional strengthening;
3. Create partnerships to address development needs;
4. Disseminate best practices;
5. Support the health sector with climate information;
6. Support local decisionmaking by developing a climate information partnership; and
7. Enhance application of satellite observations.

Climate Observations, Data Management, and Infrastructure (Result Area 4): As a result of the 2001 and 2003 GCOS Regional Workshops and the development of the associated Regional Action Plans, the essential foundation for implementation of the fourth component of the strategy is already in place (see Chapter IV and Appendix K). Participants in the Addis Ababa meeting agreed that implementation should proceed through the following actions:

1. Prepare a consolidated (i.e., Africa-wide) and re-costed set of observation and data improvement projects on the basis of those in the Regional Action Plans and in line with the priority guidance provided by the meeting. Such projects include:

    - Rescuing historical climatological and hydrological data;
    - Improving capacities for regional data management;
    - Improving Telecommunication Facilities for the Collection and Exchange of Climate Data;
    - Upgrading Stations in the GCOS Upper Air Network (GUAN);

- Upgrading Stations in the GCOS Surface Network (GSN); and
- Improving hydrological observations and hydrological data management.

2. Refer the consolidated and updated GCOS Action Plan to the forthcoming session of the WMO Regional Association I and other key GCOS implementing bodies for review, endorsement, and implementation action.
3. Invite sponsor support for the funding and implementation of an integrated Action Plan and a further set of projects as identified and jointly defined by the key user-community implementing organizations.

Overall Coordination:

It is proposed that, in collaboration with UNECA and WMO (acting also on behalf of IOC, UNEP, FAO, and ICSU as the international sponsors of GCOS), the African Union Commission take the lead in establishment of an overall High-Level Coordination Committee for ClimDev Africa. This would be underpinned by separate subsidiary coordination mechanisms for each of the four key Result Areas established (in the cases of Result Areas 3 and 4, under the auspices of the World Climate Programme and GCOS, respectively). The pan-African coordination mechanisms should involve representatives of the major donors in an observer capacity and should be mirrored, as far as possible, by national ClimDev coordinating mechanisms in the individual countries. Many of the same organizations are also involved in the Africa Regional Strategy for Disaster Risk Reduction, and a strong synergy is present in the incorporation of both climate and disaster risk reduction in development plans; implementation of both efforts must proceed jointly.

Budget:

The estimated budget for ClimDev Africa is US$200 million over 10 years.

IV. AN INTEGRATED ACTION PLAN FOR CLIMATE OBSERVATIONS AND DATA MANAGEMENT

Introduction--The Regional Workshops and Regional Action Plans

The urgent requirement to assist countries of sub-Saharan Africa to secure resources with which to implement the projects contained in the two Regional Action Plans (RAPs) provided the initial impetus for organizing the Addis Ababa meeting, “Climate Information for Development Needs: An Action Plan for Africa.” The RAPs were products of two workshops organized as part of the global GCOS Regional Workshop Programme. The first of these workshops, for the countries of Eastern and Southern Africa (ESA), was organized in October 2001 in Kisumu, Kenya to discuss needs and priorities for systematic observation in response to the charge that GCOS received from the Conference of the Parties (COP) to the UN Framework Convention on Climate Change (UNFCCC). Noting that observing systems in the subregion were inadequate and/or had been deteriorating in recent years, the Directors of National Meteorological Services and National Climate Change Coordinators who attended the workshop concluded that urgent action was needed to find solutions to observing system problems. The workshop participants met again in January 2002 to draft an Action Plan containing fourteen high-priority projects with particular relevance for global and regional needs. In a similar manner, GCOS organized a Regional Workshop for the Directors of National Meteorological Services and National Climate Change Coordinators of the countries of Western and Central Africa (WCA). This workshop was held in Niamey, Niger in March 2003. A follow-up meeting to develop an Action Plan for

this region was held in Dakar, Senegal in September 2003. The resulting Action Plan, issued in 2004, contains ten high-priority projects.

The two Regional Action Plans were introduced and discussed on the third day of the Addis Ababa meeting. The RAPs contain a total of 24 projects, six of which treat the same subjects in the two subregions, thus allowing the list of projects for the two subregions combined to be reduced to 18. Brief descriptions of the 18 distinctive projects are given in Appendix K. The complete Regional Action Plans may be viewed on the GCOS website (http://www.wmo.ch/web/gcos/gcoshome.html). The RAPs are strategic, agenda setting documents and hence contain brief project descriptions and approximate costs rather than detailed project plans. Additional work will be required in most cases to refine costs and to provide the detail necessary to conform to the requirements of specific donors.

Prioritization of Projects to Meet Identified Needs

An informal prioritization exercise was undertaken as part of the Regional Action Plan discussions. This was an attempt to obtain a first indication of how important different stakeholder groups (in this case providers of climate information, users of climate information, and the donor community) considered each project to be. Although it is not possible to draw robust conclusions from this small, informal poll, it may be useful to note that all three stakeholder groups included the project to "build capacity in public understanding of climate change and variability" in their top five projects. Also of note is that: both users and providers of climate information indicated "improving surface and upper air observations" among their "top five" projects; both users and donors considered the projects to "develop a climate information partnership to support local decisionmaking" and to "develop capacity to assess vulnerability and adaptation to climate variability" to be in the top five; and donors, in addition to those projects already cited, listed "improving capacities for regional data management," "improving telecommunication facilities for the collection and exchange of climate data," and "supporting the health sector with climate information" to be especially important. As noted earlier, users who participated in the Gap Analysis gave high priority to data rescue and to data management and dissemination.

More generally, it was not practical (and meeting participants did not try) to definitively agree on the relative importance of projects. Diverse stakeholders naturally assign different importance to different projects. Moreover, in a practical sense, it is problematic to conclude that a project addressing one observing system domain, e.g., the atmosphere, is more important than one addressing another domain, e.g., the terrestrial domain, or that a project seeking to build partnerships is more important than one that focuses on improving observations. A variety of needs exist along a continuum from improving fundamental observations to providing end users with useful information and climate risk management products.

All participants agreed on the importance of maintaining the quality, homogeneity, and long-term continuity of the observations and data sets needed to support climate services, risk management, and policy development.

Proposed Consolidated Action Plan for Climate Observations and Data Management

Many, but by no means all, of the projects contained in the Regional Action Plans address priority needs for improving climate observations, data management, and infrastructure, i.e., Result Area 4. Implementation of these projects is essential if substantial progress is to be made in the first three Result Areas (policy, climate risk management, and climate services) described in Chapter III above. Improved observations and data management are an essential

prerequisite for basis for providing enhanced climate services, informed climate risk management, and appropriate policy development. Among the observations and data management projects that participants deemed especially important are:

- ***Rescuing historical climatological and hydrological data.*** Data rescue is vital to preserving historical records related to the dimate, the hydrology, and the weather. Historical data provide the observational basis for scientific, engineering, and economic decisions for countries in the region. Numerous data were collected during the colonial period and later by National Services as well as by the scientific community, but no detailed inventory has thus far been published. Moreover, the paper on which much early data are recorded is deteriorating and some other electronic storage media are becoming obsolete. This project would undertake to digitally photograph and process available original historical observational data and provide training in the techniques of data rescue. Making this valuable data available will contribute to a whole range of societal benefits, from helping to support agriculture to improving water resources management. Approximate cost: $500,000.

- ***Improving capacities for regional data management.*** Despite numerous efforts by regional National Meteorological and Hydrological Services (NMHSs), the region suffers from deficiencies in the organization and management of national and regional databases of climatological and hydrological data. These include problems related to data quality control and reliability, the provision of up-to-date descriptions and analyses, and data exchange and dissemination between NMHSs and the World Data Centres. The project would implement suitable climatological and hydrological data management systems, train relevant staff, and greatly improve the data management capabilities of regional and national centres. This project will enable improved use of existing data, as well as of data generated through the implementation of other projects, for a variety of climate-related purposes. Approximate cost: $6,500,000.

- ***Improving Telecommunication Facilities for the Collection and Exchange of Climate Data.*** A crosscutting need for the region is to overcome widespread shortcomings in telecommunications, which seriously inhibits exchange of data even if the observations themselves are being performed in a sustained and high-quality manner. Weakness of public telecommunications infrastructure in several countries, the obsolescence of the autonomous means of telecommunication currently used by the National Meteorological Services, and difficulties in obtaining associated supplies such as power in a number of centres have been identified as the major shortcomings. The project proposes the evaluation of current capacity, strengthening of infrastructure with initial priority on the GCOS Surface Network (GSN) and GCOS Upper Air Network (GUAN) stations, acquisition of data dissemination systems, technical training, and extension of enhanced telecommunications to other GCOS network components. Approximate cost: $22,000,000.

- ***Upgrading Stations in the GCOS Upper Air Network (GUAN)***. There is a strong need to upgrade stations in the GCOS Upper Air Network to conform with GCOS Best Practices. An upgrade of the stations in the region is necessary to ensure that these stations are fully operational for the production of systematic meteorological observations. To date, irregular reporting of near-real-time and historical data, as well as unacceptably large random variations or biases in the measured parameters have been prevalent, mainly due to a lack of equipment, insufficient local operating capacity, and poor communication and archiving facilities. Implementing the project would help improve description and prediction of future climate, reduce losses from natural and

human-induced disasters, and mitigate and adapt to climate variability and change. Approximate cost: $3,500,000.

- ***Upgrading Stations in the GCOS Surface Network (GSN).*** Improvement of the GCOS surface network in Africa is critical for better understanding of climate change and variability regionally and globally. Many of the stations in these networks either do not report regularly or are silent. These shortcomings severely limit the quality of climate monitoring and prediction both on the regional and global scales. Upgrading of individual stations and capacity building to carry out day-to-day operations will be a cost-effective means to improve these observations on a sustainable basis. Approximate cost: $5,500,000.

- ***Improving hydrological observations and hydrological data management.*** Improving hydrological observations through the installation of a real- or near-real time hydrological data collection, transmission, and dissemination system will be highly beneficial for water management, as well as for adaptation to climate change and variability. Improvements will help build capacity for efficient integrated regional water resources management. An overarching objective of this project is to counter the progressive deterioration in the capacity of the National Hydrological Services (NHSs) to supply data and information on the state of their water resources. Improved observations will help support sustainable agriculture and combat desertification and lead to better management and protection of terrestrial, coastal, and marine ecosystems. Approximate cost: $8,500,000.

Each of these projects will need to be updated, re-costed, and further refined so that they are more sharply focused on the identified needs and meet the proposal requirements of funding agencies. Additional project proposals addressing Result Area 4 may also be identified and developed. The consolidated Action Plan for Observations and Data Management will be referred to the WMO Regional Association I and other key GCOS implementing bodies for review, endorsement, and implementation action. Sponsors will be invited to support the funding and implementation of this consolidated Action Plan.

It is noteworthy that among the potential donors participating in the meeting was the Government of Finland. Shortly after the meeting, Finland announced that it is planning to support the upgrading of hydrometeorological infrastructure in seven countries in Southern and Eastern Africa, among which will be GCOS surface and upper air stations. These countries include Ethiopia, Kenya, Tanzania, Zambia, Mozambique, South Africa, and Namibia. This contribution would be part of a larger capacity building effort Finland is launching in these countries. The Finnish decision to associate itself with the GCOS programme is most welcome and represents a substantial contribution toward implementation of the GSN and GUAN projects contained in the Regional Action Plan for Eastern and Southern Africa.

V. NEXT STEPS

The participants at the meeting recognized that considerable further consultation on Programme and project definition will be required to produce a comprehensive Implementation Programme for ClimDev Africa. Action toward that end will include the following:

- Negotiations will continue with the intent of starting some of the proposed activities in the second half of 2006. DFID was urged to take the lead in making available seed funding to keep the momentum going. DFID also agreed to explore whether any other G8 donors would assist, given their G8 commitments, in supporting the programme. It was

further suggested that the Executive Heads of the UNECA, AfDB, and AU should send a joint letter to G8 members to encourage them to act on their commitments.

- The GCOS Secretariat, in partnership with the UNECA and their joint Secretariat with the African Union Commission and the African Development Bank, will promote enhanced contact and collaboration with the climate community at regional and continental levels. A Memorandum of Understanding between the two secretariats will guide this partnership.
- The IRI, in consultation with UNECA and the GCOS Secretariat, will finalize the Gap Analysis by incorporating meeting discussions and contributions from the Breakout Groups.
- Participants at the meeting and their colleagues in the development and climate communities in Africa will continue raising awareness about this climate and development programme and consider how it relates to their activities.
- The IRI, in consultation with UNECA and the GCOS Secretariat (and with support from DFID), will prepare a document setting out best practices for a demand-led climate information service for development purposes in Africa that could be used as an information and advocacy tool.
- The African NMSs, through WMO Regional Association I, and in collaboration with partner agencies for climate-related ocean and terrestrial observations, will develop a coordinated approach, in support of this programme, to improve climate observations and services necessary for achieving the MDGs.

APPENDICES

Appendix A

ADDRESS BY THE EXECUTIVE SECRETARY OF THE UNITED NATIONS ECONOMIC COMMISSION FOR AFRICA, ABDOULIE JANNEH, AT THE OPENING OF THE MEETING ON CLIMATE INFORMATION FOR DEVELOPMENT IN AFRICA

Addis Ababa, Ethiopia, 18-21 April 2006

Your Excellency, Asfaw Dingamo, the Hon. Minister of Water Resources of the Federal Democratic Republic of Ethiopia,
The President of the World Meteorological Organization Regional Association for Africa
Chairman and Director of the Global Climate Observing System,
Excellencies,
Distinguished Participants,
Ladies and Gentlemen,

It is a pleasure to welcome you to Addis Ababa and to the opening of this meeting on climate information for development in Africa.

As you are all aware, in September 2000, the Member States of the United Nations adopted the Millennium Declaration, and thereby committed themselves collectively to making the right to development a reality for everyone, and to free the human race from want. They acknowledged that progress should be based on sustainable economic growth, which must focus on the poor. At the same time, the Declaration set eight Millennium Development Goals (MDGs), and called for the promotion of "a coordinated strategy, tackling many problems simultaneously across a broad front" in order to meet them by 2015.

In that context, the environmental issues, which you will be addressing over the next four days, are without doubt an essential element of a comprehensive approach to achieving the Millennium Development Goals (MDGs), especially here in Africa.

Moreover, following the commitment made in the *2005 World Summit Outcome* document to address the serious challenge posed by climate change through the creation of a worldwide early warning system for all natural hazards, this meeting provides a timely opportunity to consider how climate information can be effectively used in support of efforts to achieve the MDGS in this region as well as the actions that must now be taken on the ground.

Excellencies,
Distinguished Ladies and Gentlemen,

The imperative for action is clear. In recent years, humanity has had to contend with an increasing spate of weather-related disaster risks, such as floods, droughts, hurricanes, heat waves, cold spells, and landslides, all attributed to climate variability and change. Africa's situation is so critical, due to drought and flood, that a recent report of the US National Intelligence Council says some African countries are "so burdened by their extreme climate-related problems of health and disease, and poor geographic position that it is not clear that any economic model offers them a path towards development".

Droughts impact human livelihoods directly through crop loss that can lead to famine if alternative food sources are not available. This is a predicament of particular concern right now to our host country, Ethiopia and many of its neighbours in this sub-region. In that regard, your

discussions at this meeting will not be a mere intellectual exercise for the onus is now on all of us to work harder to find solutions to tackle the immediate causes and consequences of drought in this region and elsewhere in Africa.

We also know that there are often further challenges down the line as a result of droughts. Indirectly, water shortage contributes to the proliferation of diseases, as people lack water for basic hygiene. Furthermore, if the drought persists, people are often forced to migrate, resulting in a refugee population and the multiple health problems faced in refugee camps. The Food and Agriculture Organization (FAO) estimates that about 800 million people in the developing world do not have enough to eat, and that although food production is still on the rise, such increases are mainly in the developed world, where production subsidies play an important role.

For Africa, where farmers bear the brunt of the subsidies given to their counterparts in the developed world, the other extreme to droughts has been floods. Floods reduce the asset base of households, communities, and countries by destroying standing crops, dwellings, infrastructure, machinery and buildings. In some cases, the effect is dramatic, as in the case of Mozambique in 2000 where flooding cost 700 lives, left half a million people homeless, and caused the country's promising economic growth rate to fall from eight percent to two percent that year.

Ladies and Gentlemen,

The irony is that floodplains also come with enormous advantages. The fertile alluvial soil of floodplains is ideal for higher crop yields and helps reduce vulnerability of the floodplain occupant to a wide range of other risks, such as drought. Furthermore, floodplains typically support very high densities of human settlement, and the gross domestic product per square kilometer is high in countries whose territories are comprised mostly of floodplains. An example is the Netherlands, which has the highest GDP per square kilometer in Europe.

These two extremes also have a direct impact on Africa's freshwater, an essential driver of terrestrial and aquatic ecosystems. Freshwater ecosystems such as ponds, lakes, wetlands and river channels provide support for aquatic and terrestrial wildlife, and supply environmental goods and services. Thus, for millions of people, particularly in the rural areas, who depend directly on natural resources or benefit from ecosystems, providing water for the environment and for people is one and the same thing. For them, as with the rest of us, water makes the difference between hunger and buoyancy.

Yet, according to some climate scenario analysis, more people will face the risk of hunger by 2080, due to the effect of future climate change. Indeed, the GDP of the agricultural sector in the developing regions, especially in Africa, would be negatively impacted by climate change, and since high-tech solutions do not always reach poorer farmers who rely on rain for crop sustenance, they will pay the highest price.

The FAO says while climate change is not expected to depress global food availability in the next three decades, it may increase the dependence of developing countries on food imports and accentuate food insecurity for vulnerable groups and countries. Other studies show that 13 African countries, which already have 87 million undernourished people, may lose cereal production potential in the 2080s for three climate models and across all the emission scenarios.

Excellencies,

While diversification is a natural strategy for spreading risk across several enterprises, such strategies are only effective if the risk does not co-vary across the enterprises involved, which in fact often happens in rural Africa. Many sectors of the African economy depend indirectly on agriculture and when shocks arise, they affect all farms.

It is a cause and effect scenario, which indicates that vulnerability is maintained by economic and other conditions. It is reproduced by the activities that either sustain unsafe living conditions for some or disempower them; changing only if those conditions are transformed.

It also shows that vulnerability is the product of many processes, including poverty, marginalization, social instability, conflict, environmental degradation and floodplain settlement.

An emerging body of evidence indicates that natural resources mismanagement contributes to the vulnerability of human systems to disaster, and that enhanced management can provide a tool for its reduction.

ECA is aware that managing climate-related disaster risks is key to achieving the MDGs. For example, the lack of information about the onset, intensity and cessation of rainfall may cause farmers to lose their assets including crops and even seed, affecting the livelihoods of many African homes. Sustainable livelihoods, food security, poverty reduction and sustainable environmental management are therefore linked to climate variability and extremes.

Available evidence shows that climate information can be developed with risk managers for addressing specific problems. Specifically, climate information can be used to manage risks related to farm-level agriculture, food insecurity, livestock trade, and reservoir operation.

In the case of farm-level agriculture for instance, experience shows that the most serious problems confronting the farmers include inadequate or unreliable rainfall, as well as lack of knowledge, and that seasonal rainfall forecasts could enhance viable management responses related to the timing and method of land preparation, crop and cultivar selection, planting strategy, weeding and soil fertility management as well as pest management, and other critical agricultural factors. In the same way, climate forecasts on possible droughts and food shortages can help governments and humanitarian agencies plan ahead for timely assistance.

However, the value of climate risk management is fundamentally dependent on the quantity and quality of the basic climate observations that are available. In Africa, we have seen that some of our important networks are deteriorating and that others have never been extensive enough to allow for the risk management that is required to optimize sustainable development.

A critical requirement of sustainable development is the capacity to design policy measures that exploit synergies between economic growth objectives and those focused on the environment in accordance with national strategies.

In that regard, climate change mitigation strategies offer a clear example of coordinated and harmonized policies that take advantage of such synergies. This is why this meeting is very crucial. It is a worthwhile investment, fundamental to all development projects in high-risk areas in Africa.

As you embark on this serious task, over the next few days, I therefore urge you to come up with recommendations on ways to mainstream climate risk management into national policy-making processes in Africa. As you do this, I urge you to give proper consideration to the creation of appropriate communication and information channels so that the elements that make up policies at different levels can operate in a mutually reinforcing manner. I also wish to exhort this meeting to look into the possibility of convening "training of trainers" workshops on the climate dimensions of risk management at the various sub-regional offices of ECA and IDEP, so that in the near future the capacity of African countries in climate risk management can be further developed.

Excellencies,
Ladies and Gentlemen,

On a final note, let me seize this opportunity to reiterate that ECA is proud to be in this partnership because of the significant contribution that climate risk management can make to our mutual quest to attain the MDGs and help African countries develop and implement homegrown solutions to some of the challenges facing the continent.

I wish to thank our development partners, particularly in the G8 countries, who have manifested their willingness to support the climate risk management initiative in the Commission for Africa Report, and in their various ministerial and summit declarations. I thank you for your attention and wish you fruitful deliberations.

Appendix B

STATEMENT BY H. E. MADAME ROSEBUD KURWIJILA
COMMISSIONER FOR RURAL ECONOMY AND AGRICULTURE
AFRICAN UNION

STRATEGY DEVELOPMENT MEETING ON THE IMPLEMENTATION OF GCOS-AFRICA ACTION PLAN ON CLIMATE FOR DEVELOPMENT

United Nations Conference Center
Addis Ababa, Ethiopia
18-21 April

Mr. Chairman,

- Your Excellency, Mr. Abdoulie Janneh, Executive Secretary of the United Nations Economic Commission for Africa
- Honourable Ministers of the Federal Democratic Republic of Ethiopian;
- Excellencies, Ambassadors and Members of the Diplomatic Community
- Distinguished Delegates
- Ladies and Gentlemen,

On behalf of His Excellency President Alpha Oumar Konare, Chairperson of the Commission of the African Union, who unfortunately could not be with us today due to prior commitments and has therefore delegated me to represent him and to make this Statement, may I extend the sincere gratitude of the entire African Union Commission to the Organizers for convening such an important meeting that would anticipate and plan against the impacts of climate change on Africa. H. E. Alpha Oumar Konare has asked me to extend his sincere regrets for his inability to attend and to assure you of the African Union Commission's readiness to collaborate with all development partners and stakeholders in our common quest for viable measures that could be implemented to protect Africa against the potential negative impacts of climate change and variability. I would also like, on my own behalf, to congratulate the organizers and to welcome all the delegates to Addis Ababa, the seat of the African Union Commission.

Mr. Chairperson, Excellencies, Ladies and Gentlemen,

It is a recognized fact that Africa, because of wide spread poverty and consequential limited adaptation and coping capabilities, is one of the most vulnerable regions of the world to the projected impacts of climate change. It is also a known fact that most of Africa's disasters are meteorologically related. These disasters pose a serious threat to the continent's ability to attain the Millennium Development Goals and sustainable development. While it is projected that some parts of Africa, especially in the Sahel region, may realize an increase in rainfall, and others in southern Africa may experience a reduction over the next forty to fifty years, overall the African continent is likely to suffer unless adequate preparation are made and sufficient mitigation as well as risk reduction measures are put in place against the anticipated droughts and sea-level rises. The different scenarios of 0.5M to 1M sea-level rises given in various studies/reports are projected to have potentially devastating social, economic and environmental impacts on Africa. This results from the fact that while urbanization rates in the coastal areas of the continent are amongst the highest in the continent and indeed to a large extent in the world, Governments and municipal authorities have yet to incorporate adequate

protection infrastructures in their coastal area development plans against anticipated sea-level rises, which potentially threatens billions of dollars of destruction and the inundation of whole towns in some areas. Your meeting, therefore, is of paramount importance because of its precautionary nature.

As a prevention measure against the negative economic and livelihood impacts of climate change, Africa needs to intensify its agricultural diversification programme in a way that would ensure food self-sufficiency and sustainably contribute to food security in years of unprecedented climatic eventualities. Climate observation could potentially play an important role in informing government policy decision in this respect. However, Africa's efforts have to be linked to the global processes and be informed by them in a way that would further enhance the continent's capacity to observe climate systems and analyze and apply climate information to development.

The Environment Initiative of the New Partnership for Africa's Development and its related Action Plan took cognizance of the economic importance of climate change and variability in its programme area on combating climate change in Africa. The African Union Commission wishes to see that the outcome of your meetings establishes the relevant linkages with the Action Plan of the NEPAD Environment Initiative for a harmonious implementation of climate change and variability as well as vulnerability reduction initiatives in the continent.

Excellencies, Ladies and Gentlemen,

The African Union Commission, in recognition of the importance of climate observation, and the application of climate information to guide development policy, agreed, on the request of Regional Economic Communities and economic groupings concerned, namely: ECOWAS; CEMAC; IGAD; IOC and SADC, to host the Project Management Unit of the "Africa Monitoring of the Environment for Sustainable Development (AMESD)" project. The AMESD project, the financing agreement for which is currently being finalized for subsequent presentation to the EU for approval, is a successor to the 2000 to 2005 project, called "Preparation for the Use of Meteosat Second Generation for Africa (PUMA)", also funded under the European Development Fund. It will be recalled that through the PUMA Project, almost all Member States of the African Union had satellite-receiving stations installed or existing ones refurbished, mainly in NMSs. The PUMA project also trained about 350 African experts to maintain and operate the stations. The AMESD Project is designed to operationalize the PUMA infrastructure project. Through the authority of the European Organization for the Exploitation of Meteorological Satellites' (EUMETSAT), PUMA will use EUMETSAT's Broadcast Service for Environmental Data (EUMETCast) system to downloading free satellite data, including meteorological data, for development purposes up to 2018. The principal ultimate objectives of AMESD are to help African countries to:

- Design, implement, monitor and evaluate regional and continental environmental policies in support of sustainable development;
- Improve the socio-economic and environmental well-being of African populations;
- Meet obligations towards international environmental treaties; and
- Participate in international efforts of global environmental monitoring.

The AMESD Project is therefore strategically relevant to the ACP-EU partnership agreement; the G8 Summit conclusions in Avian in 2003, and Gleneagles in 2005; the EU development policy and strategy for Africa; Global Monitoring for Environment and Security (GMES) and many other regional and international development policies and initiatives.

The African Union Commission hopes that the presence of regional and global partners at this meeting will help guide your deliberations towards the development of coherent, as opposed to fragmented, strategies for Africa to address climate change issues through the help of coordinated and or harmonized policies and implementation plans. Only through this harmonization and coordination, wherever possible, could Africa effectively reap the region-wide benefits of climate observations for sustainable development. To this end the outcome of your meeting should contribute to the development and or strengthening of the coping capabilities of our nations and local communities in line with the objectives of the Hyogo Framework of Action adopted by the World Community in Japan in 2005. The African region is already the poorest region in the world. We should use every possibility of climate observation and prediction for the purpose of poverty reduction, given our heavy dependency on environmental resources for the sustenance of livelihood systems.

Let me once more assure you of the African Union's commitment to this and to subsequent consultative processes as well as to the coordinated and effective implementation of their outcomes.

I wish you a successful meeting and I thank you all for your kind attention.

Appendix C

REMARKS BY MR. ALEXANDER ALUSA
DEPUTY DIRECTOR, DIVISION OF ENVIRONMENTAL CONVENTIONS
UNITED NATIONS ENVIRONMENT PROGRAMME
DURING THE OPENING SESSION OF THE
GLOBAL CLIMATE OBSERVING SYSTEM (GCOS) MEETING

Addis Ababa, Ethiopia, 18-21 April, 2006

Mr. Chairman,
Distinguished Participants,
Ladies and Gentlemen,

In the context of the World Climate Programme and the Climate Agenda, UNEP has always been charged with the implementation of the World Climate Impacts Assessment and Response Strategies Programme and Thrust 3 of the Climate Agenda on Assessing Climate Impacts and Responses Strategies to reduce vulnerability. UNEP has therefore undertaken studies of climate impacts on specific sectors – food supply, water and of course ecosystems.

We have also looked at vulnerability assessments and how best societies could reduce such vulnerability for sustainable development. Work has concentrated on developing tools for vulnerability assessment and identifying coping mechanisms. Indeed our work has advanced towards adaptation strategies largely in tandem with vulnerability work.

Mr. Chairman,

In this address, we seek to look at how meteorological information is relevant and important in some of the work UNEP has been undertaking and specifically how it is significant in the achievement of Millennium Development Goals and the development process in general. We shall touch upon not only on the need for data, but the need for such data to be shared and indeed analysed into critical information database for decisionmaking in the development arena. The significance of global telecommunication system (GTS) under the WMO's World Weather Watch in Africa will be highlighted as an important and critical imperative for effective use of meteorological information for development.

Mr. Chairman,

We have in the audience people better placed to discuss the development needs of Africa and I trust that these will be better articulated by them – notably our sister organizations UNECA and UNDP. I want only to flag that poverty and especially hunger continues to be a critical deterrent for Africa's development. And whereas I believe that industrialization is probably going to be the only way to extricate Africa from its present economic abyss, it must be recognized that agriculture remains, for the moment, the economic mainstay of many of the African countries. What is especially important in view of our discussions this week is that much of Africa's agriculture is rain-fed. And herein lies the significance of climate in the realization of the MDG's in Africa and in its overall sustainable development.

The IPCC tells us that climate change impacts will be more severe in developing countries and more so in the least developed among them. Africa is home to about three quarters of the LDCs, and therefore climate change impacts will be more severely felt in Africa.

There are many reasons for this, but among these are: (i) the limited capacity for Africa to respond to these impacts due to poverty, (ii) the over dependence on rain-fed agriculture which makes Africa most susceptible to the impacts on climate system and especially changes in the precipitation regimes and (iii) weak or lack of early warning systems especially the absence of preparedness plans for climate related disasters.

National climate extremes are a given known and have existed since time immemorial. What may be new is the imprint likely to be made on these climate extremes as a result of changes in the climate system occasioned by climate change. Preparedness for climate related disasters is non existent or at best poor. Every time we have a flood or drought, governments act scared, have no response strategy, and untold damage is occasioned to habitats and communities.

The key missing link here is early warning systems including preparedness plans. In the case of early warning, there are clear gaps in information exchange with regard to impending climate related disasters. Part of the gap is in knowledge. Our ability to predict, at the scientific level, a drought with significant lead-time remains poor. This knowledge base is not at all helped by limited or lack of optimal observational network for climate data. But in the case of say floods the problems are also in part due to poor capacity to predict and target the hazards.

Mr. Chairman,

An "early warning" must have two clear attributes as implied by the name. It must be "early" and it must "warn". Often, we in meteorology confuse a weather forecast with an "early warning". A forecast only becomes an "early warning" when, the timing between the predicted event and its occurrence is enough for corrective action or avoidance of risk.

In other words, if the forecast is "early", it is also an "early warning", only if it also "warns". A forecast warns if it carries with it an indication of an element of "risk" and suggests with some precision who it is likely to impact and where the event is likely to occur. The anatomy of an early warning system therefore would be one that (a) has the capacity to provide a good lead time in warning of an impending climate related disaster, (b) it must have a capacity to target which communities, structures or areas are at risk and (c) it must put in place a preparedness plan for dealing with such disasters, and have a capacity to reduce vulnerability of communities to the disaster.

Mr. Chairman,

Africa has a chronically poor observational network in terms of synoptic stations, climatological stations and satellite coverage. What is even more disturbing is the poor exchange of data in Africa. It is not unusual to visit ACMAD and find the bulk of Western African charts showing a relatively good data coverage in Western and Central Africa but poor data coverage in Eastern and Southern Africa. Likewise, eastern and southern Africa could have good data coverage but lack western and central African data on their charts. The data is not exchanged between west and east hence a forecaster in eastern and southern Africa is unable to factor into his/her forecast the weather events in western and central Africa. Likewise, the forecaster in western and central Africa cannot take into consideration the weather events in eastern and southern Africa. To make things worse, many of the observations are not continuous. As a result, it is

difficult to accurately describe the climate of some areas as a basis for detecting incipient droughts and severe weather.

What Africa needs, in terms of data, are:

(a) consistent and continuous synoptic observational network throughout Africa
(b) consistent and continuous dense climatological observational network
(c) A reliable telecommunication network that would facilitate the exchange of such data for effective forecast and early warning systems to be put in place for sustainable development.
(d) Africa needs to build up a radar network in areas prone to severe weather as an essential tool in an early warning system. Supplemented by satellite data and with surface observations as ground truth, the essential ingredients for an effective early warning system would be in place.

In addition to the meteorological data for an effective early warning, critical socio-economic data is necessary. Demographic information with an indication of vulnerable regions, such as population distribution along flood prone river basins or hillsides and tops, constitutes important information for preparedness and response strategies in an early warning system.

Environmental data and agricultural activities are also important information. Changes in land cover through land use changes will lead to floods in areas where there used to be none and therefore raise the vulnerability of communities that were hitherto not vulnerable to floods.

Mr. Chairman,

As has been pointed out, Africa relies on rain-fed agriculture for its economic mainstay. Even if Africa were to become fully industrialized, the bulk of its raw materials would be agriculture based. Climate therefore plays a very important role in the development of Africa. We all know for example that the horn of Africa has been experiencing a very severe drought leading to famine. This has necessitated the diversion of resources from other important sectors in order to import food for the population. In Kenya for example, we are already being informed that owing to this drought the anticipated economic growth rate will drop from the forecast 5.5% to 4.0%. Inflation is reportedly up because of the increase in the price of food products. These are all direct consequences of climate behaviour on development. Beyond these direct effects, climate and climate related disasters have consequences for development because climate related disasters tend to direct resources from the other urgent development imperatives.

In conclusion, Mr. Chairman,

We can see that climate is significant for development and indeed a key determinant in the achievement of the Millennium Development Goals. It is also clear that in Africa, our ability to fully exploit climate information in development is hampered by sparse climatological observational network and its ineffectual communication through the Global Telecommunication Systems. These networks and communication systems need to be improved upon in order that we can build in Africa a capacity to establish effective early warning systems for climate related disasters, and so that we can establish the necessary preparedness to respond to these disasters. In addition to these data and observational needs, information on demography and other socio-economic and environmental data will need to be combined with climatological information in order to ensure that vulnerability of communities to climate related disasters can be reduced and that any development is sustainable in the long term.

Appendix D

REMARKS BY DR. M.S. MHITA
PRESIDENT WMO REGIONAL ASSOCIATION I (AFRICA)
AT THE GCOS MEETING

Addis Ababa, Ethiopia 18-21 April 2006

Excellencies,
Distinguished Participants,
Ladies and gentlemen,

It is a great honour and privilege for me to have this opportunity to give some opening remarks during the opening of the Global Climate Observing System (GCOS) meeting here in Addis Ababa Ethiopia. I will give a few remarks in my capacity as the President of WMO Regional Association I (Africa).

Ladies and Gentlemen,

GCOS as an observing system was developed after it was established that there is need to have information on a global scale that would be made available to various stakeholders for use in addressing various climate related issues facing humanity today. The system's functioning is summed up as a comprehensive "user driven operational system aimed at providing observations required for monitoring the climate system, for detecting and attributing climate change, for assessing the impacts of climate variability and change, and supporting research toward improved understanding modeling and prediction of the climate systems". The system adopts a total and integrated approach to addressing climate issues through the main domains of the atmosphere, oceans and land.

The GCOS has the objectives of meeting the needs for:

- Climate system monitoring climate change detection and monitoring the impacts of the response to climate change, especially in terrestrial ecosystems and mean sea-level;
- Climate data for application to national economic development;
- Research toward improved understanding, modeling and prediction of the climate system.

Your Excellencies,
Ladies and Gentlemen,

GCOS therefore plays a very important role in the world today where the global climate as it relates to predictability, application and especially climate change and its likely consequences on the social and economic development of individuals, communities, nations and the whole world is a topical subject in every walk of life. Although GCOS plays a role of such great importance, it cannot assure the availability of data to the users because it does not carry out observations. Instead, it is only a facilitator that encourages, supports, and coordinates global observations. The observations are carried out at national level--by NMHSs. The WMO coordinates timely observations standards through the WWW and exchange through the Global Telecommunication Systems (GTS).

The issue of adequacy of the Global Climate Observing Systems was the subject of a meeting of the 4th Conference of parties of the United Nations Framework Convention on Climate Change (UNFCCC) in Buenos Aires, Argentina in 1998. The meeting noted and concluded that there were serious observational deficiencies with respect to climate needs in relation to consistency, spatial and temporal coverage, procedures, quality and number of observations, and exchange. Specifically the meeting pointed out four areas of inadequacies that needed to be addressed, namely,

- Satisfactory global coverage for many of the essential climate variables has not been achieved;
- Regional coverage is not adequate in many areas for both surface and upper air observations from large parts of Africa, Asia, and South America. Ironically these were cited as regions where impacts of climate change are expected to be most severe.
- Observations of selected variable often do not have adequate accuracy or precision to be reliably used as indicators of climate change and
- Key data set, although collected are often not effectively exchanged.

Recommendations for addressing these challenges were made and a call was made to all nations and concerned parties to be committed to cooperate and work together to provide global coverage for the key variables and to exchange information more effectively of the needed atmospheric, oceanic, and terrestrial systems. Each party was called upon to "undertake programmes of systematic observations in accordance with national plans, which they should develop in concert with the overall strategy for global climate observations."

Your Excellencies,
Ladies and Gentlemen,

This challenge was made nearly a decade ago to all parties concerned with addressing climate issues namely to GCOS, WMO, UNESCO, IRI, IOC, UNEP, WHO, ICSU and other international organizations that support the Climate Agenda, and to nations. All concerned have played a commendable role since that time in meeting the set challenges. It is high time as we sit during this meeting in Addis Ababa to reflect on those challenges of a decade ago and to take stock of what has been achieved or could not be achieved. We should ask ourselves whether, as was required, our national plans today contain commitments to undertake specific implementation actions, that data required to meet the climate objectives is exchanged between nations and relevant organizations, that support is given to countries in need to develop capacity to collect and utilize observational data to meet local and regional needs, that countries are supportive of national meteorological observing systems and particularly GCOS station networks based on the WWW and GCOS are fully operational and best practices are maintained, that countries are supportive as well of both the ocean and surface observing systems.

For what I know, Europe and North America have played their local and regional roles fully in contributing towards the integrated observation and acquisition of global atmospheric, terrestrial and ocean data. As for the other Regions some improvements have been made too but the major constrains have remained inadequate resources to build and sustain the required observational capacity. In the case of Africa this is true for even the basic surface network!

It is with this background that we hope the donor community and development partners can play an important role in improving the GCOS network in Africa. This will enhance the NMSs'

contribution to socio-economic development and achievement of the Millennium Development Goals (MDGs), protection of the environments; safety of life and property; sustainable development, safe land, air and sea transport.

Your Excellencies,
Ladies and Gentlemen,

This meeting is offering us a great opportunity to reflect and review our past plans, commitments, actions and achievements. However, as we do that, we know very well that the Global Climate Observing System objectives are still valid today. Nevertheless, their realization needs all of us (the climate community, stakeholders, users and the donor community) to work together to develop and implement new strategies for the common good of all humanity.

I thank the organizers, GCOS, WMO, ECA, IRI and others, for making possible this important meeting. I also thank the development partners for their support and look forward to a useful meeting.

Thank you.

Appendix E

REMARKS BY DR. JOHN W. ZILLMAN
CHAIR, GLOBAL CLIMATE OBSERVING SYSTEM STEERING COMMITTEE,
DURING THE OPENING SESSION OF THE MEETING ON
CLIMATE INFORMATION FOR DEVELOPMENT NEEDS:
AN ACTION PLAN FOR AFRICA

Addis Ababa, Ethiopia: 18-21 April 2006

MEETING OBJECTIVES AND OUTCOMES

Mr. Chairman, Dr. Josué Dioné,
Executive Secretary of the UN Economic Commission for Africa, Mr. Abdoulie Janneh,
Your Excellency the Minister for Water Resources of the Republic of Ethiopia, Mr. Asfaw Dingamo,
Director of the Rural Economy and Agriculture Department of the African Union Commission, Dr. Babagana Ahmadu,

May I first add to the remarks of Mr. Alusa of UNEP and Dr. Mhita of WMO and, on behalf of the other two international sponsors of GCOS, the Intergovernmental Oceanographic Commission (IOC) and the International Council for Science (ICSU) as well as the GCOS Steering Committee and Secretariat, extend our thanks to the Economic Commission for Africa for serving as co-sponsor and host of this meeting; and also especially, thank the UK Department for International Development (DFID) for initiating and supporting the process that has brought us to Addis Ababa.

You will see from the programme that I am listed to speak about the meeting objectives and outcomes. An early draft of this morning's programme had the remarks that I am about to make entitled something like " Why are we here and what are we trying to achieve?"

Although my revised title is a little briefer, and may even be simpler, it seems to me that if I can provide clear answers to those two original questions, I will have gone a long way towards ensuring that we all have a common understanding of:

- The objectives of this meeting; and
- The outcomes we seek to achieve over the next four days.

So, *Why are we here*? In the most general sense, it is very easy to explain why the sponsors of this meeting have brought together the unprecedented grouping of climate impact sector, economic, policy, meteorological service and development assistance representatives and expertise assembled in this room. We are here, as we have already heard in very compelling terms, because of the recent convergence of a number of powerful factors that link climate and development in Africa. Let me summarize:

- We are here because one of the most pervasive influences in impeding development and escape from the triple scourge of poverty, hunger and disease in much of Sub-Saharan Africa is the relentless impact of droughts, floods and other meteorologically

and hydrologically induced disasters that are part of the natural variability of climate and because there are solid scientific grounds for believing that, without careful planning and a comprehensive adaptive strategy, their impact will be seriously exacerbated by human-induced climate change in the decades ahead;

- We are here because, in the words of Nobel Prize-winning development economist, Amartya Sen, the two great challenges facing a now largely capitalist world are the issues of:

    - Inequality (especially that of grinding poverty in a world of unprecedented prosperity); and
    - The provision of public goods (i.e. those non-rival goods and services, of which meteorological information is often cited as one of the best examples, from which the societal benefit is the greater the more widely they are consumed but which will be under-provided if left to market processes alone);

- We are here because, at the September 2000 Millennium Assembly of the United Nations, the largest ever gathering of world leaders committed themselves to address the issues of inequality, poverty, hunger, illiteracy, disease, and environmental degradation and to improve the human condition through the achievement by 2015, of the eight Millennium Development Goals (MDGs):

    1) Eradicate extreme poverty and hunger;
    2) Achieve universal primary education;
    3) Promote gender equality and empower women;
    4) Reduce child mortality;
    5) Improve maternal health;
    6) Combat HIV/AIDS, malaria and other diseases;
    7) Ensure environmental sustainability; and
    8) Develop a global partnership for development;

- We are here because of the now widespread recognition, as eloquently explained by Professor Jeffrey Sachs in his recent best selling book on 'The end of poverty; how we can make it happen in our lifetime', and reaffirmed in the September 2005 joint statement to world leaders by the heads of international non-governmental scientific organizations which, as President of the International Council of Academies of Engineering and Technological Sciences (CAETS), I was privileged to co-sign with him, that achievement of the Millennium Development Goals will require substantial strengthening of the key science, technology and innovation institutions in every developing country.

- We are here because, as recognized more than 25 years ago by the World Meteorological Organization (WMO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), the Food and Agriculture Organization of the United Nations (FAO) and the International Council for Science (ICSU) when they jointly established the World Climate Programme (WCP), as already comprehensively demonstrated through research and practical experience in agriculture, water resource management, health and many other social and economic sectors in many parts of the world over recent decades, and as now forcefully reaffirmed in Professor Sachs' book (where he identified as one of several

areas of special importance “improved measurement of seasonal, inter-annual and long-term climate changes with a view towards prediction as well as adjustment to climate change), climate information is one of the most powerful of the scientific tools available for addressing the challenges of development; and because, in 1991, through the initiative of the sponsors of the World Climate Programme, we began to coordinate and build on the various established national and international meteorological, hydrological and oceanographic observing systems to implement a comprehensive Global Climate Observing System (GCOS) which would underpin the climate service provision activities of the World Climate Programme within countries and meet the full range of needs for climate data for research and application to national economic and social development; and

- Most importantly, we are here because, although many of the expected social, economic and environmental benefits from effective use of climate information in the many climate-sensitive sectors of Africa failed to materialize during the 1990s because of rundown of observational infrastructure, shortage of specialized staff and staff training and the limited technical assistance provided by the developed countries, we now have, as a result of the resolutions of the World Summit for Sustainable (WSSD) and especially the twin focus of the G8 Gleneagles Summit on climate and poverty reduction in Africa, the unprecedented convergence of the essential criteria for real progress, viz:

    - a large body of international expertise and experience in the effective use of climate information for development;
    - the international and national institutional framework for climate observation and climate service provision;
    - user communities ready to grasp the opportunity to exploit the potential of climate information to contribution to the achievement of the Millennium Development Goals; and
    - an international development assistance community committed to help make it happen.

I believe, therefore, that we have a real window of opportunity, over the next few days, to build a broad consensus on the action that must, and can, be taken to ensure that the potential of climate information to contribute to the attainment of the Millennium Development Goals in Africa is now realized to the full.

So let me identify briefly what I see as our most important building blocks and the specifics of what I believe we should be seeking to achieve by the end of the meeting.

First the essential build blocks:

- We have the experience and insight of both the climate service provider and user community representatives in this room and the access which they can provide to a very large body of African and international expertise and experience in climate service provision and use in agriculture, water resources and many other climate-sensitive sectors of society;

- We have the well established international framework of the Global Climate Observing System for observation and data collection and the World Climate Programme and the international Climate Agenda for climate services, applications and impact assessment, within which to work;

- We have the regional, national and local institutional framework for end-to-end observation, data processing and climate service provision provided by ACMAD (African Centre for Meteorological Applications for Development) and the other regional and sub-region centers; and especially by the charters and established operations of the individual National Meteorological and Hydrological Services (NMHSs) of the Region; and, in this context, it is important to note that the WMO Regional Association for Africa will meet early next year, bringing together the Directors of all NMHSs in Africa to plan the future development of GCOS and climate service provision in Africa.

- We have two comprehensive Regional Action Plans for GCOS implementation in Africa, developed through expert Regional Workshops and extensive external consultation over the period 2001-04, each consisting of a series of carefully targeted and costed projects which, if implemented as a package, could make an enormous difference to the scope, quality, utility and benefits of climate services in Africa, on the time frame of attainment of the Millennium Development Goals;

- We have the very recently completed, IRI (International Research Institute for Climate and Society) " Gap Analysis" commissioned by DFID (UK Department for International Development) which, very appropriately, in my view, identifies not just the gaps in observation and data collection but, most importantly, the gaps all the way along the chain to delivery of climate services and their use in the various social and economic impact sectors. It is important to note the order in which the gaps are presented in the IRI Gap Analysis:

    - Gaps in integrating climate into policy
    - Gaps in integrating climate into practice at scale
    - Gaps in climate services; and
    - Gaps in climate data; with climate data, in a sense, the fourth and most fundamental since it underpins the other three; and finally:

- We have the essential elements of a roadmap for the way ahead as the basis for development of a coordinated Implementation Plan during this meeting, which, if agreed approved and funded, will enable us to make a truly monumental contribution to the effective use of climate science and information in attaining the Millennium Development Goals for Sub-Saharan Africa.

We are thus well served with a set of excellent building blocks for a successful and productive meeting. It is important, then, that we gear ourselves to make full use of our limited time for discussion and interaction in order to achieve the outcomes that our sponsors are looking for from this meeting. I would identify the outcomes that we must aim to deliver by Friday afternoon as:

- Firstly, a widely shared understanding of the immense potential of climate information, efficiently provided and effectively used, to contribute towards the achievement of the Millennium Development Goals;

- Secondly, a strong commitment from the climate service provider and user communities to work together, at sectoral, regional, national and local levels, to put in place

institutional arrangements and working mechanisms which will ensure that the potential benefits will actually be delivered on the ground;

- Third, the strong support of the regional economic policy and development agencies for the objective of upgrading climate observations, enhancing climate services and capturing the full range of social, economic and environmental benefits potentially available from state-of-the-art climate services in Africa;

- Fourth, an agreed Framework Implementation Plan, based on the two Regional Action Plans, the Gap Analysis, the charters and capabilities of the NMHSs and regional climate institutions of Africa, and compatible with the international Implementation Plans for GCOS and WCP, consisting of a set of targeted, costed, scalable projects for the effective delivery and use of climate services (especially past and current climate information and seasonal to inter-annual and longer term forecasts) in support of the Millennium Development Goals; and

- Fifth, finally and most importantly, we must aim to inspire a high level of confidence, on the part of the representatives of the development funding agencies represented at this meeting that systematic implementation of the Plan will, indeed deliver the regional, national and local benefits that are so much needed in the short term and contribute strongly to overall achievement of the Millennium Development Goals, on the 2015 time frame and the decades beyond.

There is no doubt in my mind that we have the expertise and the commitment in this room to achieve these important outcomes. It will be the aim of my Co-chair, Dr. Josué Dioné, and myself, to assist you, the potential beneficiary communities from a successful meeting, to achieve the ultimate outcomes you seek through full implementation of the Global Climate Observing System for Africa and effective delivery of climate services, to meet the needs of all the vital user sectors who are represented in this historic meeting.

Appendix F

STATEMENT DELIVERED BY H.E. ATO ASFAW DINGAMO
MINISTER, MINISTRY OF WATER RESOURCES
OF THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

AT THE GCOS MEETING
CLIMATE INFORMATION FOR DEVELOPMENT NEEDS:
AN ACTION PLAN FOR AFRICA

Addis Ababa Ethiopia
18-21 April 2006

Executive Secretary of Economic Commission for Africa,
Representative of the AU,
Representative of the World Meteorological Organization,
The Chief Executive of the Global Climate Observing System,
The President of WMO Regional Association for Africa,
Members of the Diplomatic Corps,
Representatives of the UN Agencies and other International Organizations,
Distinguished Participants,
Ladies and Gentlemen,

It gives me great pleasure to welcome you all to Addis Ababa for the meeting on Climate Information for Development in Africa. Allow me to express, on behalf of the Government of the Federal Democratic Republic of Ethiopia, our sincere appreciation for the decision taken to hold this important meeting to consider the climate information needs for development in Africa, in Addis Ababa.

We in Africa, particularly in Ethiopia, often had to contend with an increasing spate of weather related disaster risks, such as floods and droughts, cold spells, hail storms, attributed to exceptionally high climate variability. Particularly the repeated drought in several parts of our country and our continent of Africa had caused several negative impacts on human livelihood. As consequence of drought vital crop harvests are lost often causing famine, where alternative food sources are not available.

The impact of drought on the availability of Water Resources, contribute to the proliferation of diseases, as people lack water for basic hygiene, to say the least. Shortage of water in dams causes power cuts; further constraining industrial, agricultural and social infrastructures, resulting in poor economic performances, and negatively impacting on the environment.

Excellencies,
Distinguished participants,
Ladies and Gentlemen,

Recent studies show the impact that climate variability can have on agrarian economies such as in the case of our country Ethiopia, and many African economies show economic growth track variations in annual rainfalls. Sub-Saharan economics are especially susceptible to climate due to their agrarian structure. In these countries 25% of GDP derives from Agriculture, 70% of the workforce is in the rural sector, and where there are no mineral resources most of the exports originate in this sector.

In years such as this, characterized by drought across much of the continent, nearly half of the Sub-Sahara Africa countries require food assistance, such crises are ones that erode assets and livelihoods and direct scare resources away from long term development.

Accordingly, we here in Ethiopia value better management of climate risks because we believe that climate variability is one of the factors affecting the prevailing poverty and therefore it must be managed better to deliver a sustainable development in Africa. We are also worried that the climate variability may even increase under the climate change therefore becoming a major threat livelihood and development of Africa.

Excellencies,
Distinguished participants,
Ladies and Gentlemen,

We believe that enhanced monitoring of climate system parameters, improved data management and easy access to observational data are needed to assist climate research and monitoring. These improvements will allow better and early warning of extreme event such as floods and droughts in the continent. This will benefit the people, countries, the region and the world as whole.

Finally, I would like to take this opportunity to thank all who have been working relentlessly and those committing vital resources for this important meeting to take place. I look forward for the concrete actions that will come through your agreement and decisions in this important meeting.

In closing, allow me to express once again my pleasure in welcoming you all to Addis Ababa and wish you a pleasant and fruitful stay. I hereby declare the meeting open.

GOD BLESS AFRICA

I thank you.

Appendix G

BACKGROUND ON THE GLOBAL CLIMATE OBSERVING SYSTEM AND OF EVENTS LEADING TO THE ADDIS ABABA MEETING

The closing decades of the 20th Century brought heightened awareness, in Africa and elsewhere around the world, of the enormous impact of climate on society and especially of the impacts of climate variability and change on the achievability of sustainable development in developing countries. The World Meteorological Organization (WMO) convened the (first) World Climate Conference in 1979 following the onset of protracted drought in the Sahel in the 1960s and a series of devastating floods, tropical cyclones, fires, storms, and other extreme weather and climate events around the world. These events reinforced early scientific speculation on the prospect of adverse human impacts on climate. In response to the recommendations of the Conference, and in collaboration with a number of other United Nations (UN) organizations (United Nations Environment Programme (UNEP), the Food and Agriculture Organization (FAO), and the Intergovernmental Oceanographic Commission (IOC) of UNESCO) and the non-governmental International Council for Science (ICSU), the 1979 World Meteorological Congress established the World Climate Programme with the four-fold objectives of:

- Collecting and archiving all the climate data needed for research, application, and policy development;
- Understanding the working of the global climate system and assessing the impacts of human interference with climate;
- Supporting climate applications and services at the national level world-wide; and
- Assisting governments to integrate climate considerations into national policy development.

Throughout the 1980s scientific concern with the threat of human-induced climate change was increasing. The scientific basis for this concern was reinforced by the 1990 First Assessment Report of the WMO-UNEP Intergovernmental Panel on Climate Change (IPCC) and was recognised at the highest political levels through the Ministerial Declaration of the 1990 second World Climate Conference. As a result, the United Nations General Assembly set in train the processes which led to the negotiation and signing of the UN Framework Convention on Climate Change (UNFCCC) at the 1992 Rio Earth Summit. The WMO, UNEP, IOC and ICSU agreed to strengthen and coordinate their existing climate-related atmospheric, oceanographic, and terrestrial observing systems worldwide through establishment of the Global Climate Observing System (GCOS). The mission of GCOS is to meet the global and regional needs for:

- Climate system monitoring, climate change detection, and monitoring the impacts of and the response to climate change, especially in terrestrial ecosystems and mean sea-level;
- Data for application to national economic development, including adaptation to climate change; and
- Research toward improved understanding, modeling, and prediction of the climate system.

In response to the establishment of GCOS, the 52 National Meteorological Services (NMSs) of Africa, through decisions of the 1994 Eleventh Session of WMO Regional Association I (Africa), committed themselves and their governments to a coordinated effort to strengthen the African climate observing networks. At the same time, African Governments, under the joint auspices of WMO and the UN Economic Commission for Africa (UNECA) agreed to establish the African Centre for Meteorological Applications for Development (ACMAD) to support the efforts of the

individual NMSs to enhance the quality and utility of the climatological (and other meteorological) services to their respective national user communities. A special focus was to provide climate information in support of sustainable development.

While substantial progress was made in several areas and major benefits flowed from the enhanced use of climate information in some sectors (especially agriculture), severe resource constraints in most African NMSs have greatly limited the overall capacity of the NMSs to maintain, let alone strengthen, their observing networks. In consequence, the improved climate services that were urgently needed to support the various national initiatives for sustainable development in Africa in the closing years of the 20th Century have, by and large, not been implemented.

The Chairman of the IPCC reported to the third session of the Conference of the Parties (COP) to the UNFCCC in November 1997 that, despite the best efforts of NMSs and other national observing network operating agencies around the world, the global climate observing networks were deteriorating at a serious rate. This report led the COP to institute a national reporting and review process aimed at stemming the deterioration of networks and ensuring that GCOS would, in fact, be able to meet the essential needs of the Convention process for climate data in fulfillment of the 'systematic observation' commitment of Article 4 of the UNFCCC. COP decisions, in turn, triggered a series of initiatives, including the organization, with United Nations Development Programme (UNDP) and Global Environment Facility (GEF) support, of a Regional Workshop Programme. This programme included a workshop for the countries of Eastern and Southern Africa in Kisumu, Kenya, in October 2001 and another for Western and Central African countries in Niamey, Niger in March 2003.

Workshop participants agreed to prepare Regional Action Plans (RAPs) with the assistance of the GCOS Secretariat. The two African Regional Action Plans were widely circulated prior to publication in January 2002 and May 2004 respectively. They include a set of targeted, costed projects deemed by the participants to address the highest priority needs for climate information and services in sub-Saharan Africa. Concurrently, COP also requested the GCOS Secretariat to reassess the adequacy of observing systems for climate globally. The resulting assessment and subsequent GCOS Implementation Plan provide additional confirmation of the priority needs identified in the two African RAPs.

Since the initial establishment of GCOS, as noted above, one of its principal purposes has been to facilitate the provision of the climate information needed to support national economic development. It was not until September 2000, however, when the UN adopted the Millennium Declaration and the Millennium Development Goals (MDGs), that the key institutions, both within the developing countries and in the international development assistance community, began to focus on the essential ingredients of a strategy for achievement of the MDGs. The Millennium Declaration gave a much sharper focus to the body of literature that was beginning to emerge on the potential contribution of climate information for development. In brief, the MDGs are to:

1) Eradicate extreme poverty and hunger;
2) Achieve universal primary education;
3) Promote gender equality and empower women;
4) Reduce child mortality;
5) Improve maternal health;
6) Combat HIV/AIDS, malaria and other diseases;

7) Ensure environmental sustainability; and
8) Develop a global partnership for development.

This focus was further sharpened as a result of the 2005 Gleneagles Summit of the G8 nations. The resulting Gleneagles Plan of Action included a specific commitment to address the intimately linked problems of climate change and poverty reduction in Africa and identified the important role of GCOS and climate information in achievement of the MDGs.

The G8 countries also formally recognized that action was required to strengthen cooperation on global observations. In 2003, France spearheaded G8 agreement on the need for strengthened cooperation on global earth observations, including climate. This was followed by an Earth Observation Summit, which was hosted by the US in July 2003. The UK-led G8 Gleneagles statement on adaptation and global climate observations in 2005 led to the convergence of two closely linked objectives by the end of 2005:

- Strengthening climate observations in Africa in support of both the UNFCCC-related and development-related objectives of GCOS; and
- Full use of the potential of climate science and services to contribute to the achievement of the MDGs in Africa.

The GCOS Secretariat began working with interested partners to fast-track the achievement of both objectives and involve all stakeholders by convening the April 2006 UNECA-GCOS joint meeting on "Climate Information for Development Needs: An Action Plan for Africa."

Appendix H

AGENDA

Climate Information for Development Needs: An Action Plan for Africa

Addis Ababa, Ethiopia: 18-21 April 2006

Purpose: To agree on two sub-Saharan African regional implementation plans for the effective delivery and use of climate information in support of attaining the Millennium Development Goals

Tuesday 18 April: Day 1 — Development Issues and Climate Context

Objective: Assess the importance of climate in development

09.30 – 10.30 Session 0: Opening Ceremony
Master of Ceremony: Josué Dioné

- Address by the Executive Secretary of the UNECA: The Millennium Development Goals, Climate Variability and Change in Africa — Mr. Abdoulie Janneh (UNECA)
- Statement on behalf of H. E. Madame Rosebud Kurwijila, Commissioner for Rural Economy And Agriculture, African Union
- Remarks Deputy Director, Division Of Environmental Conventions, United Nations Environment Programme — Mr. Alexander Alusa
- Remarks by the President, WMO Regional Assn I (Africa) — Dr. Mohammed Mhita
- Remarks by the Chair, Global Climate Observing System Steering Committee: Objectives and Outcomes — Dr. John Zillman
- Statement by the Minister of Water Resources of the Federal Democratic Republic Of Ethiopia-- H.E. Ato Asfaw Dingamo

10.30 – 11.00 Break

11.00 – 13.00 Session 1: Sustainable development and needs for climate information
Chair: John Zillman Rapporteur:

- The Rural Economy and Climate in Africa — Abdoulaye Niang (UNECA/SDD)
- Climate Change: What Can Africa Expect? — Steve Palmer (UK Met Office)
- Managing Climate Variability for MDGs and Adaptation to Climate Change — Abdallah Mokssit (WMO CCl)

13.00 – 14.30 Lunch

14.30 – 16.00 Session 2: Overview of Global Action towards Adaptation to Climate Change
Chair: Josué Dioné Rapporteur:

- Advancing the Development Dimension of Climate Change Adaptation in relation to MDGs — Frank Pinto (UNDP)
- UNEP and Adaptation to Climate Change in Africa — Mr. Alexander Alusa (UNEP)

- African Experiences with Adaptation to a Changing Climate— Youba Sokona (OSS)
- GCOS, the Regional Workshop Programme, and Climate Change Threats to the MDGs — Dave Goodrich (WMO/GCOS)

16.00 – 16.30 Break

16.30 – 17.30 Continuation of Session 2

- Ongoing Climate Change Activities in Africa — Mohammed Boulahya
- A brief look at the programme for the next three days. Participants invited to study their documents during the evening.

17.30 – 19.00 Reception

Wednesday 19 April: Day 2 — Gaps and Constraints: Exploring Problems in Depth

Objective: Develop consensus for the key problems that need addressing

09.00 – 10.30 Session 3: Plenary Session on Climate and Development: Gaps, Sectoral Needs and Challenges
Chair: Frank Pinto Rapporteur: Molly Hellmuth

- The Gap Analysis — Thomson (IRI) and Menghestab Haile (WFP)
- Panel Discussion

10.30 – 11.00 Break

11.00 – 12.30 Session 4: Breakout Session — Assessing the Gaps
Breakout Chair (Nkuuhe) & Vice-Chair (Bwango-Apuuli): Eastern & Southern Africa:
Breakout Chair (Nyong) & Vice-Chair (Kignamon-Soro): Western & Central Africa
Rapporteurs: Wolde-Georgis and Bruno Gerard

Gaps to address:

- Political awareness of the importance of climate in development, the MDGs and Climate Change
- Knowledge and capacity in addressing climate issues in development planning and investment
- Knowledge and capacity in addressing climate issues in sectoral development activities
- Delivering information services for development: institutional and functional gaps
- Observations, data management and infrastructure: RAP findings plus

Sectors: Agriculture, Disaster Risk Reduction, Health, Water, and Coastal

12.30 – 14.00 Lunch

14.00 – 16.00 Session 4: Breakout Session: Bridging the Gaps

16.00 – 16.30 Break

16.30 – 18.15 Special Session: Climate and Development
Chair: Rapporteur: Balgis Osman

- Introduction to Developments in Climate Science/Seasonal Forecasting — Steve Zebiak (IRI)
- Climate and Health Impacts — Madeleine Thomson (IRI)
- RANET — Milton Waiswa
- Regional Climate Centres in Support of Development Needs — Laban Ogallo (ICPAC)

Evening **Hosted dinner**

Thursday 20 April: Day 3 — Toward Solutions

Objective: Develop consensus on priority actions in Implementation Programme

09.00 – 10.30 **Session 5: Preliminary reports and Panel Discussion of results of Breakout Groups**
Breakout Group Chairs and Rapporteurs

10.30 – 11.00 **Break**

11.00 – 13.00 **Session 6: Development Perspectives on Overcoming Gaps and Constraints: Advice from financing development partners on what is needed**
Chair: Gordon Conway Rapporteur:

- Investment Viewpoints and Requirements — Gordon Conway (DFID) (11.00 – 11.30)
- Panel Discussion: Investment Perspective with Preliminary Discussion of Implementation Issues — (G8 and other donors)

13.00 – 14.30 **Lunch**

14.30 – 16.00 **Session 7: Plenary Session on Enhancing Climate Observations and Services for Development Decisions**
Chair: Mohammed Boulahya Rapporteur: Stephan Bojinski

- Engaging the Climate Community in Providing Services for Development — Mohammed Mhita
- A Review of the Regional Action Plan for Eastern & Southern Africa — Sok Appadu
- A Review of the Regional Action Plan for Western & Central Africa — Mama Konate
- Prioritisation of RAP and Other Proposals

16.00 – 16.30 **Break**

16.30 – 18.30

- Panel Discussion

Friday 21 April: Day 4 — Towards Implementation: The Way Forward

Objective: Reach consensus on aspects of the implementation plan

09.00 – 16.00 Session 8: Reaching Consensus on the Way Forward & Strengthening the Implementation Plan
Chairs: Josué Dioné & John Zillman
Rapporteurs: W. Westermeyer & J. Oguntola

09.00 – 10.30

1. ***Presentation of the Draft Outline Implementation Plan: Williams/ECA***
2. ***Consideration of Objectives in Relation to Needs; Development issues, Clients, Beneficiaries and Players***

10.30 – 11.00 Break

11.00 – 13.00

3. ***Programme Content: Results and Outputs Required***
4. Discussion: Priorities/Omissions/Improvements
5. Style of Implementation: Partnership focus; Indicators

13.00 – 14.30 Lunch

14.30 – 16.00

6. Next steps: Who does what, when, and how — Chairmen

16.00 Closure of Meeting

Appendix I

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CLIMATE FOR DEVELOPMENT IN AFRICA (ClimDev AFRICA): STRATEGY AND IMPLEMENTATION PROGRAMME

This document sets out a strategy and implementation programme for mainstreaming climate information into planning for achievement of the Millennium Development Goals (MDGs) in Africa. The strategy was developed through a meeting held in Addis Ababa, Ethiopia on 18-21 April 2006 under the joint auspices of the United Nations Economic Commission for Africa (UNECA) and the Sponsors and Secretariat of the Global Climate Observing System (GCOS). It was based on an assessment of needs for climate information for development and a Gap Analysis prepared by the US-based International Research Institute for Climate and Society (IRI). It presents an integrated strategy for filling the most serious gaps identified at the meeting. It also provides an implementation programme for "Climate for Development in Africa" (ClimDev Africa) and the foundation for an integrated Regional Action Plan to meet the highest priority needs for climate observations, data, and services.

1. Programme Purpose: The purpose of the Programme is to guide the effective integration of climate information and services into development planning for Africa and to ensure the mainstreaming of climate considerations in achievement of the Millennium Development Goals (MDGs). The Programme seeks material progress in achievement of the MDGs and will focus initially on the contribution of climate services to health and food security through improved management of climate variability and change.

2. Main Components of the Programme – Four Result Areas: In order to achieve its purpose, the programme seeks results in the following four areas:

- ***Policy:*** *Awareness of politicians, central planners, and the public raised sufficiently to achieve broad political ownership, political support, and leadership, and to demonstrate commitment to adaptation to climate variability and change;*
- ***Climate Risk Management:*** *Climate risk management practices incorporated in: a) strategic MDG development planning, b) sectoral management, c) pro-poor livelihood strategies, and d) disaster risk reduction programmes;*
- ***Climate Services*****:** Climate information and support services developed and used by MDG decisionmakers in government, the private sector, and civil society to help meet priority needs in operational climate risk management and overall social and economic development; and
- ***Observations, Data Management, and Infrastructure:*** Observation networks and support infrastructure upgraded and enhanced to provide data essential for climate services, climate risk management, and policy development.

3. Geographical coverage: The programme is designed for needs across Africa. Since climate issues in development are considered reasonably similar in much of Africa, and examples of best practice relatively scarce, it was agreed that one programme should be designed to cover the needs of all Africa in order to optimize inter-regional knowledge sharing. Arrangements will be needed to ensure that francophone and Portuguese-speaking partners are not disadvantaged. Participation of North African countries will depend on additional funding.

4. Implementation Timeframe: To achieve the MDGs in the timeframe envisaged (2015) is a major challenge and requires more than a *'business-as-usual'* approach to development. In order to be able to achieve impact in proportion to the MDG requirements in Africa, a planned 3-phase 'scaling-up' approach is proposed over 10 years. To ensure coherence between scales of operation, all Phase 1 activities must be designed with scaling-up in mind, so that they are ready for expansion of best practice actions in Phase 2, and then again in Phase 3. Indicative phasing and support envisaged is:

- **Phase 1: Demonstration and planning:** Development of best practices for Climate Risk Management (and of ways to measure their impact on society) and establishment of necessary infrastructure: 3 years and approximately $50 million required.
- **Phase 2: Scaling up towards MDG requirements:** Testing scaled-up approaches: 3-5 years and approximately $50 million required, plus engagement with governments to obtain contributions from national budgets.
- **Phase 3: Large scale implementation to meet requirements for MDGs and adaptation to climate change:** 3-5 years and $100+ million required, possibly leveraged through country strategy papers, requests from individual countries, national budgets, etc.

5. Modes of Implementation: To create a package of measures likely to have the most impact on MDG achievement, it is envisaged that the programme will adopt three principal modes of implementation. These will address the principal inter-institutional gaps in use of climate information, identified in the IRI Gap analysis as both important and widespread:

- **Horizontal mainstreaming (H):** Coordination of climate risk assessment and responses among countries, among ministries, among sectors, and among institutions. Such coordination requires that partners work together to actively share knowledge. Additional benefits will be derived from harmonisation through regional organizations;
- **Vertical mainstreaming (V):** Climate risk assessment and coordinated responses will be integrated from ministry to household levels, including the private sector and civil society. Such integration again requires that partners work together to actively exchange knowledge. Dissemination of best practices through regional organizations will provide additional benefits; and
- **Knowledge sharing (K):** Many climate and climate risk management practices are applicable in different regions, countries, and locations. Therefore, developing and sharing best practices, knowledge, and experience is both cost effective and most rapid in terms of uptake, utilization, scale-up, and overall impact. Knowledge sharing also helps ensure common practices across borders, e.g., as in transboundary watershed management.

6. Communication Strategy: Sharing knowledge is an integral part of both horizontal and vertical mainstreaming, so early development of a communication strategy is essential for successful outcomes and maximum impact. The strategy should include: a) learning about other related programmes, b) exchange of information between partners in the programme, and c) targeted dissemination of the new knowledge gained. For many purposes, regional centres of excellence are the natural focal points for the development of such knowledge-sharing networks.

7. Capacity Building: The ClimDev Africa programme is essentially about developing capacity in Africa for effective adaptation to climate through the development process. During

implementation, programme managers will need to identify generic needs for training and awareness-raising (among other things) beyond those described above, and suggest opportunities for developing capacity as the needs arise. Such requirements will likely occur in all result areas.

8. Principles for Project Selection: In addition to the objectives and results required, the scale and phasing necessary for contribution to achievement of the MDGs, the essential modes of implementation, and the NEPAD criteria (see Section 12), a set of principles has been developed to assist selection of activities within the programme. These include requirements to:

a) Concentrate primarily on achieving beneficial impact on rural poverty in semi-arid zones where vulnerability and risk from climate variability is greatest;
b) Build on existing activities and on-going development programmes to mainstream climate in decision processes;
c) Focus on developing methodologies with designed-in potential to scale up in the longer term;
d) Learn from the policies and practices of countries already well advanced;
e) Make best use of existing regional and national institutions, strengthening capacity where appropriate;
f) Seek early success on which to build, e.g., pilot work ready to scale up and replicate for wide impact;
g) Concentrate on developing productive partnerships and networks both nationally (e.g., among ministries, institutions, the private sector, and civil society) and regionally;
h) Produce measurable results with clear indicators of success;
i) Demonstrate rigorousness and accountability (e.g., see the NEPAD peer review mechanism);
j) Seek cost effective and sustainable actions that contribute to development;
k) Maintain and extend existing long-term 'global' climate records;
l) Contribute to institutional strengthening; and
m) Help bridge the communication and perspective gaps between the development, climate, and user communities

In addition, should initial finance available for Phase 1 be less than that recommended, it is important to ensure that most useful outcomes can be obtained while opportunities to bring forward other finance are explored. There is need, therefore, for:

n) Early progress to build donor support and momentum;
o) Demonstration actions in key areas with capacity to scale up in the next phase; and
p) Adaptable design to attract and make best use of additional funding (e.g., G8 partners).

9. Starting points: Adaptation to climate is a bottom-up process much more than it is government/top down, so there is a need to develop appropriate starting points for activities in each of the result areas. To this end and to avoid the 'business as usual' approach with top-down institutional direction, a tender process should be used, wherever appropriate. The tender process would invite and select the best ideas based on ongoing and pilot activities, so that best practices in the areas under consideration (food security, agriculture, health, and water) could be developed and shared. This process is flexible and fair and encourages initiative, quality, and engagement of the full spectrum of institutions and talent (universities, research centers, development NGO's, government institutions, and commercial organizations). This process also encourages new partnerships appropriate to actions from farm and household to MDG

scales. Examples of possible actions derived from the Addis meeting Breakout Groups, the Gap Analysis, and RAP proposals include the following:

9.1. Result Area 1: Policy: Awareness Raising, Accountability and Advocacy

It is becoming increasingly important to integrate climate considerations into long-term planning and investment decisionmaking. In order to initiate routine integration of climate information into development decisions, a first step is effective and compelling presentation of the data, analyses, and policy options to those who set priorities and allocate resources.

Outcome Required: *Awareness of politicians, central planners, and the public raised sufficiently to achieve broad political ownership, political support, and leadership, and to demonstrate commitment to adaptation to climate variability and change*

Actions Proposed:

1. Commission a rapid audit of work already completed in related domains, then;
2. Invite tenders for actions intended to advance policies, leadership, and public awareness of adaptation to climate variability (CV) and climate change (CC), especially at the highest decisionmaking levels, both regionally and nationally (and possibly also in local government);
3. Distill lessons and best practices and disseminate them via the communication strategy, with particular emphasis on achieving behavioral change of national and regional leaders;
4. Build capacity in public understanding of climate change and variability; and
5. Improve regional climate predictions and climate change scenarios.

Some examples of needed capacity building, assessment, and research:

a) Evaluate the development payoff from public support to climate services as public goods with open data policies;
b) Quantify the economic impacts of climate variability and of application of climate products;
c) Assess how much current investment in development and infrastructure (especially water) will be annulled by expected climate change;
d) Determine the value of climate information in sectoral climate risk management;
e) Identify beneficial opportunities within climate change scenarios (the news is not all bad);
f) Assess the impacts of climate variability; the utility of climate information in practical settings; and the institutional, policy, and technical constraints to effective use of climate information (clarifying the roles of government, the private sector, and civil society in climate monitoring, data management, and adaptation to climate change);
g) Integrate MDG indicators and climate variables in decision frameworks;
h) Develop capacity for multisectoral analysis to contribute to integrated policy development for coping with climate change;
i) Assess the importance of climate in addressing synergies with the Biodiversity and Desertification Conventions. (A focus on adaptation to climate change could be a useful entry point to address all three agreements together as development problems, offering practical ways to reduce poverty);
j) Encourage African leaders to provide leadership for investment in adaptation activities at national and regional scales; and
k) Promote climate risk management through regional climate change modeling so that climate change issues can be integrated into poverty reduction strategy plans (PRSPs) and national adaptation plans of action (NAPAs).

9.2 Result Area 2: Climate Risk Management

For the foreseeable future, the best strategy for addressing the long-term problem of climate change in Africa is to enable societies to cope better with climate variability today. A progressive approach to managing climate risk will help: a) to improve food security today, b) to deliver the MDGs tomorrow, and c) to sustain MDG achievements gained through greater resilience to future climate change. This win-win-win approach requires that climate considerations be fully incorporated in development decisions (along with pertinent social, economic, and environmental factors) to help guide policy, planning, investment and management decisions, from farm to continental scales. This process is known as Climate Risk Management (CRM).

Outcome Required: *Climate risk management practices incorporated in a) strategic MDG development planning, b) sectoral management, c) pro-poor livelihood strategies, and d) disaster risk reduction programmes.*

Actions Proposed:

1. Commission an audit of actions already undertaken in this domain;
2. Invite tenders for actions to advance a) current best CRM practices, b) new CRM partnerships, and c) understanding of CV and CC at the scale of the MDGs;
3. Distill lessons and best practices and disseminate them widely through a dedicated communication strategy; and
4. Develop capacity for the assessment of societal vulnerability and adaptation to climate change and variability.

Some examples of needed capacity building, assessment, and research:

a) Identify, research, and share current CRM best practices for food security, agriculture, health, and water (e.g., survey and assess existing/priority requirements for CRM at local, national, and regional scales) and disseminate detailed findings for planning implementation; also include other experiences and bad practice examples;

b) Develop CRM partnerships (preferably based on ongoing development activities where climate variability considerations need to be incorporated) for translating user needs into demands and for helping to meet priority development requirements in food security, agriculture, health, and water;

c) Undertake research into aspects of climate variability and delivery of MDGs at various scales; and

d) Disseminate best practices, with particular emphasis on encouraging uptake by relevant national and regional decisionmakers.

9.3 Result Area 3: Climate Services

The National Meteorological and Hydrological Services (NMHSs) and other climate service providers have great potential to improve the services they offer to decisionmakers in support of the development agenda. An important challenge will be to fully engage them in an accelerated effort, under the auspices of the World Climate Applications and Services Programme (WCASP), to identify a set of climate services that address the full range of user needs.

Outcome Required: *Climate information and support services developed and used by MDG decisionmakers in government, the private sector, and civil society to help meet priority needs in operational climate risk management and overall social and economic development.*

Actions Proposed:

1. Audit current practices and unmet needs;
2. Undertake targeted capacity building and institutional strengthening;
3. Promote end user liaison, e.g., through Regional Climate Outlook Fora, and develop tailored climate products;
4. Create partnerships to address development needs;
5. Disseminate best practices.
6. Support the health sector with climate information;
7. Support local decisionmaking by developing a climate information partnership; and
8. Enhance application of satellite observations.
9. Demonstrate the socioeconomic benefits of using climate information through showcase projects.

Some examples of needed capacity building, assessment, and research:

a) Survey/audit, evaluate, and share current best practices in provision of climate services needed by the food security, agriculture, health, and water communities, and assess the impacts obtained by implementing such services.

b) Undertake targeted capacity building and institutional strengthening to enable climate institutions to improve how they work and to integrate poverty considerations into their missions. Suggestions to accelerate change include: i) establishment of 'Development Units' in National Meteorological Services (NMSs) and Risk Assessment Units in sectoral and development institutions, ii) provision of training for managers in project implementation, and iii) formation of networks to promote demand-led partnerships within the development agenda.

c) Develop partnerships to enhance the capacity of NMSs to contribute to development objectives (e.g., through greater participation in existing local community services to enhance coping with climate variability). Some specific activities include:

i. Support to Mali farmers by installing rain gauges to increase community crop yields (V&H);
ii. Maximizing farmer benefit from existing climate forecasts and related activities (V);
iii. Malaria, meningitis, and other climate-sensitive disease early response (V&H);
iv. User-oriented climate outlook support (H);
v. Participation in vulnerability assessment, particularly at national level using regional climate prediction to identify people most at risk and to encourage engagement of national governments (H);
vi. Provide climate services for locust control and/or for the urban poor (who have no MDG of their own).

d) Distill lessons and best practices, for example, as established by the WMO Commission for Climatology, and disseminate them (see Communication Strategy, Section 6), with particular emphasis on relevant national and local decisionmakers.

9.4. Result Area 4: Observations, Data Management, and Infrastructure

The principal conclusion of both the 2001 and 2003 GCOS Regional Workshops in Eastern & Southern Africa and Western & Central Africa was that urgent action was needed to find solutions to observing system problems. The needed improvements in observing systems fundamentally underpin effective climate services in support of agriculture, water resources, health, natural disaster reduction, and other sectoral strategies for the reduction of poverty, hunger, disease, and environmental degradation. Regional Action Plans for the two African

regions have already been developed; hence, the essential foundation for implementation of this component of the strategy is already in place.

Outcome Required: *Observation networks and support infrastructure upgraded and enhanced to provide data essential for climate services, climate risk management, and policy development.*

Actions Proposed:

1. Prepare a consolidated (i.e., Africa-wide), re-costed, and integrated set of observation improvement projects on the basis of those in the Regional Action Plans and in line with the priority guidance provided by the meeting.
2. Refer the consolidated and updated GCOS Action Plan to the forthcoming session of the WMO Regional Association I and other key GCOS implementing bodies for review, endorsement, and implementation action.
3. Invite sponsor support for the funding and implementation of an integrated Action Plan and a further set of projects as identified and jointly defined by the key user community and implementing organizations.

Some examples of needed capacity building, assessment, and research:

a) Rescue historical climatological and hydrological data;

b) Improve capacities for regional data management;

c) Improve telecommunication facilities for the collection and exchange of climate data;

d) Upgrade stations in the GCOS Upper Air Network (GUAN);

e) Upgrade stations in the GCOS Surface Network (GSN);

f) Improve hydrological observations and hydrological data management;

g) Re-establish development-oriented National Meteorological Services in war-affected regions;

h) Improve access to climate data, information, and analytical techniques for development practitioners; and

i) Collect baseline and change data for climate variability and change impact assessment in different sectors and assess the degree to which the response to impacts was linked to the data collected.

10. Knowledge Management: For widespread usage of climate services, people need easy access to knowledge concerning the information, data, tools, and applications that are available for their situation. The knowledge management component of the Programme should seek to achieve an outcome in which best practices are communicated effectively throughout Africa and taken up, adapted, and implemented wherever appropriate. In order to achieve this outcome, it is proposed to invite tenders to develop and implement a communication strategy (see Section 6) dedicated to promoting climate-resilient MDGs and to making best use of information produced by both ClimDev Africa and other programmes engaged in work on adaptation to climate change. In a large scale knowledge management system there is need for excellent communications with harmonized efforts to ensure that: a) all partners are fully aware of developments in other parts of the programme and what has already been done elsewhere in related programmes, and b) target beneficiaries (e.g., national leaders, development practitioners, farmer groups, extension services, NGOs, and others working with communities) are reached with best practice recommendations that they can understand and to which they

can respond effectively. Development of the communication strategy and its implementation is a key part of the whole 'best practice' process and needs to be addressed as an action in its own right, not just left to partners to address when they have time. The services of a dedicated communication manager will be required, with increased support as the programme grows. Communication workshops will be needed to devise the strategy and to refine it as the programme progresses. Development of a strategy for reaching vulnerable communities with climate information services (whether or not such communities have effective agricultural or health extension services) is also important. Rural radios, cell phones, SMS, etc. could be used.

11. The Implementation Process: Public bodies, donors included, are increasingly exhorted to use open tendering processes for programme implementation in the best interests of transparency, accountability, and ensuing best value (impact) for money. There are many other advantages to this process, not least because it provides an easy entry point for other donors to invest additional funds without replicating administrative costs. In the case of ClimDev Africa, many of the possible tender processes could be managed by existing regional centres in Africa (with support from the appropriate Regional Economic Community, if necessary and appropriate). Such centres, with capacity strengthening/extra support seconded from national partners, as appropriate, could also be charged with organizing capacity development directly where common needs are identified (e.g., in proposal preparation) and in evaluating and deriving best practices from the project contracts issued. This knowledge could be shared widely for scaling up in Phases 2 and 3. The tendering process for the IDRC-DfID climate change research programme is currently underway, and tender processes for ClimDev Africa, if appropriate, could run along similar lines.

Points made in Addis about the tender process include the following:

- The process needs to be adequately supported or it can waste much effort for the bodies concerned;
- In Result Areas 2 and 3, joint tenders between providers and users would be appropriate;
- In Result Areas 1 and 4, there could be single institution tenders;
- The programme needs top quality communication and knowledge manager(s) in order to take full advantage of the outputs;
- Weakness in programme management is a risk;
- Opportunities for capacity development should be given to those less experienced in developing fundable projects (e.g., through participatory proposal development workshops);
- An inclusive approach is needed that gives guidance to those with good ideas to finalize their proposals;
- There is a need to ensure equal language opportunity; and
- Tenders and management tenders should not be limited to regional centres or to National Meteorological and Hydrological Services, but should be open to all appropriate institutions.

12. The Political Context: This programme is an attempt to implement a recognised component of Programme Area 5 in the Environment Initiative of NEPAD, "Combating Climate Change in Africa," produced with the support of the African Ministerial Conference on the Environment (AMCEN) and United Nations Environment Programme (UNEP) during 2003-4, and endorsed by all countries in Africa.

It will be important, however, to engage fully with national governments in order to achieve their ownership of the strategy and participation in the programme with internal support for actions affecting their states. Initially, UNECA, the AfDB, and the AU (all represented at the Addis meeting) are expected to take this initiative forward for approval by the Council of Ministers and thus to obtain top-level ownership of the adaptation to climate change (ACC) process in Africa. Additional awareness raising activities are needed to engage other players at the country level.

Further, the climate change action plan within NEPAD, which seeks to reduce the vulnerability of society from current climate variability and potential climate change, identified the following criteria for project selection and preparation:

a) *Regional, sub-regional and multi-country projects or regional impact:* Projects developed and selected under the action plan should have a sub-regional or regional outlook or involve several African countries;
b) *Multi-focus:* Projects should aim as far as possible at integrating the three pillars of sustainable development;
c) *Participatory nature:* Projects should be developed through a participatory approach, with strong ownership by all partners, including the government, the private sector, civil society, NGOs, and the scientific community;
d) *Programmatic approach:* Projects should be integrated in a comprehensive, programmatic, and, as far as possible, strategic approach;
e) *Sustainable Development Perspective:* Projects should be designed taking into account the need to alleviate poverty and promote economic growth;
f) *Capacity Building:* Projects should integrate capacity development needs as part of their planned activities;
g) *Maximize utilization of African expertise:* Projects should aim at maximizing the utilization of local experts and institutions;
h) *High rate of duplication:* Projects should be designed to ensure replication and dissemination of good practices and experiences;
i) *Sustainability of activities:* Projects should have activities whose benefits are sustainable beyond the life cycle of the interventions;
j) *Fundability:* Only projects likely to attract adequate domestic funding and external support shall be considered;
k) *Promote sharing of experiences and learning:* Projects should aim at promoting sharing of experiences, enhancing regional co-operation and collective learning;
l) *Performance criteria:* Projects should contain clear objectives, performance indicators and monitoring mechanisms;
m) *Thematic balance:* Balance between the thematic areas of the Action plan should be sought;
n) *Geographical balance:* Balance between the five Africa sub-regions should be sought based on the United Nations geographical groupings;
o) *Ensure gender mainstreaming in all projects.*

13. Indicators of Impact: Impacts from the different result areas might be measured using the following kinds of indicators. Actions proposed should contain their own indicators pertinent to the particular impacts anticipated.

13.1 Result Area 1--Policy: Awareness Raising of politicians, central planners, and the public to obtain ownership, political support, and leadership of the process and to demonstrate commitment to adaptation to climate change:

a) Number of national/regional leaders promoting ACC policies based on CV, CC, and CRM;
b) Number of countries with ACC programmes integrated into the development process; and
c) Quantity of national resources invested in related ACC activities at national and local levels.

13.2 Result Area 2-Climate Risk Management: Climate risk management practices incorporated in a) strategic MDG development planning, b) sectoral management, c) pro-poor livelihood strategies, and d) disaster risk reduction programmes.

a) Number of countries with operational CRM activities integrated into MDG programmes;
b) Number of people directly benefiting from CRM activities;
c) Number of communities directing their own CRM strategies with climate support.

13.3 Result Area 3--Climate Services: Climate information and support services developed and used by MDG decisionmakers in government, the private sector, and civil society to help meet priority needs in operational climate risk management and overall social and economic development.

a) Number of climate service providers engaged with community-led development programmes;
b) Number of climate service agencies actively engaged with providing climate services for central MDG planning and delivery; and
c) Number of new opportunities for climate services in relation to CRM that become operational.

13.4 Result Area 4--Observations, Data Management, and Infrastructure: Observation networks and support infrastructure upgraded and enhanced to provide data essential for climate services, climate risk management, and policy development.

a) Number of national climate networks fully operational with free access to comprehensive climate data sets for development programmes;
b) Number of global climate networks fully operational with all data received at the National Climatic Data Center in Asheville, North Carolina;
c) Number of communities with increased agricultural productivity from direct engagement in observing and using climate data in decisions.

Other impact indicators include: number of countries meeting MDG targets, disaster risks reduced, food security improvements, mortality reductions from improved health strategies, and amount of CRM-type knowledge gained, shared, and used effectively

14. Other Activities to Take into Account: Many of the activities under the programme will be crosscutting, so it is important that those involved in detailed programme design and implementation be fully aware of the numerous other related activities ongoing in Africa and ensure effective coordination with existing activities. Activities of particular importance include:

- WMO: All of the basic observational, applications, and service programmes of WMO, including especially the World Weather Watch and other WMO and jointly-sponsored observing systems on which GCOS is built; also cross-cutting WMO programmes, such as the Least Developed Country Programme, the Natural Disaster Prevention and Mitigation Programme, and research programmes such as African Monsoon Multidisciplinary Analysis (AMMA);

- The climate-related programmes of the other GCOS sponsors, UNEP, IOC, and ICSU;
- Other donor programmes for adaptation to climate change, including research under IDRC-DFID, GEF, START, DECAFS, etc.;
- The Millennium Villages Programme, which offers an opportunity to tie into a rapidly growing enterprise where CRM is already understood; and
- The European Commission's African Monitoring of the Environment for Sustainable Development (AMESD) programme, due to start in 2007, and US FEWSNET activities.

15. Beneficiaries and Partners--Roles and Responsibilities: Institutional engagement depends very much on the context of intervention, which in the case of climate can be quite diverse and broad. The *ultimate beneficiaries* of the programme are intended to be the poorest, i.e., those without food security, earning less than $1 per day, and at risk of dying due to lack of basic healthcare. The *immediate beneficiaries* of the programme are intended to be those development practitioners and rural service providers, who can be more effective within a CRM framework with functional climate services.

Key partners promoting this initiative include: DFID, IRI, and UNDP, with Finnish Aid also likely.

Essential to successful impact and sustainability is full participation of national governments and the political institutions in Africa, funding partners, regional and sub-regional institutions, climate data 'users,' national climate service providers, the global climate community, and the entire diverse range of development practitioners who engage with and assist communities. There are also important roles for agricultural and health extension services and both national and transboundary river basin authorities.

Suggested selection criteria for institutional participation vis-à-vis maximising impact and sustainability, include those that:

- Are horizontally and vertically integrated, i.e., have strong regional links but also links at the sub-regional, national, and local levels;
- Have support from regional economic communities with capacity to offer policy recommendations and to obtain resources and support;
- Provide good governance, i.e., leadership and effective implementation;
- Have multi-sectoral interests and embrace synergies and opportunities to integrate solutions to complex development problems;
- Provide technical and political capacity, including leadership, implementation focus, and scale up abilities; and
- Have a mission that already includes ClimDev Africa objectives and/or genuine interest in the technical and developmental issues involved.

The absence of multi-sectoral regional development institutions to lead processes from a development perspective was noted.

16. Overall Coordination: In order to achieve the horizontal and vertical mainstreaming and knowledge sharing necessary for successful implementation of an integrated climate programme for development in Africa, it will be essential to put in place an effective coordination framework for the programme as a whole, as well as for the separate sets of activities within each of the four Result Areas. It is proposed that this be implemented along the following general lines:

- **Overall Programme Coordination.** This could be provided by a High-Level Coordination Committee for ClimDev Africa established by the African Union and composed of national ClimDev Coordinators from participating countries and representatives of the pan-African coordination mechanisms for each of the four Result Areas. National ClimDev Coordinators should, in general, be located with the Department of the Prime Minister or within the policy ministry that has lead responsibility for MDG achievement. Coordinators should have national-level responsibility for horizontal coordination of activities across the four Result Areas. Representatives of the major donor organizations and of the international sponsors of key climate observing and services programmes should be invited to participate, in an observer capacity, in the work of the High-Level Coordination Committee. This overall coordination mechanism should itself be linked or integrated, as appropriate, with the climate coordination mechanisms of NEPAD.
- **Coordination of the Policy and Risk Management Components.** Coordination of the policy and risk management components (i.e., Result Areas 1 and 2) of ClimDev Africa should, in the first instance, be carried out under the auspices of the High-Level Coordination Committee. Subsidiary coordination mechanisms could be established, as necessary, in light of experience with the scale and scope of coordination required. At the national level, coordination of policy and risk management components will need to be sensitive to and integrated with existing arrangements for climate change policy development and national and sectoral programmes for sustainable development.
- **Coordination of Climate Services.** Climate services (i.e., Result Area 3) should be coordinated under the joint auspices of WMO Regional Association I and the UN Economic Commission for Africa (UNECA) within the general framework of the World Climate Applications and Services Programme (WCASP) and with the active involvement of the national coordinators of ClimDev Africa. Representatives of key African user-sector communities, donors, and the international sponsors of the World Climate Programme should also be involved.
- **Coordination of Climate Observations and Data Management.** Coordination of climate observations and data management (i.e., Result Area 4) should be carried out, on behalf of the international sponsors of the Global Climate Observing System (GCOS), by a Coordination Committee for GCOS Africa. This Committee could be led by WMO Regional Association I in consultation with the appropriate African programme mechanisms of IOC, UNEP, and ICSU. It should foster the establishment of, and work through, National GCOS Committees and should coordinate closely with the WMO-UNECA joint mechanism for climate applications and services with respect to ongoing assessment of user needs and services. Alternatively, the mechanism for climate services described above could be used for observations and data management, as well.

17. Budget: The Budget for ClimDev Africa will be based on the detailed formulation and costing of the priority projects (especially in Result Areas 1 and 2) required for successful achievement of its four key outcomes, in addition to the GCOS-related projects set down in the Regional Action Plans and further developed and prioritized at the Addis Ababa meeting (total cost US$67 million). As indicated in Section 4 above, the estimated total Budget is US$200 million distributed over the 3 phases of the ten-year Programme.

Appendix K

A CONSOLIDATED GCOS REGIONAL ACTION PLAN FOR AFRICA

Introduction

An important part of the vision for the Global Climate Observing System (GCOS) is that all countries and governments will have readily available to them the climate data and related information that they need to manage and adapt to the impacts of climate. However, systematic observation of climate in most countries of Africa is, at present, inadequate to permit reliable assessment, quantification, and prediction of climatic conditions and their impacts. Immediate action must be taken to address critical deficiencies in these programmes, since adaptation to climate and managing its impacts are critical factors in the pursuit of sustainable development, poverty reduction, and the protection of human lives and health in Africa.

Recognizing the problem, the Conference of the Parties (COP) to the UN Framework Convention on Climate Change (UNFCCC) invited the GCOS Secretariat to initiate a Regional Workshop Programme so that deficiencies in climate monitoring capabilities in various regions of the globe could be identified and assessed and so that actions to remedy critical shortcomings could be proposed. The GCOS Secretariat organized two of the ten workshops in the Programme in sub-Saharan Africa. The first of these workshops, for the countries of Eastern and Southern Africa (ESA), was organized in October 2001 in Kisumu, Kenya. The Directors of National Meteorological Services and National Climate Change Coordinators who attended the workshop noted that observing systems in sub-Saharan Africa were inadequate and/or had been deteriorating in recent years. A small group of those who participated in this workshop met again in January 2002 to draft a Regional Action Plan. Upon completion, this Plan contained fourteen high-priority projects with particular relevance for global and regional needs. In a similar manner, GCOS organized a Regional Workshop for the Directors of National Meteorological Services and National Climate Change Coordinators of the countries of Western and Central Africa (WCA). This workshop was held in Niamey, Niger in March 2003. A follow-up meeting to develop an Action Plan for this region was held in Dakar, Senegal in September 2003. The resulting RAP, issued in 2004, contains ten high-priority projects. A GCOS Mediterranean Basin Workshop was held in November 2005, which includes projects in North Africa. The Action Plan for this workshop is in preparation.

While the two Regional Action Plans (RAPs) were focused primarily on implementation of climate observing systems in support of the needs of the Framework Convention on Climate Change, the actions required and the priority projects proposed are essentially identical with those needed for support of sustainable development and the Millennium Development Goals.

The urgent requirement to assist countries of Africa to secure resources with which to implement the projects contained in the two RAPs provided the initial impetus for organizing the Addis Ababa meeting, “Climate Information for Development Needs: An Action Plan for Africa.” As a result of discussions that took place at the meeting following agreement on the essential features of an overall Strategy and Implementation Programme for “Climate for Development in Africa” (ClimDev Africa), participants decided to consolidate the two Action Plans into one for all of sub-Saharan Africa. Six of the 24 projects contained in the two original RAPs treat the same subjects in both subregions. Hence, the number of unique projects has been reduced to 18 to produce a consolidated Action Plan. The overall objective of the consolidated “GCOS Regional Action Plan for Africa” is to remedy significant deficiencies in systematic climate observation

programmes in sub-Saharan Africa in order to ensure that the data and information produced by them meet the needs of decision-makers in support of the Millennium Development Goals.

The complete Regional Action Plans for both regions (ESA RAP and WCA RAP) may be viewed on the GCOS website (http://www.wmo.ch/web/gcos/gcoshome.html). The RAPs are strategic, agenda setting documents and contain only brief project descriptions and approximate costs rather than detailed project plans. Hence, an initial activity will be to prepare a consolidated (i.e., Africa-wide) and re-costed set of projects that are in line with the priority guidance given by the Addis Ababa meeting and that provide the detail necessary to conform to the requirements of specific donors.

The following sections give brief descriptions of the 18 separate projects contained in the combined Action Plans for Eastern and Southern Africa and Western and Central Africa. The first section introduces those 12 projects that support all four Result Areas (i.e., Policy; Climate Risk Management; Climate Services; and Observations, Data Management, and Infrastructure) as defined by the ClimDev Africa Strategy and Implementation Programme, principally by addressing fundamental climate observation and data management needs. Participants in the Addis Ababa meeting considered the first six of the projects in this category to be of somewhat higher priority than the second six. Each of these projects will be updated, re-costed, and further refined so that they meet the proposal requirements of funding agencies.

The second section introduces Action Plan projects that are especially targeted at improving climate services (Result Area 3); the third introduces a project that is focused particularly on climate risk management (Result Area 2); and the fourth introduces two projects that address needs for improved policy (Result Area 1). Since Result Areas 1, 2, and 3 were not a particular focus of the RAPs, the ClimDev Africa strategy recognizes that additional project identification and development for these Result Areas will need to take place. Additional project proposals addressing observations and data management (Result Area 4) may also be developed, as the consolidated Action Plan for Observations, Data Management, and Infrastructure will be referred to the WMO Regional Association I and other key GCOS implementing and user-community bodies for review, endorsement, and implementation action. Sponsors will be invited to support the funding and implementation of this consolidated Action Plan.

Projects That Support All Result Areas:

1. ***Rescuing historical climatological and hydrological data.*** Data rescue is vital to preserving historical records related to the climate, the hydrology, and the weather. Historical data provide the observational basis for scientific, engineering, and economic decisions for countries in the region. Numerous data were collected during the colonial period and later by National Services as well as by the scientific community, but no detailed inventory has thus far been published. Moreover, the paper on which much early data are recorded is deteriorating and some other electronic storage media are becoming obsolete. This project would undertake to digitally photograph and process available original historical observational data and provide training in the techniques of data rescue. Making this valuable data available will contribute to a whole range of societal benefits, from helping to support agriculture to improving water resources management.

   Principal Project objectives:

   - Assemble and inventory all available hydrometeorological observational data;
   - Provide for digital photographing of all available original historical observational data;

- Provide the capability for NMHSs in each project country to photograph and digitize current and future observations;
- Establish procedures for data quality control; and
- Assist countries (NMHSs) in ensuring that the data rescue, archiving and quality control programmes continue.

Approximate cost: $500,000. (See ClimDev Africa 9.4a and WCA RAP Project 7).

2. ***Improving capacities for regional data management.*** Despite numerous efforts by regional National Meteorological and Hydrological Services (NMHSs), the region suffers from deficiencies in the organization and management of national and regional databases of climatological and hydrological data. These include problems related to data quality control and reliability, the provision of up-to-date descriptions and analyses, and data exchange and dissemination between NMHSs and the World Data Centres. The project would implement suitable climatological and hydrological data management systems, train relevant staff, and greatly improve the data management capabilities of regional and national centres. This project will enable improved use of existing data, as well as of data generated through the implementation of other projects, for a variety of climate-related purposes.

   Principal Project Objectives:

   - Rescue and archival of climatological and hydrological data;
   - Creation of reliable databases of climatological and hydrological data;
   - Reinforcement of the data processing capacities of regional institutions and improvement of the mechanisms of data exchange and dissemination between the NMHSs and the World Data Centres; and
   - Implementation of a climatic and hydrological monitoring system.

   Approximate cost: $6,500,000. (See ClimDev Africa 9.4b, WCA RAP Project 8, and ESA RAP Project 3.7).

3. ***Improving Telecommunication Facilities for the Collection and Exchange of Climate Data.*** A crosscutting need for the region is to overcome widespread shortcomings in telecommunications, which seriously inhibits exchange of data even if the observations themselves are being performed in a sustained and high-quality manner. Weakness of public telecommunications infrastructure in several countries, the obsolescence of the autonomous means of telecommunication currently used by the National Meteorological and Hydrological Services (NMHSs), and the difficulties in obtaining associated supplies such as power in a number of centres have been identified as the major shortcomings. A five-phased project proposes the evaluation of current capacity, strengthening of infrastructure with initial priority on GCOS Surface Network (GSN) and GCOS Upper Air Network (GUAN) stations, acquisition of data dissemination systems, technical training, and extension of enhanced telecommunications to other GCOS network components.

   Principal Project Objectives:

   - Implement appropriate means of telecommunication to ensure timely GTS relay of quality-controlled GSN and GUAN reports between and among observing stations, national climate data-management centres, World Climate Data Centres, and specialized regional centres (ACMAD, AGRHYMET, etc.) for the purposes of processing and relaying these data to end users;
   - Implement data dissemination and distribution systems by satellite, email, radio, etc., for the purposes of relay of data to end users;

- Provide capacity building in the use and maintenance of the specific equipment that is installed.

Approximate cost: $22,000,000. (See ClimDev Africa 9.4c, WCA RAP Project 3, and ESA RAP Project 3.8).

4. ***Upgrading Stations in the GCOS Upper Air Network (GUAN)***. There is a strong need to upgrade stations in the GCOS Upper Air Network to conform with GCOS Best Practices. An upgrade of the stations in the region is necessary to ensure that these stations are fully operational for the production of systematic meteorological observations. To date, irregular reporting of near-real-time and historical data, as well as unacceptably large random variations or biases in the measured parameters have been prevalent, mainly due to a lack of equipment, insufficient local operating capacity, and poor communication and archiving facilities. Implementing the project would help improve description and prediction of future climate, reduce losses from natural and human-induced disasters, and mitigate and adapt to climate variability and change.

   Principal Project Objectives:

   - Upgrade upper-air stations in Africa to ensure that these stations are fully operational and adhere to best practices for the production of systematic upper-air observations;
   - Ensure that the TEMP and CLIMAT TEMP reports of these stations are available internationally (i.e., at World and Regional Specialized Meteorological Centres and World Climate Data Centres) through the Global Telecommunications System (GTS) for the immediate and long-term future.

   Approximate cost: $3,500,000. (See ClimDev Africa 9.4d, WCA RAP Project 1, and ESA RAP Project 3.1).

5. ***Upgrading Stations in the GCOS Surface Network (GSN).*** Improvement of the GCOS surface network in Africa is critical for better understanding of climate change and variability regionally and globally. Many of the stations in these networks either do not report temperature and precipitation regularly or are silent. These shortcomings severely limit the quality of climate monitoring and prediction both on the regional and global scales. Upgrading of individual stations and capacity building to carry out day-to-day operations will be a cost-effective means to improve these observations on a sustainable basis.

   Principal Project Objectives:

   - Ensure that GSN stations are fully operational and adhere to best practices for the production of reliable systematic surface observations and environmental data;
   - Ensure that the SYNOP and CLIMAT reports of these stations are available internationally (World and Regional Specialized Meteorological Centres and World Climate Data Centres), through the Global Telecommunications System (GTS) and/or other communication channels, for the immediate and long-term future;
   - Ensure the provision of national and regional climatology information for use in application for sustainable development.

   Approximate cost: $5,500,000. (See ClimDev Africa 9.4e, WCA RAP Project 2, and ESA RAP Project 3.1).

6. ***Improving hydrological observations and hydrological data management.*** Improving hydrological observations through the installation of a real- or near-real time hydrological data collection, transmission, and dissemination system will be highly beneficial for water

management, as well as for adaptation to climate change and variability. Improvements will help build capacity for efficient integrated regional water resources management. An overarching objective of this project is to counter the progressive deterioration in the capacity of the National Hydrological Services (NHSs) to supply data and information on the state of their water resources. Improved observations will help support sustainable agriculture and combat desertification and lead to better management and protection of terrestrial, coastal, and marine ecosystems.

Principal Project Objectives:

- Assess the state of existing hydrological networks and their ability to deliver accurate and reliable hydrological data and information;
- Improve and upgrade existing hydro-meteorological networks to an optimum status (cf. WMO Minimum Standards for Hydrological Networks);
- Install a network of real or near-real time hydrological data collection and transmission systems through satellite in collaboration with the NMSs;
- Support NHSs in developing and/or improving their hydrological databases and eventually integrating them into a regional database;
- Build and/or enhance institutional, human, and operational capacity in data collection, transmission, processing, dissemination, and management; and
- Develop partnerships through collaboration in data collection and exchange.

Approximate cost: $8,500,000. (See ClimDev Africa 9.4f, WCA RAP Project 5, and ESA RAP Project 3.4).

7. ***Ensuring high-quality greenhouse gas and air quality monitoring.*** This project seeks to improve observation of key constituents of the atmosphere, including greenhouse gases and air quality parameters at stations contributing to the Global Atmosphere Watch (GAW) global and regional networks. Measuring greenhouse gas trends and variability allows the detection of regional carbon sources and sinks. Irregular reporting from these stations due to lack of equipment, inadequate support by qualified staff, and telecommunication problems seriously hamper sustained operation. Missing high-quality data in Africa leads to biases in the performance of climate models and predictions, and therefore affects the credibility of climate change scenarios.

   Principal Project Objectives:

   - Assess, rehabilitate, and/or automate the existing GAW network;
   - Build capacity related to operation, maintenance, and repair;
   - Ensure an improved programme of measurements related to climate change; and
   - Ensure continuous and timely quality data flow.

   Approximate cost: $750,000. (See ESA RAP Project 3.2).

8. ***Reliably detecting and attributing carbon sources and sinks.*** This project proposes a set of measures for a 5-year timeframe to further reduce uncertainty in observing the carbon cycle, which is vital in the regional and global context of the Kyoto protocol. Those include additional high-precision ground-based and airborne profile measurements of atmospheric CO_2, carbon flux observations in an African flux tower network, regular mapping of land cover and maintenance of a land cover database, as well as the derivation of carbon cycle indicators from satellite data. Integration of all carbon cycle observations will lead to improved mapping of carbon sources and sinks, which in turn will help mitigation and adaptation to climate variability and change and prediction of future climate.

Principal Project Objectives:

- Build capacity and promote regional carbon cycle syntheses;
- Operate two additional atmospheric CO2 sampling stations within the subcontinent (Africarbon);
- Establish a network of existing carbon flux measurement sites in savannas and encourage establishment of three new sites in under-sampled biomes (Afriflux);
- Observe carbon-cycle-relevant parameters at fifty RSN stations located on national agricultural research stations, forestry research stations, or ecological research stations (African production network); and
- Create a database of land-surface characteristics for climate, hydrological and carbon cycle modelling at 500 locations in the region (Reference Patch Network).

Approximate cost: $1,600,000. (See ESA RAP Project 3.3).

9. **Monitoring inland lakes as indicators of climate change.** Inland lakes, in particular in Eastern and Southern Africa, are important components of the climate and water resources for the region. Further, a majority of the population of this region live around these lakes and depend heavily on their resources for their livelihood. Changes in inland lakes would be useful indicators of regional and global climate change. This project will enhance the monitoring of inland lake variables in order to contribute to better understanding and prediction of climate change. The project will also contribute to the sustainable development and use of the marine resources of the major inland lakes, to the protection of their marine environments, and to better long-term planning and management of the impacts of climate variability and change.

   Principal Project Objectives:

   - Enhance the lake observation network;
   - Build capacity in marine meteorology/hydrology, data collection, instrumentation, and quality control
   - Systematically collect, exchange, and analyze data for selected parameters; and
   - Improve infrastructure for effective data exchange.

   Approximate cost: $275,000. (See ESA RAP Project 4.3).

10. ***Improved monitoring of changes in African ocean and coastal environments in support of integrated coastal management.*** Observations of the oceanic and coastal environment play a key role in the assessment of regional climate change and variability, as well as in other societal areas, such as fisheries and coastal management. A specific focus of this project is on monitoring sea level. Enhanced training for the region in the use of satellite observational data to determine ocean parameters, such as sea-surface temperature, ocean colour (biological activity), and ocean salinity is also required, e.g., by establishing a link with the Regional Ocean Observing and Forecasting System for Africa Project (ROOFS-Africa). In the Western Indian Ocean improved networks would be complemented with the establishment of one or two regional centres of excellence that can make use of in-situ and satellite observations and ocean-atmosphere models.

    Principal Project Objectives:

    - Establish an ocean observing system, which will produce data and products addressing a broad spectrum of user needs, including shipping, agriculture, fishing, recreation, tourism, and government ministry needs for long-term planning.

Approximate cost: $6,750,000 for ESA RAP project only. (See ESA RAP Project 3.5 and WCA RAP Project 4—ROOFS Africa Project).

11. ***Undertaking observations for sustainable urban development.*** Observations of the urban environment have become more important in planning and environmental management, as urban centres in the region continue to grow. Large urban centres also have significant effects on regional climate. Building institutional and technical capacity for effective and sustainable urban monitoring, e.g., of air pollution, land cover, or other climatological parameters, will contribute to improved health and welfare of urban communities.

    Principal Project Objectives:

    - Build technical and institutional capacity for effective and sustainable observations of the urban area; and
    - Establish urban observation systems in major cities in sub-Saharan Africa.

    Approximate cost: $2,000,000. (See ESA RAP Project 4.2).

12. ***Undertaking glacier monitoring for climate and water resources assessment*.** Establishing a reliable, consistent and sustainable glacier observing system for Mt. Kenya, Mt. Kilimanjaro, and Mt. Ruwenzori would allow continuous monitoring of glacier volumes and spatial extent, using both ground-based and satellite data. Apart from standalone studies, such observations have not been carried out systematically to date, limiting the understanding of the region's climate change and dynamics and the ability to predict the future of these mountain glaciers, which are among the most important water resources in the region, as well as important indicators of climate change.

    Principal Project Objectives:

    - Establish a reliable, consistent, and sustainable glacier observing system for Mt. Kenya, Mt. Ruwenzori, and Mt. Kilimanjaro;
    - Monitor the glacier volumes and spatial extent of these glaciers through ground and satellite based methods;
    - Study the past climatic conditions of the region from glacier ice core records; and
    - Determine the glacial contribution to the flow levels of rivers.

    Approximate cost: $600,000. (See ESA RAP Project 4.1).

Projects Principally Supporting Climate Services (Result Area 3):

1. ***Supporting the health sector with climate information.*** Weaknesses in regional climate observing systems limit the current application of climate data for decisionmaking in the health sector. The project proposes new measures and support to ongoing measures to recover, create, and use relevant data to predict the spatio-temporal distribution of infectious diseases. This project would strengthen regional capacity and help promote closer partnerships among the health and climate/environment sector ministries of countries in the region, as well as with other relevant organizations sharing common borders, common ecological zones, or common infectious disease problems. Through targeted networking and community building broader use of predictive models, including climate change scenarios and decision support tools, could be achieved in the region, thus leading to improved health surveillance. (This project attracted special early interest at the Addis Ababa meeting, and, as a result, IRI has been asked by DFID to prepare a “Concept Note” to flesh out the project in further detail.)

Principal Project Objectives:

- Create the environment in which to share expertise, data, and products, and through joint ownership, to energize the regional, national, and local capacity to describe, monitor, and predict the spatial and temporal distribution of climate related infectious diseases and thereby prevent and control them in a more efficient way;
- Improve health surveillance through the enhanced use of appropriate climate/environmental data on selected areas over Niger, Mali, and Burkina Faso.

Approximate cost: Not available. (See ClimDev Africa 9.3.5 and WCA RAP Project 10).

2. *Supporting local decisionmaking by developing a climate information partnership.* There is a widespread need in Africa to enable technical institutions to work more effectively together in an information partnership, especially in the context of local rural development and its relation to climate change and variability. The aim of this project is to provide reliable and timely environmental information for community development decisions in a range of societal areas in cost effective and sustainable ways. An integrated data collection, processing and dissemination system would be developed, ultimately leading to a multi-disciplinary local/rural development toolkit. Examples for this approach have been successfully demonstrated in some countries in the region, with great benefits to local communities, agents of change, and the technical institutions providing data and services. This project was initially proposed to be undertaken in several pilot areas in Western and Central Africa. It is desirable, however, that it be eventually expanded to other parts of Africa.

Principal Project Objectives:

- Make rural development more sustainable for poor communities through improved information sharing practices that involve the communities themselves. This requires technical institutions to work more coherently, sharing information with each other as well as developing improved 2-way communication with rural communities.

Approximate cost: $1,200,000. (See ClimDev Africa 9.3.6 and WCA RAP Project 6).

3. *Enhancing application of satellite observations for climate and society.* In the past, technological and scientific advances in satellite observations, e.g., for the purpose of numerical weather prediction and climate monitoring, have not always been transferred to the countries of the region, which rarely had access to satellite data and lacked the infrastructure and skill to process it. The PUMA (Preparation for the Use of METEOSAT Second Generation in Africa) project has addressed some of these deficiencies, but many still remain. The project would enhance capacity building in the interpretation and use of satellite data, e.g., through workshops, public education, networking among regional experts, and soliciting user requirements from all application areas.

Principal Project Objectives:

- Integrate remotely sensed data with the data observed from traditional stations;
- Develop methodologies for the conversion of remotely sensed data into measures of weather and climate variables;
- Enhance the capacity of the region for the effective utilization of remotely sensed data in the monitoring of weather and climate; and
- Raise awareness of the use of space technology among decisionmakers.

Approximate cost: $2,400,000. (See ClimDev Africa 9.3.7, WSA RAP Project 9, and ESA RAP Project 3.6).

Project Principally Supporting Climate Risk Management (Result Area 2):

1. ***Developing capacity for the assessment of societal vulnerability and adaptation to climate change and variability.*** Developing countries will be among the first and hardest hit from the adverse impacts of climate change because of their low adaptive capacity. The basis for undertaking research in vulnerability and adaptation is inadequate in the region. A set of targeted measures is required to improve understanding of the vulnerability of the region to climate change. These measures range from improving access to quality-controlled data, such as temperature and rainfall, to the use of regional climate change scenarios derived from climate models, to the incorporation of adaptation options into countries' development plans for various socio-economic sectors.

Principal Project Objectives:

- Improve availability of quality-controlled research data sets for key variables, such as temperature and rainfall, for the purpose of climate change monitoring, detection, and attribution and for vulnerability and adaptation studies;
- Ensure availability and application of consistent standards, methodologies, and tools for vulnerability and adaptation assessment as well as for monitoring, detecting and attributing climate change;
  - Enhance expertise in integrated climate change vulnerability and adaptation assessments and in scenario development; and
  - Improve the understanding of the vulnerability of the region to climate change and to promote the incorporation of adaptation options in development plans including the application of climate information for decision making in various socio-economic sectors

Approximate cost: $3,000,000. (See ClimDev Africa 9.2.4 and ESA RAP Project 4.4).

Projects Principally Supporting Policy: Awareness Raising, Accountability, and Advocacy (Result Area 1):

1. ***Building capacity in public understanding of climate change and variability.*** I..mproving public awareness and education at all levels on climate change, with a focus on the importance of observational data, will serve as a basis for addressing climate change on a regional scale. Training at the community level, e.g., through appropriate curricula, leaflets, media training, and workshops, is key to ensure that various communities are aware of the impact of climate change and variability on their daily life, and that they appreciate the value of systematic observations for targeted adaptation measures.

Principal Project Objectives:

- Improve public awareness and education in the field of climate change with a focus on the importance of observational data as a basis for tackling the issue of climate change;
- Provide training to ensure that various communities are also aware of the climate change and variability issues and the use climate data and information acquired through systematic observations; and
- Raise awareness at various societal levels of the importance of climatic information for improved management of socio-economic activities.

Approximate cost: $1,300,000. (See ClimDev Africa 9.1.4 and ESA RAP Project 3.9).

2. ***Improving regional climate predictions and climate change scenarios.*** The assessment of impacts of climate change requires climate change scenario products at regional scales,

using existing general circulation models, databases and downscaling techniques. However, due to a lack of observational data, ancillary socio-economic data, and modelling expertise and infrastructure in the region, these regional scenarios suffer from great uncertainties. As a consequence, there are currently no models with reasonable skill to adequately capture the climate in the region. Through improved collaboration with leading modelling centres, appropriate model assessment and targeted capacity building, steps are proposed to establish reliable climate change scenarios.

Principal Project Objectives:

- Review of past and on-going activities on climate modeling;
- Acquisition of the necessary workstations for climate change scenarios in the region;
- Identify, evaluate, and validate appropriate GCMs for use over our region;
- Identify and customize regional climate models for downscaling climate change scenarios from GCMs for vulnerability assessment studies;
- Build capacity (training of personnel) of the region to run simple climate change scenarios; and
- Develop appropriate linkage with other world climate research centers.

Approximate cost: $700,000. (See ClimDev Africa 9.1.5 and ESA RAP Project 4.5).

Project Costing: The initial costing of the ESA and WCA projects was undertaken at the time of preparation of the RAPs. A summary of the individual project costs, which are subject to refinement and updating, is provided in Table 1.

Table 1. Approximate Project Costs as Proposed in Original Action Plans*	
Project	**Approximate Cost USD**
Projects That Support All Result Areas	
1. Rescuing Historical Climatological and Hydrological Data	500,000
2. Improving Capacities for Regional Data Management	6,355,000*
3. Improving Telecommunication Facilities for the Collection and Exchange of Climate Data	22,163,000*
4. Upgrading Stations in the GCOS Upper Air Network	3,340,000*
5. Upgrading Stations in the GCOS Surface Network	5,334,500*
6. Improving Hydrological Observations and Hydrological Data Management	8,525,500*
7. Ensuring High-Quality Greenhouse Gas and Air Quality Monitoring	750,000
8. Reliably Detecting and Attributing Carbon Sources and Sinks	1,588,500
9. Monitoring Inland Lakes as Indicators of Climate Change	274,000
10. Improved monitoring of Changes in African Ocean and Coastal Environments	6,715,000
11. Undertaking Observations for Sustainable Urban Development	2,020,000
12. Undertaking Glacier Monitoring for Climate and Water Resources Assessment	580,000
Projects Principally Supporting Climate Services	
1. Supporting the Health Sector with Climate Information	*Not Given*
2. Supporting Local Decisionmaking by Developing a Climate Information Partnership	1,200,000
3. Enhancing Application of Satellite Observations for Climate and Society	2,350,000*
Project That Principally Supports Climate Risk Management	
1. Developing Capacity for the Assessment of Social Vulnerability and Adaptation to Climate Variability	3,020,000
Projects That Principally Support Policy: Awareness Raising, Accountability, and Advocacy	
1. Building Capacity in Public Understanding of Climate Change and Vulnerability	1,305,000
2. Improving Regional Climate Predictions and Climate Change Scenarios	665,500
TOTAL	**66,686,000+**

***** For projects appearing in both Regional Action Plans, the cost reported is the sum of the costs for both regions