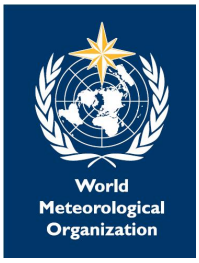
WORLD METEOROLOGICAL ORGANIZATION



IMPROVED DECISION MAKING FOR CLIMATE ADAPTATION

WMO POSITION PAPER PREPARED FOR
UNFCCC FIFTEENTH CONFERENCE OF PARTIES (COP-15)
(Copenhagen, Denmark, 7-18 December 2009)

CCA-5

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World Meteorological Organization
Working together in weather, climate and water

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SUMMARY

World Climate Conference-3 (WCC-3) confirmed the need for improved climate services to underpin, inter alia, decision making for climate change adaptation. In its Declaration the WCC-3 has called for the implementation of a Global Framework for Climate Services (GFCS) to meet this urgent, global need for improved climate service to serve a broad range of needs including, and beyond, those of the UN FCCC. Learning to adapt to present weather and climate variability helps develop capacity to adapt to climate change tomorrow. Comprehensive climate information and services at various levels from global to regional, national and local at various time-scales is fundamental to the design of effective adaptation policies.

A Global Framework for Climate Services will generate comprehensive understanding of the climate system; fill information gaps at global, national, and local scales; and enable use of such information in various socio-economic sectors. Enhanced research, comprehensive observations, and efficient and effective service delivery and service application constitute the essential components of such a framework.

Recognizing that climate information that is already available for adaptation and mitigation planning is often not used in an optimal manner there is need for mechanisms that better connect users to the experts generating the information. At the same time NMHSs and their national partners need to better understand user needs and tailor climate information products to meet societal requirements.

Accelerated weather and climate research through advanced global/regional modelling development of better tools for climate observations, climate change detection, adaptation planning, improved understanding of current and future patterns of sector-specific climate risk and interpretation of climate products to provide user relevant services is required at both national and international levels.

For improved climate information for adaptation at the local level, adequate and properly functioning regional- and national-scale observation networks are fundamental. The Global Climate Observing System (GCOS) assessment of climate observations needs has pointed out the large gaps that require strengthening. Governments need to urgently consider strategic support for the National Meteorological and Hydrological Services (NMHSs), research institutions and environmental agencies to strengthen various observation systems.

The Climate Services Information System, built on established global programs such as the World Climate Programme and its various elements will synthesize information streaming from the observation, research and modelling through a network of global, regional and national institutions and ensure the development and delivery of user-oriented climate information and prediction services. It will reinforce and further develop, existing institutions, their infrastructure and mechanisms to generate and deliver climate information. NMHSs will play a crucial role in this delivery mechanism.

Governments should make use of existing strengths of NMHSs, and enhance them, where necessary to ensure that relevant climate information is available to various sectoral users at all levels.

IMPROVED DECISION MAKING FOR CLIMATE ADAPTATION

1. INTRODUCTION

1.1 This position paper presents the role that the climate, weather and water communities can and do play in achieving the objectives of the United Nations Framework Convention on Climate Change (UNFCCC). It is hoped that this note will help National Meteorological and Hydrological Services (NMHSs) and their national partners to provide the scientific underpinning to the negotiations, to enable them to play their expected role within the national delegations and, in so doing, facilitate the discussions at the Conference of Parties at their Fifteenth (COP-15) meeting in Copenhagen, Denmark in December 2009.

1.2 Climate variability and change are posing significant challenges to societies worldwide. The Bali Action Plan has adopted adaptation as one of the four pillars of the post-2012 UNFCCC regime. The other three areas identified under the Action Plan include streamlining and scaling-up resources, knowledge sharing, and institutional frameworks.

1.3 Irrespective of the mitigation policies adopted and implemented, adaptation to a changing climate will be required - an inevitability that has been termed the "adaptation imperative." Moreover, strategies to adapt to current weather and climate variability, is the only option available for dealing with the adverse impacts and maximise beneficial effects due to climate change that are inevitable over the next few decades. Greater focus on adaptation is required in order to reduce vulnerability to climate risks.

1.4 Climate information at various time scales, including projections of future climate at regional, national and local scales, is required for adaptation. Availability of climate information and its effective use helps prevent disasters that can result from climate extremes and long term climate change. It plays a crucial role in national development planning, for managing development opportunities and risks and for mitigation and adaptation. Recent advances in science and technology offer the prospect of further improvements in quality of climate information and prediction services.

1.5 The World Climate Conference-3 (WCC-3) confirmed the need for improved climate services to underpin, *inter alia*, decision making for climate change adaptation. In its Declaration the WCC-3 has called for the implementation of a Global Framework for Climate Services (GFCS) to meet this urgent, global need for improved climate service to serve a broad range of needs including, and beyond, those of the UN FCCC.

2. CLIMATE INFORMATION FOR SUSTAINABLE DEVELOPMENT

2.1 Integrating monthly/seasonal to multi-decadal predictions and long-term climate projections for and into decision-making in all socio-economic sectors, through an effective dialogue between meteorological service providers, other experts in related disciplines and service users on the range, timing, quality and content of climate products and services, will ensure that decisions relating to managing climate risks are well informed, more effective and better targeted.

2.2 The way society adapts to extreme weather and climate conditions determines the sustainability of development. The sharp rise in economic, social and environmental damages in recent decades due to weather and climate extremes will set back the development gains painstakingly made over the years unless concerted, focused, and science-based adaptation measures are taken. The UNFCCC SBI at its 28th session agreed on the further implementation of decision 1/CP.10, inter alia, enhancing national

planning for adaptation, through integrating adaptation into the planning process, promoting risk management approaches and other appropriate responses to the adverse effects of climate change.

2.3 Climate, climate change, and vulnerabilities to climate change differ from one region to another, and as such regionally and locally specific climate information is required for adaptation. Mainstreaming climate information into decision-making would foster effective climate risk management strategies in support of the achievement of the Millennium Development Goals, eradicating extreme poverty and hunger and ensuring environmental sustainability.

2.4 Parties should be encouraged to ensure access to relevant climate information[1], to propose a regional mitigation and adaptation framework and identify win-win options for the socio-economic sectors, to recommend policy and financial innovations to enable smooth implementation of the regional frameworks, and to explore appropriate options for strengthening information exchange on climate change impacts.

Climate, climate change, and vulnerabilities to climate change differ from one region to another, and as such, regionally and locally specific climate information is essential for adaptation.

3. WMO STRATEGY IN SUPPORT OF CLIMATE CHANGE ADAPTATION

3.1 WMO, consisting of a network of the NMHSs of 188 Member countries with its partners in international organizations and national institutions promotes the generation, delivery and use of climate information. Despite very significant advances made by NMHSs and its partners in providing climate information, much work remains to be done to further reduce the uncertainty in global, regional and local climate predictions. Through its network of NMHSs and other national, regional, and global partners, WMO coordinates and supports programmes that organize research, observations and assessments. It co-sponsors the, the World Climate Research Programme (WCRP), the Global Climate Observing System (GCOS), and, the Inter-governmental Panel on Climate Change (IPCC). It fosters and furthers collaboration among members of the UN system and with other international organizations in global observations and climate research and applications. WMO's strategy for supporting adaptation to climate variability and potential climate change is, based on:

- Enhanced cooperation through global, regional and national partnerships
- Building awareness of, and capacity for, adaptation to climate change;
- Effective generation and delivery of climate information and prediction; and,
- Enhanced research, observations, and monitoring.

3.2 In order to address the need for improved climate information and an effective interface between scientists and decision-makers, The World Meteorological Organization (WMO), in partnership with other UN Agencies organized the World Climate Conference-3 (WCC-3), in Geneva, Switzerland, from 31 August to 4 September 2009. The World Climate Conference-3, decided to develop a Global Framework for Climate Services (Framework). The goal of the Framework is to:

> ***"Enable better management of risks of climate variability and change and adaptation to climate change at all levels, through development and incorporation of science based climate information and prediction into planning, policy and practice."***

[1] *FCCC/AWGLCA/2008716/Rev. 1, 15 January 2009*

3.3 The Global Framework for Climate Services is proposed as a long-term cooperative arrangement through which the international community and relevant stakeholders will work together. The Framework will have a number of major components: a Climate Services Information System; a User Interface Programme, Observation and Monitoring; Research, Modelling and Prediction; and a Capacity Building component. The Climate Services Information System component, builds on and expands existing capabilities of the WMO's network of NMHSs that are currently coordinated through the World Climate Programme. The User Interface, is new proposal that calls for extensive partnership among a range of international and national organizations in order to make climate information effectively reach decision-makers in all socio-economic sectors. The last two components, the capability to deliver climate information and the infrastructure that supports relevant reseach and the collection and exchange of climate-related data are well established but are in need of strengthening.

3.4 Effective implementation of the four components of the Framework would lead to:

- Widespread social, economic and environmental benefits through more effective climate risk management and increased capacities for adaptation to climate variability and change.
- More effective use of global, regional and national climate information and prediction services by all stakeholders in climate-sensitive sectors in all countries (leading to improved planning and investment in sectors vital to national economies and livelihoods);
- Improved understanding throughout the developing world of how to access and make best use of the climate-related data and information available locally, regionally and globally;
- Strengthened local, national, regional and global observational networks and information management systems for climate and climate-related socio-economic and environmental variables; and,
- Enhanced climate modeling and prediction capabilities through strengthened international climate research focused on monthly/seasonal to decadal timescales.

3.6 WMO, through its NMHSs and partners, will strive to play a coordinating role to energize the UN system to act as one in the development and implementation of Global Framework for Climate Services (GFCS) and achieve its objectives.

4. ENHANCED PARTNERSHIP

4.1 Climate change is a global, multi-disciplinary phenomenon, and understanding of climate systems and developing solutions to particular global, regional and local issues requires partnership across expertise, geographical and political boundaries. WMO and its network of NMHSs collaborate with UN agencies and Programmes, research institutions, satellite operators and many other regional and national institutions. One of the WMO's key partnerships is with UNEP as the co-sponsors of the IPCC.

4.2 As a part of its work the WMO and UNESCO/IOC manage the Joint Technical Commission on Oceanography and Marine Meteorology (JCOMM), which leads to unprecedented levels of cooperation in the implementation of weather and climate services to meet the diverse needs of the marine community. The WMO, through its Commission for Hydrology (CHy) also works closely with the UNESCO International Hydrology Programme (IHP) to improve global hydrological systems and services. The WMO, through its Commission for Aeronautical Meteorology (CAeM) works closely with the International Civil Aviation Authority (ICAO) to continuously, and cost effectively, improve the weather and climate services available to underpin commercial aviation.

4.3 The WMO participates in jointly funded aid projects aimed at improving, *inter alia*, disaster response- and climate-related services throughout Africa and in Central Asia with partners that include the EU, World Food Programme, World Bank, and national aid agencies. In all of these activities the WMO provides active support by tapping a vast network of expertise and knowledge among its Members, Programmes, Technical Commissions, partner institutions, and partner organizations thereby supporting its Members in the implementation of relevant environmental conventions and multilateral environmental agreements.

4.4 Under the UN System-wide unified response to the challenges of climate change, WMO and UNESCO have been assigned the responsibility to convene a forum entitled: *"Science, assessment, monitoring and early warning"* for coordination, integration and dissemination of the climate change knowledge developed by the UN system organizations. Providing access and thereby facilitation use by the public, policy and decision-makers world-wide, it will support the UNFCCC process.

4.5 Each development sector has distinct needs, decision-making processes, user requirements and financial and technical constraints. Decisions related to adaptation to climate change can best be addressed by working with users and other UN agencies and strategic partners who have knowledge and responsibilities beyond those in the meteorological community so that a true multi-disciplinary approach can be taken to finding solutions for the complex and urgent problems that the world faces in both the weather and climate domains.

Understanding climate systems, which are essentially global in nature, their monitoring and prediction, and downscaling this understanding to regional and local levels requires partnerships across expertise, geographical and political boundaries.

5. CLIMATE INFORMATION SERVICES AND ENHANCED AWARENESS AND CAPACITY

5.1 Given the multi-dimensions of the climate challenge, climate is fast becoming 'everyone's business'. Various development sectors, sections of society, countries, communities, enterprises and civil society need to adapt to the present climate variability and associated extremes well before all the effects of climate change are fully visible. However, informed decisions cannot be made without reliable and actionable climate and other related information and services. A core responsibility of the international community as a whole and each government in particular should, therefore, be to ensure access to scientifically credible and adequate information on climate.

5.2 Some of the essential building blocks for development and delivery of climate information and services have been put in place over the years by a range of organisations to meet clearly stated requirements. In response to the needs of governments working through their NMHSs, the WMO implemented the World Climate Programme and, particularly through the Climate Information and Prediction Services (CLIPS) project, has demonstrated the practical value of climate information and prediction services delivered globally insupport of regional and local climate affected decision making. Through its Members, WMO has established Global Producing Centers of Long-Range Forecasts (GPCs) and is currently putting in place a world-wide network of Regional Climate Centres (RCCs) to provide real-time inputs to NMHSs to generate scientifically sound, continuously improving climate information. In these efforts special attention goes to countries that are more vulnerable to the effects of climate change, especially Least Developed Countries and the Small Island Developing States.

5.3 WMO, through Regional Climate Outlook Forums (RCOFs) and their user networks, strive to provide scientific inputs for decision making to address seasonal climate predictions, provision of climate variability and climate change information, and products at the national and local level. The participating countries in the RCOFs develop important regional and national climate information in close collaboration with the WCRP. The RCOFs provide an effective mechanism for capacity building at both national and regional levels and supports the Nairobi Work Programme. However, these forums need to be sustained and extended under GFCS to all hydro-climatic regions.

5.4 The NMHSs have the responsibility to work closely sectoral users and scientists from other disciplines in their respective countries in integrating climate risk information into their decision making processes. A key part of this work is conveying the level of information available in climate forecasts as well as how to accommodate the uncertainties within their decisions.

5.5 Through its capacity building activities WMO provides it's Members with the needed technology and know-how to address adaptation to climate change by facilitating NMHSs in accessing global climate products and the use of projected climate change

estimates for assessing risks and impacts. It assists in the identification of gaps and deficiencies in climate observations, data rescue and management, modelling capabilities, including downscaling tools, particularly in developing countries and addressing these gaps.

The WMO's current climate service provision programmes and their user networks provide scientific inputs for decision making to address seasonal climate predictions, provision of climate variability and climate change information and products at the local level. They also provide experience and a framework for the GFCS to build on as it works to fulfil its vision.

6. RESEARCH, OBSERVATIONS, AND MONITORING

6.1 Despite the significant advances made over time in understanding, modelling, prediction, projections and earth system sciences, the complexities of climate system processes and their interactions are yet to be fully unravelled. WCRP, jointly sponsored by WMO, the International Council for Science, and the UNESCO/Intergovernmental Oceanographic Commission, provides international coordination in climate research and plays a crucial role in increasing skills in climate prediction (from monthly/seasonal to decadal), climate modelling, estimating the uncertainties of climate predictions, and projections. Increasing these skills both at the global and regional levels requires extensive scientific research. It would require comprehensive understanding and representation of Earth System processes through integrated approaches by, for example, including greater biological and chemical details in fully coupled Earth system models.

6.2 Accelerated weather and climate research is required both at national and international levels in order to develop better tools for adaptation through advanced regional modelling, and improve understanding of future patterns of sector-specific climate risks. Strengthening of institutions and centres through targeted research programmes of societal relevance is required to address the adverse effects of climate change in vulnerable sectors.

Despite the significant advances that have been made in climate science recently, much work remains to be done to improve the information needed to adequately adapt to the changing climate.

6. 3 The accuracy and reliability of regional climate models depends to a large extent on the availability and quality of the observations that are used to validate them. To ensure that climate requirements are properly reflected in the design and implementation of meteorological networks the WMO co-sponsors GCOS in partnership with UNEP, UNESCO/IOC and ICSU and hosts its secretariat. The GCOS focus has been on the importance of properly functioning global-scale networks. The demands for downscaling to meet regional and local needs for adaptation related decision making will substantially increase the importance of regional- and national-scale networks.

6.4 Good observational records acquired over extended periods make possible an understanding of both the frequency of occurrence of significant extreme events and the identification of trends in climate extremes conditions in order to draw reliable information for planning needs in the current climate as well as reliable future climate projections. For example, WMO issues regular El Niño/La Niña updates, including outlooks, which helps develop regional climate outlooks and seasonal prediction. Similar oscillations to improve predictions can be identified through extensive observations and monitoring.

6.5 In many places around the world, particularly the developing countries, climate observing networks are inadequate to document regional and local climate change and have been in decline since the 1990s. Enhancement of systematic observation and monitoring networks in countries with observation stations that are consistent with the GCOS requirements are urgently needed[2].

6.6 WMO is also committed to supporting the implementation of the UNFCCC, the Vienna Convention on Protection of the Ozone Layer and the UN-ECE Convention on Long Range Transboundry Transport of Air Pollution. Under a WMO coordinated programme NMHSs have undertaken the responsibility to monitor various greenhouse gases, ozone, and aerosol in the atmosphere all of which are relevant to climate change.

6.7 There is an urgent need for governments to provide the required resources to NMHSs to maintain and improve their national observations networks; enable them to utilize the latest technologies and current scientific knowledge; and to build their human capabilities. Maintaining these networks over long periods is critical, and developing countries need financial and technical support to undertake this responsibility. SBSTA has recognised[3] the need for involvement of experts from developing countries in improving data collection and information gathering relating to climate change, as well as in the analysis, interpretation and dissemination of such data and information.

One of the core responsibilities of governments participating in the GFCS should be to ensure the access of scientifically credible and adequate information on climate prediction and climate change.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Climate services provided through the GFCS will need to address user needs for the information, products and tools required for climate risk management and adaptation to climate variability and change in support of sustainable development.

7.2 Governments should make full use of the existing infrastructure, capacity and capabilities of NMHSs and further strengthen them to enable NMHSs to continue to play their key role in delivering climate services to all user sectors through the GFCS.

7.3 NMHSs will continue to develop partnership with different sectoral users and experts from a range of disciplines to support improved decision making for climate change adaptation. National mechanisms in form of National Climate Partnerships needs to be further developed for user and cross-discipline expert interactions so as to share experiences on how best to incorporate climate information and model predictions in planning and decision making processes.

7.4 The societal need for timely, relevant and authoritative information on climate demands increased efforts in climate research including advanced computational modelling at high spatial resolutions to capture the regional aspects of climate variations.

7.5 WMO and partners will continue to take the lead in coordinating weather, climate, water and environmental observations, in promoting research, and generating and producing climate information and services thereby enhancing the ability of countries to adapt and mitigate and sees that there would be significant advantages in doing this through a broad-based approach as is proposed by the GFCS.

7.6 The Framework would facilitate understanding of current climate, enable predictions of future climate change, provide methods for better understanding and using the uncertainties associated with these and help to improve the capacity in developing countries to use such information to design effective adaptation strategies. The Framework would address the needs of climate observations, climate services, and climate modelling and support the smooth flow of the required climate information from global to local levels and their applications in various sectors.

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[2] GCOS in its report to the SBSTA (29) at COP 14, Poznan.
[3] *FCCC/AWGLCA/2008716/Rev. 1, 15 January 2009.*

7.7 It is extremely important to maintain and improve climate observation networks and share climate related data. Many developing countries have difficulty maintaining regional- and national-scale networks. Continued assistance to developing countries by the developed countries is needed for improvements in climate observing networks, and it is important that the Conference of the Parties to the UNFCCC to continue to draw attention to this fact.
