Global Framework for Climate Services

CONCEPT NOTE

Contents

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TERMINOLOGY USED IN THIS DOCUMENT

Today, climate is everybody's business. Stakeholders from various sectors and backgrounds have differing conceptions and use the same terms to mean different things. It is therefore important to begin by clearly stating how some of the most important terms used in this document are meant to be interpreted.

'**Adaptation**' refers to adjustment to present climate variability and to anticipated climate change.

'**Climate change**' as defined by IPCC refers to the change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

'**Climate information**' includes historical data, analyses and assessments based on these data, forecasts, predictions, outlooks, advisories, warnings, model outputs, model data, climate projections and scenarios, climate monitoring products, etc., and can be in the form of text, maps, charts, trend analyses, graphs, tables, GIS overlays, photographs, satellite imagery, etc.

'**Climate prediction**' includes forecasts and outlooks and predictions at monthly, seasonal, inter-annual, decadal, and multi-decadal scales. This range includes the following meteorological forecasting ranges as defined in the Manual on the Global Data Processing and Forecasting System (GDPFS) (WMO-No. 485, Volume 1 (global aspects)): long-range forecasts (monthly outlooks, three-month or 90-day outlooks, seasonal outlooks and climate forecasting (including climate variability prediction and climate prediction, beyond two years).

'**Climate Risk Management (CRM)**' is an approach to decision-making in climate-sensitive activities (e.g. agriculture and food security, health, tourism, management of water and energy resources, urban planning and design, transportation, etc.), that seeks to reduce the vulnerability associated with climate risk (both variability and change) and aims to both maximize the positive and minimize the negative outcomes for these sectors.

'**Climate Watch**' or '**Climate Watch System**' is a monitoring activity generally at national or subnational scales leading to issuance of advisories and statements to inform users, thereby serving as a mechanism to heighten awareness and initiate preparedness measures, particularly for those involved in natural hazard preparedness, mitigation and response. The elements of the system include thresholds, indices, criteria and databases.

'**Decision-maker**' (see User, below)

'**Framework**' refers to the outline or structure on which improved climate predictions, information and services will be built and carries no political or legal meaning.

'**Global Producing Centre of Long Range Forecasts (GPC)**' is a WMO-designated operational centre producing long-range forecasts of global large-scale fields of a standard set of climate variables including surface temperature, precipitation and others, with a regular predefined frequency. GPCs provide access to their forecasts to all WMO Members as well as supplying additional information on standard verification statistics to facilitate assessment of their forecast skills for the regions of interest. At present, ten GPCs have been designated around the world.

'**National Climate Service**' or '**National Climate Centre**' can be and often is an entity within a National Meteorological Service (NMS) or a National Meteorological and Hydrological Service (NMHS) to, inter alia, carry out climate studies, conduct climate prediction and projection and develop and provide climate services. It is recognized that in some countries, climate functions can be entrusted to other national entities, including other government agencies, universities or research institutions, in addition to NMHSs. It is assumed that in most cases the NMHS will be the principal official national entity for most operational climate functions and that the full suite of climate efforts developed across multiple mandated agencies for adaptation to climate variability and change will be coordinated at national levels. Where needed in this document for discussion on climate service development and delivery, the term 'NMHS and other mandated institutions' is used.

'**National Meteorological Service (NMS)**' has a useful working definition (see 'The National Meteorological Service', by John W. Zillman: WMO Bulletin Vol. 48, No. 2, April 1999). For the purpose of this Concept Note, an NMS is 'an organization established and operated primarily at public expense for the purpose of carrying out those meteorological and related functions which governments accept as a responsibility of the State in support of the safety, security and general welfare of their citizens and in fulfilment of their international obligations under the Convention of the World Meteorological Organization'. In many countries, the NMSs and a Hydrological Service are co-located, and are referred to as the National Meteorological and Hydrological Service (NMHS).

'**Regional Climate Centre (RCC)**' is a WMO-designated regional institution with capacity to develop high-quality regional-scale climate products based on global products incorporating regional information.

'**Regional Climate Outlook Forums (RCOFs)**' are platforms (generally meetings) in which climate experts (providers of information, predictions, products and services) develop consensus-based regional climate predictions and meet with users of climate information, usually at significant seasonal changes in climate (e.g. beginning of the rainy season). RCOFs produce and disseminate a regional, consensus-based assessment of the state of the regional climate (i.e. a climate prediction) for the upcoming season.

'**Service**' is used to describe an action, such as delivery of climate information (see above), guidance, or a product to a client or user, and does not normally imply a physical entity such as an organization or institute unless this is specifically described (as in NMHS above).

'**User**' (or '**decision-maker**' – these terms are frequently used interchangeably) refers to a client (perhaps an individual or organization) with responsibilities for decisions and policies in climate-sensitive settings, for whom a service is provided or to whom some form of climate information is delivered, and can include entities that may not yet be aware of their vulnerability to climate variability and change.

ABBREVIATIONS AND ACRONYMS

ACMAD	African Centre of Meteorological Application for Development
AeMP	Aeronautical Meteorology Programme
AgMP	Agricultural Meteorology Programme
AR 4	IPCC Fourth Assessment Report
ASEAN	Association of Southeast Asian Nations
AU	African Union
CDMS	Climate Database Management System
CEB	United Nations Chief Executives Board for Coordination
CIIFEN	Centro Internacional para la Investigación del Fenómeno de El Niño
CLIPS	Climate Information and Prediction Services
CLIVAR	Climate Variability and Predictability (a WCRP programme)
CMIP	Coupled Model Intercomparison Project
COF	Climate Outlook Forum
COP	Conference of the Parties
CSAP	Climate Services Application Programme
CSIS	Climate Services Information System
DPFS	Data Processing and Forecasting System
DRR	Disaster risk reduction
ECV	Essential Climate Variable
ESSP	Earth System Science Partnership
FAO	Food and Agriculture Organization of the United Nations
GAW	Global Atmosphere Watch
GEO	Global Earth Observations
GEOSS	Global Earth Observing System of Systems
GIS	Geographic Information System
GCM	Global Climate Model
GCOS	Global Climate Observing System
GEF	Global Environmental Facility
GOOS	Global Ocean Observing System
GPC	Global Producing Centre of Long-range Forecasts
GPCC	Global Precipitation Climatology Centre
GRDC	Global Runoff Data Centre
GTOS	Global Terrestrial Observing System
ICAO	International Civil Aviation Organization
ICID	International Centre for Irrigation and Drainage
ICPAC	IGAD Climate Prediction and Applications Centre
ICSU	International Council for Science
IFRC	International Federation of Red Cross and Red Crescent Societies
IGAD	Intergovernmental Authority on Development
IGBP	International Geosphere-Biosphere Programme
IGFA	International Group of Research Funding Agencies
IHDP	International Human Dimensions Programme on Global Environmental Change
IOC	Intergovernmental Oceanographic Commission
IPCC	Intergovernmental Panel on Climate Change
IRI	International Research Center for Climate and Society
ISDR	International Strategy for Disaster Reduction (UN)
IUCN	International Union for Conservation of Nature
JCOMM	Joint WMO-IOC Technical Commission on Oceanography and Marine Meteorology
LDC	Least developed country
LRF	Long-range forecasting
MDG	Millennium Development Goal
NASA	National Aeronautics and Space Administration

NGO	Non-governmental organization
NOAA	National Oceanic and Atmospheric Administration
NMHS	National Meteorological and Hydrological Service
NMS	National Meteorological or Hydrometeorological Service
NSIDC	National Snow and Ice Data Center
NWP	Nairobi Work Programme
PCMDI	Program for Climate Model Diagnosis and Intercomparison, Lawrence Livermore National Laboratory, USA
RCC	Regional Climate Centre
RCM	Regional Climate Model
RCOF	Regional Climate Outlook Forum
SADC	Southern African Development Community
SIDS	Small Island Developing States
UIP	User Interface Programme
UN	United Nations
UNDP	United Nations Development Programme
UN ECOSOC	United Nations Economic and Social Council
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UN-Energy	UN interagency mechanism on energy
UNEP	United Nations Environment Programme
UNWTO	UN World Tourism Organization
WB	World Bank
WCC	World Climate Conference
WCP	World Climate Programme
WCRP	World Climate Research Programme
WDC	World Data Centre (ICSU) (WDCs for Meteorology are: Asheville, NC, USA; Beijing, China; and Obninsk, Russian Federation); World Data Centre for Aerosols; World Data Centre for Greenhouse Gases; World Data Centre for Precipitation Chemistry; World Data Centre for Surface Ozone, etc.
WHO	World Health Organization
WIOC	WCC-3 International Organizing Committee
WMO	World Meteorological Organization
WOUDC	World Ozone and UV Data Centre
WRDC	World Radiation Data Centre
WWF	Worldwide Fund for Nature
WWRP	World Weather Research Programme
WWW	World Weather Watch

Global Framework for Climate Services

CONCEPT NOTE

EXECUTIVE SUMMARY

All communities, especially the poor and the most vulnerable, are struggling to adapt to the growing risks due to enhanced climate variability and climate change. Decision-makers in many climate-sensitive sectors – water, agriculture, fisheries, health, forestry, transport, tourism, energy and disaster risk management – are increasingly concerned by growing adverse impacts due to climate risks but are insufficiently equipped to make effective use of available climate information. To provide them with the information they need to make informed decisions and to ensure effective use of such information, a new approach is needed.

With science at the heart of how society deals with the impacts of climate change, we can ensure that adaptation is smarter, more effective and better targeted. While recent scientific and technologic progress and its potential for application offer the prospect of continuing improvement in climate information and prediction services, the most urgent need is for an effective interface between providers and users of climate services.

The World Meteorological Organization (WMO) and its partner organizations which are cosponsoring the World Climate Conference-3 propose the establishment of a new Global Framework for Climate Services (GFCS) with the goal to:

> ***"Enable better management of the 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."***

GFCS is proposed as a long-term cooperative arrangement through which countries and various international, regional and national institutions together with stakeholders would work together to achieve the above stated goal. It would have four major components: User Interface Programme, Climate Services Information System, Observation and Monitoring; and Research, Modelling and Prediction. While the first two represent substantially new concepts the last two components are relatively well established but are in need of strengthening.

Given that the needs of the user community are diverse and complex, the User Interface Programme would focus on bridging the gap between the climate information being developed by climate scientists and service providers on one hand and the practical needs of information users in many climate-sensitive sectors of society on the other. It would support and foster necessary institutional partnerships, cross-disciplinary research, innovation, development of decision support tools, capture of knowledge, evaluation and establishment of the best practices, education, capacity-building and service application for decision-making.

The Climate Services Information System would ensure the development of user-oriented climate information and prediction services and the flow of information among climate providers and users from global to local scales. It would be built on established global programmes such as the World Climate Programme and its various elements and would streamline, take advantage of and further develop existing institutions and their infrastructure and mechanisms.

Despite the significant advances made over time in modelling, prediction and Earth system studies, the complexities of the global climate system are not yet fully understood. GFCS would strengthen and refocus the role of the existing Global Climate Observing System (GCOS) and the World Climate Research Programme (WCRP) to support the development of climate predictions and timely information for decision-making. Apart from strengthening the research, modelling and observations infrastructure, including the creation of new and necessary computing facilities, GFCS would strengthen the communication of the resulting climate information. Particular emphasis would be placed on the needs of developing and least developed countries, including Small Island Developing States (SIDS) and other especially vulnerable regions.

Implementing GFCS would require broad collaboration and partnerships. National and local government agencies, civil society, the private sector, as well as universities and research institutions, would all need to contribute to the success of GFCS, supported by the entire United Nations System, including key technical support from existing programmes at the World Meteorological Organization, the United Nations Education, Scientific and Cultural Organization (UNESCO) and other organizations contributing to the 'Climate Knowledgebase'. It would contribute to the United Nations Framework Convention on Climate Change (UNFCCC), the Bali Action Plan, especially the Nairobi Work Programme, and is expected to feed into the negotiation process at the Fifteenth Conference of Parties (COP-15) meeting in Copenhagen in December 2009 as a possible mechanism for building the individual and collective capacities of nations to adapt to climate change.

Financial support for GFCS implementation within a stipulated time frame would need to be established through a range of mechanisms. The expectation is that specific commitments and support from developing as well as developed countries would be required to maintain appropriate national and regional institutions. Resources would be required to build capacity in the countries, particularly the Least Developed Countries (LDCs), Small Island Developing States (SIDS) and others.

Upon the endorsement of GFCS concept by the High-Level Declaration of WCC-3, it is proposed that a task force of independent advisers with due consideration to expertise, geographical and gender balance, supported by a broad-based group of experts, would further develop the Framework in wide consultation with all relevant partners within twelve months following WCC-3. Within the same timeframe, it would develop a GFCS Implementation Plan giving measurable indicators and a timeline for the implementation of the Framework and advise the UN system, governments and other relevant organizations on the next steps.

By strengthening the development, provision and application of climate services, GFCS would support poverty alleviation and disaster risk management and help to achieve internationally agreed objectives, including the Millennium Development Goals. Enhanced climate services would empower communities everywhere to manage and prepare for the ongoing and emerging climate risks and opportunities.

Global Framework for Climate Services

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The climate challenge is enormous and requires a comprehensive and coordinated response from the world community. In the tradition of the earlier two World Climate Conferences, the World Climate Conference-3 (WCC-3), which is organized by WMO and its partners, envisions to establish a mechanism to provide "better climate information for a better future". This Concept Note has been developed to serve as a basis for the possible outcome of WCC-3, under the guidance of the High-level Sub-committee of WCC-3 International Organizing Committee (WIOC) and was accepted by WIOC at its third meeting in March 2009 in Bonn. Subsequently the Concept Note has been modified on the basis of inputs from the countries and deliberations during six consultation meetings with the representatives of the Missions in Geneva, organised between April and August 2009. It will serve as the core concept which would be further shaped and built upon, after WCC-3, by a high-level task force in consultation with , countries, major partners, particularly the UN System agencies and other international institutions, in order to make the Framework inclusive.

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1. BACKGROUND

1.1 Introduction

1. Climate change poses one of the greatest challenges facing the human society in contemporary times. Unequivocal and unyielding climatic trends overlaid by increasing climate variability are already critically impacting socio-economic development and the environment. The sharp rise in economic, social and environmental damage in recent decades due to weather and climate extremes is, in part, a testimony to our lack of understanding and our current inability to prepare for adaptation to climate change, including the associated extremes. The way we are able to adapt, or not, to changing or extreme weather and climate conditions, affects the sustainability of our human and societal development.

2. From global to local levels, public and private sector institutions are seeking the tools and the knowledge for climate risk management. Many of the world's leading development institutions are reviewing their programmes from the perspective of climate-related risk assessment and climate risk management. Similarly, national governments and decision/policy-makers at regional and local levels are asking how they can better manage climate-related risks and opportunities. Demand for useful knowledge and information is increasing.

3. **Managing weather- and climate-sensitive enterprises is enhanced through access to critical climate information from the past and the present, and through anticipation of future climate**. Integration of climate information into decision-making in all sectors of society would foster more effective climate risk management strategies in support of the achievement of economic and development objectives, including the Millennium Development Goals. A good deal of relevant information is now available, particularly at the global scale. In addition, climate monitoring information and global-scale seasonal-to-interannual climate forecasts are produced at several centres. The knowledge

and tools thus available need to be adapted, improved and made available at the regional to local scale to optimize available options for climate change adaptation, disaster risk reduction, development and sustainability.

4. **The ability to predict changes in the climate on the time scale of a few years to several decades would have a profound effect on how we manage our lives.** Scientific advances in seasonal to multi-decadal prediction, increasing political sensitivity and the awareness of a wide range of user communities of their vulnerability to climate variability and change make it essential to strengthen the provision of pertinent, tailored climate information to all user communities. The challenge with regard to the provision of adequate and timely climate information and its appropriate use is twofold:

(1) Developing a system for production and delivery of climate information, spanning global to local scales;

(2) Ensuring an effective uptake of the information by decision-makers in different sectors.

5. To meet this twin challenge, there is an urgent need for a global framework embracing observation, research, operational climate information generation, and user interaction mechanisms to improve the content and utility of the information (Figure 1).

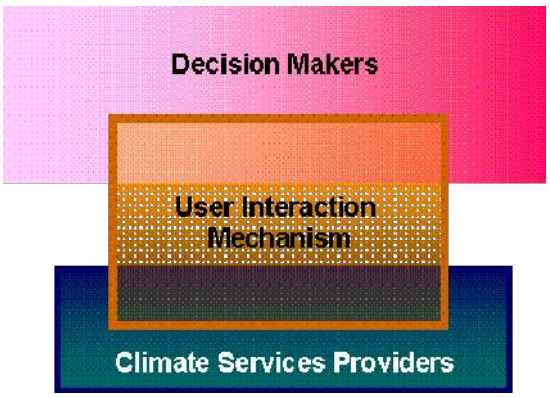

Figure 1: Bridging the gap between providers and users of climate information

1.2 Overview and context

6. Technological progress and international collaboration are sweeping across the field of climate science**. As understanding of the climate system grows and society becomes more aware of the potential opportunities offered by this knowledge, demand is developing for new and better climate services.** The World Climate Conference-3 (WCC-3), with the theme "climate prediction and information for decision-making", which is being organized by the World Meteorological Organization (WMO) in collaboration with other UN system agencies and partners, is designed to respond to the growing climate information needs of users and sectors worldwide.

7. GFCS is proposed as a long-term cooperative arrangement through which Member countries and various international, regional and national institutions together with stakeholders would work together to achieve the above stated goal. It would have four major components: User Interface Programme (UIP), Climate Services Information System (CSIS), Observation and Monitoring; and Research, Modelling and Prediction. The later two, the focus of the first and second World Climate Conferences (1979 and 1990, respectively), are reasonably well-developed components although they still require continued commitment and strengthening.

8. To meet the challenges of provision of adequate and timely climate information and its appropriate use, a major thrust is needed to develop a comprehensive and systematic approach. Two new components of GFCS, namely the UIP and CSIS, together are expected to constitute a World Climate Services System (WCSS) – an international framework for service provision and service application with the primary focus on the interface between service providers and users. This note will therefore describe in detail the UIP that would underpin the application of sector/user-oriented climate information products, and the CSIS, that would strengthen and build linkages between global, regional, national and local climate service production and provision on an operational basis in an integrated manner. Successful implementation of WCSS would require global partnerships, cooperation, commitment and coordination to develop and sustain climate services worldwide.

9. **The Framework addresses the core objective of WCC-3, namely, to 'accelerate global action to address climate-related risks** that threaten the well-being of society and to capitalize on associated opportunities in the context of achieving sustainable socioeconomic growth, especially in developing and least developed countries'. GFCS would:

- Provide a cooperative framework for nations, as well as organizations, to meet the needs of end users;
- Enable users to benefit from improved climate prediction and information services;
- Mobilize climate science globally to advance the skills of seasonal-to-interannual and multi-decadal climate predictions to generate and provide climate information on an operational basis;
- Ensure an ongoing assessment of the current state of knowledge and adaptive capacity across communities;
- Foster principles and mechanisms for sharing new advances in science and information through a cooperative global infrastructure.

10. **The Framework would bridge the information gap between the IPCC assessments and the practical climate risk reduction and adaptation needs of users.** It would contribute to the various Multi-lateral Environment Agreements (MEAs) including United Nations Framework Convention on Climate Change (UNFCCC); the Nairobi Work Programme (NWP) on Impacts, Vulnerability and Adaptation to Climate Change; the Hyogo Framework for Action on Disaster Risk Reduction; and the achievement of the United Nations Millennium Development Goals to eradicate extreme poverty and hunger and improve child and maternal health. It would fulfil the 'Climate Knowledge' objectives of UN coordinated action to 'deliver as one' on climate change (see also item 2.3). Participants at the Fifteenth session of the Conference of Parties to the UNFCCC (COP 15), to be held in Copenhagen, Denmark, in December 2009, will be informed of GFCS. Subsequent to endorsement through WCC-3, **the concept of GFCS would be developed into a GFCS Implementation Plan with timeframes and projected funding requirements, by a high level taskforce in consultation with member countries, UN Agencies and relevant partners**. Roles and responsibilities of all partners would be clearly identified therein.

2. BUILDING ON EXISTING FOUNDATIONS

11. The quest to detect and qualify the ongoing changes in the climate has expanded in the past few decades. However, the understanding of the Earth's climate system is built on scientific knowledge accumulated over the centuries. Given that the hypotheses in Earth science cannot be tested through physical experimentation, a combination of observations and models are used extensively. Scientific observations of the climate started in the later half of the nineteenth century and have been coordinated through the International Meteorological Organization (1873) and its

successor, the WMO. The National Hydrological and Meteorological Services (NMHSs) of its 188 Member countries have established extensive hydro-meteorological observation networks. In recent years, the Global Climate Observing System (GCOS), and recently the Group of Earth Observations (GEO) have further consolidated these gains. Supported by such observation, over the years, the World Climate Research Programme (WCRP), along with the International Geosphere Biosphere Program (IGBP) and other research initiatives, has furthered understanding of the Earth system. GFCS would build on these and other existing mechanisms and institutions developed over the years, in order to generate climate information and services. Some of these mechanisms are described briefly in this section.

2.1 Assessment of knowledge of climate change by the Intergovernmental Panel on Climate Change

12. IPCC, established jointly by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), concluded in its Fourth Assessment Report (AR 4) that warming of the climate system is unequivocal. The invaluable work of the World Climate Research Programme (WCRP), together with the International Geosphere and Biosphere (IGBP) on Earth system behaviour, forms an integral part of IPCC assessments. The research coordinated by the International Human Dimension Programme (IHDP) on Global Environment Change has further helped IPCC to assess impacts and vulnerability to climate change.

13. There is a clear scientific consensus that without mitigation, the increase in atmospheric greenhouse gas concentrations will lead to a projected climate change scenario that could place unprecedented stresses on natural and social systems. Scientific evidence also indicates that, even if the anthropogenic influences are capped or stabilized expeditiously, further warming is likely to take place in the near term due to slow responses in the climate processes.

> Climate knowledge is the foundation for the development of an effective response to the climate change challenge. The UN System plays a central role in this area, bringing together global resources for observation and analysis of climate change trends. It is committed to reinforcing its efforts to provide sound and unbiased scientific information and climate services to enable evidence-based policy and decision-making at all levels.
>
> *From 'Acting on Climate Change: The UN System Delivering as One*
>
> *United Nations Chief Executives Board for Coordination at COP 14, Poznan, Poland, 2008*

14. This evidence makes it imperative for society to arm itself with appropriate adjustment measures to fight the inevitable increase in climate variability. As such, adaptation and mitigation are both pivotal in determining the future social, environmental and economic well-being of the human society.

2.2 The Bali Action Plan and Hyogo Framework for Action on Disaster Risk Reduction

15. To meet the growing challenges of climate change, enhanced action on adaptation through international cooperation has been recognized by the UNFCCC's COP-13 (2007) as one of the five building blocks of the Bali Action Plan. It includes efforts geared to the integration of adaptation actions into sectoral and national planning, disaster risk management and reduction strategies, and ways to facilitate climate-resilient development and reduce vulnerability. In addition, the Bali Action Plan calls for enhanced action on mitigation of climate change, the development and transfer of technology, the provision of financial resources and a shared vision for long-term cooperative action.

16. The Hyogo Framework for Action (2005-2015): Building the Resilience of Nations and Communities to Disasters, adopted at the 2005 World Conference on Disaster Reduction, calls for increased engagement of all stakeholders, particularly the communities, for building awareness and taking preventive and preparedness measures for risk management. **Successful Climate Risk Management (CRM) requires understanding the sensitivity to climate of the various users, identification of their requirements for climate information and reliable provision of this information, effective two-way communication, decision support tools, and appropriate policy frameworks for action.** Tailored, timely, clear and useful climate predictions, from seasonal to decadal scales, are necessary to fulfil the goals and objectives of the Hyogo Framework. At the same time, **climate information plays a crucial role in national development planning, for management of climate opportunities and risks and for mitigation and adaptation.**

17. Decision-makers from the policy level to the individual level need objective and reliable sources of information about variations and changes in the climate system, including their causal mechanisms and potential environmental and socio-economic consequences. As a result of recent advances in the development of climate information from a science-based perspective, coupled with increased awareness within climate-sensitive sectors of their vulnerability, the time is ripe to move from crisis management to risk management, in an effort to enhance socio-economic benefits. Underpinning CRM must be the climate and applied climate research, climate knowledge base, and the socio-economic knowledge base for fully understanding the climate system, climate impacts and societal vulnerability.

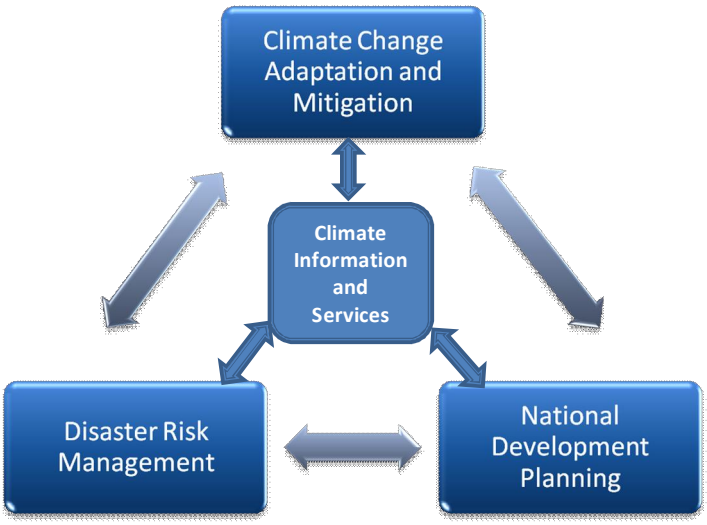

Figure 2 : Role of climate information for sustainable development

2.3 The United Nations: Delivering as One

18. In response to the Bali Action Plan, a UN System-wide coordination of climate activities has been launched by UN Secretary General to address the global response to climate change. The initiative further notes that **building the individual and collective capacity of countries to monitor climate change, enhance climate science and services and utilize climate predictions, is crucial for effective adaptation and mitigation strategies.** Recognizing that knowledge is the foundation for the development of an effective response to the climate change challenge, the United Nations Chief Executives Board for Coordination (CEB) has identified a cross-cutting area of activities – climate

knowledge: science, assessment, monitoring and early warning – and has tasked WMO and the United Nations Educational, Scientific and Cultural Organization (UNESCO) with coordinating activities. As a joint effort of all United Nations agencies, GFCS would form the nucleus of the climate knowledge base.

2.4 Building blocks for service development and delivery

19. Some of the essential building blocks for development and delivery of climate information and services have been put in place and tested on a pilot scale. The World Climate Programme, particularly through the Climate Information and Prediction Services (CLIPS) project, has demonstrated the value of climate information and prediction services and facilitated efforts to build capability to predict climate on monthly, seasonal and interannual timescales by exploiting existing skills. In the past few years, WMO, through its Members, has designated Global Producing Centres of Long-range Forecasts (GPCs). At the same time, efforts to establish a worldwide network of Regional Climate Centres (RCCs) to provide real-time inputs to NMHSs with a view to generating climate information at the national level, on an operational basis are in the early stages.

20. Regional Climate Outlook Forums (RCOFs) are operational in several parts of the world with an overarching responsibility to produce and disseminate regional assessments of the state of the regional climate for the upcoming season. However, many more such forums need to be organised in other climatologically homogenous regions and their sustainability ensured. Built into the RCOF process is a regional networking of the climate service providers and user-sector representatives (including media), within which users can interact with climate experts and discuss technical information and products (analyses, forecasts, probabilities, etc.) with information providers.

21. The NMHSs from the 188 countries have over the years developed mechanisms to consistently produce and deliver weather services, which have improved with time. Some of the NMHSs, in collaboration with other national agencies, also provide climate services. Many NMHSs, once they have seen the advantages of RCOFs, have further instituted national Climate Outlook Forums (COFs) to act as an interface with national users. With climate research entering the seamless prediction mode, the NMHSs would form the core network underpinning GFCS, particularly as far as the provision of climate services is concerned.

3. THE GLOBAL FRAMEWORK FOR CLIMATE SERVICES

22. Decision-makers need objective information about past, current and projected states of the climate for managing near-term opportunities and risks, their impacts on various development sectors, and for planning and implementing coping strategies to deal with the potential environmental and socio-economic consequences of a changing climate. Given that climate variability and change, and human and environmental vulnerability to these, differ from one region to another**, it is increasingly clear that regionally and locally specific information on climate must be available to users in order to support their efforts to make effective decisions related to development and adaptation and for climate risk management**.

23. To enable users to develop "proactive" strategies for climate risk management, sector planning and adaptation measures, the requirements of users in climate-sensitive sectors must be taken into account in the generation and delivery of climate information. The basic scientific and technical climate information must also be turned into user-focused information to support climate-sensitive decisions. Easy access, consistency and pertinence of the information

to users' needs are important in ensuring that information is integrated into decision-making process. Development and delivery of the associated climate information and products to users need to be strengthened, expanded and coordinated.

24. From section 2 above, it is apparent that significant steps have been taken over the years to set up the infrastructure, programmes and partnerships needed at global, regional and national levels for provision of climate information. **Implementation of the Global Framework proposed in this Note would further consolidate, improve, evolve and expand coverage of these global, regional and national elements**.

3.1 Goal and objectives

25. In order to address the need for improved climate information and to provide an effective interface between scientists, service providers and decision-makers, a substantive outcome emerging out of WCC-3 is the development of a new Global Framework for Climate Services (GFCS) with the goal to:

> ***"Enable better management of the 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."***

26. GFCS will strengthen the production, availability, delivery and application of science-based climate prediction and services in the timeframe from months to several decades through provision of an effective interface between climate service providers and users and would undertake to:

- Enhance understanding of and responding to the climate risks and opportunities associated with climate variability and change;
- Improve climate information for the development of natural resources, protection of lives, livelihoods and property;
- Provide user-defined climate and climate-relevant information at global, regional, national, local and sectoral levels in a timely, understandable and easily accessible manner;
- Promote the confident and frequent use of climate and climate-relevant information for economic efficiency, social well-being and development of policies for sustainable development.

3.2 GFCS components

27. As a framework of cooperation, out of the four main components of the proposed GFCS, the new components constituting the WCSS, namely the UIP and CSIS described in detail in the following sections, would rely on the continued and still-evolving components for research and observation. Close interaction among these four components is essential to ensure that the Framework functions effectively and efficiently.

3.2.1 The User Interface Programme (UIP)

28. It is recognized that few governments have effective climate services that meet national needs and demands. Stakeholder communities engaged in development, policy and planning and operational decision-making need to factor climate information but are not generally capable of assimilating available information. They worry increasingly about climate risk but remain largely at a loss as to what to do about it in practice. Fundamentally, there is a gap in engagement and communication between service providers and service application.

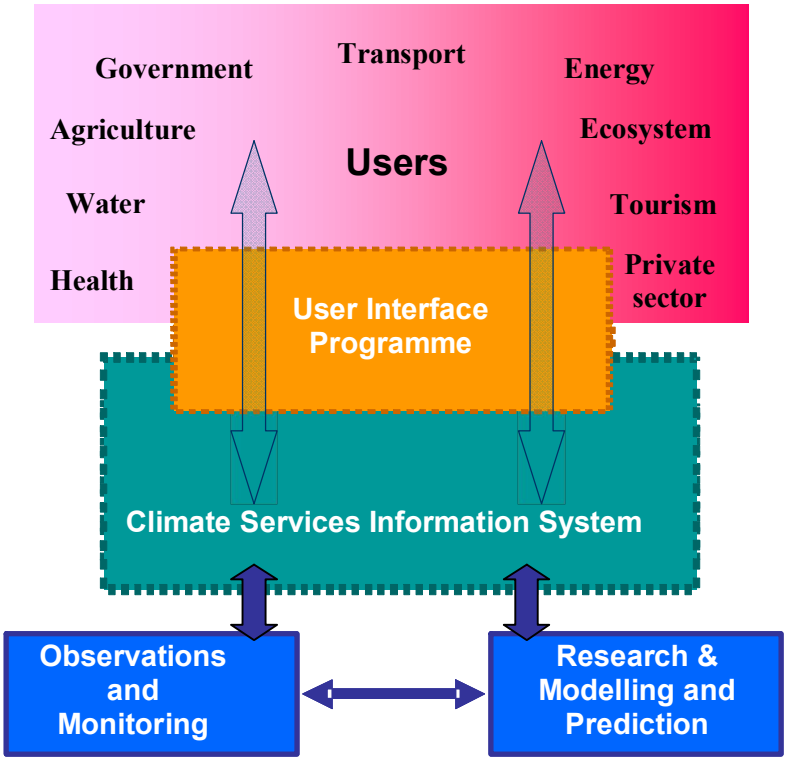

Figure 3: Components of the Global Framework for Climate Services

29. **Central to the development of user-specific climate information is the recognition that the needs of the user community are diverse and complex.** Climate research and services communities are developing knowledge and related information products from a disciplinary research perspective, largely uninformed about stakeholder needs. As a result, research continues but its achievements are not adequately translated into actionable outcomes. Providing useful and targeted climate information requires a better grasp of decision-making processes. Understanding the specific information requirements of the different users requires interdisciplinary research and closer interaction of climate scientists with experts from other sectors and disciplines.

30. The UIP, a GFCS component aimed at bridging the gap between climate services providers and decision-makers, would:

- Promote, facilitate, coordinate and conduct focused interdisciplinary research and development needed to understand the sensitivity of activities in vulnerable socio-economic sectors to climate variability and change;
- Identify user requirements for climate information, and prioritize these for future development work;
- Capture and demonstrate knowledge, share and disseminate the utility of research in practical settings;
- Facilitate user uptake and use of climate information, and continually provide user feedback to the system in order to drive its growth and improvement;
- Build capacity at various levels in the uptake of climate knowledge and information.

31. UIP would develop **user interaction and application mechanisms at various levels:** global, essentially addressing applied research requirements and feedbacks; regional, addressing the specific requirements of products according to the regional economic, climatic and physical characteristics; and national, addressing sector-specific and user-specific needs according to national and local conditions. UIP would require mobilizing existing institutions and networks engaged with various user sectors and appropriately reorienting them to fulfil the above objectives.

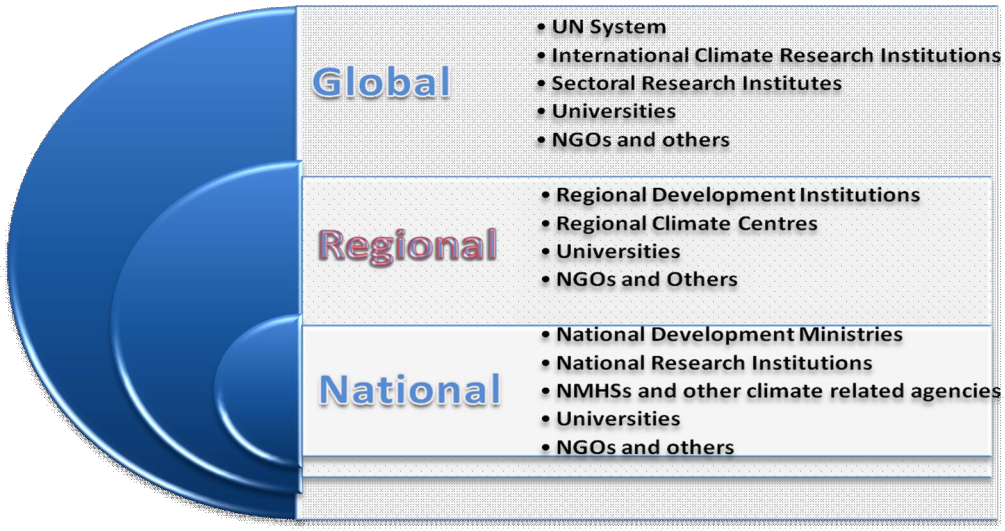

Figure 4: Players for user interaction at different levels.

32. **While some of the mechanisms, particularly at regional and national level, do exist, they need to be strengthened and mainstreamed into decision-making processes.** Other mechanisms, particularly at the regional and global levels, need to be developed. Some of the players whose role would be critical in developing service applications and user interaction are shown in Fig. 4. The GFCS Implementation Plan (Para 10) would identify and set up mechanisms at each level according to the sectors they target or the specific requirements and situation in the region.

33. To help user sectors shift from a "reactive" to a "proactive" approach in climate risk management, there is a need at the **global level** for enhanced cooperation within research networks to coordinate applied climate research and to develop applications and products. Such research would require an interdisciplinary approach and close user interaction. UIP would set up an appropriate mechanism for applied research and applications. For logistical purposes, the programme might have to be subdivided into various sectors.

34. The role of development agencies such as UNDP, the World Bank and other bilateral and multilateral development and financial agencies; climate-related international research institutions, global climate centres; development, aid and emergency response agencies; universities; sectoral research institutions; and NGOs would be crucial in UIP. UN agencies that support Members in their sectoral development efforts (e.g. WHO and FAO) would play a key role in their respective mandated areas. Close collaboration would be required by all entities participating in the Group on Earth Observations (GEO) initiatives, particularly in areas relevant to user engagement.

35. At the **regional level**, UIP would depend on mechanisms carved out on the basis of socio-economic, physical and climatic conditions. These would consist of regional entities, supported by global entities where required, that would represent the regional inter-governmental mechanisms, sectoral development and financial agencies, aid and emergency response agencies, research institutions, regional offices of UN agencies, universities and regional climate centres or other regional entities providing quality regional climate information. Particularly in the water sector, regional river basin authorities would play an important role. RCOF mechanisms, wherever they exist, would serve as an excellent starting point,. Climate outlook forums, driven by the sectors themselves, such as hydrological outlook forums and malaria outlook forums that have been launched and proven their worth in some regions, would be useful. Regional climate change adaptation centres, wherever they exist, would form an important link in applications of climate information.

36. At the **national level,** particularly in many developed countries, institutions that support application of climate information in various sectors do exist. In other countries, the NMHSs and other climate information provider(s), sectoral agencies, national sectoral ministries, relevant research institutions, NGOs and universities come together under the National Communication Forums (as required under UNFCCC) and interact for better adaptation practices. COF processes, wherever they exist, and national User Forums, such as farmers' forums, represent good starting points. These mechanisms need to be sustained and established where they do not exist. These mechanisms would have to be strengthened through regional, multilateral and bilateral cooperation.

3.2.2 The Climate Services Information System (CSIS)

37. **Given that climate processes are global in character and operate on a wide range of space/time scales, the flow of information from global to local scales is essential and must be ensured.** For an effective delivery of climate information, it is essential to put in place appropriate institutional mechanisms to generate, exchange and disseminate quality information at global, regional and national levels on an operational basis. All elements of development and dissemination of climate information must be provided for and improved. Implementation of climate watches systems as well as climate predictions provide a variety of information, products and services. For example, predicting the behaviour of El Niño Southern Oscillation (ENSO) related phenomena over the months and years ahead offers the best prospects of seasonal forecasting for many parts of the world.

38. Under the proposed Framework, CSIS provides a coordinated approach to meet the operational requirements of climate information. CSIS would depend on a network of global, regional and national institutions that develop and provide the climate information. **It would take advantage of and further develop existing infrastructure and mechanisms developed over the years.** Accordingly, networks of global, regional and national entities, including GPCs, RCCs and national climate centres, would serve as key elements of CSIS.

National Climate Centres

39. National Climate Centres (NCCs) would be at the forefront of the CSIS information development, dissemination and application cycle. It is recognized that at the national level, climate activities can be shared among a range of mandated agencies including governmental and non-governmental organizations, universities and national research institutes. However, given their experience in delivering weather information and the existing facilities, the National

Meteorological and Hydrological Services (NMHSs) would form the nucleus for performing a number of functions in support of the generation and delivery of climate information in most of the countries. They would:

- Provide links to the regional and global centres (e.g., GPCs, RCCs);
- Exchange climate data and operational products with regional and global centres;
- Downscale global and regional climate information, including diagnostic (present and past) and prognostic (future) information at various time scales;
- Monitor, conduct climate watch and issue weather warnings and climate advisories in support of national early warning systems and disaster risk reduction activities and programmes;
- Develop climate services at the national level for various sectors.

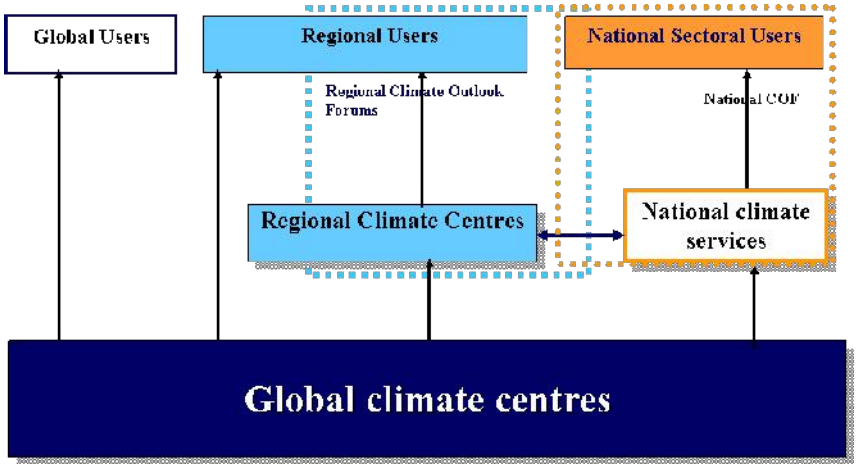

Figure 5: Elements of the Climate Services Information System

Regional Climate Centres

40. Regional Climate Centres (RCCs) are regional institutions with the capacity and mandate to develop high-quality regional-scale climate products using global products and incorporating regional information. RCCs would, with the new knowledge and tools developed through applied climate research, generate regional- and subregional-scale tailored products. RCCs would provide online access to their products/services to national climate centres and to other regional users. Typically, RCCs would:

- Downscale, interpret and assess relevant prediction products from global centres;
- Monitor regional climate variability and extremes;
- Implement and conduct Climate Watches;
- Develop quality-controlled regional climate datasets;
- Share regional and subregional products and information;
- Downscale climate change scenarios.

Global centres

41. At the global level, the network would include the Global Producing Centres of Long-range Forecasts (GPCs), the World Data Centres (WDCs) and other such institutions providing climate related information at global scale (collectively referred to as global climate centres; see Figure 5). GPCs are operational centres producing long-range forecasts of global large-scale fields of temperature, precipitation and other major climate variables. At a minimum, GPCs are committed to providing calibrated probability information for land surface air temperature, sea surface temperature (SST) and precipitation along with their standard verification statistics. In addition, they could provide calibrated outputs from ensemble prediction systems showing the mean and spread of the distribution for some selected surface and upper-air parameters. Some GPCs are likely to extend their capability from seasonal to longer timescales.

42. In addition, there are a number of data centres offering global/international coverage for specialized data, such as meteorology, climate, oceanography, radiation, remote sensing, atmospheric chemistry and environment. These datasets cover land, sea, surface and upper air domains. Reanalysis of historical climate data using a constant state-of-the-art assimilation techniques and model has helped enormously in making the historical record more homogeneous and useful for various uses. Some of the data centres generate and archive the results of reanalysis. These data centres would form an integral part of the network.

43. CSIS would place high priority on developing climate information addressing sector-specific requirements and on increasing users' capacity to understand and apply such information in their decision-making processes. Within the Framework, in close collaboration with UIP, **it is proposed to work through an expanded partnership network and extend the RCOF process to all vulnerable regions of the world.** The Framework would facilitate the efforts of countries to ensure sustainability for RCOF and the national COF activities, which also serve as an essential user interaction mechanism (see Section 3.2.1).

3.2.3 Research, modelling and prediction

44. The twentieth century has witnessed remarkable progress as far as understanding the climate system is concerned. The World Climate Research Programme (WCRP), jointly sponsored by WMO, the International Council for Science (ICSU) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO, provides international facilitation and coordination in climate research and has contributed invaluably to climate science, and directly to the IPCC assessment process.

45. **Despite the significant advances made over time in modelling, prediction, projections and Earth system sciences, the complexities of climate system processes and their interactions have not yet been fully unravelled.** Current climate models are known to have characteristic limitations and are subject to a range of biases and errors. As pointed out in the Fourth Assessment Report of IPCC, there is a need to identify and understand the important processes that govern climate systems and how they interact with broader societal issues. Increasing skills in climate prediction (from seasonal to decadal) and practising climate modelling and estimating the uncertainties of climate predictions and projections at both the global and regional levels call for extensive scientific research. It would require better representation of Earth system processes through integrated approaches by including greater biological and chemical details and incorporating observations in a coordinated fashion in order to make better estimates of model-based certainties and uncertainties.

46. Society's need for timely, relevant and authoritative information on climate requires increased efforts in the field of climate research, including advanced computational modelling at high spatial resolutions to capture the regional aspects of climate variations and ensure realistic representations of the complexity of crucial climate processes. Necessary scientific advancements encompass the quantification of uncertainties in a probabilistic manner, including recognition of the high-impact end of distributions; integrated space-based and *in situ* observational systems that accurately monitor key climate variables, span the globe, and are sustained over decades; capacity for gathering, processing and sharing observational data for model evaluation and initialization; development of capabilities for synthesizing and interpreting the model and observational results; streamlined transition to an operational mode, including the generation of climate products and services; and resources and skills to synthesize the information and meet user needs for decision-making at the global, regional and local levels. Given that climate-related risks are likely to increase in magnitude and frequency in future, particular and urgent research foci should be to improve monitoring of such extremes and refine models for their prediction and projection.

47. At this time, the ability of science to provide robust estimates of climate-related risks to society shows increasing potential at global level. At the regional and local level, however, it is constrained by technical and capacity limitations. Expanding studies of global climate variability and changing to applications at the regional level have tremendous ramifications for present and future climate models. To meet the needs of decision-makers for adaptation to climate variability and change, a number of existing gaps must be addressed.

48. A new level of commitment is needed to reinforce the international, regional and national cooperation required to strengthen climate research at existing and newer institutions, in order to:

(i) Develop improved methodologies for the assessment of climate impacts on natural and human systems;

(ii) Characterize and model climate risk on various time and space scales relevant to decision-making and refine climate prediction skills;

(iii) Enhance spatial resolution of climate predictions, including improvements in downscaling and better regional climate models;

(iv) Improve climate models to represent the realism of complex Earth system processes and their interactions in the coupled system;

(v) Develop a better understanding of the linkages between climatic regimes and the severity and frequency of extreme events;

(vi) Enable national centres to accelerate progress in improving operational climate predictions; and

(vii) Streamline the linkages between research and operational service providers.

49. It must be recognized that climate prediction is among the most computationally demanding problems in science. No single nation has the capabilities and necessary scientific expertise to address the problem. A concerted international effort is called for development of integrated Earth system models and numerical experimentation. This would require a number of facilities with adequate scientific staff and high-speed computational infrastructure (climate prediction being one of the most computationally challenging areas of research in science), and sustained high-quality observation, for developing climate information products and services underpinned by scientific knowledge. Successful

climate and Earth system modelling requires a continuous infusion of human scientific talent via appropriate training and capacity-building, especially through young scientists and, importantly, in the developing countries. This would help build the essential knowledge base, tools, models and methodologies for the development of sector-specific climate information for decision-making, especially in the developing countries.

3.2.4 Observation and monitoring

50. The systematic gathering of basic climate and environmental and marine data is vital to the understanding of past and current climate variability and change. The National Meteorological and Hydrological Services (NMHSs) around the world, in cooperation with other national, regional, and global partners, undertake climate-related observation that underpins the analyses, assessments, predictions and other information critical to decision-making for adaptation.

51. The Global Climate Observing System (GCOS) established in 1990 as a joint initiative of WMO, the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the International Council for Science (ICSU) and UNEP, has further raised awareness among all nations participating in the United Nations Framework Convention on Climate Change (UNFCCC) of the importance of climate observation. Through a partnership among a number of players, including NMHSs, GCOS promotes observation of essential climate variables (ECVs). It has developed important principles to guide climate observation and has identified those variables that must be observed in order to better understand climate with its variations and changes. In conjunction with the World Weather Watch, the Global Observing System (GOS), the Global Atmosphere Watch (GAW), the Global Ocean Observing System (GOOS), the Global Terrestrial Observing System (GTOS), and as a contributor to the Global Earth Observation System of Systems (GEOSS), GCOS addresses the requirements of various areas of societal benefit to meet their climate-related observation needs.

52. Some observation networks have been developed through research initiatives. Over time, they have become quasi-operational and have been instrumental in advancing climate prediction and analysis. These networks need to be supported and should, where possible, be converted into operational observation programmes with sustained funding.

53. While there have been great advances in technology supporting global climate observation, the task of defining observation requirements is still evolving, especially when user needs are to be addressed. Another major challenge in monitoring the climate system and in improving understanding is developing and maintaining observation programmes, particularly in remote regions of the world. Further, many developing countries and economies in transition have great difficulty in implementing and sustaining even the most basic observation systems. As a result, spatial coverage of *in situ* climate observation networks on a global scale has been deteriorating since the 1990s. Such networks are considered inadequate to document regional and local climate change and to provide the necessary quality inputs to regional climate models. Strengthening of these networks and integrated monitoring across multiple disciplines would be required for effective adaptation outcomes.

54. **Activities under the Framework would strengthen the existing mechanism and ensure that the essential climate variables are measured as widely and as effectively as possible around the world**. There is a critical and urgent need for governments to provide the required support to NMHSs and other agencies gathering climate-related

data to establish or improve their national observation networks and to enable them to utilize the latest technologies and current scientific knowledge. Developing countries would require assistance in order to do so.

55. In addition to monitoring Essential Climate Variables (ECVs), it would be necessary, especially at the country level, for decision-makers to have access to high-quality socio-economic data, environmental and biodiversity data to conduct impact studies and assess adaptation options. Efforts would be needed to develop collaboration with the groups developing those datasets (for example, the United Nations Economic and Social Council (ECOSOC) and the United Nations Economic Commission for Africa (UNECA), with mechanisms for merging data for joint studies on impacts and vulnerabilities. The Framework would undertake to develop synergies with stakeholders for sectoral, socio-economic and environmental datasets.

56. **For sector-specific information, products and services, all sectors would also have to systematically collect and manage relevant data for their activities.** They would need to identify and evaluate the completeness of and formats for their sector-specific information. These data, where they exist, may require consolidation, development of metadata, and evaluation of how to merge information with climate-related information, on time and space scales. Some datasets are not easily available, and their availability may require high-level government decisions and commitments to changes in policies for data sharing and interoperability.

3.3 Partnerships for implementation of the Framework

57. International cooperation is the only way to produce a coherent response to global climate issues. **How nations participate in international climate activities, and how they design their own national programmes to fit in these efforts, will determine how successfully we face the challenge.** Partnerships would have to be strengthened and new ones developed where necessary, in order to support and sustain the activities under the umbrella of the Framework. While the following paragraphs discuss some of the UN-based partners and their possible roles, broader collaborative arrangements with the other entities, including the private sector, would have to be made while preparing the implementation plan.

> As a unique international mechanism with universal membership that combines convening power, normative work, standard-setting, policy development and operational activities, the UN System in its entirety has embarked on an action-oriented and coordinated effort to support the international community to rise to this challenge.'
>
> *BAN Ki-moon, at the thirteenth meeting of the UNFCCC Conference of the Parties, Bali, Indonesia,2007*

3.3.1 *Building user interaction*

58. User interaction mechanisms at global, regional and national levels would require partnerships among UN agencies, universities, research institutions, NGOs and the private sector. CSAP or UIP establishment would require a network of institutions to work together. Application of climate information to develop decision support tools for water resources, agriculture and the disaster risk reduction communities would necessitate closer collaboration and

cooperation with other UN agencies such as FAO, UNESCO, UN-Water, the Intergovernmental Oceanographic Commission (IOC) and the United Nations International Strategy for Disaster Reduction (ISDR) and with partners from development and humanitarian communities. Similarly, for application to health, energy, tourism, aviation and urban sectors, user interaction to assess their needs and provide feedback on the products and services should essentially be driven by partners such as the World Health Organization (WHO), the UN World Tourism Organization (UNWTO), UN-Energy, UNEP and ICAO. **Such an inclusive and coherent approach would enable the UN system to provide comprehensive support to its Members in meeting the challenges of climate change.**

59. Further, a number of international non-governmental organizations have access to national sectoral development agencies. Partnership with these entities would be beneficial in terms of interacting with sectoral users. For example, NGOs including the World Wide Fund for Nature (WWF), the International Federation of Red Cross and Red Crescent Societies (IFRC), IUCN and ICID would play an important role in addressing user needs.

3.3.2 *Technical partnerships for facilitating implementation*

60. Technical partnerships at various levels exist under various CSIS operational components. For observing the climate system and for transmitting data and information, WMO entities work closely with space agencies, developers and suppliers of observing technologies, communications companies, etc. GCOS and GEO provide the required platform for observation.

61. In conducting Earth system model studies, WCRP would have to develop stronger links with other research coordination mechanisms such as IGBP and IHDP. Existing partnerships between the academic communities, government entities and developers of Earth system climate models need to be strengthened and new ones forged where required. The extraordinary computing infrastructure requirements for climate modelling and prediction could be addressed through strategic partnerships with relevant industries. For applied climate research, public–private partnerships (PPPs) would be useful. The research networks of the World Climate Research Programme (WCRP), the World Weather Research Programme (WWRP) and other research partners, including IGBP and other specialized institutions and universities, would have crucial roles to play in implementing the Framework. Technical partnerships are required for projects to rescue data, create homogeneous databases and develop indices for detection of climate change, and for all manner of training initiatives.

62. A number of institutions designated as GPCs or RCCs would need to collaborate with many regional institutions such as CIIFEN, ACMAD and ICPAC, which in many cases would need to be encouraged, strengthened and supported. Global partnerships among regions are important for sharing knowledge, experiences and techniques. Universities and research institutions and NMHSs would play a crucial role in making the information available at global, regional and national scales.

> 'One of the core responsibilities of each government should be to ensure the access of scientifically credible and adequate information on climate prediction and climate change'.
>
> *WMO Secretary-General Michel Jarraud at UNFCCC COP 14, Poznan, Poland, December 2008*

3.3.3 Communication

63. Adaptation to climate change requires knowledge of climate risks. In most cases, users and decision-makers are either not aware of such risks or have biased information about them. CSAP or UIP, through its **user interaction mechanism, would strive to develop science-based awareness** of such risks and the approaches through which they can be managed. The Framework would identify partners in a variety of media, seek the commitment of new partners in these efforts and ensure that the relationship with existing partners continues to be strong and productive.

64. Strategic collaboration with communications entities and the major media groups would be sought to facilitate public (non-technical) awareness and outreach to climate-sensitive socio-economic communities. At the national level, the **Framework would encourage collaboration with national and local media to bridge the communication gap between climate scientists and other sectors and broaden the scope of adaptation measures.**

3.4 Global Framework governance

65. Any framework involving multiple partners and related but independently-functioning components at multiple levels requires a governance mechanism. The taskforce would develop and propose an action plan for the development and implementation of the Framework, addressing inter alia governance of the Framework, resource implications, a timeline for proposed actions and measurable indicators for success of the implementation of the Framework. The taskforce will submit the findings and proposed next steps for developing and implementing the Framework to the Secretary-General of WMO who shall then provide the report to Governments.

4. CAPACITY-BUILDING

67. The Framework is being built using, wherever possible, the existing elements that are either in place or are in the process of being established. However, it needs to be recognized that the existing elements in themselves would require strengthening. Therefore, establishment of the Framework would require capacity-building through:

1. Infrastructure establishment and/or strengthening;
2. Institutional realignment;
3. Human skills development and training.

68. CSIS establishment would require strengthening the infrastructure of the existing GPCs, supporting the upgrading existing regional climate institutions to serve as RCCs, and reinforcing the NMHSs to take up this additional challenge of providing climate information on a regular basis. Access to the global and regional products would require the NMHSs to have Internet Technology (IT) and telecommunication facilities.

69. **Adequate financial support for maintaining and strengthening the capacity of NMHSs and for establishing and strengthening national, regional and global climate centres would rely on country support, as always.** In other words, countries themselves must accept a share of the challenge of implementing GFCS and strengthening their own capacity. Developed and developing countries alike would be required to commit to providing adequate support to maintain their national observing networks and to establishing and maintaining national and regional

climate institutions. Countries would likely need improvements in capacity to fully contribute to CSIS, some more than others. These improvements would come at a cost.

70. Those countries that are able to help others, particularly the OECD members, could do so through bilateral arrangements and through WMO and other UN initiatives. Wherever possible, existing and proposed projects and climate-related initiatives aimed at building capacity would be harmonized with the activities within the Framework. In order to succeed, the Framework should require that governments give high priority to financing the NMHSs, communications, power and other infrastructure. In addition, countries that support GFCS could exercise an influence over the funding and development agencies they support (e.g. World Bank and others), to give high priority to GFCS implementation and ongoing operation (infrastructure, communications, etc.), in view of the benefits that would follow for society as a whole around the world.

71. **Particular emphasis would be placed on the needs of developing and least developed countries including SIDS, and particularly vulnerable regions** such as Africa, as highlighted by UNFCCC and its Bali Action Plan. The Framework would aim to strengthen the capacity of NMHSs to deliver a complete suite of products to the national sectoral agencies with a view to mainstreaming such climate information into development decision-making.

72. Human skills in accessing global and regional climate products, including downscaled projected climate change scenarios for assessing climate change impacts, would be developed through access to technology and knowledge (manuals, guidance documents, technical papers, workshop, etc.), and through training. Universities within the countries would be encouraged and facilitated to closely collaborate with the NMHSs with a view to achieving this sustainability. The GFCS Implementation Plan would incorporate the training needs to develop capacity at regional and national levels for identifying user requirements for information and training and for information-sharing techniques.

73. Closer collaboration, right from the detailed development of the GFCS Implementation Plan, would be established with implementing and financing agencies such as the World Bank, regional development banks, the European Commission, the United Nations Development Programme (UNDP), the Global Environmental Facility and other bilateral and multilateral development agencies. To ensure the implementation and sustainability of Framework components, collaboration and partnerships would be sought with regional economic groupings, including the United Nations Economic Commission for Africa, ASEAN, the International Group of Research Funding Agencies (IGFA) and other national agencies with funding capacity. Alignment would be sought with other institutional programmes related to climate change, such as the AU-ECA-led ClimDev-Africa.

5. EXPECTATIONS FROM WCC-3

74. **Establishing the Global Framework requires global ownership** and commitment to work together through a time-bound process that should be identified in the Conference Declaration for development of the Framework Implementation Plan.

75. The WCC-3 High-level Segment is expected to endorse the setting up of a taskforce that would develop and propose an action plan for the development and implementation of the Framework.

76. Support from the High-level Segment is sought to:

(i) Establish GFCS with a view to guiding and enhancing the development and provision of user-oriented climate services through global partnerships involving providers of climate services and users of climate information and products;

(ii) Strengthen research geared to serving end users and the development of targeted climate services;

(iii) Strengthen the integration of climate services into decision-making processes from international to regional level as a necessity for adapting to climate change;

(iv) Urge Governments, organizations and institutions, including financial institutions, and the international community to support the Framework.
