WORLD METEOROLOGICAL ORGANIZATION

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GLOBAL FRAMEWORK FOR CLIMATE SERVICES

SUMMARY

DECISIONS / ACTIONS REQUIRED:

The Working Group is invited to note the information contained in the document and provide recommendations/ guidance on:

i) re-adjustment of the various WMO Programmes in light of GFCS
ii) Setting up of Inter-commission Coordination Group on GFCS

REFERENCES:

1. WCC-3 Conference Declaration and its annexed Brief Note
2. Final report of the Inter-governmental Meeting (IGM) (11-12 January 2010)
3. Report of the Extraordinary session of the EC WG-CWE (21-23 October 2009)
4. Report of the meeting of PTC-2010

CONTENT OF DOCUMENT:

APPENDICES:

Appendix 1: Report to the EC WG on WMO Strategic and Operational Planning on Global Framework for Climate Services
Appendix 2: Executive Summary of the Position Paper on Global Framework for Climate Services
Appendix 3: Mapping of WMO Programmes to the GFCS Components

REPORT TO THE EC WORKING GROUP ON WMO STRATEGIC AND OPERATIONAL PLANNING

9. GLOBAL FRAMEWORK FOR CLIMATE SERVICES *(agenda item 9)*

9.1 World Climate Conference -3

9.1.1 At the invitation of the Government of Switzerland, the World Climate Conference-3 (WCC-3) was held in Geneva, Switzerland, from 31 August to 4 September 2009. It was organized by the World Meteorological Organization (WMO), in collaboration with other UN system agencies and partners. Some 2,500 participants from 163 countries and 59 international organizations attended the Conference.

9.1.2 The theme of the Conference was 'Climate Prediction and Information for Decision Making' and its vision was to develop "An international framework for climate services that links science-based climate predictions and information with the management of climate-related risks and opportunities in support of adaptation to climate variability and change in both developed and developing countries".

9.1.3 The Conference recognized that great progress has been made over the past 30 years towards an integrated global approach to the development, implementation, operation and application of climate services in support of a wide range of societal needs in all countries and in all major socio-economic sectors. It particularly recognized the achievements under the World Climate Programme (WCP), including the World Climate Research Programme (WCRP), to put in place a firm basis for the delivery of a wide range of climate services, especially its World Climate Applications and Services Programme (WCASP) and the Climate Information and Prediction Services Project (CLIPS). The participants in the Expert Segment welcomed the extensive preparatory work by WMO and its partner organizations on the design of the proposed Global Framework for Climate Services and the consultations that had already taken place with governments through both technical and diplomatic channels.

9.1.4 Heads of State and Government, along with ministers and other national representatives, and other invited dignitaries noted the findings of the Expert Segment of the Conference and adopted a Conference Declaration.

9.1.5. Through the declaration, the conference decided to establish a Global Framework for Climate Services (GFCS) to strengthen the production, availability, delivery and application of science-based climate prediction and services; requested the Secretary-General of WMO to convene an intergovernmental meeting of Member States of the WMO to approve the terms of reference and to endorse the composition of a task force of high-level, independent advisors for implementing the framework, taking into account the concepts outlined in the Brief Note annexed to the Declaration. The full text of the WCC-3 Conference Declaration can be found at http://www.wmo.int/wcc3/declaration_en.php and its annexed Brief Note at http://www.wmo.int/wcc3/documents/brief_note_en.pdf .

9.2 The Inter-government Meeting for High-level Taskforce on Global Framework for Climate Services

9.2.1 The Intergovernmental Meeting for the High-level Taskforce on the Global Framework for Climate Services was organized by WMO Secretariat at the Geneva International Conference Centre (CICG) from 11 to 12 January 2010, under the chairpersonship of Dr A. I. Bedritsky, President of WMO. The Secretary-General recalled the mandate of the Meeting and emphasized that the objectives of the GFCS, along with its scientific and technical aspects, would be a system to deliver new and highly relevant climate products to the Members.

9.2.2 The Intergovernmental Meeting approved the terms of reference of the High-level Taskforce. It noted that governments and relevant organizations may submit by 15 April 2010 their views to the Taskforce for its consideration. The Intergovernmental Meeting also endorsed the composition of the High-level Taskforce on the Global Framework of Climate Services proposed by the Secretary-General of WMO. For further information, the Group may refer to the final report of the IGM meeting at:
http://www.wmo.int/pages/documents/IGM_HLT_GFCS_Final_report_1061_en.pdf.

9.2.3 The first meeting of the High-Level Taskforce (HLT) of independent advisers for Global Framework for Climate Services was held on 25-26 February 2010, at the WMO Headquarters in Geneva. Eleven out of 14 members of HLT attended the first meeting. Mr Jan Egeland of Norway and Dr. Mahmoud Abu-Zeid of Egypt were selected as co-chairs. Other members of the taskforce are Joaquim Chissano, who served as the second President of Mozambique from 1986 until 2005; Ricardo Lagos, Former President of Chile from 2000 to 2006, and Special Envoy of the United Nations Secretary-General on Climate Change since May 2007; Angus Friday, (Grenada), Eugenia Kalnay (Argentina/USA), Julia Marton-Lefèvre (Hungary/France/USA), Khotso Mokhele (South Africa), Chiaki Mukai (Japan), Cristina Narbona Ruiz (Spain), Rajendra Singh Paroda (India), Qin Dahe (China), Emil Salim (Indonesia); and Fiame Naomi Mata'afa (Samoa).

9.2.4 The High Level Taskforce was appraised of the process through which the HLT was set up and the procedure through which its terms of reference were established. The task force was presented the outcomes of the WCC-3 in terms of the Conference Declaration as an outcome of the High-level Segment, and the Conference Statement as an outcome from the Scientific Segment of WCC-3. The HLT was given a presentation on the status of the climate services and the role played by WMO in it. The WMO Position Paper on Global Framework for Climate Services was informally presented to the HLT.

9.2.5 The Taskforce discussed the brief outline of its proposed report. The HLT decided to have the report in three sections: i) The present status of the climate services, ii) The needs and gaps to meet the objective of the GFCS, and iii) The mechanism to achieve the objective. The HLT proposed that the Section 1 and the elements of Section 2 should be prepared on the basis of consultations with all the stakeholders, the inputs from the Members for which Ministries of Foreign Affairs have already been addressed, and the inputs received in the preparation of the Expert segment of WCC-3 and its outcome. First draft of the Section 1 and elements of Section 2 would be made available to the HLT for its second meeting scheduled around 25-26 May 2010. The draft of Section 2 and elements of Section 3 will be made available to the HLT at its third meeting planned for 2-4 August 2010. The final report of HLT is proposed to be made available by January 2011 well before the next quadrennial World Meteorological Congress in May 2011.

9.2.6 The HLT Secretariat will set up the network of experts for all further consultations starting with those involved in WCC-3 and extending it with the help of other partners such as UN System organizations. A questionnaire is proposed to be developed and sent to all stakeholders to get additional information.

9.3 WMO Position Paper on Global Framework for Climate Services

9.3.1 EC-LXI, while discussing the proposed outcomes of WCC3 had desired that WMO should prepare a Position Paper with the concurrence of EC WG-CWE on how WMO Programmes should become core elements of the GFCS. An extraordinary session of the EC WG-CWE was organized in October 2009 to critically look at the approach being taken in the Position Paper and the commitments that are made therein. After discussions at the Extra-ordinary session of EC-WG-CWE and based on subsequent inputs from the members of EC WG-CWE, the Draft Position Paper (Appendix 2), was finalized.

9.3.2 The Position Paper takes into account the views of WMO Members as presented at the last EC, discussions at the meetings of WCC3 International Organizing Committee, discussions with various experts and missions that took part in meetings related to the preparation of WCC3, and the discussions that took place in the various sessions of the Expert Segment of WCC3 as outlined in the Conference Statement. The paper also brings out the strengths of WMO in taking its designated role in GFCS.

9.3.3 The Position Paper outlines the WMO vision of the Framework and WMO's potential role in its implementation. It describes WMO's ongoing activities related to the climate services, and its future commitments for its successful implementation. These commitments would have to be taken on board while preparing WMO Strategic Plan for the Cg-XVI (already proposed in the Draft under discussions) and programme of work in various Technical Commissions as well as in the future planning processes. The Draft Position Paper was informally shared with the HLT.

9.3.4 Most of the existing WMO Programmes will contribute to the implementation of GFCS to various degrees (Appendix 3). It is expected that in order to implement the GFCS, WMO may have to make certain readjustments to its Programs, structure of its Technical Commissions etc. The reorganization of World Climate Programme is proposed to be discussed at the regular meeting of the EC-WG-CWE on 27th March 2010. The recommendations on reorganization of WCP will be submitted to EC-LXII for consideration and recommendation to Cg-XVI.

9.4 Issues for consideration

9.4.1 An internal coordination mechanism among the Programmes, to ensure involvement of and contribution from all technical commissions and Steering Committees of the co-sponsored Programmes in the implementation of GFCS. This internal coordination mechanism is proposed in the form of an Inter-commission Coordination Group on GFCS (ICG-GFCS), consisting of presidents of all the technical commissions and the Chairs of the Joint Steering Committees of the Co-sponsored Programmes has been proposed at the meeting of PTC-2010. The ICG-GFCS will (i) provide technical coordination in alignment of GFCS with the Strategic Plan for 2012-2015, (ii) provide technical oversight on inter-Programme and inter-commission coordination on various cross-cutting activities required to be undertaken by different technical commissions and (iii) monitor and evaluate implementation of GFCS. The EC-WG-SOP may wish to recommend to the EC-LXII the establishment of the proposed ICG-GFCS.

WORLD METEOROLOGICAL ORGANISATION

Position Paper on Global Framework for Climate Services

EXECUTIVE SUMMARY

The Heads of State and Government, Ministers and Heads of Delegations present at the World Climate Conference-3 (WCC-3), held from 31 August to 4 September 2009 in Geneva, through the Conference declaration, decided to establish a Global Framework for Climate Services (hereafter referred to as "the Framework") to strengthen the production, availability, delivery and application of science based climate monitoring and prediction services. The declaration decided that a taskforce, consisting of high-level independent advisors, would prepare a report, including recommend action on the proposed elements of the Framework, taking into account the concepts outlined in the Brief Note annexed to the Declaration. This position paper outlines the overall vision of the Framework for consideration of the taskforce.

Introduction

1. Adaptation to climate variability and change represents an important challenge for the sustainable development of society. Adaptation, to be effective, requires a policy framework, technology and practices to adjust to expected changes, supported by relevant climate information and tools. The Framework is designed to mainstream climate science into decision making at all levels and help ensure that every country and every climate-sensitive sector of society is well equipped to access and apply the relevant climate information. The overarching goal of the Framework is to:

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

2. Climate services deal with the generation and provision of a wide range of information on past, present and future climate and its impacts on natural and human systems. Also included is the application of that information for decision-making at various levels in society. As understanding of the climate system grows and the society becomes more aware of the potential benefits from use of this knowledge, communities will increasingly expect that these services are: accessible, dependable, usable, credible, authoritative, responsive, flexible, and sustainable.

The concept and components of the Framework

3. Climate information and products are based on sustained, long-term, high quality observations of climate elements over the land and oceans and in the atmosphere; synthesizing these observations; monitoring various processes and understanding them through diagnostics, research and modeling; and making predictions/projections of what to expect in weeks, months, years or decades. Further, the application of climate services must involve close interaction between the providers and the users. As such, the production and application of climate services requires concerted multi-disciplinary efforts.

4. Given the complexity of and requirements for climate services, addressing the immense variety of user needs for climate services is beyond the capacity of any single organization, a small group of organizations or a country. It calls for an unprecedented collaboration among institutions across political, functional, and disciplinary boundaries. The Framework is, therefore, conceived as an integrating set of international arrangements which will be built upon the established global climate observation and research programmes as well as operational structures into an end-to-end product generation, service provision and application system. Many of these elements (systems, programmes, projects, institutions etc.,) are either in place or are in the process of being established. The Framework must be designed to be an effective, efficient and economically viable mechanism for the generation, delivery and application of climate services.

5. Noting that the "Global Framework for Climate Services" will be user need driven, as a process, and the recommendations incorporated in the Conference Statement, it is proposed to have five major

components: (i) Observations; (ii) Climate research, modelling and prediction; (iii) a Climate Services Information System; (iv) a Climate User Interface Programme; and (v) Capacity Building.

Observations

6. Underpinning an effective climate service is the systematic gathering of high quality basic climate and environmental data. Climate and climate related observations are needed for: climate system monitoring; climate change detection and attribution; operational climate prediction on seasonal-to inter annual time scales; research to improve understanding, modeling and prediction of the climate system; assessment of the impacts of, and vulnerability and adaptation to, natural climate variability and human-induced climate change; and applications and services for sustainable economic development. In addition, related systematic environmental and socio-economic data and information are needed to assess human and environmental vulnerabilities and plan actions that must be taken in various development sectors to adapt to climate variability and change.

7. National Meteorological Services (NMSs), for more than 150 years, have built infrastructure for observation on land, at sea and in the air that measure meteorological and some environmental variables. Various agencies are charged with the national implementation of the individual observing networks and systems. These observing networks across a number of observing domains follow procedures and adhere to standards established through intensive work of the WMO Technical Commissions, which now fall under the WMO Quality Management Framework. The current understanding of climate change has been achieved to a large extent through the re-use of this data initially collected for the purposes of weather analysis and forecasting. Satellite observations have supplemented the observations of earth system in the past 50 years.

8. In response to the decisions at the Second World Climate Conference (1990), the Global Climate Observing System (GCOS) was conceived. GCOS, supported by Global Terrestrial Observing System (GTOS) and Global Ocean Observing System (GOOS), has a goal to provide continuous, reliable, comprehensive data and information on the state and behavior of the global climate system. These observing systems are supported by WMO, FAO, UNEP, UNESCO and International Council for Science (ICSU). To ensure the quality and consistency of observations, GCOS has developed a set of Climate Monitoring Principles to guide the collection, archiving and analysis of in-situ and satellite-based climate observations.The Global Earth Observation System of Systems (GEOSS) provides comprehensive, coordinated Earth observations from all platforms.

9. Considering that weather and climate know no political boundaries, it is vital that the meteorological and hydrological data that are fundamental to operationally conduct analysis and diagnostics, and prepare and distribute weather and climate records, warnings, forecasts and outlooks, are quickly and reliably shared around the world.

10. WMO periodically evaluates the requirements for observations for a variety of applications (e.g. weather forecasting, seasonal climate prediction for application in agriculture, aviation, and water management, among others), and to meet IPCC and UNFCCC requirements, through 'Rolling Requirements Reviews'. The GCOS also reports on the progress and the adequacy of the global observing systems for climate in support of the UNFCCC.

11. These reviews have identified a number of critical issues related to the observations such as: spatial and temporal data gaps; absence of organized and standardized socio-economic data gathering mechanism; limited access to some data; non-availability of historical records in digitized form; appropriate processing and archiving systems to handle vast amount of data; and interoperability of data. It is important to reduce these gaps as they adversely impact on the reliability of climate services including monitoring, predictions and projections.

12. Establishing and maintaining operational observing system requires significant human and financial resources. In competition with major societal and economic issues, observing systems often get relatively low priority and funding in national fiscal planning. As a result, observation networks around the world are deteriorating, in both the developed and developing countries. With respect to data access, restrictive data policies and the non availability of these data sets in electronic form prevent the optimal use of the data and information generated by these systems for the benefit of the society.

13. For strengthening existing climate services and developing new ones, it is imperative that these issues are adequately addressed. Strengthening, upgrading and modernizing the observation networks that

NMSs currently use for weather forecasting, to serve the needs of climate services is a high priority. Observational networks established for research, but which have potential ongoing applications in weather and climate services, need to be converted into robust operational observation programmes with sustained funding. It is essential that data are collected to the required standards to meet the purposes for which their use is intended.

14. Collection of environmental, biodiversity as well as socio-economic data, which is largely ad-hoc and not well-organised in most countries, needs to be coordinated. There are a limited number of standards developed so far for observation and archiving of such data. For sector-specific information, products and services, all sectors would also have to systematically collect and manage relevant data for their activities. Barriers to sharing of data among various institutions within the country and with global research community need to be removed.

Climate research, modelling and prediction

15. Climate research, including modeling and prediction aspects, helps the Framework characterize climate variability and change and to generate quantitative climate predictions and climate projections, on a range of time and space scales. The World Climate Research Programme (WCRP), established in 1979 jointly by WMO, the International Council for Science (ICSU), and the Intergovernmental Oceanographic Commission (IOC) of UNESCO as a major component of the World Climate Program (WCP), has helped determine the extent to which climate can be predicted, and the extent of human influence on the climate system. It has successfully laid the science foundation for the climate services of the future. Its current research projects, particularly those pursuing the coupled climate and Earth system models, are poised to push the frontiers of climate predictability further. Climate research has successfully developed policy-relevant future climate scenarios projections for the 21st century that formed a key component of the IPCC process.

16. While climate science has advanced significantly during the past three decades, many scientific challenges still remain. There is an increasing need in society for information about the future state of the climate system in the near term, extending from years to decades, to support development of practical applications and crucial decision making. New focus is required on the development of decadal prediction systems, an area of concerted research still in its infancy. Further, there are many inherent uncertainties in our estimates of the past, present and future behaviour of the climate. Large uncertainties in the climate information, predictions and projections make it difficult for planners in various development sectors to use them confidently in their decision making processes and therefore, have to be reduced to the extent possible.

17. The full understanding of the climate system requires an understanding of all natural processes of the Earth system, along with the climate-relevant socio-economic processes. To meet the expectations of the Framework, there is, therefore, a need for a holistic Earth system approach to observations, monitoring, modeling, analysis and prediction.

18. The potential for climate prediction on longer time scales and with better spatial resolutions is tied to the availability of high-performance computational infrastructure and adequately trained scientific staff. Significant increases in the computing capacity available to the global and regional weather and climate centers is called for in order to accelerate progress in improving predictions. It is widely agreed that more researchers need to be working on the forecast systems to fully exploit the predictability potential available in the climate system, and to address the enormous challenge of understanding the Earth system and its future evolution.

19. Weather research and climate research are closely intertwined; progress in our understanding of the climate processes and their numerical representation is common to both. The models used for weather and climate prediction are essentially based on the same physical principles and formulations, though the way they are deployed is substantially different. Experts advocate adopting a more seamless prediction approach to prediction. Seamless prediction (on timescales from a few hours to centuries) needs to be further developed and extended to aspects across multiple disciplines relevant to climate processes.

20. Availability of highly-skilled human scientific talent, particularly in the developing regions of the world, is critically lacking. There is need to improve skills among scientists to properly interpret research findings and to improve the skills of those who apply this information to national planning initiatives. To address the above-noted needs for climate research, modeling and prediction, to ensure development of the knowledge

base, of reliable high-resolution products and to reduce uncertainties in the present climate information and products will take an unprecedented multinational effort, with significant supercomputing, infrastructural and human resource deployment.

Climate services information system

21. The climate services information system (CSIS) is designed to deliver the climate information that users need for the decisions they have to make. 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 facilitated. For an effective delivery of climate information, an appropriate institutional mechanism is required to generate, exchange and disseminate quality information at global, regional and national levels on an operational basis.

22. CSIS, based on the inputs from the observations and research components, will require physical infrastructure such as computers, institutions, centres; skilled human resources for product development and consultation; and mechanisms for interactions with the users. Many of the elements of what will be the fully operational CSIS already exist in some form, but need to be further developed and standardized.

23. Progress in evolution of climate services was given a systematic direction with the establishment of the World Climate Programme (WCP) in 1979 that laid the foundation for modern climate services. Advances in the provision of climate services have been gradual, useful and timely, but in the last decade the demands for climate information at local level and expectations of better tools for decision making have grown rapidly and continue to outpace capabilities. There are a number of gaps between present capacities and the expectations of the policy makers, planners, operators, nations, communities, and individuals that must be addressed.

24. The CSIS will be based on the three-tiered structure of entities at global, regional and national levels. They include global data centres and global forecast/information producing centres (GPCs), Regional Climate Centres (RCCs) and National Climate Services (NCSs). National Climate Services either within or closely associated with NMSs, mandated by the national governments, would be at the forefront of the CSIS information development, dissemination and application cycle. CSIS will encourage and facilitate the collaboration of NCSs with relevant boundary and specialised sectoral institutions to enable them to work with national agencies, including governmental and non-governmental organizations, universities and national research institutes that are mandated to serve different sectors and at levels of administration. NCSs will get global and regional inputs from the RCCs and GPCs, and will benefit from the consensus development mechanisms of the Climate Outlook Forums (COFs).

25. Climate Outlook Forums (COFs) at regional and national level have shown promising results in user engagement. They have been developed, for the most part, on pilot basis and therefore do not adequately cover all the regions of the world, nor do they adequately cater to the needs of information at local levels and as often as users might need. It is imperative therefore to ensure that the network of these elements is expanded spatially and cover the range of quality products users require, facilitate a common understanding of climate risks and opportunities, provide information on inherent uncertainties, and advice on how the information can be applied for the optimal results.

26. RCCs would need the infrastructure, capacity and mandate to develop high-quality regional-scale climate products using products generated at global scale and incorporating regional information. They will develop, monitor regional climate variability and extremes, conduct climate watches, and downscale prediction and projection products from global centres. RCCs would be expected to develop a broader suite of region-specific products to address regional needs and help NCSs to develop the capacity of downscaling regional products, tailoring them and delivering to the national users. The establishment of RCCs has begun only recently, and will require significant human and financial inputs to accelerate the global implementation.

27. Climate services, therefore, will be strongly rooted in the existing capabilities for the provision of weather services and the years of research, investment, and collaboration among 189 NMHSs. The CSIS will rely on and expand the weather and climate infrastructure developed over time and will strengthen the human expertise needed for its operation. While all WMO NMSs conduct some climate services, especially those related to data, aspects related to prediction, services and user liaison require considerable development. It is essential to devise production systems to meet user needs more explicitly, especially at national and local levels, to provide 'actionable' information. A comprehensive and systematic plan of well

defined actions and appropriate resources would be required to turn the existing disparate elements into a coherent, cohesive, and dynamic functioning system.

28. Flow of information and generation of products and services within the system would require regular feedback from users at various levels, for continual improvement of services. The CSIS will therefore have very close links with the Climate User Interface Programme component of the Framework.

Climate user interface programme

29. The climate user interface programme (CUIP) is aimed at bridging the gap between climate services providers and users, the decision-makers in various sectors and the public at large by providing mechanisms through which the users of climate information can liaise actively with climate service providers and vice versa, with the value of the climate service to the community being judged on its ability to improve decision making.

30. CUIP will coordinate, facilitate and oversee the development of mechanisms at various levels (global to regional, national and local (in close relation with the national government)) in various sectors. It will help: users in expressing their needs; prioritizing these user needs; promoting, facilitating and coordinating focused interdisciplinary (applied climate) research; facilitating communication and use of climate information; capturing and disseminating knowledge in diverse socio-economic settings; and obtaining user feedback in implementation of other three Framework components described above.

31. Central to the development of user-specific climate information is the recognition that the needs of the user community are diverse and complex. At the same time it has to be recognised that 'users' work at various spatial and temporal scales and have common as well as different needs.

32. CUIP is seen as a set of activities, projects and initiatives running across all the components of the Framework but particularly concentrating on the application of the climate information and products in decision making in various sectors and at various levels of the user spectrum. CUIP would need to have its roots down to the national levels. The CUIP initiatives/activities may differ from sector to sector. As such it has to be developed jointly with national, regional and global partners who have direct links and interaction with various sectoral user groups.

33. NCSs would need to establish arrangements with boundary organizations/extension agencies in different sectors, and popularize the concept of National Climate Outlook Forums in close collaboration with sectoral ministries or interest groups. At the regional level, CUIP would depend on mechanisms and partnerships developed on the basis of socio-economic, physical and climatic conditions, supported by global entities where required. Regional entities such as River Basin Organisations and economic groupings, possibly in association with RCOFs, can play a crucial role in facilitating such mechanisms. At the global level, CUIP would enhance cooperation within research networks belonging to different disciplines, coordinate applied climate research, and encourage interdisciplinary research to develop applications and tools. It will largely be lead by various UN Agencies and other Inter-governmental organisations and non-governmental organisations.

34. Effective communication of climate information is vital to ensure its appropriate application. The communication strategy under the Framework has to be based on a broad range of contemporary media and user-friendly content. These communication means would have to be in-built into various elements of the Framework to build advocacy, generate awareness, interact and encourage involvement.

Capacity building

35. Implementation of the Framework will require capacity-building through: strengthening and aligning institutional arrangements; strengthening of existing, and where required, establishment of new infrastructure and systems; and development of human skills and training. Particular emphasis should be placed on the needs of developing and least developed countries including Small Island Developing States (SIDS), and particularly vulnerable regions such as Africa.

36. In many countries absence of clear mandates and legislative frameworks on climate related issues are a hindrance to the proper functioning of climate services. There is need for institutional strengthening in governance, management and funding as well as human resources development. At the same time it will require an improvement in the infrastructure within countries to systematically and sustainably undertake

high-quality climate observations, undertake research and establish and operate various elements of CSIS. Developing countries would require international support to attain desirable level of capabilities to participate in the implementation of the Framework and optimally make use of its products.

37. To develop the human capacity needed in the Framework, a review of the educational qualifications and on-job training requirements for climate specialists would have to be taken up. New skills would be required to be developed at a much larger scale as the climate service provision is made operational in the countries. Countries would have to develop clear human resources development policies to address this issue. As these skills would be technology intensive, Universities within the countries would be in the best position to participate or take lead in these activities.

Governance and Resourcing of the Framework

38. Implementation of the Framework needs be coordinated and overseen through a governance mechanism to: ensure adequate technical and professional guidance; provide oversight; ensure that resources are used efficiently; assign and ensure accountability for realizing the vision of the Framework; set directions and monitor progress; ensure respective roles and mandates; facilitate resource mobilization; and suggest policy directions, where required. Much has been learnt about climate coordination efforts through experiences from the Coordinating Committee for the WCP. In deliberating on governance structures, the taskforce may wish to take into account the experiences from a number of current models guiding the WMO co-sponsored programmes GCOS and WCRP, and the IPCC.

Mapping of WMO Programmes to the GFCS Components

Programme	Observations	Climate research, modeling and prediction	Climate Services Information System	Climate User Interface Programme	Capacity Building
WCP					
WCASP		X	XXXXX	XX	XX
WCDMP	XXXX		XX		XX
WCRP	X	XXXXX	XX		X
GCOS	XXXXX	X			X
WWW Programme					
GOS/ WIGOS	XXXXX				X
GDPFS		X	XX	X	X
WWWDM/GTS/WIS			XX		X
WWWSSA					X
IMOP	X				X
TCP			X	XX	X
ERA			X	X	
AREP					
GAW	XX		X		X
WWRP/Thorpex		XXX	XX		X
Applications of Meteorology Programme:					
PWSP			X	XXX	X
AgMP			X	XXX	X
AeMP				X	X
MMOP	XXX		XX	X	X
HWRP	X			XXX	X
ETR Programme			X	X	XXX
TCP				X	
VCP					XXX
P-LDCs					XX
Regional Programme			X	X	X
DRR Programme			X	XX	X
WMO Space Programme	X		X		X