



First Meeting of the Task Team on “Meteorological,  
Hydrological and Climate Services for Improved Humanitarian  
Planning and Response”, WMO Headquarters, Geneva,  
Switzerland

(31 August – 2 September, 2010)

Final Report

22 December 2010

## Table of Contents

<b>1.</b>	<b>BACKGROUND.....</b>	<b>3</b>
<b>2.</b>	<b>ABOUT THE MEETING.....</b>	<b>4</b>
2.1.	GOALS OF THE MEETING .....	4
2.2.	EXPECTED OUTCOMES OF THE HUMANITARIAN TASK TEAM .....	5
<b>3.</b>	<b>SYNTHESIS OF PRESENTATIONS AND DISCUSSIONS .....</b>	<b>5</b>
3.1.	INTERNATIONAL AND HUMANITARIAN AGENCIES .....	5
3.1.1.	<i>Institutional Structure and decision making processes of the Humanitarian Agencies .....</i>	<i>5</i>
3.1.2.	<i>Needs and requirements for meteorological, hydrological and climate information products and services.....</i>	<i>6</i>
3.1.3.	<i>Information sources and dissemination channels used by humanitarian agencies.....</i>	<i>7</i>
3.1.4.	<i>Sources of expertise for meteorological, hydrological and climate information products.....</i>	<i>8</i>
3.1.5.	<i>Major gaps and constraints.....</i>	<i>8</i>
3.2.	TECHNICAL CENTRES INVOLVED IN THE PRODUCTION AND DISSEMINATION OF METEOROLOGICAL, HYDROLOGICAL AND CLIMATE INFORMATION PRODUCTS AND SERVICES .....	9
3.2.1.	<i>Institutional relationship with humanitarian agencies .....</i>	<i>9</i>
3.2.2.	<i>Needs and requirements for meteorological, hydrological and climate information products and services.....</i>	<i>9</i>
3.2.3.	<i>Information products and services provided by Technical Centres.....</i>	<i>10</i>
3.2.4.	<i>Dissemination channels.....</i>	<i>10</i>
3.2.5.	<i>Major gaps .....</i>	<i>10</i>
3.3.	WMO OPERATIONAL NETWORK AND TECHNICAL CAPACITIES FOR PROVISION OF METEOROLOGICAL, HYDROLOGICAL AND CLIMATE SERVICES .....	10
3.3.1.	<i>WMO Global Data-Processing and Forecasting System (GDPFS).....</i>	<i>11</i>
3.3.2.	<i>Drought Monitoring Centres.....</i>	<i>11</i>
3.3.3.	<i>Global Framework for Climate Services (GFCSS).....</i>	<i>12</i>
3.3.4.	<i>WMO’s Global Telecommunication System (GTS) and WMO Information System (WIS).....</i>	<i>13</i>
3.3.5.	<i>Public Weather Services.....</i>	<i>13</i>
3.3.6.	<i>Hydrology and Water Resources.....</i>	<i>14</i>
3.3.7.	<i>Disaster Risk Reduction Programme.....</i>	<i>14</i>
3.3.8.	<i>Training.....</i>	<i>16</i>
3.3.9.	<i>Role of Technical Commissions .....</i>	<i>16</i>
<b>4.</b>	<b>MAJOR ISSUES.....</b>	<b>17</b>
<b>5.</b>	<b>OVERALL CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>18</b>
<b>6.</b>	<b>NEXT STEPS.....</b>	<b>19</b>

## 1. Background

1. The Task Team on “Meteorological Services for Improved Humanitarian Planning and Response” (hereafter referred to as Humanitarian Task Team) was established by the Commission of Basic Systems (CBS) of the World Meteorological Organization (WMO) at its 14th Session (Croatia, April 2009). The objective of the Humanitarian Task Team is to work towards the development of operational capacities to provide meteorological, hydrological and climate information products and services to humanitarian agencies at international, regional and national levels to support their emergency contingency planning, preparedness and response (Terms of reference provided in Annex I).

2. New opportunities for utilization of meteorological, hydrological and climate information products and services by humanitarian and disaster risk management agencies, based on understanding of their institutional structures, planning and operational mechanisms, needs and requirements motivated the establishment of the Humanitarian Task Team. These opportunities were unleashed by the wave of humanitarian reforms initiated in early 2000s by the Inter-Agency Standing Committee (IASC) using the cluster approach for enhanced coordination among the humanitarian agencies to improve contingency planning to anticipate and better respond to disasters.

3. Following the establishment of the Humanitarian Task Team, a brainstorming session on “Meteorological Services for Improved Humanitarian Emergency Contingency Planning and Response” was held at the WMO headquarters, in Geneva, on the 17 April 2009. The objective of the brainstorming meeting was to explore how to proceed with the development of information products and services to support humanitarian contingency planning and response. The meeting was attended by experts from international and UN humanitarian agencies involved in humanitarian contingency planning, including IFRC, OCHA, UNICEF, UNITAR, UNHCR, WFP, WHO and staff from the WMO Secretariat.

4. The brainstorming session took stock of the mechanisms used by humanitarian agencies to access and exchange information, the type of information products they use, their level of meteorological expertise and the needs and requirements for meteorological, hydrological and climate information products and services. The session concluded that:

I. Humanitarian agencies need a wide range of meteorological, hydrological and climate information ranging from data, analysis and forecasts. However, simply providing information is not sufficient. It is important that information products are designed based on understanding of the needs and requirements such that they can be easily accessed and interpreted by these agencies;

II. There is a pressing need by the humanitarian agencies for predictions in relation to hazardous conditions (trends and characteristics) within the context of climate variability and climate change, including hazard analysis, climate forecasts and information (next month, seasonal to longer timeframes) to enable improved prevention and preparedness planning by these agencies. Forecast information from the next month, to seasonal and longer time frames are the highest priority for improving humanitarian preparedness and response, including the need for understanding the impacts of climate change to adjust agencies’ own climate based plans;

III. Floods are the major causes of disasters worldwide and that humanitarian agencies could benefit from access to flood related information and warnings;

IV. Short to medium-range weather forecasts, information and warnings are important for response and relief to imminent threats. Specifically, alerts, forecasts and warnings issued by the authoritative source (such as the National Meteorological and Hydrological Services for hydrometeorological hazards) could be displayed on the information portals of the humanitarian agencies.

5. Based on these conclusions the session recommended the need to:

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

- I. Better understand the decision processes and timing of emergency contingency planning and response of humanitarian agencies, including current sources of meteorological, hydrological and climate information;
  - II. Better understand the needs and requirements of humanitarian agencies for meteorological, hydrological and climate information-products and services (contents, timing, format, distribution mechanisms);
  - III. Engage experts from humanitarian agencies, WMO operational network and leading experts from meteorology, hydrology and climate in the work of the Humanitarian Task Team;
  - IV. Include hydrological and climate aspects in the work of the Humanitarian Task Team.
6. To reflect hydrological and climate aspects in the work of the Humanitarian Task Team, the presidents of the Commission of Hydrology (CHy) and Climatology (CCI) nominated experts to the Humanitarian Task Team.
7. The Task Team on “Meteorological Services for Improved Humanitarian Planning and Response” held its first meeting at the WMO headquarters, from 31 August to 2 September 2010. The meeting was attended by 29 experts from international and UN agencies involved in coordination of humanitarian contingency planning and response, including IFRC, UNICEF, UNITAR, WFP, WHO, experts in operational meteorology, hydrology and climate forecasting from the NMHSs, specialized and international centres and staff from the WMO Secretariat (List of participants provided in Annex II).
8. The first meeting of the Humanitarian Task Team consisted of presentations made by (i) international and humanitarian agencies focusing on their institutional structures, decision making processes, needs and requirements, and the major gaps with respect to meteorological, hydrological and climate information products and services; (ii) leading experts from Technical Centres involved in the production and dissemination of meteorological, hydrological and climate information products and services, providing an overview of their experiences in working with international and humanitarian agencies and (iii) staff of the Secretariat providing information about the structure and capacities available through the WMO operational network. The presentations were complemented with discussions, during which participants identified major needs, gaps and requirements for the provision and utilization of meteorological, hydrological and climate information products and services as summarized in the next sections. The agenda is attached as Annex III.
9. The focus of the presentations and discussions was on what is currently available and is being used within the structures of the humanitarian agencies, particularly at global and regional levels. Aspects related to the national level, including the relationship between the NMHSs, humanitarian agencies and disaster risk management agencies were not addressed as these could be better addressed through the prototypes to be developed as part of the outcomes of the work of the Humanitarian Task Team.
10. A questionnaire with two parts (Part A and Part B) was designed to collect information from humanitarian agencies and Technical Centres involved in the production and dissemination of meteorological, hydrological and climate information products and services prior to the meeting (Annex IV). The entities that provided responses are indicated in Annex V. The questionnaires were analyzed and the major outcomes are provided in Annex VI.
11. All the presentations and documents of the meeting of the Humanitarian Task Team are available at:  
[http://www.wmo.int/pages/prog/drr/events/HumanitarianTT/index\\_en.html](http://www.wmo.int/pages/prog/drr/events/HumanitarianTT/index_en.html)

## **2. About the Meeting**

### **2.1. Goals of the meeting**

12. The first meeting of the Humanitarian Task Team, was the initial step towards the realization of the expected outcomes of the Humanitarian Task Team over the short and long – term. Its goals were to:

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

- I. Review the structure and decision making processes of the humanitarian agencies at global, regional and national levels;
- II. Review the meteorological hydrological and climate information products and services currently used by humanitarian agencies, including their sources and dissemination mechanisms;
- III. Review needs and requirements of humanitarian agencies for meteorological, hydrological and climate information products and services;
- IV. Review the capacities available through the WMO operational network for provision of meteorological, hydrological and climate information products and services;
- V. Identify major gaps with respect to the utilization of meteorological, hydrological and climate information products and services;
- VI. Recommend concrete actions leading to the initiation of pilot projects for the development of prototype products and services targeted at the needs and requirements of the humanitarian agencies.

## **2.2. Expected Outcomes of the Humanitarian Task Team**

13. Through two meetings the Humanitarian Task Team will:

### **A. Over the short-term (one year)**

14. Make recommendations for concrete pilot projects to develop prototype products and services targeted at the needs and requirements of humanitarian agencies that could be delivered by National Meteorological and Hydrological Centres (NMHSs), Regional Specialized Meteorological Centres (RSMCs), regional Climate Centres (RCCs) and Drought Monitoring Centres. It is expected that such prototypes will be developed and demonstrated as part of WMO projects undergoing in a number of regions such as Central America and the Caribbean, Southeast Asia and Africa.

### **B. Over the long-term (beyond one year)**

15. Develop a systematic mechanism for identifying and responding to the needs and requirements of the humanitarian agencies with respect to meteorological, hydrological and climate information products and services, through the WMO operational network.

## **3. Synthesis of presentations and discussions**

### **3.1. International and humanitarian agencies**

#### **3.1.1. Institutional Structure and decision making processes of the Humanitarian Agencies**

16. The meeting acknowledged that the structure of the humanitarian agencies, though different, has some similarities (see details in Annex VII). These include:

- (i) Most humanitarian agencies have headquarters in Geneva (IFRC, UNICEF, OCHA, WHO);
- (ii) Most regional or zone offices cover similar geographic regions (Africa: Eastern and Southern Africa and West and Central Africa; Latin America and the Caribbean, Middle East and North Africa; Europe, Asia and Pacific);
- (iii) Most regional or zone offices are in the same countries such as Johannesburg and Nairobi for Eastern and Southern Africa; Dakar for West and Central Africa, Panama City for Latin America and the Caribbean and Amman for Middle East and North Africa.

17. According to their structure, decisions are taken at the headquarter level, regional or zone level and country level. Humanitarian agencies have three decision making timeframes: short-term, medium-term and long-term. The major decision processes that require use of meteorological, hydrological and climate information products and services include:

- I. Emergency preparedness planning and response;
- II. Operation and logistics planning;
- III. Long term strategic planning for disaster risk management and climate change adaptation;
- IV. Policy development.

### **3.1.2. Needs and requirements for meteorological, hydrological and climate information products and services**

18. Humanitarian agencies have different needs for meteorological, hydrological and climate information products and services with respect to geographical and temporal scales. Requirements for geographical scales vary from location specific to large scales, while temporal resolution vary from the next hour to decadal or longer time scales, including the need for understanding the impacts of climate change for the development of long-term disaster risk reduction strategies. It was noted that these information requirements should be addressed as a continuum of information to support the different decision making processes of the humanitarian agencies.

19. Specifically, they require more precise, location specific, and forecasts presented in an understandable language as misunderstanding of technical language can lead to wrong decisions. Furthermore, the need to include impacts and recommendations for action in the forecast statements was stressed. However, it was noted that this is only possible when there is a relationship between the producer and user and where there is a clear understanding of the user needs and decision making processes by the provider of the information.

20. In addition, they require cross-border information, historical and real-time data, analysis and expertise to interpret the information products. In particular, humanitarian agencies require information on patterns of historical risks and predicted anomaly patterns. The content and presentation of information products and services needs to be designed based on understanding of the specific needs and requirements of the humanitarian agencies.

21. Humanitarian agencies stressed the importance of strengthening the dialogue between providers and users of meteorological, hydrological and climate information products and services to improve the understanding of how humanitarian agencies apply information and products. They also stressed the need for more investments to be made in training to improve the understanding, interpretation and application of meteorological, hydrological and climate information products and services.

22. Though requirements are different from agency to agency and from country to country, humanitarian agencies confirmed that there is a set or core products and services that could be useful to all agencies. In this regard, the meeting noted the need to identify these core products.

23. Presently, the information products and services used by humanitarian agencies in their decision making processes range from data, analyses and forecasts, including:

- I. Rainfall estimations (RFE);
- II. Rainfall forecasts (short, medium and seasonal);
- III. Snow forecasts (depth and coverage);
- IV. Temperature forecasts;
- V. Cyclone tracking;
- VI. Current and forecast river levels;
- VII. Specific on-demand forecast.

24. Humanitarian agencies stressed the need to improve consistency in the provision of information products and services to ensure that there are no discrepancies between the global, regional and national scales. They expressed the need for integration of authoritative meteorological, hydrological and climate information into humanitarian agencies information systems. This could be achieved through (i) a central information repository or one stop shop for products ranging from short-range to climate forecasts, and (ii) synchronization of information dissemination mechanisms.

### 3.1.3. Information sources and dissemination channels used by humanitarian agencies

25. Humanitarian agencies access meteorological, hydrological and climate information products and services through various sources (see a detailed list of sources in Annex VIII). These include:

#### **National Meteorological and Hydrological Services and Government Agencies**

26. Humanitarian agencies access some meteorological, hydrological and climate information products and services through official websites (where they exist and are perceived to provide reliable information) of NMHSs and other government agencies. To facilitate access to national official meteorological and hydrological information, WMO through its Website maintains links to the Websites of NMHSs of Member countries ([http://www.wmo.int/pages/members/members\\_en.html](http://www.wmo.int/pages/members/members_en.html)). Furthermore, the WMO Severe Weather Information Service (SWIS) (<http://severe.worldweather.wmo.int>) and the world weather information service (WWIS) (<http://worldweather.wmo.int>) carry advisories issued by RSMC, Tropical Cyclone Warning Centres (TCWC), official warnings and forecasts issued by NMHSs. Examples of the SWIS and WWIS are provided in Annex IX.

#### **International and Regional Specialized Centres**

27. They also access information from Technical Centres that are involved in the production and dissemination of climate information products and services such as:

- (i) The International Research Institute for Climate Prediction (IRI) at (<http://portal.iri.columbia.edu/portal/server.pt?open=512&objID=490&PageID=0&cached=true&mode=2&userID=2>), which provides climate diagnostics, climate monitoring, climate forecast and other products. Sample products shown in Annex X;
- (ii) Centro Internacional para la Investigación del Fenómeno de El Niño (CIIFEN) at (<http://www.ciifen-int.org>), which provides seasonal forecasts, sea surface temperatures and sea surface temperature anomalies, etc., as shown in Annex XI;
- (iii) ACMAD at (<http://www.acmad.ne/en/homepage.htm>), which provides weather forecasts, bulletins, etc., as shown in Annex XII.

#### **Open Source**

28. These include Media reports, meetings, bulletins, e.g., FewNet bulletins, University and Research Institutions and internet based information websites such as Hurricane Watch Net, Weatherwatch.com and Weather Underground.

#### **Information portals used by humanitarian agencies to facilitate information sharing and coordination**

29. These information portals ensure access to the same information to facilitate inter-agency coordination and response. They include:

- a. **The Global Disaster Alert and Coordination System (GDACS)** (<http://www.gdacs.org>): It provides near real-time alerts about natural hazards around the world and tools to facilitate response coordination, such as media monitoring, map requests and map-catalogues and Virtual On-Site Operations Coordination Centre (Virtual OSOCC).
  - **Virtual OSOCC** (<http://www.gdacs.org/virtualosocc>): Virtual OSOCC is a sub-system of GDACS that allows access only to authorized international disaster responders to facilitate real-time information exchange, disaster coordination and decision-making;
- b. **ReliefWeb** (<http://www.reliefweb.int>): ReliefWeb is a global hub for time-critical humanitarian information on complex emergencies and natural hazards, coordinated by OCHA. It provides timely, reliable and relevant information as events unfold, while emphasizing the coverage of “forgotten emergencies” at the same time.

- c. **Humanitarian Early Warning Service (HEWSweb)** (<http://www.hewsweb.org>): A global multi-hazard service to support humanitarian preparedness. WFP is investing in the upgrade of HEWSweb’s presentation and content to better serve the humanitarian community. Under its new format it will publish early warning information and inputs related to disasters caused by natural hazards from IASC members.

### **Information products available to all agencies**

30. The meeting noted existence of information products that are available to all humanitarian agencies to support their planning and coordination. These include the Early Warning/Early Action report of the Inter-Agency Standing Committee, the Map-coordinator of GDACS and high resolution satellite products facilitated by UNITAR/UNOSAT. Examples are indicated in Annex XIII.

### **Internal products developed for use of specific humanitarian agencies**

31. Humanitarian agencies have developed partnerships with technical institutions for the development of tailored products for their decision making processes. These include:

- I. Customized products of the IFRC, developed through partnerships with the International Research Institute (IRI) at Columbia University; NOAA, NASA, the Dartmouth Flood Observatory and ACMAD. Products range from medium range weather forecasts, to seasonal forecasts, precipitation forecasts, flood potential maps, etc., targeted at the specific needs of IFRC (see Annex XIV);
- II. WFP products developed through partnerships with NOAA, NASA and ITHACA (University of Turin) (see Annex XV);
- III. The e-atlas of disaster risk of WHO developed in partnership with the University of Agadir, Morocco, which uses climatic data to predict the spatial distribution of hazards such as floods, wind speed, heat, etc. In addition, WHO has a Vulnerability and Risk Analysis & Mapping platform (VRAM) (see Annex XVI).

32. Some humanitarian agencies such as IFRC, WHO and WFP have developed centralized mechanisms for collating and disseminating information to their personnel on the ground. IFRC uses a disaster management information system (DMIF) and information flow as shown on Annex XVII. WHO uses the WHO HAC Alert Database which is an internet-based system gathering, on real-time basis, reports, news, maps and relevant correspondence on events that may evolve into a humanitarian public health crisis requiring WHO/HAC intervention. WFP uses the intranet based platform EPweb (see Annex XVIII). In addition, humanitarian agencies use internet based systems, DVDs, emails, SMS and meetings to disseminate information through their structures.

#### **3.1.4. Sources of expertise for meteorological, hydrological and climate information products**

33. The meeting re-iterated that internal mechanisms and technical capabilities of humanitarian agencies to apply meteorological, hydrological and climate information are variable. Most humanitarian agencies do not have “in house” expertise to interpret information products and services. Some humanitarian agencies outsource compilation of available information, analysis and interpretation to technical institutions, through partnerships or memorandum of understanding (MoU). This information is generally shared through internal internet-based platforms.

#### **3.1.5. Major gaps and constraints**

34. The major gaps and constraints faced by humanitarian agencies with respect to access and utilization of meteorological, hydrological and climate information products and services, include the following:

- Access to reliable and consistent information from the regional to national levels. The meeting noted that there are different sources providing different types of information in a non-systematic

manner. At national level, in some cases the information required by humanitarian agencies is not available;

- Access to accurate and location specific forecasts from the short to longer-term time scales;
- Difficulties in understanding the technical language and interpreting probabilities and the uncertainty associated with the forecasts;
- Difficulties in accessing historical and real-time data.

### **3.2. Technical Centres involved in the production and dissemination of meteorological, hydrological and climate information products and services**

35. Leading experts from Technical Centres involved in the production and dissemination of meteorological, hydrological and climate information products and services provided an overview of their experiences in working with international and humanitarian agencies. They clarified that at national level NMHSs are generally the responsible entities for the issue and dissemination of warnings. Specialized Centres can however, provide climate information and services directly to users such as the humanitarian agencies, through specific agreements or partnerships. The information products provided through these arrangements are for the internal use of the agencies only.

#### **3.2.1. Institutional relationship with humanitarian agencies**

36. The meeting noted that through a process involving dialogue, partnerships, agreements, internship programmes, help desks and user feedback, Technical Centres have developed relationships with humanitarian agencies with a view to generate tailored products and services that support their decision making processes. Examples of specific partnerships and agreements that have been developed include (i) IFRC and ACMAD and IFRC and IRI, (ii) WFP and the University of Torino, Italy, (iii) WHO and the University of Agadir, Morocco, and WHO with the London School of Hygiene and Tropical Medicine, etc.

37. These partnerships allow better understanding of the decision making processes of the humanitarian agencies and the development of tailored information products to suit the user needs. In addition, partnerships allow the development of feedback mechanisms for the continuous improvement of products and building of trust between producers and users of information. It was stressed that trust is a key element for the use of meteorological, hydrological and climate information for effective action on the ground.

#### **3.2.2. Needs and requirements for meteorological, hydrological and climate information products and services**

38. The experts confirmed that humanitarian agencies require tailored products with simple and explicit content presented in a language that is understandable to them. Maps and graphics are particularly desired by these agencies.

39. Specifically, the experts re-iterated that humanitarian agencies require meteorological, hydrological and climate information products with different spatial and temporal resolutions. They indicated that the most common products requested range from 1 to 6 days forecasts for managing risks associated with floods to seasonal forecast, El Niño forecasts and climate change information.

40. The need of integrated products combining meteorological, hydrological and climate information with other information, e.g., information on population, infrastructure and vulnerability was stressed. It was however noted that information on vulnerability is often not readily available, requiring more collaboration between the providers of weather and climate information (e.g. NMHSs, WMO RCCs, other Technical Centres, etc.) and the institutions that are custodians of the socio-economic information.

### **3.2.3. Information products and services provided by Technical Centres**

41. The Technical Centres are involved in the production and dissemination of climate information products and services such as:

- Decadal and Monthly climate watch bulletins that may include impacts on agriculture, water resources, health, ecosystems, etc;
- Seasonal forecasts of precipitation and temperature;
- El Niño/La Niña bulletins;
- Hydrological forecasts;
- Short range flood risk during the rainy season;
- Map rooms containing 6 day and seasonal forecasts;
- Specific bulletins such as river basin bulletins;
- Climate change scenarios in support of national and local assessment of vulnerability and impacts in support of adaptation and mitigation strategies

### **3.2.4. Dissemination channels**

42. Technical Centres use different channels to disseminate their information such as satellite broadcasts, bulletins, WebPages, emails, media, map rooms, help desk, interns, RANET (Radio and internet), meetings and interaction with designated focal points in some agencies.

### **3.2.5. Major gaps**

43. The experts from Technical Centres identified the following as the major gaps for the effective production and utilization of meteorological, hydrological and climate information products and services:

- Difficulties in accessing observed data due to the quality of the observing networks in some areas;
- Technical limitations for forecasting extremes at seasonal timescales;
- Insufficient information available beyond 6 days and at the near-term climate change timescales;
- Inefficient communication systems used for the communication of observed data in real time;
- Inadequate knowledge of the specific needs and requirements of the humanitarian agencies to enable the development of tailored products for their use;
- Lack of verification information for 6 day forecasts;
- Lack of information on how the weather and climate forecasts correspond to impacts;
- Lack of feedback from the user.

## **3.3. WMO operational network and technical capacities for provision of meteorological, hydrological and climate services**

44. Through the coordinated networks of the NMHSs of its 189 Members, WMO coordinates an operational network that comprises the Global Observing System, the Global Telecommunication System (GTS), which is evolving into the WMO information system (WIS), the Global Data Processing and Forecasting System (GDPFS), Regional Meteorological Training Centres (RMTCs), Regional Associations (RAs), supported by 10 WMO Technical Programmes and 8 Technical Commissions (TCs) composed of experts designated by the WMO Members.

45. The meeting noted that at national level, capacities of NMHSs to support humanitarian agencies needs are often weak. NMHSs coordinate with DRM agencies and not with humanitarian agencies. In a few countries linkages between the NMHSs and humanitarian agencies are realized through the participation of NMHSs and the Humanitarian Agencies in the national DRM. Humanitarian agencies seek information from NMHSs where they are perceived to provide adequate services. In this regard, the meeting noted the need to link NMHSs and the disaster risk reduction communities through concrete projects.

### **3.3.1. WMO Global Data-Processing and Forecasting System (GDPFS)**

46. The WMO’s meteorological operations include its global observational network, global telecommunications, and the Global Data-Processing and Forecasting System (GDPFS), which represents the function of weather forecasting including the production of alerts and warnings of severe weather. It is a network of operational meteorological centres that produce numerical guidance, and forecasts and warnings, and is a part of a global early warning system for meteorological and environmental hazards. The GDPFS provides the basis for delivery of a wide variety of meteorological services, including warnings of hazardous conditions, to the general public, to many socio-economic sectors, and to many international organizations.

47. As a single system, the GDPFS centres produce routine weather and climate data products and analyses, forecasts, advisories, warnings and specialized products required by NMHSs and other Members’ agencies for providing effective services for the protection of life and property, the environment, increased safety of activities carried out on land, at sea and in the air and enhance the quality of life through sustainable development. Each of the GDPFS centres are at the core of the operational infrastructure of the NMHSs and operate 24 hours a day everyday in a continuous programme of data collection and exchange and data-processing, to assimilate data into objective analyses and numerical simulations, to produce numerical predictions of the future states of the atmosphere as well as data archiving, and, through further post-processing, produce additional routine and specialized outputs and products in a wide range of applications.

48. The GDPFS is organised as a network of: i) 3 World Meteorological Centres (WMCs) and ii) 40 Regional Specialized Meteorological Centres (RSMCs), and iii) National Meteorological Centres. While the national centres are responsible for all forecasting and warning services within its respective territory, the world and regional centres, operated or supported by NMHSs carry out data forecasting functions at the global and regional levels. The GDPFS includes a number of centres that specialize in long-range forecasting (seasonal predictions). They are the Global Producing Centres for Long-Range Forecasts (GPC-LRF, presently 12 centres around the world), and Regional Climate Centres (RCC, presently 2 centres). While the GPCs are in the production of global seasonal predictions using complex numerical models, the RCCs tailor the predictions to regional scales, monitor the regional climate, provide data services and training on their products and services, for example via the consultative Regional Climate Outlook Forums (RCOF). This coordinated GDPFS system provides analysis, modelling, forecasting and other products and services in support of forecasting and early warnings of weather- and climate-related hazards to other Members, and to other relevant international organizations. WMO specifically ensures that capacities are implemented within the NMHSs of developing and least developed countries, for issuance of forecasts and warning of various hydrometeorological hazards and events.

### **3.3.2. Drought Monitoring Centres**

49. While not through the GDPFS, the WMO also supports developing countries on drought issues through national and regional projects, including through establishing Drought Monitoring Centres. The present operating centres for Eastern Africa and for Southern Africa are located in Nairobi (ICPAC), Kenya and in Gaborone Botswana (SADC), respectively. The ACMAD centre (Niger) is also involved in drought monitoring in Africa. A centre has been established for Southeastern Europe, in Slovenia (DMCSEE), while another is planned for Central Asia (DMCCA).

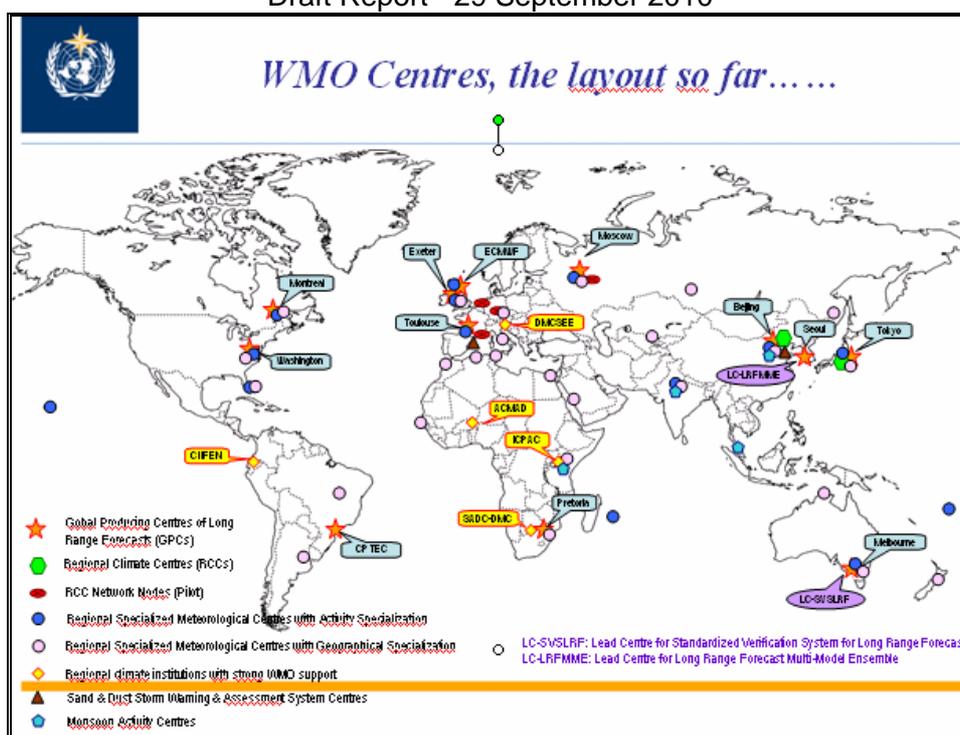


Figure 1. WMO operating centres of the GDPFS including the Regional Specialized Meteorological Centres, Global Producing Centres for Long-Range Forecasts, Regional Climate Centres, as well as Drought Monitoring Centres.

### 3.3.3. Global Framework for Climate Services (GFCSs)

50. In 2009 in Geneva, Switzerland, WMO hosted World Climate Conference-3, at which Heads of State and Government, Ministers and Heads of Delegations present at the session agreed to establish a Global Framework for Climate Services (hereafter referred to as “the Framework” or the GFCS) to strengthen the production, availability, delivery and application of science-based climate monitoring and prediction services. WCC-3 assessed that the Framework should be designed to mainstream climate science into decision-making at all levels, and that it should have five major components: (i) observations; (ii) climate research, modelling and prediction; (iii) a climate services information system (CSIS); (iv) a climate user interface programme (CUIP); and (v) capacity building. Establishment of the Framework involves an unprecedented collaboration among institutions across political, functional and disciplinary boundaries. When fully implemented, the GFCS will be driven by user needs, and will be expected to ensure that every country is better equipped to meet the challenges of climate variability and change.

51. Since climate services are often weakest in those countries where they are most needed, the GFCS would aim at capacity building in these countries to bridge the gaps –strengthening the observational capabilities and climate expertise around the world will be important goals. A core principle of the GFCS is the relationship between providers and users of information, and it is fully intended that users will be engaged in the design and operation of the Framework, and in the products and services it will generate. Quality and consistency of the products and services, along with utility, clarity and timeliness will also be priorities. The establishment of the GFCS would, inter alia, support the climate information needs of the humanitarian sector. It is recognized that in addition to technical climate information, analyses, assessments, predictions and projections, actors in the sector would prefer also to understand quickly what these mean in terms of impacts on their activities. Most climate information providers at present (e.g. NMHSs) do not have access to, or a clear mandate to work with social and economic information, and the GFCS was proposed in order to develop the environment in which these efforts could be better integrated. To fully develop this type of multi-disciplinary information as required by the sector, a close working relationship is recommended between representatives of the sector and information developers/providers at various levels (i.e. global to local). This interaction will be fostered

through interdisciplinary training and awareness-raising collaboration, participation in regional climate outlook forums, expert study/research groups and through projects.

#### **3.3.4. WMO’s Global Telecommunication System (GTS) and WMO Information System (WIS)**

52. WMO's information systems includes the Global Telecommunication System (GTS) composed of a dedicated network of terrestrial and satellite-based telecommunication links and centres operated by countries, 24 hours a day, seven days a week, all year round. It interconnects all NMHSs for round-clock reliable and real-time collection and distribution of all meteorological and related data, forecasts and alerts.

53. WMO is further developing the WMO Information System (WIS) to be open to all WMO activities and partners to facilitate the exchange of information amongst WMO Members, collaborators and partners. This includes being interoperable with external networks such as those connecting and supporting humanitarian agencies activities through the use of international standards. Thus, WIS will allow UN agencies to exchange information with WMO Members including the ability to find and subscribe to information as well as access it when required.

54. The session noted that the information available from the Global Information System Centre (GISC) Offenbach was very specialist in nature and for humanitarian services to benefit from these new systems, they would still need assistance from relevant WMO subject experts in determining which information is relevant. It noted the potential for WIS to support their systems and future automated decision making support processes and that such development would also benefit from close collaboration between WMO and humanitarian agency technical experts in addition to subject experts.

#### **3.3.5. Public Weather Services**

55. WMO Members through their NMHSs have to provide warnings, forecasts and information on weather, water and climate-related events in a timely, reliable and comprehensive manner as part of their responsibility for the safety of life and livelihood, protection of property and the well-being of their nations’ citizens. The PWS Programme of WMO includes a core component common to all NMHSs which centres on ensuring the safety of life and property. This is done through working with NMHSs to strengthen and support their efforts not only in producing and disseminating warnings of severe weather hazards, but also in developing partnerships with stakeholders, and public education and outreach activities aimed at effective application and use of these products and services. The PWS programmes of NMHSs provide the channel for communication and dissemination of NMHSs forecast and warning products, mainly through collaboration with the mass media. Dissemination and communication with the recipients are vital elements of PWS and form a cornerstone of the PWS Programme.

56. With modern technologies developing rapidly, the issue is no longer how to simply spread information, but how to disseminate it in the most efficient way to the intended audience. Especially in the case of warnings, in order to avoid confusion and elicit proper response, the NMHSs, public safety officials and the media must work cooperatively to ensure that a clear and consistent message is provided to the recipients. This requires not only effective communications and dissemination systems but also an extensive and ongoing public education programme which is another focus of the PWS Programme. WMO promotes the principle of single authoritative sources of warnings to avoid public confusion in hazardous and potentially dangerous situations. In nearly all countries NMHSs are the single official voice for issuing meteorological warnings within the principle of national sovereignty.

57. To facilitate access to national official warnings of tropical cyclones, PWS Programme established the Severe Weather Information Centre (SWIC). This is a WMO website that displays the existing cyclones and their tracks anywhere in the world on a map of the globe and carries advisories issued by RSMS, Tropical Cyclone Warning Centres (TCWC) and official warnings issued by NMHSs (see <http://severe.worldweather.wmo.int>). Discussions are underway with Google to bring this site to the top

of the listing in the Google search engine, thus enabling the display of the official cyclone warnings above all other warnings issued by other sources. A widget is also being developed to allow a pop-up when cyclone warnings are issued. These advances will make access to cyclone warnings easier. The SWIC is linked to Meteoalarm, a European initiative for visualization of warnings and their harmonization.

58. Similarly, to access the official city forecasts from 3 to 5 days ahead and climate information as provided by the NMHSs, the PWS Programme established the World Weather Information Service (WWIS) which can be viewed at the website <http://worldweather.wmo.int>.

59. The PWS Programme is working towards standardization of warning message formats using Common Alerting Protocol (CAP) to allow consistent warning messages being disseminated simultaneously over many different warning systems, thus increasing warning effectiveness.

### **3.3.6. Hydrology and Water Resources**

60. To promote Integrated Flood Management (IFM), a HelpDesk has been established which provides:

- Quick access to flood management information;
- Guidance for activities towards IFM ;
- A continuous and sustainable capacity development mechanism;
- A link between flood management practitioners or decision makers and experts in various fields;
- A link between technical and financial partners.

61. WMO is implementing – on a river basin and regional basis – a Flash Flood Guidance system (FFGS) that aims to provide:

- Early awareness of impending local flash flood threats for potentially vulnerable areas;
- Enhancement of collaboration with meteorologists and hydrologists and disaster management agencies;
- Improvement of community awareness of flash flood disaster threat and mitigation – to respond to warnings;
- Development of products for high risk flash flood areas to effectively plan future development.

62. WMO is implementing the Flood Forecasting Initiative (FFI), which aims to strengthen meteorological and hydrological cooperation for improved flood forecasting in particular to improve the capacity of meteorological and hydrological services to jointly deliver timely and more accurate products and services required in flood forecasting and warning. Amongst the key deliverables are the development of integrated forecasting products and the development and implementation of demonstration projects.

63. A Coastal Flood Inundation Demonstration Project (CFIDP) is providing an integrated software coupling meteorological (tropical cyclone), hydrological (river) and ocean (storm surge) forecasting models where the forecasting results are used by mandated authorities for warnings, alerts and coastal integrated management purposes.

### **3.3.7. Disaster Risk Reduction Programme**

64. The WMO DRR Programme has developed a systematic approach engaging WMO Programmes, constituent bodies, Members and external partners to implement WMO DRR strategic priorities through national projects with a strong regional cooperation framework. In addition, a clear DRR Project Management Framework with criteria for initiation of projects and a resource mobilization strategy were

developed, which are being used for the initiation of two types of DRR model projects in several WMO regions and sub-regions, with strong connection to the Regional DRR structures.

65. The criteria for initiation of projects include the following:
- (a) Alignment with WMO strategic priorities related to DRR;
  - (b) Built on priorities, capacities, DRR requirements and needs of Members within a region, sub-region or country-grouping;
  - (c) Have both a national capacity development component, complemented with a regional cooperation component;
  - (d) Involve integrated planning, budgeting, and implementation, leveraging expertise, resources and activities of WMO technical programmes, constituent bodies and external partners, with roles and responsibilities clearly defined;
  - (e) Result-based approach, with clear outcomes, deliverables and timelines;
  - (f) Must be scalable;
  - (g) Sustainability of capacities overtime to be considered within the project design;
  - (h) Ensure end-to-end solutions to the Members leading to better DRM decision-making capacities;
  - (i) Have a well-defined resource mobilization strategy.

66. To date, two types of DRR national/regional cooperation projects are underway to demonstrate the benefits of integrated programming across WMO Technical Programmes and Technical Commissions in collaboration with Regional Associations and external partners for development of capacities of NMHSs to support DRM and multi-hazard early warning systems. These include:

- (i) First type: National and regional disaster risk management and adaptation projects with the World Bank, UN–International Strategy for Disaster Reduction (UN-ISDR), and UNDP which focus on development of national capacities and regional cooperation along three components, including: (i) disaster risk management institutional capacities across various economic sectors (e.g., health, infrastructure and urban planning, agriculture, energy, civil protection and emergency planning, etc.); (ii) NMHSs and their partnership with disaster risk management stakeholders; and (iii) financial risk transfer and insurance markets. WMO is invited as a key partner for addressing capacity developments of the NMHSs and their partnerships. This type of project has been initiated in eight countries in Southeast Europe, eight countries in Central Asia and Caucuses, and five countries in Southeast Asia;
- (ii) Second type: Comprehensive end-to-end multi-hazard early warning system (MH-EWS) projects building upon capacity development activities of WMO technical programmes in countries that have some institutional capacities for emergency preparedness and planning. These projects involve: (i) a training workshop on MH-EWS with Focus on Institutional Partnerships and Cooperation for senior officials of NMHS and disaster risk management agencies; (ii) a coordination meeting involving stakeholders in disaster risk management to identify gaps and needs for the development of a regional programme to strengthen MH-EWS; and (iii) use of guidelines on “Institutional partnerships and coordination on MH-EWS” developed on the basis of the documented good practices in MH-EWS. These projects are implemented through partnership with a number of regional technical and disaster risk management agencies and international agencies engaged in national EWS capacity development such as UN-OCHA, UNDP, the World Bank and IFRC. Concrete initiatives include: (i) The Central America Demonstration Project on Early Warning Systems for Hydro meteorological Hazards involving three countries (Costa Rica, El Salvador and Mexico) under the leadership of RA IV and engaging all relevant partners; and (ii) Strengthening of the Caribbean Regional MH-EWS, which is being developed, following extensive consultations involving two workshops (Training and Coordination Workshop on MH-EWS with Focus on Institutional Partnerships and Coordination, San Jose, Costa Rica, 22-26 March 2010 and the Technical Cooperation Workshop for Development of the Caribbean Regional Cooperation Programme in MH-EWS, Christ Church, Barbados, 2-5 November 2010 – documentation available at

[http://www.wmo.int/pages/prog/drr/events/Barbados/index\\_en.html](http://www.wmo.int/pages/prog/drr/events/Barbados/index_en.html)) and a number of regional events.

67. These projects can serve as a platform for the development of prototype products and services targeted at the needs and requirements of the humanitarian agencies.

### **3.3.8. Training**

68. The meeting identified the need for staff from the humanitarian agencies to have some training to better understand and utilize meteorological, hydrological and climate information products and services. Three broad areas of training were identified based on the planning and operation cycles of the humanitarian agencies and the time-frame of the available WMO data, information and products. The notional time-frames were 0 to 24 hours, 1 to 10 days, and monthly to multi-year. The training could range from basic courses covering terminology and typical uses of the products, to much more in-depth application of the data and information. On a case-by-case basis it may be necessary for specialist training for software developers from the humanitarian agencies to enable them to take full advantage of the WMO data, information and products. Noting WMO's global reach it may be possible to deliver such training using the Regional Climate Centre and Regional Training Centre networks and on a national basis the NMHS training centres where they exist. To provide some consistency and make better use of training resources it would be desirable to develop the training needs centrally and then adapt it regionally and nationally as required. The session agreed to consider training needs as part of the pilot programme discussions.

### **3.3.9. Role of Technical Commissions**

69. Technical commissions are composed of experts designated by Members who are responsible for establishing methodology and procedures for addressing matters related to operational meteorology, hydrology, applications and research. They make recommendations to the Executive Council and the Congress of the WMO.

#### **Commission of Basic Systems (CBS)**

70. CBS is the Commission that has responsibility for the maintenance and ongoing development of the technical systems that underlie the work of operational meteorology, as well as the development of products and services that translate meteorological data into information of value to users. On the technical side, CBS gathers together, through a network of Expert Teams, organized into so-called Open Programme Area Groups (OPAGs), the technical expertise of Member countries and organizes the focus of this expertise on specific problems and development areas. The primary OPAGs that contribute directly to the provision of meteorological, hydrological and climate services to humanitarian agencies are the (OPAGs) on Data-processing and forecasting systems (DPFS) and public weather services (PWS). However it should be stressed that the structure of operational meteorology is highly integrated and no one area can function without support from all the other areas. It is through DPFS that the work of the major computing centres which run weather models is coordinated, and through PWS that a focus is maintained on moulding products and services to better match the needs of users.

#### **Commission of Climatology (CCI)**

71. Under its structure (see Annex XIX), CCI established four open panels of climate experts (OPACE). Its OPACE on Climate Information for Adaptation and Risk Management (OPACE 4) aims to improve decision-making for planning, operations, risk management and for adaptation to both climate change and variability (covering time scales from seasonal to centennial) and will be achieved through a higher level of climate knowledge, as well as by access to and use of actionable information and products, tailored to meet their needs. OPACE 4 includes relevant Task Team such as: (i) The Task Team on user participation in climate outlook forums; (ii) Task Team on User Interface; and (iii) Task Team on Climate Risk Management.

72. Specifically, CCI will contribute through the work of the Task Team on User Interface, which has as one of its tasks to “In collaboration with CBS Task Team on Meteorological Services for Improved Humanitarian Planning and Response, develop an implementation plan to facilitate the provision of meteorological, Hydrological and Climate Services to the international humanitarian agencies from National Meteorological and Hydrological Services (NMHSs), RSMCs, Global and Regional Climate Centres (RCCs)”.

73. Furthermore, OPACE 3 on Climate Products and Services and their Delivery Mechanisms, will contribute through the work of its CCI-CBS Expert Team on Regional Climate Centres and the Task Teams on CLIPS (Climate Information Products and Services) Evolution and the Task Team on Global Seasonal Climate Update

### **Commission of Hydrology (CHy)**

74. CHy will contribute to the provision of meteorological, hydrological and climate services to humanitarian agencies through its panels of CHy Experts on Hydrological Prediction and Forecasting (OPACHE III) and Weather, Climate and Risk Management (OPACHE IV) (see Annex XX).

## **4. Major Issues**

75. The meeting identified a number of issues that need to be addressed and grouped them in the following categories:

- i) Data access
  - Access to high resolution data;
  - Access to historical data;
  - Limited observational data, particularly in Africa.
- ii) Service delivery
  - Interpretation or translation of the highly technical meteorological, hydrological and climate information products and services to be understandable by humanitarian agencies;
  - Systematic availability of forecasts covering various spatial and temporal scales;
  - Harmonization of regional forecasts and national forecasts issued by NMHSs;
  - High quality and location specific forecasts, including hydrological forecasts;
  - Linkage of forecasts to statements of action to be taken on the ground;
  - Feedback from users to evaluate the information products provided;
  - Verification information.
- iii) Training
  - Training on the interpretation of forecasts, probabilities and the uncertainty associated with forecasts;
  - Training of both users and producers of meteorological, hydrological and climate information products and services to speak the same language.
- iv) Coordination and Cooperation
  - Linkages between NMHSs and humanitarian agencies at national level;
  - Improved linkages between the different Commissions working within WMO to sharpen the focus on the specific problems and needs of the humanitarian agencies.

## 5. Overall conclusions and recommendations

76. Currently there are many meteorological, hydrological and climate information products and services available from different sources. This results in lack of systematic use of meteorological, hydrological and climate information products as different sources provide different products. Humanitarian agencies require systematic and consistent sources of information from the regional to the national level. In this regard, regional climate outlook forums and similar mechanisms were identified as platforms that may help humanitarian agencies deal with different sources.

77. There is a strong need of partnerships between the producers of meteorological, hydrological and climate information products and services and the users. Partnerships enable better understanding of user needs, building of trust and the provision of feed for the continuous improvement of service delivery.

78. Systematic access and application of meteorological, hydrological and climate information products and services, available through National Meteorological and Hydrological Services (NMHSs), global and regional meteorological centres such as Regional Specialized Meteorological Centres (RSMCs), Regional Climate Centres (RCCs), Drought Monitoring Centres, as well as climate consensus forums, on an operational basis, can support humanitarian agencies in improving national and regional contingency planning and response to potential disasters and ongoing humanitarian relief.

79. As a first step to ensure that the requirements of humanitarian agencies for meteorological, hydrological and climate information products and services are met through the WMO operational network of NMHSs, RSMCs, RCCs and Drought Monitoring Centres, with the support of Technical Commissions, there is a need to take stock of the products that are currently available and being used within the structures of the humanitarian agencies for their emergency contingency planning, preparedness and response.

80. The Commission for Basic Systems, through its president, will be requested to initiate a discussion between all of the presidents of the Technical Commissions on how best the various strands of work being carried out in WMO in support of humanitarian agencies and similar organizations can be better coordinated and streamlined.

81. The work of the Humanitarian Task Team will focus on meteorological, hydrological and climate information products at global and regional levels. Aspects related to provision of this information at national level, including the relationship between the NMHSs, humanitarian agencies and disaster risk management agencies would be addressed through the prototypes projects to be developed as part of the outcomes of the work of the Humanitarian Task Team.

82. To implement the first pilot Central America and Southern Africa were considered as potential regions. Participants agreed to start in Southern Africa. Consideration was based on (i) Need and impact such projects can have in the region; (ii) good governance including political will, existence of coordination structures for DRM, availability of institutional and technical capabilities, allocation of resources for DRM; (iii) demonstrated efforts and progress in DRM; (iv) capacity development activities being carried out by WMO and partners and (iv) on-site presence of humanitarian agencies.

## 6. Next Steps

83. The next meeting of the Humanitarian Task Team is scheduled in March 2011 with consideration for other meetings and events in Geneva.

84. To accomplish the work of the Humanitarian Task Team, the meeting recommended the following short-term priorities as detailed in the following table:

### Proposed Short-term Priorities for Task Team

Time Line	Leas/Support	Priority for action
By end of November	Simon Mason (IRI) Support: P. Chen (GDPFS), L. Malone (Climate), W. Grabs (Hydrology), H. Kootval (PWS), DRR Division	<ol style="list-style-type: none"> <li>1. Mapping of current decision processes within humanitarian agencies at global level in support of the regional and national level that interface with weather, water and climate information               <ol style="list-style-type: none"> <li>a. Map products and information used (content, sources and access)                   <ol style="list-style-type: none"> <li>i. Information</li> <li>ii. Value added information e.g. IFRC/IRI, WFP/ITHAC, WNOSAT/ECMWF/WMO</li> <li>iii. EWEA IASC report</li> </ol> </li> <li>b. Focal points in humanitarian agencies at global, regional and national level (who should receive what?)</li> <li>c. Technical agencies supporting humanitarian agencies at global, regional and national level</li> <li>d. Mapping of interagency (IA) information management mechanisms</li> <li>e. Understand the global-regional/varying time-scales implications for different institutions in the humanitarian sector</li> </ol> </li> </ol> <p>Mapping of how information is being used (link information to usage)</p>
By end of December	Peter Chen & L. Malone Support: W. Grabs (Hydrology), H. Kootval (PWS), DRR Division	<ol style="list-style-type: none"> <li>2. Mapping of existing global and regional meteorological, hydrological and climate products and services               <ol style="list-style-type: none"> <li>a. Content (forecasts, digitized data, maps, etc)</li> <li>b. Who provides?</li> <li>c. How can it be accessed (public vs. non public)</li> </ol> </li> <li>3. Determine possibilities for accessibility to public and non public core forecast data and information (project specific)               <ol style="list-style-type: none"> <li>a. Provide relevant one-stop-shop for products such as regional climate outlooks, ENSO forecasts, seasonal tropical cyclone forecasts, etc.</li> <li>b. Facilitate accessibility to other high priority core data</li> </ol> </li> </ol>

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

<b>Time Line</b>	<b>Leas/Support</b>	<b>Priority for action</b>
	M. Jean Support: DRR Division	4. Identify and map information systems of WMO and humanitarian agencies to determine sustainable delivery of information over time <ul style="list-style-type: none"> <li>a. WMO/WIS and other systems</li> <li>b. Humanitarian               <ul style="list-style-type: none"> <li>i. Intranet (IFRC/DMIS, WFP/epWeb, EWEA UNICEF intranet system)</li> <li>ii. Internet (GDACS, HEWSweb, ReliefWeb, One response web site)</li> </ul> </li> </ul>
	DRR Division	5. Evaluate institutional capacities and presence of WMO and humanitarian agencies in different regions for long-term partnership development

## **Annexes**

**Revised Terms of reference of the Task Team on “Meteorological Services for Improved Humanitarian Emergency Planning and Response”**

**(a) Task Team on Meteorological Services for Improved Humanitarian Planning and Response** with the following Terms of Reference (TORs):

1) Review and document the needs and requirements of the international humanitarian agencies for:

- a) Meteorological, hydrological and climate services for operational procedures for planning, coordination and response to potential disasters;
- b) Dissemination mechanisms for exchange of these services and information; and,
- c) Training with regards to the effective utilization of meteorological, hydrological and climate services;

2) Review the institutional mechanisms and the documented procedures established through PWS in 1995 and their outcomes to enable the UN Department of Humanitarian Assistance (DHA), the predecessor of United Nations Office for Coordination of Humanitarian Affairs (UN-OCHA) to request meteorological assistance and information from the National Meteorological Centres and Regional Specialized Meteorological Centres (RSMC) serving that region;

3) In light of the needs and requirements of the humanitarian agencies, lessons learnt from the experiences from the PWS initiative in 1990s, new institutional and operational mechanisms resulted from the humanitarian reform, new meteorological, hydrological and climate technologies and other relevant issues, to develop an implementation plan to facilitate the provision of meteorological, hydrological and climate Services to the international humanitarian agencies from National Meteorological and Hydrological Services (NMHSs), RSMCs, Global and Regional Climate Centres (RCCs).

## First Meeting of the Task Team on Meteorological Services for Improved Humanitarian Planning and Response

31 August – 2 September 2010

### List of participants

Chair	Dr Michel Jean Meteorological Service of Canada Place Bonaventure 800, de La Gauchetiere Street West, room 7810 North-East Portal H5A 1L9 Montreal Quebec Quebec, Canada	Tel: +1 514 421 4614 Fax : +1 6139435737 Email: <a href="mailto:Michel.Jean@ec.gc.ca">Michel.Jean@ec.gc.ca</a>
CBS Expert	Mr Gerard Fleming Met Eireann Glasnevin Hill Dublin 9, Ireland	Tel: +353 87 2200 815, +353 53 9142 451, +353 1 806 4255 Fax: +353 1 8064247 Email: <a href="mailto:gffleming@eircom.net">gffleming@eircom.net</a>
CCL Expert	Dr Simon Mason International Research Institute for Climate and Society (IRI) Columbia University 61 Route 9W P.O. Box 1000 PALISADES, NEW YORK 10964-8000, USA	Tel: +1 845 680 4514 Fax : +1 8456804866 Email: <a href="mailto:simon@iri.columbia.edu">simon@iri.columbia.edu</a>
CCL Expert	Dr Rodney Martinez International Research Centre on El Niño (CIIFEN) Escobedo 1204 y 9 de Octubre Guayaquil, Ecuador	Tel: +593 4 2 514770 Fax: +593 42514771 E-mail: <a href="mailto:r.martinez@ciifen-int.org">r.martinez@ciifen-int.org</a>
CHy Expert	Mr Guido Van Langenhove Head, Hydrological Services Private bag 13193 Windhoek, NAMIBIA	Tel: +(264) 61 208 72 57 Fax: +264 612877009 Email: <a href="mailto:guidovanlangenhove@yahoo.fr">guidovanlangenhove@yahoo.fr</a>
International Federation of Red Cross and Red Crescent Societies (IFRC) Experts	Ms Yvonne Klynman Senior Officer, Disaster Policy  Mr Frederic Zanetta Senior Officer, Disaster Information 17, Ch des Crêts Petit Saconnex P.O. Box 372 1211 Geneva 19, Switzerland	Tel: +41 22 730 4477 Fax: +41 227330395 E-Mail: <a href="mailto:yvonne.klynman@ifrc.org">yvonne.klynman@ifrc.org</a>  Tel: +41 22 730 4291 Fax: +41 22 730 4291 E-Mail: <a href="mailto:frederic.zanetta@ifrc.org">frederic.zanetta@ifrc.org</a>
United Nations Children's Fund (UNICEF) Experts	Ms. Heidi Peugeot Regional Disaster Risk Reduction Specialist Emergency Unit, UNICEF TACRO Ciudad del Saber, Panama City	Tel: +5073017435 Fax : Email: <a href="mailto:hpeugeot@unicef.org">hpeugeot@unicef.org</a>

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

	Mr. Guillaume Simonian Programme Officer - Emergency Office of Emergency Programmes, Early Warning & Preparedness Section 5 - 7 avenue de la Paix 1202 Geneva, Switzerland	Tel: +41 22 909 5644 Fax: +41 22 909 5902 Email: <a href="mailto:gsimonian@unicef.org">gsimonian@unicef.org</a>
United Nations Institute for Training and Research (UNITAR) Expert	Mr Olivier van Damme UNITAR Operational Satellite Applications Programme (UNOSAT) Palais des Nations 1211 Geneva 10, Switzerland	Tel: +41 22 767 4020 Fax: +41787119745 Cell : +41 78 7119745 Email: <a href="mailto:olivier.vandamme@unitar.org">olivier.vandamme@unitar.org</a>
United Nations World Food Programme (WFP) Expert	Mr Etienne Labande Deputy Chief, Preparedness and Response Branch Via Cesare Giulio Viola 68/70 - Parco de' Medici 00148 Rome, Italy	Tel: +39 06 6513 3769 Fax: +39 0665132962 Email: <a href="mailto:etienne.labande@wfp.org">etienne.labande@wfp.org</a>
World Health Organization (WHO) Experts	Ms Heather Papowitz Medical Officer Risk Reduction and Preparedness  Dr Luzitu Simão Emergency Programme Support Health Action in Crises  Mr Abrahams Jonathan Coordinator, Risk Reduction & Emergency Preparedness Health Action in Crisis  Avenue Appia, 20 1211 Geneva 27, Switzerland	Tel: +41 22 791 3588 Fax: Email: <a href="mailto:papowitzh@who.int">papowitzh@who.int</a>  Tel: +41 22 7912720 Fax: +41 22 791 4844 Email: <a href="mailto:simaol@who.int">simaol@who.int</a>  Tel: +41 22 791 4366 Fax: Email: <a href="mailto:abrahamsj@who.int">abrahamsj@who.int</a>
ACMAD Expert	Mr Adama Alhassane Diallo Director General ACMAD 85, Avenue des Ministères BP:13184 Niamey - Niger	Tel: +227 20 734992 Fax: +227 20 723627 Email: <a href="mailto:dgacmad@acmad.ne">dgacmad@acmad.ne</a>
UNDP Expert	To be nominated	
WMO Secretariat		World Meteorological Organization 7 bis Avenue de la Paix Case postale No. 2300 CH-1211 Geneva 2 Switzerland
Dr Geoffrey Love Director, Weather and Disaster Risk Reduction Services Department		Tel: +41 22 7308264 Email: <a href="mailto:GLove@wmo.int">GLove@wmo.int</a>
Dr Maryam Golnaraghi Chief, Disaster Risk Reduction Programme		Tel: +41 22 730 8006 Email: <a href="mailto:MGolnaraghi@wmo.int">MGolnaraghi@wmo.int</a>
Mr Peter Chen Chief, Data Processing and Forecasting Systems Division		Tel: +41 22 7308 231 Email: <a href="mailto:PChen@wmo.int">PChen@wmo.int</a>
Mr Michael Berechree Observing Systems Division		Tel : +41 22 730 8212 Email : <a href="mailto:MBerechree@wmo.int">MBerechree@wmo.int</a>
Ms Haleh Kootval		Tel : +41 22 730 8333

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

Chief, Public Weather Services Programme	E-Mail: <a href="mailto:HKootval@wmo.int">HKootval@wmo.int</a>
Ms Leslie Malone Scientific Officer Climate Prediction and Adaptation Branch, CLW Department	Tel : +41 22 730 8220 Email : <a href="mailto:LMalone@wmo.int">LMalone@wmo.int</a>
Dr Rupa. Kolli Chief, Climate Information and Prediction Services	Tel: +41 22 730 8377 Email: <a href="mailto:RKolli@wmo.int">RKolli@wmo.int</a>
Mr Wolfgang Grabs Hydrology and Water Resources Division, CLW Department	Tel : +41 22 730 8358 Email : <a href="mailto:WGrabs@wmo.int">WGrabs@wmo.int</a>
Dr Jeff Wilson Director, Education and Training Programme	Tel. +41 22 730 8294 Email: <a href="mailto:JWilson@wmo.int">JWilson@wmo.int</a>
Mr David Thomas Project Manager, WIS	Tel : +41 22 730 8241 Email : <a href="mailto:DThomas@wmo.int">DThomas@wmo.int</a>
Mr Filipe Lúcio Senior Scientific Officer, Disaster Risk Reduction Division	Tel : +41 22 730 8579 Email : <a href="mailto:FLucio@wmo.int">FLucio@wmo.int</a>
Ms Nanette Lomarda Senior Scientific Officer and Acting Chief, World Weather Research Division Atmospheric Research and Environment Branch	Tel: +41 22 730 8384 Email: <a href="mailto:NLomarda@wmo.int">NLomarda@wmo.int</a>
Mr James Douris Consultant, DRR Programme, WMO	Tel : +41 22 730 8229 Email : <a href="mailto:JDouris@wmo.int">JDouris@wmo.int</a>

## First Meeting of the Task Team on Meteorological Services for Improved Humanitarian Planning and Response

31 August – 2 September 2010

### AGENDA

Day 1 – August 31	
0830 – 0900	Registration
09:00 – 12:30	<ol style="list-style-type: none"> <li>1. ORGANIZATION OF THE MEETING <ol style="list-style-type: none"> <li>1.1 Opening of the meeting</li> <li>1.2 Introduction of the Task Team members</li> <li>1.3 Adoption of the agenda</li> <li>1.4 Working arrangements</li> </ol> </li> <li>2. OVERALL OBJECTIVES AND EXPECTATIONS OF THE INITIATIVE AND THE 1<sup>ST</sup> MEETING OF THE TASK TEAM</li> <li>3. REVIEW OF THE TERMS OF REFERENCE OF THE TASK TEAM ON METEOROLOGICAL SERVICES FOR IMPROVED HUMANITARIAN PLANNING AND RESPONSE</li> </ol>
12:30 – 14:00	Lunch
14:00 – 17:00	4. INSTITUTIONAL STRUCTURE OF THE HUMANITARIAN AGENCIES, THEIR REQUIREMENTS FOR METEOROLOGICAL, HYDROLOGICAL AND CLIMATE INFORMATION PRODUCTS AND SERVICES, SOURCES OF INFORMATION AND DISSEMINATION CHANNELS
17:30 – 19:00	Cocktail
<b>Day 2 – September 1</b>	
0900 – 12:30	5. DISCUSSION OF INSTITUTIONAL MECHANISMS AND NEEDS FOR INFORMATION OF THE HUMANITARIAN AGENCIES IN DIFFERENT REGIONS AND WMO CAPACITIES IN THOSE REGIONS
12:30 – 14:00	Lunch
14:00 – 17:00	<ol style="list-style-type: none"> <li>6. WMO STRATEGY IN DRR AND IMPLEMENTATION PLAN THROUGH REGIONAL/NATIONAL PROJECTS</li> <li>7. WMO OPERATIONAL NETWORK AND TECHNICAL CAPABILITIES FOR PROVISION OF METEOROLOGICAL, HYDROLOGICAL AND CLIMATE SERVICES</li> </ol>

<b>Day 3 – September 2</b>	
0900 – 12:30	8. PLANNING FOR DEVELOPMENT OF PILOT/PROTOTYPES FOR PROVISION OF METEOROLOGICAL, HYDROLOGICAL AND CLIMATE SERVICES THROUGH POTENTIAL PILOTS IN THE SHORT AND LONG - TERM  9. DATE AND VENUE OF THE NEXT MEETING  10. ANY OTHER BUSINESS
12:30 – 14:00	Lunch
14:00 – 17:00	Continued
17::00	11. CLOSURE OF THE MEETING

## Questionnaire

### Part A: To be completed by experts from humanitarian and development agencies

**Please list the contact information for individuals who contributed to this questionnaire:**

Title	First name	Last name	Country	Name of agency	Phone number	e-mail address

#### 1 Institutional structure and decision making processes of the humanitarian agencies

1.1 Please describe the institutional structure of your organization at national, regional and global levels?

**Answer:**

1.2 What are the decision processes within short, medium and long-term at national, regional and global levels (including headquarters)?

**Answer:**

#### 2 Decision processes that require the use of meteorological, hydrological and climate information-products and services

2.1 Please describe the way meteorological, hydrological and climate information-products and services are used in decision making for humanitarian planning and response at national, regional and global levels;

**Answer:**

2.2 Please describe the type of information-products and services used in each case.

**Answer:**

#### 3 Needs and requirements for meteorological, hydrological and climate information ranging from data, analysis and forecasts (short to medium-range weather forecasts to forecasts and

<p><b>information from the next month, season to longer time frames)</b></p> <p>3.1 Please describe your needs and requirements for meteorological, hydrological and climate information-products and services with respect to:</p> <ul style="list-style-type: none"> <li>• Content;</li> <li>• Time Frames (lead-time and frequency);</li> <li>• Dissemination Mechanisms;</li> <li>• Source of Information.</li> </ul>
<p><b>Answer:</b></p>
<p><b>4 Current sources of information</b></p> <p>4.1 Please describe your current sources of meteorological, hydrological and climate information-products and services (data, analysis, and forecasts);</p>
<p><b>Answer:</b></p>
<p>4.2 Please describe to what extent you receive meteorological, hydrological and climate information-products and services directly from National Meteorological and Hydrological Services (NMHSs) or Regional Specialized Meteorological Centres (RSMCs);</p>
<p><b>Answer:</b></p>
<p>4.3 Please describe to what extent you organization outsourcers meteorological, hydrological and climate information-products and services from specialized institutions other than the NMHSs;</p>
<p><b>Answer:</b></p>
<p>4.4 Please indicate the sources from which your organization outsourcers meteorological, hydrological and climate information-products and services.</p>
<p><b>5 Dissemination channels used to access and share information</b></p> <p>5.1 Please describe the channels used to access meteorological, hydrological and climate information-products and services in your organization;</p>
<p><b>Answer:</b></p>
<p>5.2 Please describe the channels used to disseminate or share meteorological, hydrological and climate information-products and services from your source to your network from headquarters, regional and national levels.</p>
<p><b>Answer:</b></p>
<p><b>6 Sources of expertise to analyze and interpret meteorological, hydrological and information, products and services</b></p> <p>6.1 Please describe the extent of meteorological, hydrological and climate expertise within your</p>

institution for analysis and interpretation of meteorological, hydrological and climate information-products and services;
<b>Answer:</b>
6.2 Please describe the source of expertise used by your organization to analyze, interpret and apply meteorological, hydrological and climate information-products and services;
<b>Answer:</b>
6.3 Please describe to what extent your institution requests external expert support for interpretation of information.
<b>Answer:</b>
<b>7 Where are the major gaps</b>
7.1 Please describe where are the major gaps with respect to:
<ul style="list-style-type: none"> <li>• Access to meteorological, hydrological and climate information-products and services;</li> <li>• Utilization of meteorological, hydrological and climate information-products and services.</li> </ul>
<b>Answer:</b>

**Part B: To be completed by experts from technical agencies and regional centres**

**Please list the contact information for individuals who contributed to this questionnaire:**

Title	First name	Last name	Country	Name of agency	Phone number	e-mail address

<b>1 Institutional relationships with humanitarian and emergency preparedness and response agencies</b>
1.1 Please describe the institutional relationship of your organization with humanitarian and emergency preparedness and response agencies at national, regional and global levels?

<b>Answer:</b>
1.2 Please describe how was the relationship developed?
<b>Answer:</b>
<p><b>2 Needs and requirements for meteorological, hydrological and climate information ranging from data, analysis and forecasts (short to medium-range weather forecasts to forecasts and information from the next month, season to longer time frames)</b></p> <p>2.1 Please describe the needs and requirements for meteorological, hydrological and climate information-products and services required by the humanitarian and emergency response agencies at national, regional and global levels, with respect to:</p> <ul style="list-style-type: none"> <li>• Content;</li> <li>• Format;</li> <li>• Time Frames (lead-time and frequency)</li> </ul>
<b>Answer:</b>
2.2 Please describe how these needs and requirements were identified.
<b>Answer:</b>
<p><b>3 Information-products and services provided.</b></p> <p>3.1 Please describe the information-products and services provided by your organization (ranging from data, analysis and forecasts from short to seasonal or longer time frames) to humanitarian and emergency preparedness and response agencies at national, regional and global level.</p>
<b>Answer:</b>
3.2 Please describe any information-products and services required by the humanitarian and emergency preparedness and response agencies that your organization is currently not able to provide.
<b>Answer:</b>
<p><b>4 Interpretation of meteorological, hydrological and climate information products and services</b></p> <p>4.1 Please describe the extent to which humanitarian and emergency preparedness and response agencies can interpret and apply meteorological, hydrological and climate information-products and services from your organization.</p>
<b>Answer:</b>

<b>5 Dissemination channels</b> 5.1 Please describe the channels used to disseminate meteorological, hydrological and climate information-products and services from your organization to the humanitarian and emergency preparedness and response agencies.
<b>Answer:</b>
<b>6 Where are the major gaps</b> 6.1 Please describe where are the major gaps with respect to: <ul style="list-style-type: none"><li>• Production of tailored meteorological, hydrological and climate information- products and services;</li><li>• Access to meteorological, hydrological and climate information-products and services;</li><li>• Utilization of meteorological, hydrological and climate information-products and services.</li></ul>
<b>Answer:</b>

## Questionnaire Response List

Agency	Type of Agency	Responded
International Federation of Red Cross and Red Crescent Societies (IFRC)	Humanitarian	Yes
The United Nations Children's Fund (UNICEF)	Humanitarian	Yes
Office for the Coordination of Humanitarian Affairs (OCHA)	Humanitarian	Yes
United Nations World Food Programme (WFP)	Humanitarian	Yes
United Nations Commissioner for Refugees (UNHCR)	Humanitarian	No
United Nations Development Programme (UNDP)	Humanitarian	No
World Health Organization (WHO)	Humanitarian	Yes
United Nations Institute For Training and Research (UNOSTA)	Humanitarian	No
African Centre of Meteorological Application for Development (ACMAD)	Specialized	Yes
Centro Internacional para la Investigación del Fenómeno de El Niño (CIIFEN)	Specialized	Yes
International Research Institute for Climate and Society (IRI)	Specialized	Yes

## Questionnaire Outcomes

### A) International Agencies

The table below summarizes the responses to the questionnaire from the International Federation of Red Cross and Red Crescent Societies (IFRC), The United Nations Children's Fund (UNICEF), Office for the Coordination of Humanitarian Affairs (OCHA), United Nations World Food Programme (WFP).

Survey Questions							
Agency	1) Institutional structure and Decision making Processes	2) Decision processes that require hydromet and climate information	3) Needs for Meteorological, Hydrological and Climate products	4) Current sources of information	5) Dissemination channels	6) Sources of expertise to analyze and interpret hydromet and climate data and products	7) Major gaps
IFRC	<p>Decentralized with headquarters in Geneva.</p> <p>5 zones that cover the world</p> <p>IFRC Signed MoU's with UN Agencies (OCHA, UNDP, WFP) and other international organizations (ECOWAS, Oxfam, etc)</p> <p>IFRC are an auxiliary to National Governments</p>	<p>Since signing MoU with ACMAD (ACMAD and IFRC Climate Center)</p> <p>IFRC has a desk in ACMAD which analyses and interprets the hydromet &amp; climate information</p>	<p>Forecasts need to be more precise, specific and user friendly.</p> <p>Seasonal, Monthly, weekly and daily forecasts</p> <p>3 day lead-time for rain and flooding will enable a well coordinated response</p>	<p>ACMAD (data, analysis and forecasts)</p> <p>The IFRC Climate Center support the Regional Representations of the NS in translating the scientific information into actions</p> <p>IFRC Climate Guide which is used as a risk assessment tool</p>	<p>DRM department of the regional representation of the Sahel base in Dakar, Africa receives yearly a May – June climate forecast for the rainy season. This forecast is immediately sent the National Societies of the Sahel, West Coast Regional Representation and Central Africa who are also responsible for sending to the NS under their responsibility. The NS disseminates to concerned communities and their volunteers.</p>	<p>ACMAD and IFRC (MoU)</p>	<p>Need national forecasts from the NMHS of the forecast country</p> <p>Need for NMHS and regional forecasts to be harmonized</p> <p>Need a simple accessible communication tools for all stakeholders to send and receive information in real-time</p> <p>Access to meteorological, hydrological and climate information-products and services;</p> <ol style="list-style-type: none"> <li>Difficulties for the humanitarian actors to understand the scientific information when simplified and without key indicators that makes simple understanding of the available information;</li> <li>Low cooperation between meteorological, hydrological services and humanitarian actors</li> </ol> <p>Utilization of meteorological, hydrological and climate information-products and services.</p> <ol style="list-style-type: none"> <li>Translation of the scientific information to the communities;</li> <li>Dissemination of the information to the actors concerned in a timely manner;</li> </ol>

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

Survey Questions							
Agency	1) Institutional structure and Decision making Processes	2) Decision processes that require hydromet and climate information	3) Needs for Meteorological, Hydrological and Climate products	4) Current sources of information	5) Dissemination channels	6) Sources of expertise to analyze and interpret hydromet and climate data and products	7) Major gaps
							3. The forecasts help the communities elaborate their own early warning early action system, preparedness and emergency response.
<b>UNICEF</b>	<p><u>Structure</u></p> <p>National Level: 130 country offices, plus sub-national offices in many countries</p> <p>Regional Level: 7 Regional Offices</p> <p>Global Level: Head Offices in New York and Geneva, Logistical hub in Copenhagen, Liaison Offices in Tokyo and Brussels, Research Centre in Florence</p> <p>In addition, 36 UNICEF National Committees in high income countries do fundraising and advocacy for the rights of the child</p> <p><u>Decision processes</u></p> <p>Global Level:</p> <p>Long-term: Mid Term Strategic Plan over 4 years and extended to 8 years</p> <p>Mid-Term: Office Management Plan (2 years)</p> <p>Short-Term: Annual Work Plan</p> <p>Regional Level:</p> <p>Long-term: Mid Term Strategic Plan over 4 years and extended to 8 years</p> <p>Mid-Term: Office Management Plan (2 years)</p> <p>Short-Term: Annual Work Plan</p> <p>Country Level:</p> <p>Long-term: Country Programme Document / Country Programme Management Plan over 5 years</p> <p>Mid-term: Mid-term review of the</p>	<p>Hydromet services are used for early-warning purposes in order to draw the attention to potential emergency situation that would warrant a response from UNICEF, they are not used consistently though:</p> <p>Global Level: UNICEF 24/7 Emergency Operation Center (OPSCEN) and Early-Warning and Preparedness Unit on a daily basis, as well as IASC Inter-Agency sub-working group on preparedness 3 times/year. Enhanced forecasts would feed into long-term organizational strategies for DRR and Climate Change Adaptation</p> <p>Regional Level: Emergency unit of the Regional Offices (not very consistently). Enhanced forecast would feed into regional strategies to support specific country Offices on DRR and climate change adaptation</p> <p>Country Offices: Emergency focal point (varies a lot from no monitoring / no link with Hydromet service at all to regular monitoring in the various country offices).</p>	<p>Medium-term regular hydrological and meteorological analytical information would be useful per region for the next month, for the next season and for the year, coupled with alerts if needs be in the next week.</p>	<p>Various humanitarian and specialized hazard information portals (e.g. HEWS web, FEWS Net, IRI, FAO, USGS, WMO)</p> <p>These sources are not used regularly as they speak of different types of potential threats (no generic overview taking all the various threats together, hence no time to go through them one by one) and they don't provide readily clear information for humanitarian professionals.</p> <p>Local media and open-source alerts</p> <p>Some countries institutionalized direct linkages with the NMHS but his is more the exception rather the rule.</p>	<p>UNICEF internal Early-Warning Early Action system (intranet based) is the main channel as early-warning information repository.</p> <p>The country offices provide regular analyses and given the amplitude of the threats they face the system sends alerts.</p>	<p>Very little expertise in this field, and no institutionalization of it at all. The hydromet information would need to be pre-analyzed by specialists with indication of possible humanitarian consequences before reaching UNICEF if to be of any use</p> <p>Some Country Offices entertain relations with hydromet experts but this is very ad-hoc.</p>	<p>At the moment both access and utilization of hydromet information are not institutionalized in UNICEF because:</p> <ul style="list-style-type: none"> <li>No relevant service has been able to provide a coordinated approach enabling the provision of regular and clear but not overwhelming seasonal analytical bulletins coupled with humanitarian early-warning alerts if needed. These bulletins must be formulated in such a language that is not technical and accessible to non-specialist development and humanitarian workers.</li> <li>Since access and utilization of hydromet information are ad-hoc, many situations that are potentially possible to forecast come as a surprise. Such a service could help bridge that gap.</li> <li>Regular UNICEF early-warning analyses at country level are often made without knowledge of the forecasts and analyses done by hydromet experts.</li> <li>Monitoring by headquarters and regional offices are also often not informed by good and updated information by hydromet specialists due to lack of access and absence of specialized skills to read and understand technical information.</li> <li>There is a very clear need for “translation” of the highly technical and jargon-filled hydro-met data and forecasts from specialized institutions and hydro-</li> </ul>

First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010

Survey Questions							
Agency	1) Institutional structure and Decision making Processes	2) Decision processes that require hydromet and climate information	3) Needs for Meteorological, Hydrological and Climate products	4) Current sources of information	5) Dissemination channels	6) Sources of expertise to analyze and interpret hydromet and climate data and products	7) Major gaps
	Country Programme  Short-term: Rolling Work Plan / Annual Work Plan over 1 or 2 years.						met stations around the world into common-sense English that can be easily understood and acted upon by our humanitarian officers at all levels.
OCHA	<p>The executive management of OCHA consists of the Offices of the Under-Secretary-General/Emergency Relief Coordinator and the Assistant Secretary-General/Deputy Emergency Relief Coordinator, as well as the Offices of the Directors of New York, Geneva and the Coordination and Response Division.</p> <p>The Under-Secretary-General/Emergency Relief Coordinator (USG/ERC) serves as the principal adviser to the Secretary-General on all humanitarian issues. The USG/ERC has three primary tasks: humanitarian policy development and coordination in support of the Secretary-General; advocacy of humanitarian issues and provision of guidance and direction to United Nations Resident Coordinators and Humanitarian Coordinators; and coordination of international humanitarian response.</p> <p>The USG/ERC chairs the Inter-Agency Standing Committee (IASC) and the Executive Committee for Humanitarian Affairs (ECHA). With an emphasis on strategic planning, management, staff security and transition issues, the Assistant Secretary-General/Deputy Emergency Relief Coordinator supports the work of, and is principal adviser to, the USG/ERC. The Assistant Secretary-General provides direct managerial supervision of OCHA, ensuring effective cooperation between headquarters (New York and Geneva), Regional Offices (ROs) and Country Offices (COs). The Assistant Secretary-General oversees the Executive Office and the Strategic Planning Unit.</p>	<p><u>National level:</u> Emergency preparedness planning processes such as contingency planning are based on scenario building on hydro-met information, such as precipitation forecast, flooding records, long-term climate patterns, etc.</p> <p>Early Warning systems for famine, floods, cyclones etc require weather and climate information.</p> <p><u>Regional level</u></p> <p>Same as above.</p> <p><u>Global level</u></p> <p>The Global Disaster Alert and Coordination System uses dynamic weather data to provide near real-time alerts about natural disasters around the world and tools to facilitate response coordination, including media monitoring, map catalogues and Virtual On-Site Operations Coordination Centre: <a href="http://www.gdacs.org/">http://www.gdacs.org/</a></p> <p>The IASC Humanitarian Early Warning Service (HEWSweb) is an inter-agency partnership project aimed at establishing a common platform for humanitarian early warnings and forecasts for</p>	It is important to have timely and detailed information by zones on a small scale for areas at risk (in order by example to detect pocket areas of drought or potential flash floods etc).	Depending on the location, the relation between OCHA and UN with the NMHS/RSMCs, and the capacity of the NMHS/RSMCs to provide information.	<p>Access meteorological, hydrological and climate information-products and services is through the web for regional information and through regional meetings (i.e. food security network). If information is required, requests are handled at the technical level, mainly in the field.</p> <p>Dissemination or sharing of meteorological, hydrological and climate information-products is done through information meetings with regional humanitarian partners, through regional analysis of future humanitarian trends.</p> <p>Through web portals (e.g. GDACS, ReliefWeb, Virtual On-Site Operations Coordination Centre (Virtual OSOCC))</p>	<p>There is no dedicated expertise for such analysis within OCHA.</p> <p>OCHA relies on partner organizations, NMHS/RSMCs or relevant institutions such as FEWS NET.</p>	<p>Coverage: various services cover different areas, thus it is difficult to obtain an overall sub-regional outlook covering all countries and have a forecast published on time.</p> <p>Precision: due to the scale of the area covered by a forecast they are not precise enough to have a detailed picture of the possible consequences of the forecast. However, a precise forecast on a small scale would be very useful for highly populated areas and for preparedness in zones with difficult physical access.</p> <p>Timing: of course the earlier the better, knowing that it is highly difficult to have accurate forecast within 6 months time ...</p> <p>Flexibility: Is it feasible to request a special weather forecast, for a relatively small scale forecast for certain zones where this information will be determinant for a better response/recovery strategy ( post major earthquake by example)?</p> <p><u>Identified Pakistan gaps are illustrative of common national to local gaps. These include:</u></p> <ul style="list-style-type: none"> <li>Public awareness programs to respond to warnings issued by authorities is lacking.</li> <li>Resources and mobilization are at the disposal of the (District Disaster Management Authorities (DDMAs) and the community level. Therefore there are no resources at the higher level to translate the</li> </ul>

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

Survey Questions							
Agency	1) Institutional structure and Decision making Processes	2) Decision processes that require hydromet and climate information	3) Needs for Meteorological, Hydrological and Climate products	4) Current sources of information	5) Dissemination channels	6) Sources of expertise to analyze and interpret hydromet and climate data and products	7) Major gaps
		natural hazards: <a href="http://www.hewsweb.org">http://www.hewsweb.org</a> .					<p>warnings into action.</p> <ul style="list-style-type: none"> <li>Realization at all levels of authority that Disaster Risk Reduction (DRR) is an investment requiring resources is lacking.</li> <li>The Media is supportive to disseminate information but Public awareness on what to steps to take in case of emergency is lacking.</li> <li>Meteorological &amp; hydrological information is available at meteorological centers located in capital cities and through website of PMD <a href="http://www.pakmet.com.pk/">http://www.pakmet.com.pk/</a>, very few people can access these information. There is need to devolve information centers to reach many more people. The interpretation of the information by the end users is a problem effort should be made to provide the advisories in simpler language.</li> </ul>
WFP		<p>1) Early Warning and Preparedness Planning activities: Weather patterns form part of the risk analysis for each country, whether for 'routine' emergencies related to predictable weather patterns eg monsoon flooding, winter-melt landslides or unusual weather patterns that can bring abnormal problems. Long term forecast (3 months and more) are used for Contingency Planning in scenario building in terms of impact on agricultural campaign and food assistance requirement (caseloads and needs)</p> <p>2) GIS/remote sensing</p>	<p>For the short and medium time scales:</p> <ul style="list-style-type: none"> <li>Periodic rainfall estimated (RFE)</li> <li>Forecast rainfall (short/medium/long term)</li> <li>Current and forecasted river levels</li> <li>Snow data (depth and coverage)</li> <li>Temperature</li> <li>Sea temperatures (specifically Pacific ocean)</li> <li>Cyclone tracking</li> </ul>	<p>IGAD, ICPAC, FEWS NET, IRI, NOAA, Regional Remote Sensing Centre in Gaborone, NMHSs, ACSAD in Damascus, British Met Office, ACMAD, Weatherwatch.com, NASA wist explorer, especially MODIS satellite information, USGS RFE &amp; hydrological, FAO (normal potential evapotranspiration data), General Circulation Modael (GCM) and Regional Climate Model rainfall and PET data, ENEA, ITHACA, JRC, Weather Underground, BOM, JMA, NRL_MRY, EARS</p> <p>Some of the sources mentioned above are using</p>	<p>WFP accesses hydromet and climate information and products through Email services and websites</p> <p>Following interpretation, analysis and synthesis of humanitarian and logistical operational implications, the analysis is shared with management at country, regional and headquarters levels by:</p> <ul style="list-style-type: none"> <li>Intranet platform (EPweb)</li> <li>Emails (early</li> </ul>	<p>Good level of in-house expertise to analyze and interpret the data: VAM, GIS, Early Warning Team, Africa Risk View project</p> <p>These experts analyses/interpreted this information and present it in an easy way for decision making purpose, through the dissemination channels already described</p> <p>External support used for interpretation of information includes:</p> <p>Collaboration with the</p>	<p>1) Access to quality information for certain high risk countries:</p> <p>2) Access to higher resolution data: Cumulative precipitation data and short/medium forecasts for rain and snow falls at a good resolution would be useful to be able to focus on small areas. Information on the rainfall distribution would be extremely useful to better understand the agricultural campaign ( in addition to information on quantity)</p> <p>4) Access to historical data at good resolution: There is still a need for a consistent rainfall dataset going back in time as far as possible without inconsistencies/data gaps in order to further calibrate the Africa RiskView model and better quantify rainfall risk across the continent. To date all consistent records start in 1995/6. In addition to having a long-term</p>

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

Survey Questions							
Agency	1) Institutional structure and Decision making Processes	2) Decision processes that require hydromet and climate information	3) Needs for Meteorological, Hydrological and Climate products	4) Current sources of information	5) Dissemination channels	6) Sources of expertise to analyze and interpret hydromet and climate data and products	7) Major gaps
		<p>analyses: GIS/remote sensing analyses are looking at current trends of climate indicators in relation to household food security, risk analysis at catchment level, especially for implementing natural resource conservation and development programmes</p> <p>3) Response Design:</p> <ul style="list-style-type: none"> <li>- When hazards are imminent: Response planning (possible population affected / operation scale up)</li> <li>- Once the hazard has occurred: Risk trend monitoring, where to scale up/down operation</li> <li>- Logistics: where to store food, corridors, road conditions etc</li> </ul>	<p>- NDVI (not a meteorological, hydrological and climate information but linked to precipitation)</p> <p>Time Frames (lead-time and frequency): Depends on whether hazard is drought, flood or cyclone. Generally monthly to quarterly updates as lead-time or pre-season outlooks are sufficient, however in case cyclone and floods have occurred regular (up to daily or weekly updates) are required for logistics planning of humanitarian response.</p>	<p>information and analysis from NMHSs and RSMCs</p> <p>At national level, some WFP country offices consult with national meteorological service if efficient services are available and few have signed a MOU (like El Salvador, and Honduras). However, there is lack of contact with NMHSs in certain regions, especially in West Africa</p>	<p>warning services)</p> <ul style="list-style-type: none"> <li>• HEWS web</li> <li>• Regional websites: SATCA, SARCOF platform for SADC countries</li> <li>• Africa Risk View software</li> <li>• Meetings (interagency meetings, Climate Change conferences)</li> <li>• Ad hoc emails with key country staff and senior management for decision making and response planning</li> </ul>	<p>other UN agencies, Governments/regional institutions and partners to discuss potential impact and agree on scenario</p> <p>Collaboration with specialized institution</p>	<p>consistent time series of data, a real-time, objective and reliable data feed is also critical in order to use the data operationally. The highest spatial resolution of data as possible is required to adequately monitor sub-national rainfall.</p> <p>5) Access to technology: CDRS is using the leading technology available that satisfies the project’s data criteria of using long, consistent historical datasets with reliable, objective real-time data feeds as outlined above. Any improvements in these input datasets are welcome. In this regard CDRS is in discussions with NOAA on reprocessing the ARC RFE data set back to 1983 to create a consistent, nearly 30 year 10 x 10 km gridded rainfall estimate product for the African continent. It is hoped results from this work will be available in 2011 for use by CDRS and the public. However there is still plenty of scope to improve real-time and historical RFE and PET products using the most recent remote sensing technology and improving the operational models that are built using this data.</p> <p>6) Utilization at the ground level: One of the major gaps lies with the sharing of information to population likely to be affected: farmers, pastoral should be informed early of this info so that plan can be made with them on how to medicate the situation. Increased communication of such information in local language to population at risk is a real and important gap that needs to be covered. There is plenty of info and WFP uses it – however we are not doing well in sharing it with the people we are here to serve (ex of Bangladesh drums)</p> <p>7) Access to more information on abnormal weather patterns: It would be useful to have alerts for abnormal weather patterns, like the weak gulf stream for example, including modeling that underlies factors and likely effects (in the same way as is done for El Nina).</p>

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

Survey Questions							
Agency	1) Institutional structure and Decision making Processes	2) Decision processes that require hydromet and climate information	3) Needs for Meteorological, Hydrological and Climate products	4) Current sources of information	5) Dissemination channels	6) Sources of expertise to analyze and interpret hydromet and climate data and products	7) Major gaps
<b>WHO</b>	<p><b>WHO is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.</b></p> <p><b>This includes technical support to countries for developing health emergency management capacities, including risk assessment, preparedness, response and recovery; as well as supporting countries to respond to emergencies, disasters and other crises, principally in relation to coordination of international health assistance and filling gaps in the response.</b></p> <p><b>WHO operates at three levels: a WHO Country Office presence in over 140 low and middle developing countries led by the Head of the WHO Country Office, usually the WHO Representative. Country Offices have responsibility for advising Ministries of Health on the development of health system capacities, which includes emergency risk management.</b></p> <p><b>WHO has six Regional Offices led by a Regional Director. Each Regional Office has a unit to address support for strengthening of national health emergency management capacities and to coordinate international humanitarian assistance in time of emergency, disaster or crises.</b></p> <ul style="list-style-type: none"> <li>• <b>Emergency and Humanitarian Action, WHO Regional Office for Africa (AFRO)</b></li> <li>• <b>Emergency Preparedness and Disaster Relief, WHO Regional Office for the Americas/Pan American Health Organization (AMRO/PAHO)</b></li> <li>• <b>Emergency Preparedness and Humanitarian Action, WHO Regional Office for the Eastern Mediterranean (EMRO)</b></li> </ul>	<p><b>Long-term (greater than 6 months) :</b></p> <ul style="list-style-type: none"> <li>• Support for national capacity development is based on risk assessment (and emergency risk profiles) incorporating meteorological, hydrological and climate information.</li> <li>• Climate information related to food security (good and poor rains for agriculture, drought)</li> <li>• Development of WHO response plans as part of UN country teams.</li> <li>• Development of national/community/health facility response plans for climate-related hazards, including wildfire, flood, storms, landslides, infectious diseases, water shortages, heat stress, chemical and radiological hazards and other potential sources of risk, including food security, mass gatherings, population displacement and infrastructure failure.</li> <li>• Climate information informs policy on climate change adaptation (such as setting and standards of health infrastructure.)</li> <li>• Climate data informs spatial distribution of health risks and burdens (e.g. climate suitability maps for infectious disease transmission, including epidemics).</li> <li>• Climate information informs</li> </ul>	<ul style="list-style-type: none"> <li>• Content; daily meteorological data at the climatic station level</li> <li>• Time Frames (lead-time and frequency); the longest period of observation possible</li> <li>• Dissemination Mechanisms; dataset online on internet</li> <li>• Source of Information: National meteorological agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Global Surface Summary of the Day Dataset produced by the US National Climatic Data Center (NCDC) at: <a href="ftp://ftp.ncdc.noaa.gov/pub/data/inventories/">ftp://ftp.ncdc.noaa.gov/pub/data/inventories/</a></li> <li>• Climate surfaces and projections from a range of climate data centres (e.g. UEA and Hadley Centre in the UK)</li> </ul>	<p><b>The WHO accesses meteorological, hydrological and climate information-products and services through the internet and disseminates or shares this information to the WHO organization through internet and sending DVD's.</b></p>	<p><b>The WHO uses the following to analyze, interpret and apply meteorological, hydrological and climate information-products and services:</b></p> <ul style="list-style-type: none"> <li>• Ibnou Zohr University of Agadir in Morocco and the Regional Center of Investigation in Public Health (CRISP) based in Chiapas, Mexico for data extraction, analysis and mapping for the production of meteorological hazard distribution maps in the context of the WHO e-atlas of disaster risks (flood, heat wave and wind speed)</li> <li>• Academic institutions with experience in applying climate information in risk mapping over short to long time periods (e.g. London School of Hygiene and Tropical Medicine),,</li> </ul> <p><b>The WHO requests the WMO to review the models used in the context of the first version of the WHO e-atlas of disaster risk.</b></p>	<ul style="list-style-type: none"> <li>• Possibility to have access to NMHSs data when the country data is not integrated into global datasets</li> <li>• Forum/tasks force/working group aiming at developing/standardizing method to model and spatially distribute meteorological hazards (i.e. agricultural and hydrological drought right now)</li> <li>• Lack of a expert directory</li> </ul>

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

Survey Questions							
Agency	1) Institutional structure and Decision making Processes	2) Decision processes that require hydromet and climate information	3) Needs for Meteorological, Hydrological and Climate products	4) Current sources of information	5) Dissemination channels	6) Sources of expertise to analyze and interpret hydromet and climate data and products	7) Major gaps
	<ul style="list-style-type: none"> <li>Disaster Preparedness and Response, WHO Regional Office for Europe (EURO)</li> <li>Emergency and Humanitarian Action, WHO Regional Office for South-east Asia</li> <li>Emergency and Humanitarian Action, WHO Regional Office for the Western Pacific (WPRO)</li> <li>At WHO Headquarters, based in Geneva, the Health Action in Crises cluster is headed by the Assistant Director General (HAC) and has three departments:               <ul style="list-style-type: none"> <li>Strategy, Policy and Resource Management</li> <li>Response and Recovery Operations, and</li> <li>Emergency Preparedness and Institutional Readiness (including the WHO Mediterranean Centre for Health Risk Reduction in Tunis).</li> </ul> </li> </ul> <p>Other clusters and departments in WHO have comparable responsibilities related to managing the risks of other types of hazards: such as Health Security and Environment Cluster (for infectious disease, chemical hazards, radiological hazards and food safety). The Department of Public Health and Environment has a climate change team which leads the development and implementation of the WHO Global Work Plan on climate change and health (including components related to emergencies, such as surveillance, early warning, disaster risk reduction and emergency preparedness.) Working with corresponding departments in the six WHO regional offices, it coordinates policy and technical guidance, and country projects integrating health dimensions of long-term climate change alongside shorter-term meteorological hazards.</p> <p>The WHO Country Office is the front-line of WHO's humanitarian efforts, including capacity development for health</p>	<p>WHO advocacy on disaster risk management and climate change (through country and regional risk assessments, eg E-Atlas)</p> <p><b>Medium-term (6 months):</b></p> <ul style="list-style-type: none"> <li>Adaptation of WHO/national response plans based on seasonal information (such as El Nino/La Nina)</li> <li>WHO contributes to health information to the UN Early Warning Early Action Reports which are distributed to Regional and Country Offices.</li> <li>Forecasts also required to post-disaster recovery concerning the weather conditions to be expected and impact on public health (eg. cold weather relates to clothing and shelter, surface water for vectors carrying disease)</li> <li>Seasonal information is required for risk assessment and early warning of diseases with epidemic potential (eg. water-borne diarrhoeal diseases, meningitis, malaria, dengue )</li> </ul> <p><b>Short-term:</b></p> <ul style="list-style-type: none"> <li>Warning systems for weather events, including storms, floods, heatwaves, extreme cold, and associated health risks, such as infectious disease epidemics</li> <li>Operational information on weather conditions for ongoing risk to populations</li> </ul>					

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

Survey Questions							
Agency	1) Institutional structure and Decision making Processes	2) Decision processes that require hydromet and climate information	3) Needs for Meteorological, Hydrological and Climate products	4) Current sources of information	5) Dissemination channels	6) Sources of expertise to analyze and interpret hydromet and climate data and products	7) Major gaps
	<p>emergency risk management and coordination. WHO Regional Offices provide support to Country Offices, and in turn, HQ provides support to countries through the WHO Regional Offices. Regional office activity is focused on providing technical assistance, development of regional/national capacities and developing regional partnerships, while at the global level, WHO is focused on policy setting, developing norms and standards, promoting advocacy at international and interagency levels, and establishing interagency and international partnerships in this area.</p> <p>WHO also leads the thematic platform on disaster risk reduction for health (as part of the ISDR system) and the Global Health Cluster with responsibility for developing cluster capacities as well as ensuring the functioning of the Health Cluster at country level in times of emergency.</p> <p>Over the very long-term, WHO provides technical guidance to assess health vulnerability to climate change, and to support stronger and more adaptable services and infrastructure in health and health supporting sectors (e.g. selecting climate-resilient water and sanitation technologies).</p>	<p>and responders (eg. temperature, rainfall, wind for plume modeling related to smoke, water and air pollutants from chemical spills, radiological emergencies, fires, volcanoes)</p> <ul style="list-style-type: none"> <li>Operational information on the effect of hydrometeorological factors on humanitarian response operations such as logistics, access to affected populations, siting of health facilities, potable water and latrines</li> <li>weather information required for the safety of people attending mass gatherings (eg heat, cold, rain)</li> </ul>					

First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010

**B) Specialized Centers**

The table below summarizes the responses to the questionnaire from the African Centre of Meteorological Application for Development (ACMAD), Centro Internacional para la Investigación del Fenómeno de El Niño (CIIFEN), International Research Institute for Climate and Society (IRI).

Survey Questions						
Agency	1) Institutional relationships with humanitarian and emergency preparedness and response agencies	2) Needs for Meteorological, Hydrological and Climate products	3) Information-products and services provided	4) Interpretation of hydrometeorological and climate information products and services	5) Dissemination channels	6) Major gaps
ACMAD	<p>At the continental and national levels, the focal points are the NMHSs for the dissemination of meteorological and climate services that are elaborated by ACMAD (weather and climate information and prediction products). However, ACMAD can provide directly climate services to any user at whatever level through specific agreements.</p> <p>An agreement has been established with the IFRC Regional Office for West and Central Africa based in Dakar, for the development and the dissemination on the risks of flood.</p> <p>ACMAD /ViGIRisC project is initiating collaboration with the UNISDR in order to build from early warning systems, systems that will be targeted to climate risks in Africa.</p> <p>ACMAD has been elaborated and disseminated since 1998 and through the Regional Climate Outlook Forum (RCOF), the seasonal forecast for 18 countries (16 west African countries and Chad and Cameroon). During the user's forum, IFRC and UNICEF expressed their interest to use the seasonal forecast to estimate its impacts on the community and they expressly desire to be receiving weekly forecasts</p>	<p>To make predictions at different time scales, the observed data, the outputs of several models in GRIB or NetCDF formats are needed as well as satellite images.</p> <p>The lead-time varies from 48 hours required for the risks of flooding, and to few months for the risks of drought and food security. The climate data is updated every day and month. (rainfall situation and flood risk at the district level and outlook: seasonal, monthly, decadal and short range forecasts)</p> <p>These needs were identified according to the users' demand that is mentioned in the agreement. Before that, we had a work meeting in order to better understand their needs and also to explain them that the forecasts are probable situations. It was necessary to share with the users this notion of probability that goes with the forecasts.</p>	<p>Climate Watch Decadal (10-days) bulletin with an outlook (forecast) of 10- days period with highlight on sectoral impacts on agriculture and food security, health and African ecosystems are disseminated by emails and posted on ACMAD website.</p> <p>Two products, the monthly Climate Watch Africa bulletin and Climate &amp; Health bulletin.</p> <p>Seasonal consensus forecast for July-August-September (JAS) rainy season issued during the released at the regional Climate Outlook Forum (RCOF), the Prévisions Saisonnières en Afrique de l'Ouest (PRESAO) for 18 countries (16 West African countries, Chad and Cameroon). Other RCOFs organized jointly by ACMAD and NMHSs in collaboration with partners include PRESAC (for central Africa countries), PRESA-NOR (for North African countries) and programmed PRESA-OI (for Indian Ocean region).</p> <p>Climate change scenarios generated for capacity building and training on PRECIS (Providing Regional Climates for Impacts Studies) model enable the countries to undertake better local assessments of the impacts and vulnerability of the communities and support development of appropriate mitigation strategies and adaptation policies. Climate change scenarios have been conducted under the NBA-ACMAD project for Niger River Basin in relation to climate change impact on water resources management.</p> <p>Rainfall seasonal forecast: seasonal rainfall probabilistic forecast: once a month, one month lead time. Format: pdf by e-mail and available in <a href="http://www.acmad.org">www.acmad.org</a></p> <p>Monthly and decadal watch bulletins: Climatological situation and impacts during the last month/decade, rainfall and temperature anomalies. Rainfall and temperature outlook followed by particular advices on persons and goods (risk of flooding), on plants (locust invasion), on Public Health (malaria epidemics and other waterborne diseases such as cholera), on agriculture and food security and on africa ecosystems. Format: pdf by e-mail and available in <a href="http://www.acmad.org">www.acmad.org</a></p> <p>Weekly bulletin for Niger River Basin: Rainfall and Hydrological situation along the Niger Basin, weekly rainfall outlook. Format: pdf by e-mail and available on the ACMAD website.</p> <p>Short range flood risk during the rainy season over West Africa: once per two days, 72h lead time. Format: pdf by e-mail and available in <a href="http://www.acmad.org">www.acmad.org</a>.</p> <p>Special bulletin such as : Rain season onset over Sahel, End of rain</p>	<p>Every year after the climate prediction outlook forum, an evaluation on the use of the consensus forecasts by users is made through their oral feedbacks. This information is used for timely interventions such as acquisition of medicine/vaccination by health and food aid agencies such WFP, OCHA, IFRC, UNICEF, FEWSNET, WHO among others.</p>	<p>ACMAD informs the regional structure of the humanitarian and emergency preparedness and response agencies then they will contact their local representatives.</p> <p>By NMHSs which disseminate downscaled information to the local humanitarian and emergency preparedness and response agencies</p> <p>By broadcasting via satellite (EUMETSAT /DEVCOCAST)</p> <p>RANET</p> <p>Local media</p> <p>Dissemination of Weather and Climate bulletins by email</p> <p>ACMAD web site <a href="http://www.acmad.ne">http://www.acmad.ne</a>, <a href="http://www.acmad.org">http://www.acmad.org</a></p> <p>WMO/WAMIS website <a href="http://www.wmo.int">http://www.wmo.int</a></p>	<p>For flood forecast, there are problems to access hydrological information; hydrological monitoring network is very coarse.</p> <p>Lack of information from end users in order to evaluate our products.</p> <p>Weather station network is coarse in Africa.</p> <p>There are gaps while transmitting the synops and other messages</p> <p>Land use and urban plan information are needed to issue risk of flooding.</p>

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

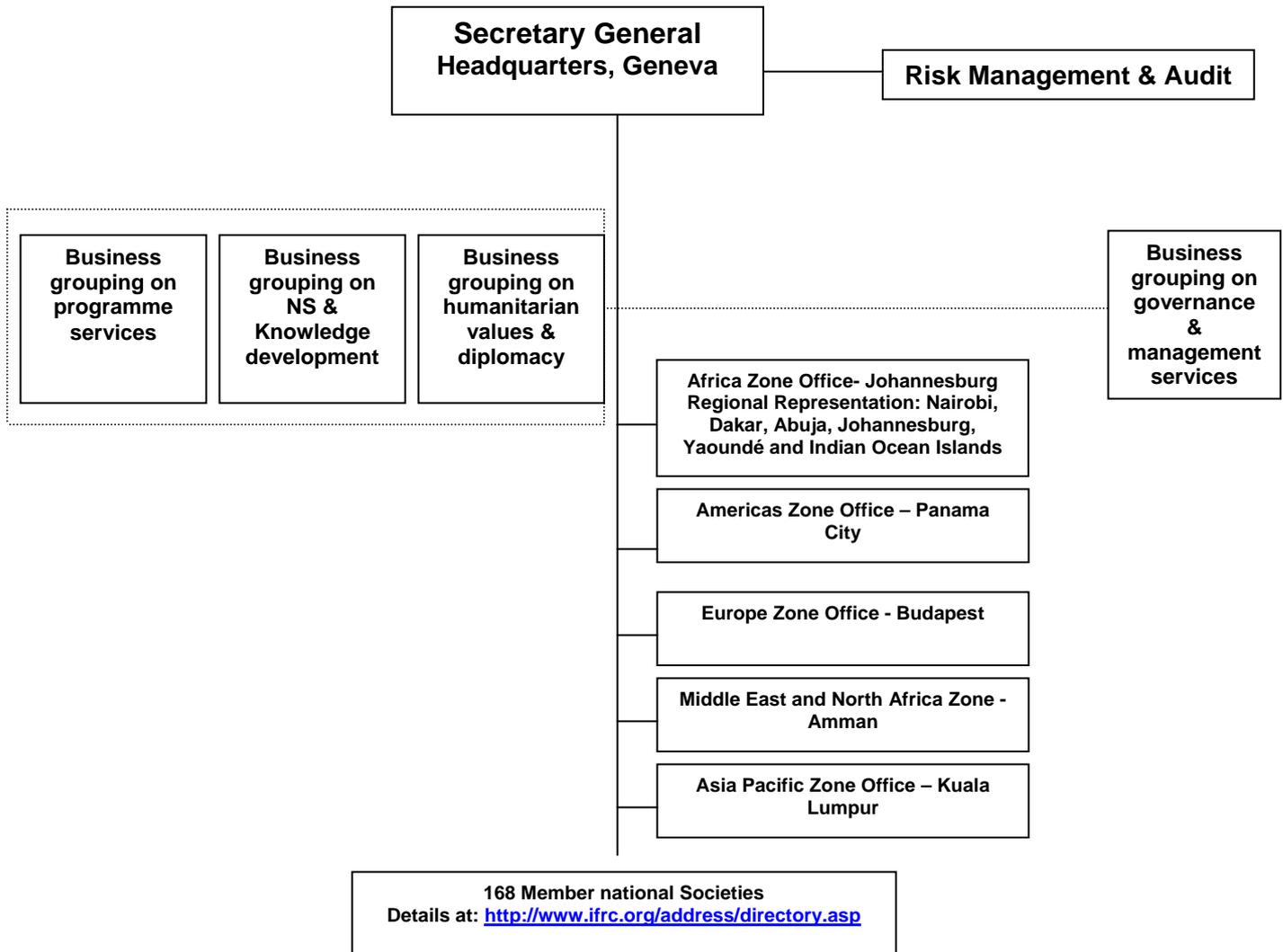
Survey Questions						
Agency	1) Institutional relationships with humanitarian and emergency preparedness and response agencies	2) Needs for Meteorological, Hydrological and Climate products	3) Information-products and services provided	4) Interpretation of hydrometeorological and climate information products and services	5) Dissemination channels	6) Major gaps
	during the rainy season. ACMAD has been delivering to IFRC this product since the 2009 rainy season.		season, Dry spell period watch Rainfall forecasting and flood prediction at a district level. Hydrological information Rainfall seasonal forecast seasonal rainfall probabilistic forecast: once a month, one month lead time. Format: pdf by e-mail and available in www.acmad.org			
CIIFEN	CIIFEN keeps an active relationship with Disaster prevention Agencies in the Andean Region, CAPRADE, National Red Cross Agencies, ISDR and other agencies which are users of our products.  Most of our contacts were established because their interest to receive our products and specific information	Humanitarian and emergency response agencies require tailored products, with very simple but explicit content in a format which must privilege maps and simple graphics and most of all, to ensure the production of such products in the required time frames in close coordination with all the users. This must be built at regional and national scales in several regions, Latin America is one of them.  These needs and requirements were based on Based on the assessment of several disasters occurred in the region during the last 10 years	SEASONAL FORECAST FOR WESTERN SOUTH AMERICA (monthly) EL Niño/La Niña Bulletin (monthly) Eastern Pacific Ocean Analysis (monthly) Sea Surface Temperature Charts (Eastern Pacific) weekly  CIIFEN currently does not have operational hydrological products	From several surveys done with users, the information provided is mostly understood, however more local products are required for humanitarian and emergency preparedness.	By e-mail and the CIIFEN web site	Little progress on tailoring products for these sectors, more knowledge about the needs and specific requirements is required to improve our current services to humanitarian and emergency communities.
IRI	Informal “Partnership to Save Lives” established in 2007.  The relationship started by an Initial visit of IRI personnel to IFRC Geneva in June 2006 organized by The Red Cross/Red Crescent Climate Centre (RCCC). Return visit of IFRC personnel to IRI in November 2007, followed up by informal Partnership. The following are some of the achievements of this partnership to date:  • Map Room created April 2008.	Initial interest in interpreted 6-day global rainfall forecasts, and seasonal forecasts presented in easy-to-understand language and targeted at IFRC interests.  Near-term climate change information and seasonal forecasts of heavy rainfall events are under development.  Requests for regional and national information largely unmet, but some collaboration with ACMAD for Africa.	<u>IRI Provides:</u>  Map Rooms containing 6-day and seasonal forecasts. Verification information for seasonal forecasts is provided separately.  Help Desk responses.  Input to background documents for Preparedness for Climate Change phase 2.  Background documents and updates (e.g. ENSO bulletins tailored to RC/RC concerns and decisions).  Internships to identify needs for information, identify ways to build capacity to use the information more effectively, and promote dialogue with NMHSs..  Decision support.  Joint side-events, press conferences and other awareness building	Information specifically tailored for and designed in part by humanitarians, but considerable work still needs to be done to tailor the information so that it is more directly relevant and understandable.	Map Rooms Help Desk Interns  Personal interactions with RCCC personnel  RCCC employee has desk at IRI and can interact with all the scientists.	Forecasts of extremes at seasonal timescales  Hydrology forecasts.  Insufficient information available beyond 6-days and at near-term climate change timescales.  Lack of verification information for 6-day forecasts.  Lack of information on how the weather and climate forecasts map on to impacts.

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

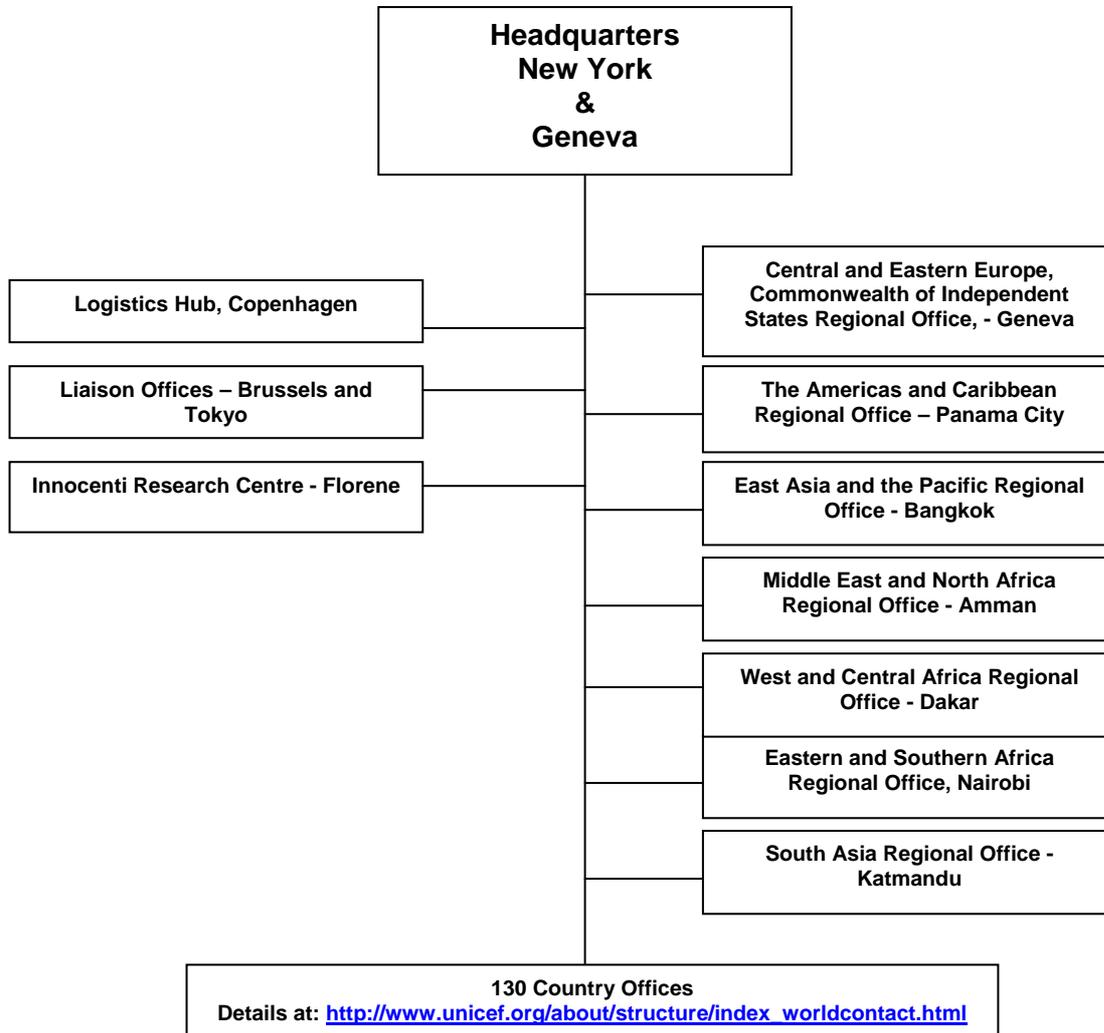
Survey Questions						
Agency	1) Institutional relationships with humanitarian and emergency preparedness and response agencies	2) Needs for Meteorological, Hydrological and Climate products	3) Information-products and services provided	4) Interpretation of hydrometeorological and climate information products and services	5) Dissemination channels	6) Major gaps
	<ul style="list-style-type: none"> <li>• Intern program initiated June 2008.</li> <li>• Help Desk established in mid-2008.</li> <li>• RCCC personnel given full-time desk at IRI in April 2009.</li> <li>• Funded project “Tailoring Extreme Weather and Climate Information Products in Preparedness for Climate Change” initiated December 2009.</li> </ul>	<p>The above requirements were identified by:</p> <ul style="list-style-type: none"> <li>• One-on-one interviews with IFRC personnel in Geneva.</li> <li>• Internship reports.</li> <li>• RCCC requests.</li> <li>• Help Desk questions.</li> </ul>	<p>activities.</p> <p>Joint training workshops.</p> <p><u>Information and products that humanitarian agencies require but IRI currently cannot provide:</u></p> <ul style="list-style-type: none"> <li>• Requests for regional and national information (improved spatial resolution).</li> <li>• Cannot issue alerts.</li> <li>• 7 days to seasonal.</li> <li>• Heat wave warnings.</li> <li>• Hydrological forecasts.</li> <li>• Short-range weather forecasts and decision support at these timescales.</li> <li>• Capacity building at larger scale.</li> </ul>			<p>In many cases the global information provided by IRI is unavailable at regional and national levels.</p> <p>Ability to communicate uncertainty in a way that is useful for decision-making.</p>

## Institutional Structure of the Humanitarian Agencies

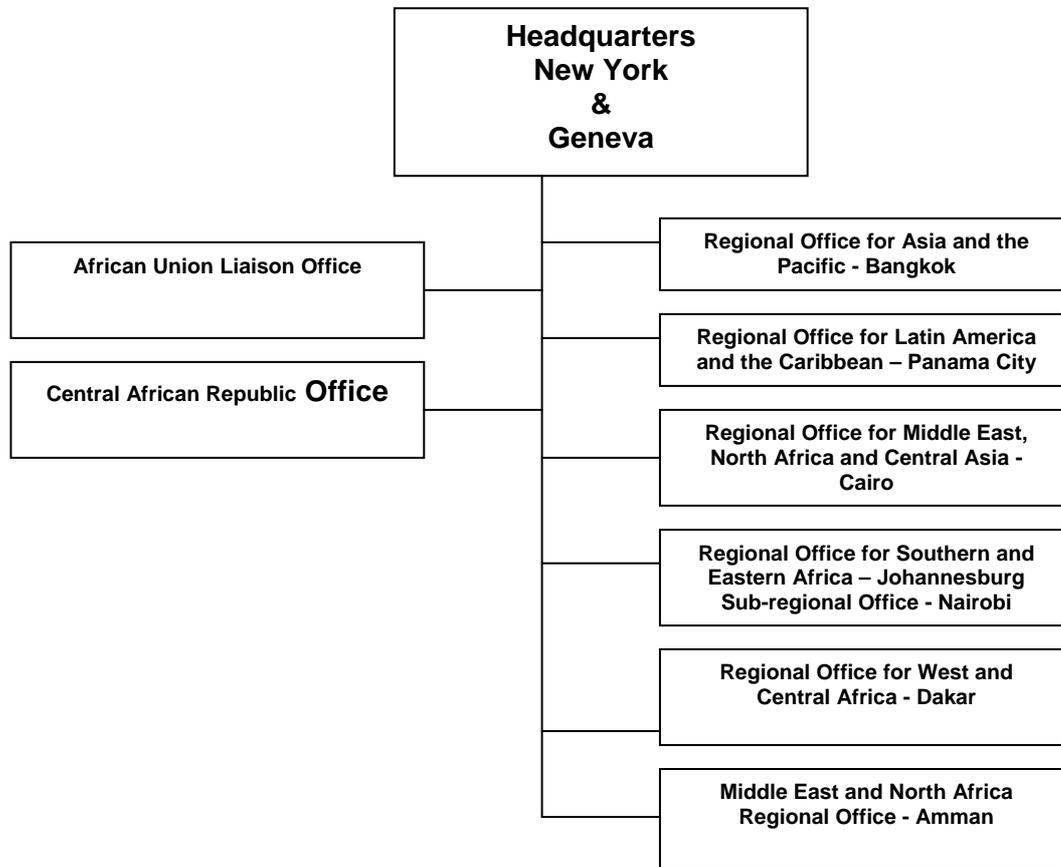
### 1. International Federation of Red Cross/Red Crescent Societies (IFRC)



2. United Nations Children Fund (UNICEF)



3. Office for the Coordination of Humanitarian Affairs (OCHA)



OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS - 2010

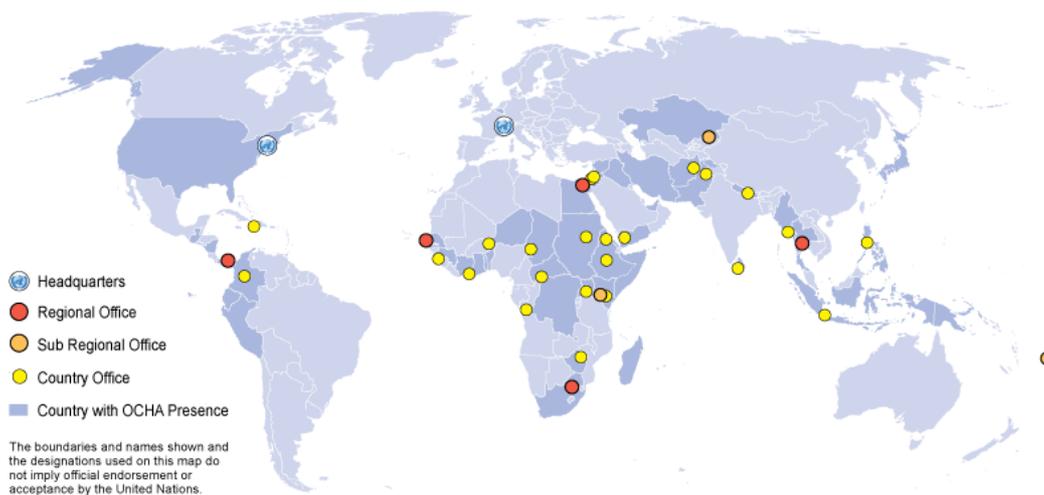
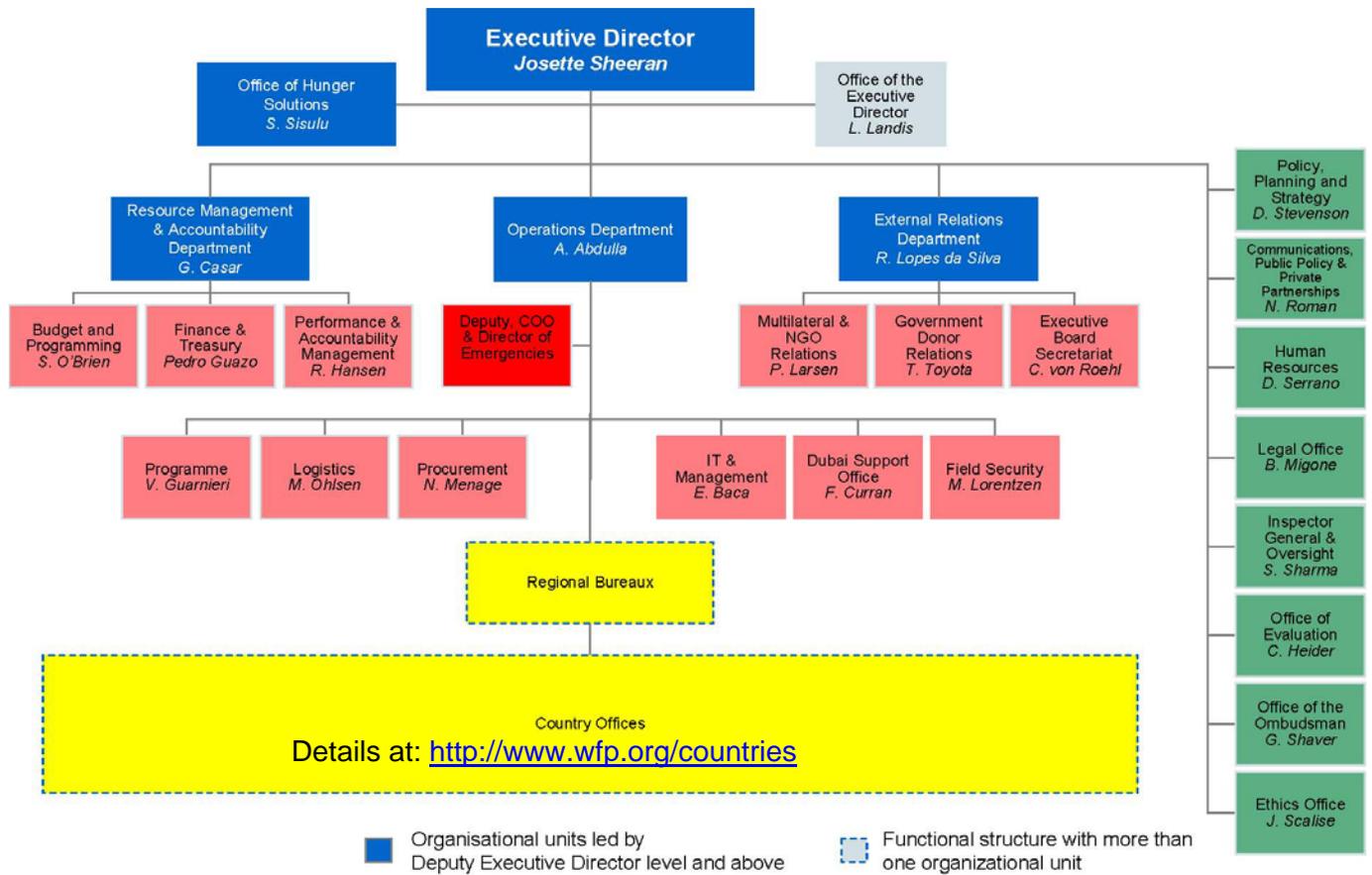
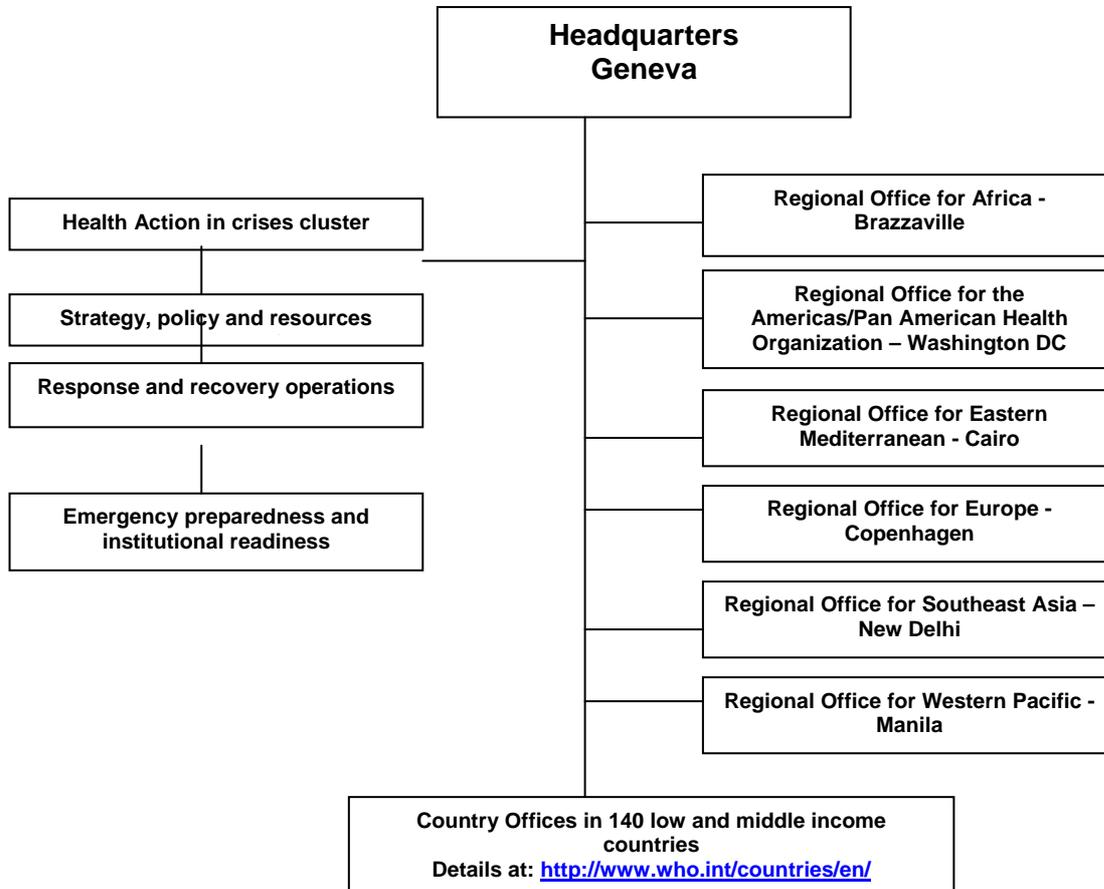


Figure 1 Global distribution of OCHA offices

4. World Food Programme (WFP)



5. World Health Organization (WHO)



## Sources of Meteorological, Hydrological, Climate and Geological Information Humanitarian Agencies

The table below lists the websites humanitarian agencies, as identified in their responses to the survey, which they utilize for meteorological, hydrological, climate and geological information.

Source Name	Website address
<b>National Meteorological and Hydrological Organizations (NMHS)</b>	
NMHSs websites	<a href="http://www.wmo.int/pages/members/members_en.html">http://www.wmo.int/pages/members/members_en.html</a>
The Australian Bureau of Meteorology	<a href="http://www.bom.gov.au/index.shtml">http://www.bom.gov.au/index.shtml</a>
JMA the Japan Meteorological Agency	<a href="http://www.jma.go.jp/jma/en/menu.html">http://www.jma.go.jp/jma/en/menu.html</a>
NOAA	<a href="http://www.noaa.gov/">http://www.noaa.gov/</a>
National Hurricane Center (NHC)	<a href="http://www.nhc.noaa.gov/">http://www.nhc.noaa.gov/</a>
NWS Climate Prediction Center	<a href="http://www.cpc.ncep.noaa.gov/products/fews/index.html">http://www.cpc.ncep.noaa.gov/products/fews/index.html</a>
British Met Office	<a href="http://www.metoffice.gov.uk/">http://www.metoffice.gov.uk/</a>
WMO Severe Weather Information Centre	<a href="http://severe.worldweather.org/">http://severe.worldweather.org/</a>
<b>Governmental Agencies</b>	
NRL Monterey Marine Meteorology Division Tropical Cyclone Page: Office of Naval Research and the Space and Naval Warfare Command	<a href="http://www.nrlmry.navy.mil/tc_pages/tc_home.html">http://www.nrlmry.navy.mil/tc_pages/tc_home.html</a>
USGS RFE	<a href="http://earlywarning.usgs.gov/adds/">http://earlywarning.usgs.gov/adds/</a>
USGS (hydrological)	<a href="http://water.usgs.gov/GIS/huc.html">http://water.usgs.gov/GIS/huc.html</a>
<b>Humanitarian Agency Portals</b>	
The Global Disaster Alert and Coordination System (GDACS)	<a href="http://www.gdacs.org">http://www.gdacs.org</a>
Humanitarian Early Warning Service (HEWSweb)	<a href="http://www.hewsweb.org">http://www.hewsweb.org</a>
ReliefWeb	<a href="http://www.reliefweb.int">http://www.reliefweb.int</a>
FAO – Global Information and Early Warning System	<a href="http://www.fao.org/gIEWS/english/index.htm">http://www.fao.org/gIEWS/english/index.htm</a>
<b>International / Regional Agencies or organizations</b>	
International Research for Climate and Society (IRI)	<a href="http://portal.iri.columbia.edu/portal/server.pt">http://portal.iri.columbia.edu/portal/server.pt</a> <a href="http://portal.iri.columbia.edu/portal/server.pt?open=512&amp;objID=580&amp;PageID=0&amp;cached=true&amp;mode=2&amp;userID=2">http://portal.iri.columbia.edu/portal/server.pt?open=512&amp;objID=580&amp;PageID=0&amp;cached=true&amp;mode=2&amp;userID=2</a>
ACMAD	<a href="http://www.acmad.org">http://www.acmad.org</a>
IGAD Climate Prediction and Application Centre (ICPAC)	<a href="http://www.icpac.net/Products/products.html">http://www.icpac.net/Products/products.html</a>
Centro Internacional para la Investigación del Fenómeno de El Niño (CIIFEN)	<a href="http://www.ciifen-int.org/">http://www.ciifen-int.org/</a>
FEWS NET	<a href="http://www.fews.net/Pages/default.aspx">http://www.fews.net/Pages/default.aspx</a> <a href="http://earlywarning.usgs.gov/adds/imgbrowses2.php?image=ml&amp;extent=af">http://earlywarning.usgs.gov/adds/imgbrowses2.php?image=ml&amp;extent=af</a>
ISDR Current & Archived Significant Global Fire Events and Fire Season Summaries	<a href="http://www.fire.uni-freiburg.de/current/globalfire.htm">http://www.fire.uni-freiburg.de/current/globalfire.htm</a>
EARS – Satellite Data for Climate, Water and Food	<a href="http://www.ears.nl/index.php">http://www.ears.nl/index.php</a>
<b>University based</b>	
ITHACA (Politecnico di Torino project for	<a href="http://www.ithaca.polito.it/">http://www.ithaca.polito.it/</a>

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

<b>Source Name</b>	<b>Website address</b>
Information Technology for Humanitarian Assistance, Cooperation and Action	
Colorado University - The Tropical Meteorology Project	<a href="http://tropical.atmos.colostate.edu/">http://tropical.atmos.colostate.edu/</a>
University of Hawaii - Hurricane, Typhoon & Tropical Cyclone Strike Probabilities (World Wide)	<a href="http://www.solar.ifa.hawaii.edu/Tropical/StrikeProb.html">http://www.solar.ifa.hawaii.edu/Tropical/StrikeProb.html</a>
University of Nebraska-Lincoln Drought Monitoring Site (Focus on United States)	<a href="http://www.drought.unl.edu/monitor/monitor.htm">http://www.drought.unl.edu/monitor/monitor.htm</a>
<b>Internet based information websites</b>	
Hurricane Watch Net	<a href="http://www.hwn.org/">http://www.hwn.org/</a>
Weatherwatch.com	<a href="http://weatherwatch.com/">http://weatherwatch.com/</a>
Weather Underground	<a href="http://www.wunderground.com/">http://www.wunderground.com/</a>

**World Meteorological Organization**  
*Severe Weather Information Centre*  
Official Observations. Official Warnings.

**HOME**  
Severe Weather  
Tropical Cyclones  
Heavy Rain/Snow  
What's New  
Introductory Pamphlet  
Pilot Project  
Notes To Users  
Links  
World Meteorological Organization  
Official World City Forecasts  
Disclaimer

This World Meteorological Organization (WMO) pilot website is developed and maintained by the Hong Kong Observatory (HKO) of Hong Kong, China. For more information on the pilot project please click here.

**NOTES**

- Click on the symbol or for advisories and warnings on the tropical cyclone.
- Click on the symbol for information from individual WMO Members participating in the Pilot Project.
- Click on individual boxes to view zoom-in maps.
- This page is best viewed with a display resolution of 1024 x 768 pixels.

Last Updated at 2004-09-01 08:44 UTC

The information in this World Meteorological Organization (WMO) pilot website is based on advisories issued by Regional Specialized Meteorological Centres (RSMC), and official warnings issued by National Meteorological and Hydrological Services (NMHSs) for their respective countries or regions. The media may use this information for their broadcasting services on the radio or TV. When doing so, it should be indicated that they are issued by the respective RSMCs, TCWCs or NMHSs.

**World Meteorological Organization**  
Weather • Climate • Water

**World Weather Information Service**  
Official Observations. Official Forecasts.

weather forecasts + climatology  
climatology

ENGLISH عربي 中文 PORTUGUÊS ESPAÑOL FRANÇAIS

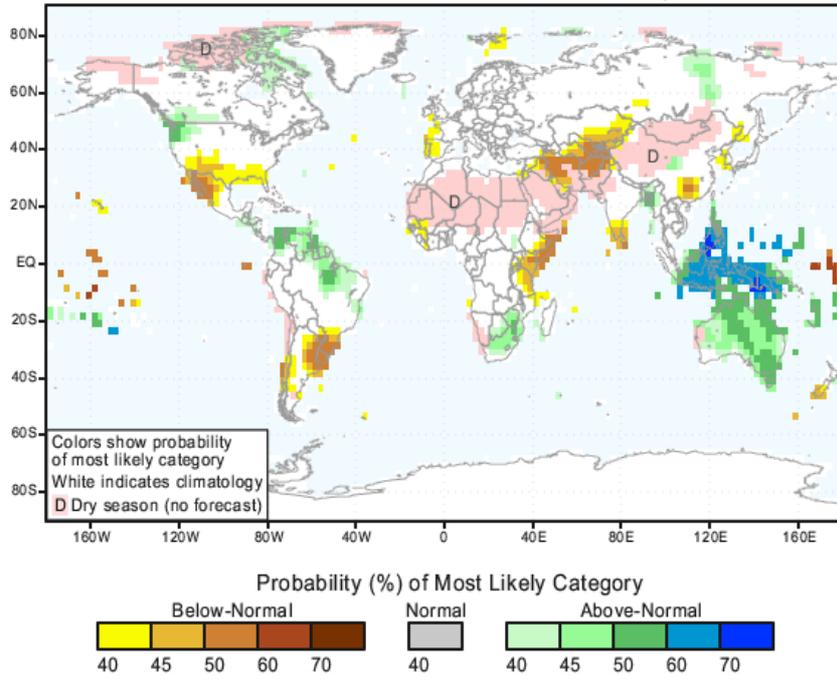
This global web site presents OFFICIAL weather observations, weather forecasts and climatological information for selected cities supplied by National Meteorological & Hydrological Services (NMHSs) worldwide. The NMHSs make official weather observations in their respective countries. Links to their official weather service web sites and tourism board/organization are also provided whenever available. Weather icons are shown alongside worded forecasts in this version to facilitate visual inspection.

The media are welcome to make information presented in this web site available to the public. When doing so, credit to the respective NMHSs should be given.

By 1 Mar 2008, 118 Members supply official weather forecasts for 1263 cities. 1265 cities from 161 WMO Members also have their climatological data presented in this web site. Suggestions to enrich the contents of this web site are welcome.

Figure 2 WMO Severe Weather Information System (SWIS) and World Weather Information System (WWIS)

IRI Multi-Model Probability Forecast for Precipitation  
 for October-November-December 2010, Issued September 2010



Monthly Precipitation Percentile

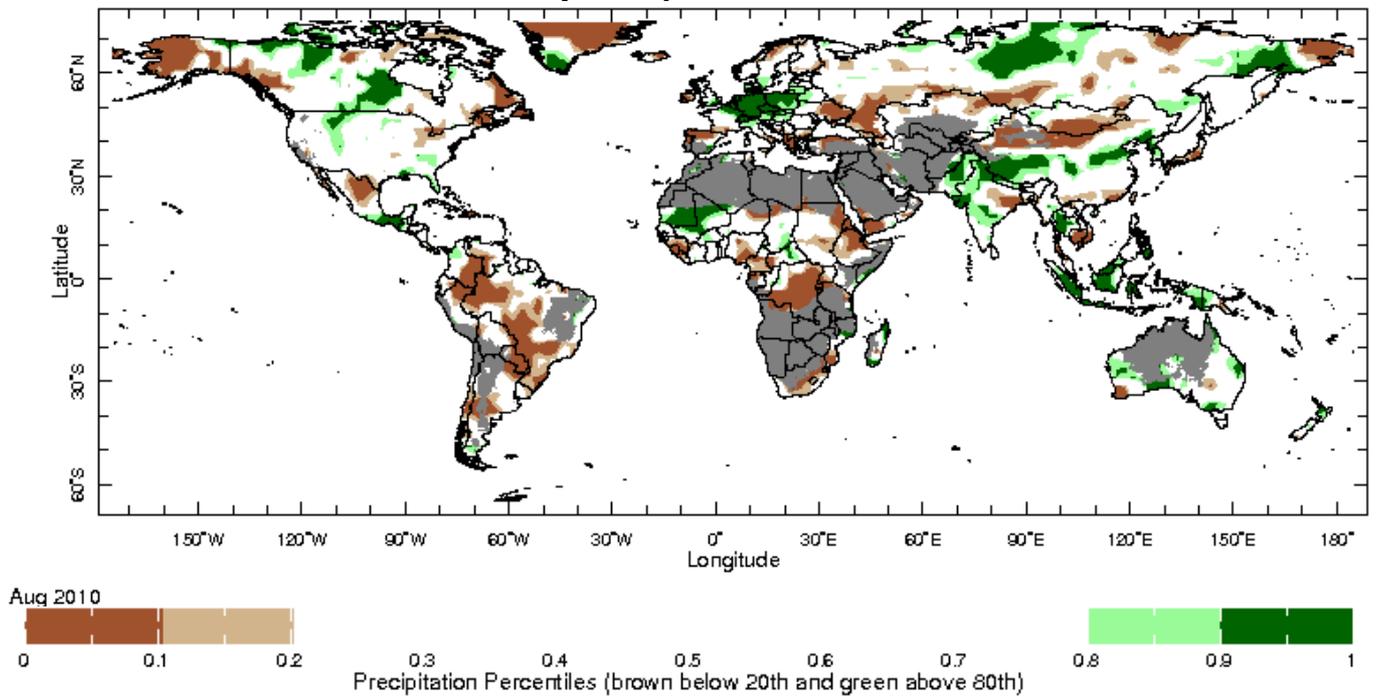


Figure 3 Sample products from IRI

ANNEX XI

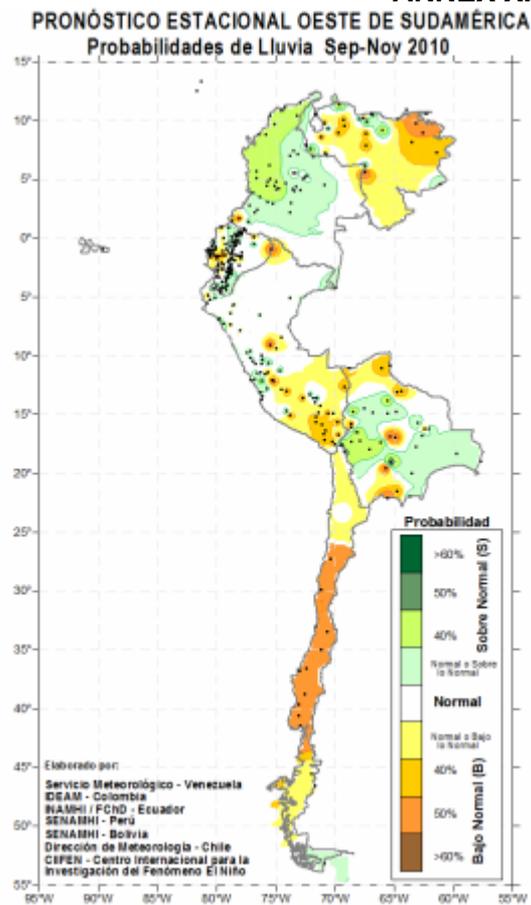
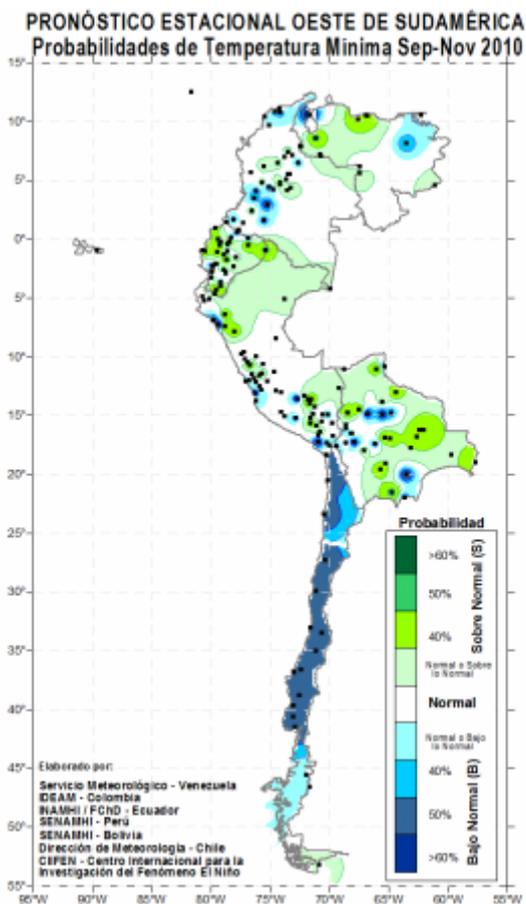
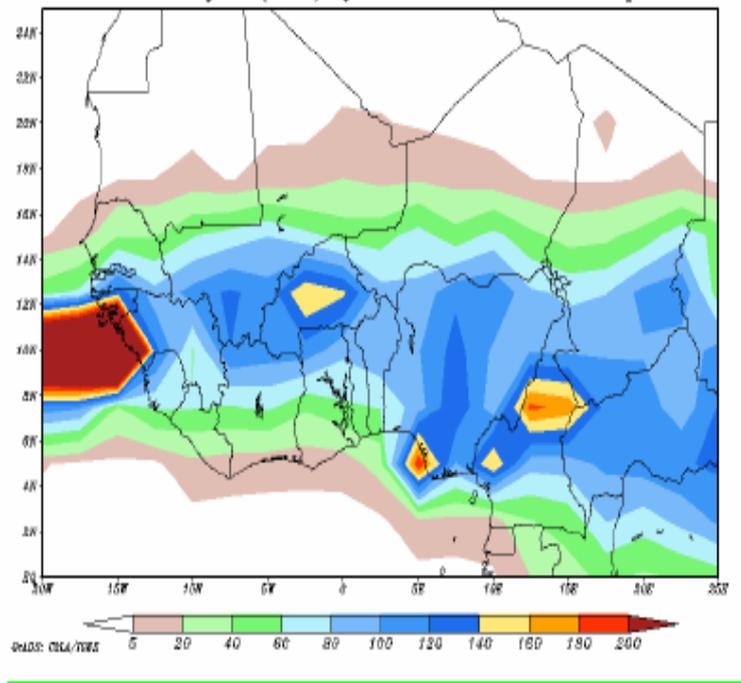


Figure 4 Sample products from CIIFEN

**OUTLOOK FOR AUGUST DEKAD 1:**

Moderate to heavy rainfall are expected over Sahel Countries during the first part of the next dekad, particularly over Guinea Conakry, South and West Mali, Senegal, South Niger, South Chad and North Cameroon. During the 2<sup>nd</sup> part of the dekad, rainfall activities will be light to moderate over these areas but over the Northern and Central part of Guinea Golf Countries, rainfall activities will increase with moderate to heavy rain.

*Cumulative rainfall (mm), from 20100802 00UT up to D+10*



**Seasonal Rainfall Forecast for Aug-Sept-Oct (ASO) 2010**

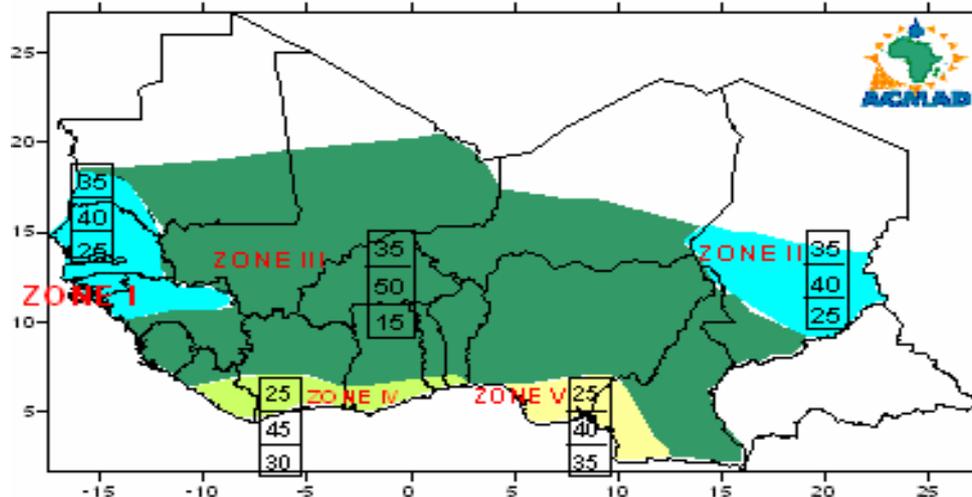


Figure 5 Sample products from ACMAD

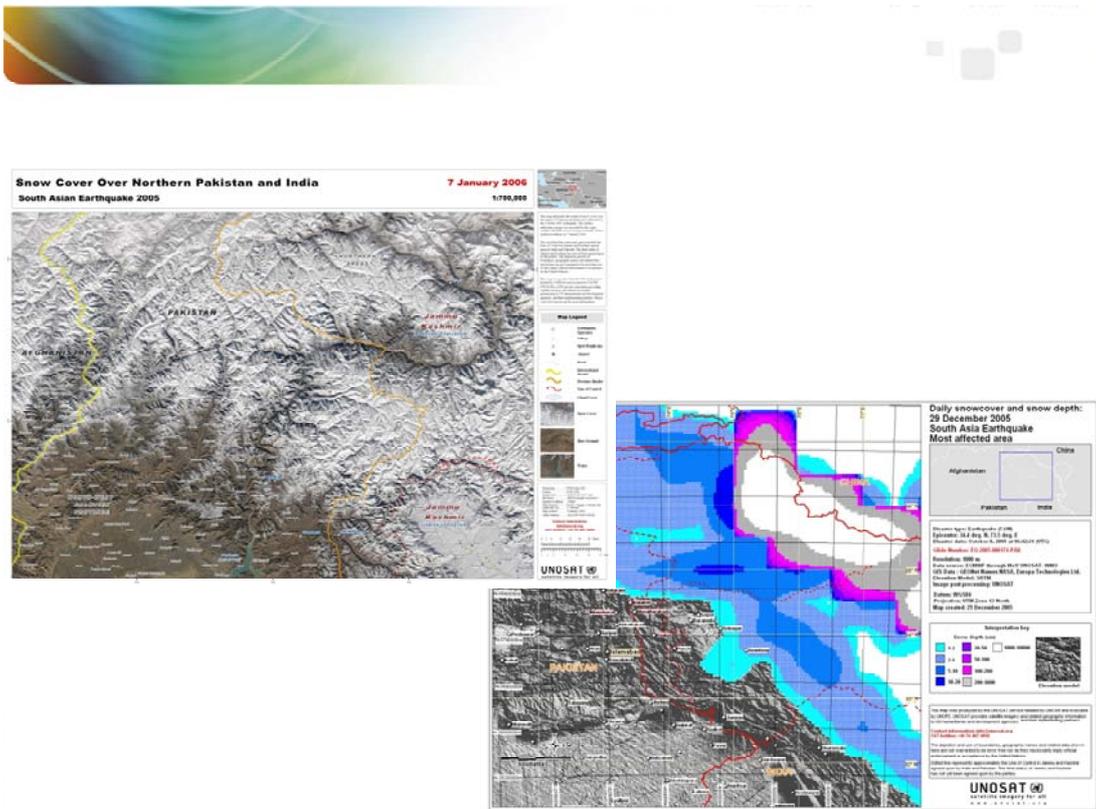


Figure 6.  
Pakistan

Sample of products developed by UNOSAT to support response after the earthquake in

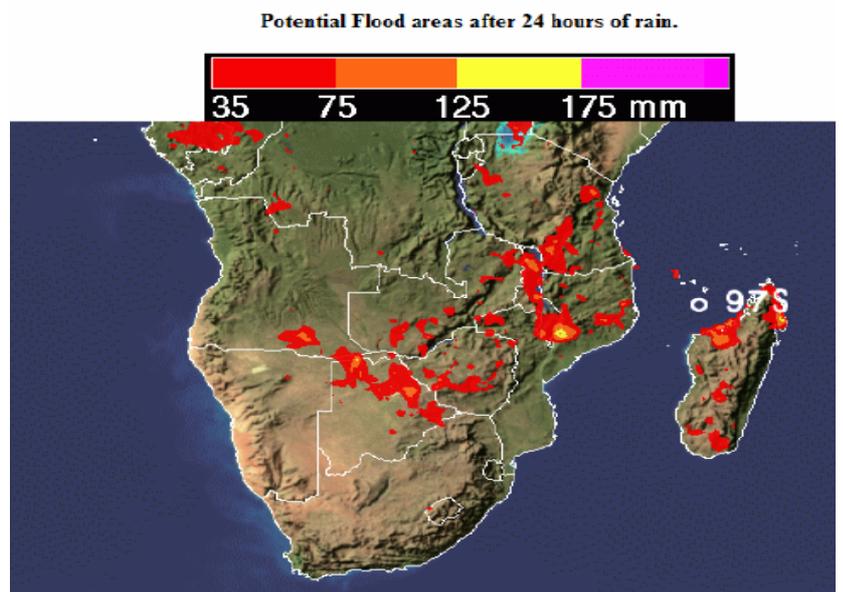
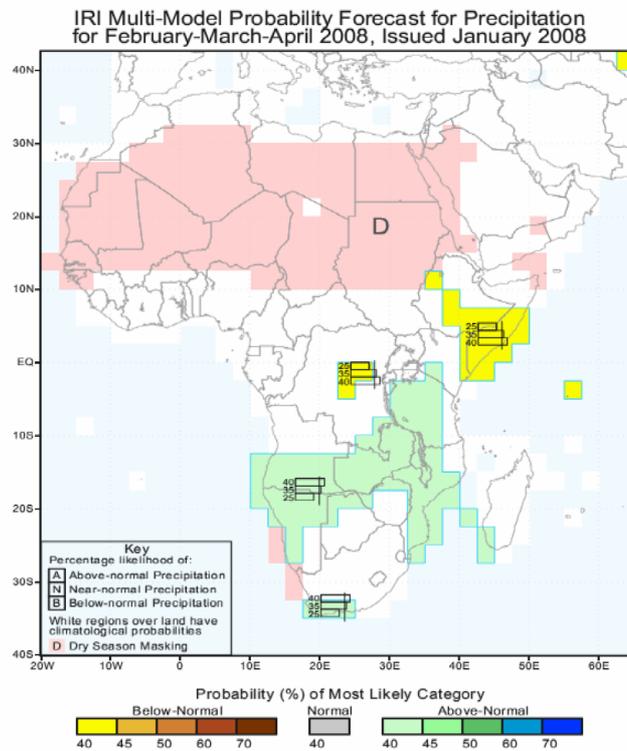


Figure 7. Sample of products received by IFRC on the basis of partnerships with Technical Centres

**Pakistan floods - Central districts**

**MODIS satellite imagery multi temporal analysis**

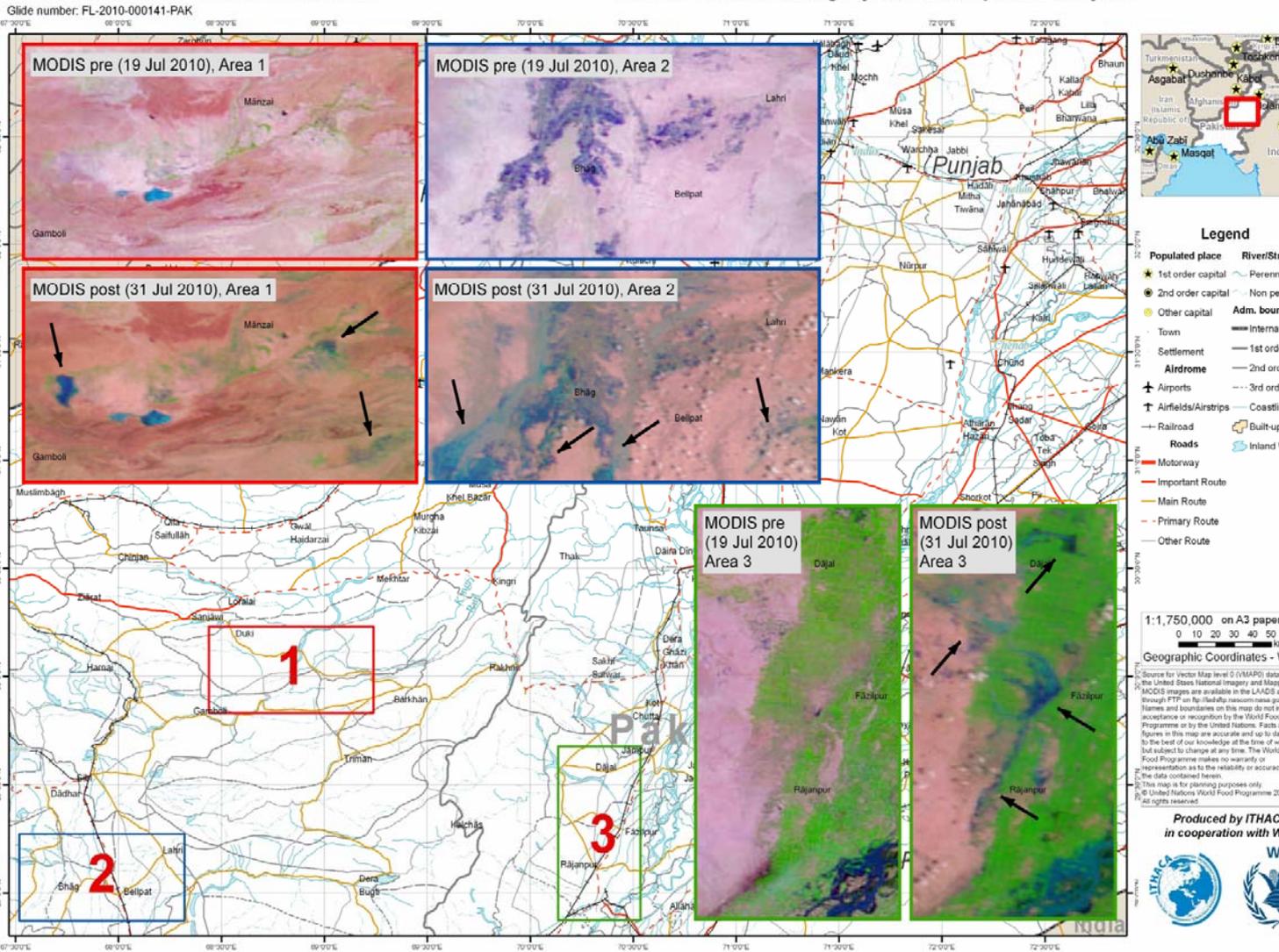


Figure 8 Sample products developed by ITHACA for WFP

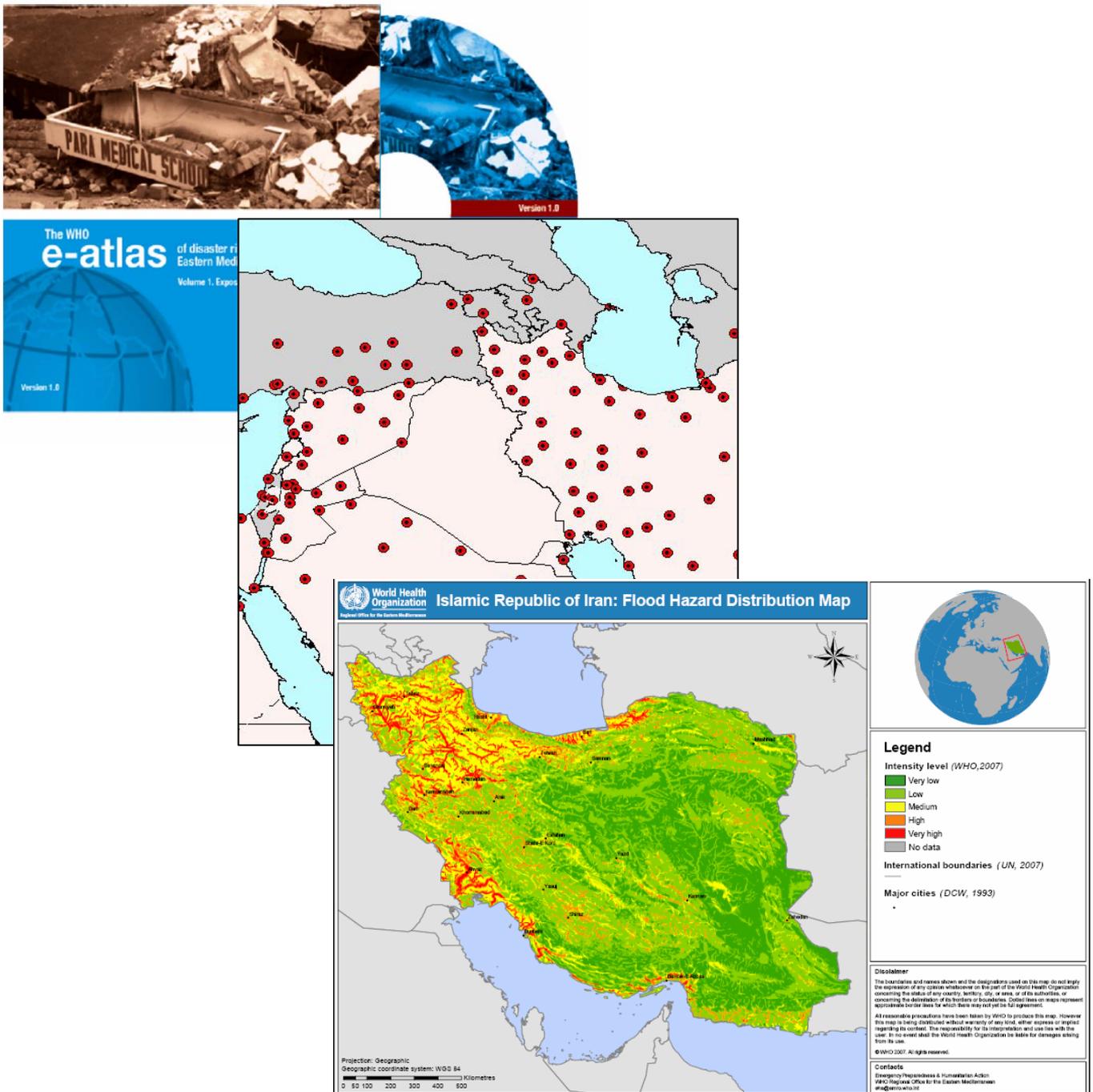


Figure 9: Sample products of the WHO e-atlas of disaster risk reduction

International Federation  
of Red Cross and Red Crescent Societies

**DMIS**  
Disaster Management  
Information System

Home
Preparedness
Disaster tracking
Response
Toolbox
About DMIS
Frédéric Zanetta | [Admin](#) | [My profile](#)
Logout

---

### Disaster tracking

**Latest field reports**

Date	Country	Disaster	Summary
30 Aug 10	<a href="#">Virgin Islands, Briti...</a>	Extra tropical cyclone	<a href="#">Hurricane Earl Cat 4</a>
30 Aug 10	<a href="#">Bahamas</a>	Local storm	<a href="#">MONITORING</a>
30 Aug 10	<a href="#">Dominica</a>	Earthquake	<a href="#">2.9 Earthquake at 8 km depth ...</a>
30 Aug 10	<a href="#">Zone Americas</a>	Tropical cyclone	<a href="#">Hurricane Earl - Caribbean update</a>
30 Aug 10	<a href="#">Saint Kitts and Nevis</a>	Tropical cyclone	<a href="#">Hurricane Earl - Caribbean update</a>
30 Aug 10	<a href="#">Netherlands Antilles</a>	Tropical cyclone	<a href="#">Hurricane Earl - Caribbean update</a>
30 Aug 10	<a href="#">Aruba</a>	Tropical cyclone	<a href="#">Hurricane Earl - Caribbean update</a>

[> view all field reports](#)

---

**Main ongoing natural hazards**

6

**Storms, hurricanes and typhoons - [More](#)**

Click on area of interest for regional map  
Click on system name for main zoom and probabilities

Source: [Tropical Storm Risk](#)

May 27 - NOAA predicts that ..."the 2010 Atlantic hurricane season is expected (with 70% chance) to produce 14-23 named storms, 8-14 hurricanes, and 3-7 major hurricanes. Therefore, this season could see activity comparable to a number of extremely active seasons since 1995. If the 2010 activity reaches the upper end of our predicted ranges, it will be one of the most active seasons on record." [Complete press release](#)

#### Disaster types

- [Geophysical](#)
- [Hydrometeorologic](#)
- [Meteorological](#)
- [Hydrological](#)
- [Climatological](#)
- [Biological](#)
- [Technological](#)
- [Industrial accident](#)
- [Miscellaneous accident](#)
- [Transport accident](#)
- [Human related](#)

---

The International Research Institute  
for Climate and Society

### Rain anomalies and climate

Working in collaboration with the Federation, IRI has developed a map tool to provide context for global precipitation forecast information. Below is the map showing six-day total forecast precipitation anomaly - [Click for more maps](#) and read about their interpretation in this document

26 KB

#### Fields reports

[Write a field report](#)

#### Latest RSOE alerts

**RSOE EDIS - Emergency and Disaster Information**

**Flash Flood - North-America - Canada**  
31.08.2010 - 03:26:26 - Flash Flood event happened in North-America / Canada.

**Heat Wave - North-America - Canada**  
31.08.2010 - 03:01:56 - Heat Wave event happened in North-America / Canada.

**Fire - North-America - USA**  
31.08.2010 - 03:15:59 - Fire event happened in North-America / USA.

Figure 10 IFRC Disaster Management Information System

**First Meeting of the Task Team on “Meteorological Services for Improved Humanitarian Planning and Response”  
Draft Report - 29 September 2010**

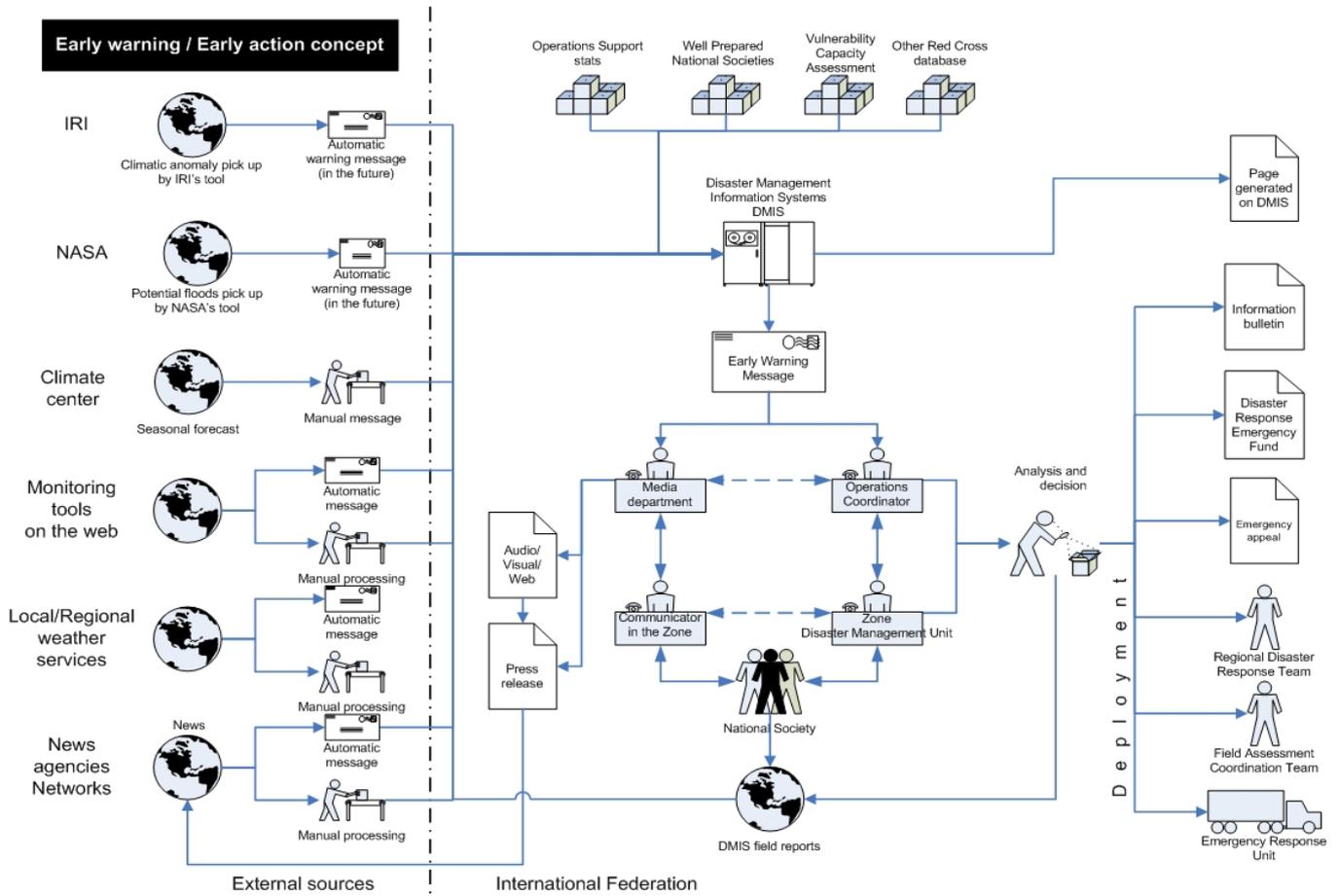


Figure 11 Information flow mechanism of the IFRC

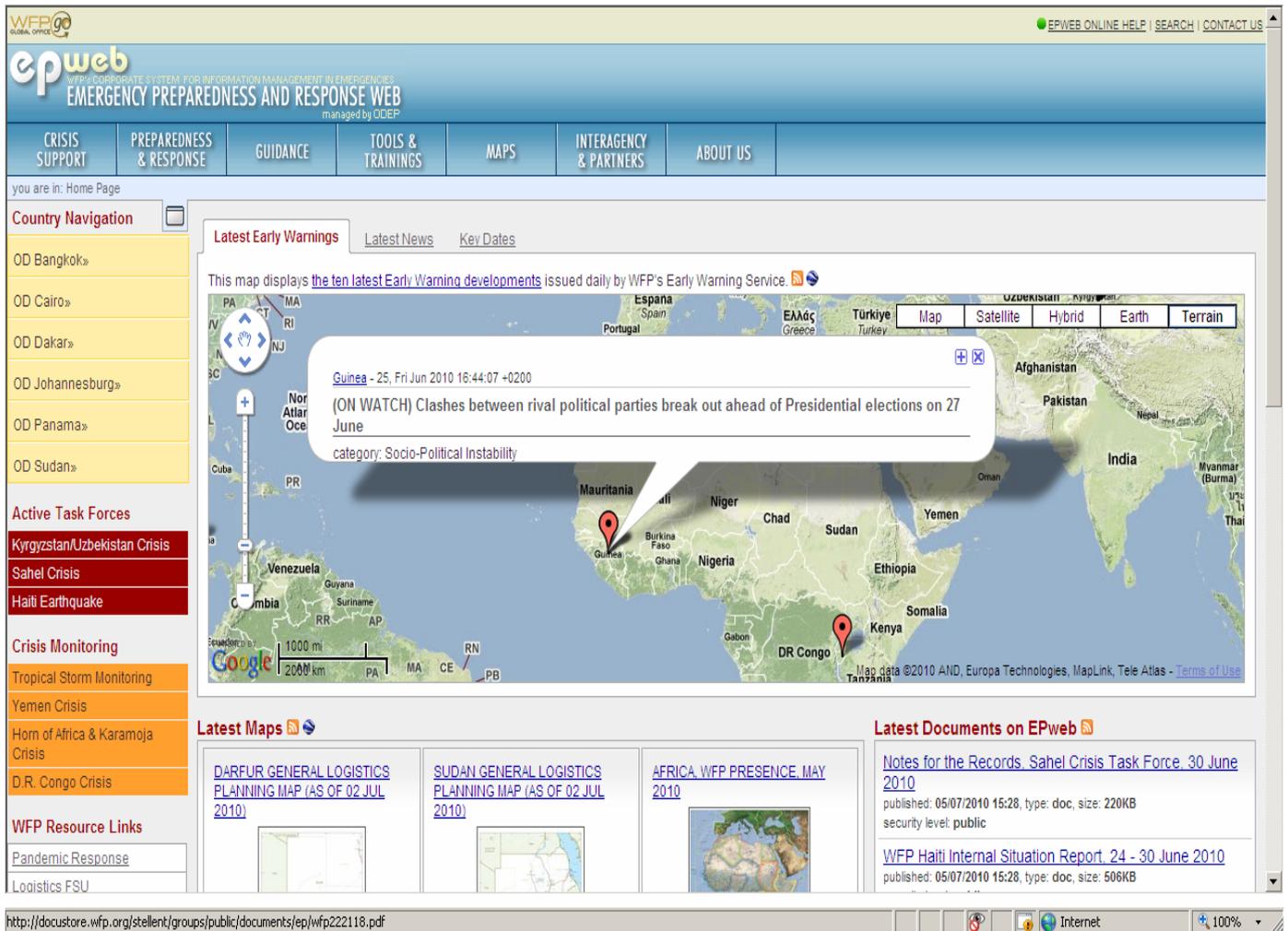
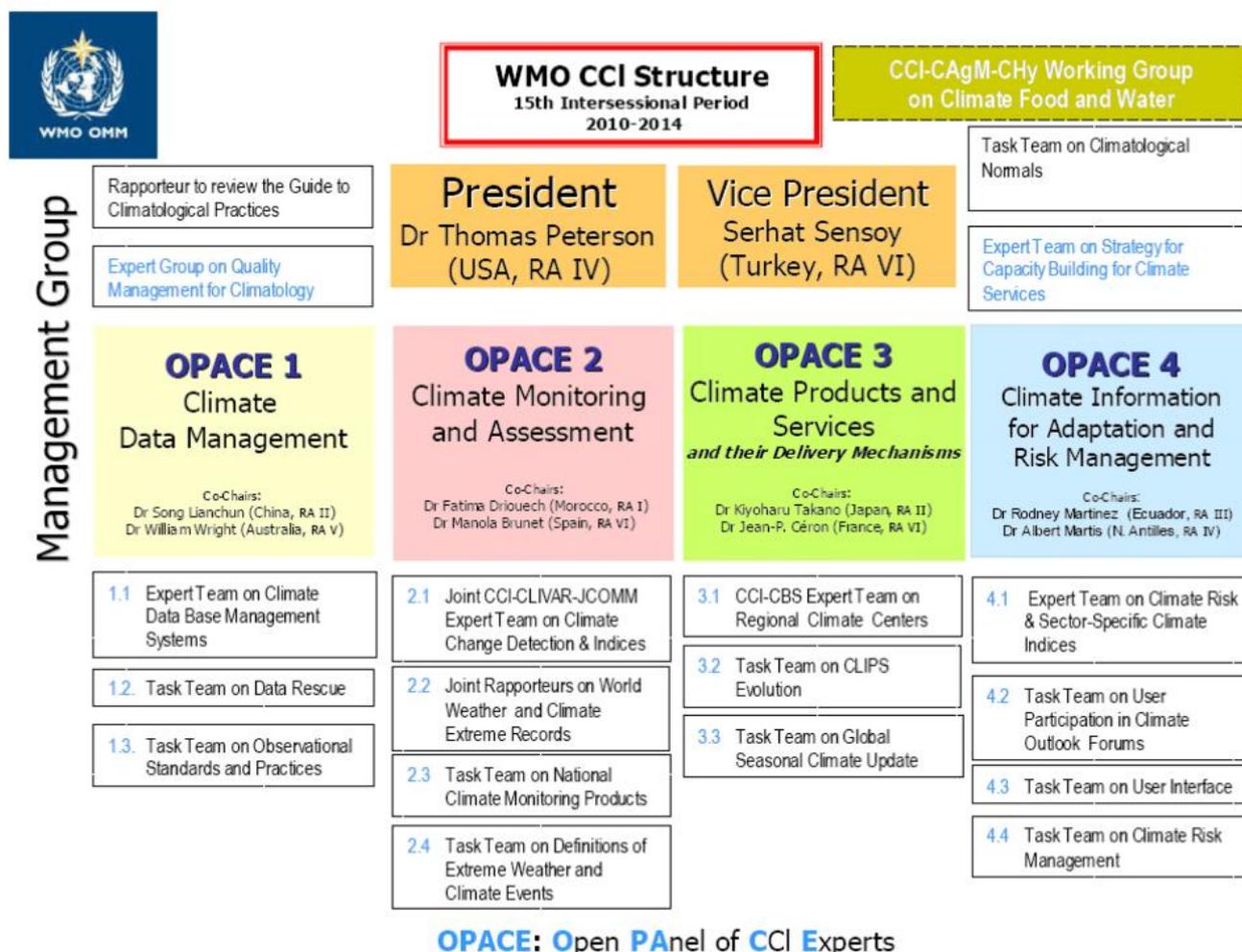


Figure 12 WFP EPweb information system

## Commission of Climatology Structure



## Task Team on User Participation in Climate Outlook Forums (TT-UPCOF)

### Terms of Reference:

1. Review and assess the approaches in the existing and ongoing user outlook forums (e.g., MALOF, HYDROF);
2. Develop guidance and promotional material to enhance user participation in Regional Climate Outlook Forums (RCOFs) and in post-COF user interaction, particularly through implementation of user-driven outlook forums in conjunction with RCOFs;
3. Develop guidance for RCOFs to more efficiently communicate climate outlooks to the users, along with uncertainty aspects;
4. In collaboration with the concerned sectors, develop proposals to establish sector-driven user outlook forums with clear linkages to RCOFs to take climate outlooks into account;
5. Work with CHy and CAGM to develop the concepts of user outlook forums for water resources and agriculture/food security;
6. Task team lead to inform the OPACE co-chairs that the task is finished (within a period of 12 months from the date of formation of the Task Team) and that the team can be dissolved.

## **Task Team on User Interface (TT-UI)**

### **Terms of Reference:**

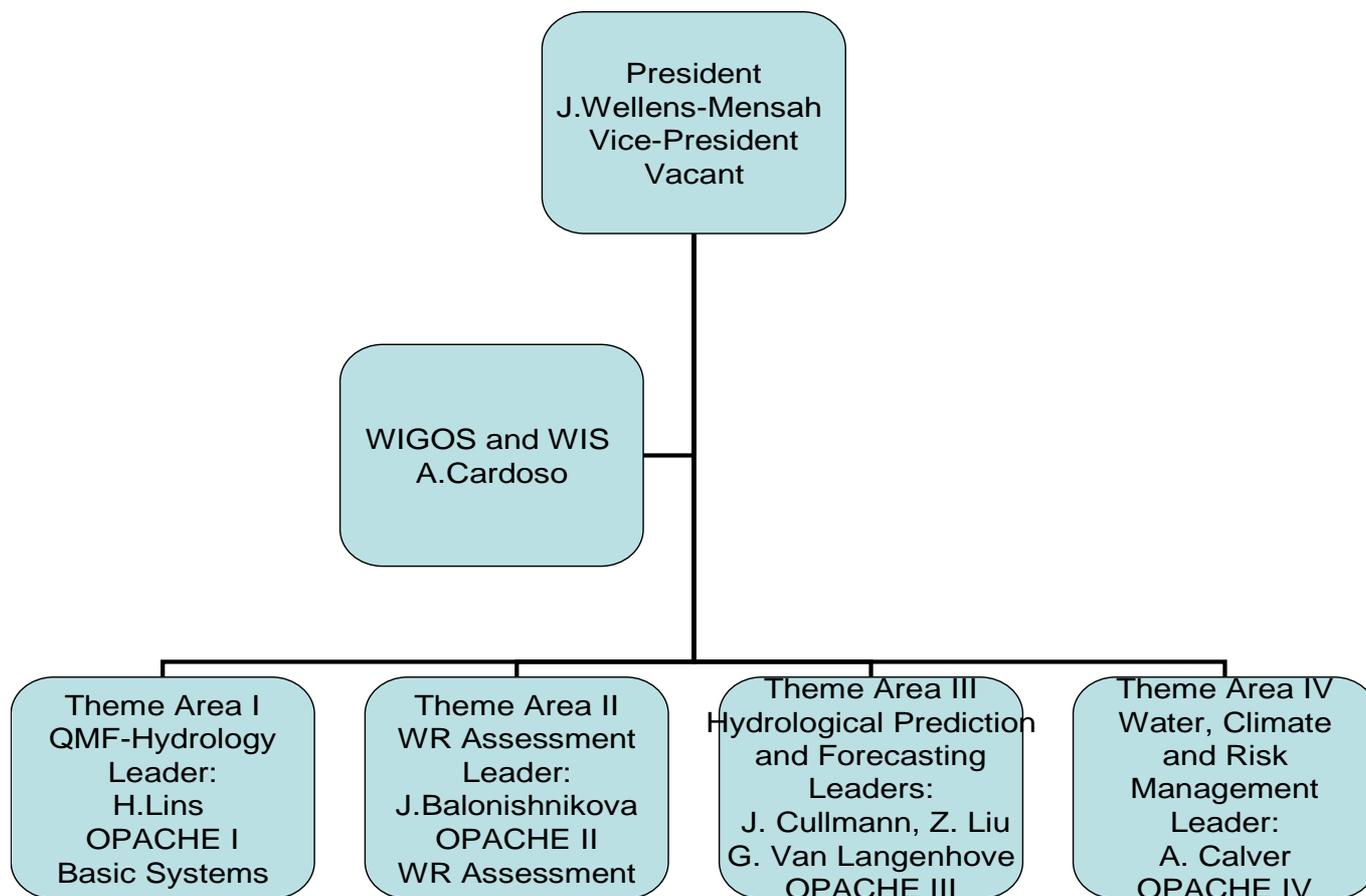
1. Develop a guideline for users on integrating climate predictions and information into climate risk management, and adaptation strategies and planning, to include a user-friendly terminology;
2. Collect and assess existing case studies relevant to quantifying the social and economic benefits of using climate information, products and services;
3. Collect and develop information on the susceptibility of various sectors to climate variations and change and on the use of climate information in climate risk management and adaptation by specific sectors, and publish these in the form of an online catalog;
4. In collaboration with CBS ET on Meteorological, Hydrological and Climate Services for Improved Humanitarian Planning and Response, develop an implementation plan to facilitate the provision of meteorological, Hydrological and Climate Services to the international humanitarian agencies from National Meteorological and Hydrological Services (NMHSs), RSMCs, Global and Regional Climate Centres (RCCs);
5. Inform the CCI Management Group on completion of the tasks (within a period of three years from the date of formation of the Task Team) and that the team can be dissolved.

## **Task Team on Climate Risk Management (TT-CRM)**

### **Terms of Reference:**

1. Develop a concept of Climate Risk Management;
2. Find or develop examples of best practices in CRM already in use in different parts of the world (e.g. in water and agriculture sectors);
3. Develop a strategy for extending the concept of CRM to WMO Members (through training workshop (s); educational materials (preferably for e-learning); practical tools to apply CRM principles);
4. Develop a 'summary report' to feed into Congress sixteen, 2011.

## Current structure of CHY



### Terms of Reference of Theme Area III: HYDROLOGICAL FORECASTING AND PREDICTION

- Develop a manual on flood forecasting and warnings
- Promote the use of the Manual on Low Flow Estimation
- Provide advice and support to projects related to the FFGS and PROHIMET
- Provide advice and monitor the Global Flood Alert System
- Assess the use of NWP to improve flood forecasting
- Prepare guidance material on seasonal flow forecasting
- Prepare guidance material on QPE; QPF and pQPF
- Intercomparison on the use of operational flood forecasting models
- Provide advice on relevant hydrological risk management issues

### Terms of Reference of Theme Area IV: CLIMATE and RISK MANAGEMENT

- Identification of climate sensitive stations and analysis of their data
- Identify potential use of Regional climate models for water resources assessment and management
- Prepare guidance material on the climate information requirements of water resources managers
- Prepare guidance material on drought forecasting
- Prepare guidance material for factoring transient climates and uncertainty analysis in the estimation of the design flood