

# MID-TERM MONITORING AND PERFORMANCE EVALUATION REPORT

January 2012–December 2013

## Part I: Introduction

1. In the previous financial period, the Secretary-General submitted a first Mid-Term Monitoring and Performance Evaluation Report to the Executive Council at its sixty-first session on the request of the Fifteenth Congress (Cg-15, paragraph 6.2.17). An updated report was further presented at EC-LXII towards achieving the Expected Results on the basis of the deliverables in the Secretariat Operating Plan (OP) 2008-2011.

2. The current report presents the first Mid-Term Monitoring and Performance Evaluation Report since the start of full implementation of the WMO Monitoring and Evaluation system in January 2012. It covers the period 2012-2013, which is the first biennium of the 2012-2015 financial period.

3. The report is based on self-assessment data regularly gathered at the Secretariat and the results of the Survey on Impacts of Achieved Results on Members, together with relevant data available at the Secretariat. It is structured along the eight WMO Expected Results (ERs) (Annex 1) and follows the result chain as presented in the WMO M&E System (WMO-No 1089). The term 'survey respondents' is used in defining the outcomes to refer to Members who responded to the questionnaire on impacts of achieved results.

4. Performance is therefore assessed at: (1) *the output/deliverables level* (i.e. implementation of the OP 2012-2015)<sup>1</sup>; and (2) *the key outcome level* (i.e. assessment of impacts of achieved results on Members).<sup>2</sup> Regarding the latter, the majority of the data comes from the Survey on Impacts of Achieved Results on Members conducted in 2012 and 2013 (the full results are available at [http://www.wmo.int/pages/about/monitoring\\_evaluation\\_en.html](http://www.wmo.int/pages/about/monitoring_evaluation_en.html)). The complete list of KPIs, together with their baselines and targets, is available at: [http://www.wmo.int/pages/about/documents/KPIs\\_Jan2014.pdf](http://www.wmo.int/pages/about/documents/KPIs_Jan2014.pdf).

## Part II: Progress on Performance

### Challenges in Measuring Performance

5. The low level of response to the Survey on Impacts of Achieved Results on Members and fluctuations in the number of respondents made it difficult to measure progress in performance. In some Regions (e.g. RA V), the response rate was as low as 33% in 2013, which cannot be representative of the situation for WMO Members in the Region. Higher levels of responses from developed countries compared to developing and least developed countries may further lead to skewed results. Fluctuations in the level of responses also made it difficult to compare with the baselines to establish progress. There may be a need to enhance the capacities of NMHSs in developing and least developed countries on the strategic planning process, with the aim of improving their participation in M&E surveys.

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<sup>1</sup> *Output/deliverable* is "a lower level, expected result (Secretariat specific) that is arrived at through an accumulation of activities, i.e., is a tangible outcome. Deliverables contribute to the achievement of a key outcome or programme area (WMO M&E Guide, WMO-No 1088, p.3).

<sup>2</sup> *Key outcomes* are "likely or achieved short-term and medium-term effects of accomplished deliverables/outputs related to programme areas that define the parameters for the unique contribution by WMO in the progress to achieve expected results. [...] For each outcome, there are a set of KPIs to measure the achievement of the outcome (WMO M&E Guide, WMO-No 1088, p.4).

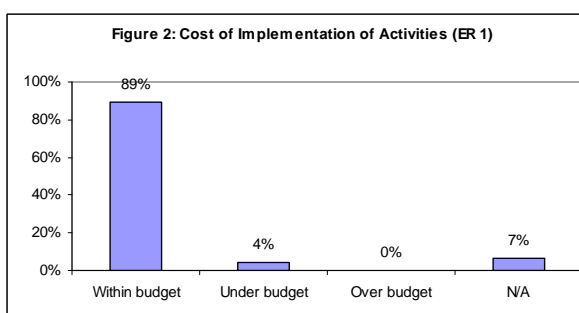
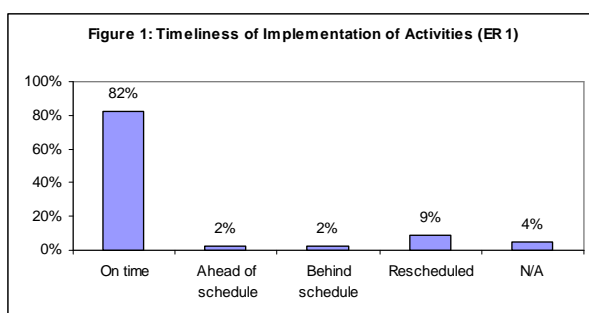
6. At its meeting in February 2014, the EC Working Group on Strategic and Operational Planning (WG/SOP) established a Task Team composed of WG/SOP members and focal points from the regional associations to look into ways to improve the M&E System, including the performance metrics and alternative data collection methods, taking into consideration data readily available at the Secretariat.

## Expected Result 1: Service Delivery

### Outputs/Deliverables

#### *Timeliness and Cost of Implementing Activities*

7. The majority of the ER 1 activities planned in the 2012-2015 Operating Plan were implemented on time (82%) and within budget (89%) as of December 2013 (Figures 1 and 2). 'N/A' refers to recurrent activities or activities that had not started at the time of reporting



#### *Highlights of Achieved Deliverables*

### Service Delivery

8. In the reporting period, the implementation of the Common Alerting Protocol (CAP) standard for disseminating warnings was initiated and in-country CAP-Jump Start training carried out in five countries of RA I. In addition, more Members from all Regions joined the International Register of Alerting Authorities, nominated country editors, and edited the register. Currently, there are 130 participating Members.

9. The number of Members participating in the World Weather Information Service (WWIS) increased to 161 and the cities for which climate information and forecasts are provided reached 1,700. WWIS Android and iPhone weather Apps were further developed and launched and modernization of the WWIS website initiated.

10. In terms of capacity building, CAP training was carried out at workshops on the Severe Weather Forecasting Project (SWFDP), benefiting 22 countries in RA I. Three seminars on socio-economic benefits and service delivery were held in RA I, RA IV and RA V. Training on TV weather presentation was further carried out, and about 20 Members from RA I, RA II, RA IV and RA V benefited from training on delivery of hurricane/tropical cyclone warning services.

11. The following four guidelines were developed: (1) Guidelines on the strategies for use of social media by National Meteorological and Hydrological Services (NMHSs); (2) Guidelines on the Participation of NMHSs in the WMO World Weather Information Service; (3) Guidelines for Creating a Memorandum of Understanding and a Standard Operating Procedure between a NMHS and a Partner Agency; and (4) Guidelines for Implementation of CAP-Enabled Emergency Alerting.

12. The WMO Strategy for Service Delivery and Implementation Plan were developed and finalized.

#### Emergency Response

13. A publication on "Meteorological Analyses for Fukushima-Daiichi Nuclear Power Plant Accident" was prepared.

#### Global Framework for Climate Services (GFCS)

14. A "Climate Exchange" publication containing case studies from around the world was launched at a "Dialogue for Climate Services Users and Providers: towards implementation of the GFCS" held in October 2012 prior to the Extraordinary Session of the World Meteorological Congress (Cg-Ext). An "Atlas of Health and Climate," a joint publication between WMO and WHO providing scientific information on the geographical spread and impacts of climate-induced health problems, was also launched at Cg-Ext. Pilot projects were initiated in Burkina Faso, Mali, Niger and Chad in 2012-2013 to draw lessons on critical elements for the establishment of frameworks for climate services at the national level. Critical needs and priorities for the implementation of the GFCS in the Caribbean region were identified at a regional workshop on climate services at the national level held in May 2013 in Trinidad and Tobago.

15. The GFCS Adaptation Programme in Africa was launched in October 2013. The programme aims at co-designing and generating information and knowledge to support decision-making in food security and nutrition, health and disaster risk reduction, with Malawi and Tanzania as the two focus countries.

### **Outcomes**

#### Access to seamless weather, climate, water and related products and services

16. The Surveys on Impacts of Achieved Results on Members conducted in 2012 and 2013 indicated that access to the products delivered by the WMO global and regional centres was 'mostly' to 'highly reliable'. In terms of utilization, the NMHS products and services were mostly used by the general public and emergency management authorities, followed by the aviation industry, agriculture and the marine industry. Other sectors where services were used include energy, water, health, transportation, tourism, urban planning, housing, and industry, especially the construction industry.

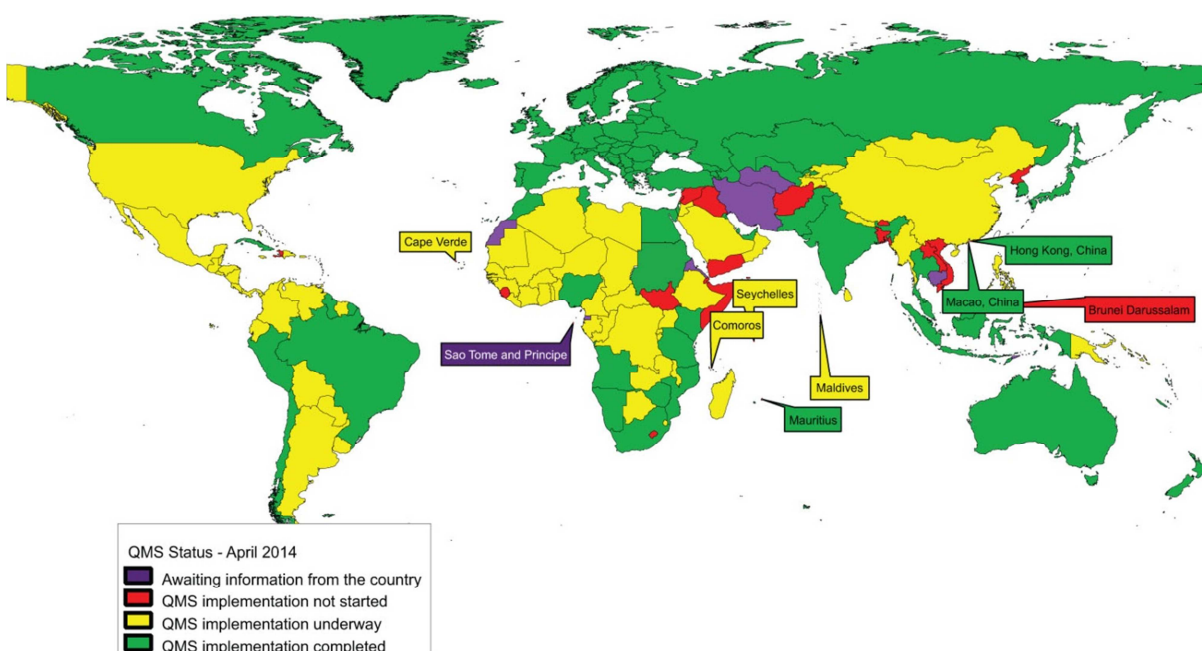
#### Service Delivery

17. According to the survey results, there was high level of user satisfaction with the availability, reliability, range and timeliness of products and services as well as with their contribution to decision-making.

#### Quality Management Systems (QMS)

18. As evident from Figure 3, the implementation of QMS for aeronautical meteorological services was either completed or underway in most regions, as of April 2014. It remains to be completed by most Members in RA I and some members in RA III, RA IV and RA II. Some Members in RA I, RA II, RA V and RA VI have not started to QMS implementation.

Figure 3: Status of QMS Implementation as of April 2014

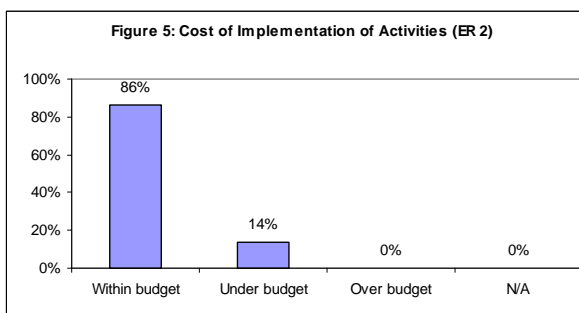
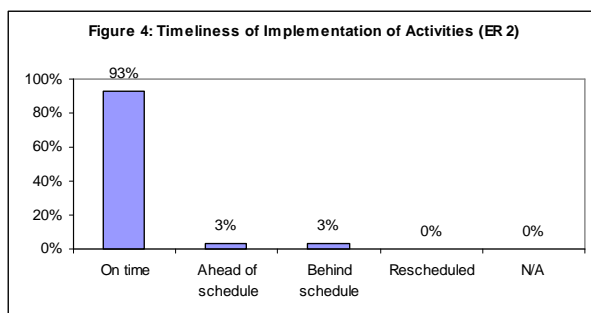


## Expected Result 2: Disaster Risk Reduction

### Outputs/Deliverables

#### *Timeliness and Cost of Implementing Activities*

19. As shown in Figure 4, most ER 2 activities were implemented on time or ahead of schedule (96%) as of December 2013. All were implemented either within or under their assigned budget (Figure 5).



#### *Highlights of Achieved Deliverables*

20. A set of recommendations and priorities for action for the next 2-8 years were developed as a result of the First Technical Workshop on Standards for Hazard Monitoring, Databases, Metadata and Analysis Techniques to Support Risk Assessment (June 2013) to provide guidelines and standards for hazard definitions, monitoring and detection, databases and metadata and hazard analysis and forecasting tools for weather-, climate- and hydrological-related hazards.

21. The Costa Rica Early Warning Systems for Hydrometeorological Hazards Project demonstrated the benefits of cooperation of the National Meteorological Service with the Disaster Risk Management Agency, the National Hydrological Service and authorities and stakeholders in the local communities for development of early warning systems. Specific outputs included analysis of threats, vulnerability and mapping of hydrometeorological events in the Sarapiquí River basin; hydrological and hydraulic modeling of the basin and design of a protocol based on the rain and flow thresholds; and a community simulation exercise.

22. Multi-hazard early warning systems were designed for eight beneficiary countries from South-Eastern Europe with a regional cooperation framework.

23. An inter-commission proposal was developed on "Meteorological, Hydrological and Climate Services to Reduce Human and Economic Losses and Realize Economic Opportunities and Benefits through Enhanced Risk Assessment and Multi-Hazard Early Warning Systems for weather-, water-, climate- and coastal-related hazards" in Southeast Asia, including Cambodia, Lao, Thailand, Vietnam and the Philippines.

24. In terms of materials and publications, a draft new "Manual on the Global Data-Processing and Forecasting System" was developed, and the development of a book on "Climate Services for Disaster Risk Financing and Insurance" initiated, documenting over 15 Members' experiences.

25. Implementation Plans for the SWFDP-Southern Africa, SWFDP-South Pacific and SWFDP-Eastern Africa were developed.

26. Among the beneficiaries of capacity-building events were: 42 hurricane forecasters from RA IV Hurricane Committee Members; 1 tropical cyclone forecaster from each RA V Tropical Cyclone Committee Members; and 42 forecasters from various Regions, who were trained in severe weather forecasting and warning services.

## **Outcomes**

### **Early Warning Systems**

27. Almost all survey respondents indicated their respective NMHSs contribute to the implementation of a multi-hazard early warning system in their countries and participate in disaster risk reduction platforms. Twenty-two NMHSs and Regional Centres issued drought early warnings in 2013, as compared to 20 in 2012.

### **Flood Management**

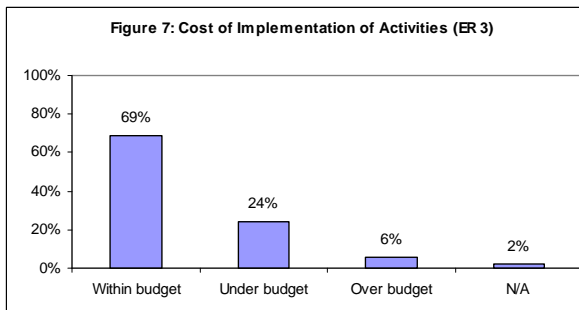
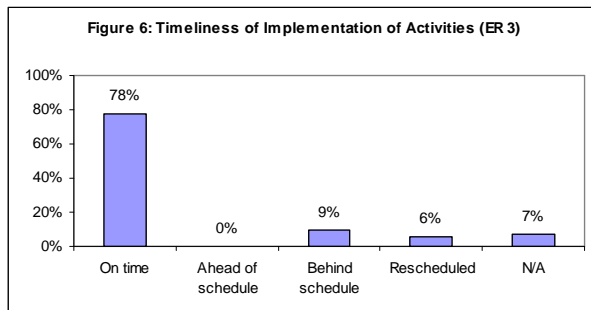
28. Most survey respondents had a flood management plan established or under development as of 2013.

## Expected Result 3: Data Processing and Forecasting

### Outputs/Deliverables

#### *Timeliness and Cost of Implementing Activities*

29. Seventy-eight percent of the ER 3 activities were implemented on time as of December 2013, as shown in Figure 6. In terms of expenditure, 93% were implemented either within or below their budget (Figure 7).



#### *Highlights of Achieved Deliverables*

30. The “WMO Statement on the Status of the Global Climate in 2012” was published in May 2013. Two El Niño/La Niña Updates were issued in June and October 2013. In addition, guidance on climate information for climate risk management and adaptation was published in the reporting period.

31. A Climpack software package, a guidance document and a concept workshop were developed, including training. A workshop on Operational Long-Range Forecasts for Global Producing Centres, Regional Climate Centres (RCCs), Regional Climate Outlook Forums (RCOFs), and NMHSs was also conducted and recommendations developed. Several workshops on climate indices were held, specifically targeting participants from developing and least developed countries.

32. There are currently about 18 active RCOFs around the world. Most of them have held at least one session along with a training workshop, though a few have 2-3 sessions per year including online sessions.

33. The Global Seasonal Climate Update is still in prototype development by the CCI Task Team. It is being developed in real time once every three months for expert review and suggestions for improvement.

34. The CHy Advisory Working Group was established and its 2013-2016 workplan developed.

### Outcomes

#### Member satisfaction with the Information and Products of WMO RCCs

35. According to the results of the 2013 Survey, regional climate monitoring products constituted the most valued type of products provided by RCCs. These were followed by regional data and guidance materials on regional products. Long-range forecasts were considered valuable but in need of improvements.

### Regional and National-Scale Products

36. Most survey respondents indicated issuing seasonal predictions at the regional and national levels as well as monthly predictions and climate watch bulletins. Only a few respondents had issued long-term predictions. In the Survey on Impacts of Achieved Results on Members, climate watch bulletins were rated to be of the highest quality, followed by seasonal predictions. The two products delivered most timely were monthly and seasonal predictions.

### Climate Products and Information

37. The majority of survey respondents indicated contributing to national local climate assessments and providing climate-based products derived from national climate data. The majority also provide climate diagnostics and climate analysis as well as conduct hazards and extreme value analysis. According to the survey results, most NMHSs further issue monthly and longer climate predictions, including seasonal climate outlooks, specialized climate products, and national climate watch advisories and bulletins. Considerably fewer NMHSs produce policy- and adaptation-oriented climate information and products, make downscaled long-term climate projections, or produce regional-scale climate model products. Roughly half of the Members who responded to the survey generate risk identification and risk assessment products. Some develop products based on interdisciplinary models. Very few provide global-scale climate model products.

38. In terms of quality of the national climate information and products, the two products/services that were considered of highest quality were: (1) the basic climate products derived from national climate data; and (2) NMHS contribution to national and local climate assessments. These were followed by climate diagnostics/analysis; hazards/extreme value analysis; and monthly and longer climate predictions, including statistical and model-based seasonal climate outlooks. On average, the quality of specialized climate products and national climate watch advisories/bulletins was also considered satisfactory.

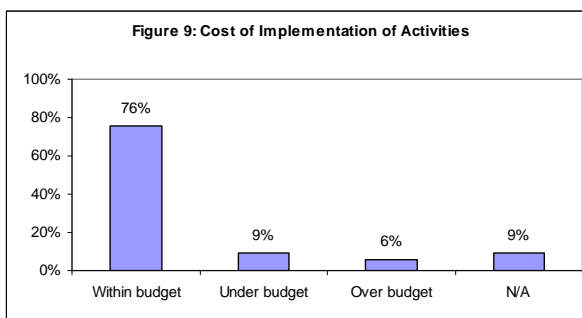
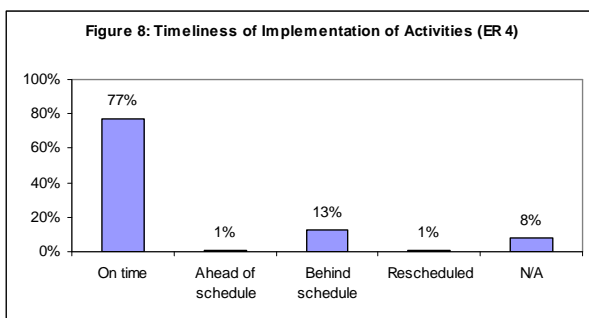
39. The general public is the sector to which almost all survey respondents provide targeted/tailored climate information, products and services. The vast majority also provide such products and services to the agricultural and food security sector, including fisheries and livestock, water resource management, emergency management, energy, transportation (land, air, marine), government agencies and NGOs. Many survey respondents provide services to the tourism, public health and industrial sectors as well as for urban design and management.

## **Expected Result 4: Observations and Data Management**

### **Outputs/Deliverables**

#### ***Timeliness and Cost of Implementing Activities***

40. As shown on Figures 8 and 9, over three-quarters of activities were implemented on time and within budget as of December 2013. Thirteen percent were lagging behind schedule, and hence, had absorbed fewer resources than allocated. Most of these activities were related to the implementation of WIGOS and a few concerned the WMO Satellite Programme.



## ***Highlights of Achieved Deliverables***

### **Instruments and Methods of Observation**

41. Twenty sites were approved to participate in the WMO Solid Precipitation Intercomparison Experiment (SPICE), and instruments were selected and assigned to sites. In addition, Regional Instrument Centres (RICs) websites were created in the reporting period, updated chapters of the Commission for Instruments and Methods of Observation (CIMO) Guide were finalized, RIC intercomparisons were coordinated, and a survey on obsolete and dangerous instruments completed.

42. Guidance to Members on new remote sensing technologies was developed and made available. Contributions to update the CIMO guide were finalized and it is currently ready for Members to review. A set of recommendations were developed to update the International Cloud Atlas.

### **Availability and Use of Satellite Data and Products**

43. The WMO 2012 survey on the use of satellites was published, and guides on radio frequency coordination for NMHSs were drafted. A WMO Position Paper was further produced on the World Radiocommunication Conference 2015 (WRC-15) agenda items. SATCOM meetings advanced the development of a collaboration method for data collection platforms. In terms of capacity building, a training event for RA III/RA IV was held in College Park, USA, and for RA V in Melbourne, Australia, leading to improved capacity of the regional satellite user requirements groups.

44. Generally, there was improvement in availability of satellite sounding data to Numerical Weather Prediction (NWP) centres. New Aviation XML was also developed by the Task Team on Aviation XML to be reviewed at CBS-Ext.(2014).

45. There are more than 150 visits per day on the Observing Systems Capability Analysis and Review (OSCAR) pages.

### **WMO Integrated Global Observing System (WIGOS)**

46. WIGOS Regulatory Material was prepared and will be included in the Manual and Guides to WIGOS.

47. Basic principles of the Observing System Network Design (OSND) were drafted and are under review.



## WMO Information System (WIS)

48. As of December 2013, thirteen of the 15 GISCs (87%) were audited and were operational as well as 54 of the 123 DCPCs (47%).

49. Version 1.3 of Discovery Metadata was published and WIS Competencies and learning guides drafted. Other important updates and publications included: an update of WMO-No. 49 to include WIS; publication of a Guide to WIS (WMO-No. 1061) and a Manual on WIS (WMO-No. 1060) which was later significantly expanded to include material on discovery metadata; major updates to the Manual on GTS (WMO-No. 386) and the Guides relating to GTS security and Internet usage (WMO-Nos. 1115 and 1116).

## **Outcomes**

### WIGOS Implementation and Increased Availability of Observations

50. Thirty percent of the key implementation tasks, milestones and deliverables of the WIGOS Implementation Plan (WIP) were achieved as of December 2013, thus exceeding the initial target of 20%.

51. The 2012 and 2013 surveys indicated an increase in the availability of observations to users/user groups, particularly surface observations from Automated Weather Stations. Many survey respondents reported having increased their radar and satellite observations.

52. Improved availability of surface observations is discernible from Figure 10, with most Regions showing availability ranging from 45-100%. Significant changes in available surface observations were observed in some parts of RA I, RA II, RA III and RA V (Figure 11). 90-100% availability in surface observations was observed in most of RA VI and some parts of RA I, RA II, and RA III.

*Figure 10: Surface reports received from regional basic synoptic networks through the GTS during the WWW monitoring in January 2014*

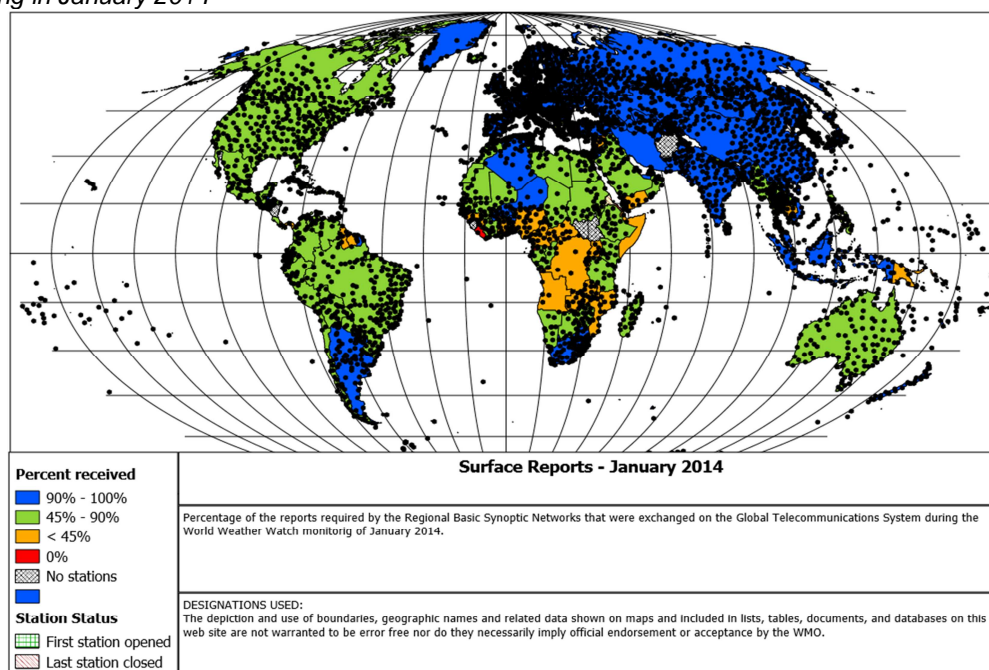
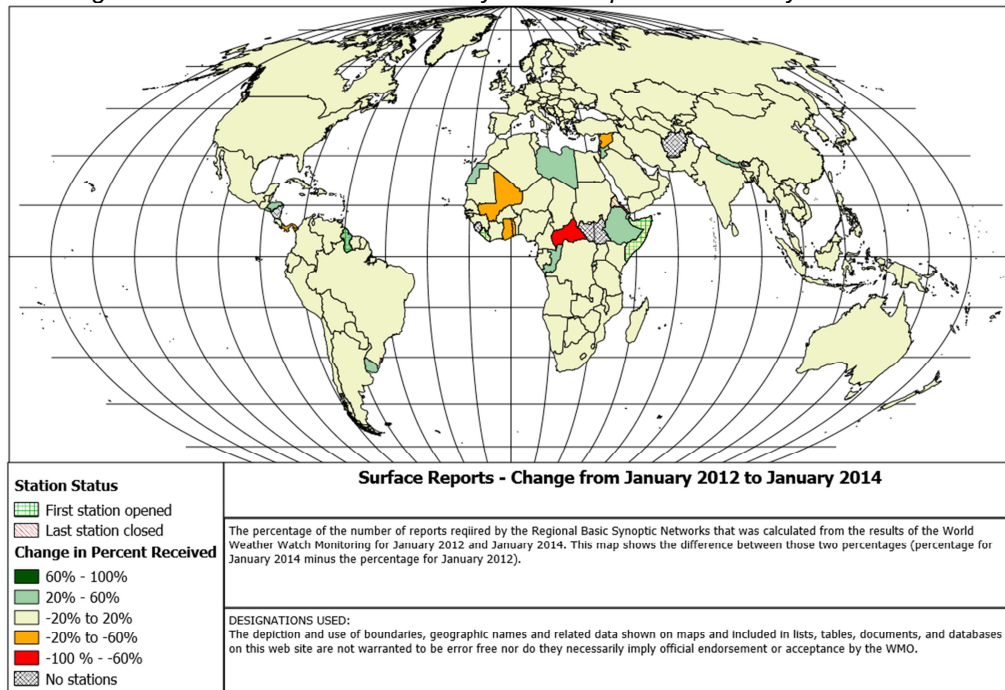


Figure 11: Changes in observation received January 2014 compared to January 2012



53. The availability of upper-air observations was high in most of RA IV, RA V and RA VI (Figure 12) but generally low in RA I, RA II and RA III. No upper-air stations exist in parts of RA I, RA II and RA III. Significant changes in the availability of upper air observations were observed in parts of RA I, RA II and RA III (Figure 13).

Figure 12: Upper-air reports received from regional basic synoptic networks through the GTS during the WWW monitoring in January 2014

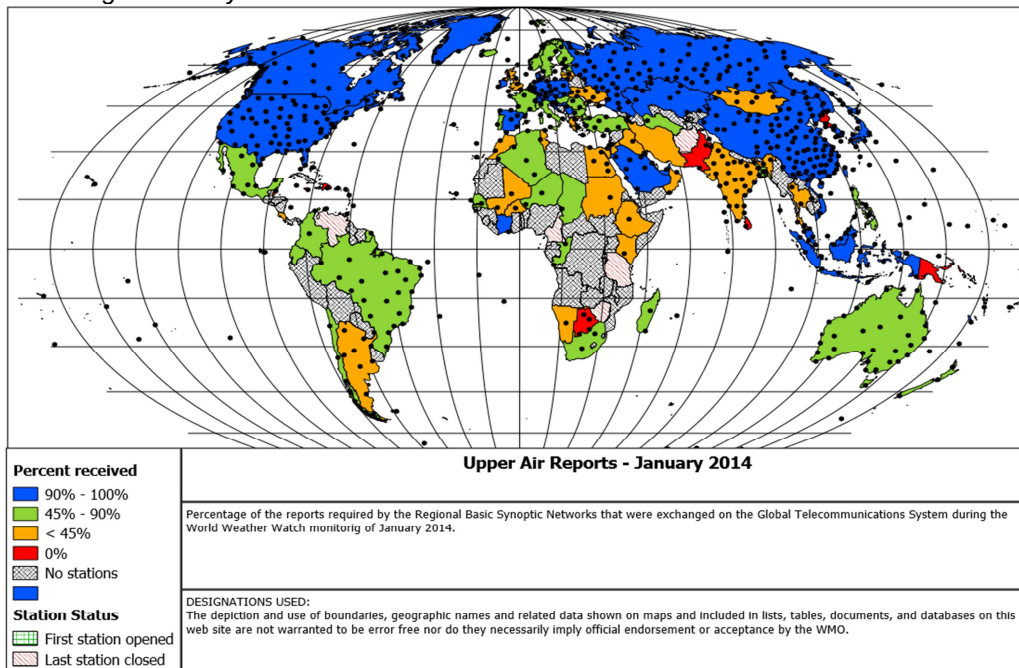
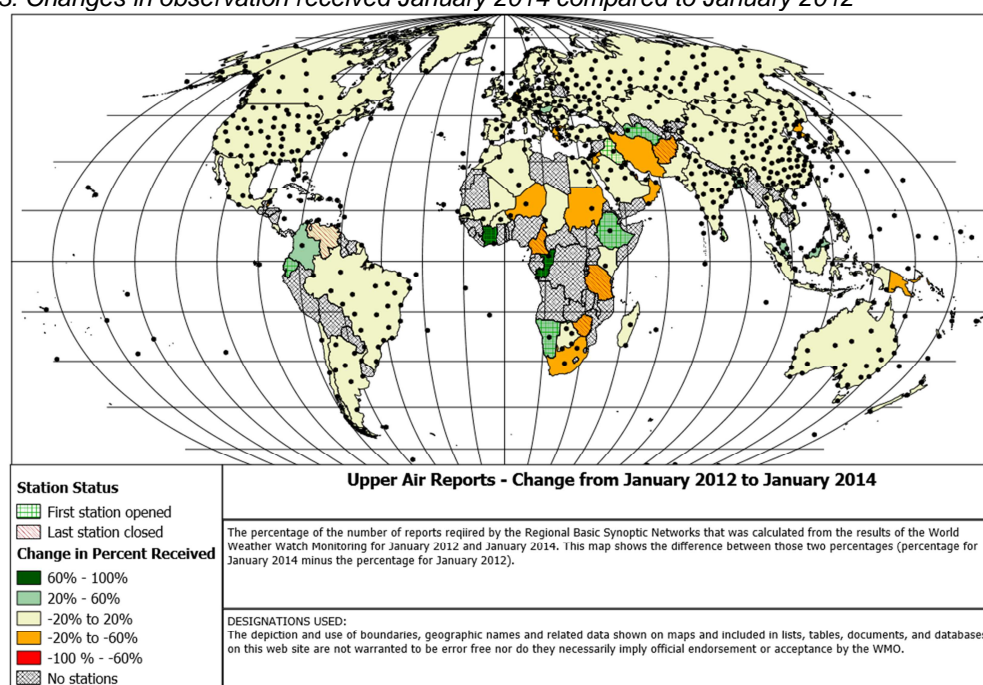


Figure 13: Changes in observation received January 2014 compared to January 2012



### WMO Information System (WIS)

54. As of December 2013, 49% of the registered WIS centres were endorsed as WIS compliant.

55. Most survey respondents indicated having implemented some functions of the WIS as defined in the Manual on WMO Information System (WIS) (WMO-No. 1060), over the past two years. These included:

- Data (metadata management; data access and retrieval; publication of data statistics, maps and research; upgrading of data format to comply with TDCF format; use of WIS data for Global Spectrum Model, etc.);
- Global Information System Centres (GISCs);
- National Centres (NCs);
- Forecasting products;
- Data Collection or Production Centres (DCPCs).

### Implementation of Global Climate Observing System

56. In the past biennium, progress in achieving the tasks of the GCOS implementation plan advanced as follows: 63% of the tasks in the atmospheric domain had been completed; 44% in the oceanic domain; 49% in the terrestrial domain; and 29% in the cross-cutting domain.

### Data Rescue and Data Management Systems

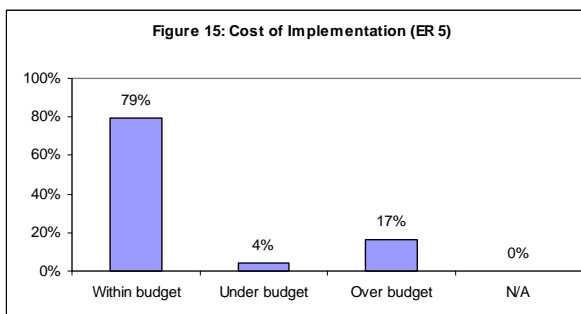
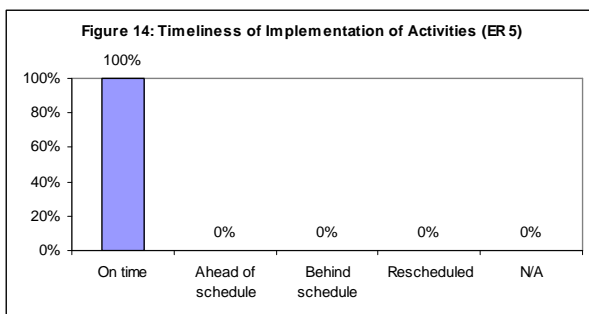
57. About two-fifths of survey respondents have benefited from a WMO-coordinated data rescue project. Many have climate monitoring and/or watch systems in use in their country, which were rated very positively.

## Expected Result 5: Research

### Outputs/Deliverables

#### *Timeliness and Cost of Implementing Activities*

58. Figures 14 and 15 illustrate the timeliness and cost activity of implementation relative to the planned budget. All activities related to ER 5 were executed on time. 83% were implemented within or below the assigned budget, while 17% exceeded the initial budget.



#### *Highlights on Achieved Deliverables*

59. With more than 150 meetings supported in 2012 and 2013, active research was in progress in the World Climate Research Programme (WCRP) and its core projects on climate predictability on sub-seasonal to seasonal scale, polar climate predictability, regional climate, reanalysis, climate and Earth system modelling and observations, ocean data synthesis, monsoons, atmospheric dynamics, chemistry and climate, etc. In addition, planning of implementation of the six WCRP Grand Challenges for climate science started focusing on regional climate, sea-level rise, extremes, water availability, climate sensitivity, and cryosphere. The development of the Research, Modelling and Prediction Annex to the GFCS Implementation Plan was also completed.

60. In the reporting period, archives of model predictions and projections from three major WCRP climate prediction and projection experiments were established (CMIP5, with decadal and centennial time scales; the Climate System Historical Forecast Project on seasonal predictions; and CORDEX on regional climate model downscaling), which make several petabytes of climate data openly available to all scientists in the world. In addition, 364 science articles comprising contributions from 26 modelling centres were published on the basis of the CMIP5 archive of climate data. These articles were used as the main source of climate predictions and projections for the IPCC AR5 Report "Climate Change 2013: The Physical Science Basis".

61. Support was provided to participants from NMHSs in tropical regions on coordinating global observations for atmospheric prediction/analysis.

62. Reports published include: "A Global Assessment of Precipitation Chemistry & Deposition"; a technical report on the establishment of a WMO Sand and Dust Storm Warning Advisory and Assessment System Regional Node for West Asia, published in cooperation with UNEP; a Progress Report of the Typhoon Landfall Forecast Demonstration Project; and Proceedings of the 2012 Third International Symposium on Nowcasting and Very Short Range Forecasting and the 2013 Fifth International Workshop on Monsoons.

## **Outcomes**

### **Climate Research and Support to Early Career Scientists**

63. Sixty-one early career scientists and researchers from developing and least developed countries were funded in 2013 under WCRP to participate in climate research activities. Assistance not only included an opportunity to participate in individual events but a set of systematic capacity building activities were also put into place, thus targeting the development of a future workforce that contributes to the WMO priorities in the domain of climate.

64. Seven new research activities were launched in the past biennium, aimed at advancing climate research capacity at the global and regional level, especially for early career scientists and scientists from developing and least developed countries. Of these, four were started in 2013:

- (a) The *WCRP Polar Climate Predictability Initiative*, a contribution of WCRP to the Global Integrated Polar Prediction System, studies the predictability of polar climate on time scales from seasons to decades as well as the mechanisms behind it. The initiative is particularly timely, given that climate is changing fastest in polar regions, which have started to affect stronger the mid-latitudes;
- (b) New domains in *CORDEX (Coordinated Downscaling Experiment)*: The first focus of CORDEX was on Africa, with initial CORDEX domains later established on all continents. WCRP is currently expanding the range of domains to more regions. Specifically, CORDEX takes long-term climate projections, which usually are produced using models run at a coarse resolution, and uses them as boundary conditions to run higher-resolution climate models. Due to account of previously unresolved features, particularly at the surface, the higher-resolution climate output becomes more adjusted to local conditions and output of such models becomes more useful for analysis of future local climate;
- (c) The *Climate-Chemistry Modelling Initiative* is a joint activity of the WCRP Stratosphere-troposphere Processes And their Role in Climate (SPARC) Project and the International Geosphere-Biosphere Programme Project IGAC (International Global Atmospheric Chemistry). It combines research on all aspects of atmospheric chemistry and climate prediction, while taking into account their inter-connection. This involves all factors contributing to global warming, those affecting the evolution of the stratospheric ozone, as well as factors involved in air quality, thus potentially leading to a new generation of Earth System Models;
- (d) *Clouds, Circulation and Climate Sensitivity* is a new research initiative that aims to implement a WCRP Grand Challenge. It aims to better understand: (a) how all aspects of the hydrological cycle, such as clouds and regional precipitation changes, affect, and are affected by large-scale atmospheric circulation; and (b) how these interactions are represented in various climate models used to project climate change in response to an increase of greenhouse gas concentrations.

### **Research in the Prediction of High-Impact Weather**

65. Respondents to the 2013 Survey indicated improvements to their operational products and services as a result of WMO research projects. Most progress was achieved in the area of operational nowcasting services, followed by enhancements in the access and use of outputs of operational ensemble modelling systems. Advances in the design and operational use of mesoscale prediction systems were also made, though to a lesser extent. Other improvements noted by respondents included seasonal forecasting as well as the design and experimental use of the global numerical weather prediction models.

66. The survey respondents from developing and least developed countries, who had participated in regional or international research initiatives on high-impact weather or severe weather forecasting demonstration projects, considered their participation to have been of benefit.

67. There were seven research projects on operational products and services at the end of the biennium. Four of these were launched in 2013:

- (a) The *Southern China Monsoon Rainfall Experiment* is aimed at improving the observation of precipitation processes using new generation in-situ and remote sensing systems operated from the ground, on aircraft and aboard satellites, as well as advanced high resolution modelling facilities able to resolve and represent the monsoon thermodynamics. This project seeks to improve the skill in forecasting heavy rain, which remains a serious threat to people's lives and properties, especially in Southeast Asia;
- (b) The *Polar Prediction Project* aims to improve weather and environmental predictions on time scales from a few hours to seasonal in order to meet growing demand for skillful and reliable predictions in polar regions and beyond;
- (c) The *Sub-seasonal to Seasonal Project* seeks to improve forecast skill and understanding on the sub-seasonal to seasonal timescale with specific attention to the risk of extreme weather events. Improved weather-to-climate forecasts promise to be of significant social and economic value, particularly as many management decisions in agriculture and food security, water, disaster risk reduction and health fall into this range;
- (d) The *La Plata Basin Project* is a project demonstrating the feasibility of providing dynamical prediction of local extreme weather using dense observation data and numerical models which would contribute to minimize their impacts. The project is mainly motivated by the incomplete understanding of the processes that determine severe weather events, particularly those related to heavy precipitation in the La Plata Basin, a catchment covering five countries (Argentina, Brazil, Uruguay, Bolivia, and Paraguay) with a total population exceeding 200 million.

#### Member satisfaction with the Skill of Climate Predictions

68. Many survey respondents considered the skill of climate predictions to be average to above average.

#### Member satisfaction with Atmospheric Chemistry Observations and Assessments

69. Most survey respondents considered the Global Atmospheric Chemistry Bulletins to be useful and timely, though some improvements were encouraged. Most respondents also considered the GAW measurement guidelines and reports, the Sand and Dust storm products and the chemical weather activities of GURME to be useful.

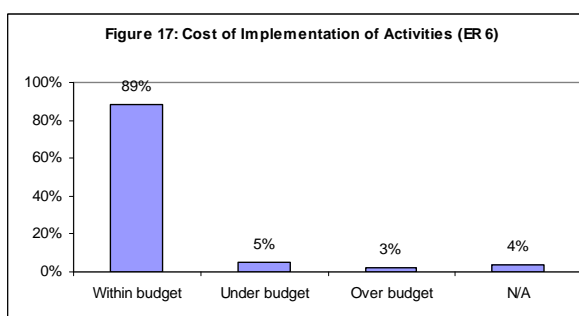
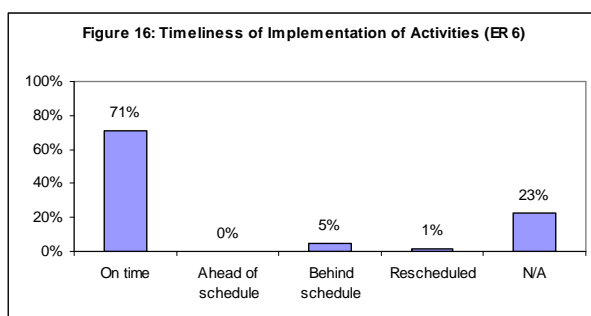


## Expected Result 6: Capacity Development

### Outputs/Deliverables

#### *Timeliness and Cost of Implementing Activities*

70. Seventy-one percent of the activities planned under ER 6 were implemented on time, as presented in Figure 16. Only four activities, accounting for 5% of the total, were lagging behind schedule as of December 2013. As shown in Figure 17, spending was also on track, with 89% of activities implemented within their planned budget. 'N/A' refers to recurrent activities or activities that have not started yet.



#### *Highlights on Achieved Deliverables*

##### Fellowships

71. Overall, 368 fellowship requests were received in the past biennium, with a marked increase from 164 in 2012 to 204 in 2013. The total number of fellowships awarded was 207, of which 76 were in 2012 and 131 in 2013. These figures indicate a 46% rate of meeting requests in 2012, and 64% in 2013. Almost 100% of the fellows who completed their studies returned to their respective countries (93 fellows in 2012 and 106 in 2013).

72. A total amount of CHF 1,211,640 was invested in fellowships in 2012, out of which CHF 1,029,227 was from the regular budget. The amount increased to CHF 1,461,170 in 2013, of which CHF 1,148,485 was from the regular budget. Consequently, about 15% of the total investment in fellowships in 2012 and 21% in 2013 were from extrabudgetary sources, with Norway being the biggest contributor.

73. As was the case in the previous biennium, China hosted more long-term fellows than any other country, with 20 new fellows on average each year. Currently, 45 fellows from 35 countries are studying in China (mostly from RA I but also from RA II and RA III). Other major destinations of long-term fellows included Algeria, Barbados, Kenya, Philippines and Russia. A limited number of fellows were sent to Australia, Germany, India and Nigeria for long-term studies. The United States of America (through the National Oceanic and Atmospheric Administration) hosted 18 and 22 fellows in 2012 and 2013, respectively. It was the major destination for short-term fellowships with an average duration of 4 months.

74. With support from Norway, the Institute for Meteorological Training and Research of the Kenya Meteorological Department hosted 24 fellows from 22 African countries for short-term specialized training course on calibration and maintenance of meteorological instruments in 2013.

75. During the biennium, cooperation agreements were reached with 4 additional partners, namely Ewha University, Korea; Nanjing University of Information Science and Technology, China; the UK Met Office; and UNESCP-IHE, the Netherlands.

## Training

76. Training workshops in public weather services, severe weather and nowcasting, hydrological forecasts, weather observations and telecommunications, climate services, tropical cyclone forecasting, Global Atmospheric Watch, aeronautical forecasts, use of numerical weather prediction, agrometeorology, tropical meteorology, cryospheric processes and others, as well as seminars for trainers, were all supported with the regular budget and provided financial support to over 218 participants. Overall, Regional Training Centres (RTCs) reported having served 3,200 foreign participants and 7,500 local participants in 2012-2013.

77. RTCs in Nairobi, Kenya, and Pune, India, ran several online courses for people in their regions on basic hydrology using the COMET modules, adapted to an international audience with guidance from the Secretariat, demonstrating that this form of learning is becoming more feasible. Additional online courses in aeronautical forecasting and observing, and many webinars were also implemented. RTCs alone served nearly 300 students via distance learning in 2013.

78. In May 2013, EC-64 approved the draft competencies for training personnel and agreed that they be sent to Members for their approval into the WMO Technical Regulations as Recommended Practices. The review is now complete and these competencies will be included in an update of the WMO Technical Regulations. The Secretariat's Education and Training Office continues to work closely with the Technical Departments upon the creation of competencies in the key technical areas. Draft competencies for personnel in WIS, Public Weather Services, Climate Services, Tropical Cyclones, and Marine Meteorology are in preparation.

79. Training material was produced in different languages for the Quality Management Framework for Hydrology and Spanish Instructors on Stream Gauging were trained.

80. A Regional Workshop on Climate Monitoring and Implementation of Climate Watch Systems (CWS) was organized in Amman, Jordan, in May 2013. Eleven countries attended the event, which led to the development of a CWS implementation plan for the West Asian Arab countries. Roving seminars for farmers were conducted in Peru, Moldova, Ecuador and Romania.

## Regional Offices

81. Two LDC coordination meetings were held at which it was demonstrated how NMHSs could contribute to the attainment of the Millennium Development Goals through the development of climate information and products. As a result of the national workshops held, strategic development plans were developed for two countries.

82. In the course of a regional technical conference for RA VI, assistance was provided to Members for a national self-assessment of their readiness for WIGOS implementation. In accordance with the Terms of Reference, technical assistance and guidance materials were further provided to the various working groups and support to the president and Management Group.

## Outcomes

### Visibility and Relevance of NMHSs in National and Regional Agenda

83. Respondents to the 2013 Survey observed significant improvements in their visibility and relevance in the national development agenda, associated with user accessibility to timely and accurate forecasts and warnings. Figure 18 presents the results of the Survey in this respect, including other important factors, such as awareness by users on the types of services that NMHSs can deliver and contribution to policy setting.



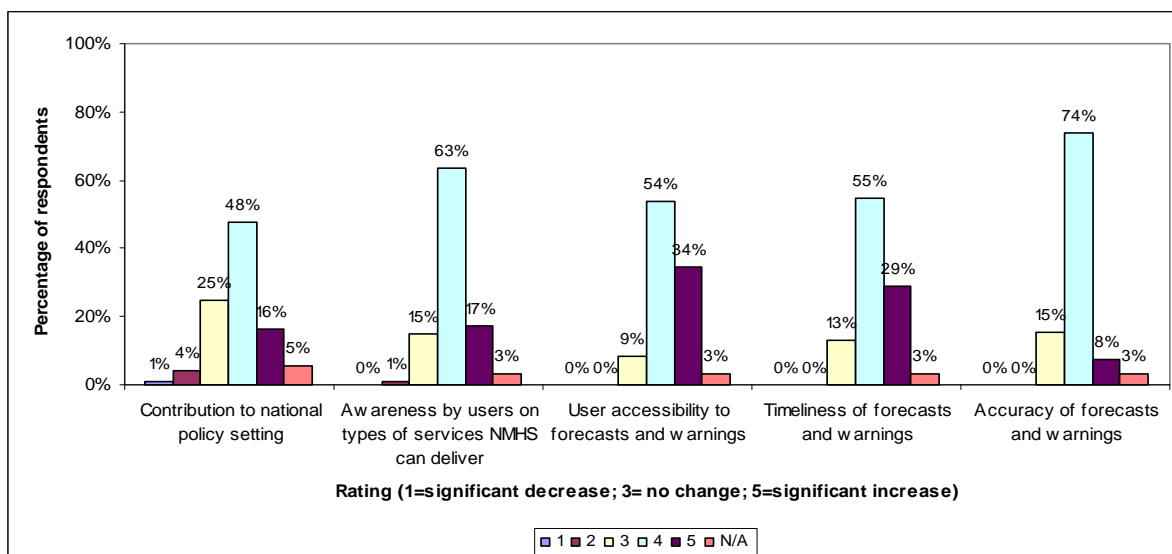


Figure 18: Change in the visibility and relevance of NMHSs in the national development agenda

84. Less improvement was noted in terms of the visibility and relevance of the regional services provided by NMHSs in the regional development agenda, as illustrated by Figure 19. While many respondents reported advances as a result of increased contribution to regional policy setting, a similar proportion indicated no change in this regard.

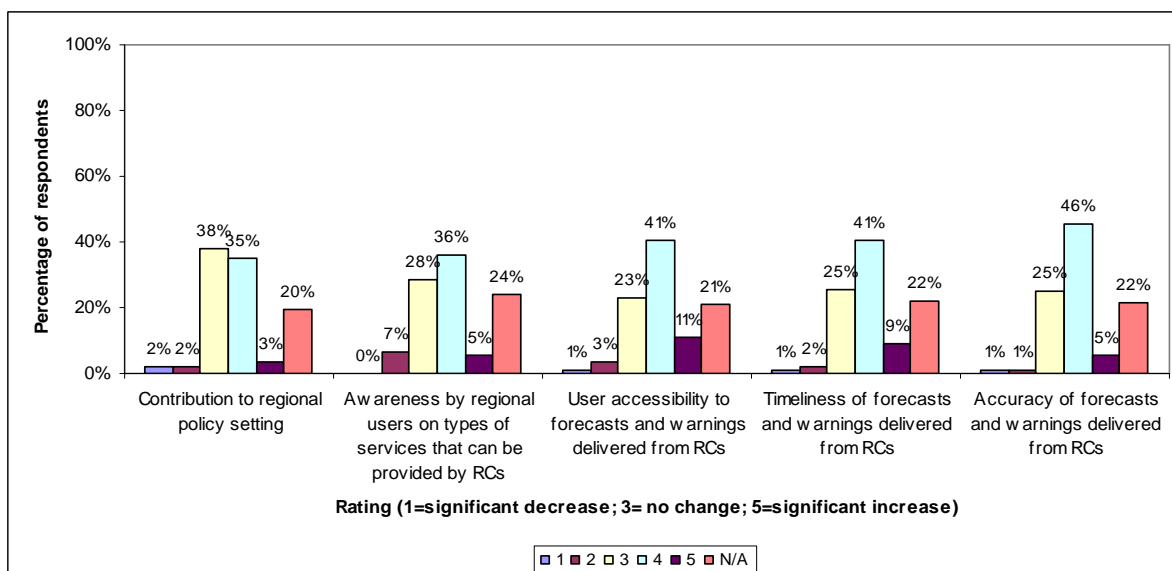


Figure 19: Change in the visibility and relevance of the regional services delivered by NMHSs in the regional development agenda

### Infrastructure and Operational Facilities

85. According to the survey results, the infrastructure and operational facilities improved by Members included surface observing network, the data-processing/forecasting facilities, and equipment for meteorological, environmental and satellite data. There was less improvement in the upper-air observing networks. Other improvements achieved were in relation to web and mobile service delivery, the use of social media, increased radar coverage as well as repairs to radar and satellite systems, upgrade to corobor systems, enhancements to server and storage virtualization technology, increased quality control and calibration, satellite data acquisition, local area numerical

weather prediction, the use of biometeorological indices, and the conduct of hydrometeorological early warning and hazard risk assessments.

#### Education and Training in Support of GFCS

86. Fifteen RTCs provided education and training support for GFCS-related activities in the past two years, with China, Turkey, Israel, Barbados and Niger being the most active. Some examples of the short courses provided include:

- “Methods for Short-term Climate Prediction,” April 2012 and 2013, in Nanjing and Beijing, China;
- International Training Course on “Regional Climate Prediction and Drought Monitoring and Warming,” September 2012, Beijing, China;
- International Training Course on “Application of Meteorological Satellites in Disaster Mitigation and Environmental Studies,” October 2012, Beijing, China;
- The training workshop on “Climate Change and Agriculture” at the RTC Bet-Dagan, Israel, June 2013;
- International Training Course on Regional Climate Prediction and Drought Monitoring, in Beijing, China, October 2013.

87. Additional partners that are not RTCs also served Members in meeting their needs for training in GFCS-related areas. One of the most important was Météo-France, which offered a course on "Climatology, a step towards climate services" in 2012 and "Climatology, foundation for climate service" in 2013.

#### Member satisfaction with RTCs

88. According to the survey results, the staff trained in WMO Regional Training Centres in each Region in 2012 and 2013 were as follows:

Region	Staff trained in 2012	Staff trained in 2013
RA I	18	17
RA II	36	26
RA III	3	6
RA IV	17	16
RA V	8	7
RA VI	36	25

89. Respondents indicated high degree of satisfaction with the training at RTCs, except for RTCs in RA III (Figure 20).

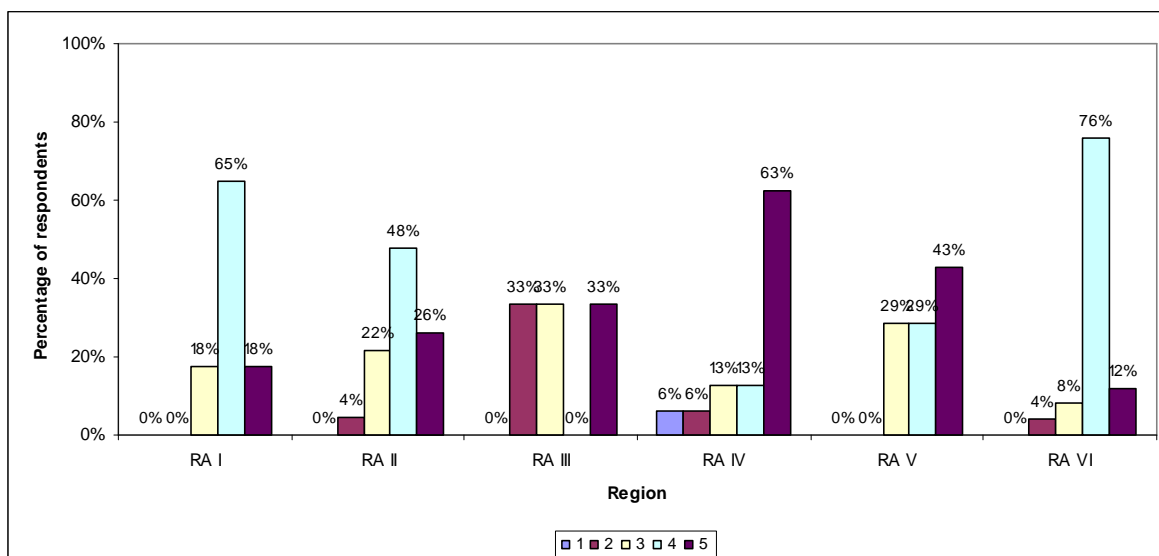


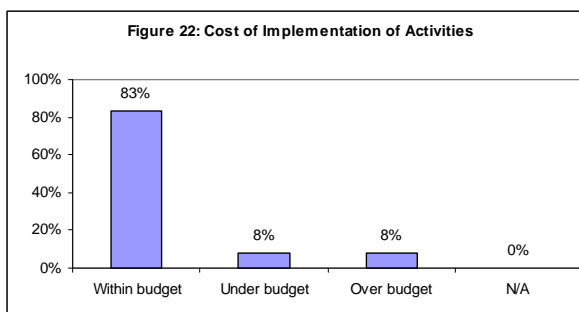
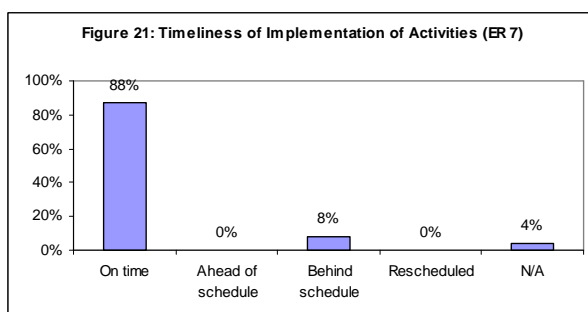
Figure 20: Rating of satisfaction with RTCs in each Region in 2013 on a scale of 1-5.

## Expected Result 7: Partnerships

### Outputs/Deliverables

#### *Timeliness and Cost of Implementing Activities*

90. As of December 2013, 88% of the activities planned under ER 7 were implemented on time and 83% within budget, as presented in Figures 21 and 22.



#### *Highlights on Achieved Deliverables*

91. With close to two million annual visitors to the WMO website, 26,000 annual mentions in the press and a growing presence on social media, WMO's communications activities have strengthened the Organization's reputation for scientific and operational expertise in climate change, drought, disaster risk reduction, climate services, and other high-profile subjects. During the reporting period, the most successful outreach effort was for "The Global Climate 2001-2010, A Decade of Climate Extremes" report. Four regular issues and one special GFCS issue of the WMO Bulletin were published, and extensive press coverage achieved of WMO reports and activities.

92. WMO is well-placed in UN-Water activities and enjoys increased exposure of its capabilities. Improved relationships with UNESCO have further enabled enhanced guidance to NMHSs on water-related issues.

93. In the area of climate change, the leadership position of WMO was boosted by the role of the ASG as Chair of the High-Level Committee on Programmes (HLCP) Working Group on Climate Change. A Guide to Climatological Practices was further produced in the UN languages.

94. Other noteworthy outputs include financial and in-kind contributions to the Intergovernmental Panel on Climate Change (IPCC), WCRP, UN-Water, Rio+20 follow-up, post-2015 development agenda, CEB/HLCP/HLCM participation, COPs, and the Global Platform for Disaster Risk Reduction, among others.

## **Outcomes**

### **Contribution to the UN system**

95. WMO made important contributions to the UN and other international conventions, submitting a total of 18 reports in the past biennium. Of these, 10 were submitted in 2013: six to the work of the UNFCCC Subsidiary Body for Technological and Scientific Advice (SBSTA) and Subsidiary Body for Implementation (SBI), mainly in the areas of adaptation, capacity building, research and systematic observation, and national adaptation plans. COP 19 considered GFCS as an initiative to promote the science-based approach for adaptation, building climate resilience, reducing economic and social losses, and alleviating damages associated with climate change impacts. WMO submissions to the UN Convention to Combat Desertification (UNCCD) included Drought Early Warning Systems and the Integrated Drought Management Programme. There was no direct input on a specific issue to the Convention on Biological Diversity (CBD) in 2013, but there was a regional drought workshop jointly organized by WMO, UNCCD and CBD.

### **Partnerships**

96. As of December 2013, WMO had 51 agreements, 48 working arrangements, 85 Memoranda of Understanding (MoUs) and 20 consultative status arrangements. To enhance collaboration and support the implementation of the GFCS, three of these MoUs were concluded in 2013, involving the International Union for the Conservation of Nature (IUCN), the International Federation of the Red Cross (IFRC) and the International Commission on Irrigation and Drainage (ICID). Other areas in which MoUs were signed ranged from cooperation in the field of maritime communication for safety and efficiency of navigation at sea, to cooperation for scholarship and fellowship activities. Three Letters of Agreement were further signed to give recognition to specific entities as contributing networks and/or calibration centres for the WMO GAW programme. The Working Agreement signed between UNESCO and WMO in the field of hydrology and water resources is an updated version that supersedes the agreement signed in 1973.

97. The survey results showed that WMO Members had also implemented a large variety of projects or activities in partnership with UN and other international organizations over the past two years. Most of them were implemented through cooperation with multilateral partners, including UN organizations and the World Bank. A large number of activities were implemented in partnership with regional organizations, while only a few were in direct collaboration with universities and research institutions.

### **Communications**

98. The external communications parameters tracked by the Secretariat indicated a good positioning of WMO in both the traditional media and the social media whose importance has only been growing in the past couple of years. From 2012 to 2013, the number of Twitter followers doubled from 4,690 to 8,913. The number of Facebook fans grew from about 8,000 in 2012 to 14,574 in 2013. The number of unique visitors to the WMO website (1,930,177 in 2013) also almost doubled, reflecting a broader outreach effect achieved since the beginning of the financial period. This enhanced prominence on the Internet and in the social media was accompanied by

sustained WMO presence in the traditional press where a 5% increase was attained in the number of times that the Organization was mentioned (26,446 in 2013 compared to 25,260 in 2012).

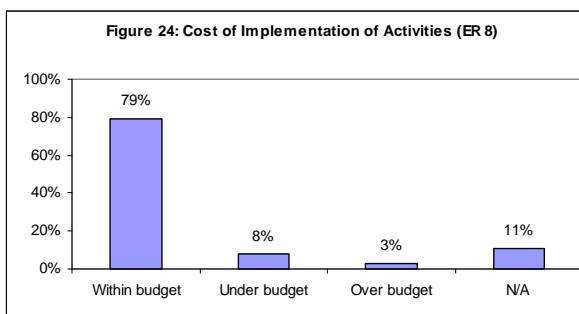
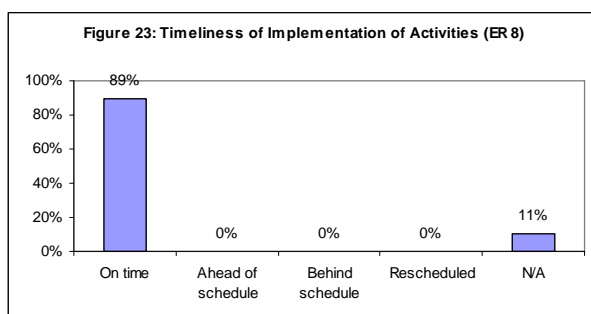
99. There was also a high level of utilization of WMO non-technical, public information outputs among Members, such as website, press releases, World Meteorological Day materials, In the Media, Facebook, Twitter, etc. Most survey respondents indicated having used these communication products frequently or on a regular basis.

## Expected Result 8: Strengthening Good WMO Governance

### Outputs/Deliverables

#### *Timeliness and Cost of Implementing Activities*

100. Eighty-nine percent of the total ER 8 activities were implemented on time and 79% within budget, as presented in Figures 23 and 24. N/A stands for forthcoming activities or activities of a recurrent nature.



#### *Highlights on Achieved Deliverables*

101. Conference and interpretation services were provided to 304 major meetings of EC, subsidiary bodies, the Intergovernmental Panel on Climate Change (IPCC), WCRP and GCOS during the period January 2012-December 2013, including 18 sessions of FINAC, WMO Bureau and EC, and meetings of presidents of RAs and TCs; and 286 sessions of subsidiary bodies, the Audit Committee and IPCC, WCRP, and GCOS.

102. Sixty-three numbered publications were issued in a total of 198 language versions and 78 flyers/brochures/folders were issued in a total of 188 language versions. A total of 18 publications were distributed exclusively on-line on the WMO Library site. In addition, in 2012, a total of 19,746 copies (print and CD-form) of 8 different WMO titles were distributed free of charge. In 2013, this number was 18,918 copies of 6 different titles. In terms of sales, a total of 2,316 hard copies (in print- and/or CD-form) of 135 different WMO titles were sold in 2012. In 2013, 790 hard copies of 84 titles in English, Chinese, Spanish and/or French as well as in multi-lingual versions were sold.

103. The WMO Strategic Plan 2016-2019 was drafted and reviewed by the EC Working Group on Strategic and Operational Planning and EC-65. The strategic priorities for the next financial period were defined and other areas of importance identified. In terms of M&E, baselines were set using data from the 2012 Survey on Impact of Achieved Results on Members and other information available at the Secretariat. They were further used to set performance targets for 2013 and 2015.

104. The WMO Risk Management Framework was published in April 2013 and top high-risks for the Organization regularly reviewed to establish the status and identify actions to mitigate them.

### **Outcomes**

105. In both 2012 and 2013, the External Auditor provided an unqualified opinion on the financial statements of the Organization, certifying that they represented fairly the financial position of WMO as well as its financial performance and cash flow, in accordance with the International Public Sector Accounting Standards and the Organization's Financial Regulations.

106. Seventy-eight percent of the accepted oversight recommendations of the WMO Internal Oversight Office were implemented in 2013. The rate of implementation was similar in 2012 (75%). The implementation rate of accepted recommendations of the Joint Inspection Unit was 86.2% in 2012. Data for 2013 is still not available.

107. In terms of achieving better efficiency of operations, the cost of holding EC-65 in May 2013 amounted to CHF 559,049 which represents a 7.5% decrease vis-à-vis the cost of holding EC-64 (June 2012), CHF 604,129. This decrease is largely due to the effective planning and management of EC-65 that yielded considerable savings in two key areas:

- (a) Interpretation – fewer interpreters were required due to improvements in scheduling of interpreters and to better adherence to the EC meeting calendar; and
- (b) Translation and revision – the in-session revision of draft documents was streamlined, contributing to the need for fewer translation resources.

108. In addition, EC-65 was conducted in a nearly paperless fashion.

109. The results of the evaluation surveys conducted following constituent body meetings were largely positive. For instance, 73% of the survey respondents to the EC-65 survey rated the technical content of documentation as average to above average; 80% provided this rating to the language quality of documents, and 67% to the quality of interpretation. Similarly, 80% of the respondents to questionnaires regarding the CAS-16 and RA VI-16 meetings rated the technical content of constituent body documentation as average to above average; 93% provided such rating to the language quality of documents and the quality of interpretation.

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## **ANNEX 1**

### **LIST OF EXPECTED RESULTS**

- ER 1: Enhanced capabilities of Members to deliver and improve access to high-quality weather, climate, water and related environmental predictions, information, warnings and services in response to users' needs, and to enable their use in decision-making by relevant societal sectors
  - ER 2: Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate, water and related environmental elements
  - ER 3: Enhanced capabilities of Members to produce better weather, climate, water and related environmental information, predictions and warnings to support in particular disaster risk reduction and climate impact and adaptation strategies
  - ER 4: Enhanced capabilities of Members to access, develop, implement and use integrated and interoperable Earth- and space-based observation systems for weather, climate and hydrological observations, as well as related environmental and space weather observations, based on world standards set by WMO
  - ER 5: Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and the related environmental science and technology development
  - ER 6: Enhanced capabilities of NMHSs, in particular in developing and least developed countries, to fulfill their mandates
  - ER 7: New and strengthened partnerships and cooperation activities to improve NMHSs' performance in delivering services and to increase the value of the contributions of WMO within the United Nations system, relevant international conventions and national strategic issues
  - ER 8: An effective and efficient Organization
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