WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR BASIC SYSTEMS

WMO REGIONAL ASSOCIATION I

MEETING OF THE REGIONAL TECHNICAL IMPLEMENTATION TEAM (RTIT) OF THE SEVERE WEATHER FORECASTING DEMONSTRATION PROJECT (SWFDP) FOR SOUTHERN AFRICA

FLIC-EN-FLAC, MAURITIUS, 19-22 JULY 2011

FINAL REPORT

EXECUTIVE SUMMARY

The meeting of the Regional Technical Implementation Team (RTIT) of the Severe Weather Forecasting Demonstration Project (SWFDP) for Southern Africa was opened by its vice-Chairperson, Mr Premchand Goolaup of the Mauritius Meteorological Service, at 09:30 on Tuesday, 19 July 2011, at the Pearle Beach Resort & Spa Hotel, in Flic en Flac, Mauritius.

The SWFDP – Southern Africa project is to be maintained relative to the implemented routine forecasting framework of the project, i.e. the cascading forecasting process, including the global products made available by ECMWF, Met Office UK, and NCEP USA, and regional products made available by RSMC Pretoria and RSMC La Réunion, and the RSMC Pretoria Daily Guidance and Website, and MSG satellite products. The RTIT would remain as the project's technical management body for the project. A new project implementation plan will be developed, based on revision of the present RTIT, and will be referred to as the "Regional Phase 4 Implementation Plan ("RP4IP").

The RTIT, viewing the future of the project is to shift from management under WMO/CBS to within the WMO Regional Association for Africa, wished to encourage the Meteorological Association of Southern Africa (MASA), i.e., its NMHS members, to support the future activities of SWFDP – Southern Africa, as follows:

- Conduct resource mobilization initiatives, for training (Pretoria Desk, e-learning, NWP training etc…);
- Encourage members contributions/ support towards SWFDP activities;
- Facilitate the conclusion of the WMO-SADC MOU and influence policy making in SADC, through which recognizing that the SWFDP contributes to major Regional goals and strategic directions (e.g. disaster risk reduction);
- Establish a MASA SWF Task Force under the S&T Committee of the Board (including few MASA directors, regional technical experts, WMO, and relevant global centres) to oversee, steer, advocate and enhance SW Forecasting framework in Southern Africa (continuous improvement, integrating FFGS etc.);
- Showcase and promote the SA-SWF scheme to AMCOMET & COP-17 etc.;
- Build and nurture relations with WMO global NWP centres;
- Prioritize SWF within the SAMPRO project;
- Conduct regular PWS surveys to track and enhance quality of forecasting services in member countries;
- Promote and monitor stakeholder/ user community engagements in the region;
- Encourage members to conduct regular verification of forecasts
- Develop a platform for forecasters & researchers to share experiences, case studies, best practices aimed at risk assessment and risk management/ contingency planning/SOP/ Quality Management of processes;
- Pay particular attention to special forecasting needs faced by the NMHSs in LDCs and SIDS.

The SWFDP should be publicized, including its benefits, and successes that have been realized so far, including case studies that illustrate the goals and benefits. The RSMC Website could be expanded beyond the present real-time forecasting guidance content. Reporting on SWFDP activities and progress against the project goals will be done using new templates (see Annex 3 and Annex 4), and on semi-annual basis, one for the "rainy" season, and the other for the "dry" (winter) season.

Two specific aspects of the verification activity need urgent attention to move the verification forward towards an acceptable level:

a. implementation of verification methods for RSMC and the global and regional NWP products for the SWFDP region; and

b. the sub-division of the larger countries into suitable regions so that the more meaningful verification can be carried out region by region.

Training for forecasters continues to be a high priority, and suitable approaches include:

- Establishing a training desk at RSMC Pretoria;
- Conducting a training tour by expert trainers;
- E-learning opportunities;
- Virtual-laboratory approach (possibly collaborating with Satellite Programme).

The SWFDP should seek collaboration and build synergies with other relevant programmes and activities, where it makes sense, including on the implementation of regional flash flood guidance system (FFGS), and tapping on promising research outcomes, or legacies of regional research field campaigns, such as GIFS-TIGGE.

The following aspects are for the improvement of the PWS component of the project:

1.1. Development of Standard Operating Procedures (SOPs). NMHSs should develop SOPs with DMCPAs on the one hand, and with the media on the other. SOPs entail a set of instructions that clearly define the functions and responsibilities of each entity.

1.2. NMHSs should continue to seriously pursue evaluation of their products and services in order to get the public, media and the DMCPAs engaged using the new format of the evaluation forms for obtaining feedbacks. In the case of DMCPAs and the media, NMHSs need to prepare and send questionnaires to these organizations after each severe weather event. For the general public, a different kind of survey is required which will collect information from the end users on the reception and use of the disseminated information. Guidelines on preparation of surveys are freely available on PWS Web pages at: http://www.wmo.int/pages/prog/amp/pwsp/surveys.htm

1.3. NMHSs should make use of the guidance materials provided by PWS which are freely available and contain most of the materials needed by the participating NMHSs, showing them how to create channels of communication with these two large user groups.

1.4. Specialized training is needed to equip NMHSs with skills for service delivery (such as how to generate and deliver effective warning messages, etc) should be continued in the region. The details of how such training will be organized and the participating organizations will be considered in due course.

1.5. The WMO Joint GDPFS/PWS training workshops, where participants from NMHSs share experience on developing dialogue with user communities should be continued in future.

1.6. Where national networks of meteorologists and journalists exist, NMHSs should use them to strengthen relationships with the media.

1.7. NMHSs should consider developing national databases of severe events and their impacts for use in qualifying and putting future severe weather events into context, as demanded by users. This could be considered as part of the proposed development of the RSMC Website and portal.

1.8. NMHSs should develop an outreach programme for sensitizing and raising awareness among the public to the potential benefits, but also the limitations of weather forecasts in order to address the question of credibility of NMHSs.

1.9. NMHSs should consider preparing simple pamphlets (in-house if possible) explaining meteorological phenomena and hazards applicable to their particular countries for distribution to the public.

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING

1.1 The meeting of the Regional Technical Implementation Team (RTIT) of the Severe Weather Forecasting Demonstration Project (SWFDP) for Southern Africa was opened by its vice-Chairperson, Mr Premchand Goolaup of the Mauritius Meteorological Service, at 09:30 on Tuesday, 19 July 2011, at the Pearle Beach Resort & Spa Hotel, in Flic en Flac, Mauritius. The meeting noted that the Chairperson of the RTIT, Mr Eugene Poolman was unable to attend the meeting. The opening welcome was made by the Permanent Representative of Republic of Mauritius with WMO, Mr Balraj Harikrishna Dunputh, and by Mr Peter Chen and Ms Haleh Kootval, the representatives of the WMO Secretary-General. The opening was also attended by Deputy Directors of the MMS, Mr Beebeejaun and Mr Mungra.

1.2 Mr Dunputh warmly welcomed the participants to Mauritius, and expressed his appreciation to WMO for agreeing to hold this important meeting in Mauritius. He noted the first SWFDP, for Southeast Africa, had completed its first demonstration phase in November 2007. The WMO Executive Council in 2008, responded positively to a request by NMHS members of the Meteorological Association of Southern Africa (MASA) to continue to support the SWFDP and to the rollout of the project to include all sixteen countries of southern Africa, which spanned the period November 2008 to December 2011. The SWFDP has been implemented successfully and completed its expansion to include all sixteen countries of southern Africa, and that other regional projects are also in progress or in development. The SWFDP represented a systematic and practical approach for building capacity, transferring new knowledge and skills in severe weather forecasting and in the delivery of warning services.

1.3 Mr Dunputh further noted that the public demand for weather information is ever increasing, including more accurate forecasts of extreme weather- and climate-related events, and in parallel with heightened interests associated with climate change. While advanced NMHSs continued to invest and realize improved NWP systems and also improved warning services such as increased advanced alerting to possible hazardous conditions, many other Services, such as in Mauritius, simply do not have the resources to make similar advancements. The SWFDP in southern Africa is key to channeling NWP guidance from advanced centres into the developing countries of the SADC region. As an example, he highlighted with appreciation, the high-resolution Aladin-Réunion model products covering the southwestern Indian Ocean that are made available by RSMC La Réunion of MétéoFrance to the SWFDP. He highlighted the rapid introduction of advanced forecasting tools into forecasting routines in the region, improved exchange of technical knowledge through networking of forecasters, and the important training that has been provided on an annual basis. He further noted the crucial importance of ensuring long-term sustainability of the benefits that have been realized, and the beginnings of continuous improvement process with the SWFDP via verification activities, and in this sense he saw it desirable to put into routine operations the successful elements of the demonstration. He noted that the meeting will consider important matters such as forecast verification, technical training, and the future structure and responsibilities of the RTIT. On this note, Mr Dunputh wished the meeting a success, and declared the meeting opened.

1.4 Mr Chen expressed his thanks on behalf of WMO to the Mauritius Meteorological Service, and its Acting Director, Mr Dunputh, for hosting this meeting in Mauritius, and to Mr Prem Goolaup for making the local arrangements for the meeting and its participants, and as well for agreeing to take on the responsibility of chairing the meeting of the RTIT in his capacity as the Vice-Chairperson, in the absence of the Chair, Mr Eugene Poolman (South Africa). Mr Chen also recognized the participation of Mr Mark Majodina, representing the Meteorological Association of Southern Africa (MASA), and Mr Bernard Strauss, Chairperson of the CBS Steering Group for the SWFDP, and Chairperson of the Commission for Basic Systems Open Programme Area Group on Data-Processing and Forecasting System (DPFS).

1.5 Mr Chen then provided background to the project and the context for this meeting. The ever-increasing precision, reliability and lead-time provided by NWP systems have led to increasingly skillful weather forecasting over the recent decades and will become even more relevant in the future. NWP systems generally provide an accurate indication of developing extreme weather events, thereby being a very relevant component of routine and severe weather forecasting and warning programmes at NMHSs. It is in this context that the SWFDP initiative is intended, to: 1) further explore and enhance the use and application of outputs of existing NWP systems, available through WMO's Global Data-Processing and Forecasting System (GDPFS), in the improvement of severe weather forecasting in countries where sophisticated NWP outputs are not currently used, or poorly used; and, 2) deliver warning services through the Public Weather Services (PWS) Programme. He noted that the SWFDP in southern Africa was a trailblazing project, having been the first to successfully demonstrate the project's basic concepts and methods of implementation.

1.6 Noting the need for ensuring the long-term sustainability of the benefits gained with mature SWFDPs (for example in Southern Africa), through making the transition into routine operations of the project's successful elements, the Steering Group for the SWFDP developed an additional project phase entitled: "Continuing Development Phase" (referred to as "Phase 4"), when the project has developed sufficiently its framework through its initial phases for it to be fully assumed under the responsibility of the respective Regional Associations including the raising of necessary resources to sustain the project. This strategy was supported by CBS-Ext.(10), in November 2010, and endorsed by the recent sixteenth session of the WMO Meteorological Congress, in May 2011. In this context, there is commitment made by the Meeting of SADC Ministers Responsible for Transport and Meteorology (Pemba, Mozambique, May 2010) to ensure long-term sustainability of the benefits gained from the SWFDP – Southern Africa, to support future developments and to incorporate successful elements of the demonstration project into daily forecasting routines.

2. ORGANIZATION OF THE MEETING

2.1 Adoption of the agenda

2.1.1 The meeting adopted the provisional agenda, which is found in Annex I of this report.

2.2 Working arrangements

2.2.1 The meeting agreed on the organization of its working hours and session arrangements. All documents that were submitted for the consideration of the meeting have been placed on the WMO web site at:

http://www.wmo.int/pages/prog/www/BAS/CBS-meetings.html

linked to the banner for the meeting.

2.2.2 A list of the participants was completed, which is found in Annex II of this report.

3. SUPPORT TO SWFDP – SOUTHERN AFRICA BY MASA/SADC

3.1 On the invitation of the Chair, Mr Chen provided an overview briefing on the SWFDP project, including the status of its development in different regions of the world.

3.2 The meeting noted that NMHS members of the Meteorological Association of Southern Africa (MASA) had requested WMO to continue to support the SWFDP, including all countries of the southern Africa region. The WMO Executive Council, at its sixtieth session (2008), responded positively to this request. The meeting further noted the commitment made by the Meeting of SADC Ministers Responsible for Transport and Meteorology (Pemba, Mozambique, May 2010) to

support the SWFDP in Southern Africa. The Chair invited Mr Mark Majodina, representing MASA to make a statement in this regard.

3.3 Mr Majodina, expressed the view of the Meteorological Association of Southern Africa, that the SWFDP has been enormously beneficial to its members, and represented a genuine partnership between the developed and the developing world in meteorology. The demonstration has been important for this region, from the initial project that involved five NMHSs, and at the request of MASA in 2008, expanded to all sixteen countries of the southern African region with additional support from WMO. At the annual meeting of the Ministers of SADC, it was recognized that 1) the SWFDP was a contribution to climate change adaptation in improving the prediction of severe weather; 2) NMHSs were requested to secure the future of the project by allocating sufficient budget to ensure its continuation; and SWFDP is relevant to regional socio-economic benefits and development. It was recognized that LDCs were not likely in a position to allocate adequate budget to permit their full participation, and therefore resource mobilization efforts are needed.

3.4 Mr Majodina also noted that information about the successes of the SWFDP is not well known beyond the NMHSs and its technical community. It was suggested that a promotional publication should be developed (see section 8.2), targeted to broad audiences, in government and the general public, describing success stories, which could also be used to promote the role of NMHSs in disaster risk reduction through improved warning services, and regional cooperation.

3.5 The meeting concluded that the support of MASA was important to ensure governments of the region will favour and further develop this project into the future, including providing overarching direction on its goals and priorities, as well as ensuring adequate resources are mobilized to support its activities, especially for regular technical training and developmental activities, and project coordination. At the same time MASA requested that the participation of the global and regional centres, and that coordination with WMO, continue. The meeting decided to develop a set of messages for MASA, which is found in the Conclusion and Recommendation (see section 8.6) of this report.

4. EVALUATION OF THE FULL EXPANDED DEMONSTRATION OF THE SWFDP FOR SOUTHERN AFRICA (RA I)

4.1 The Secretariat presented to the meeting the outcomes of the expanded demonstration of the SWFDP for Southern Africa, which were included in the Final Progress report for the period November 2008 – December 2010. This report is exclusively based on quarterly reports that were provided by the participating NMHSs. Over the project period, the NMHSs of Botswana, Lesotho, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe provided all eight of the required quarterly reports. Six of the NMHSs had provided less than one-half of the quarterly reports; fewer reports were received for 2010 than for 2009.

4.2 The severe weather of the region was mainly experienced during the rainy season of November to the following March/April, which is also the tropical cyclone season of the western Indian Ocean. Heavy rainfalls and damaging winds are often associated with strong convection and tropical cyclones. During the dry season, June to October, strong winds are experienced along coastal regions and at islands, while extremely cold conditions and snowfall are experienced in high elevation regions of Lesotho, South Africa, and Swaziland. During the two one-year periods of the demonstration, 309 (2009) and 307 (2010) extreme events were reported by the NMHSs.

4.3 The NMHSs evaluated three kinds of forecasting guidance: RSMC Daily Guidance Product, MSG-based (satellite) products, and NWP/EPS/LAM products. All were considered useful, although RSMC and NWP guidance was considered useful, in spite of the limited skill of the NWP for predicting small scale convective developments that resulted in heavy rainfalls and strong wind gusts. RSMC guidance was very useful for assessing large scale features, and widely used in

routine forecasting. NWP products, especially EPS products, were most useful for extending lead-times and increasing forecast confidence for advisories and warnings. Very few comments were received on MSG diagnostic products (hydro-estimator, and CII instability index). Some expressed difficulty with accessing and using the wide range of products made available to the SWFDP.

4.4 In relation to the five principal goals of the SWFDP, the following were noted:

- improving forecasting of severe weather
  - *Very positive impact, increased skill and confidence*
  - *Probabilistic products very significant, helpful*
- improving lead-time of warnings
  - *Significant for advisories & warnings issued*
- improving interaction of NMHSs with DMCPAs
  - *Progress made (see 6.3.3)*
- identifying areas for improvement
  - *Predicting convective weather (stong winds/gusts, heavy precipitation)*
  - *Shortage of surface observations*
  - *Getting feedback from users (media, DMCPAs)*
- improving products from NWP Centres through feedback
  - *No feedback in « real-time »*
  - *Need to better define the feedback required*

4.5 The meeting discussed the Verification and Public Weather Services parts of the evaluation under their respective agenda items below.

4.6 Overall, the SWFDP was considered a very successful project. Severe weather forecasting aspects saw considerable advancement and improvements through the demonstration, which resulted in improved warning services in many, but not all, of the NMHSs. In some countries, relations with media and disaster management organizations were developed and improved, while in other countries, assistance is needed to develop improved working relations. In particular, regarding the development of effective relationships and operational procedures with disaster management organizations, the meeting believed that MASA/SADC could assist in establishing dialogue between NMHSs and these organizations to facilitate and improve decision making based on the weather warnings for the public, since it should be the interest of governments to ensure the safety of its citizens and the protection of their livelihoods.

5. CASCADING FORECASTING PROCESS: ROLES OF PARTICIPATING COUNTRIES, REVIEW PROGRESS AND ONGOING SUPPORT

5.0.1 The meeting reviewed the experiences of the participating centres in the cascading forecasting process of the SWFDP, including the continued commitments of the global products centres, developments at RSMC Pretoria and RSMC La Réunion, the perspectives of the participating NMHSs, including the benefits realized, the challenges remaining, quality assurance through forecast verification, and relations with users such as the media, disaster management organizations, the general public, and important socio-economic sectors.

5.1 Global: ECMWF, Met Office (UK), NOAA/NCEP (USA)

5.1.1 The meeting reviewed the continuing commitment by the three global centres. The ECMWF continues to support the project with no change in products provided. The Met Office UK noted some changes were recently introduced in the limited area models over Africa, as well as the products that are transmitted via EUMETCast broadcast. The meeting noted that the Met Office UK's MOGREPS products will soon extend to T+144h, and the Met Office will also consider providing deterministic wave forecasts. It also enquired as to which products were not useful to the NMHSs. The meeting suggested that through the use of Web access statistics, we may understand the usage patterns for the products. Some felt that usage may well be seasonally

dependent. NCEP USA continues to support the SWFDP through dedicated Web pages, and its training activities through the Africa Desk.

5.2 Regional: RSMC Pretoria, RSMC-TC La Réunion

5.2.1 Both RSMC Pretoria and RSMC La Réunion continue to play very important complementary regional forecasting guidance roles in this region. RSMC Pretoria noted that its involvement in the SWFDP has been a very positive experience. Through this project SAWS has been able to access the latest NWP/EPS products which are of great benefit for its local operations as well. Another benefit has also been the enhancement of tropical weather knowledge for SAWS forecasters. SAWS continue to commit resources to this project through its forecasting, research, and ITC divisions. The biggest challenge has been severe weather associated with small scale convection. In this region with limited radar coverage, satellite remains the major tool for nowcasting. This will have to be done mainly at the NMHS level.

5.2.2 RSMC La Réunion continues to provide outputs of the limited area model Aladin-Réunion (8-km resolution) with coverage over the southwestern Indian Ocean and adapted for the tropical ocean, hence particularly relevant and valued to the region's small island states (Comoros, Mauritius, Seychelles), Madagascar, and the southeastern coast of continental Africa. The meeting learned that products from a multi-model ensemble system (PEArp/MF, EPS/ECMWF, MOGREPS/Met Office UK, EPS/CMC, GEPS/NCEP), produced from the TIGGE database will soon be made available via the RSMC La Réunion Website. Access to these products will be provided to members of the Tropical Cyclone Committee (RA I) and to participating NMHSs of the SWFDP-Southern Africa project, under password access and a usage agreement.

5.2.3 The NMHSs that are within the coverage of these products are encouraged to provide feedback on their performance, including through case studies.

5.3 National Meteorological Centres: Angola, Botswana, Comoros, DRCongo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe

5.3.1 There was unanimous expression by the NMHSs of the many benefits realized through the SWFDP, especially in improving the forecasting of severe weather, raising the confidence of forecasters in producing and issuing alerts and warnings of severe weather. In some NHMSs, the SWFDP has dramatically changed the forecasting programme and the work conditions of the forecasters, as well as benefiting forecasting services in specialized areas, in particular the increased lead-times of forecasts. Visibility and credibility of the NMHSs have been significantly raised. The participants expressed their sincerest appreciation to the global products centres, and equally to RSMC Pretoria and RSMC La Réunion for their continuing daily support to operational weather forecasting in the region.

5.3.2 Relations with media were generally good or improving steadily, while relations with disaster management and civil protection authorities varied widely, from dramatically improved to a case where the disaster management office responsible for issuing warnings is not taking immediate action on advice to do so from the NMHS. In general, feedback from these users have been difficult to obtain. The dissemination of advisories and warnings in a timely fashion, especially to remote rural communities, in the local languages, continues to be a challenge in several countries. (For more detailed description, please refer to section 7 of this report.)

5.3.3 NMHSs Comoros and Seychelles noted they receive forecasting guidance in the form of NWP-based charts, by e-mail from the Regional Integrated Multi-Hazard Early Warning System, "RIMES" organization. They were not aware of the NWP system on which the products are based.

5.3.4 The meeting welcomed the first time participation at the RTIT of the representative from Comoros, and noted the unfortunate absence of representatives from Angola and Madagascar.

6. VERIFICATION OF FORECASTS AND WARNINGS

6.1 In the framework of the SWFDP, verification of severe weather is required. Reporting and verification of severe weather events are required whether they are forecast or not, and when they are forecast, whether they occurred or not. Verification provides the necessary evidence of the quality of the warning and forecasting system, and points to areas that require additional improvements.

6.2 Mr. Wilson presented a summary of the verification activities undertaken during the two years of the expanded Southern Africa SWFDP. It was noted that moderate success had been achieved by increasing the verification activity among the NMHSs, and several interesting verification studies were carried out during the period. Nevertheless, several NMHSs had not yet carried out any verification of their warnings. From the information provided in the quarterly reports, Mr Wilson, with some further analysis, was able to show good evidence that severe weather forecasts in some countries had improved over the course of the project.

6.3 It was also pointed out that neither the RSMC Pretoria nor any of the global products centres had carried out any verification of the guidance products, i.e., the RSMC Daily Guidance, global and regional NWP/EPS/LAM model products. While it is essential that the producing centres provide verification information to users of their respective products, it is arguably desirable that the producing centres collaborate with the NMHSs in this essential activity because the NMHSs are the holders of the most comprehensive observational datasets. In fact, Mr Wilson outlined collaborative efforts that are being initiated to verify the global model forecasts for the Eastern Africa SWFDP. This collaboration should also be initiated in the future with the Southern Africa countries.

6.4 An example of an internal ECMWF diagnostic precipitation chart (QPF overlaid with verifying observational data) was shown. It was agreed that this chart would be useful for the NMHSs of the SWFDP, and the meeting recommended that ECMWF be asked to make this product available to the participating centres.

6.5 Finally, it was noted that two specific aspects of the verification activity need urgent attention to move the verification forward towards an acceptable level:

a. implementation of verification methods for RSMC and the global and regional NWP products for the SWFDP region; and
b. the sub-division of the larger countries into suitable regions so that the more meaningful verification can be carried out region by region.

6.6 The meeting agreed to adopt a revised Event Evaluation Report Form, which is to be used to collect data and information whenever a warning is issued (whether the event occurred or not), or whenever a severe weather event occurred (whether a warning was issued or not). The form is provided in Annex III of this report (see section 8.2 for changes in reporting).

7. PWS COMPONENT OF SWFDP: LESSONS LEARNT AND RECOMMENDATIONS FOR FUTURE IMPLEMENTATION

7.1 The meeting was presented with a review of the implementation of the PWS component of the Severe Weather Forecasting Demonstration Project (SWFDP) – Southern Africa, based on the quarterly reports from the participating countries. The challenges experienced by the participating countries were highlighted and a number of recommendations to address them were suggested. The meeting discussed the results of the review and agreed on the next steps to take to ensure that shortcomings that have been reported could be remedied, so as to ensure a successful transition of the PWS component of SWFDP into routine Service Delivery activities of the region.

7.2 The meeting noted that the overarching role of the Public Weather Services **(**PWS) in the (SWFDP) was to provide participating countries with the necessary skills, capacities and capabilities to effectively deliver warning services to the public they serve, through the Disaster Management and Civil Protection Authorities (DMCPAs) and the media. To this end, the PWS component of the SWFDP focused on assisting participating NMHSs to develop well-run public weather services programmes that would provide timely warning services of severe weather to the emergency services managers and the public, as an essential ingredient for the success of the SWFDP. The NMHSs were also assisted to establish efficient operational relationships with those users in order to understand their requirements and preferences for the delivery of the severe weather warning and forecast services. One of the important lessons learnt from the experience of implementing the PWS component of the project, is the need to establish formal relationships between NMHSs and disaster risk management agencies and between NMHSs and the media. The meeting was therefore invited to consider how this could be achieved.

7.3 Under the SWFDP, some NMHSs interacted with the DMCPAs and organized meetings, training workshops and/or appointed focal points to strengthen cooperation with DMCPAs. Reports indicated that participating countries had recognized a need to set up formal mechanisms of co-operation between NMHSs and DMCPAs. In this regard, some countries took steps towards initiating a process for the development of Standard Operating Procedures (SOPs) for the internal operation of NMHSs. In addition, SOPs need to be designed and prepared for working with the media and DMCPAs as part of the overall national contingency planning process. This will provide a more concrete, accountable and sustainable service delivery culture.

7.4 It was observed from the reports that, in general, the public was positive about the SWFDP supported services offered by NMHSs. Nonetheless, some NMHSs reported that they experienced difficulties in getting public feedback, especially from rural areas, because there were no means of communication between NMHSs and the rural public. There were however examples of successful surveys that NMHSs had undertaken in order to get feedback. In one case an NMS posted a feedback form on its website and the public did respond with very positive and encouraging notes. Below are examples of feedback from the public as contained in the quarterly reports.

7.5 Some countries reported that, in general, the media appreciated the forecasts issued and in certain cases, organized interviews on national and rural community radio stations, television as well as in the print media. Although feedback was mainly positive for reasons attributable to the accuracy of the weather information, negative feedback was also received from the media on some occasions. It was also noted that there was a substantial number of participating countries which did not receive feedback from the media, showing that there is a need for NMHSs to proactively seek feedback by carrying out formal surveys targeted at the media. It is encouraging to note that several NMHSs expressed their willingness to undertake actions to improve relationships with the media.

7.6 The lessons learnt so far from the project implementation period have indicated that overall, the majority of the participating countries have made efforts to implement the feedback and evaluation of the SWFDP to varying degree. One major drawback to this process has been the expectation of the NMHSs to automatically receive feedback from the user groups. A major lesson learnt from the project is that even the best forecasts and warnings do not generate such feedback on their own and NMHSs need to actively pursue the user groups to obtain the necessary information. PWS Programme has made available to the participating countries all the guidance materials which, if applied could help in assisting the NMHSs on how to overcome many difficulties and shortcomings in building effective relationships with the user groups and communities.

7.7 The meeting agreed that systematic documentation of the interaction with the user groups was important in that it would provide a record over time on how the relationship has evolved. This may not be the case in those countries that do not have formal relationships with the user groups.

7.8 Surveys are a key method of documenting improvements in the services delivered at the different stages of SWFDP. A baseline survey to evaluate the satisfaction of the users with the services of NMHSs before the implementation of SWFDP would have provided a basis to evaluate the subsequent improvements in the services as a result of the SWFDP. This has not happened in the project.

7.9 The meeting agreed to use a revised form to provide the semi-annual report on progress, to acquire more detailed information on the interaction with users of the NMHS' warning services. The revised form is found in Annex IV of this report.

7.10 Contingency Planning

7.10.1 Mr Goolaup presented to the meeting a basic primer on contingency planning, and standard operating procedures, in the context of emergency preparedness for severe weather events.

7.10.2 Contingency Planning is forward planning process whereby scenarios and objectives are agreed, managerial and technical actions defined, and potential response systems put in place. Contingency planning must be accompanied with actions. The purpose of contingency planning is to better respond to, or prevent an emergency situation. Contingency planning is a dynamic process, focused on preparation and is flexible. Planning requires constant monitoring of progress and adjusting the objectives to take account of new realities.

7.10.3 By definition a contingency planning process is achieved by a group of people or organizations, working together on an ongoing basis to identify shared objectives and define respective actions. The process is best achieved through a collaborative effort wherein all relevant agencies should work together, in the same direction (shared objectives) and over a period of time. The direct benefit of working together is that it builds a sense of ownership among those persons who will be called to implement the plan. Typical group in the case of severe weather hazards will consist of the National Meteorological Centre, the Disasters Risk Management Agency, other stakeholders from the socio-economic sectors, a representative of NGO as well as the media.

7.10.4 The Contingency Planning Exercise is a forum and an opportunity for all involved to participate. The frequency of the meetings depends on the circumstances – the norm is to have a meeting every 3 months or prior to the beginning and end of the season prone to severe weather events. The Plan is a product of the process which brings all activities together in a coherent form and explains how each component is part of the whole. The Plan has a short life because the climate is dynamic and the institutional setup may be changing as well.

Standard Operating Procedures (SOPs)

7.10.5 A Standard Operating Procedure (SOP) is a set of written instructions that document a routine activity followed by an organization. The purpose of SOPs is to detail the regularly recurring work processes that are to be conducted or followed within an organization. They document the way activities are to be performed to ensure conformity to technical and quality system requirements. The SOPs are intended to be specific to the organization whose activities are described. They assist that organization to maintain their quality control and quality assurance processes.

7.10.6 To prepare a SOP, the organization should setup a team (management committee) in place for determining what procedures or processes need to be documented. Those SOPs should then be written by individuals who are fully knowledgeable with the activity and the organization's internal structure.

7.10.7 SOPs should be reviewed and validated by one or more individuals with appropriate training and experience. SOPs should be organized to ensure ease and efficiency in use and to be specific to the organization which develops it.

8. IMPLEMENTATION OF THE SWFDP IN SOUTHERN AFRICA, INCLUDING TRANSITION INTO ROUTINE ACTIVITIES

8.1 Report on the relevant outcomes of CBS-Ext.(10) and guidance from the SWFDP Steering Group

8.1.1 The meeting was presented with a report on the relevant outcomes of the 2010 extraordinary session of the Commission for Basic Systems (CBS-Ext.(10), Windhoek, Namibia, November 2010) and guidance from the Steering Group of the SWFDP, regarding the implementation of the SWFDP in Southern Africa and its transition into routine activities.

8.1.2 Mr Bernard Strauss, Chairperson of the Steering Group of the SWFDP, noted to the RTIT the three main reasons for the resounding success of the SWFDP in southern Africa, and believed that these must be kept in mind in the planning of future developments. The reasons are:

a. a well established organization and project management structure, including well defined goals and objectives, responsibilities of the parties, included in an implementation plan, under the guidance of a Steering Group, and well supported by the WMO Secretariat;
b. a strong technical basis for improving the forecasting methods, through the cascading forecasting process involving global, regional, and national levels;
c. highly motivated participation of the centres, especially the significant investments made at the regional centre for the SWFDP.

8.1.3 Mr Strauss further noted the Strategy for the SWFDP, which was adopted at the recent sixteenth World Meteorological Congress (May 2011), included four key elements: technical forecasting aspects, PWS developments, developments for other applications, and sustainability. The entire statement of Strategy for the SWFDP is included in Annex V of this report.

8.1.4 The meeting discussed the actual state of the project, and agreed that it was now fully in line with Phase 4 Continuous Development Phase of the SWFDP as defined in the strategy approved by the sixteenth World Meteorological Congress (May 2011).

8.2 Future directions, framework, feedback, reporting and training

Cascading Forecasting Process

8.2.1 Based on discussions under previous agenda items, the meeting agreed whole-heartedly to maintain the current implementation relative to the forecasting framework of the project, i.e. the cascading forecasting process, including the global products made available by ECMWF, Met Office UK, and NCEP USA, and regional products made available by RSMC Pretoria and RSMC La Réunion, and the RSMC Pretoria Daily Guidance and Website, and MSG satellite products.

8.2.2 The meeting agreed that some technical fixes and maintenance activities will continue to require attention, for example, the Met Office UK MOGREPS EPSgrams available via the RSMC Pretoria Website has not yet been expanded to include locations for all 16 participating countries (still only the original 5 countries). If technical problems arise, they should be raised to the Chairperson or Vice-Chairperson of the RTIT.

8.2.3 The meeting believed that a significant gap in capacity and skill level continues to exist among the participating NMHSs in the project implementation, and noted that CBS has requested that those NMHSs that are lagging be provided suitable training to more fully achieve the goals of the SWFDP. The priority areas for this training need to be identified and then addressed, by the RTIT.

Publicizing the SWFDP

8.2.4 The meeting agreed that the successes and benefits of the SWFDP have not been adequately publicized beyond the technical meteorological community, especially beyond WMO, therefore it suggested that a promotional brochure be developed, aimed at non-technical audiences, such as in governments. This could include a case study where SWFDP has effected real positive changes to the forecasting and warning services (such as the article that was written on the experience of TC Favio of 2007 (Chikoore, Lucio, Poolman; WMO Bulletin 2008?). High-level messaging should be included, such as the important contribution of the SWFDP to disaster risk reduction and to climate change adaptation, to supporting efforts in NMHSs in their implementation of Quality Management Systems. This work would be best undertaken in coordination with MASA.

RSMC Pretoria Website and Portal

8.2.5 The meeting suggested that the RSMC Pretoria Website could be expanded beyond the present real-time frequently refreshed content, to become a portal for SWFDP case studies, relevant presentations by members, or resource materials that support the activities of the SWFDP, for both forecasting technologies (e.g. severe weather associated with convective complexes), and public weather services (user surveys, standard operating procedures). A small team should be assigned the task of reviewing the present Website, and to propose a new Website structure and identify suitable content to populate it. Consideration could also be given to other posting sites, such as the Met Office e-Learning site, already linked on the RSMC Pretoria Website (see also section 8.2).

8.2.6 The meeting agreed that the inclusion into the Website of a platform for posting all weather warnings of the southern Africa region should be further pursued, and further explored by RSMC Pretoria.

Reporting on activities

8.2.7 All activities related to verification (see above section 6), user engagement and feedback (see above section 7), reporting (changed to semi-annual, see below), are to be further developed to achieve ongoing availability of reliable verification results and user assessment of the usefulness of the products.

8.2.8 The meeting decided that the preparation of 4 quarterly reports a year was too demanding, and considered that semi-annual reporting would be more practical. It decided that the first semi-annual report will include the next rainy season, i.e. October 2011 to March 2012 (inclusive), and the following semi-annual report will include the period April 2012 to September 2012. In addition, it was decided that the synthesis of the semi-annual reports into summary progress reports will be done by RSMC Pretoria.

Training approaches and activities

8.2.9 The meeting noted the high importance of training as part of the SWFDP. It strongly recommended the establishment of a SWFDP Training Desk, and considered the potential value of establishing it at RSMC Pretoria. Present thinking would be to implement attachment training for two forecasters at a time, from different countries, for one-month period during the rainy season. Half of the daily routine would be the production of the RSMC Daily Guidance under the supervision of the RSMC Pretoria senior forecaster, and the remaining time would be used to carryout scientific studies on relevant topics, including preparation of detailed case studies, possibly for publication, and PWS topics related to improved Service Delivery. Incremental cost implications have to be identified and estimated, and funding would have to be found. Consultation with the NCEP African Desk could be useful to understand the effectiveness of this approach.

8.2.10 Another highly recommended option would be to conduct a training tour by expert trainers (team of two, one from within the SWFDP region), which could work alongside other training options, such as a training desk. This approach is favoured for low capacity NMHSs, where progress in realizing the benefits of the SWFDP has been very slow. Cost implications have to be identified and estimated, and funding would have to be found.

8.2.11 The meeting recalled CBS-Ext.(10) had recommended investigating the feasibility of modelling a Virtual Laboratory for SWFDP along the lines of the Virtual Laboratory for Satellite Meteorology. The meeting agreed in principle, however will need to more fully understand what organizational and developmental work is required, and resource implications of developing a Virtual Laboratory for SWFDP – Southern Africa. The RSMC Pretoria and the Secretariat agreed to seek further clarification, with the EUMETSAT Centre of Excellence Pretoria, and Education and Training offices, respectively.

8.2.12 Other e-learning opportunities should be pursued further (RSMC Pretoria, Met Office UK, Education and Training office of the Secretariat), such as one one-hour Web-based Moodle session could be done per month. "Traditional" training workshops could still be undertaken, likely less frequently as has been done in the past.

8.2.13 RSMC La Reunion will pursue forecasters training courses in partnership with the WMO Tropical Cyclone Programme and will add new modules like ensemble forecasts in its next courses.

8.3 Future technical enhancements/developments

8.3.1 A Phase 4 for the SWFDP would allow future development of mature projects, including long-term sustainability of the benefits gained and a process of continual technical improvement, by taking advantage of future capability and technology developments, and fostering broadening of activities in synergy with other WMO programmes. In the absence of Mr Poolman, the meeting did not discuss possible mechanisms for dissemination of relevant information to international or regional bodies (e.g. UN OCHA).

Flash Flood Guidance

8.3.2 The meeting was informed by RSMC Pretoria that a Flash Flood Guidance System has been recently implemented for South Africa. A Southern African Regional Flash Flood Guidance (SARFFG) project, one of the sub-regional projects of the WMO's global FFGS programme is underway. Development activities in this project had started and an operational system has become available in 2011. Seven countries in Southern Africa (Namibia, Botswana, Mozambique, Zimbabwe, Zambia, Malawi and South Africa), a regional centre (RSMC Pretoria) and a global centre participate in the SARFFG through a mechanism of cascading of information to the NMHSs. SARFFG involves a combination of regular hydrological modelling for small catchments (each approximately 200 km^2) over the entire domain with real-time precipitation information from satellites to determine catchments with the potential of experiencing flash floods. It is essentially providing useful information on the hydrologic response of small basins to rain in the next 1 to 6 hours, and thus guidance on flash flood potential. However, forecasting the rain expected to fall in the next 1 to 6 hours is not addressed in this system and it relies on forecaster skills and capability. This will require a special meteorological effort in future.

8.3.3 Similar to SWFDP, the SARFFG allows forecasters in NMHSs to use the information received from the global and regional centres to issue nowcast information on potential flood to the disaster management structures in their countries. It is important to develop an excellent collaboration between weather forecasters and hydrologists, and between weather forecasters and disaster managers in each country for the success implementation of the SARFFG. Recognizing the similarities between the SWFDP activities and the SARFFG system, it is recommended synergy between the cascading frameworks of SWFDP and the SARFFG to maximize existing structures in the region.

Research – Global Interactive Forecasting System of TIGGE

8.3.4 The Secretariat reported that collaboration between the GDPFS programme and the World Weather Research Programme's TIGGE project has resulted in the recent creation of a Website where the Multi-Centre Global Ensemble (MCGE) for the probability of predicted heavy precipitation is posted. This product is produced at MRI-JMA (Japan) and uses TIGGE datasets provided by ECMWF, JMA (Japan), Met Office UK, and NCEP (USA), to produce a combined product. The meeting requested the Secretariat to find additional information on the formulation of these products, for example the choice of these four sets of ensemble outputs. The Website is located at: http://tparc.mri-jma.go.jp/TIGGE/tigge_SWFDP.html and select Southern Africa tab).

8.3.5 The meeting was reminded that these products are still in research production, without verification information, and that presently there is a 48-hour delay in the availability of the product (i.e. the forecasts are based on outputs from ensemble runs 2 days ago). Product description has been requested by the Secretariat on behalf of SWFDP.

SWFDP and climate change adaptation – case in point, Mauritius

8.3.6 Mr Goolaup presented to the meeting the importance of the SWFDP in Mauritius in relation to the project's contribution to the realization of objectives of climate change adaptation. With a high likelihood of the globe experiencing changing climatology of extreme weather events, the goals of the SWFDP, and the results being achieved, contributed to climate change adaptation through ever more skilful and useful prediction services with increasing resolution of all scales of modelling including for climate, increasing forecast lead-times in the medium-range, and beyond, and increasing accuracy to widen the scope of applications.

8.3.7 The following main points were made:

- Climate change is already happening in this part of the world.
- The frequency and intensity of extreme weather is likely to increase as per findings of IPCC 2007.
- Trend analysis of heavy precipitation in Mauritius shows the frequency of rainfall equal or greater than 50 mm and equal and greater than 100 mm is increasing.
- SWFDP is contributing to proactive adaptation to climate change and disaster risk reduction through improved lead-time early warning.
- SWFDP is contributing to influence decision at top management level regarding risk assessment and management.
- SWFDP is contributing to achieve the Cancun Adaptation Framework through improved lead-time early warning.

8.3.8 The members of the RTIT were encouraged to develop similar assessments of trends in observed severe weather (e.g. heavy precipitation) at a few stations, and possibly provide them for inclusion in this work. Mr Goolaup was encouraged to continue to pursue this work, with the intention to publish a paper, for example in the WMO Bulletin, or in a suitable peer reviewed journal.

8.4 Continuation of the Regional Technical Implementation Team (RTIT)

8.4.1 The meeting decided the Phase 4 should be managed by the same Regional Technical Implementation Team (RTIT) which had implemented the project until now.

8.4.2 The RTIT will evolve from management under CBS to Regional Management while maintaining regular reporting to the CBS Steering Group for the SWFDP.

8.5 Regional Phase 4 Implementation Plan (RP4IP)

8.5.1 Based on discussions under previous agenda items, the meeting agreed to develop a Plan to guide the development activities to be tackled during Phase 4. These include:

i. addressing the needs of the less advanced participating NMHSs in relation to achieving the objectives of the SWFDP;
ii. ensuring the continuation of training activities as required by the further development of the project;
iii. ensuring regular reporting from the participating regional and national centres and from global centres of any changes;
iv. re-enforcing regular feedback from all user groups (media, DMCPAs, the public);
v. enhancing the verification activity and regular reporting of results.

8.5.2 The Secretariat will revise the RSIP and provide a draft Regional Phase 4 Implementation Plan (RP4IP) to the RTIT for consideration and adoption, by 30 September 2011.

8.6 Conclusion and Recommendation

8.6.1 The SWFDP – Southern Africa project is to be maintained relative to the implemented routine forecasting framework of the project, i.e. the cascading forecasting process, including the global products made available by ECMWF, Met Office UK, and NCEP USA, and regional products made available by RSMC Pretoria and RSMC La Réunion, and the RSMC Pretoria Daily Guidance and Website, and MSG satellite products.

8.6.2 The RTIT would remain as the project's technical management body for the project. A new project implementation plan will be developed, based on revision of the present RTIT, and will be referred to as the "Regional Phase 4 Implementation Plan ("RP4IP").

8.6.3 The RTIT, viewing the future of the project is to shift from management under WMO/CBS to within the WMO Regional Association for Africa, wished to encourage the Meteorological Association of Southern Africa (MASA), i.e., its NMHS members, to support the future activities of SWFDP – Southern Africa, as follows:

- Conduct resource mobilization initiatives, for training (Pretoria Desk, e-learning, NWP training etc…);
- Encourage members contributions/ support towards SWFDP activities;
- Facilitate the conclusion of the WMO-SADC MOU and influence policy making in SADC, through which recognizing that the SWFDP contributes to major Regional goals and strategic directions (e.g. disaster risk reduction);
- Establish a MASA SWF Task Force under the S&T Committee of the Board (including few MASA directors, regional technical experts, WMO, and relevant global centres) to oversee, steer, advocate and enhance SW Forecasting framework in Southern Africa (continuous improvement, integrating FFGS etc.);
- Showcase and promote the SA-SWF scheme to AMCOMET & COP-17 etc.;
- Build and nurture relations with WMO global NWP centres;
- Prioritize SWF within the SAMPRO project;
- Conduct regular PWS surveys to track and enhance quality of forecasting services in member countries;
- Promote and monitor stakeholder/ user community engagements in the region;
- Encourage members to conduct regular verification of forecasts
- Develop a platform for forecasters & researchers to share experiences, case studies, best practices aimed at risk assessment and risk management/ contingency planning/SOP/ Quality Management of processes;
- Pay particular attention to special forecasting needs faced by the NMHSs in LDCs and SIDS.

8.6.4 The SWFDP should be publicized, including its benefits, and successes that have been realized so far, including case studies that illustrate the goals and benefits.

8.6.5 The SWFDP RSMC Website and portal could be expanded beyond the present real-time forecasting guidance content.

8.6.6 Reporting on SWFDP activities and progress against the project goals will be done using new templates (see Annex 3 and Annex 4), and on semi-annual basis:

- "rainy" season: October to the following March; next report is for the period October 2011 to March 2012, inclusive, and due 30 April 2012; and
- "dry" winter season: April to September inclusive; report due 31 October 2012.

8.6.7 Two specific aspects of the verification activity need urgent attention to move the verification forward towards an acceptable level:

a. implementation of verification methods for RSMC and the global and regional NWP products for the SWFDP region; and
b. the sub-division of the larger countries into suitable regions so that the more meaningful verification can be carried out region by region.

8.6.8 Training for forecasters continues to be a high priority for the SWFDP, and suitable approaches include:

- Establishing a training desk at RSMC Pretoria;
- Conducting a training tour by expert trainers;
- E-learning opportunities;
- Virtual-laboratory approach (possibly collaborating with Satellite Programme).

8.6.9 The SWFDP should seek collaboration and build synergies with other relevant programmes and activities, where it makes sense, including on the implementation of regional flash flood guidance system (FFGS), and tapping on promising research outcomes, or legacies of regional research field campaigns, such as GIFS-TIGGE.

Recommendations for the PWS Component of SWFDP:

8.6.10 The meeting agreed to the following recommendations for the improvement of the implementation of the PWS component in the next phase of the project:

a. Development of Standard Operating Procedures (SOPs)
   In order to solve a cross-section of problems that were cited, it would be necessary to assist NMHSs develop SOPs with DMCPAs on the one hand, and with the media on the other. SOPs entail a set of instructions that clearly define the functions and responsibilities of each entity. It is hoped that such action would help meet the following needs as reported, through formal agreement:
   - to clearly define content (e.g. intensity, mitigation actions) and format of warnings that NMHSs would provide to users;
   - to agree on efficient communication channels for warnings in order to ensure timely delivery of services;
   - to set out feedback mechanisms from the end users following an event;
   - to agree on severity thresholds and associated terminologies to be used for different types of alerting messages (early warning, advisory, warning, alarm, alert …);
   - to carry out contingency planning;
   - exercising and evaluating emergency procedures etc.

b. NMHSs should continue to seriously pursue evaluation of their products and services in order to get the public, media and the DMCPAs engaged using the new format of the evaluation forms for obtaining feedbacks. In the case of DMCPAs and the media, NMHSs need to prepare and send questionnaires to these organizations after each severe weather event. For the general public, a different kind of survey is required which will collect information from the end users on the reception and use of the disseminated information. Guidelines on preparation of surveys are freely available on PWS Web pages at: http://www.wmo.int/pages/prog/amp/pwsp/surveys.htm

c. NMHSs should make use of the guidance materials provided by PWS which are freely available and contain most of the materials needed by the participating NMHSs, showing them how to create channels of communication with these two large user groups.

d. Specialized training to equip NMHSs with skills for service delivery (such as how to generate and deliver effective warning messages, etc) should be continued in the region. The details of how such training will be organized and the participating organizations will be considered in due course.

e. The WMO Joint GDPFS/PWS training workshops, where participants from NMHSs share experience on developing dialogue with user communities should be continued in future.

f. Where national networks of meteorologists and journalists exist, NMHSs should use them to strengthen relationships with the media.

g. NMHSs should consider developing national databases of severe events and their impacts for use in qualifying and putting future events into context, as demanded by users. This could be considered as part of the proposed development of the RSMC Website and portal (see also section 8.2).

h. NMHSs should develop an outreach programme for sensitizing and raising awareness among the public to the potential benefits, but also the limitations of weather forecasts in order to address the question of credibility of NMHSs.

i. NMHSs should consider preparing simple pamphlets (in-house if possible) explaining meteorological phenomena and hazards applicable to their particular countries for distribution to the public.

9. ANY OTHER BUSINESS (AOB)

9.1 The meeting may consider any other issues requiring actions or discussion by the RTIT of the SWFDP for Southern Africa.

10. CLOSING

10.1 The meeting of the Regional Technical Implementation Team of the Severe Weather Forecasting Demonstration Project (SWFDP) for Southern Africa is estimated to close at 16:00 on Friday, 22 July 2011.

ANNEX I

AGENDA

1. OPENING

2. ORGANIZATION OF THE MEETING

2.1 Adoption of the agenda
2.2 Working arrangements

3. SUPPORT TO SWFDP – SOUTHERN AFRICA BY MASA/SADC

4. EVALUATION OF THE FULL EXPANDED DEMONSTRATION OF THE SWFDP FOR SOUTHERN AFRICA (RA I)

5. CASCADING FORECASTING PROCESS: ROLES OF PARTICIPATING COUNTRIES, REVIEW PROGRESS AND ONGOING SUPPORT

5.1 Global: ECMWF, Met Office (UK), NOAA/NCEP (USA)
5.2 Regional: RSMC Pretoria, RSMC-TC La Réunion
5.3 National Meteorological Centres: Angola, Botswana, Comoros, DRCongo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, United Rep. of Tanzania, Zambia, Zimbabwe

6. VERIFICATION OF FORECASTS AND WARNINGS

7. PWS COMPONENT OF SWFDP: LESSONS LEARNT AND RECOMMENDATIONS FOR FUTURE IMPLEMENTATION

8. IMPLEMENTATION OF THE SWFDP IN SOUTHERN AFRICA, INCLUDING TRANSITION INTO ROUTINE ACTIVITIES

8.1 Report on the relevant outcomes of CBS-Ext.(10) and guidance from the SWFDP Steering Group
8.2 Future directions, framework, feedback, reporting and training
8.3 Future technical enhancements/developments
8.4 Continuation of the Regional Technical Implementation Team (RTIT)
8.5 The Regional Phase-4 Implementation Plan (RP4IP)
8.6 Conclusion and recommendation

9. ANY OTHER BUSINESS (AOB)

10. CLOSING

Annex II

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ANNEX III

EVENT EVALUATION REPORT FORM

(SWFDP-Southern Africa, Rev. 21 July 2011)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Event No.**	**Event type**	**Region**	**OBS start time (to nearest h in UTC)**	**OBS end time (to nearest h)**	**observations (list all reports in region)**	**Severe weather observed? (Yes=1, No=0)**	**Warning Issued? (Yes=1, No=0)**	**FCST start time (to nearest h)**	**FCST end time (to nearest h)**	**Lead time of warning (0=time of observed start)**	**Impact of event**	**Impact of the warning**
2													
3	Please fill out this table for each event, either forecast or observed or both, for each region of the country where an event occurred and/or an event was forecast. For "false alarms" only columns F to J and M need to be filled. For missed events, only columns A to H and L need to be filled in; but please also evaluate the guidance in those cases.						Guidance:	RSMC: (check each one used)	Evaluation: 1 to 4 (1=useless, 4=best)	Other Products (check each one used)	Evaluation: 1 to 4 (1=useless; 4=best)		
4								Severe weather chart: Prob Table		ECMWF: NCEP: UKMO global: UKMO regional:			
5	1	rain> 50 mm	NW	01/11/10 12 UTC	01/11/10 17UTC		1	1	01/11/10 11UTC	01/11/10 24 UTC	1 h		
6	Example (This large box can be used for any comments on the event, explanations of problems etc.)					(all observations whether extreme or not, 24h totals)	Guidance:	RSMC: (check each one used)	Evaluation: 1 to 4 (1=useless, 4=best)	Other Products (check each one used)	Evaluation: 1 to 4 (1=useless; 4=best)	minor flooding	Warning received just in time for start of flooding
7								Severe weather chart: ✔ Prob Table ✔	4 (comment) 3 (comment)	ECMWF: ✔ NCEP: UKMO global: UKMO regional: ✔	ECMWF: 3 NCEP: UKMO global: UKMO regional: 2		
8													
9							Guidance:	RSMC: (check each one used)	Evaluation: 1 to 4 (1=useless, 4=best)	Other Products (check each one used)	Evaluation: 1 to 4 (1=useless; 4=best)		
10								Severe weather chart: Prob Table		ECMWF: NCEP: UKMO global: UKMO regional:	ECMWF: NCEP: UKMO global: UKMO regional:		
11													
12							Guidance:	RSMC: (check each one used)	Evaluation: 1 to 4 (1=useless, 4=best)	Other Products (check each one used)	Evaluation: 1 to 4 (1=useless; 4=best)		
13								Severe weather chart: Prob Table		ECMWF: NCEP: UKMO global: UKMO regional:	ECMWF: NCEP: UKMO global: UKMO regional:		

ANNEX IV

SEMI-ANNUAL REPORT OF THE SEVERE WEATHER REGIONAL SUBPROJECT
(SWFDP-Southern Africa, Rev. 21 July 2011)

NMC : - - - - - - - - -
PERIOD: (Start date to end date)

1. HIGHLIGHTS OVER THE PERIOD

2. OVERVIEW OF PRODUCTS

a. Usefulness of RSMC-Severe Weather Daily Guidance
b. Usefulness of SWFDP NWP/EPS Products received from each global centre and RSMC Limited Area Model (if available)

3. PROJECT EVALUATION AGAINST SWFDP GOALS

SWFDP GOAL	COMMENTS ON PROGRESS TOWARDS EACH GOAL	Questions to help you with an answer for each box
To improve the ability of NMHSs to forecast severe weather events		How did the products on the RSMC…….help you make better severe weather forecasts and warnings?
To improve the lead time of alerting these events		How much earlier do you issue severe weather forecasts & warnings now compared to before?
To improve the interaction of NMHSs with Disaster Management and Civil Protection authorities (DMCPAs), the media, and the public, before, during and after severe weather events		Comment on any interactions with your disaster agency, media agencies and the public. Please indicate if there hasn't been any interaction since the last repor,.
To identify gaps and areas for improvements		What are the weaknesses in your forecast system?
To improve the skill of products from Global Centres through feedback from NMHSs		What weaknesses have you found in the products from RSMC …, UKMO, ECMWF, etc?

4. EVALUATION OF SEVERE WEATHER FORECASTS AND WARNINGS

4.1 The Public

A) Have you received any feedback from the general public?

B) Have you taken any actions to obtain feedback from the general public? Please elaborate on these actions.

C) Have you received any comments from the public on how they reacted when they heard or received the warnings?

D) What have been specific difficulties in getting these feedbacks? Please elaborate on these.

E) How have improved forecasts and warnings impacted the areas of activities of the public?

4.2 Disaster Management

F) Have you had any feedback from the disaster management authorities about the timeliness and usefulness of the warnings?

G) Have you taken any actions to obtain such feedback? Please elaborate on these actions.

H) Have you had any comments from your emergency management organisations on how they worked with other organisations in response to your warnings?

I) Were messages and calls to action issued from your emergency management organisation in agreement with the forecasts/warnings issued by you?

4.3 Media

J) Have you received any feedback from the media?

K) Have you taken any actions to obtain feedback from the media?

L) How did the relationship with the media work in getting forecasts/warnings out as quickly as possible?

M) What particular issues or difficulties emerged in working with media during the period under consideration?

N) Complete the Progress Evaluation Table if you experienced a severe weather event

5. SUMMARY (general comments, challenges, etc)

6. **CASE STUDY** (PowerPoint presentation to include guidance products (RSMC and NWP), satellite imagery, warnings issued, impact evidence etc)

Case studies for each severe weather event ***DON'T*** need to be completed at the same time as the rest of this report.

Comment: Case studies don't need to be long. What's important is the learning experience that you gain from actually doing the case study.

Progress Evaluation Table (Use the information from the Severe Weather Event Evaluation Report Form)

ANNEX V

STRATEGY FOR THE SWFDP

(Adopted at sixteenth World Meteorological Congress, May 2011, part of the Resolution that adopted the General Summary, with Resolutions and Recommendations of the CBS-Ext.(10))

Background

The SWFDP was originally designed in 2004. The two main ideas driving the project are still valid today:

- ensure that valuable forecast information readily available in the World Weather Watch regarding severe weather occurrence was effectively used in operations by developing countries, and

- develop the potential of the 3-layer structure of the GDPFS, with the "Cascading Forecasting Process".

Initially the goals set for the SWFDP (CBS-XIII) included:

- improve severe weather forecasting,
- improve lead-time of warnings,
- improve interaction of NMHSs with media and with disaster management and civil protection authorities,

and also:

- improve the skill of products from GDPFS Centres through the provision of feedback.

They were encompassed in the WMO "Vision of Improved Severe Weather Forecasting in Developing Countries" which was stated by Cg-XV in 2007:

> *"NMHSs in developing countries are able to implement and maintain reliable and effective routine forecasting and severe weather warning programmes through enhanced use of NWP products and delivery of timely and authoritative forecasts and early warnings, thereby contributing to reducing the risk of disasters from natural hazards."* (Cg-XV, 2007)

The SWFDP contributes directly to WMO's strategic thrusts of Service Delivery and Capacity Building, and to two of WMO's highest priorities as recommended by EC-LXII (2010), i.e., capacity building and disaster risk reduction.

Progress

It is widely recognized that the development of the SWFDP so far has been highly successful. Two regional subprojects have been implemented, in 2006 in Regional Association I and in 2009 in Regional Association V, and the first one is now reaching a stage where transition to full operational status can be envisaged. These two projects have incorporated significant steps forward in the direction of the stated goals of the project; furthermore, they have demonstrated that within the SWFDP framework a tremendous contribution can be achieved in transferring meteorological technology into Operations.

It is worth analyzing the reasons for the success of the SWFDP so far. One of them is that an efficient management framework has been put in place: each subproject has been managed at the right level, namely in this case the regional level, with appropriate guidance from the project Steering Group, and with considerable and highly efficient support from the WMO Secretariat. Good project management practices have been encouraged, including the setting up of a

continuous improvement cycle, with regular reporting and evaluation of progress and objective identification of technical gaps.

A second reason for success is technical, in that the initial choice to develop and build upon a 3-layer cascading process has proven to be a good one, perfectly well in line with today's operational meteorology.

At this point it should be strongly underlined that the most critical condition for success has been the engagement of high quality and efficient leading centres at the regional level. The role and functions of these centres as focal point and central hub for all information exchange between the various global, regional and national partners have been essential, including the production of coordinated forecast guidance. The experience acquired with the SWFDP will actually be used to redefine the role of a regional centre.

An important aspect underlying the positive outcome of the SWFDP is that it is highly cost-effective. The budget of the project has been rather on the frugal side, and even taking into account the substantial in-kind contributions of the global and regional centres involved, the overall total cost is much less than what is generally expected for this type of project resulting in this level of outcome.

The SWFDP initially focused on improving the information flow to, and through, the forecast offices of the participating Members. As the Project progressed it became evident that, to leverage the optimum benefit from these improvements on the technical side, the engagement of the user community in the design and delivery of products was essential. Thus the service delivery element of the Project developed; this works to collect feedback from users and to try and get users involved in a continuous evolution in the design of products and the delivery of services.

One can recall that the expectations regarding the SWFDP were very high almost from the start, to a point that a failure to achieve the goals would have been rather disappointing. This is so because some of today's main challenges were at stake, namely, the ability to deliver services in support of disaster risk reduction and for capacity building in the actual meteorological world. The SWFDP concept was tailored to contribute to meet these challenges in an efficient cost-effective way, and it is very satisfactory that its validity could be demonstrated in a rather short period of time.

Future

EC-LXII (2010) gave various directions regarding the SWFDP's further development. The goals of the project should be updated as follows.

- contribution to service delivery and to capacity building;
- improved severe weather forecasts, including accuracy and lead time, which should remain a priority area;
- improved severe weather warning services, encompassing accuracy and lead time, according to identified user needs. This implies the further development of the use of probabilistic information, and the continuation of effort to enhance the feedback loop with end-users;
- improved capacity to deliver Public Weather Services;
- targeting other applications and progressively extending the scope to include, e.g., Aviation, Marine, Agriculture, and Hydrology;
- finally, special attention should be given to ensuring sustainability, following the appropriate conclusion of the demonstration phase.

To work towards these updated goals some extensions to the existing project mechanism are required.

Strategy

1. On the technical side:

- Increased use should be made of high resolution NWP (as it becomes available) and of ensemble products. The SWFDP framework has been identified as highly suitable for the evaluation of products developed by GIFS-TIGGE, and this should be actively pursued.

- Nowcasting and very short-range forecasting tools should be introduced into the projects, including satellite-based products.

- A special effort on training in forecasting techniques should continue to be made, and even further developed, focused on the needs of the individual subprojects. Relevant local case studies should be used.

2. Regarding PWS developments:

- Explore new and enhanced formulation of warnings, including the use of uncertainty estimates;

- Extend the range of warning services and, in particular, establish continuous interactions with disaster management organizations;

- Further effort on training in service delivery is required. It should be noted that, amongst other benefits, this would help to enhance the feedback loop with the users at national level, which is one of the weaknesses identified to date.

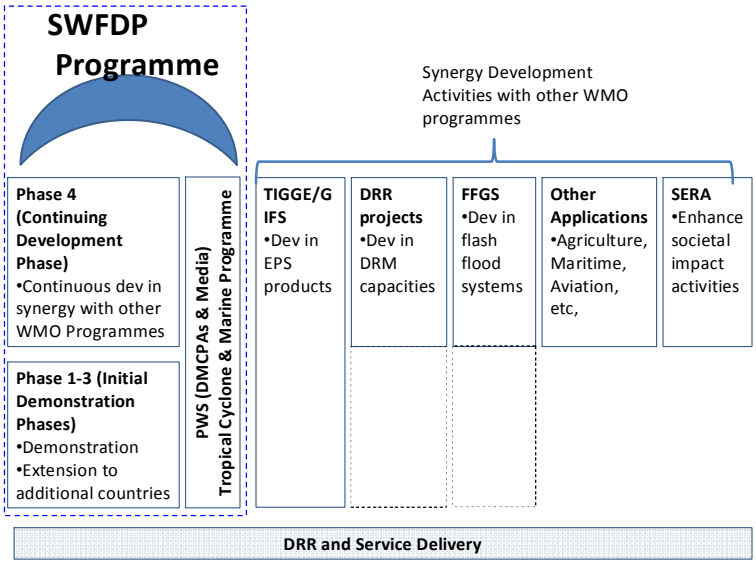
3. Developments for other applications

The range of targeted applications should be progressively extended, resources permitting, to transfer the benefits of the SWFDP to other users sectors in society, in synergy with other WMO programmes and according to local needs and priorities, without distracting from the central focus on severe weather.

4. Sustainability:

The CBS Steering Group for the SWFDP recommended the introduction of a “Phase 4” concept in the Overall Project Plan, namely, a transition phase of matured regional projects into a fully operational_activity. Ongoing training will be needed, which should take place on an annual basis and should become sustainable within the Regions.

During this Phase 4 the management of the activity should be transferred to the normal operational management structure within the Regional Association. The overall structure of the extended SWFDP concept is illustrated by the diagram below.



5. Funding:

Substantial in-kind contributions from participating global and regional centres are expected to continue, as will the regular budget allocations from relevant programmes and VCP for project management, initial training and workshops. However, these are far from being sufficient to support the coming phases of the SWFDP, and anticipated development of new projects, as the difficulties already experienced in the previous phase abundantly demonstrate. Additional funding is critical to sustain the necessary enhancement to the training effort. Support to correct critical deficiencies in technical capacities at some participating NMHs will also be required.

Extra-budgetary funding should be sought from those sources that have shown interest in investing in developing NMHSs of developing countries for disaster risk reduction goals. To achieve this, WMO needs to invest in promoting the SWFDP and its successes via coordinated resource mobilization mechanisms at international and regional levels.

Finally, two important milestones are suggested for the continuation of the project. The first one would mark the introduction of at least one project in every RA, and this could happen before the end of 2013. The second one would correspond to the transition to operations (phase 4) of again at least one project in every RA, and this could be reached by the time of or soon after Congress-XVII in 2015.