

# **WORLD METEOROLOGICAL ORGANIZATION**

## **COMMISSION FOR BASIC SYSTEMS**

### **MEETING OF CBS STEERING GROUP SEVERE WEATHER FORECASTING DEMONSTRATION PROJECT (SWFDP) WITH DEVELOPMENT OF DISASTER RISK REDUCTION STRATEGY FOR SWFDP**

GENEVA, SWITZERLAND, 17-20 March 2008



**FINAL REPORT**



## **1 Opening of the meeting**

1.1 The meeting was opened at the Headquarters of the Secretariat of WMO, Geneva, at 9:30 am, Monday, 17 March 2008 by Mr Bernard Strauss, Chairperson of the Steering Group, and Chairperson of the CBS OPAG on Data Processing and Forecasting System. Opening welcome and remarks were given by Deputy Secretary-General of WMO, Professor Hong Yan.

1.2 Professor Yan noted the Severe Weather Forecasting Demonstration Project, "SWFDP", is an initiative that the Steering Group guided to further explore and enhance the use of existing NWP outputs and products available through WMO's Global Data-Processing and Forecasting System (GDPFS). The project's aim is to contribute to capacity-building and to help developing countries in particular to have available and implement the best possible use of these products for improving forecasts and warnings of hazardous weather conditions.

1.3 He noted that much progress and achievement have been made in the first realization of the SWFDP in Southeast Africa, implemented at the beginning of the rainy season in south-east Africa in November 2006 with a one-year duration. Indeed the 15<sup>th</sup> WMO Congress (May 2007) recognized the early successes and benefits already being realized at that time. The task of the Steering Group at this meeting is to review the outcomes of the first SWFDP demonstration in southeast Africa, in particular relative to the project goals. In addition, the Steering Group will consider the possible future implementations of this project, in different regions of the world, as was requested by CBS-Ext.(06) and Cg-XV (2007), and to guide the strengthening of the planning framework to further include aspects of Public Weather Services, in relation to warning services provided by the NMHSs, as well as the development of a Disaster Risk Reduction strategy through this project.

## **2 Organization of the meeting**

2.1 The meeting adopted the provisional agenda without change, as found in Annex 1. The meeting was conducted in plenary in its entirety. The list of participants is found in Annex 2. All documents submitted for the meetings are referenced and hyperlinked in the Documentation Plan (INF. 1), which is posted on the WMO Web site at:

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

## **3 Review and evaluation of SWFDP project**

3.1 The first meeting of the SWFDP Steering Group took place in December 2005. The planning of the first Regional Subproject in Southeast Africa was initiated in July 2006. The Subproject in Southeast Africa was implemented, starting November 2006, for a 12-month period.

### **Background**

3.2 With the ever-increasing precision, reliability and lead-time provided by numerical weather prediction (NWP) systems, for weather forecasting and the provision of meteorological services, they have also become a very relevant component of routine and severe weather forecasting processes at National Meteorological and Hydrological Services.

3.3 The SWFDP is an initiative to further explore and enhance the use of outputs of existing NWP systems, including ensemble prediction systems (EPS). Its aim is to contribute to capacity-building and to help developing countries in particular to have available and implement the best possible use of existing NWP products for improving forecasts and warnings of hazardous weather conditions. Global-scale products, as well as data, other products and information provided by other regional centres, are integrated and synthesized by a designated Regional Specialized Meteorological Centre (RSMC), which, in turn, provides daily guidance for short-range (days 1 and 2) and medium-range (out to day-5) on heavy rain and strong winds to participating National Meteorological Centres of the region. This is a "Cascading" concept of the forecasting process.

3.4 The CBS Management Group (CBS-MG7, June 2007), which immediately followed the Fifteenth WMO Congress (Cg-XV), echoed the acknowledgement of broad support of Cg-XV of the SWFDP and its successful implementation, and that the project is a solid basis upon which to implement a broader NWP strategy for improving severe weather forecasting in developing countries. Already, collaboration between DPFS and PWS has enlarged the scope of benefits of the project from improving the forecasting process in the participating NMHSs to improving the effectiveness of the severe weather forecasting and warnings programmes in these countries.

3.5 Congress, noting the importance of accurate and timely severe weather warnings for Members and that if the SWFDP in south-eastern Africa was successful, decided that its concept should be expanded and implemented throughout Africa (RA I) and to other Regions of WMO especially in developing countries. In this regard, Congress requested CBS to consider the possibility of implementing similar projects in Africa and for the South Pacific Islands (RA V).

3.6 In South America (RA III), in parallel with the development of the SWFDP, many activities were also organized in Brazil to create a demonstration project for the mid-latitude countries in South America, including with Argentina, Uruguay, Chile, and Paraguay. They agreed on implementing a virtual centre for severe weather forecasting, and to strengthen the communications among the NWP centres. Work on identification of severe weather patterns of the region and their impacts have been initiated.

3.7 Congress also noted that this project is contributing significantly and in a very concrete way to capacity building in the NMHSs through better understanding and use of NWP and EPS products, and is providing the opportunity to improve the interaction with Disaster Management and Civil Protection Authorities, thereby supporting the goal of increasing the visibility of NMHSs. In addition it recognized the role of the GDPFS in enhancing the return on WMO's investment in observational and communication systems.

### **Status of SWFDP Southeast Africa**

3.8 Following a period of planning in 2006, the first realization of the SWFDP was implemented at the beginning of the rainy season in south-eastern Africa in November 2006. RSMC Pretoria (South Africa) is the integrating regional centre for the global-scale products provided by the European Centre for Medium-Range Weather Forecasts (ECMWF), the Met Office, UK, the National Centres for Environmental Prediction (NCEP, USA), as well as other information from RSMC La Réunion (France) specializing in tropical cyclones in the Southwest Indian Ocean, the African Centre of Meteorological Application for Development (ACMAD), and RSMC Pretoria's own NWP production system, such as a limited area NWP system (UM SA12) and satellite data products (e.g. METEOSat MSG) covering Southern Africa. The participating National Meteorological Centres include those of Botswana, Madagascar, Mozambique, Tanzania and Zimbabwe. A Regional Subproject Management Team was established to manage the project implementation, with representation by all participating centres.

3.9 Two training workshops were conducted specifically targeted for weather forecasters of the region who were carrying out the project's implementation. First was a "Preparatory Training" session conducted just prior to the launch of the demonstration, which focused on NWP/EPS use and also on the SWFDP implementation. The second was carried out at the end of the demonstration, and focused on both NWP/EPS products and Public Weather Services to further underpin the significant gains achieved during the project; it trained forecasters from all NMHSs in Southern Africa and also other NMHS in Africa. The project terminated in November 2007, and has been evaluated. A draft Final Report was presented to the Steering.

3.10 The Steering Group appreciated the step-wise implementation of the SWFDP, first with its focus entirely on the forecasting process internal to the NMHSs, i.e., how to provide and use effectively NWP/EPS-based products of the WMO's GDPFS in the SWFDP for use by the participating NMCs. This was understood as "getting one's house in order" first before engaging outside of the NMHSs. After the demonstration phase was established, the national agencies for disaster management and civil protection were engaged and invited by the NMHSs to participate at

a review meeting of the Regional Subproject Management Team, in Maputo, in February 2007.

3.11 Regular reports of the experiences of the participating countries in the SWFDP have been extremely positive. The goals of the project of improved weather forecasting and warnings programmes are being significantly realized, including for example, longer lead-times for alerting the public and national and regional civil protection agencies, and improved cooperation between NMHSs with their civil protection agencies. Some deficiencies have also been identified, such as tools for forecasting the rapid onset of localized severe thunderstorms.

3.12 The Steering Group recognized the very important role and very significant operational tasks performed at RSMC Pretoria, including the RSMC's Web site and portal, as part of the "Cascading forecasting process" concept, for increasing the efficiency of access and use of products and information by NMHSs. This demonstration therefore reinforces the concept and operational role of the GDPFS' RSMCs with Geographic Specialization. It was also noted that the RSMC Daily Guidance Product plays a very important role in the cascading process and will improve over time, as forecasters, in NMCs and RSMC alike, increase their forecasting knowledge and skills with experience and ever increasing use of existing NWP/EPS products. Continued cooperation among global, regional, and national meteorological centres under the established SWFDP framework is necessary to sustain and increase the benefits already realized, in this continuous regionalized capacity-building approach.

3.13 Mr Eugene Poolman (South Africa), Assistant Chairperson of the Regional Subproject Management Team (RSMT), presented the status and outcome of the first SWFDP Regional Subproject of Southeast Africa. On behalf of the RSMT, he expressed gratitude to WMO, the participating Centres, and the Secretariat for supporting the project.

3.14 Mr Poolman presented the results of the project evaluation based on the draft Final Report. The achievement relative to the project's goals are summarized (and assessed):

- All 5 NMHSs noted definite positive impact on their ability to forecast severe weather events and reinforces forecasters' confidence (Significantly improved);
- All 5 NMHSs felt it led to an increase in lead-time for alerting users, up to 4 to 5 days (Significantly improved);
- Interaction of NMHSs with disaster management agencies varies between the five countries, in some areas it is real fruitful, in others lacking (Progressing);
- Gaps and areas for improvement were identified (Significant progress);
- Feedback of the skill of products to the regional and global centres need to be increased, some shortcomings were identified (Area for improvement).

3.15 Overall conclusions include:

- The five NMHSs confirmed that the new approach is demonstrating significant usefulness to the early warning services in their countries, and it was supported by disaster managers of these countries (SWFDP RSMT Meeting, Maputo, February 2007);
- The cascading forecasting process was found to be working very well to make products and guidance available to NMCs;
- Southern African countries at WMO Congress highlighted:
  - Successful recipe demonstrating real benefit to developing countries
  - High impact, low cost, with visible operational results

3.16 Main issues and challenges identified from the project include:

- Forecasting tools better used, but a gap in nowcasting tools now evident:
  - Lack of useful guidance tools (e.g. diagnostics of surface streamlines) and information of localized heavy precipitation and strong winds, i.e. small scale phenomena;
  - No radars, thus must be MSG satellite-based tools (products);

- Interaction between NMHSs, disaster management authorities, media and end-users is still not optimal;
- Data communication challenges;
- Feedback mechanisms from NMHSs to RSMCs and to global product centres still a challenge and needs to be improved;
- Improved coordination with regional and international response organizations needs to be built on the SWFDP framework.

3.17 The Steering Group agreed that the project was well implemented, consistent with the guidelines provided, and was a successful demonstration of how developing countries can be assisted to reduce the technology gap, increase their capacity to carry out operational severe weather forecasting. It supported the progression of the practical approach of the SWFDP in Southeast Africa to operational implementation in all NMHSs of the Southern Africa (SADC countries), with the provision of closing the important gaps that have been identified in the demonstration phase, including training of forecasters on the use of satellite based nowcasting techniques, and development of communication strategies with DMCPAs and the media. Mr Poolman indicated that plans are being developed to extend the SWFDP to immediately address the operational roll-out to all countries in Southern Africa, including improved use of MSG-products for nowcasting.

3.18 Some PWS and DRR aspects that were not part of the initial project implementation need to be worked into the follow-up activities to close that gap. To achieve this, follow-up projects were proposed to address specifically these issues, building on the framework already established by the Steering Group for the project. (See section 6 of this report.)

3.19 The Steering Group expressed the importance of measuring the performance and effectiveness of warnings. The following questions need to be addressed: Is there a practical verification system to determine were the warnings correct in timing and location? Were there language difficulties in the information flow, in the use of the RSMC Daily Guidance, for example? It was noted that obtaining data and information for verification purposes was very difficult.

3.20 Mr William Nyakwada noted that in the implementation, the level of scientific expertise of forecasters in the NMCs in the developing countries of Africa is not of the same level as that in advanced centres. The SWFDP should provide the enhancement in scientific knowledge and skills, in the more effective use of and enhancing benefits from existing products of advanced centres, as part of capacity building for forecasting severe weather events.

3.21 The Steering Group, while recognizing the successes of the first project, noted that the continuation of the project into the future will have to be managed carefully, while maintaining proper project management and accountabilities, in order that the project focuses effort on high priority improvements, and be sustainable. The task of extending the SWFDP from 5 NMHSs to 14 SADC countries could be enormous, for example for RSMC Pretoria. Participating global products centres (ECMWF, Met Office UK, NCEP USA) are willing to continue to maintain their respective level of support, at the level they have been during the one-year demonstration, however are very interested to obtain feedback on their products, so that they may fine tune their support to the project's future, focusing on the most useful products. For example, performance of NWP products in tropical regions is of interest because many of the products are optimally designed for use over the tropical regions.

### **EPS feature-based diagnostics (Summary)**

3.22 Mr Ken Mylne briefed the meeting on the developments in "Feature-based diagnostics", which can offer the possibility of quickly identifying and summarising the features in the atmosphere liable to be associated with high-impact weather. They are particularly useful for interpretation by forecasters as they use techniques similar to conventional synoptic analysis and diagnosis. They can be particularly effective when used with ensemble forecasts where it is necessary to summarise information from many ensemble members in a concise way. Some existing feature-based diagnostic tools may be useful in extending the products supplied through

the SWFDP, but also there may be scope to help forecasters with some of the gaps in current capability identified in the first phase of the SWFDP by development of new feature-based diagnostics targeting features such as tropical convection. The Met Office would welcome voluntary participation by operational forecasters in future development and evaluation. The Steering Group was in general agreement with this approach.

#### **4 Public Weather Services (PWS) Aspects of the SWFDP**

4.1 The first regional subproject under the SWFDP concentrated on improving the availability and use of NWP products from global centres in NMCs as part of the forecasting process. CBS recognized that in order to fully realize the benefit to end-users of these improvements, there needed to be a concomitant focus on improvements in service delivery. Consequently, CBS asked that the project concept be expanded to include, among other points, PWS aspects.

4.2 In considering this request from CBS, and in recognition of the importance of the services provided by NMHSs to end-users for the overall benefit of the public at large, the Steering Group considered that the effective communication of forecasts and warnings services represented a critical step in realizing the full value of the investment in improving the forecasting process.

4.3 Mr Gerald Fleming, Chairperson of the OPAG on PWS, presented two papers to the Steering Group, the first of which dealt with the “what” in defining 8 different PWS aspects, and proposed that some or all of these might be incorporated into future SWFDP subprojects. The meeting agreed that all of these aspects were of importance and identified 4 which it felt were of high priority. These 4 are:

- Ensuring that forecasters are fully aware of the needs of each user group;
- Ensuring that users are fully aware of the limitations of the forecasting process;
- Development of improved communication skills within the forecaster community;
- Assessments of user satisfaction with the forecast and warning services provided by the NMHS (including the establishment of appropriate baselines where possible).

4.4 Two particular user groups that were identified by the Steering Group as being of greatest importance were the Disaster Management and Civil Protection Authorities (DMCPA) and the Media.

4.5 The Steering Group also noted that improvements in networking, communication, and user interaction were essentially social skills and that involvement of a social expert in this process should also be considered. The meeting noted the concept developed by the OPAG on PWS of “Learning Through Doing”, which involves mentoring, reviews and follow ups in addition to formal training workshops. The meeting agreed on the merits of this approach in devising methodologies in building the capabilities of participating NMHSs.

4.6 The meeting noted the substantial amount of work done by the PWS Programme in developing guidance materials and resources on communication skills, media relations, verification, and user assessment relevant to the objectives of this project and asked that these materials be made available to the participating NMHSs as well as being utilized in training activities. These materials could be used to design certain specific demonstration activities within a SWFDP. The references are listed in the Reference section at the end of this report.

4.7 The meeting noted that in a number of countries in Africa, the disaster management and civil protection authorities already have a contingency provision to include the NMHS as part of an emergency or crisis group; the NMHS could be requested to station a forecaster on-site with the emergency team to provide close-hand support to decision-making. In this instance for example, communications skills are extremely important, reinforcing the point that forecasters need to be trained to interact with their users, in particular DMCPAs and Media.

4.8 Mr Han informed the meeting that at Korea Meteorological Administration, verification of forecast accuracy is approximately at 80%, while surveys of users regarding their satisfaction with the forecasts show a much lower result, at approximately 60%. This supports the idea that attention should be on improving forecasts to meet the needs of the users.

4.9 The meeting noted an idea used in the past where a limited (1- or 2-day) designed table-top exercise was carried out in a community, involving various officials and public representatives. The goal was to demonstrate the need for up-to-date contingency plans for public protection against a variety of hazards, including severe weather, at the community level. The results of the exercise were then used to develop or renew emergency preparedness and response plans that include all public and community stakeholders.

## **5 Development of Disaster Risk Reduction (DRR) strategies at national and regional levels for SWFDP**

5.1 Through a coordinated approach involving consultations with the relevant programmes and technical commissions, the DRR programme facilitated a one-day segment on “Development of DRR Strategies at national and Regional Level for the Severe Weather Forecasting Demonstration Project (SWFDP)”. A detailed agenda is found in Annex 3. The goals of the one day DRR segment were to (i) bring stakeholders to the same understanding of the benefits of expanding the SWFDP to link technical advances of the NMHS to emergency preparedness and response agencies and regional and international organizations; and (ii) review and agree on the main components that should be included in the second phase of the demonstration project. The meeting agreed that effective linkage of NMHS to emergency preparedness and response agencies in the second phase of the SWFDP should be achieved through synergies of DRR Programme and PWS through: (i) identification and segmentations of stakeholders involved in different aspects of emergency preparedness and response decision processes, (ii) identification of requirements for meteorological products and services; (iii) development of products and services to meet the needs of the users; (iv) facilitation of interaction of NMHSs with emergency preparedness and response agencies and media; (v) development of communication strategies to ensure effective response to warnings; (vi) training through workshops to facilitate the understanding of meteorological products and services; and (vii) the establishment of a methodology for documentation of good practices.

5.2 The meeting welcomed many Secretariat representatives of relevant WMO programmes that have interest in the SWFDP concepts. Mr Yuichi Ono joined the meeting representing International Strategy for Disaster Risk Reduction (ISDR). The Chairperson expressed appreciation for their presentations on relevant activities and perspectives.

5.3 The meeting noted numerous possibilities for expanding the scope of SWFDP to specifically address needs related to disaster risk management at regional and national levels. This would involve development of partnerships with stakeholders such as humanitarian agencies, civil security and emergency management agencies, for enhanced utilisation of NMHSs’ products and services in support of decision making.

### **Results of WMO/DPM Survey and DRR Strategies in Africa**

5.4 The Steering Group noted the WMO/DPM regional survey brought out useful information to address DRR in the regions. The results of the survey for Africa revealed various initiatives in the region aimed at reducing disaster risks that included the development of Regional and sub-regional DRR strategies. The Steering Group appreciated that all the strategies recognized the role of NMHSs in disaster risk reduction in the region. It was, however, noted that the components related to NMHSs DRR functions are not adequately recognized by governments and thus, rarely attracted funding. The desire of the region is for NMHSs to improve the forecasts and provide demand driven products and services to the users. It was recommended that future NMHSs DRR

activities in the region address user needs identified in the regional, sub-regional and national strategies and put emphasis on the services needed to address key problems in the region.

### **Coordination for development or strengthening of multi-hazard early warning systems in WMO Regions**

5.5 WMO is initiating several projects for development or strengthening of multi-hazard early warning systems, with specific focus on the role of NMHSs. The goal is to leverage expertise and resources of key partners working at the national and regional levels, to assist the Members in strengthening of their early warning systems through a multi-hazard, integrated end-to-end approach. These projects are built upon a project management framework that includes 6 steps: i) Identification and mapping of capacities and opportunities in the region, on the basis of partnerships among humanitarian, donor, technical agencies; ii) development of project proposals with clear deliverables and timelines, monitoring and evaluation indicators and resource mobilization strategy; iii) implementation of demonstration projects in countries where there is potential; iv) transition of successful projects into operational practices; v) ensuring sustainability of projects and; vi) project broadening to include additional countries.

5.6 The Steering Group noted that a comprehensive multi-hazard end-to-end systems approach to planning of SWFDP is desirable. Members recognized that in the implementation there is a practical advantage to use a building-block approach, as was used in the first SWFDP regional subproject, i.e., that the GDPFS “engine” (of the Cascading forecasting process) was first implemented (November 2006). With a well-functioning forecasting “engine” in place, other blocks are added, such was the case for introducing PWS aspects (February 2007).

#### **Asia (RA II)**

5.7 A demonstration project has already been initiated with Shanghai (China) to demonstrate the benefits and document good practices where early warning systems are supported by appropriate governance and legislation, organizational coordination mechanisms and operational frameworks.

#### **Europe (RA VI)**

5.8 A project has already been initiated with France to demonstrate the benefits and document good practices where early warning systems are supported by appropriate governance and legislation, organizational coordination mechanisms and operational frameworks.

5.9 As a next step, the Second Symposium on Multi-hazard Early Warning Systems, to be held in Toulouse (France) during the first quarter of 2009, will provide a great opportunity for sharing lessons learned through analysis of good practices, further develop the concept of multi-hazard approach to early warning systems, and launch pilot projects in developing countries, together with agencies involved in all aspects from observing to community preparedness.

5.10 In South-East Europe, through a partnership with the World Bank, 8 NMHSs have been modernized to strengthen their contribution to early warning systems. As a result, those NMHSs were able to provide critical contributions to the Drought Management Centre for South-Eastern Europe (DMCSEE), setup in 2006.

5.11 More recently, the DRR Programme office is working with the regional association working group on DRR in the development of its strategy and work plan for the region. The first meeting of the working group has been held in Helsinki, Finland, on 11 – 12 March 2008, and agreed on a framework and a set of activities that should be implemented including: (i) identification of specific gaps, needs and requirements for different groupings of countries in the region, (ii) identification of priorities for action where projects could be initiated to strengthen their DRR capacities, (iii) development of a regional / sub-regional coordination process for project management and implementation to support disaster risk reduction, built upon WMO and partners’ capacities.

### **North America, Central America and the Caribbean (RA IV)**

5.12 A Regional Planning and Advisory Group (RPAG) has been established under leadership of RA IV President, involving regional representatives from WMO including the chairman of RA IV working group in Hydrology and working group on Disaster Prevention and Mitigation and representatives from NOAA, the World Bank and International Federation of Red Cross and Red Crescent (IFRC). They have developed a coordinated project proposal for “multi-hazard early warning systems,” for Central America. During the first meeting of the RPAG (January 2008), all participating agencies have agreed to together develop proposals for three pilot countries, that would leverage each agencies’ capacities. In this regard, it is aimed to strengthen the contributions of RA IV Hurricane Committee, RSMC Miami Hurricane Center, Regional Flash Flood Guidance Center in Costa Rica, Regional Training Centres towards improved EWS capacities in the region. Additional stakeholders have also been identified for participation in these projects from the early stage. Assessment missions have already been planned to further identify the capacities and needs of pilot countries with regard to multi-hazard early warning systems. The goal is to leverage activities and capacities of WMO and other partner agencies in a more coordinated way to benefit the Members. A detailed project plan is under development with the goal to finalize and obtain extra budgetary funds for implementation of the project.

### **South America, Pacific (RA III & V)**

5.13 Coordinated disaster risk reduction projects will be initiated in 2009, based upon the WMO disaster risk reduction project management framework. Activities will be designed to respond to priority needs of the regions, as identified by the DRR country- and regional-level diagnosis carried out in 2006 – 2007.

### **Africa (RA I)**

5.14 A coordination process is underway to develop multi-hazard early warning system projects built upon technical capacities available or being developed through WMO programmes, technical commissions and bi-lateral partnerships (e.g., flash flood guidance system, flood and drought risk assessment project, etc) and other initiatives and activities underway through partner agencies in Africa. This approach will engage the WMO and partners’ network at the regional level for project planning and implementation. Currently, (i) ongoing activities (ii) regional capacities that can be leveraged in support of projects, (iii) major partners and (iv) potential sources of funding are being identified and mapped.

5.15 WMO, under the crosscutting framework of the disaster risk reduction Programme participated and lead several sessions in a ministerial meeting on, “Hazard Risk Reduction in West Africa,” in Abidjan, Côte d’Ivoire, in May 2007, sponsored by African Union, the World Bank, and ISDR. It led the discussion on hydro-meteorological hazards. Following this meeting, the African Union with support from ISDR has developed a preliminary assessment project, funded by the World Bank GFDRR, in which WMO will lead the national assessments for capacities in flood and drought risk assessment and management.

### **SE Africa – SWFDP - Proposal for a future phase to address DRR**

5.16 Following the initial implementation of SWFDP (2006/2007) in five countries in Southeast Africa (Botswana, Madagascar, ~~Malawi~~, Mozambique, Tanzania, Zimbabwe, with the support of RSMC Pretoria - South Africa), there is potential for expanding and scaling up the project, with a view to strengthen operational cooperation between NMHSs, national disaster management, civil and humanitarian agencies, to ensure utilization of severe weather warnings in emergency preparedness and planning activities. It is now proposed to initiate a subsequent phase to this project, in order to ensure that forecasts and warnings of hazards lead to improved decision-making, specifically in support of early warning systems. This second phase would include:

1. Consideration of the initial countries where an end-to-end approach to early warning systems can be implemented and demonstrated;
2. Development of a proposal for these countries, leveraging from initiatives ongoing in SADC and Africa. These proposals should be considered as contributing to

- development of disaster risk management in the countries, and linking with ongoing development with regard to disaster risk management;
3. Identification of potential stakeholders and their ongoing projects upon which this project could be leveraged;
  4. Identification of needs and requirements of these stakeholders;
  5. Identification of products and services responding to these requirements, and needs for additional technical capacity developments;
  6. Clarification of technical limitations with regard to utilisation of available products and services for disaster risk management decision-making;
  7. Development of coordination processes among stakeholders at all levels, from technical to decision support;
  8. Feedback mechanisms for improving capacities;
  9. Planning expansion of stage 2-8 (above) for other countries.

### **Enhancing marine meteorological services**

5.17 The Steering Group noted that an end-to-end pilot project on enhanced capability of NMHSs in West Africa and the RSMC-Dakar to produce marine meteorological forecasts and to provide marine services to end-users, including the link with the emergency authorities, is currently being developed. This project follows the SWFDP concept of the Cascading Forecasting Process applied to marine meteorological forecasts. The Steering Group agreed that an extension of the SWFDP to include marine forecasting aspects (e.g. in West Africa (RA I), and Southeast Africa (RA I), and for the South Pacific Countries (RA V) would be of benefit and have potential for development and implementation. In this context, the meeting recommended that the initiators coordinate these aspects with the MMOP and JCOMM activities.

5.18 The Steering Group noted that the recent ECMWF Council (Reading, UK, December 2007) decided to enhance the set of ECMWF products disseminated to WMO Members. The improvement was quite significant and includes: (1) the provision of a deterministic forecast range of global marine products on 2.5-degree latitude/longitude grids of up to 7 days; and (2) the provision of global marine products from the Ensemble Prediction System (EPS) on 2.5-degree latitude/longitude grids of up to 6 days, in support of high impact and extreme sea state events. This includes in particular global forecasts of the probability of Significant Wave Height (SWH) above 2, 4, 6, and 8m based on the EPS.

5.19 The meeting noted that the Fifth Regional Workshop on Storm Surge and Wave Forecasting - A Hands-on Forecast Training Laboratory would be convened in Melbourne, Australia, from 1 to 5 December 2008. This workshop, jointly organized by the TCP and MMOP, has a major focus on Pacific Island Countries.

### **Interest of the Aeronautical Meteorology Programme in the SWFDP**

5.20 The SWFDP, as a highly successful and focussed demonstration project, is addressing issues pertinent to aviation weather forecasting, in particular associated with convection, heavy precipitation, and strong surface winds. Aviation weather hazards such as turbulence and icing can be predicted from NWP model variables or parameters, or calculated by using available algorithms coupled with the outputs of NWP models.

5.21 Aviation weather users have been requesting improvements in the reliability and accuracy of aeronautical warning messages such as AIRMET and SIGMET. Many of these warnings provide a lead time of 4 to 6 hours, and require regional NWP for this time range blended with observations (radar, satellite, PIREPS). Many NMHSs of developing countries do not currently have the capacity to produce model forecasts of the required parameters on their own, but would greatly benefit from the "cascading" approach of RSMC's running such models for other NMHSs of the region.

5.22 SWFDP training that is provided on the GDPFS and PWS aspects also indirectly benefit aviation weather forecasting, as many of the trained forecasters also carryout aviation weather related duties.

5.23 AMDAR profiles (vertical profiles of wind, temperature, and to a lesser extent humidity) can be obtained from regional AMDAR programmes, and would complement and greatly improve the necessary density of UA networks particularly in regions of developing countries.

## **6 Development of future directions: regional expansion of subprojects and updated framework including PWS and DRR aspects**

6.1 Regional representatives of RA I, RA III, and RA V, of the Steering Group, presented each their Regional perspectives on how SWFDP would be relevant, and in particular made proposals on regional subprojects that would benefit severe weather forecasting and warnings programmes of WMO Members, especially those in developing countries.

### **Africa (RA I)**

6.2 The Steering Group joined in the enthusiasm for the success of the first SWFDP Regional Subproject created in Southeast Africa (see agenda item 3, above) and noted the interest to implement similar projects, including extending SWFDP to include forecasting for the marine environment. The Steering Group also noted that the projects proposed for the Eastern and Western Africa would also benefit the region and the SWFDP process in Africa. The Steering Group also recognized the need to extend the SWFDP to include all Southern Africa (SADC) countries and to address the gaps identified in the first phase of the project, including the request made by the Chairperson of the Meteorological Association of Southern Africa, to sustain the SWFDP and extends its benefits to all countries of Southern Africa. (Please see meeting Doc. 6.1)

### **South America (RA III)**

6.3 In RA III, in parallel with the development of the SWFDP, many activities were also organized in Brazil to create a demonstration project for the mid-latitude countries on South America, including with Argentina, Bolivia, Peru, Uruguay, Chile, and Paraguay. They agreed on implementing a virtual centre for severe weather forecasting, and to strengthen the communications among the NWP centres. Work on identification of severe weather patterns of the region and their impacts has been initiated through two recent approved projects called ADAPT and SIMPAT, under the Brazilian Agency for Project Financial Support - FINEP. The goal of these projects is to prepare regional centres in Brazil that will act as venues for dissemination of NWP-based information regarding severe weather. Some conferences were held in Brazil, Argentina and Chile, where representatives of South American countries reinforced the needs for better monitoring of extreme events. Additionally, members of regional centres and from the NHMS in South America were sent to Madrid for 2-week training on implementation of a virtual centre. RA III is prepared to pursue the implementation of the SWFDP in RA III in 2008. (Please see meeting Doc. 6.2)

6.4 The Steering Group noted that the outline of the project followed the Guidelines but some points may be emphasized for RA III implementation, such the use of nowcasting tools. The Steering Group suggested that the project include other countries whose NHMSs require additional capacity building on NWP/EPS products, as well as aspects related to PWS and DRR improvements. In addition, the northern countries, such as Equator, Venezuela, Guyana (Georgetown, French Guiana) may also be included, at least as observers. Aviation and marine weather services could also benefit from the project.

6.5 The Steering Group suggested the project management team for RA III be formed as soon as possible to develop and carryout the implementation plan while several other severe weather related initiatives are presently in progress in the region. The idea of linking the SWFDP to the projects already underway in Brazil was well received, specially the Virtual Centre for dissemination of early alerts and forecasting of severe weather for RA III. This Centre will facilitate the process for the dissemination of information.

**Southwest Pacific (RA V)** (Please see meeting Doc. 6.3)

6.6 The Steering Group noted the support in principle that has been expressed for a SWFDP to be implemented in this Region:

- Cg-XV requested that the CBS consider the possibility of implementing similar projects (to the SWFDP RA I subproject) in the South Pacific islands;
- A Needs Analysis for the Strengthening of Pacific Islands Meteorological Services completed by the South Pacific Regional Environment Program (SPREP) in 2000, identified improved severe weather warnings services as a priority area common to Pacific Small Island Developing States (RAV/WG/PIW/Doc5.0, 2005);
- Interest in an SWFDP subproject in the South Pacific has also been noted in the Southern Hemisphere THORPEX Implementation Plan (V14 Draft 04, June 2007) and at the 12th meeting of RA V Regional Meteorological Service Directors (July 2007);
- The 2007 WMO fact-finding mission to RSMC Nadi strongly recommended the promotion of an SWFDP to strengthen the delivery of weather forecasting and warning services of RSMC Nadi, particularly for severe weather associated with tropical cyclones;
- RSMC Nadi has stated that it is fully committed and has expressed a willingness to commit staff resources to an RA V SWFDP subproject. RSMC Darwin is willing to provide additional assistance on top of its ongoing program of improvement to regional and tropical cyclone products for the southwest Pacific region;
- To date, expressions of interest for participation in an RA V SWFDP subproject have been received from NHMSs in Kiribati, Niue, Samoa, Solomon Islands and Vanuatu, while Tonga and PNG are still considering the proposal.

6.7 The meeting noted that there are several current and planned projects in the southwest Pacific region that would dovetail well with an RA V SWFDP subproject, and assist with the ongoing implementation of the severe weather forecasting techniques that could be field trials as part of a SWFDP regional subproject. Improved working relationships between Pacific Island Countries resulting from their participation in the proposed RA V subproject are likely to assist with enhancing service delivery by NHMSs in the south-west Pacific region.

6.8 An important issue to be considered in planning a South Pacific subproject is the possible difficulty that RSMC Nadi and some NHMSs will encounter in committing sufficient resources to project activities. The pivotal role of the regional centre (RSMC) in SWFDP activities includes a substantial effort in planning and preparation, operational production of new guidance products, then evaluation and documentation.

6.9 In the proposed RA V subproject, a daily Tropical Cyclone Outlook product could be produced by RSMC Nadi, describing areas favourable for tropical cyclone genesis within the next 3-5 days, to complement their existing Tropical Disturbance Summary and Advisory service. However, substantial additions to the operational workload of RSMC Nadi forecasters may be challenging, as the RSMC has been operating well below establishment levels of meteorologists and IT staff for some years. This situation has started to normalize with the employment of three trainee meteorologists in 2007.

6.10 The 12th session of the RA V Tropical Cyclone Committee in mid-July 2008 will provide an opportunity to discuss the proposed project among relevant Permanent Representatives of all interested RSMCs and NHMSs of the region.

6.11 The Steering Group provided the following suggestions:

- The early priority of project should be on increasing the forecasting capacity of RSMC Nadi to provide sustained TC services to the region, and later shift focus to the NHMSs;
- An addition of marine services aspects should be considered, due to important effects of TCs on sea-state and related hazards; this aspect could be in the form of a separate subproject or in a later project phase using marine/sea-state NWP products incorporated into the SWFDP process;

- Emphasis on PWS and DRR aspects should be included for the NMHSs.

### **Future SWFDP regional subprojects**

6.12 Following the briefings on proposals for future implementations of regional subprojects, from Africa (RA I), South America (RA III), and South-West Pacific (RA V), the Steering Group agreed that the following regional subprojects are of the highest priority for the SWFDP:

#### RA I (Africa)

Undertake an extension of the initial SWFDP subproject in Southeast Africa (5 NMHSs) to all countries in Southern Africa, represented at the Meteorological Association of Southern Africa (MASA). The extended demonstration should take place during 2008-2009, and implemented under the same terms as was done for the 5 NMHSs in the 2006-2007 heavy rain and strong wind season, and with an additional focus to strengthen PWS aspects of the demonstration, and on Nowcasting techniques based on MSG.

Undertake a focused demonstration to establish and strengthen operational cooperation between the NMHSs and emergency preparedness and response agencies so that the products and services derived from the SWFDP would lead to effective decision-making and appropriate actions that would lead to saving of lives, livelihoods of the communities at risk. Participation in this demonstration will be voluntary, and intended to build on the accomplishments already achieved by all 5 NMHSs that have participated in the SWFDP in Southeast Africa, together with the South African Weather Service in its role as RSMC Pretoria and its national role. This is proposed to take place in 2008-2009, and will be coordinated with the DRR Office. (See draft proposal in Annex 4.)

#### RA III (South America)

Create a regional subproject, as was proposed to the PSG, including NMCs in Bolivia, Chile, Paraguay, Peru, and Uruguay, and relevant regional centres and global products centres. The proposal should be further developed, to include all aspects required for input to the development of a Regional Subproject Implementation Plan, including confirming the participation of the Centres in the Cascading Forecasting Process, and to include PWS aspects. The PSG encouraged the initiator to consider the inclusion of additional NMHSs of other developing countries. If practically possible, the implementation should be considered for the severe weather season of November 2008 to April 2009, to take advantage of potential synergies with currently ongoing projects of the region related to severe weather.

#### RA V (South-west Pacific)

Create a regional subproject, as was proposed to the PSG, including Pacific Island Countries, and RSMC Nadi and other relevant regional centres and global products centres. The proposal should be further developed to include all aspects required for input to the development of a Regional Subproject Implementation Plan, including confirming the participation of the Centres in the Cascading Forecasting Process, and to include PWS and Marine aspects. Since the focus of this proposal is related to severe weather mainly associated with Tropical Cyclones, the PSG requested this proposal be coordinated with the appropriate activities of the TCP.

6.13 The PSG also agreed that the following regional subprojects could also be of benefit and have potential for development and implementation:

#### RA I (Africa)

- West Africa, including the NMCs of countries that fall within the coverage of the guidance of RSMC Dakar, with an extension to include Marine aspects;
- East Africa, as was proposed to the PSG, including the NMHSs of countries that fall within the coverage of the guidance of RSMC Nairobi;

#### RA II (Asia)

- Heavy precipitation and strong winds, mainly associated with Typhoons, and summer monsoons in the Region, involving NMHSs of Southeast Asian countries, such as Vietnam, Philippines, Laos, Cambodia, Thailand.

- Southwest Pacific Islands, forecasting aviation weather hazards

#### RAs VI/II (Europe, Asia)

- NMHSs of Eastern European and Central Asian countries

6.14 The PSG also noted that the SWFDP regional subprojects are focused on the GDPFS aspects of weather forecasting and PWS aspects of warning services. Nevertheless, the PSG acknowledged that the implementation of subprojects could represent excellent opportunities to improve meteorological services in specialized areas such as marine, aviation, hydrology, and climate. The PSG welcomed such proposals, and is prepared to advise on how best to interface or harmonize with the GDPFS and PWS. Specific examples could include:

- Southeast Africa, extension of the SWFDP to include Marine aspect
- Southern Africa, extension of the SWFDP to include flash flood forecasting

#### **Updating the SWFDP “Overall Project Plan” and “Guidebook”**

6.15 The meeting reviewed the general guidance for the SWFDP, as was developed following its first meeting. It requested updates to be made to the “SWFDP Overall Project Plan” and “SWFDP Guidebook on Implementing Regional Subprojects” to reflect the experience of the first Regional Subproject, as well as input from PWS and DRR, in particular to address both technological gaps, as well as to include PWS aspects. They include:

- Technical gaps (identified during 1<sup>st</sup> subproject):
  - a. Implement available Nowcasting tools
    - i. Improve the available satellite-based products (e.g. MSG)
    - ii. Improve the use of existing satellite imagery and products in the forecasting process
  - b. Strengthen the provision of specific feedback from NMCs on NWP and other guidance products from Global Centres, and Regional Centres
  - c. Devise and apply a practical verification system for forecasts and warnings, including a base-line for measuring improvement over time. (PSG recognizes that closing this gap represents a significant challenge and that there has been some progress in this area which can be built upon.)
  - d. Further enhance the use of EPS-based products for forecasting severe weather, in particular for extending the lead-time of anticipating conditions that risk the development of severe weather
  - e. Identify data communication problems
    - i. Investigate alternate means, e.g., EUMETCAST broadcast
- User aspects (PWS and DRR aspects):
  - a. Organize interactions with DMCPA (including facilitating user feedback for assessment of warning services, and developing severe weather impact and risk information) at the national and international levels to:
    - i. Identify and segment major stakeholders involved in different aspects of emergency preparedness and response activities nationally and regionally (e.g. humanitarian agencies);
    - ii. Mapping of operational emergency preparedness and response decision processes and actions in the participating countries that would require meteorological information for decision –support. Mapping of decision processes span both national as well as humanitarian agencies providing support to the countries;

- iii. Identify requirements for meteorological products and services, including requirements on information content, format, preferred lead-times, communication and dissemination procedures and any technical advisory services needed to ensure the products and services are understood and appropriately used by the target users
- b. Develop a communication strategy and plan to ensure effective response when warnings are issued
- c. Organize interaction with Media
- d. Develop products and services to meet the requirements for meteorological products and services expressed by the users involved in operational emergency preparedness and response;
- e. Develop training tools to facilitate understanding, the limitations of products and improved communication with the DMCPA and the Media
- f. Strengthen guidelines to stress exchange of information on warnings between participating NMHSs, and between NMHS and RSMC
- g. Establish a methodology for documentation of experiences;

6.16 The meeting noted that the two guidance documents need to be updated for the correct references to CBS and other constituent body texts.

## **7 Other business**

There was no other business.

## **8 Closing**

The meeting closed at 15:00, Thursday 20 March 2008.

**References:**

- Final Report of First Meeting of CBS Steering Group on SWFDP (Geneva, December 2005)
- SWFDP Overall Project Plan (January 2006)
- SWFDP Guidebook for Planning Regional Subprojects (January 2006)
- Draft Final Report SWFDP Southeast Africa (February 2008)
- PWS resource materials:

TD No.	Title
1422	Guidelines on Communicating Forecast Uncertainty (PWS-18)
1409	Examples of Best Practice in Communicating Weather Information (PWS 17)
1385	Guidelines on capacity building strategies in Public Weather Services (PWS-15)
1354	Strategy for Developing Public Education and Outreach (PWS-14)
1292	Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management (PWS-13)
1278	Guidelines on Weather Broadcasting and the Use of Radio for the Delivery of Weather Information (PWS-12)
1256	Guidelines on Quality Management Procedures and Practices for Public Weather Services (PWS-11)
1179	Guidelines on Cross-Border Exchange of Warnings (PWS-9)
1139	Guide on Improving Public Understanding of and Response to Warnings (PWS-8)
1103	Supplementary Guidelines on Performance Assessment of Public Weather Services (PWS-7)
1102	Guide on the Application of New Technology and Research to Public Weather Services (PWS-6)
1080	Guidelines on Graphical Presentation of Public Weather Services Products (PWS-4)
1088	Guidelines on the Improvement of NMSs - Media Relations and Ensuring the use of Official Consistent Information (PWS-3)
1084	Weather on the Internet and Other New Technologies (PWS-2)
1023	Guidelines on Performance Assessment of Public Weather Services

The full list and documents are accessible from:

[http://www.wmo.int/pages/prog/amp/pwsp/publicationsguidelines\\_en.htm](http://www.wmo.int/pages/prog/amp/pwsp/publicationsguidelines_en.htm) )

**ANNEX I**

**WORLD METEOROLOGICAL ORGANIZATION**

CBS-DPFS/SWFDP-SG/Doc. 2.1(1)

COMMISSION FOR BASIC SYSTEMS  
OPAG DPFS

(15. I.2008)  
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**STEERING GROUP  
SEVERE WEATHER FORECASTING  
DEMONSTRATION PROJECT (SWFDP) WITH  
DEVELOPMENT OF DISASTER RISK REDUCTION  
STRATEGY FOR SWFDP**

ENGLISH ONLY

GENEVA, SWITZERLAND, 17-20 March 2008

**PROVISIONAL AGENDA**

- 1 Opening of the meeting**
- 2 Organization of the meeting**
- 3 Review and evaluation of SWFDP project**
  - 3.1 Introduction and background of the SWFDP
  - 3.2 Status of the implementation of SWFDP in Southeast Africa
- 4 Public Weather Services (PWS) Aspects of the SWFDP**
- 5 Development of Disaster Risk Reduction (DRR) strategies at national and regional levels for SWFDP**
- 6 Development of future directions : regional expansion of subprojects and updated framework including PWS and DRR aspects**
- 7 Other business**
- 8 Closing**

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**ANNEX II****WORLD METEOROLOGICAL ORGANIZATION**

CBS-DPFS/SWFDP-SG/INF 2

COMMISSION FOR BASIC SYSTEMS  
OPAG DPFS(10.III.2008)  
\_\_\_\_\_**STEERING GROUP  
SEVERE WEATHER FORECASTING  
DEMONSTRATION PROJECT (SWFDP) WITH  
DEVELOPMENT OF DISASTER RISK REDUCTION  
STRATEGY FOR SWFDP**

ENGLISH ONLY

GENEVA, SWITZERLAND, 17-20 March 2008

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[www.wmo.int/web/www/www.html](http://www.wmo.int/web/www/www.html)

**ANNEX III**  
(Annex to paragraph 5.1)

**WORLD METEOROLOGICAL ORGANIZATION** CBS-DPFS/SWFDP-SG/Doc. 2.1(1) Add. 1  
COMMISSION FOR BASIC SYSTEMS (15.II.2008)  
OPAG DPFS \_\_\_\_\_

**STEERING GROUP**  
**SEVERE WEATHER FORECASTING**  
**DEMONSTRATION PROJECT (SWFDP) WITH** ENGLISH ONLY  
**DEVELOPMENT OF DISASTER RISK REDUCTION**  
**STRATEGY FOR SWFDP**

GENEVA, SWITZERLAND, 17-20 March 2008

**PROVISIONAL AGENDA**

**Item 5: Development of Disaster Risk Reduction (DRR) strategies  
at national and regional levels for SWFDP  
DATE: 18 March 2008**

9:00 - 11:00	<p>WMO Strategy and Capacities in DRR</p> <ul style="list-style-type: none"> <li>- WMO DRR Programme and Project Management Framework (<i>Maryam Golnaraghi, WDS/DRR</i>) (10 min)</li> <li>- Capacities, Gaps and Needs of NMHSs in support of DRR decision-making: results of WMO Country Survey (<i>Filipe Lucio, WDS/DRR</i>) (10 min)</li> <li>- WMO initiatives in the region               <ul style="list-style-type: none"> <li>• SWFDP (<i>Peter Chen, WDS/DPFS</i>) (10 min)</li> <li>• Global Flash Flood Guidance (<i>Avinash Tyagi, CLW/HWR</i>) (5 min)</li> <li>• Flood Risk Assessment (<i>Avinash Tyagi, CLW/HWR</i>) (5 min)</li> <li>• Drought Risk Assessment (<i>Mannava Sivakumar, CLW/CLPA/AgM</i>) (5 min)</li> </ul> </li> <li>- Mozambique case study (<i>Filipe Lucio, WDS/DRR</i>) (5 min)</li> <li>- Discussions (30 min)</li> </ul>
11:00 - 11:15	Coffee
11:15 - 13:00	<p>Regional Strategies for Implementation of DRR and Link to the Mandate of WMO and NMHSs</p> <ul style="list-style-type: none"> <li>• Africa:               <ul style="list-style-type: none"> <li>→ DRR Strategy in Africa and initiation of projects involving ISDR System partners (<i>Seth Vordzorgbe, ISDR Secretariat</i>) CANCELLED (25 min)</li> <li>→ Results of the DRR survey in Africa (<i>William Nyakwada, WMO Regional Association for Africa</i>) (15 min)</li> </ul> </li> <li>• Pacific (<i>Mary Power, DRA/RMO</i>) (10 min)</li> <li>• South America (<i>Miguel Rabiolo, DRA/RAM / Francisco Villalpando, DRA/RAM</i>) (10 min)</li> <li>▪ Discussions (30 min)</li> </ul>
13:00 - 14:00	Lunch
14:00 – 14:30	<p>Proposal for development of DRR Strategy for SWFDP (<i>Maryam Golnaraghi</i>)</p>
14:30 – 15:30	<p>Proposal for development of multi-hazard early warning systems in Southern Africa (<i>Eugeune Poolman</i>)</p>
15:30 - 15:45	Coffee
15:45 - 17:30	Discussions and way forward

## ANNEX IV

### Draft proposal on project expansion in Southern Africa on DRR development (annex to paragraph 6.12)

#### **Recommendations by DRR Office for Consideration of SWFDP CBS Steering Group:**

##### **Phase II (2008-2009):**

On the basis of the evaluation of the first phase of the SWFDP, one of the major weaknesses identified is the need for establishing/strengthening operational cooperation between the NMHSs and emergency preparedness and response agencies so that the products and services derived from the SWFDP would lead to effective decision-making and appropriate actions that would lead to saving of lives, livelihoods of the communities at risk.

On the basis of these needs, it is proposed that for Phase II of the SWFDP, two to three countries be identified based on proposed, "draft" criteria (see annex 1) to develop these linkages and demonstrate how such cooperation could be operationally established.

The objectives of this phase of the demonstration project are:

1. Identification and segmentation of major stakeholders involved in different aspects of emergency preparedness and response activities (e.g. emergency preparedness and response agencies; Ministries, etc...) and identification of target users for this project (those that are willing to participate);
2. Mapping of the operational emergency preparedness and response decision processes and actions, including: (i) those to ensure overall preparedness (development of emergency planning, evacuation, drills, etc) and, (ii) those that are initiated in anticipation of potential disasters that would require meteorological information for decision-support;
3. Identification of requirements for meteorological products and services including requirements on information content, format, preferred lead-times, communication and dissemination and any technical advisory services needed by the target users to ensure the products and services are understood and appropriately utilized by the target users;
4. Development of the products and services and education of the target users on the technical limitations of these products;
5. Establishment of operational procedures for the communication and dissemination of the products to the target users;
6. Establishment of a methodology for documentation of experiences;
7. Establishment of a feedback mechanism from the target users to the NMHSs to further improve the products;
8. Final assessments of the operational linkages between the NMHSs and target users to draw lessons, and recommend improvements,
9. Develop guidelines on the basis of this input to be integrated in the SWFDP guidance materials.
10. Development of a plan for expansion to other countries

Upon confirmation of South Africa's interest, it is recommended that South Africa itself, be one of the demonstration countries. This stems from the fact that South Africa is the Regional Specialized

Metrological Center, developing the guidance products for the SWFDP. Through this phase, South Africa could leverage its own product development efforts to assist the NMHS of the other two countries in the development of products and services and other aspects of the project (if assistance is needed). Furthermore, South Africa could use this first-hand experience in its future regional training courses for the expansion of the project.

It is proposed that the implementation of the above be facilitated through:

- **Stakeholder Workshop:** This workshop would achieve Goals 1, 2, 3 stated above. Participants would involve forecasters, representatives from emergency preparedness and response and relevant operational agencies of the participating countries. Through this workshop commonalities and differences among countries would be identified. The findings of the workshop would be used to produce a guidance document that would be sent to the participating countries' NMHS and target users to support the development of products and services to meet the needs of the users, with the support of the RSMC in Pretoria;
- **Product Development phase:** Cooperation between RSMC Pretoria and NMHS of the other two participating countries to develop the products (Goal 4).
- **Product Launch Training:** Potential workshop held at RSMC Pretoria for the participating NMHS to prepare them for conducting "Product Launch Workshops" with their target users in respective countries (Goal 4).
- **National Product Launch Workshops:** to be lead by the NMHS to launch the products. These workshops would serve to educate the users on the limitations of the products and ensure that they understand them for effective use (Goals 5, 6, 7).
- **National Assessment Workshops:** to be held jointly between the NMHS and the target users at the end of the rainy season to assess the effectiveness of the collaboration and documentation of each countries experience (Goal 8).
- **Final Project Assessment Workshop:** Proposed to be held in Pretoria involving forecasters and their target users (Goal 9, 10).

### **Phase III (2009-2010):**

It is recommended that during this phase the capacities developed through SWFDP for the 14 SADC countries be leveraged (when and as appropriate) for the development of the Flash Flood Guidance System tools. It is also recommended that as part of this phase, the development of operational linkages target users from the emergency preparedness and response agencies (through similar framework as presented above). This is a critical step toward helping the Members in the development of their capacities for early warning systems with multi-hazard approach.

### **Phase IV:**

In May 2007, Congress XV recommended that under the WMO crosscutting framework of its Disaster Risk Reduction Programme MHEWS Demonstration Projects be implemented whereby the expertise, resources and activities of WMO Technical Commissions, Regional Associations, Programmes and External partners are leveraged toward bringing a more comprehensive and coordinated support to members. A number of such projects have been initiated in China (shanghai), France and more initiatives are underway, e.g. in RA IV involving 3 countries in Central America. Initiatives are underway to identify a number of countries in Africa, willing to participate and invest in the development of their operational early warning systems with multi-hazard approach.

The Steering Group of the SWFDP is requested to consider participation in the development and implementation of such projects, building on the work of the Technical Commission in the

development and implementation of the SWFDP that could be considered as one of the critical modules. The MHEWS project would also integrate other modules e.g. flash flood guidance system, drought risk assessment, marine Meteorology Forecasts, etc... WMO Secretariat will keep the Steering Committee of SWFDP informed of these developments.

#### **Annex 1: Criteria for selection of countries for Phase II of SWFDP**

The 2 to 3 countries would be selected on the basis of clear criteria that should include:

- Existence of a coordination mechanism for Disaster Risk Reduction in the country, e.g. national Platforms, Inter-ministerial Coordination Committees, etc.;
- Existence of political recognition of the value of Disaster Risk Reduction and Early Warning Systems;
- Existence of a communication and dissemination channel between the NMHSs and Emergency Preparedness and Response Agencies;
- Willingness of the NMHSs to engage with the Emergency Preparedness and Response Agencies.