WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR BASIC SYSTEMS

EXTRAORDINARY MEETING OF THE STEERING GROUP OF THE SEVERE WEATHER FORECASTING DEMONSTRATION PROJECT (SWFDP)

GENEVA, SWITZERLAND, 3 – 5 DECEMBER 2013

FINAL REPORT

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EXECUTIVE SUMMARY

The extraordinary meeting of the Steering Group for the Severe Weather Forecasting Demonstration Project (SWFDP) was held in Geneva, Switzerland, from 3 to 5 December 2013.

The meeting was presented with brief summaries of progress and any major issues in the implementation of the SWFDP in Southern Africa, South Pacific Islands, Eastern Africa, Southeast Asia and Bay of Bengal, and noted that major challenges are associated with sustainability, including financial and human resources, and transition to operations.

In response to the 2013 meeting of the Presidents of Technical Commissions (PTC-2013, January 2013) and following the recommendations by the Washington Workshop (June 2013), the meeting proposed the establishment of a Severe Weather Forecasting programme to strengthening/sustaining operational centres, especially RSMCs, to sustain and increase the capacity of NMHSS to deliver relevant services to the various user-sectors. The meeting identified the requirements for supporting such a programme, including the expansion into global coverage. In addition, the meeting discussed the future directions of the SWFDP involving all relevant WMO programmes and Technical Commissions. The meeting prepared an outline for the concept paper to be submitted to the 2014 meeting of the Presidents of Technical Commissions (PTC-2014, January 2014).

The meeting discussed sustainability issues, including how to address potential development partners' interest and investment in SWFDP, and proposed future pilot projects (aligned with the recommendations from the Washington Workshop).

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION

1.1 The extraordinary meeting of the Steering Group for the Severe Weather Forecasting Demonstration Project (SWFDP) was opened at 0930 hours on Tuesday, 3 December 2013, at the WMO Headquarters, in Geneva, Switzerland, by the chairperson of the Group, Mr Ken Mylne. Mr Mylne welcomed participants to the meeting, and invited Mr Jerry Lengoasa, the Deputy Secretary-General, to address the meeting.

1.2 Mr Jerry Lengoasa welcomed participants to the meeting, to Geneva in general and to the WMO in particular. He recalled that this is an extraordinary meeting to address the outcomes of the "Workshop on Sustaining National Meteorological Services – Strengthening WMO Regional and Global Centres", held in Washington, DC, USA, from 18 to 20 June 2013. In this context, Mr Lengoasa noted that there is a significant and growing donor interest in assisting least developed and developing countries in increasing their capability to manage the risks associated with hydro-meteorological hazards, but it is becoming apparent that investments in modernizing NMHSs often lack the necessary long-term sustainability strategies and coordinated approach at global, regional and national levels, to build from. Mr Lengoasa pointed out that the Washington Workshop encouraged a coordinated approach for donor investment targetting a group of like-countries, including funding to sustain regional frameworks, which improves on sustainability and sharing of related scientific and technological investments and outcomes, and the harmonizing of warnings across national borders. The Workshop also encouraged further and more intensive engagement of the donor community in mobilization of long-term financial resources to support sustainable operations of the '*Cascading Forecasting Process'*, especially NMHSs and regional centres, and the Project Office functions, that would contribute to mitigation of risks of natural hazards, help adaptation to climate change and facilitate further economic development; and suggested that the '*Cascading Forecast Process*' exploited in the SWFDP establish synergies with other WMO initiatives and projects.

1.3 Mr Lengoasa encouraged the meeting to consider and guide the future implementations of the SWFDP in different regions of the world, the consolidation of the SWFDP into global sustainable operations, and the future directions and planning strategies for the SWFDP towards strengthening/sustaining WMO operational centres, in the 2016 – 2019 period, taking in consideration the recent developments, including the Global Framework for Climate Services. Mr Lengoasa expressed gratitude to the meeting participants for their contributions to the work of the Steering Group for the SWFDP, which would continue to assist WMO to provide even better assistance to its Members in facing the challenges of improving severe weather forecasting and warning services. He concluded by wishing everyone a successful meeting and an enjoyable stay in Geneva.

2. ORGANIZATION OF THE MEETING

2.1 Adoption of the agenda

2.1.1 The meeting adopted the provisional agenda without change, as provided in Annex I to this report.

2.2 Working arrangements

2.2.1 All working documents submitted for the meeting are referenced and hyperlinked in the Documentation Plan (INF. 1), which had been posted on the WMO web site at:

http://www.wmo.int/pages/prog/www/BAS/Docplan.html

2.2.2 The meeting agreed its hours of work and other practical arrangements for the meeting. Participants briefly introduced themselves, to facilitate interactions throughout the meeting. The list of participants in the meeting is provided in Annex II to this report. The meeting noted that there was no participation from the donor agencies neither by the WMO Resource Mobilization Office, due to other commitments.

3. INTRODUCTION, INCLUDING THE OUTCOMES OF CBS-15 (SEPTEMBER 2012), PTC-2013 (JANUARY 2013), EC-65 (MAY 2013) AND THE WASHINGTON WORKSHOP (JUNE 2013) RELATED TO THE FUTURE OF THE SEVERE WEATHER FORECASTING DEMONSTRATION PROJECT (SWFDP)

3.1 The chairperson, Mr Ken Mylne, provided introductory remarks regarding the SWFDP progress and achievements, with particular focus on the outcomes of the Washington Workshop (including the donor's interest), a number of new activities and approaches being trialled in the SWFDP – Eastern Africa, the need for a Programme Office at WMO, the transition of SWFDP from demonstration project to operations, and the need for a socio-economic study and performance indicators for the SWFDP. Mr Mylne noted that the new Director of the WMO Weather and Disaster Risk Reduction Services Department, Mr Xu Tang, would introduce a more coordinated approach to address disaster risk reduction within the Department, bringing together different initiatives contributing to a multi-hazard early warning system. Mr Mylne noted that this is aligned with the request by the 2013 meeting of the Presidents of Technical Commissions (PTC-2013, January 2013) to strengthening the mechanisms established through the SWFDP as an end-to-end cross-programme collaborative activity that engages all WMO programmes and Technical Commissions, and transitioning the SWFDP into sustainable operational services, including associated funding aspects.

3.2 Mr Mylne stressed that the current meeting is primarily focused on non-technical aspects of project implementation. The meeting enquired about the role and responsibilities of the Steering Group for the SWFDP and therefore reviewed its Terms of Reference. While noting that the mandate of the Steering Group for the SWFDP is primarily focused on technical guidance, the meeting agreed that there are a number of management and resource aspects associated with the technical guidance to which the Steering Group should provide recommendations.

3.3 The WMO Secretariat provided background information related to outcomes of the fifteenth session of the Commission for Basic Systems (CBS-15, September 2012), the 2013 meeting of the Presidents of Technical Commissions (PTC-2013, January 2013), the sixty-fifth session of the WMO Executive Council (EC-65, May 2013), and the Washington Workshop (June 2013), related to the future directions of the SWFDP. These include:

a) CBS-15 recalled that Cg-16 approved a vision for the SWFDP as an end-to-end cross-programme collaborative activity led by the GDPFS. While recognizing that the SWFDP should engage all WMO Programmes that concern the real-time prediction of hydrometeorological hazards (from observations, to information exchange, to delivery of services, education and training, and to the transfer of relevant promising research outputs into operations), the Commission stressed the importance to move SWFDP forward with a phased approach; starting with manageable elements, first focusing on most important severe weather identified by the participating countries for protection of life and property, and expand the scope, including cross-programme activities (e.g. flood forecasting), in phases 3 and 4 of the project.

b) CBS-15 recognized the substantial amount of human resources devoted to the project especially by the leading regional centres and acknowledged that resource constraints in regional centres must be taken into consideration when planning the project especially in latter phases, in order to ensure a transition to sustainable operations. EC-65 noted the potential benefit of an expanded role for Global Centres in the SWFDP, as demonstrated by the UK Met Office Global Guidance Unit (GGU) in the East Africa SWFDP, in sharing best practices, mentoring, training on forecast guidance and facilitating the establishment of effective severe weather teleconferences between the regional centres and NMHS forecasters.

c) CBS-15 noted the inadequate resources available for supporting existing and setting up of new regional projects. Noting the main results of the study on resource requirements for ensuring effective implementation and long-term sustainability of the benefits gained with the SWFDP, which was carried out following the request by EC-64, CBS-15 recommended the establishment of a Severe Weather Forecasting Development Project (SWFDP) Office and of a Trust Fund for the SWFDP, as found in the annex to Recommendation 12 (CBS-15). This Recommendation was approved by EC-65, in Resolution 5 (EC-65).

d) PTC-2013 agreed that the SWFDP model should also be applied to longer-timescales, and extended the range of targeted applications to broaden the benefits of the SWFDP to other user sectors in society. EC-65 acknowledged that GPCs for Long-range Forecasts (LRF), RCCs and RCOFs could also have a role in the SWFDP model in support of developing seamless regional early warning systems.

e) PTC-2013 noted that the donor agencies also recognize that the primary approach to building climate resilience and mitigating extreme weather hazards is through capacity development and investment in NMHSs to provide more timely and useful early warnings. PTC-2013 recognized that this would largely rely on effective partnerships, as those established through the SWFDP "Cascading Forecasting Process" that provides improved access to and effective use by forecasters of existing and newly developed products and tools made available by advanced operational global and regional centres. The Washington Workshop encouraged a more intensive engagement of the donor community in mobilization of long-term financial resources to support sustainable operations of the '*Cascading Forecasting Process'*, especially NMHSs and regional centres, and the Programme Office functions, that would contribute to mitigation of risks of natural hazards, help adaptation to climate change and facilitate further economic development.

f) PTC-2013 agreed that strengthening and sustaining WMO operational centres (particularly RSMCs and RCCs, and their linkages to national centres in their respective geographical regions) would sustain and increase the beneficial impacts of the development of much needed capabilities at NMHSs of developing and least developed countries (which typically lack the basic human and financial capacity) for delivering weather, climate and hydrological forecasting and warning services.

g) PTC-2013 also agreed that strengthening the mechanisms established through the SWFDP, and transitioning the SWFDP to become a properly supported activity in the medium to longer-term (the next two to six years) would be an important strategic investment in WMO's plans to more fully address its priorities, for more of its Members. PTC-2013 therefore stressed the need to consolidate the SWFDP into an ongoing Programme to Strengthen Operational Centres (PSOC), particularly RSMCs and RCCs, to provide guidance of hazardous meteorological conditions and meteorological-related hazards. PTC-2013 tasked the president of CBS to develop a draft concept paper on the proposed Programme for consideration and feedback by PTC, who in turn will identify how contribute to this initiative by including it in their TC work

plans. PTC-2013 requested that the concept paper to include some guidance on the terms of a "demonstration" project, in relation to the point at which the initiative should be up-scaled to operational implementation.

h) EC-65 acknowledged the importance of engaging with regional associations, including groupings of directors of NMHSs within the regional economical bodies (i.e. comprising Heads of Meteorological Services and Ministries in charge of meteorology) from early stages, to ensure regional endorsement, ownership and sustainability (i.e. recognition of SWFDP as a contributing mechanism for the implementation of their regional meteorological development plans and investment strategies).

i) The Washington Workshop urged the WMO to consolidate the SWFDP Demonstration Projects into sustainable operational services and transition the SWFDP activities to become a fully supported global programme whose task would be to coordinate, lead and help further develop the '*Cascading Forecasting Process*' world-wide, thereby providing access to high quality analysis and forecasts for least developed and developing countries. This programme would include support for a Programme Office, as part of the Data-processing and Forecasting System (DPFS) unit, with adequate resourcing.

j) The Washington Workshop recommended that a meeting of potential donors with representatives of the global, regional and national centres involved in the SWFDP be convened to further develop the details of an initiative that builds on the lessons learnt and identifies the optimum way to "scale up" the concept. The Secretariat informed that this meeting is planned to be held in mid-2014.

k) The Washington Workshop recommended that under the guidance of the Steering Group and management by the regional project teams, and overall coordination by the Programme Office, the development of pilot(s) to be financed by donor agencies, would include:

   a. Sustaining and strengthening existing Regional Specialized Meteorological Centres (RSMCs) to create a fully functional regional centres aimed at regional integration of hydro-meteorological forecasting guidance;
   b. Expanding the role of relevant RSMCs with activity specialization in Tropical Cyclones involved in the pilot(s) into RSMCs with activity specialization in forecasting hazardous hydro-meteorological phenomena;
   c. Ensuring RSMC support for the '*Cascading Forecasting Process*' in all areas, consistent with the evolution of the GDPFS.

Development of pilot(s) will also include a cost-benefit assessment of the *'Cascading Forecasting Process'* in support of a group of like-countries versus single-country investment, including sustainability issues. The Washington Workshop also recommended that as a part of each project development plan there would be the project risk assessment, and establishment of metrics to measure success of the projects' implementation.

4. PROGRESS AND ISSUES

4.1 Brief summaries of progress and any major issues in regional projects

4.1.1 The meeting was presented with brief reports on the progress and major issues with the implementation of SWFDP regional projects in Southern Africa, Eastern Africa, South-west Pacific,

Southeast Asia and Bay of Bengal, by the Chairpersons and/or representatives of the respective Regional Subproject Management Teams.

Southern Africa

4.1.2 Mr Eugene Poolman (South Africa), Chairperson of the Regional Technical Implementation Team (RTIT) of the SWFDP – Southern Africa, presented the status and progress of the regional project, and recalled its development, which started with a planning meeting in August 2006 in Pretoria, (South Africa). Five countries were involved in the demonstration phase of SWFDP – Southern Africa (namely Botswana, Madagascar, Mozambique, Tanzania and Zimbabwe). Following the request by the Meteorological Association of Southern Africa (MASA), representing the NMHSs of the fifteen SADC (Southern African Development Community) countries, to WMO, the SWFDP – Southern Africa expanded its activities to all fifteen SADC countries (original five in addition to Namibia, Lesotho, Swaziland, Zambia, Malawi, Democratic Republic of the Congo, Angola, Seychelles, South Africa and Mauritius), as well as the Comoros. The meeting noted that the full demonstration of the SWFDP – Southern Africa lasted up to December 2011. Since January 2012, the SWFDP – Southern Africa has been to Phase 4 ("Continuing Development Phase"), consisting of the transition of the successful and mature elements of the SWFDP – Southern Africa into operations, while allowing for future developments.

4.1.3 The meeting noted that the RTIT met in Mauritius, in July 2011, to evaluate the full demonstration of the regional subproject and to discuss the "Continuing Development Phase" ("Phase 4"). The meeting noted that at this meeting MASA expressed its strong support for the SWFDP – Southern Africa and highlighted the enormous benefit of the project to its Members, and contributed financially to the training workshops of 2012 and 2013. These training workshops included less theory and significantly more practical session working groups, by language and leading countries, and a special media session in 2013. The meeting noted that a few countries lagging behind required special attention, as language is generally a bottleneck since the SWFDP activities, including training, are in English. In-country plans and assistance by country-speaking language have demonstrated improvements in the development of their forecasting systems. The meeting noted that an RSMC Training Desk concept has been tested 2 weeks prior to the 2013 training workshop, with the participation of an expert from Malawi and another from Mozambique. These activities were sponsored through WMO resourced donor funding with MASA contribution. The meeting was informed of the good collaboration in SWFDP between forecasters of RSMC Pretoria and the NMHSs of Swaziland and Mozambique during Tropical Cyclone Irina (in March 2012).

4.1.4 The meeting noted that impacts of Phase 4 on SWFDP – Southern Africa include: (a) future sustainability; (b) management moved from WMO to MASA; (c) the strong SWFDP "brand" in WMO circles can still be used and should benefit the region as other activities are linking up with the SWFDP programme; and (d) further development and expansion to other hazards or sectors, some applications into new sectors envisaged.

4.1.5 The meeting noted that internal future challenges include:

- Disaster management collaboration in various countries still need to be strengthened
- Application at local level still need to be improved: dissemination and end-user response
- Enhancement of communication bandwidth is essential
- Support of countries lagging behind is high priority
- RSMC website modernization envisaged
- Important to develop a seamless warning system from seasonal (SARCOF) to daily (SWFDP) to hourly (SARFFG) providing useful end-user products

4.1.6 External future challenges to continue realize the benefits of SWFDP sub-programmes will require:

- Continuing collaboration between the Global Centres, RSMCs and NMSs
- Specialized products of Global Centres are crucial for the cascading forecast system to work
- Continuous development through new opportunities
- Links to R&D activities such as TIGGE, and the new WMO research projects replacing THORPEX
- Ensuring future sustainability, particularly for training activities, technical team meetings, support with outreach activities

4.1.7 Synergies with other WMO initiatives, projects and programmes include:

- Training: RTC Pretoria has taken responsibility for the training activities:
  - 2-Week Nov workshop, e-learning, RSMC training desk, etc
- Research:
  - Satellite Nowcasting
- SERA:
  - Socio-economic benefits investigation (proposal)
- Hydrology:
  - FFGS: SA Flash Flood Guidance system
  - FFI-AG: "objective to provide guidance and advice on the hydrological forecasting elements of a number of flood-related initiatives and programmes in progress under WMO programmes, and to provide broad-based support to improve collaboration between the meteorological and hydrological communities for improved flood forecasting related practices"

Eastern Africa

4.1.8 Mr James Kongoti (Kenya), Chairperson of the Regional Subproject Management Team (RSMT) of the SWFDP – Eastern Africa, presented the status of implementation and progress of the regional project. The meeting was informed that the SWFDP – Eastern Africa commenced in September 2011, with the participation of the NMHSs of Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda; and has recently (May 2013) been expanded to also include the NMHS of South Sudan. The Regional Specialized Meteorological Centre (RSMC) Nairobi acts as the regional centre for the project, providing daily guidance products covering the entire project footprint. A SWFDP – Eastern Africa Web site and Portal for the subproject has been developed, and is running at RSMC Nairobi. Global centres are the Met Office UK, NOAA/NEC, ECMWF and DWD (for providing the GME data needed for nesting HRM and COSMO).

4.1.9 The meeting noted that the pilot phase of the SWFDP in Eastern Africa had provided an opportunity to trial a number of new activities associated with the project. The meeting was pleased to note that the SWFDP in Eastern Africa had got off to a very good start and all participating countries seemed to be making use of the various Numerical Weather Prediction (NWP)/Ensemble Prediction System (EPS) products and the processed information available on the Regional Daily Guidance charts produced by RSMC Nairobi for the project footprint and RSFC Dar for the Lake Victoria Basin. The meeting noted that during the pilot phase of the project, RSMC Nairobi and RSFC Dar prepared regional daily guidance containing an interpretation of the global and regional guidance out to 5 days. Information on *Heavy Rain (> 50mm in 24 hours), Strong Winds (≥25knots; 20knots over the Lake Victoria), Hazardous Waves – Indian Ocean and Lake Victoria (≥ 2m)* was included whenever the criteria (in brackets) were expected to be met. The meeting noted that while the project was also focusing on dry spells, limited guidance has been provided. Users include general public, disaster management, media, agriculture and fisheries. Verification has also been a major component of the project. Daily

videoconferences, which entail real-time interpretation of the model outputs and verification by RSMC Nairobi and RFSC Dar, with the support by Met Office UK, have been ongoing and it is now being expanded to include all SWFDP – Eastern Africa participants in the full demonstration phase.

4.1.10 The meeting noted that annual training workshops were carried out for the NMHSs of participating countries, to enable them to utilize the products on project website for generating their own forecasts and warnings. These workshops included one week training on forecasting and the other week on public weather services and agricultural meteorology.

4.1.11 The meeting noted that during the pilot phase of the project, feedback from the participating NMHSs was generally very positive about the guidance and model products. The achievements relative to the project's goals were summarized:

- Improved accuracy and lead-time in the weather forecasts, alerts and advisories;
- Enhanced capacity development;
- Created a "critical-mass" of champions at all levels (Sectors);
- Created a platform for data/product/information sharing;
- Created confidence among the weather/climate producers and users;
- Forecasters appreciated the usefulness of the NWP products;
- Improved service delivery.

4.1.12 Emerging issues, future plans and challenges identified from the SWFDP – Eastern Africa include:

(i) Project to be considered for the Lake Victoria watershed that would include a test-bed for field campaigns to collect data for research to understand the dynamics over the Lake Victoria in order to reduce disaster from water spouts, waves and wind gusts that both affect the Lake transport and fishermen who rely on the lake for their livelihoods. National Center for Atmospheric Research, (NCAR) and the East African Community (EAC) have initiated the process.

(ii) Extent the Daily Expert Group Discussion through daily teleconference by Skype to other participating countries (NMCs).

(iii) Continue with the capacity development to create a critical mass of the experts in the use and application of the NWP products including the guidance products.

(iv) The NMHSs and their respective DMCPAs to build strong synergies to ensure response and feedback mechanisms to the warnings/advisories by the agencies and communities involved. For instance in Kenya, a Smarter Public Safety Project has been initiated by the Kenya Police Service and the Development Partners, where KMS would be providing a web-based weather alerts and warnings.

(v) Possibility of expanding the SWFDP for Eastern Africa Subproject to other neighbouring countries within the region such as Somali Republic, Djibouti, Eritrea, Democratic Republic of Congo, Central African Republic, among others.

(vi) Address the Internet connectivity and band-width to allow access and timely dissemination of weather/climate information, alerts and warnings.

(vii) Explore the possibility of integration of the Community Radio (RANET) and mobile phone in communicating weather and climate information, weather alerts and warnings to the stakeholders.

South Pacific Islands

4.1.13 Mr Steve Ready (New Zealand), Chairperson of the Regional Subproject Management Team (RSMT) of the SWFDP – South Pacific islands, presented the status of implementation and progress of the regional project. The meeting noted that the first meeting of the Regional Subproject Management Team (RSMT) of the SWFDP - South Pacific Islands took place in Wellington, in April 2009. The Project started up as a Pilot in November 2009 involving NMHSs from these participating countries – Solomon Islands, Vanuatu, Fiji and Samoa. Following the 2nd RSMT meeting in Wellington, in November 2010, the SWFDP – South Pacific Islands entered a Full Demonstration phase with the addition of five other participating countries - Kiribati, Tuvalu, Tonga, Niue and Cook Islands. After nearly 3 years running in the Full Demonstration phase, the third RSMT meeting took place in Nadi, in August 2013, to evaluate overall progress and determine what should happen next and whether the Project was in a position to transition to Phase 4, the "Continuing Development Phase".

4.1.14 The meeting noted that the biggest challenge of the SWFDP – South Pacific Islands lies in the transfer of overall management and coordination of the regional project outside the WMO Secretariat and what regional body might have the credentials to shoulder this role. The meeting noted that the lead RSMC (RSMC Wellington) will just focus on the day-to-day operational requirements (i.e. production of South Pacific Guidance charts and the maintenance of the Project website – *MetConnect Pacific*, while some other body would need to take responsibility for the overall management and coordination of Project activities including organization of resources for future training, meetings and upgrades to the Project website.

4.1.15 The meeting noted that there is a lack of specific data that participating countries need to check off before they can be considered ready for Phase 4, and agreed to address this issue under agenda item 5.1. There are also sustainability issues especially in relation to long-term funding for training and the ongoing redevelopment of the Project website – *MetConnect Pacific*.

4.1.16 The meeting also noted that for all participating countries, the third RSMT agreed on a set of criteria to be implemented by each participating country and NMHS and these will be evaluated as part of the six monthly Progress reports until 31 March 2015 after which a full evaluation will be done. These criteria are:

- An appropriate non-TC warning system is implemented and operating smoothly;
- Severe weather and wave forecasts & warnings are being verified using the spreadsheet specially designed;
- At least one case study per year is completed;
- All SWFDDP progress reports completed in full before the deadlines prescribed (six monthly);
- Demonstrate on a continuing basis that the relationships between NMHSs and Disaster Management and Civil Protection Authorities (DMCPAs), the media and the public are strong and healthy, with regular communications before, during and after severe weather events.

Southeast Asia

4.1.17 Mr Yuki Honda (Japan), the representative of the SWFDP – Southeast Asia, reported on the current status and the future plan of the regional project. The meeting noted that the SWFDP – Southeast Asia has been in development since 2010. The first meeting of its Regional Subproject Management Team (RSMT) was organized in October 2011 and approved its Regional Subproject Implementation Plan (RSIP) in which its demonstration phase planned to start in April 2012 for one year. Although the start of the demonstration phase has been postponed till now due to various reasons, a lot of progress has been made since the first RSMT meeting, including:

(a) The Regional Forecasting Support Center (RFSC) Hanoi, National Center for Hydro-Meteorological Forecasting in Vietnam, has operated and maintained a project web and portal (hereafter, SWFDP-SeA site) since Q3 2011. The meeting noted that the SWFDP – Southeast Asia website show a "warning table", and taking into account that this does not reflect the warnings issued by the participating NMHSs, the title should be changed to "risk table".

(b) RFSC Hanoi has also been producing the Daily Severe Weather Forecasting Guidance routinely (every day) since Q3 2013. RFSC Hanoi is quite ready to take full responsibility of leading the project as lead regional centre. The meeting pointed out the Daily Severe Weather Forecasting Guidance is a critical element of the project which should be produced by regional forecasters.

(c) Global Centres (i.e. China Meteorological Administration (CMA), the Japan Meteorological Agency (JMA) and the Korea Meteorological Administration (KMA)) created their own dedicated websites in 2012 to provide data and products of their numerical weather prediction (NWP) systems.

(d) NMHSs of participating countries (Cambodia, Lao PDR, Thailand and Vietnam) and more recently Philippines, regularly access the above-mentioned websites to obtain various products, while the start of demonstration phase has been postponed.

4.1.18 The meeting noted that training workshops on severe weather forecasting and warning services have been conducted in Hong Kong, China, in July 2011, and in Macao, China, in April 2013. The latter was a joint training workshop of SWFDP in Southeast Asia and in the Bay of Bengal. These workshops consisted of two parts: the Global Data Processing and Forecasting Process and Satellite related topics for the first week, and Public Weather Service related topics for the second week. The meeting noted that at this training workshop, new lecture methods such as recorded lectures and webinars were successfully introduced.

4.1.19 The meeting noted that future plans include:

- Review and update RSIP, taking into account any possible concerns that are emerging.

- Reschedule the demonstration project. Since the technical and administrative preparation to implement the regional project is nearly completed, it is expected to start the demonstration phase from Q2 2014 for one year, targeting the next rainy season (normally, from April to October).

- Ensemble-based early warning products from THORPEX TIGGE project are delivered with 48-hour delay from the Meteorological Research Institute (MRI) of JMA due to the regulation of TIGGE archive database. The UK Met Office is currently working in collaboration with JMA to implement the products in real-time. In addition, RSMC Tokyo - Typhoon Centre plans to provide the guidance on tropical cyclone ensemble forecast over the North Western Pacific in real time to SWFDP – Southeast Asia, based on the success of the North Western Pacific Tropical Cyclones Ensemble Forecast Project (NWP-TCEFP), in order to further promote the operational use of such ensemble guidance.

Bay of Bengal

4.1.20 Mr Rahul Saxena (India), the representative of the SWFDP – Bay of Bengal, informed the meeting that a WMO mission to the India Meteorological Department (IMD) and to its Regional

Specialized Meteorological Centre (RSMC) New Delhi (with activity specialization in Tropical Cyclones) was carried out in November 2011, to gather information on and discuss how operational weather forecasting is organized and carried out within IMD. Also discussed was the potential for expanding the role of the RSMC New Delhi to carry out the role of the lead regional centre for the SWFDP – Bay of Bengal. The programme also included the visit to IMD facilities in New Delhi and to the National Centre for Medium Range Weather Forecasting (NCMRWF), Noida.

4.1.21 The meeting noted that a Technical-Planning Workshop on SWFDP for the Bay of Bengal (South Asia) was held in New Delhi, India, in January 2012. Participants included representatives of Bangladesh, India, Maldives, Myanmar, Sri Lanka and Thailand, representatives from global products centres (JMA, NOAA/NCEP and IMD/NCMRWF; UK Met Office and ECMWF by videoconference), and the WMO Secretariat (DPFS, PWS, AgM and DRA programmes). The meeting noted that participants in this workshop unanimously agreed in principle that the implementation of a SWFDP in the Bay of Bengal region would be technically feasible and would bring benefits to countries of the region, including Bangladesh, India, Maldives, Myanmar, Sri Lanka and Thailand. These benefits would include the enhancement of technical capacity in operational weather forecasting and advancement in service delivery to the general public and to key application areas such as agriculture and fisheries. Specifically, the meeting noted that the proposed regional project would focus on the following severe weather events (and their associated hazards such as flooding, droughts, etc.): heavy rain (50mm, 100mm), strong winds (17 knots, 34 knots), high waves / swells (2.5 m), and storm surge (1 m). The Regional Subproject Implementation Plan is in development and careful consideration should be given to the role of the NMHS of India, who has been an RSMC for Tropical Cyclone Forecasting in the region, and may expand its role to become the lead centre for the SWFDP – Bay of Bengal.

4.1.22 The meeting expressed some concern about the overlap of this regional project domain with the regional project in Southeast Asia, and the potential participation of the NMHS of Thailand in multiple subprojects, as it is happening with the NMHS of Tanzania who participates in both SWFDP – Southern and Eastern Africa. This is particularly important when guidance differs, as guidance preparation draws on products made available by different global centres. The meeting recommended that special attention be paid by NMHSs of Thailand and Tanzania to the avoidance any possible problems.

5. CONSOLIDATE THE SWFDP INTO GLOBAL SUSTAINABLE OPERATIONS

5.1 Criteria for the transition of the project from "demonstration to operations" (Phase IV)

5.1.1 The meeting recalled that the *SWFDP – The Overall Project Plan* and the *SWFDP – Guidebook on Planning Regional Subprojects*, describes Phase 4 of the SWFDP as follows:

> *"Phase 4 (Regional Project Long-term Sustainability and Future Developments) – this phase includes long-term sustainability of the benefits gained and a process of continual improvement. This phase gives the opportunity to continuously take advantage of future capability and technology developments, and to foster broadening of activities in synergy with other WMO programmes. In this phase, the responsibility for management, including seeking funding, lies with the Regional Association, while the SG-SWFDP continues to be informed of developments and to provide advice as appropriate. Phase 4 is known as the "Continuing Development Phase"."*

5.1.2 The meeting also recalled that the Steering Group for the SWFDP has not defined detailed criteria for the transition of a regional project to Phase 4. However, the regional evaluation of the

project in its full demonstration would provide an indication of the level of completion of Phase 3. In general, if the operations established through the "Cascading Forecasting Process" (i.e. from global to regional to national to users), including feedback mechanisms, have become mature, then a regional project may proceed to Phase 4. Practically speaking, potential impacts of Phase 4 include:

- At the technical level – frequency of reporting, reports streamlined to focus on specific elements (e.g. identified gaps and areas for improvement at the regional evaluation of the project), establish synergies with other programmes and activities in the region;

- At the project management and coordination level – responsibility for management, including seeking funding for future activities (e.g. training, RSMT meetings, IT developments, etc.), lies with a regional body. WMO Technical Programmes (primary DPFS and PWS) will continue to assist. Engaging with strategic coordinating frameworks, such as the relevant groups within regional economic communities, would support sustainability of the benefits gained with the SWFDP.

5.1.3 Based on the above, the meeting agreed with the following criteria for the transition of the project from "demonstration to operations" (Phase IV):

- A majority of countries shall have established and proven an end-to-end severe weather warning system with appropriate staff trained, including a warning system for relevant hazards.
- A majority of countries shall have implemented a warning verification process.
- A majority of countries shall have demonstrated use of the cascading system products.
- A majority of countries and the regional centre will comply with obligations described in the Manual on the GDPFS, i.e. the regional centre shall have designated RSMC status.
- There must exist a regional entity (i.e. a regional management structure) responsible for the overall management of the programme, including resources mobilization to support critical activities such as ongoing training and IT developments (e.g. website upgrades).
- Staff at the majority of countries shall be trained on the use of severe weather guidance products, understanding of the regional project website, PWS and DRR aspects.
- There shall be an established process for annual monitoring and evaluation.
- There shall be an established process for regular training activities at least every two years.

5.2 Strengthening/sustaining operational centres, especially RSMCs, to sustain and increase the capacity of NMHSS to deliver relevant services to the various user-sectors

5.2.1 The meeting recalled that the SWFDP develops regional projects in a phased approach, with three phases of development and demonstration followed by a transition to sustainable operations in Phase 4. In order to provide the resources to support expansion to cover additional regions towards global coverage, and to maintain a sustainable service in the regions which have reached Phase 4, the project should become a strategic programme of WMO supported by core funding and a permanently staffed Programme Office. The SWFDP will continue to be guided by a Steering Group led from the CBS/DPFS, but now involving all relevant Technical Commissions and Programmes.

5.2.2 The meeting proposed that this programme should be named the Severe Weather Forecasting (SWF) programme which would still retain a close link with the well-established acronym, SWFDP (Severe Weather Forecasting Demonstration Project) during Phases 1-3. There is also a strong emphasis on operational capability through the term forecasting, and the SWFDP *project* will remain the principle method for establishment of activities in new regions within the programme.

5.2.3 The meeting highlighted that the SWF programme will provide a major contribution to WMO High Priorities:

- Disaster risk reduction;
- Capacity development of NMHSs;
- GFCS, through increased climate change resilience;
- In addition, SWF will exploit and reinforce both WIGOS and WIS by capacity building of NMHSs, and as a vehicle to assess the gaps in the Basic Systems, including WIGOS and WIS, for effective warnings' services.

5.2.4 The meeting emphasized that the success of the SWFDP has been based on a bottom-up approach starting from a regional management team addressing regional needs, and employing a regional centre to provide forecast guidance to NMHSs in the region through the *Cascading Forecasting Process*, supported by global centres as required. The meeting agreed that this approach should continue for the development of new projects in new regions to expand the service towards global coverage. Such SWFDP projects are well-suited to donor funding to transfer the capacity in a region. However, to ensure sustainable operations after the initial development and demonstration period, and to coordinate the work of many regional services as the core of a WMO strategy for disaster risk reduction, requires a strategic programme with core funding and the support of a dedicated programme office. The meeting stressed that training support and coordination are key requirements of the programme office, to ensure the provision of central training from global and regional centres, and guidance units.

5.2.5 The meeting noted that the functions of the regional centre will define the requirements of a designated RSMC with geographical specialisation, and will be specified within the *Manual of the GDPFS*. A regional centre will be required to demonstrate compliance with these requirements and to be designated as an RSMC before the project can move from SWFDP demonstration phase to Phase 4 operational service. Thereafter RSMC status will be reviewed at regular intervals (eg. every 4 years) to ensure continued compliance. RSMCs will be expected to support the core capabilities and operational functions of the RSMC with national funding. Additional functions, including significant enhancements to RSMC systems and capabilities, may be suitable for donor funding.

5.2.6 The meeting agreed that projects, which have completed the three development and demonstration phases of SWFDP and are in a position to become fully operational will require a number of non-operational activities to be supported and funded to ensure they are sustainable. These activities include:

- Regional ownership;
- Strategic leadership;
- Management meetings around every 2 years;
- Training for RSMC and NMHS staff at least every 2 years:
  - Supplemented by e-learning facilities;
  - On-site training in NMHSs may be less frequent;
- IT development including website and product upgrades;
- Monitoring, evaluation and reporting – annually;
- Country-specific support to improving benefit realization available in all countries;
- Administrative and logistics support for meetings and training;
- Resource mobilization.

There should be a regional entity responsible for ensuring all countries achieve and maintain compliance and oversee programme management and related aspects with continuing support from the Severe Weather Forecasting (SWF) programme office.

5.2.7 The meeting stressed that to support the non-operational activities of the SWF programme, and also the development of new SWFDP projects to expand the programme towards global coverage, the SWF programme office is expected to require 2 full-time staff initially, and this level is expected to require a modest increase as the number of regional projects and services increases.

5.3 Future directions of the SWFDP towards a cross-programmatic *Programme to Strengthen Operational Centres* ("scale up" the concept, building upon the lessons learnt through the SWFDP)

5.3.1 The meeting noted that the SWFDP as a demonstration project has demonstrated the value of the *Cascading Forecasting Process* in strengthening NMHSs, supporting their capability to issue severe weather warnings and to build effective relationships with disaster management and civil protection authorities for disaster risk reduction. This had led the World Meteorological Congress, at its sixteenth session (Cg-16, May 2011), to agree that SWFDP should be an end-to-end cross-programme collaborative activity that engages with all WMO programmes that concern the real-time prediction of hydro-meteorological hazards, through their respective technical commissions: from observations, to information exchange, to delivery of services to the public and a range of targeted applications/user sectors, education and training, capacity development and support to LDCs, and to the transfer of relevant promising research outputs into operations.

5.3.2 The meeting also noted that standards and guidance established by WMO are effectively implemented by WMO Members through projects like the SWFDP, in particular in developing new capacities, benefiting from new technologies, managing change and developing appropriate mentoring schemes. The success of the SWFDP is in part because it takes a holistic, regional-driven approach, i.e. through improving the entire end-to-end chain from production to the delivery of warning services to the users, through the "Cascading Forecasting Process". Coordination with the Regional Programme (RP) – Regional Offices, including the Programme for LDCs, Education and Training Programme (ETR), Voluntary Cooperation Programme (VCP), and the Resource Mobilization Office (RMO), in the planning and implementation of regional projects has been (is) critical to ensure that desired, sustainable and relevant outcomes are achievable.

5.3.3 In particular, the Regional Programme (RP) and the Programme for Least Developed Countries (LDCs) could contribute to:

- Provide ownership and requirements for cascading process;
- Contributions to regional management teams and resource mobilization.

It is therefore important to engage Regional Associations (RAs), including groupings of directors of NMHSs within the regional and sub-regional economical bodies (i.e. comprising Heads of Meteorological Services and Ministries in charge of meteorology) from early stages, to address their requirements and to ensure regional endorsement, ownership, implementation and sustainability (including recognition of SWFDP as a contributing mechanism for the implementation of their meteorological development plans and investment strategies).

5.3.4 The Education and Training programme (ETR) could continue to contribute with the following aspects:

- Support training activities for cascading process;
- RTCs should deliver training for programme;
- E-learning;
- Cascading process gives NMHS forecasters access to products which allows training to be reinforced by usage;

- Competencies for forecasters support forecasting across many specialisms.

5.3.5 The meeting agreed that the appropriate use of the existing *Cascading Forecasting Process*, which is well described in the SWFDP Guidebook and Overall Project Plan, would contribute to strengthening operational functions of GDPFS centres, especially the RSMCs, in other programmatic activities, and by using the structures realizing the *Cascading Forecasting Process*, to also strengthening links with appropriate other national and regional hydro-meteorological activities. The meeting therefore proposed that exploiting methods similar to the *Cascading Forecasting Process* across different programmes could help to develop an integrated approach to collaboration with disaster management organizations for effective response to hydro-meteorological warnings. This would require the expansion of the existing concept of the *Cascading Forecasting Process* to provide a wider set of best practice guidelines for implementation of the *Cascading Forecasting Process* across other programmatic themes (e.g. hydrology, marine, agrometeorology, aviation, etc.), and possible involvement of the relevant WMO Technical Commissions and Programmes (as exemplified in paragraphs below).

5.3.6 The meeting stressed that the SWFDP regional projects represent the regional infrastructure to support national warnings programmes, including in collecting and conveying the requirements for the "Basic Systems" (including coordination with WIGOS and WIS), while addressing aspects related to severe weather forecasting and warning services (e.g. this is the case for the SWFDP – Eastern Africa, where issues related to observational and telecommunication aspects are being considered/addressed). Examples of possible engagement of the other CBS OPAGs and CIMO include:

- WIGOS
  - E.g. regional centres could collect (radar) observations and provide composite mapping products which would support the work of the RSMC
- WIS
  - Support to enhance data collection
  - Explore options for exchanging information between NMHSs and RTHs
- SAT
  - SCOPE-NWC Nowcasting to support SWFDP with nowcasting capabilities
  - Distribution of global and regional centre products through GEONETCAST
- Observations from WIGOS and SAT used in verification of severe weather forecast

5.3.7 The meeting noted that among the main challenges for the SWFDP, has been the need for very short-range forecasting (including nowcasting) tools, especially to address the rapid onset of localized severe thunderstorms that produce heavy precipitation and strong winds, in the absence of adequate real-time observational networks, especially in absence of weather radar coverage. In this context, following the outcome of the first phase of the SWFDP in Southeast Africa (in 2008), coordination has been established with the WMO Space Programme (SAT) to ensure that satellite-based products are available through each SWFDP regional project. Satellite-related training, satellite information (data and products) and dissemination mechanisms to support the SWFDP are now core component of the SWFDP. These products made available through the SWFDP also contribute to aeronautical meteorology (AeM).

5.3.8 The meeting highlighted that the SWFDP regional project also represents a systematic approach for building capacity and for transferring knowledge and skills to NMHSs, especially to weather forecasters. The framework has been used to implement a series of proven or modernizing enhancements to the forecasting process, as well as to provide a channel for the transfer of relevant promising S&T research and development outputs through trials, such as from the WWRP/THORPEX

TIGGE project “Global Interactive Forecast System” (GIFS), and involves the WWRP/SERA to support effective propagation of benefits to society. Other examples include:

- Establish synergies with the planned High-Impact Weather (HIWeather) project, which aims to develop new forecast and weather impact tools, and seek to trial them with SWFDP as an operational platform and link to end-users;
- Link with Sub-seasonal to Seasonal (S2S) project for seamless forecasts;
- Continue to implement new verification methods through the SWFDP;
- Strengthen synergies with the Nowcasting research activities, including the Lake Victoria project.

5.3.9 The meeting noted that presently, four of the five SWFDP regional projects include NMHSs of countries that are within the footprint of Tropical Cyclone basins. Synergies (including specific collaboration and joint development work) are being established with the Tropical Cyclone Programme (TCP), and its Regional Bodies. In particular, TCP:

- Provides a vital input to the SWFDP Cascading Process;
- Cascading Process supports communication of impacts of Tropical Cyclone forecasts to PWS.

5.3.10 The meeting recalled that the SWFDP is implemented in close collaboration with the Public Weather Services (PWS) programme in order to improve severe weather forecasting and warning services, and support the Disaster Risk Reduction (DRR) programme as the cascading process provides framework for DRR support in many vulnerable countries. The meeting noted that the SWFDP has also been coordinating with other WMO Technical Commissions and Programmes to extend the range of applications and broaden the benefits to other user sectors in society. In relation to synergies with the Commission for Hydrology (CHy) *[similar approaches may be applicable for the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) and the Commission for Agriculture Meteorology (CAgM), for example]*:

- The Cascading Forecasting Process may also be usefully applied from regional to national level in flood forecasting
  - Onward Communications of warnings and collaboration with DRR organizations should be done collaboratively with SWFDP
- Rainfall (and other) forecasts from GDPFS systems should provide a key input to hydrological forecasts and flash flood forecasts
  - May be shared at both regional and national levels
- Rainfall maps compiled by CHy provide a useful source of observations for use in SWFDP cascading process and verification
- Flood forecasts provide a useful guidance to assess the likely impact of heavy rain forecasts

5.3.11 In addition, in relation to JCOMM, CAeM and CAgM:

- Access to products and data through cascading process helps with compliance with standards (e.g. for aviation forecasting), and it reinforces training;
- Extend the forecast guidance to longer timescales for Food security;
- Propagate NWP (important meteorological and other weather-related parameters) into high-impact models for specialized forecasting (e.g. flash floods, coastal flood forecasting, large waves, etc.), including synergies with the Coastal Inundation Forecasting Demonstration project (CIFDP).

5.3.12 In relation to the Commission for Climatology (CCl):

- GPCs for Long-range Forecasts (LRF) and RCCs/RCOFs could also provide a very similar cascading forecasting process;
- Aim for a seamless process across timescales by collaboration between RCCs and RSMCs:
  - Develop working arrangements;
  - Coordinated approach to work with regional humanitarian organizations;
- Contribution to GFCS.

5.3.13 Finally, the SWFDP contributes to the WMO Quality Management Framework (QMF) through supporting efforts in NMHSs in their implementation of Quality Management Systems (QMS).

5.4 Expanding roles for Global Centres – the Global Guidance Unit

5.4.1 The meeting was informed that the SWFDP – Eastern Africa NWP/Web Developers Workshop, held in Nairobi, Kenya, in March 2012, discussed the roles of the regional centres and identified the need for improving severe weather forecasting over the region. In this context, a Global Guidance Service has been established for the periods September to December 2012 (Phase 1) and March to June 2013 (Phase 2) with the support of the UK Met Office Global Guidance Unit to assist RSMC Nairobi and RFSC Dar-es-Salaam in fulfilling their regional responsibilities within the context of the SWFDP, including: (a) model knowledge and interpretation; (b) confidence and accuracy in issuing warnings, including increasing lead times; (c) carry out verification and model feedback; and (d) improve understanding of communication of risk.

5.4.2 The meeting noted that Phase 1 consisted of: (a) Met Office UK visit KMS and TMA to assess requirements and gain appreciation of working environment; (b) Met Office UK issue daily written guidance across all models available in region; (c) regional centres use information to inform forecasts; (d) feedback on forecasting accuracy; and (e) regional confidence grows. Phase 2 included: (a) KMS and TMA visit UK Met Office (3 weeks) to shadow forecasters, view facilities and processes, meet scientists and modelers, observe Weather Desk and PWS functions, and formulate and agree on parameters for daily guidance; (b) Met Office UK generate graphics-based guidance and establish Huddle site to share information; (c) daily video conference call to share learning; (d) Met Office UK takes mentoring role; and (e) responsibility handed to RSMC Nairobi to lead conference as confidence grows. Following a successful implementation of Phases 1 and 2 of the Global Guidance Service, a Phase 3 was initiated to engage all participating countries in the region.

5.4.3 The meeting agreed in principle with this Global Guidance Service in support of the SWFDP, depending on the requirements of the region and availability of funds to support such activity. The meeting requested the Met Office UK to share case studies and feedback on the performance of models with other global centres involved in the SWFDP – Eastern Africa.

5.4.4 The meeting noted that NOAA/NCEP and the ECMWF have also been providing training and mentoring through the NOAA/NCEP African and other regional Desks, and ECMWF webinars. The meeting also agreed that such activities are a kind of Global Guidance Service in support of the SWFDP.

6. SUSTAINABILITY ISSUES

6.1 Development partners' interest and investment in WMO initiatives, including on SWFDP

6.1.1 The meeting recognized that there is a significant and growing donor interest in assisting least developed and developing countries in increasing their capability to manage the risks associated with hydro-meteorological hazards, but it is becoming apparent that investments in modernizing NMHSs

often lack the necessary long-term sustainability strategies and coordinated approach at global, regional and national levels, to build from. The meeting noted that in response to the growing risk of meteorological and hydrological hazards, the World Bank and other donor agencies have recognized the importance of improving NMHSs in developing countries, including support for the modernization of NMHSs within the wider regional and global context. The meeting was informed that donor agencies have been supporting a number of WMO initiatives, including the SWFDP, as follows:

Donor	Term	Thematic Programmes	Geographic Regions	Partners
Greece	3y	GFCS (Ag, Health)	West and North Africa	–(FAO) Food and Ag Organization –WHO –Local partners e.g. Health and Ag ministries –NMHS in focus countries
Canada	5y	DRR, Observations, Severe Weather / PWS, Coastal Inundation	Haiti	–Haitian Govt –UNDP –MeteoFrance –Environment Canada –NMHS of Haiti
Canada	4y	GFCS (Food, Health and DRR)	–Small Island States in Caribbean and SW Pacific –South Asia –Polar Regions	–NMHS in the focus countries –Regional Organizations –Other national and local partners
Norway	4y	GFCS, AMCOMET, Severe Weather, Agriculture, Health, Fellowships	GFCS Secretariat, AMCOMET and Fellowships (Africa), SWFDP and Met Agri work in East and Southern Africa, West Africa Health (Madagascar and Ethiopia) Fellowship Programme	–NMHS in the focus countries –Local partners such as Ministries of Agri
Norway	3y	GFCS	Malawi and Tanzania are the focus countries, but some work will also take place across East Africa generally	–WFP –WHO –IFRC (Geneva) –CICERO/CMI (Norway) –CCAFS (Ag Research Centre) –Local partners (Ministries)
Ireland	1y	GFCS (Ag/Food security)	East Africa (Ethiopia)	–ISDR
USAID	4y	Regional development projects - mainly flooding	Regional/global	–HRC –National and Regional entities

6.1.2 The meeting was also informed that the World Bank – WMO current project engagement include:

- Socio/economic assessment of NHMS
- Haiti (through regional office and PCU)
- Central Asia and Nepal (through PCU)
- SE Asia (through DRR)

Future/Potential areas of Cooperation include:

- Caribbean (generally)/Haiti (specifically)
- Sahelian Region of Africa
- Central and North Africa
- S / SE Asia
- Middle East

6.1.3 The meeting fully supported the following Washington Workshop recommendations:

- a coordinated approach for donor investment targetting a group of like-countries (i.e. a five year strategy for implementation of the '*Cascading Forecasting Process*' within a sub-region),

including funding to sustain regional frameworks (that improves regional monitoring, regional exchange of hydro-meteorological data and information, training, regional operations through a regional centre and support by advanced centres, all for the common benefit of individual participating countries), which improves on sustainability and sharing of related scientific and technological investments and outcomes, and the harmonizing of warnings across national borders;

- further and more intensive engagement of the donor community in mobilization of long-term financial resources to support sustainable operations of the '*Cascading Forecasting Process'*, especially NMHSs and regional centres, and the Programme Office functions, that would contribute to mitigation of risks of natural hazards, help adaptation to climate change and facilitate further economic development;

and requested the WMO Resource Mobilization Office to pursue these aspects with the development partners.

6.2 Establishment of the Project Office

6.2.1 The meeting was informed that, as part of the establishment of the SWFDP Project Office, a new P3 staff has been appointed as SWFDP Project Coordination Officer, starting in January 2014. Main duties and responsibilities include:

(a) Monitor, collect, and maintain project data and information, and actions (e.g. global and regional centres' and National Meteorological and Hydrological Services' (NMHS) websites, mission reports, quarterly reports from participating centres) on the status of implementation of all participating countries within regional projects with the objective of sustaining the WMO's global and regional centres and their linkages to national centres, and in particular the Severe Weather Forecasting Demonstration Project (SWFDP); prepare reports including regular summary progress reports for each regional project; provide input to documents for related meetings and sessions of constituent bodies;

(b) Provide Secretariat support to project management teams that sustain the WMO's global and regional centres and their linkages to national centres, including guiding the development of regional and national implementation plans, as well as to the Steering Group on SWFDP;

(c) Develop plans for sustaining WMO's global and regional centres and their linkages to national centres, including dedicated training workshops, advise and plan collaborative training sessions with other technical or regional programmes (e.g. Tropical Cyclone Programme, Public Weather Services, Hydrology and Water Resources, Agricultural Meteorology Programme, etc.) and/or arrange participation at relevant training events (e.g. annual training at the European Center for Medium-Range Weather Forecasts);

(d) Provide technical input to the Resource Mobilization Office regarding proposals for potential extrabudgetary funds, and in the development of, and reporting on SWFDP and other regional projects that sustain the WMO's global and regional centres and their linkages to national centres;

(e) Develop and maintain a website supporting the initiatives described above;

(f) Cooperate with related programmes and divisions on technical aspects of SWFDP plans and implementation activities that sustain the WMO's global and regional centres and their linkages to national centres;

(g) Carry out other relevant duties as required.

6.2.2 The meeting noted that SWFDP requires country level data, including those required to monitor and evaluate status and progress of project activities and elements related to their national severe weather programmes. In this context, and also as part of the Project Office, a data capturing interface for the SWFDP is being implemented through the Country Profile Database (CPDB) as a contribution to the Monitoring Component of the CPDB, to make use of a WMO wide interface to communicate with Members and to cross-fertilize and benefit from other data relevant to SWFDP available in the CPDB. The meeting was informed that an IT contractor is currently employed in WMO for 4 months, to implement the SWFDP database in the CPDB.

6.3 Increasing role of global and regional centres – financial and human resources' requirements in SWFDP

6.3.1 The meeting noted that the increasing role of global and regional centres would require additional core funding and human resources, requiring a dedicated programme office. As described in paragraph 5.2.7, the meeting stressed that to support the non-operational activities of the proposed SWF programme (as listed in paragraph 5.2.6), and also the development of new SWFDP projects to expand the programme towards global coverage, the SWF programme office is expected to require 2 full-time staff initially, and this level is expected to require a modest increase as the number of regional projects and services increases.

6.4 How to address potential development partners' interest and investment in SWFDP, including possible future pilot projects (aligned with the recommendations from the Washington Workshop)

6.4.1 The meeting agreed that new SWFDP projects should generally be supported by donor funding. Three different models are proposed for preparing SWFDP projects towards the Phase 4 transition to sustainable service, depending on the status and capabilities of the RSMC. Examples are given of regional SWFDPs or potential SWFDPs which might be suitable for support under each of these models:

- Sustaining and strengthening existing RSMCs:
  - SWFDP South Pacific supported by RSMC Wellington which is still in Phase 3 has been unable to secure the services of a suitable regional identity to resource a sustainable future.
- Expanding the role of relevant RSMCs with activity specialization in Tropical Cyclone Forecasting:
  - SWFDP Bay of Bengal supported by RSMC New Delhi
- Establishing RSMC support for the Cascading Forecasting Process in all areas – this may be achieved by developing new Regional Forecasting Support Centres (RFSC) which subsequently achieve RSMC designation, or by redefining a RSMC with existing geographical specialization:
  - Southeast Asia, with regional centre at RFSC Ha Noi
  - South America, with regional centre at RSMC Brasilia
  - Central Asia, with the support of RSMC Moscow or RSMC Novosibirsk
  - West of the existing SWFDP South Pacific project area, with regional centre at RSMC Darwin or by development, a new RSMC Jakarta.

6.4.2 The meeting noted that the Regional Forecasting Support Centre (RFSC) does not have a defined status within the GDPFS structure, but is the name of a centre that is carrying out the regional

severe weather forecasting functions in the development and demonstration phases of the SWFDP, which will achieve RSMC designation with the transition of SWFDP to operations (phase 4), when this centre would be fully functioning.

7. ANY OTHER BUSINESS (AOB)

7.1 The meeting developed a draft outline for the concept paper to be submitted to the 2014 meeting of the Presidents of Technical Commissions (PTC-2014), as follows:

- Title: SWF – Severe Weather Forecasting Programme
- Background to Cascading Forecasting Process
  - Lessons learned
  - Critical implementation factors
  - Sustainability – Phase 4 (SWFO) and further growth
- Expansion of SWFDP to a global programme
  - Strategic programme but developed through bottom-up projects
    - Major contribution to WMO High Priorities – GFCS, DRR, Capacity Development and exploits and reinforces WIGOS and WIS
  - Core programme of WMO supported by core funds and programme office
    - Steering Group led by DPFS
  - Redefinition of RSMCs
  - Development through SWFDP projects followed by transition to operations
- Synergies with other TCs and Programmes

7.2 The meeting tasked the chairperson of the Steering Group for the SWFDP and the WMO Secretariat to prepare the concept paper and requested to circulate it to all participants at the meeting for comments, prior to its submission.

7.3 There were no other issues raised during the meeting.

8. CLOSURE OF THE MEETING

8.1 The extraordinary meeting of the Steering Group for the Severe Weather Forecasting Demonstration Project (SWFDP) closed at 15:40 hours on Thursday, 5 December 2013.

Annex I

AGENDA

1. OPENING OF THE MEETING

2. ORGANIZATION OF THE MEETING
- 2.1 Adoption of the agenda
- 2.2 Working arrangements

3. INTRODUCTION, INCLUDING THE OUTCOMES OF CBS-15 (SEPTEMBER 2012), PTC-2013 (JANUARY 2013), EC-65 (MAY 2013) AND THE WASHINGTON WORKSHOP (JUNE 2013) RELATED TO THE FUTURE OF THE SEVERE WEATHER FORECASTING DEMONSTRATION PROJECT (SWFDP)

4. PROGRESS AND ISSUES
- 4.1 Brief summaries of progress and any major issues in regional projects

5. CONSOLIDATE THE SWFDP INTO GLOBAL SUSTAINABLE OPERATIONS
- 5.1 Criteria for the transition of the project from “demonstration to operations” (Phase IV)
- 5.2 Strengthening/sustaining operational centres, especially RSMCs, to sustain and increase the capacity of NMHSS to deliver relevant services to the various user-sectors
- 5.3 Future directions of the SWFDP towards a cross-programmatic *Programme to Strengthen Operational Centres* (“scale up” the concept, building upon the lessons learnt through the SWFDP)
- 5.4 Expanding roles for Global Centres – the Global Guidance Unit

6. SUSTAINABILITY ISSUES
- 6.1 Development partners’ interest and investment in WMO initiatives, including on SWFDP
- 6.2 Establishment of the Project Office
- 6.3 Increasing role of global and regional centres – financial and human resources’ requirements in SWFDP
- 6.4 How to address potential development partners’ interest and investment in SWFDP, including possible future pilot projects (aligned with the recommendations from the Washington Workshop)

7. ANY OTHER BUSINESS (AOB)

8. CLOSURE OF THE MEETING

Annex II

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