SWFDP REGIONAL SUBPROJECT IN RA I

QUARTERLY PROGRESS REPORT N° 4
for the period 1 September 2007 – 9 November 2007

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22 February 2008

1 – Introduction

1.1 – This report summarizes the feedback from the participating NMHSs in the SWFDP Regional Subproject in RA I (South-eastern Africa) during the fourth quarter of the demonstration phase (1 September 2007 to the 9 November 2007).

1.2 – The sources of information used to prepare this report are detailed in the "Introduction" section of the first Quarterly Progress Report (August 2007).

2 – Summary of the Severe Events reported from the NMHSs

2.1 – During the first month of the fourth quarter of the experimentation period dry weather generally prevailed over the relevant geographical area. Scattered showers and significant rainfalls occurred at the end of September. The onset of the rainy season occurred toward mid-October in most of the countries participating to SWFDP: a few significant rainy episodes only were recorded in Botswana, Madagascar, Mozambique and Tanzania before the end of the experimentation period. It is important to stress that strong wind with heavy downpours were reported in Botswana but the lack of synoptic stations in the vicinity did not allow assessing the amount of rainfall.

2.2 – No tropical storm or tropical cyclone was recorded by NMHS La Réunion during this quarter over the relevant geographical area.

2.3 – Table 1-a and Table 1-b list the severe events that were recorded by the NMHSs during this fourth quarter. The events listed in Table 1-a and Table 1-b are not mutually exclusive because both heavy precipitation and strong winds can be recorded for the same event. A "*" annotates the date when the NMHS indicated that the phenomenon is estimated as very localized/mesoscale or from convective origin. The dates of the events for which a **warning was issued** from the NMHS are written in bold characters.

Heavy Precipitation												
Botswana		Madagascar		Mozambique		Tanzania		Zimbabwe		TC		
from	to	from	to	from	to	from	to	from	to			
27/09/07 **10/10/07**		14/09/07 17/10/07 22/10/07		**25/10/07** **07/11/07** **09/11/07**		04/09/07 **01/10/07** **09/10/07**		none		none		

Table 1-a: Recorded heavy precipitation according to the NMHSs reports.

Strong Wind												
Botswana		Madagascar		Mozambique		Tanzania		Zimbabwe		TC		
from	to	from	to	from	to	from	to	from	to			
none		none		**01/10/07***		none		none		none		

Table 1-b: Recorded strong winds according to the NMHSs reports

3 –Evaluating the performance of warnings

3.1 – The common way to evaluate the performance of the warnings by means of the probability of detection (POD) and false alarm ratio (FAR) indices has been commented in the first quarter's progress report. Nevertheless it does not make sense to compute statistics when the events are scarce, which is the case for this fourth quarter period.

4 – The performance of warnings issued from the NMHSs

4.1 – NMHS Botswana

Botswana reported 2 severe weather events that corresponded to heavy precipitation. The first one that occurred on 27/09/07 over the south-eastern part of the country was underestimated in the forecast and therefore not announced by a warning but it did not result in damage or floods. The second one occurred on 10/10/07 on the north-eastern part of the country and was correctly forecast so that a warning was issued; it gave flash floods over the area concerned. According to these data the calculated POD is 2/2 = 1.

4.2 – NMHS Madagascar

Madagascar reported 3 severe weather events that corresponded to heavy precipitation: they occurred on 14/09/07, 17/10/07 and 22/10/07. Nevertheless, they did not result in damages. No warning was issued for all of these events. The events on 14/09/07 and 22/10/07 are proposed as case studies.

4.3 – NMHS Mozambique

Mozambique reported 4 severe weather events: The first occurred on 01/10/07 gave strong winds and mesoscale rainfall over Maputo and resulted in uprooting of trees. It was rather well forecast so that a warning was issued. The four other severe weather events (25/10/07, 07/11/07 and 09/11/07) corresponded to heavy precipitation associated with synoptic weather systems that result in several damages (trees uprooted damage on crops, unroofed houses). All this events were correctly forecast with respect to the amount of rainfall and announced by a warning. By taking into account all the reported severe events the POD is 4/4 = 1. On the other hand high risk of strong wind forecast by RSMC Pretoria on 15/09/07 proved to be exaggerated.

4.4 – NMHS Tanzania

Tanzania reported 3 severe weather events: The first one, which occurred on 04/09/07, gave heavy precipitation over the Bukoba basin in the Lake Victoria area but is not really documented. Another heavy precipitation event occurred on 01/10/07 over the same area and was announced by a warning. On 09/10/07 heavy precipitation occurred over the northern coast of Zanzibar and caused damages to housing and electricity pylons. As this event was well forecast, a warning was issued that had a positive impact on the safety. Taking into account all the reported severe events the POD is 2/3 = 0.67.

4.5 – NMHS Zimbabwe

The first rains of the rainfall season usually occur during this quarter with a mean onset of the main rains around mid-November. In 2007, there was a delayed start of the rainfall season and the few rainy days of November did not constitute severe weather events. This is the reason why no severe weather events were reported by Zimbabwe during this quarter. Nevertheless as a case study NMHS Zimbabwe proposed the rainy episode that occurred from 27 to 29 December 2007. Although this severe event occurred outside the duration of the experimentation period, it is a spectacular case study showing that, in some cases, heavy precipitation can be well forecast 10 days in advance.

5 – Summary of RSMC Pretoria Daily Guidance for Severe Weather Events

5.1 – Table 2-a and 2-b, which summarize RSMC forecasts, show that, during this quarter corresponding to the end of the wet season and the onset of the rainy season heavy precipitation was forecast mostly over Mozambique.

Number of days when medium or high risk of heavy precipitation were notified in the RSMC regional short range guidance				
Country	Day 1 Risk		Day 2 Risk	
	Med.	High	Med.	High
Botswana	3	0	1	0
Madagascar	1	0	4	0
Mozambique	10	2	8	0
Tanzania	5	0	1	0
Zimbabwe	7	0	4	0

Table 2-a.

Number of days when medium or high probability of heavy precipitation were notified in the RSMC regional medium range guidance						
Country	Day 3 Probability		Day 4 Probability		Day 5 Probability	
	60 %	80 %	60 %	80 %	60 %	80 %
Botswana	0	0	0	0	0	0
Madagascar	3	0	0	0	3	0
Mozambique	5	0	5	0	3	0
Tanzania	2	0	0	0	0	0
Zimbabwe	3	0	4	0	0	0

Table 2-b.

5.2 – The Table 3-b and 3b show that strong winds were forecast essentially over Madagascar at short range only.

Number of days when medium or high risk of strong wind were notified in the RSMC regional short range guidance				
Country	Day 1 Risk		Day 2 Risk	
	Med.	High	Med.	High
Botswana	0	0	0	0
Madagascar	15	0	9	0
Mozambique	3	0	1	1
Tanzania	1	0	0	0
Zimbabwe	0	1	0	0

Table 3-a.

Number of days when medium or high probability of strong wind were notified in the RSMC regional medium range guidance						
Country	Day 3 Probability		Day 4 Probability		Day 5 Probability	
	60 %	80 %	60 %	80 %	60 %	80 %
Botswana	0	0	0	0	0	0
Madagascar	0	0	1	0	1	0
Mozambique	0	0	0	0	0	0
Tanzania	0	0	0	0	0	0
Zimbabwe	0	0	0	0	0	0

Table 3-b.

5.3 – The Table 4-a and Table 4-b, which list the critical periods (corresponding to high risk forecast given by the short-range RSMC Daily Guidance (i.e. from the point of view of the forecaster at RSMC Pretoria), show that only a very small number of risky days with regards to heavy precipitation or strong wind were specified..

Heavy Precipitation high risk forecast									
Botswana		Madagascar		Mozambique		Tanzania		Zimbabwe	
from	to	from	to	from	to	from	to	from	to
none		none		08/11/07	09/11/07	none		none	

Table 4-a: High risk heavy precipitation events according to RSMC Daily Guidance.

Strong Wind high risk forecast									
Botswana		Madagascar		Mozambique		Tanzania		Zimbabwe	
from	to	from	to	from	to	from	to	from	to
none		none		15/09/07		none		06/09/07	

Table 4-b: High risk strong wind events according to RSMC Guidance.

5.4 – The usefulness of the RSMC Daily Guidance and products is summarized in the Table 5. It shows that RSMC Daily Guidance was very useful in order to decide the opportunity to issue warnings in Botswana and Mozambique even though no high risk was not always specified in the RSMC Daily Guidance.

Value of the Daily Guidance	Botswana	Madagascar	Mozambique	Tanzania	Zimbabwe
Total number of events	2	3	4	3	0
Unavailable information				1	
Misleading	0	0	0	0	0
Not useful	0	2	0	0	0
useful	2	1	2	2	0
Very Useful	0	0	2	0	0
% Useful-Very useful	100%	33%	100 %	100%	0

Table 5 : Value of the RSMC Daily Guidance according to reports from NMHSs

6 – General Comments about the Products

6.1 – Usefulness of RSMC Daily Guidance

6.1.1 – The RSMC Pretoria Daily Guidance for the next five days was prepared daily by the forecasters of the South African Weather Service National Forecast Centre and disseminated according to the set deadlines. Products from the global centres (deterministic models and ensemble products) play a critical role in their analysis process.
6.1.2 – The NMCs appreciate the Pretoria Daily Guidance, which helps forecasters in their day to day routine forecasts. The synthetic maps, the tables and the discussion are well suited to provide the forecasters with a good starting point for the elaboration of their own forecasts. Nevertheless warnings are issued after examination of all relevant information and not only after viewing the RSMC Daily Guidance.

6.1.3 – The Pretoria Daily Guidance has become more and more familiar and practical to the forecasters of the participating NMCs and boosted their confidence in their forecasts. It is imperative that it continues to remain routinely easily accessible to prepare the daily forecasts.

6.1.4 – Satellite data and derived imagery proved also to be an useful tool especially to follow the evolution and decay of convective systems.

6.2 - Usefulness of SWFDP NWP/EPS Products and RSMC UM-SA12

6.2.1 – The output of the global models are more and more appreciated as and when they learnt to better know their properties and weaknesses. ECMWF model wins approval of many NMHSs while NCEP model has been reported to suffer from an underestimation of the amount of rainfalls.

6.2.2 – The UM-SA12 limited area fine mesh model is very appreciated for the details it is able to provide for short range forecasts. Various stability indices seem also to be useful to localize severe thunderstorms.

6.2.3 – EPSgrams appear as an invaluable tool because of their ability to give locally the onset and the duration of severe weather events several days ahead. The case study proposed by NMHS Mozambique (27-29 December 2007) shows a good example of the capabilities of this product.

7 – Project evaluation against SWFDP goals

7.1 - To improve the ability of NMCs to forecast severe weather events: The participation of the NMHSs in the SWFDP allowed significant progress made in forecasting not only severe weather events but also the daily weather. Both RSMC Daily Guidance and NWP output helped improve the forecasts and boosted forecaster's confidence.

7.2 – To improve the lead-time of alerting these events: The use of SWFDP products enabled to increase the lead time of some warnings but there still remains some room for improvement in several cases.

7.3 – To improve the interaction of NMHSs with DMCPAs before, during and after severe weather events: Significant progresses have been made to strength the links with other services involved in severe weather management but more work has to be done by all parties concerned. NMHS Zimbabwe organized meetings with DMCPA, National Water Authority and Media to better know the information they really need about severe weather events. NMHS Mozambique is going to prepare a contingency plan for disaster preparedness and response with all the concerned people.

7.4 – To identify gaps and areas for improvements: The most important remark always concerns the weakness of the model to forecast strong winds and the right amount of precipitation.

7.5 – To improve the skill of products from Global Centres through feedback from NMCs: There was no important feedback in the view to improve the skill of products from Global Centres. Generally speaking case studies can be used to this aim but it is necessary to clearly point out the shortcoming and to provide complete relevant documentation about the concerned severe weather event.

8 – Evaluation of weather warnings

8.1 - Feedback from the public: The appreciation of the public seems to be positive in response to the improvement of the forecasts and the increased lead time of the warnings. Nevertheless organization of a systematic feedback needs to be developed and NMHS Mozambique is undertaking an action in this regard.

8.2 – Feedback from DMCPAs: The interaction between NMHSs and DMCPA is progressing. In Botswana and Zimbabwe these services continue to jointly work to intensify public awareness on severe weather and other disasters. In Mozambique where there is no formal feedback, it is hoped that such a co-operation could be implemented for the forthcoming rainy season.

8.3 – Feedback from the media: In Mozambique the media were invited to participate to the dissemination process of the warnings and a seminar aiming to get general feedback is planned.

8.4 – Verification by the NMCs: It is difficult to get objective elements to be able to verify the pertinence of the warnings. In Botswana there is a general assessment that the majority of the warnings corresponded to severe weather events that occurred at the right location or just in nearby areas.

9 – Conclusions

9.1 – Over the region concerned by the SWFDP, this fourth quarter of the experimentation phase was characterized by the end the dry winter season and the onset of the rainfall events of the winter season. Nevertheless, there were no tropical cyclones or storms over the western part of the Indian Ocean (the first Tropical Cyclone, ARIEL, was detected on 12/11/07 and did not reach the area of interest of SWFDP).

9.2 – All the NMHSs appreciate the RSMC Pretoria Guidance and the models products which allow to improve the quality of the forecasts and to increase their lead time.

9.3 – Despite the small number of severe weather events work is progressing to strengthen their links between NMHSs and DMCPA services in order to improve the preparedness of the vulnerable communities in the perspective of the forthcoming rainy season.

9.4 – After a full year of the experimentation phase of the SWFDP, all the NMHSs involved in this project emphasised the positive contribution of the support implemented in RSMC Pretoria to help perform their respective daily forecasting and warnings services. The forecasters gained a real experience and increased their confidence in the practical use of model fields and are now ready to continue to apply this way of working beyond the end of the demonstration phase; Moreover the advantage of this new working environment is so obvious that the forecaster cannot imagine to go back.