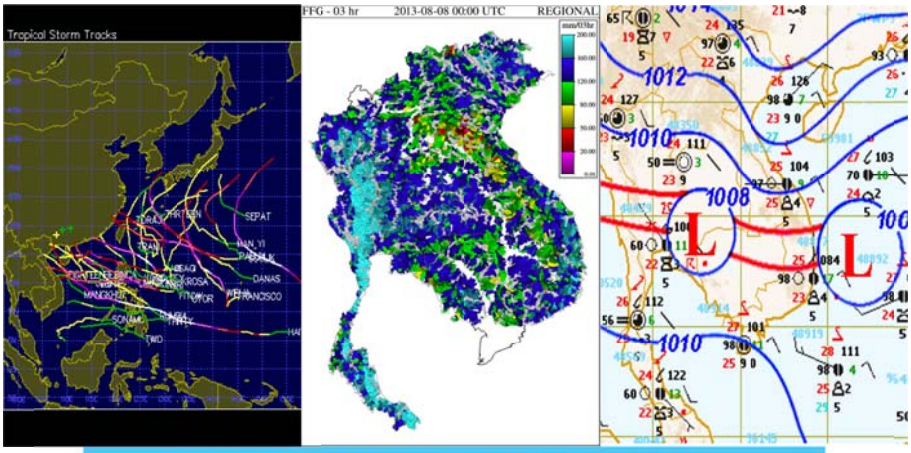
Mekong River Commission

Flood Management and Mitigation Programme

Evaluation Report on Flash Flood Guidance System for Flood Season 2013

(June - November 2013)

Final



Prepared by

Regional Flood Management and Mitigation Center

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Certification of Approval
of Internal FMMP Technical Document

Evaluation Report on Flash Flood Guidance System for Flood Season 2013
(June - November 2013)

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1. BACKGROUND INFORMATION

To respond to regional and national needs and in order to address the problems of flash floods in each MRC Member Country of the Mekong River Commission (MRC), the MRC and the Hydrological Research Centre (HRC) in San Diego, California, USA, with the financial support from the Office of US Foreign Disaster Assistance (OFDA) of the US Agency for International Development (USAID) have jointly implemented flash-flood mitigation in Cambodia, Lao PDR, Thailand and Vietnam under the MRC Flood Management and Mitigation Programme (FMMP).

In late 2009 the computational and dissemination servers for the MRCFFG system were installed at MRC's Regional Flood Management and Mitigation Centre (RFMMC) in Phnom Penh, Cambodia, which allowed the line agencies of the MRC member countries and the RFMMC to get access to the FFG products for training as well as for operational purposes. A five-day MRCFFG system in-depth regional training course, combined with hands-on operation, and a three-day national training course were successfully organised in 2010. Presently the MRCFFG system is put in an operational testing mode in order to fine-tuning as well as to gain further experience.

During the 2010 flood season the flash flood guidance system (FFGS) has been operating successfully. Reference is made to the records of tropical storms and records of tropical depressions.

During the 2013 flood season the flood forecasting team of RFMMC continued operating the flash flood guidance system; the information received from FFGS was processed, updated and posted in the MRC flood forecasting webpage in parallel with the river flood forecast. During the severe weather condition in the 2013 flood season, such as tropical storm BEBINCA, RUMBIA, JEBI, MANGKHUT, WUTIP and the Inter Tropical Conversion Zone (ITCZ), the MRCFFG system did detect very clearly the flash flood risk areas in some villages and districts of the four MRC Member Countries. In March 2012 the first evaluation report on MRCFFG system has been produced, to evaluate the performance of FFG system for period from May until 31 October 2011.

The present evaluation report is a fourth evaluation report of MRCFFG system, it produced to evaluate the performance of FFGS for the detection of the risk areas of potential flash floods in villages and districts in Cambodia, Lao PDR, Thailand and Viet Nam during the flood season from May until 30 November 2013.

2. METHODOLOGY TO EVALUATE THE FLASH FLOOD GUIDANCE PRODUCT

The methodology for evaluation of flash flood guidance product used in the present report is based in two concepts. The first concept evaluates the feed-back of the FFGS from the users or from other sources of information such as the media or the press. As the link between the regional flood center and the local people (through the focal person at national line agencies) is not yet fully established, the feed-back information on flash flood areas was mainly collected from the national media, such as online newspapers.

The second concept evaluates the FFGS through the recorded water levels that are available in the operational database of RFMMC. If FFG occurred in the sub-areas where water level stations are available, the FFG product can be evaluated by studying the changing (rising) water level records of stations located in the downstream part of sub-catchments.

The record daily rainfall of the observed stations, where available at the flash flood risk areas also used as the support data for evaluate the flash flood occurred.

3. FLASH FLOODS IN THE MEKONG REGION

In total 34 tropical storm developed at the Pacific Ocean or at the East Sea during year 2013; 10 to 12 of them caused serious flash floods, which affected the 4 countries of the Lower Mekong Basin. Figure 3.1 presents the track of the tropical storm during the year 2013.

The other cause of flash flood in the region was ITCZ, low pressure and tropical depression, which also lead to flash flood occurrences at some Mekong tributaries. Figure 3.2 presents an example of a weather chart during the ITCZ that occurred in the Mekong region. The next paragraph describes examples of flash floods, which occurred at some tributaries during the severe weather condition of the 2013 flood season.

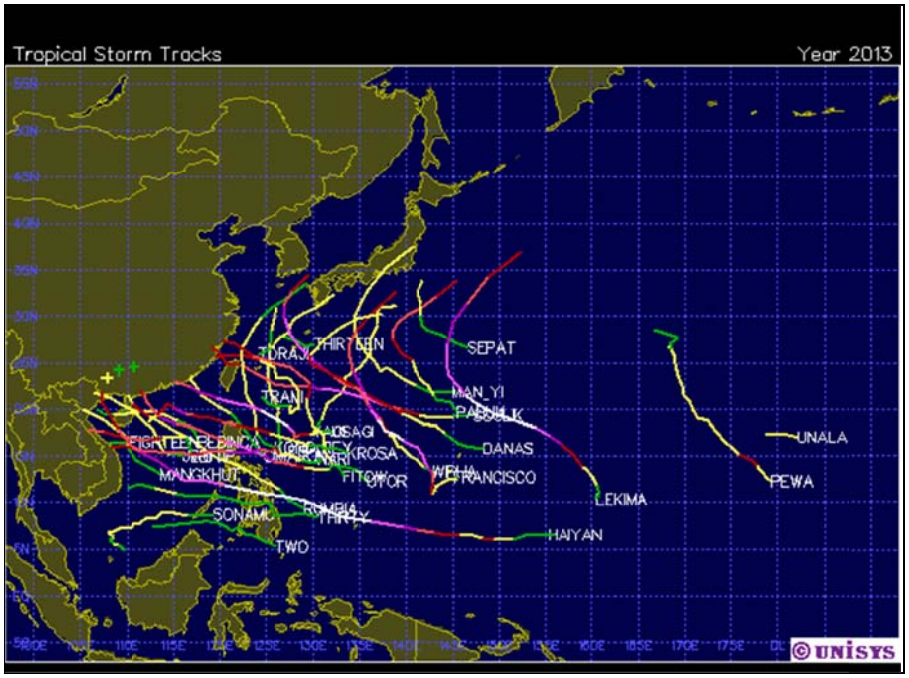
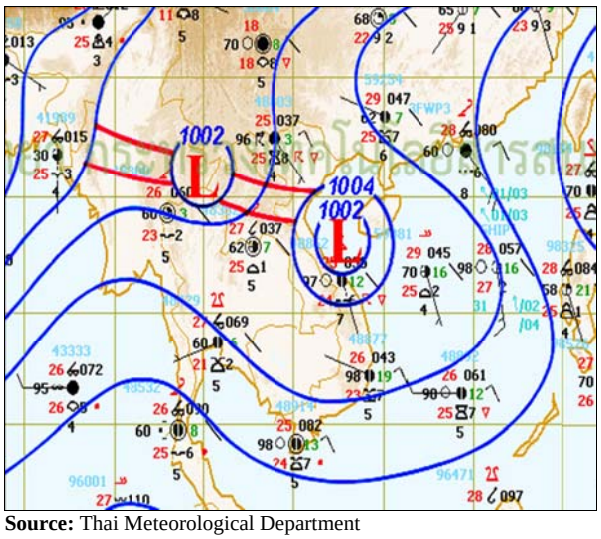


Figure 3.1 The tropical Storm Track during the year 2013, Source: UNISYS



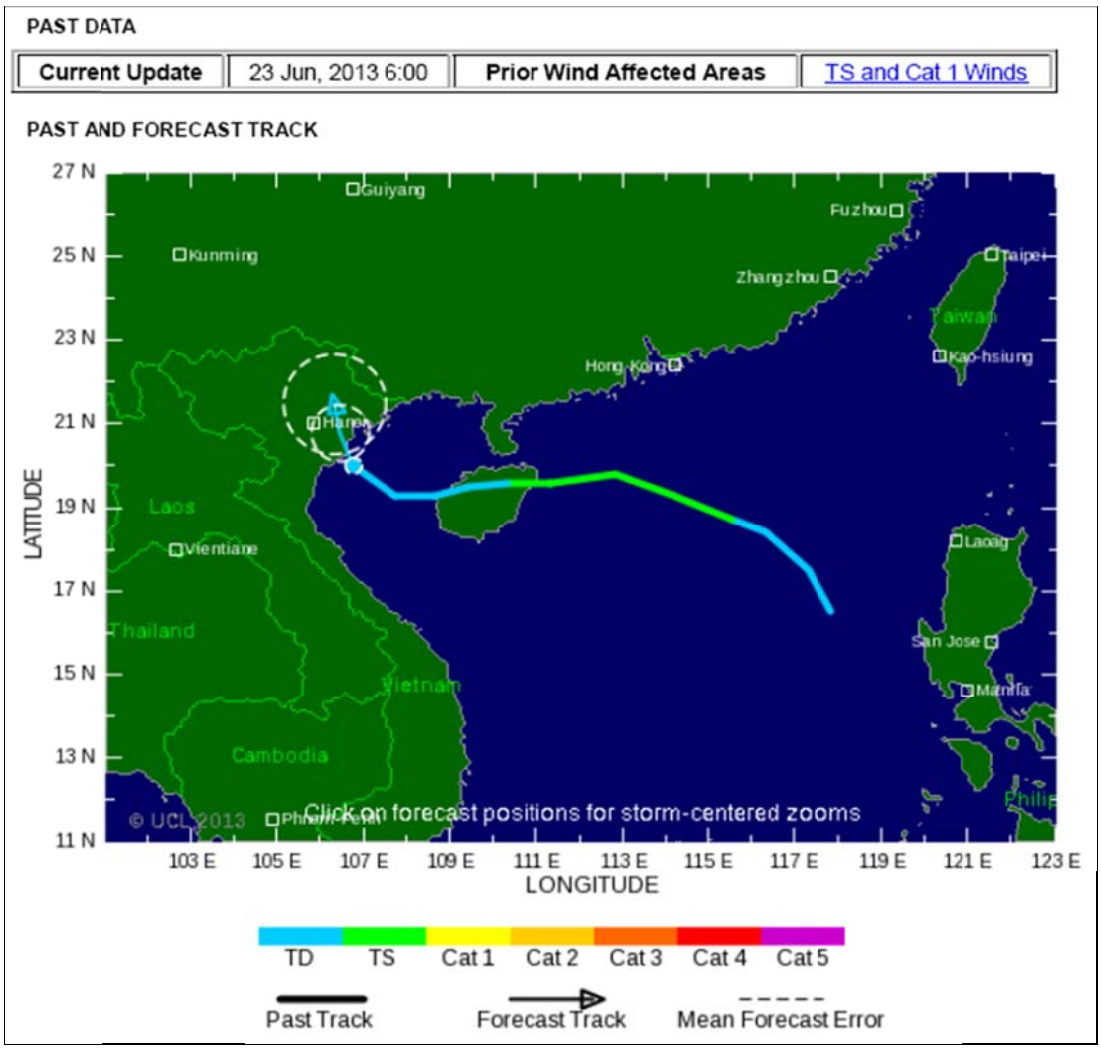
Source: Thai Meteorological Department

Figure 3.2 Weather Chart issued at 18:00 UTC on 19 July, 2013

3.1 Flash Floods Caused by Tropical Storm BEBINCA

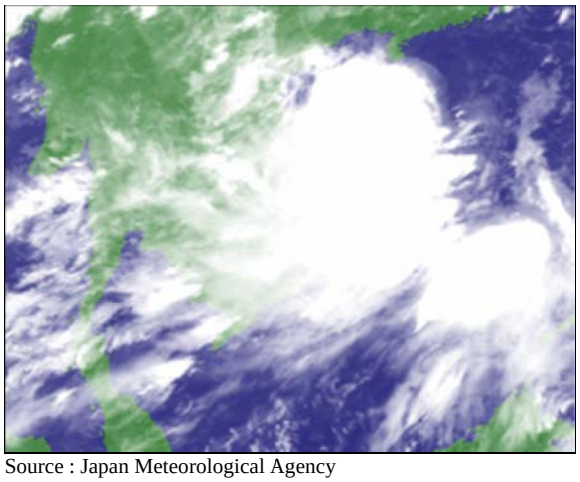
The storm BEBINCA developed at the East Sea on Friday 20 June 2013; it directed to the South of China and it brought heavy rain to the Lower Mekong Region. BEBINCA made its first of two landfalls as a tropical storm on the eastern part of Hainan Island in the East Sea on Saturday 21 June 2013.Winds of 40-50 mph were accompanied by several mm of rain, which resulted in localized flooding. The storm system weakened to a depression, but continued to the west –northwest across the gulf of Tonkin on Sunday with a second landfall in northern Viet Nam. Figure 3.1-1 presents the track of Tropical storm BEBINCA over the region.

Figure 3.1-2 presents the satellite image of Mekong Region during the storm BEBINCA.
Figure 3.1-3 present the Weather situation on Saturday 22 June 2013 during the storm BEBINCA.



Source : WWW.tropicalstormrisk .com

Figure 3.1-1 Track of tropical storm BEBINCA moved from the East Sea to the northern part of Viet Nam



Source : Japan Meteorological Agency

Figure 3.1-2 Infrared Image, MTSAT IR, at 22.30 UTC on June 21, 2013.

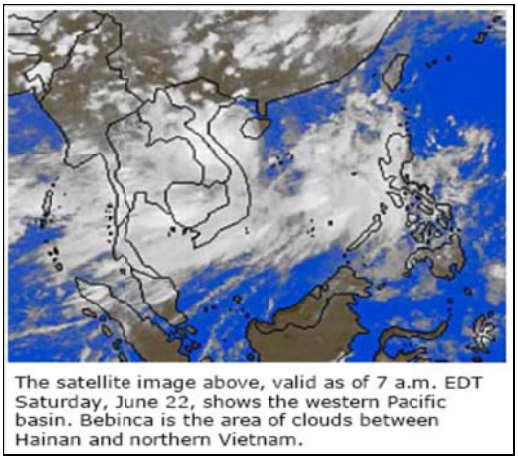


Figure 3.1-3 Satellite image taken on Saturday, June 22 during TS BEBINCAn moved from Golf of Tonkin to northern part of Viet Nam.

3.1.1 Heavy rainfall during the period of TS BEBINCA

During the period from 20 June to 23 June 2013 the Typhoon Storm BEBINCA was active in the region. Heavy rainfall occurred at some areas in the northern part of Viet Nam, and also at some sub-catchments of the Lower Mekong Basin located at the central and northern part of Lao PDR, such as Nam Cadin, Nam Sane, Nam Ngum, Nam Nhiep and Se Done. Especially during 23 - 24 June the daily rainfall at some hydro-meteorological stations in all those catchments was higher than 120 mm. Figure 3.1-4 to Figure 3.1-9 present the records of daily accumulated rainfall for sub-catchment of the Lower Mekong Basin. Figure 3.1-10 to Figure 3.1-17 present the daily accumulated rainfall of stations in the northern part of Viet Nam.

Figure 3.1-18 presents the map of the location of the rainfall stations, where daily records of accumulated rainfall was collected during the TS BEBINCA.

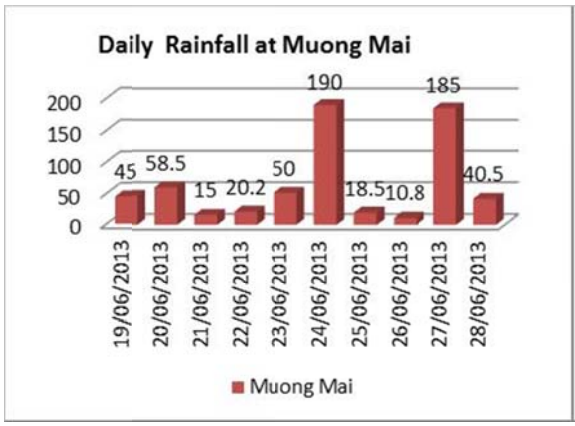


Figure 3.1-4 Daily rainfall (in mm) at Moung Mai station, Nam Ngiep catchment.

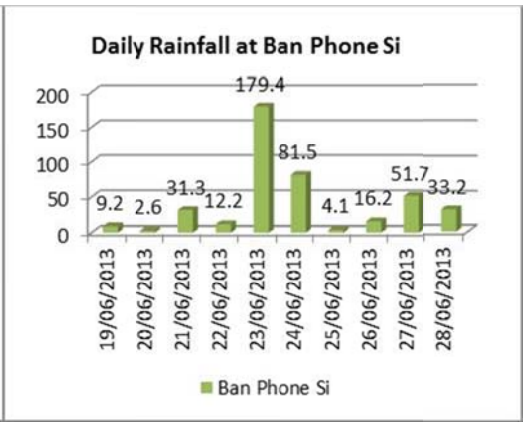


Figure 3.1-5 Daily rainfall (in mm) at Ban Phone Si station, Nam Cadin catchment.

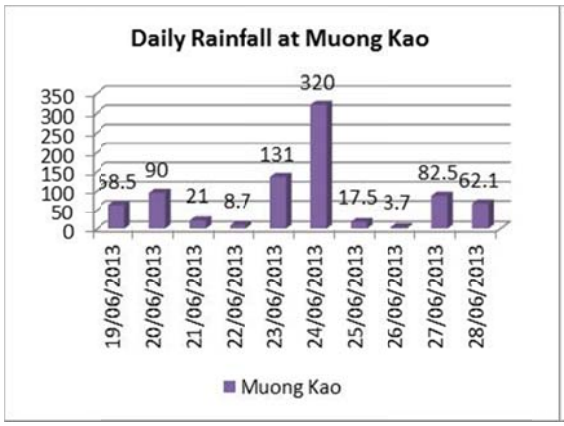


Figure 3.1-6 Daily rainfall (in mm) at Moung Kao station, Nam San catchment.

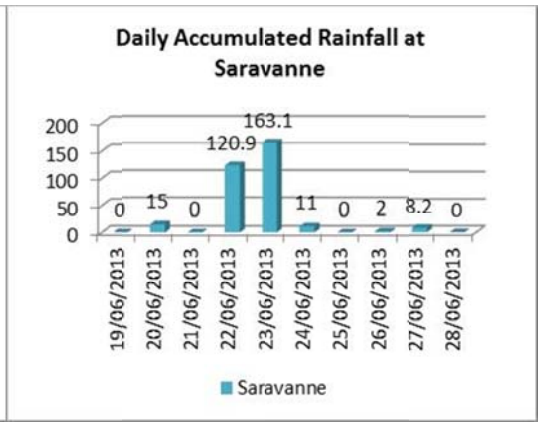


Figure 3.1-7 Daily rainfall (in mm) at Saravanne station, Se Done catchment.

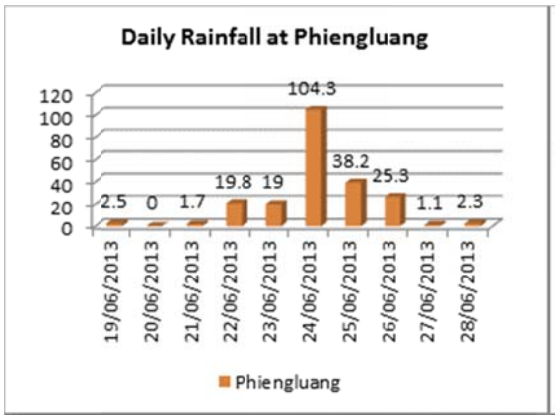


Figure 3.1-8 Daily rainfall (in mm) at Phiengluang station, Nam Ngum catchment.

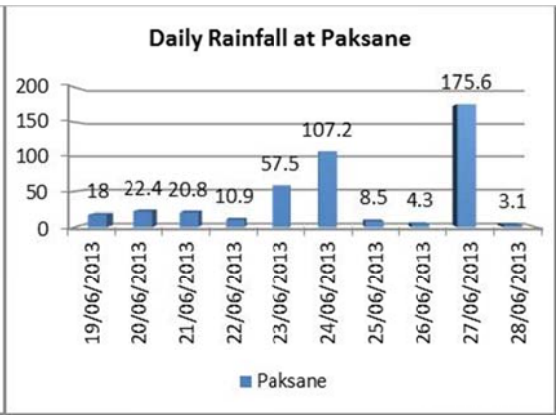


Figure 3.1-9 Daily rainfall (in mm) at Paksane.

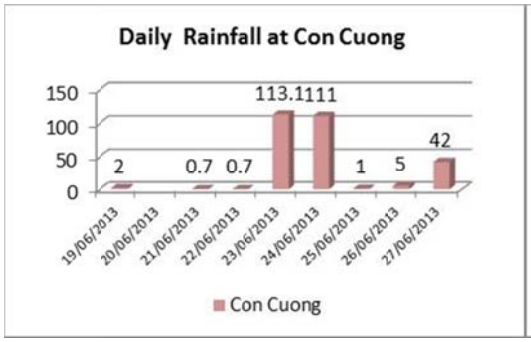


Figure 3.1-10 Daily rainfall (in mm) at Con Cuong.

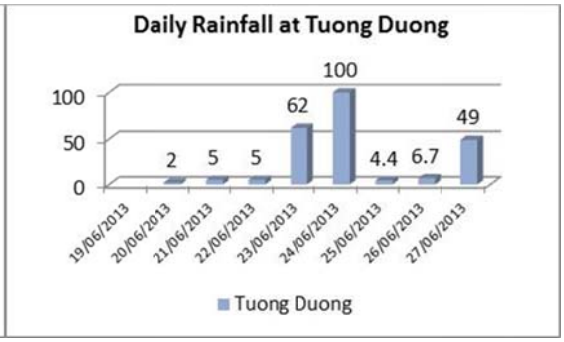


Figure 3.1-11 Daily rainfall (in mm) at Tuong Duong.

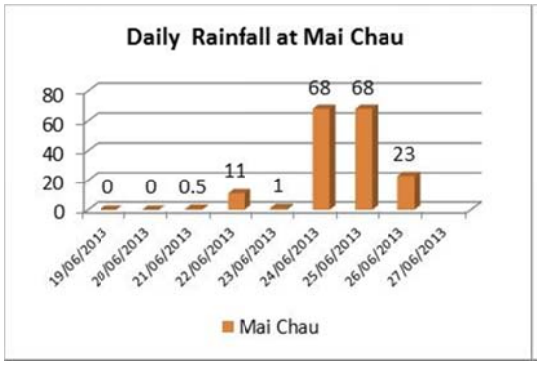


Figure 3.1-12 Daily rainfall (in mm) at Mai Chau.

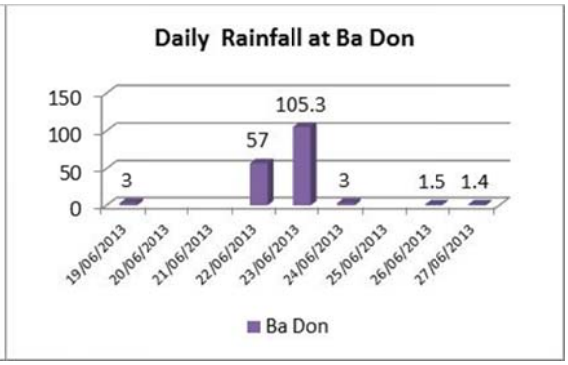


Figure 3.1-13 Daily rainfall (in mm) at Ba Don.

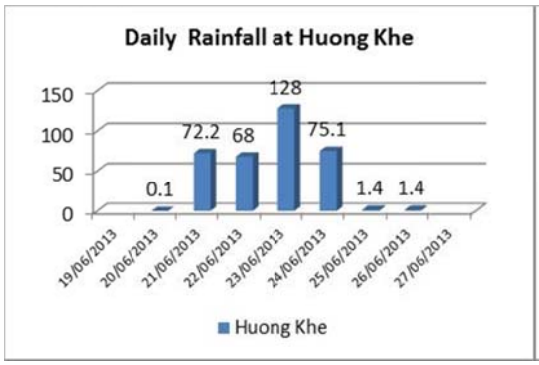


Figure 3.1-14 Daily rainfall (in mm) at Huong Khe.

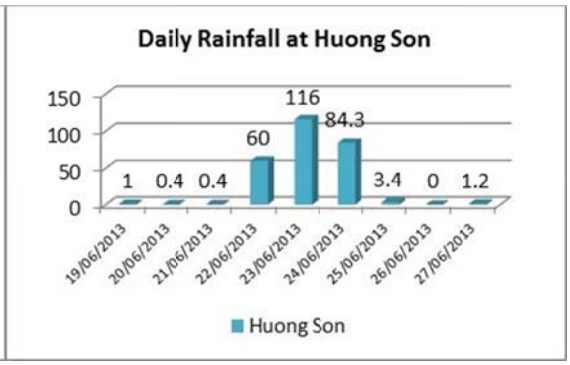


Figure 3.1-15 Daily rainfall (in mm) at Houng Son.

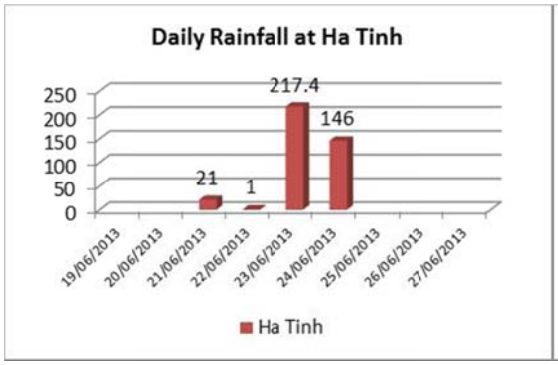


Figure 3.1-16 Daily rainfall (in mm) at Ha Tinh.

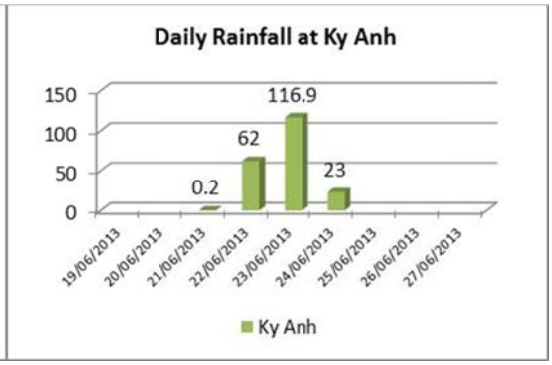


Figure 3.1-17 Daily rainfall (in mm) at Ky Anh.

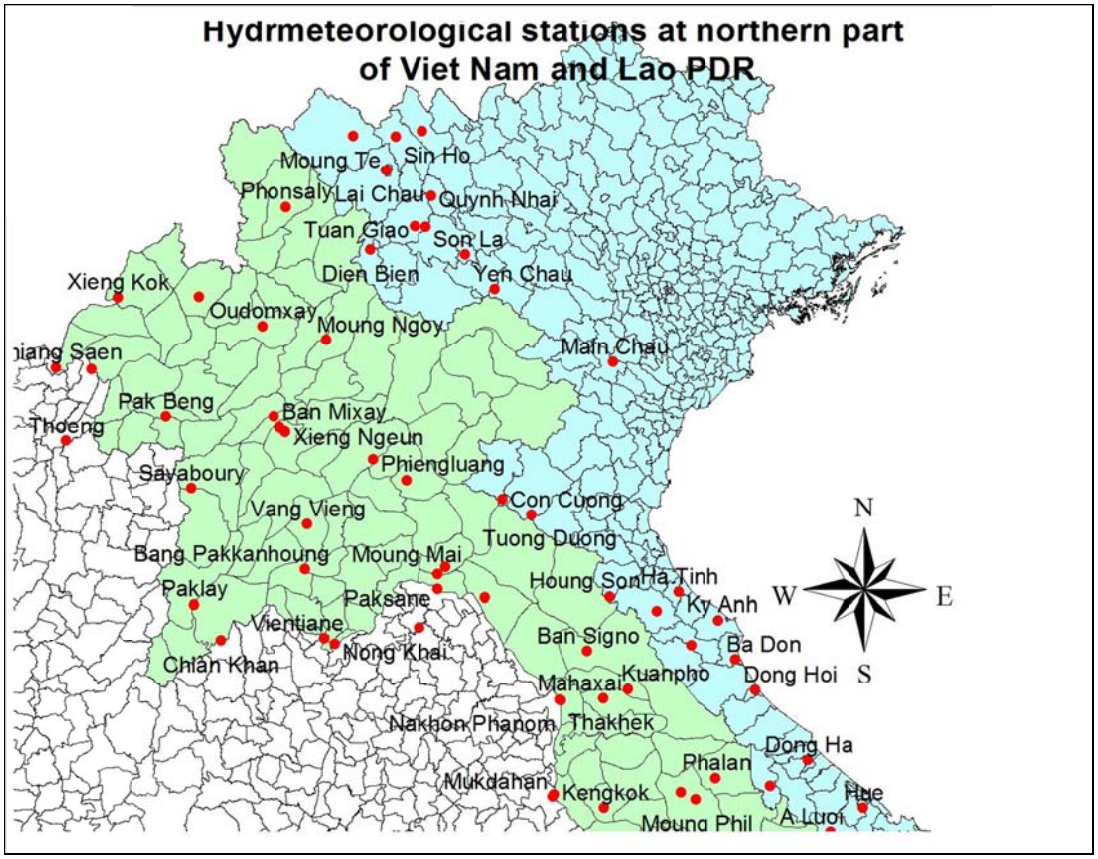


Figure 3.1-18 Map of rainfall stations in the northern part of Viet Nam and Lao PDR.

3.1.2 Flash floods caused by TS BEBINCA in the northern provinces of Viet Nam

On 23 June 2012 at 06:00 UTC (13:00 local time) the MRC Flash Flood Guidance System (MRCFFGS) detected that various areas of the northern provinces of Viet Nam were at risk of flash flood occurrences. Figure 3.1-19 present the 24 hour accumulated rainfall from 07:00 UTC on 22 June to 06:00 UTC on 23 June 2013. Figure 3.1-20 presents the 3 hourly FFG values at some areas of Northern provinces of Viet Nam and Lao PDR.

The information on flash flood risk areas on 23 June 2012 at 06:00 UTC was confirmed by the information published in the Viet Nam newspaper "Viet Nam News", dated 25 June 2013. The flash flood risk areas, which were detected by the MRCFFGS, corresponded with the reported flash flood areas. Annex 1.1 provides the information collected from the "Viet Nam News".

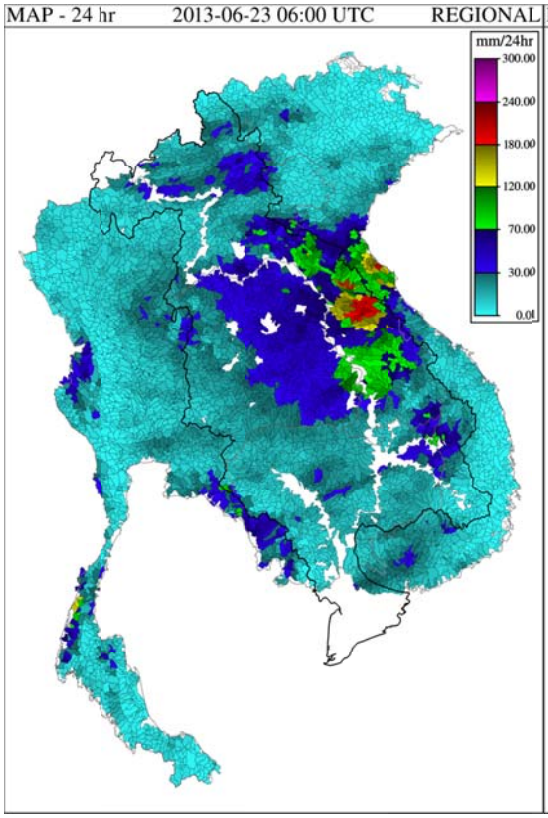


Figure 3.1-19 Mean Aerial Precipitation for 24 hours from 22 June at 07:00 UTC to 23 June 2013 at 06:00 UTC.

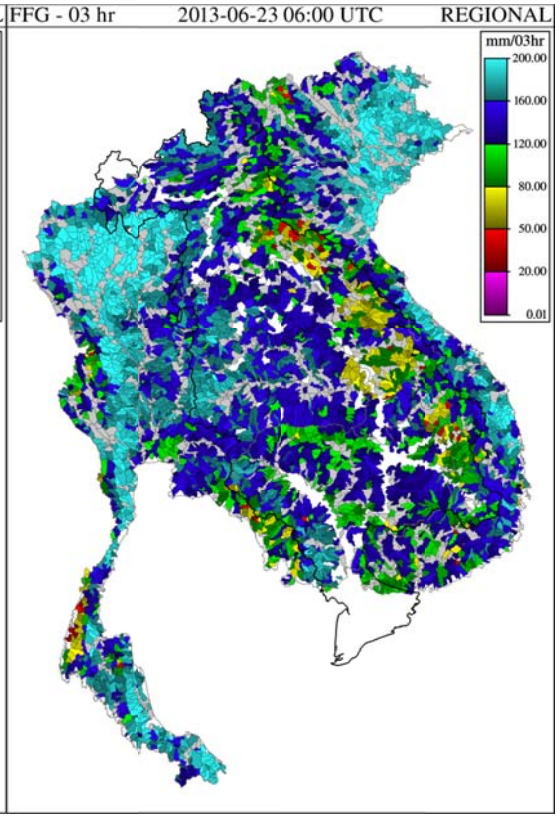


Figure 3.1-20 3 Hourly Flash Flood Guidance (FFG) on 23 June 2013 at 06:00 UTC (13:00 local time) showed a number of high risk areas in some districts of northern provinces in Viet Nam and Lao PDR.

3.1.3 Flash floods caused by TS BEBINCA in the northern provinces of Lao PDR

On 23 June 2012 at 12:00 UTC (17:00 local time) the MRC Flash Flood Guidance System (MRCFFGS) detected that various areas of the northern provinces of Lao PDR were at risk of flash flood occurrences. Those flash flood risk areas were extended to other provinces at the 24 June 2013 at 00:00 UTC. Figure 3.1-21 presents the 3 hour flash flood risk areas at some areas of Lao PDR that were detected by MRCFFG system on 23 June 2013 at 12:00

UTC. Figure 3.1-22 presents the 3 hourly FFG value that extended to other areas in northern part of Lao PDR.

The information on flash flood risk areas on 23 June 2012 at 12 :00 UTC was confirmed by the information published in the Lao PDR newspaper "Vientiane Times", dated 27 June 2013 . The flash flood risk areas, which were detected by the MRCFFGS, corresponded with the reported flash flood areas. Annex 1.1 provides the information collected from the "Vientiane Times".

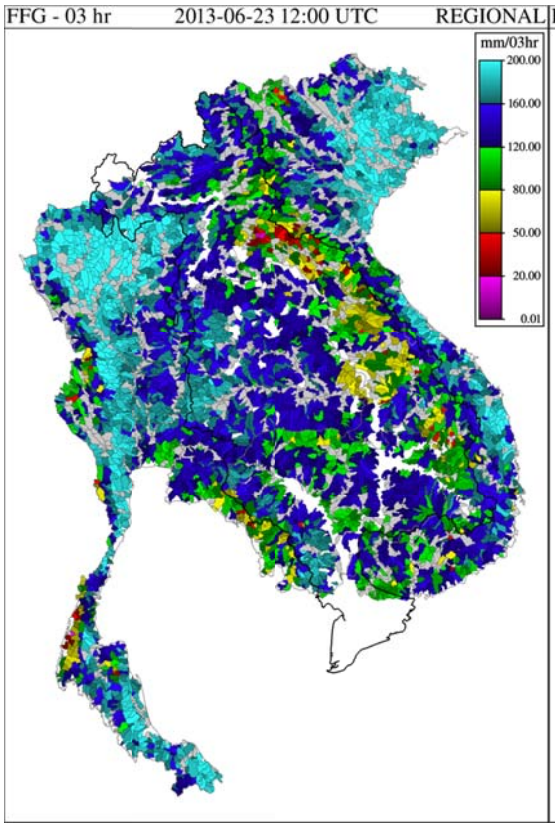


Figure 3.1-21 3 Hourly Flash Flood Guidance (FFG) on 23 June 2013 at 12:00 UTC (19:00 local time) showed a number of high risk areas in some districts of northern provinces in Viet Nam and Lao PDR.

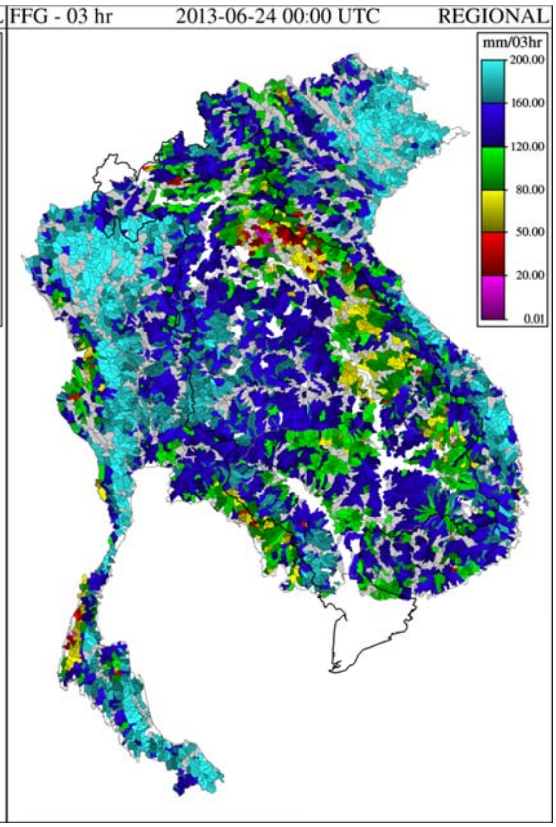


Figure 3.1-22 3 Hourly Flash Flood Guidance (FFG) on 24 June 2013 at 00:00 UTC (07:00 local time) showed a number of high risk areas to flash flood occurrences in Lao PDR was increased.

3.1.4 Impact of TS BEBINCA to water levels in some tributaries of the Mekong River Basin

The heavy rainfall that occurred in some Mekong sub-catchments, located in central and northern parts of Lao PDR, during the typhoon storm BEBINCA quickly increased the water levels in some tributaries of the sub-catchments Nam Khan, Nam San, Nam Ngiep, Nam Ngum, Nam Cadin on the 23 to 24 June 2013. For example at the Mong Mai hydrological station of the Nam Ngiep catchment the water level increased from 2.82 m at 7:00 AM on 23 June to 8.46 m at 7:00 PM of 24 June 2013; at the Ban Phonesi hydrological station of the Nam Cadin catchment the water level increased from 3.15 m at 07:00 PM on 22 June to a peak level of 8.98 m at 7:00 PM of 24 June 2013. The same situation of increasing water levels can be identified for other stations such as Moung Keo (Nam San catchment), Phieng Luang (Nam Ngum catchment), Ban Mixai (Nam Khan catchment) and Mahaxai (Xe Bang

Fai catchment), where water levels continued to rise to the peak level of 10.81 m on 25 June 2013 at 7:00 AM . Table 3.1-1 presents the record water level at some station located at the tributaries of the Mekong Basin and the Mekong mainstream. Figure 3.1-23 presents the Map of 3 hour FFG on 23 June 2013 at 12:00 UTC (07:00 PM local time) with the location of the water level stations. Figure 3.1-24 presents the Hydrograph at some hydrological stations of the Mekong tributaries.

Table 3.1-1 Record of Water level at hydrological stations located at mainstream and tributaries of Lower Mekong Basin in Lao PDR in the period 18 - 30 June 2013.

StaName	LPB	Paklay	VTE	Paksane	Thakhek	Muong Mai	B. Phone Si	Muong Kao	Mahaxai	Phiengluang	Ban Mixai
18/6/13 7:00	4.18	2.54	2.32	4.64	4.21	1.74	1.62	2.23	6.12	0.61	0.29
18/6/13 19:00	4.24	2.23	2.3	4.64	4.16	2.3	1.61	3.19	6.14	0.62	0.28
19/6/13 7:00	4.36	2.05	2.25	4.65	4.08	2.2	1.6	3.12	6.14	0.61	0.3
19/6/13 19:00	4.38	1.82	2.18	4.7	4.04	2.68	1.58	3.71	6.14	0.61	0.29
20/6/13 7:00	4.4	1.73	2.03	4.75	4	3.25	1.56	4.19	6.14	0.6	0.33
20/6/13 19:00	4.41	1.68	1.9	4.88	4.04	3.2	1.84	4.35	6.18	0.6	0.3
21/6/13 7:00	4.42	1.62	1.78	5.02	4.03	3.27	2.52	4.4	6.02	0.6	0.38
21/6/13 19:00	4.43	1.66	1.6	4.87	4.17	3.04	2.33	4.1	6.21	0.61	0.3
22/6/13 7:00	4.45	1.78	1.44	4.72	4.34	3.06	2.3	3.62	6.4	0.66	0.42
22/6/13 19:00	4.74	1.91	1.42	4.59	4.39	2.9	3.15	3.58	6.56	0.65	0.39
23/6/13 7:00	5.04	1.99	1.4	4.46	4.43	2.82	3.67	3.86	6.9	0.69	0.4
23/6/13 19:00	5.57	2.08	1.42	4.7	4.69	4.8	7.42	4.57	8.2	1.66	0.5
24/6/13 7:00	6.11	2.15	1.46	4.8	5.38	7.46	7.85	6.2	9.81	4.18	2.88
24/6/13 19:00	6.81	2.68	1.48	5.86	5.91	8.46	8.98	9.29	10.35	6.9	3.6
25/6/13 7:00	7.51	3.07	1.5	6.06	6.77	8	8.1	9.09	10.8	4.89	5.17
25/6/13 19:00	7.56	3.72	1.6	6.53	7	6.84	6.75	8.8	10.81	3.95	3.8
26/6/13 7:00	7.2	4.32	1.65	6.21	7.26	5.84	5.52	6.05	10.81	2.94	2.88
26/6/13 19:00	7.06	4.86	1.84	6.17	7.27	5.46	6.52	6.17	10.78	2.12	2.07
27/6/13 7:00	6.92	5.82	2.08	6.14	7.28	5.06	6.47	6.36	12.1	1.8	2.02
27/6/13 19:00	6.65	5.76	2.68	6.16	7.27	6.04	6.45	6.8	11.4	1.68	1.66
28/6/13 7:00	6.38	5.68	3.68	6.2	7.26	5.52	6.4	6.68	10.6	1.61	1.46
28/6/13 19:00	6.22	5.44	3.8	6.38	7.24	4.48	6.31	6.3	10.32	1.59	1.3
29/6/13 7:00	6.06	5.25	4.1	6.56	7.22	4.26	5.79	5.7	9.2	1.56	1.19
29/6/13 19:00	5.91	4.84	4.05	6.75	7.13	4.1	4.83	5	9.45	1.58	1.11
30/6/13 7:00	5.76	4.63	3.97	6.95	7	4.2	4.45	4.6	9.3	1.56	1.1
30/6/13 19:00	5.65		3.82	6.92	6.93	4	4.4	4.5	9	1.54	1.08

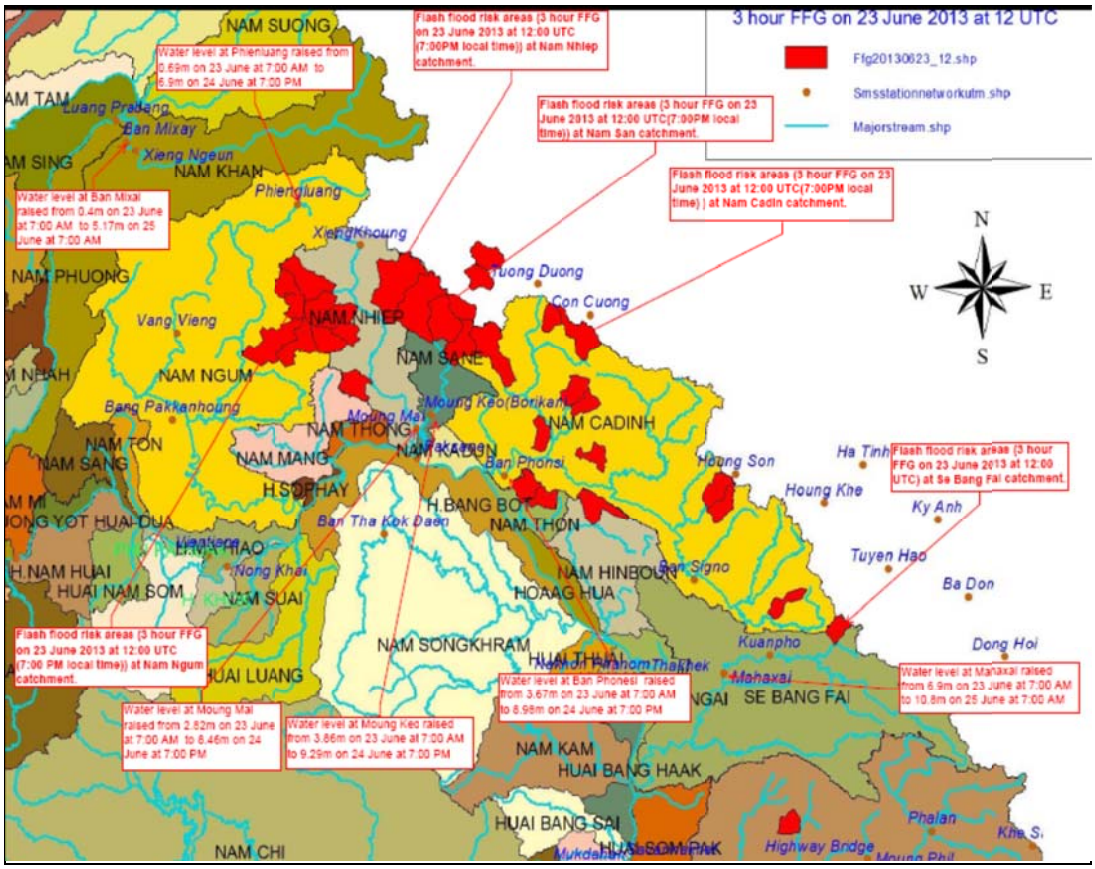


Figure 3.1-23 Map of 3 hour FFG on 23 June 2013 at 12:00 UTC (07:00 PM local time) with location of Water level stations.

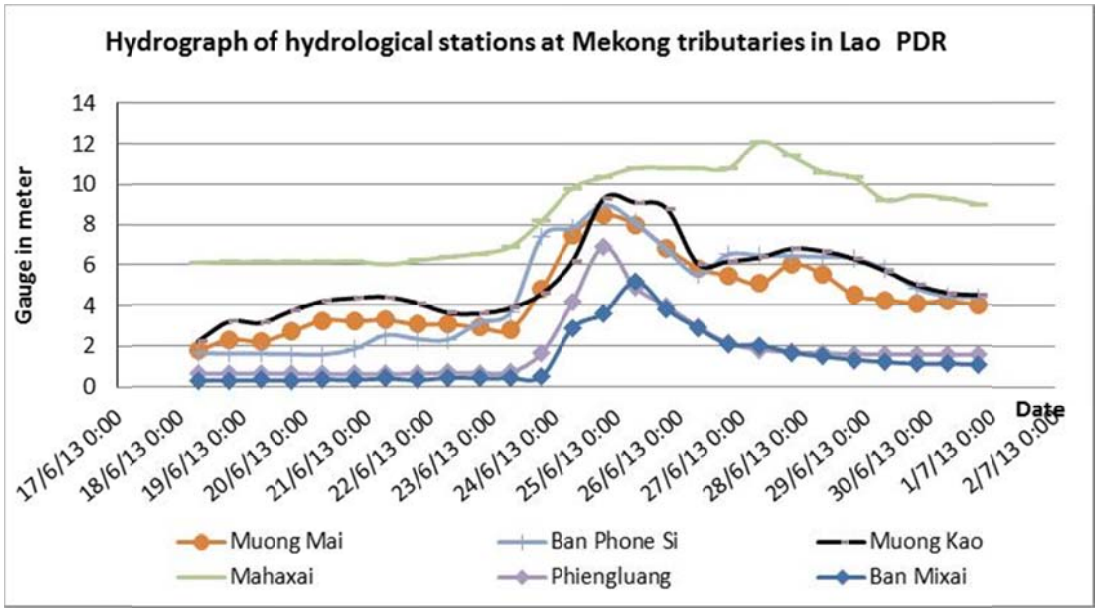


Figure 3.1-24 Hydrograph at some hydrological stations of Mekong tributaries in Lao PDR during the TS BEBINCA.

3.1.5 Raising water levels at hydrological stations of Mekong Mainstream

Quick increased water level in tributaries of central and northern parts of Lao PDR also leading to increased the level of Mekong mainstream in some monitoring stations from Luang Prabang station down to Pakse station. At some monitoring stations along the Mekong mainstream the water levels rose in the evening of 22 June to reach the peak level close to or higher than the long term average daily value. Figure 3.1-24 to Figure 3.1-31 present the hydrograph of monitoring stations along the Mekong mainstream.

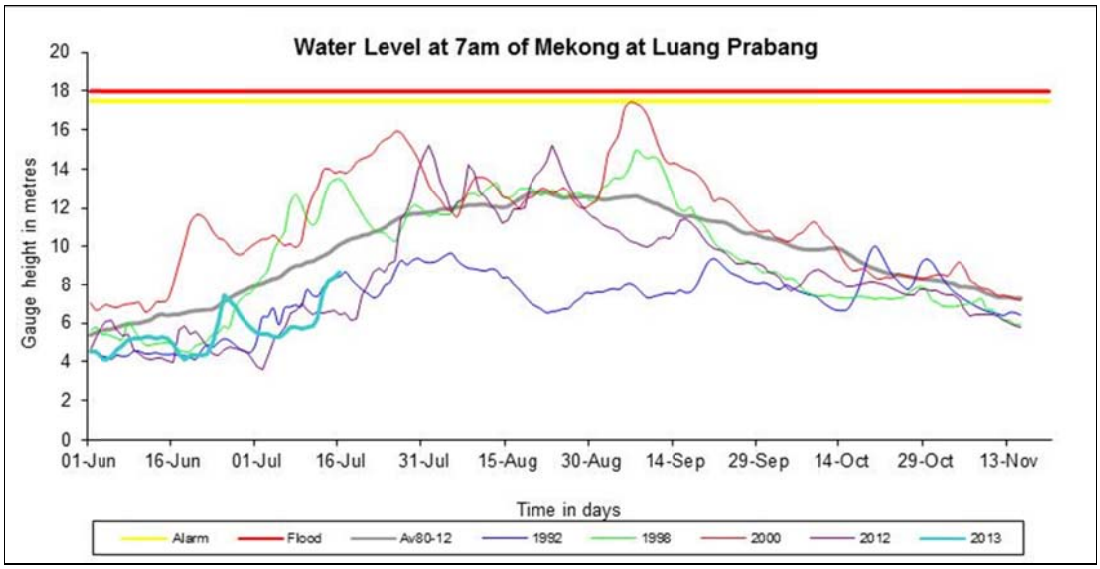


Figure 3.1-25 Hydrograph of Mekong at Luang Prabang , where WLs rose after TS BEBINCA.

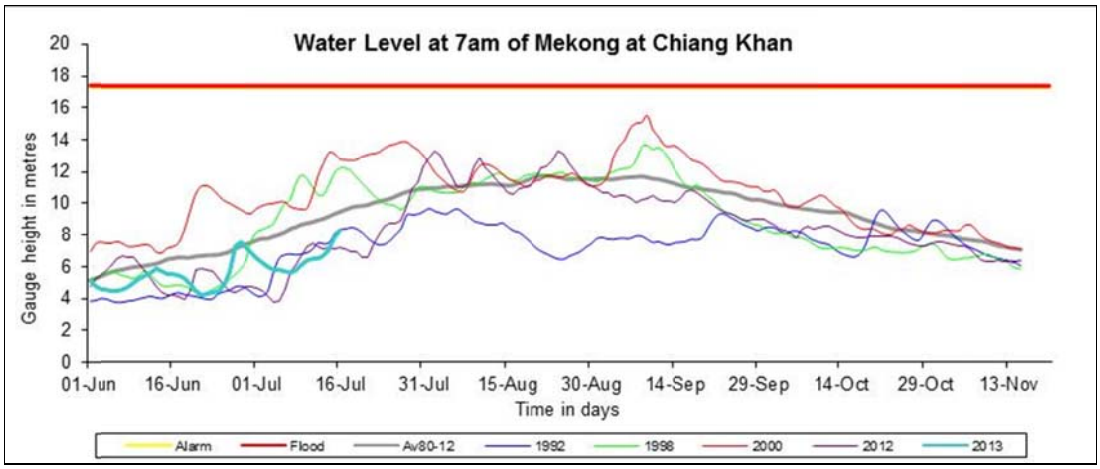


Figure 3.1-26 Hydrograph of Mekong at Chiang Khan, where WLs rose after TS BEBINCA.

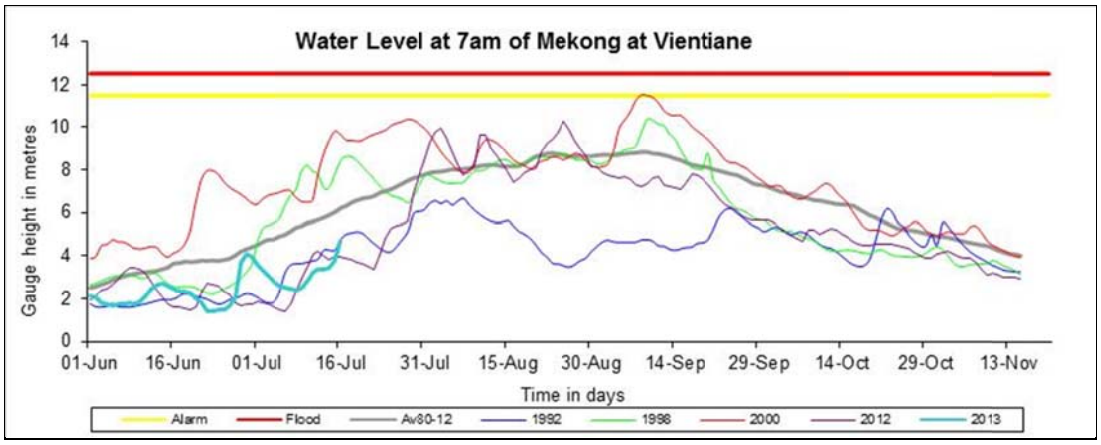


Figure 3.1-27 Hydrograph of Mekong at Vientiane, where WLs rose after TS BEBINCA.

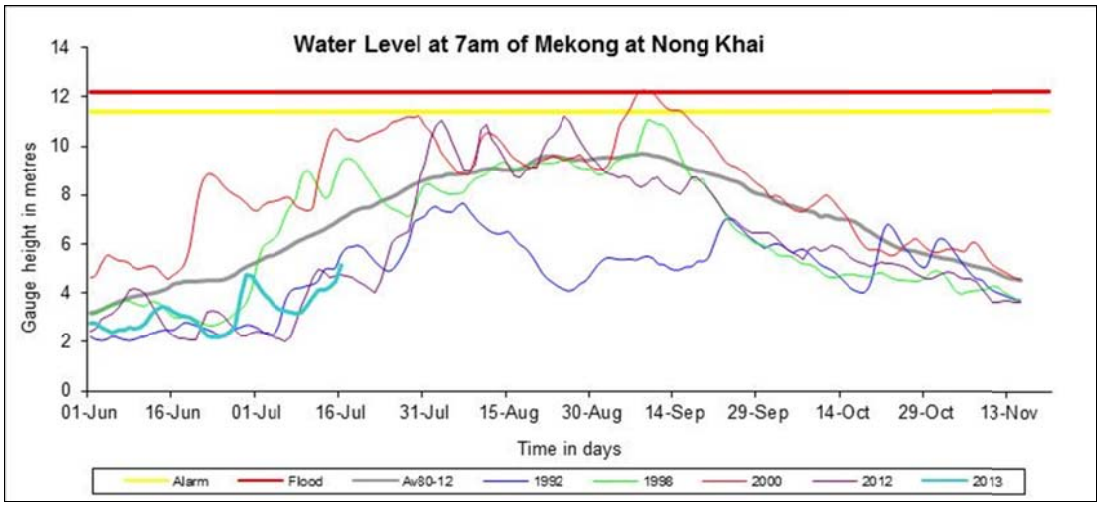


Figure 3.1-28 Hydrograph of Mekong at Nong Khai, where WLs rose after TS BEBINCA.

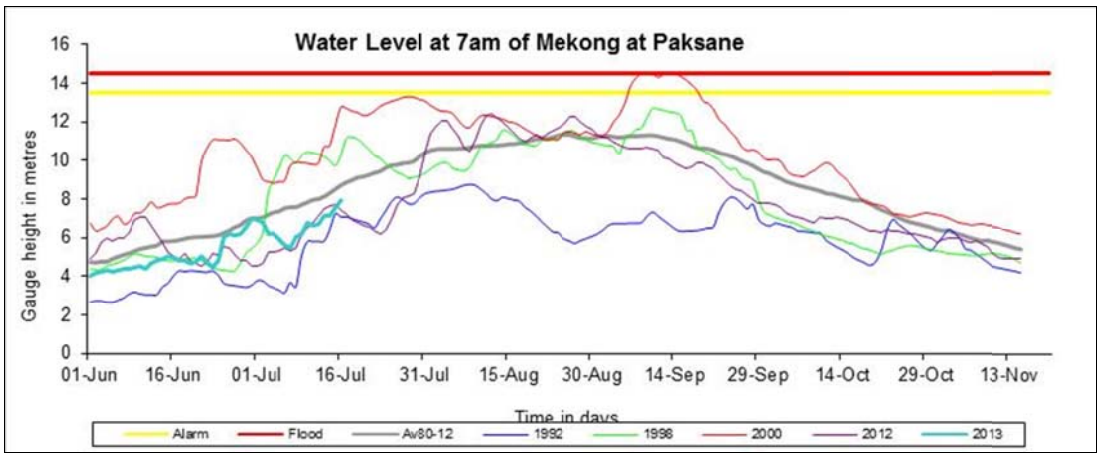


Figure 3.1-29 Hydrograph of Mekong at Paksane, where WLs rose after TS BEBINCA.

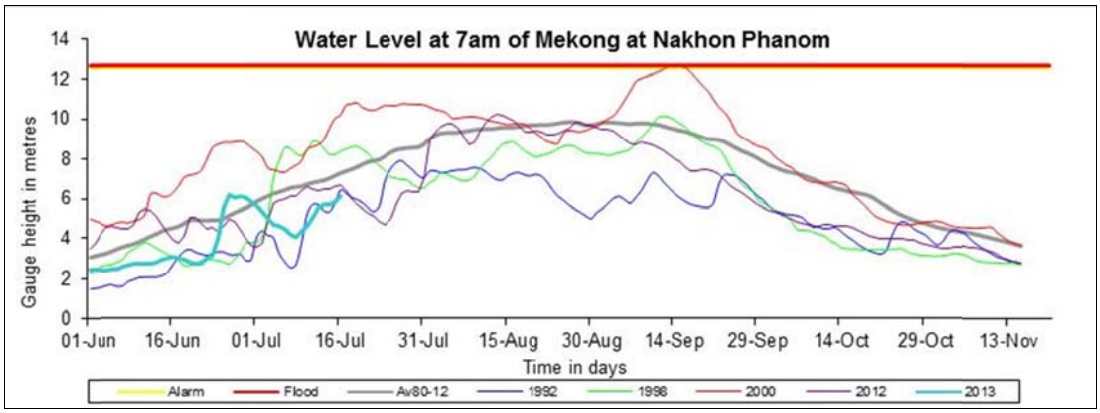


Figure 3.1-30 Hydrograph of Mekong at Nakhorn Phanom, where WLs rose after TS BEBINCA.

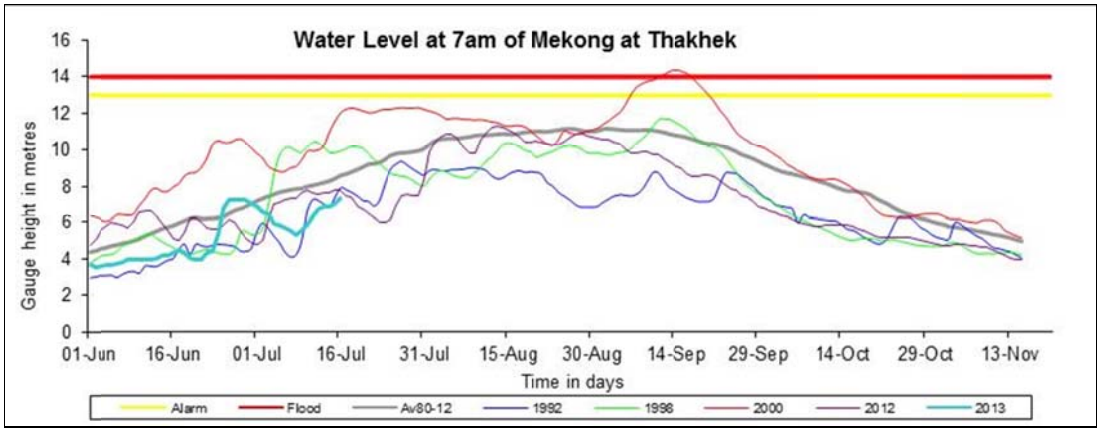


Figure 3.1-31 Hydrograph of Mekong at Chiang Thakhek , where WLs rose after TS BEBINCA.

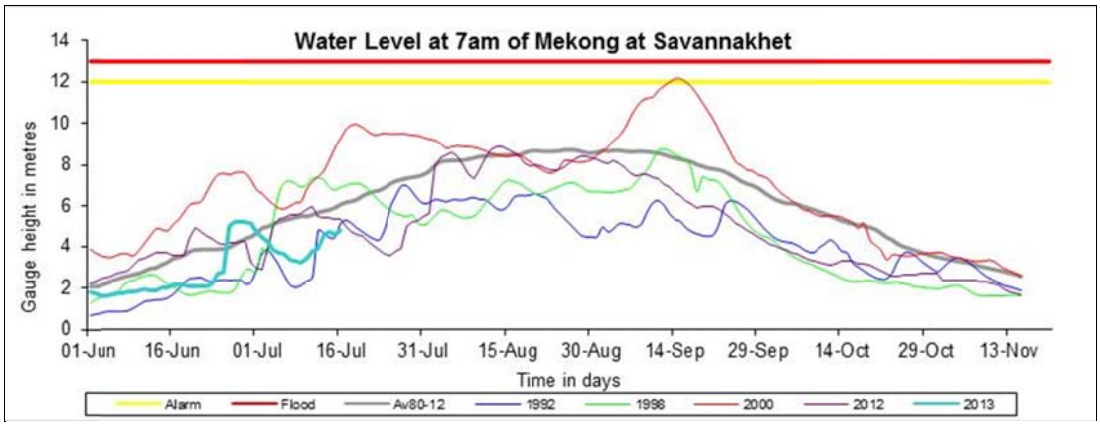


Figure 3.1-32 Hydrograph of Mekong at Savannakhe**t**, where WLs rose after TS BEBINCA.

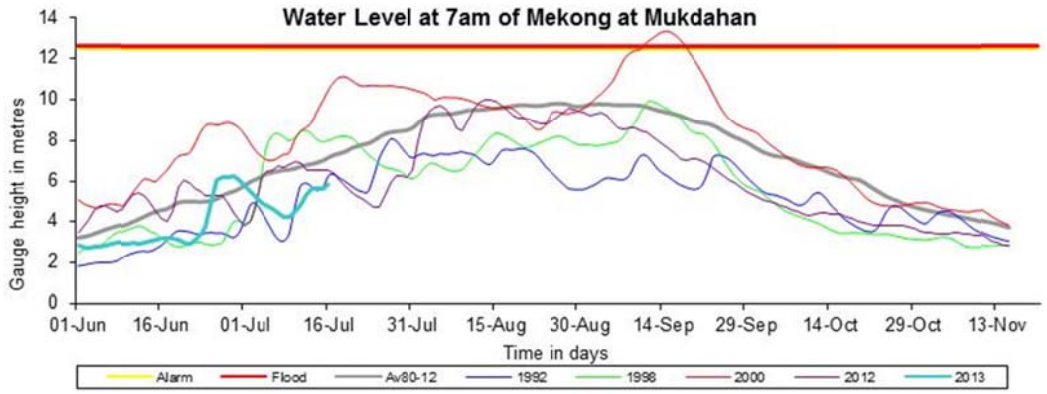


Figure 3.1-33 Hydrograph of Mekong at Mukdahan, where WL was raised after the TS BEBINCA.

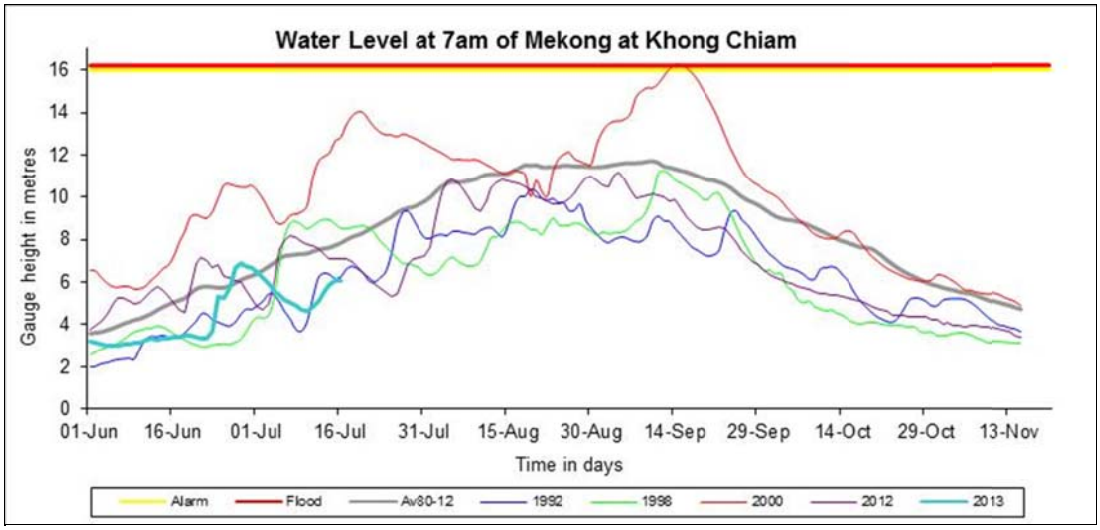


Figure 3.1-34 Hydrograph of Mekong at Khong Chiam, where WL was raised after the TS BEBINCA.

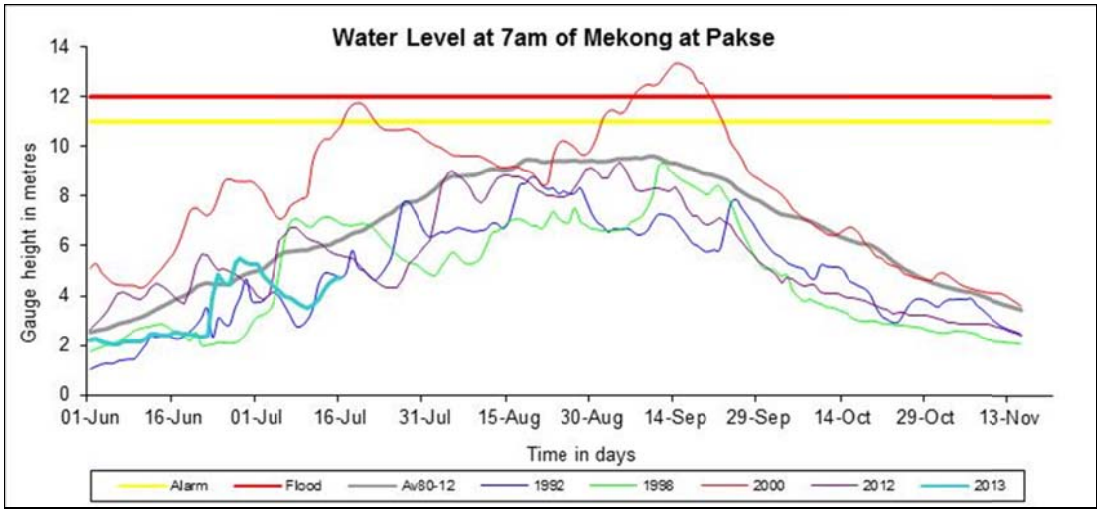


Figure 3.1-35 Hydrograph of Mekong at Pakse, where WLs rose after TS BEBINCA.

3.1.6 Conclusion

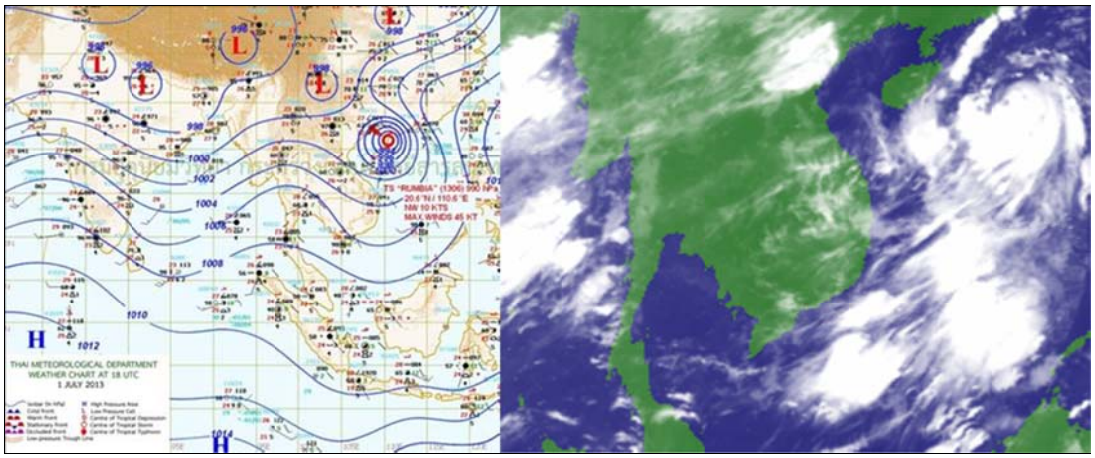
Based on the analysis of the information and hydro-meteorological data collected during the typhoon BEBINCA, the following conclusions are presented below:

1. BEBINCA was the first storm that impacted Viet Nam and Lao PDR in the 2013 typhoon season. The last tropical system that directly impacted Viet Nam was Typhoon SON-TINH, which made landfall in almost the same location in late October of 2012. While BEBINCA was not nearly as strong as Typhoon SON-TINH it made landfall there where many of the same areas were considerably damage was done last October, areas which again were affected in 2013.
2. During the period that BEBINCA weakened to a depression heavy rainfall was recorded (more than hundred mm per day) in many areas of the northern part of Viet Nam, and in many sub-catchments of LMB, located in northern and central parts of Lao PDR.
3. Water levels at some hydrological stations located in a number of tributaries of the sub-catchments Nam Nhiep, Nam Cadin, Nam Ngum, Nam San, Nam Khan and Xe Bang Fai quickly rose (approximately 3-4 meter per day), which was caused by heavy rainfall from the depression BEBINCA.
4. Following by increased water levels at some tributaries, water levels at some monitoring stations along the Mekong mainstream remarkably increases; some of these reached close to or even higher than the daily long term average value.
5. On Sunday 23 June 2013 at 06:00 UTC (13:00 AM local time) the 3 hourly MRC-RFMMC flash flood guidance system detected a number of flash flood risk areas at some districts of northern province of Viet Nam, such as Lao Cai, Nghe An, Ha Tinh, Lai Chau and Hoa Binh. The flash flood risk areas detection by MRCS-RFMMC-FFG system was confirmed by the information published in the Viet Nam newspaper “Viet Nam News” on 25 June 2013 (please see this information in annex 3.1).
6. Also on Sunday 23 June 2013 at 12:00 UTC (19:00 local time) the 1 hourly MRCS-RFMMC-FFG system detected a number of flash flood risk areas in some villages of Bolikhamxay, Xaysomboung, Khammun and Xiengkhuan provinces. These flash flood risk areas were confirmed by the information published in the “Vientiane T”mes" on 27 June 2013 (please see this information in annex 3.1).
7. During TS BEBINCA the MRCS-RFMMC–FFG system was able to detect the flash flood risk areas at some provinces in the northern part of Lao PDR and Viet Nam at least 6 to 12 hour before flash floods happened.

3.2 Flash Floods Caused by Tropical Storm RUMBIA

3.2.1 Weather condition during the first week of July

On 02 July 2013 at 18 .00 UTC, the latitude from 00N to 280N and the longitude from 900E to 1250E, the Southwest monsoon prevailed over Myanmar, the Andaman Sea, the Gulf of Thailand, Thailand, Lao PDR, Cambodia and Viet Nam, while the Tropical Storm (TS) RUMBIA travelled over the East Sea. The TS was moving northwestwards and generated heavy rainfall at some provinces on the northern part of Viet Nam (please see Figure 3.2-1). Figure 3.2-2 presents the satellite image when TS RUMBIA hit the northern part of Viet Nam.



Source: Japan Meteorological Agency

Figure 3.2-1 Weather chart on 1 July 2013 at 18:00 UTC (02 July at 01:00AM) during TS Rumbia moved close to the northern part of Viet Nam.

Figure 3.2-2 Infrared Image, MTSAT IR, at 23.50 UTC on June 30, 2013 (06:50 AM on 01July local time).

3.2.2 Heavy rainfall in the northern part of Viet Nam

During the last week of June some areas in the northern provinces of Viet Nam were covered by the heavy rain. At some rainfall stations the daily accumulated rainfall reached up to 150 mm. Figure 3.2-3 to Figure 3.2-8 present the daily rainfall recorded at rainfall stations located at northern part of Viet Nam in the period 27 June until 4 July. Figure 3.2-9 presents the map of location of rainfall stations, where the recorded rainfall data were collected.

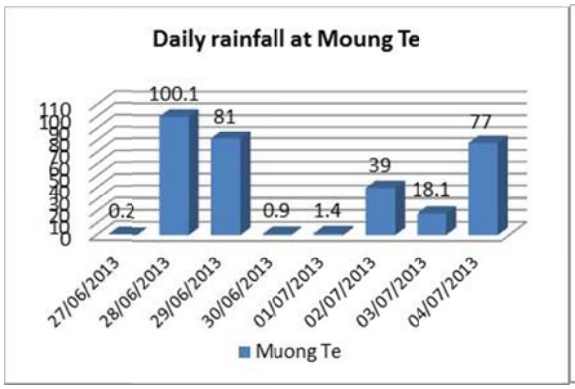


Figure 3.2-3 Daily rainfall (in mm)at Moung Te.

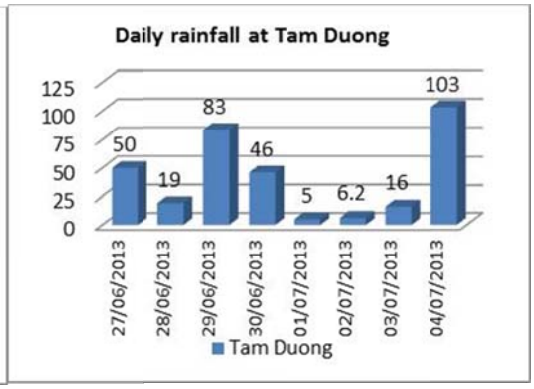


Figure 3.2-4 Daily rainfall (in mm)at Tam Duong.

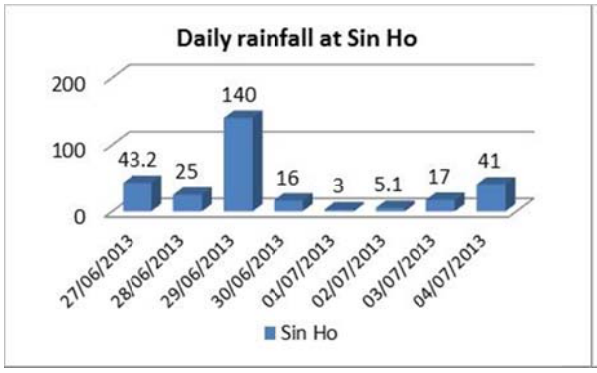


Figure 3.2-5 Daily rainfall (in mm) at Sin Ho.

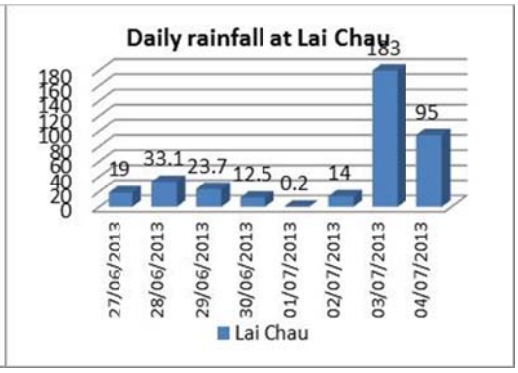


Figure 3.2-6 Daily rainfall (in mm) at Lai Chau.

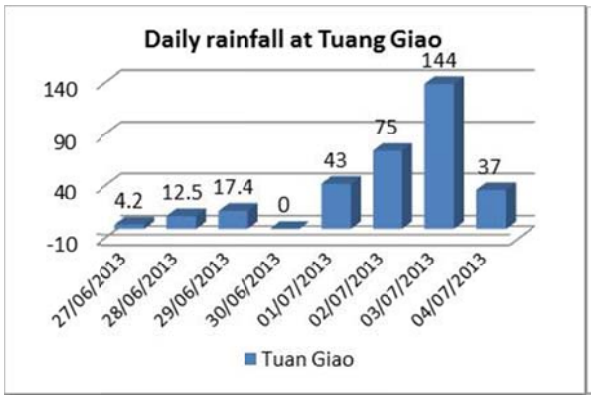


Figure 3.2-7 Daily rainfall (in mm) at Tuang Giao.

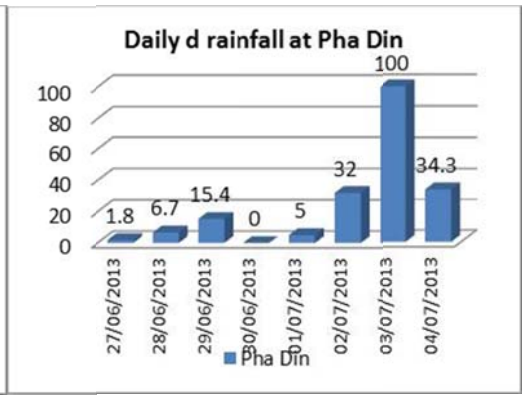


Figure 3.2-8 Daily rainfall (in mm) at Pha Din.

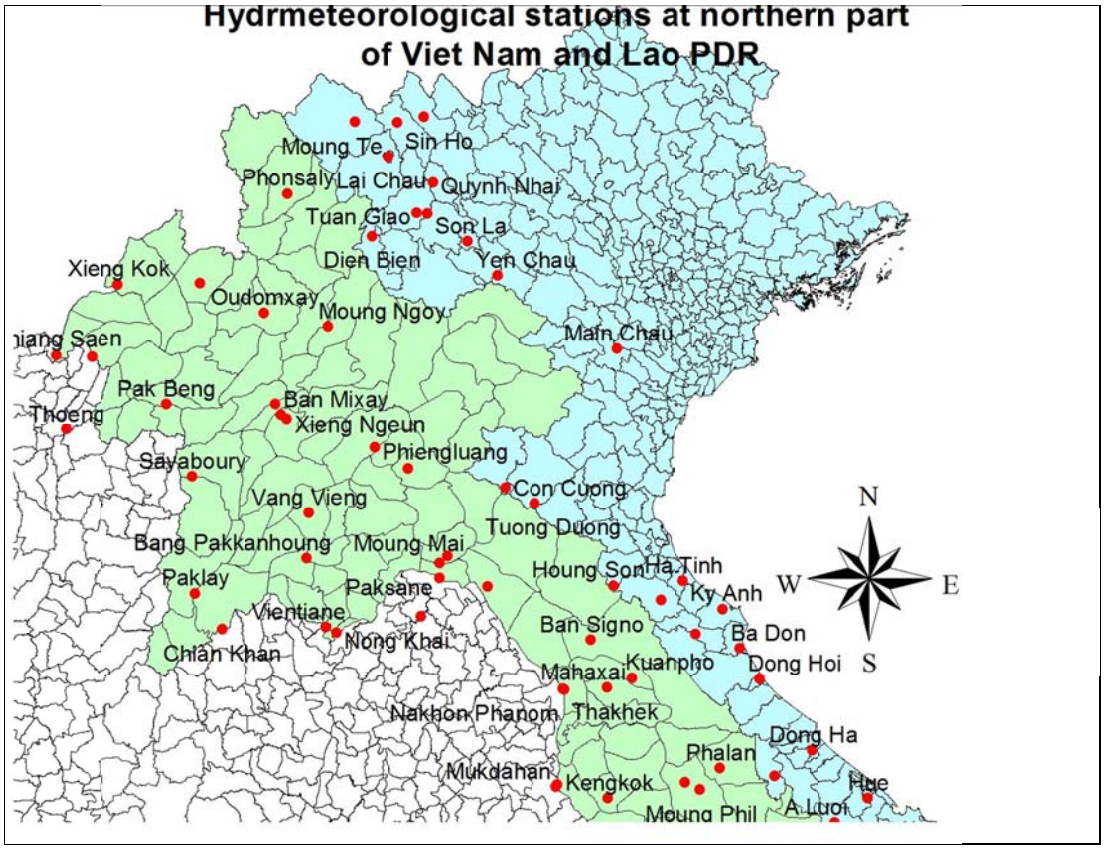


Figure 3.2-9 Map of rainfall stations at northern part of Viet Nam and Lao PDR.

3.2.3 Flash floods in the northern provinces of Viet Nam during TS RUMBIA

During heavy rains during the last week of June and first week of July 2013 in some areas of northern provinces of Viet Nam, the MRCFFG system detected on 01 July 2013 at 00:00 UTC (07:00 Local time) the risk of flash flood ocurances in some districts of the northern provinces, such as Ha Giang, Lao Cai and Lai Chau, in Viet Nam. Figure 3.2-10 presents the 3 hourly FFG value at some areas in the northern provinces of Viet Nam.

The information on flash flood risk areas, detected by MRCFFG system on 01 July 2013 on 00:00 UTC, was confirmed by the information published in the Vietnamese newspaper "Viet Nam People Army Newspaper", dated 04 July 2013. Some flash flood risk areas that were

detected by the FFG system on 01 and 02 July 2013, corresponded with the reported flash flood areas. Annex 1.2 provides the information collected from the "Viet Nam People Army Newspaper".

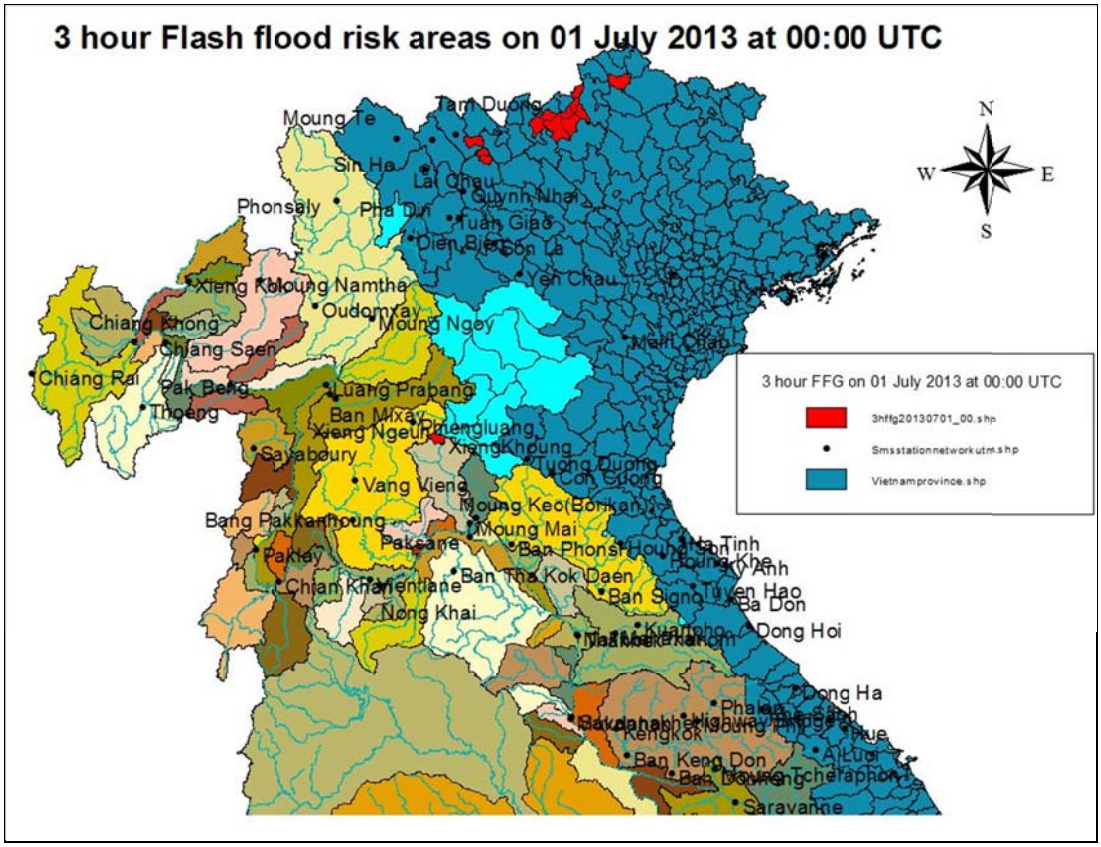


Figure 3.2-10 Flash flood risk areas detected by MRCFFG system on 01 July 2013 at 00:00 UTC.

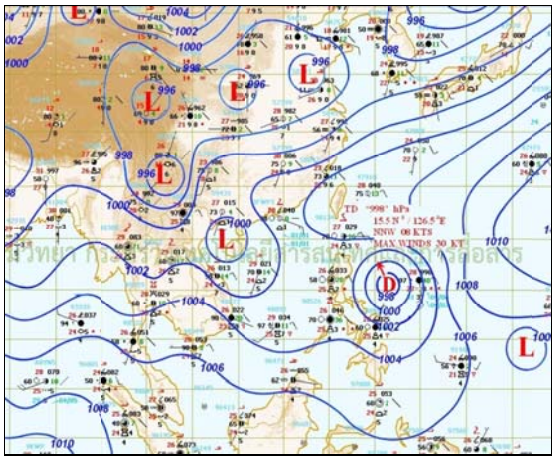
3.2.4 Conclusions

1. RUMBIA is third storm in 2013 heading to Viet Nam, which has claimed damage to three provinces in the northern part of Viet Nam.
2. Many Meteorological stations located in the northern part of Viet Nam did record heavy rainfall during RUMBIA. Some of stations recorded a daily amount of rainfall up to 150 to 180 mm.
3. In the morning of 01 July 2013 at 00:00 UTC (07:00 Local time) the MRCFFG system detected that some districts in the northern provinces in Viet Nam, such as Ha Giang, Lao Cai, and Lai Chau, were at risk of flash flood occurrences.
4. The information on flash flood risk areas, detected by MRCFFG system on 01 July 2013 on 00:00 UTC was confirmed by the information published in the Viet Nam newspaper "Viet Nam People Army Newspaper", dated 04 July 2013. Based on that information one may conclude that flash floods that occurred on 02 July corresponded with the flash flood risk areas detected by the FFG on 01 July at 00:00 UTC.

3.3 Flash Floods Caused by ITCZ (19 - 20 July 2013)

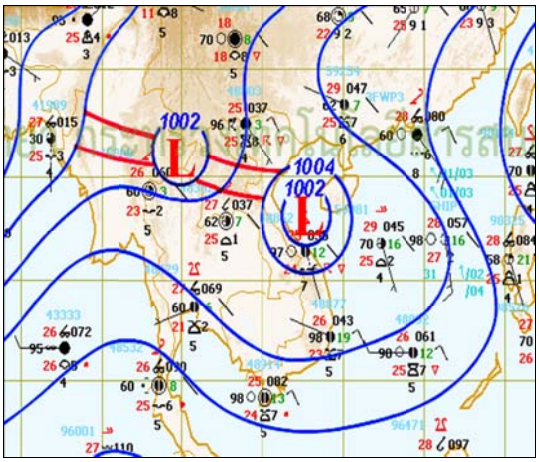
3.3.1 Weather condition during the third week of July

The whole week from 15 to 22 July the Lower Mekong Basin was influenced by low pressure and the Inter Tropical Convergence Zone (ITCZ) that covered the upper part of Thailand, the lower North of Indochina Peninsular to the active pressure cell over the Gulf of Tonkin. During this period some areas of central and northern parts of Lao PDR and also some areas of the northern provinces of Viet Nam were covered by heavy rainfall, that caused flash floods in some districts of northern provinces of Viet Nam and in some villages of provinces of central part of Lao PDR. Figure 3.3-1: Weather Chart issued at 18:00 UTC on 17 July 2013, and Figure 3.3-2: Weather Chart issued at 18:00 UTC on 19 July 2013.



Source: Thai Meteorological Department

Figure 3.3-1 Weather Chart issued at 18:00 UTC on 17 July 2013.



Source: Thai Meteorological Department

Figure 3.3-2 Weather Chart issued at 18:00 UTC on 19 July 2013.

3.3.2 Heavy rainfall period ITCZ

From 17 to 20 July 2013 the northern provinces of Viet Nam covered by the low pressure cell and ITCZ , which caused heavy rainfall; the amount of daily accumulated rainfall of some hydro-meteorological stations located in the northern provinces rose up to 70- 120 mm. Figure 3.3-3 to Figure 3.3-6 show the daily accumulated rainfall of hydro-meteorological stations of northern province during the third week of July 2013. Figure 3.3-7 presents the mean average precipitation (MAP) for 24 hour accumulated rainfall.

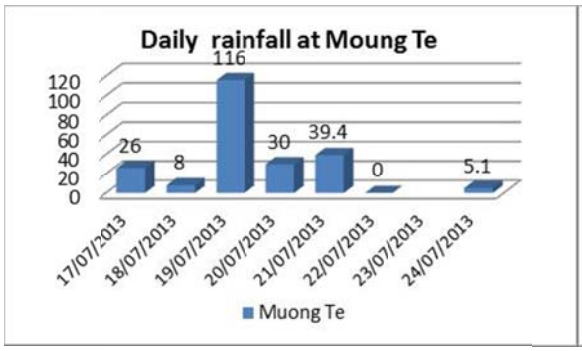


Figure 3.3-3 Daily rainfall (in mm) at Moung Te.

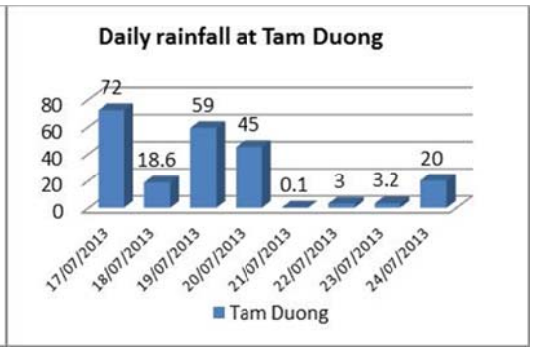


Figure 3.3-4 Daily rainfall (in mm) at Tam Duong.

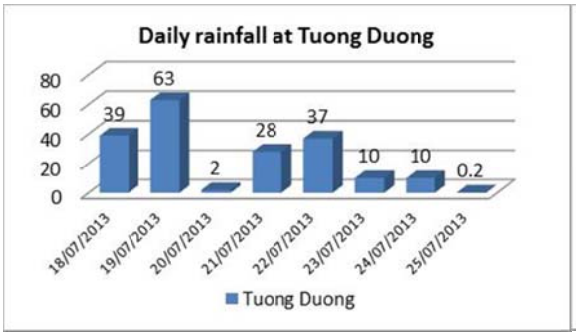


Figure 3.3-5 Daily rainfall (in mm) at Tuong Duong.

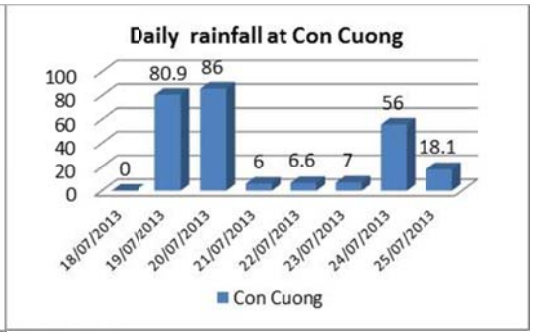


Figure 3.3-6 Daily rainfall (in mm) at Con Cuong.

3.3.3 Flash floods in the northern provinces of Viet Nam on 20 July 2013

On 20 July 2013 at 00:00 UTC (07:00 Local time) the MRCFFG system detected that some districts of northern provinces of Viet Nam, such as Son La, Lao Cai, Lai Chau and Dien Bien (former district of Lai Chau province), were at risk of flash flood occurrences. Figure 3.3-8 presents the 3 hourly FFG value at some areas in the northern provinces of Viet Nam.

The information on flash flood risk areas that detected by MRCFFG system on 20 July 2013 on 00:00 UTC was confirmed by the information published in the Viet Nam newspaper "Viet Nam Plus", dated 20 July 2013. Some flash flood risk areas detected by the FFG system on 20 July 2013 corresponded with the reported flash flood areas. Annex 1.3 provides the information collected from the "Viet Nam Plus" and "Viet Nam News", dated 22 July 2013.

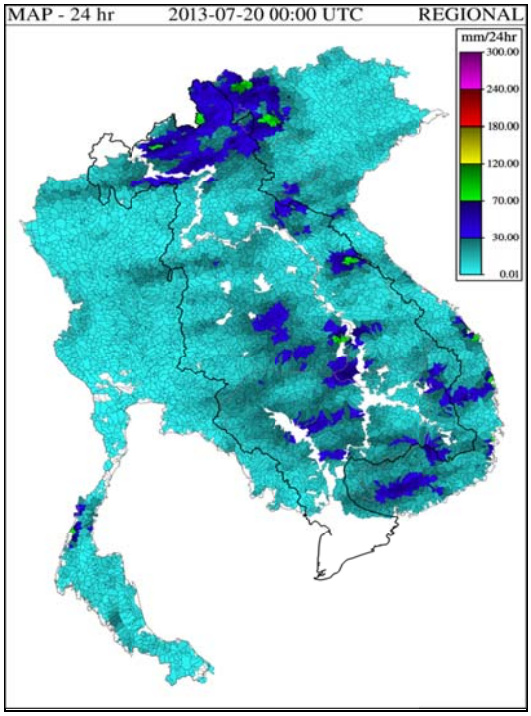


Figure 3.3-7 Daily Mean Aerial Precipitation on 20 July 2013 at 00:00 UTC.

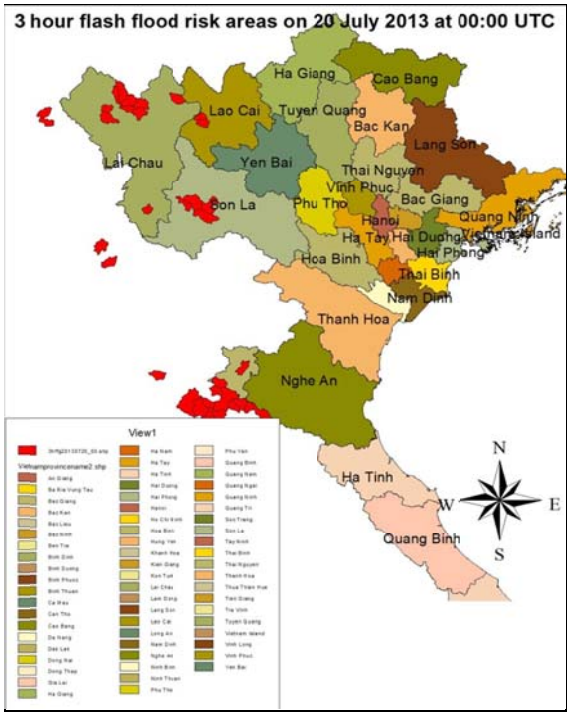


Figure 3.3-8 Flash flood risk areas detected by MRCFFG system on 20 July 2013 at 00:00 UTC.

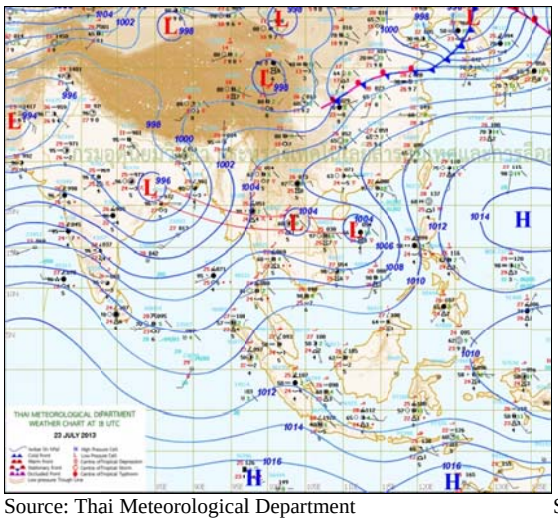
3.3.4 Conclusion

1. During the third week of July, 15 - 22 July 2013, the Mekong region was covered by low pressure and the Inter Tropical Convergence Zone (ITCZ). During this period some areas of central and northern parts of Lao PDR, and some areas of northern provinces of Viet Nam, were covered by heavy rainfall that caused flash floods in some districts of northern provinces of Viet Nam and in some village of provinces of the central part of Lao PDR.
2. Heavy rainfall has been occurred at some areas in northern provinces of Viet Nam. The daily rainfall at some hydro-meteorological station was up to 150 mm.
3. On morning of 20 July 2013 at 00:00 UTC (07:00 Local time) the MRC FFG system detected that some districts of northern provinces, such as at Son La, Lao Cai, Lai Chau, Dien Bien (former district of Lai Chau province) provinces of Viet Nam were at the risk of flash flood occurrences.
4. Some flash flood risk areas that were detected by the FFG system on 20 July 2013, corresponded with the reported flash flood areas in the "Viet Nam Plus" and "Viet Nam News", dated 22 July 2013.

3.4 Flash floods caused by ITCZ (28 – 29 July 2013)

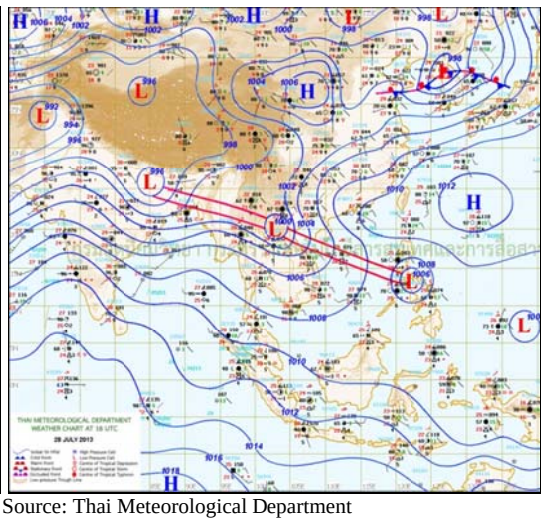
3.4.1 Weather condition during the last week of July

During the last week of July the Mekong Region was again covered by the low pressure cell and the ITCZ, which lied across the northern part of Thailand, Lao PDR and northern part of Viet Nam, before connect to the low pressure cell at the East Sea. Where cause a heavy rainfall at some Sub-catchment of Lower Mekong basin and other areas in the northern part of Viet Nam, The daily rainfall of many rainfall observation stations has been reached to 100-200 mm per day during the last week of July. Figure 3.4-1 and Figure 3.4-2 present the weather chart of Mekong Regions during the last week of July.



Source: Thai Meteorological Department

Figure 3.4-1 Weather Chart issued at 18:00 UTC on 23 July, 2013.



Source: Thai Meteorological Department

Figure 3.4-2 Weather Chart issued at 18 UTC on 28 July 2013.

3.4.2 Heavy rainfall during the ITCZ from 28 - 30 July

During the last week of July, the period 23 - 31 July 2013, the northern provinces of Viet Nam, Thailand and Lao PDR were covered by the low pressure cell and ITCZ, which caused heavy rainfall in some areas of northern provinces of Viet nam, and in some Mekong sub-catchments located in the northern part of Thailand, and northern and central part of Lao PDR. The amount of daily rainfall of some hydro-meteorological stations located in the northern provinces rose up to 70 - 200 mm. Figure 3.4-3 to Figure 3.4-146 present the daily rainfall during the last week of July for some rainfall stations located in northern part of Lao PDR, Thailand and Viet Nam.

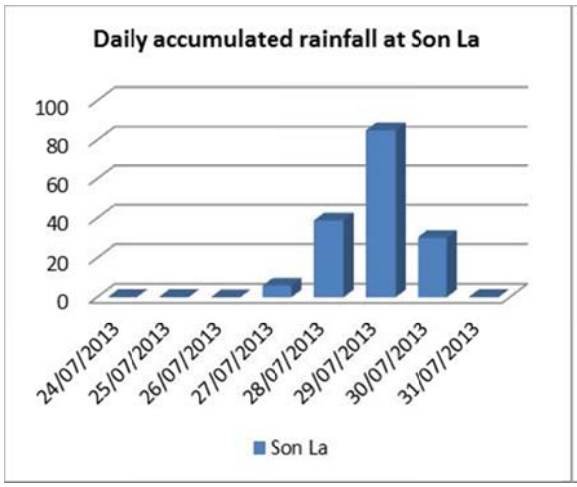


Figure 3.4-3 Daily rainfall at Son La.

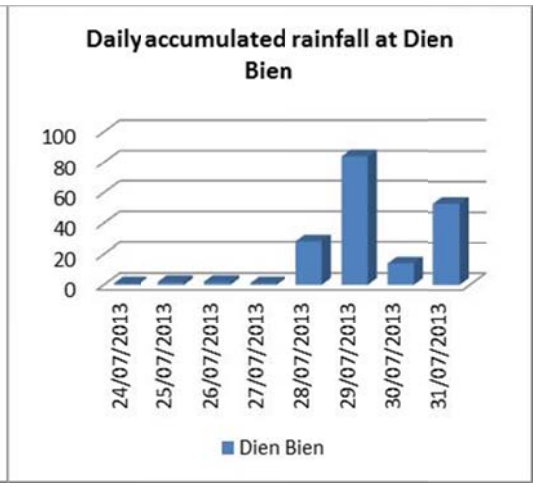


Figure 3.4-4 Daily rainfall at Dien Bien.

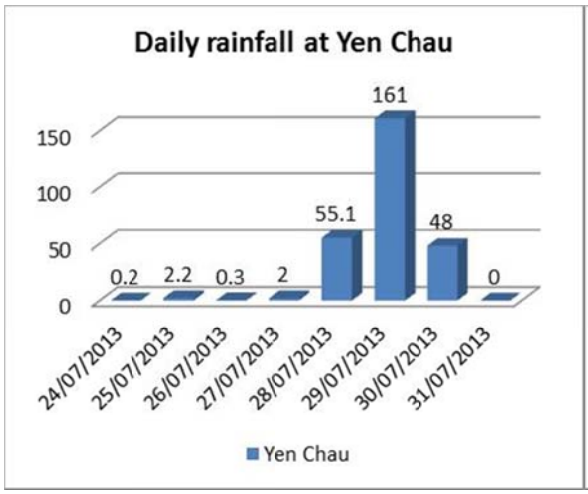


Figure 3.4-5 Daily rainfall at Yen Chau.

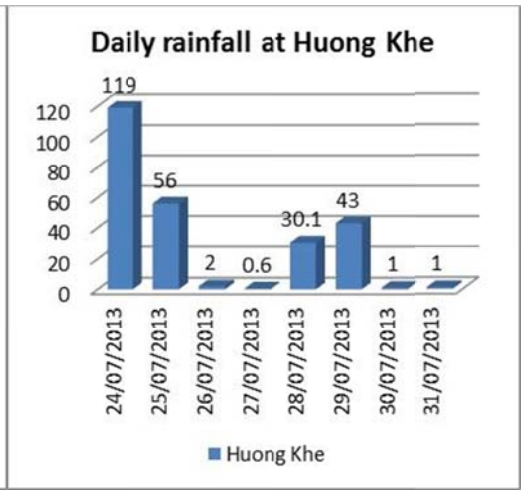


Figure 3.4-6 Daily rainfall at Houng Khe.

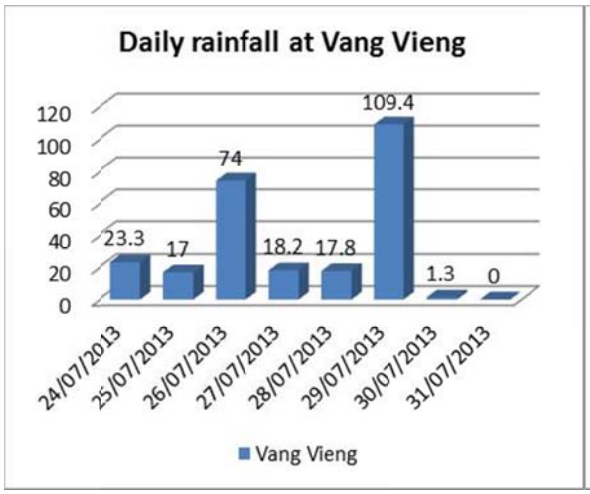


Figure 3.4-7 Daily rainfall at Vang Vieng.

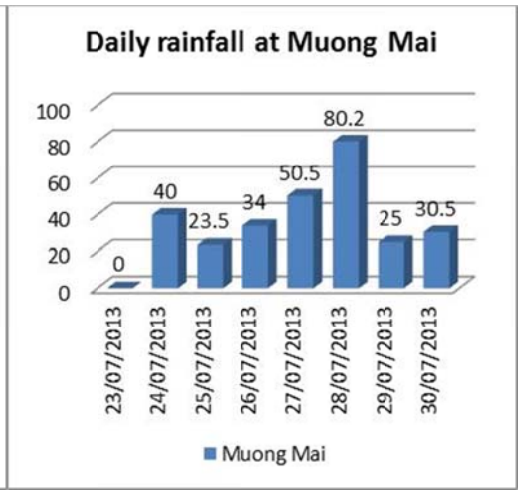


Figure 3.4-8 Daily rainfall at Moung Mai.

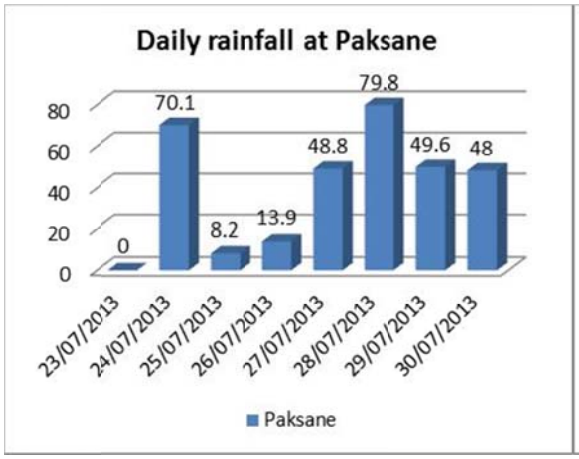


Figure 3.4-9 Daily rainfall at Paksane.

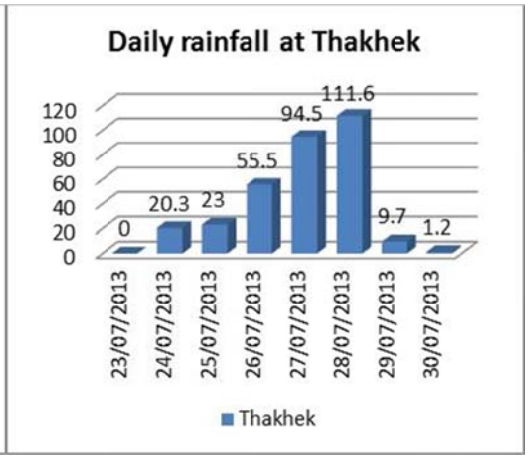


Figure 3.4-10 Daily rainfall at Thakhek.

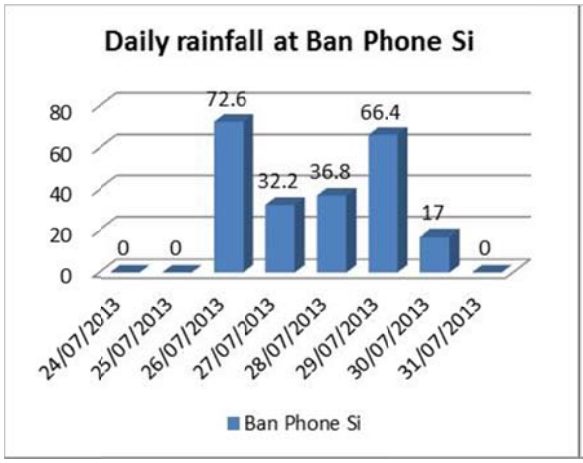


Figure 3.4-11 Daily rainfall at Ban Phone Si.

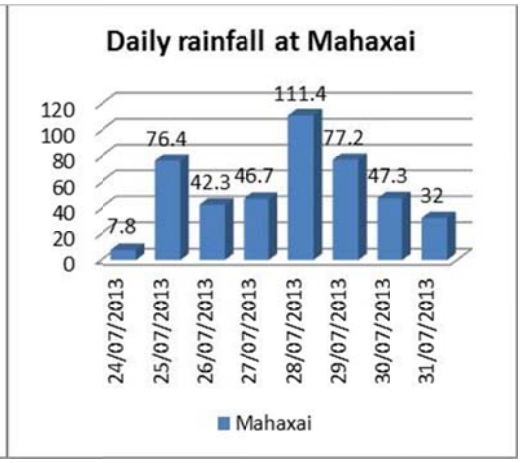


Figure 3.4-12 Daily rainfall at Mahaxai.

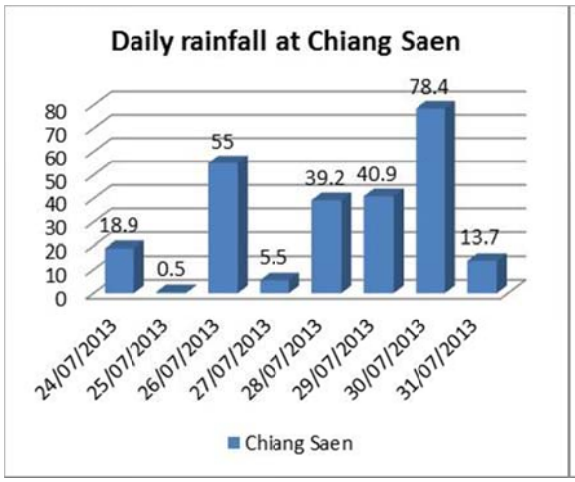


Figure 3.4-13 Daily rainfall at Chiang Saen.

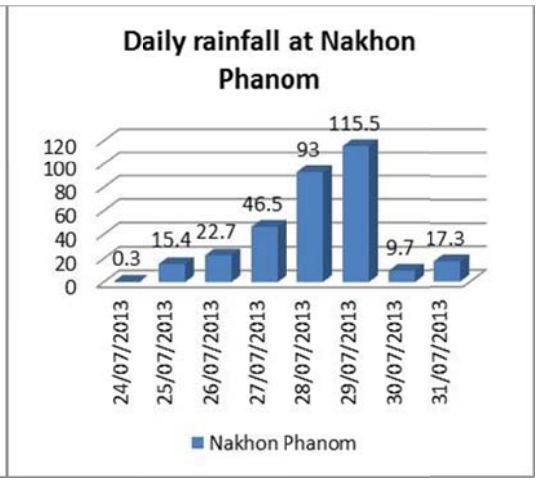


Figure 3.4-14 Daily rainfall at Nakhon Phanom.

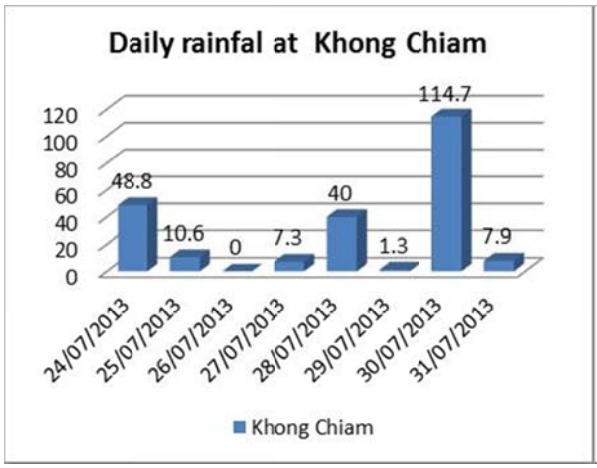


Figure 3.4-15Daily rainfall at Khong Chiam.

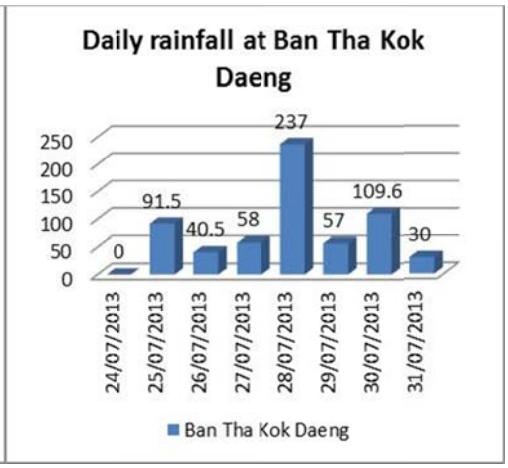


Figure 3.4-16 Daily rainfall at Ban Tha Kok Daeng.

3.4.3 Flash floods in the northern provinces of Viet Nam on 28 July 2013

On 28 July 2013 at 00:00 UTC (07:00 Local time) the MRCFFG system detected that some districts of the northern provinces of Viet Nam, such as Son La, Lai Chau, Bac Kan, Kon Tum, Gia Lai and Binh Thuan, were at risk of flash flood occurrences. Figure 3.4-17 presents the 3 hourly flash flood risk areas on 28 July 2013 at 00:00 UTC that were detected by MRCFFG system.

The information on flash flood risk areas that were detected by MRCFFG system on 28 July 2013 on 00:00 UTC was confirmed by the information published in the Viet Nam newspaper "Viet Nam Plus", dated 29 July 2013. Some flash flood risk areas that were detected by the FFG system on 28 July 2013 corresponded with the reported flash flood areas. Annex 1.4 provides the information collected from the "Viet Nam Plus" and "Viet Nam News", dated 29 July 2013.

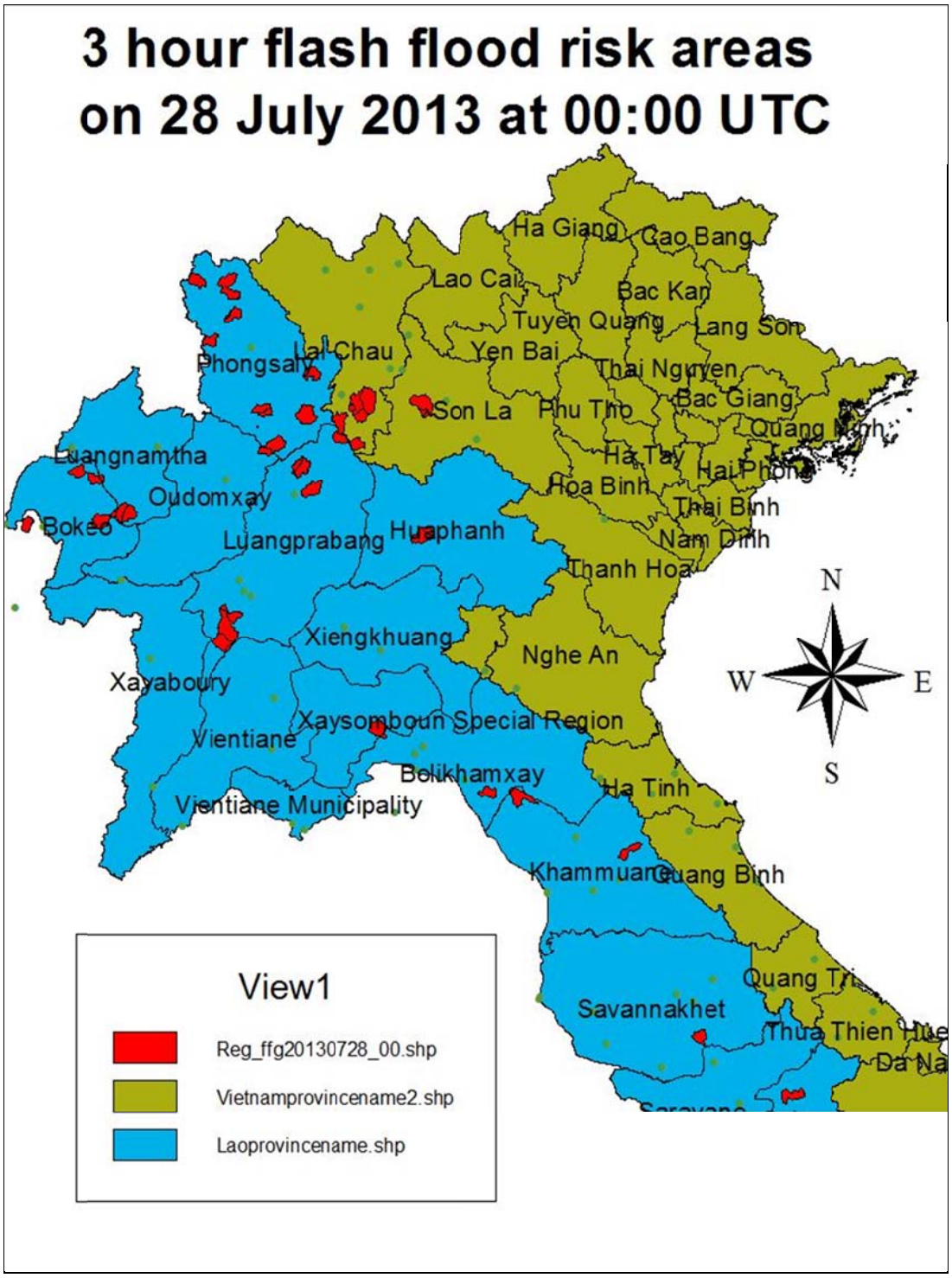


Figure 3.4-17 Flash flood risk areas detected by MRCFFG system on 28 July 2013 at 00:00 UTC.

3.4.4 Flash floods in Xayaboury Province of Lao PDR and the northern provinces of Viet Nam on 29 July 2013

On 29 July 2013 at 00:00 UTC (07:00 Local time) the MRCFFG system detected that some villages of northern and central provinces of Lao PDR, such as Phonsaly, Luangnamtha, Oudomxay, Bokeo, Luang Prabang, Huaphanh, Xayaboury, Xiengkhuang,Vientiane, Xaysomboung, Bolikhamxay and Khammuane, were at the risk of flash flood occurrences. Also some districts of the northern provinces of Viet Nam were under flash flood risk. Those

provinces were Lao Cai, Lai Chau, Son La, Dien Bien, Hao Binh, Nghe An and Hao Binh. Figure 3.4-18 presents 3 hourly flash flood risk areas on 29July 2013 at 00:00 UTC.

The information on flash flood risk areas that were detected by the MRCFFG system on 29 July 2013 on 00:00 UTC was confirmed by the information published in the Lao newspaper "Vientiane Times", dated 05 August 2013. Seven 7 villages in Khop district ("green" color in Figure 3.4-16) of Xayabouri province were impacted by the flood. There are minor differences between the report from the newspaper and the detection by the FFG system. The system detected the many villages at the Hongsa, Ngeun, and Xienghon districts (which was close to the Khop district). Annex 1.4 provides the information collected from the "Vientiane Times", dated 30 July 2013.

The online newspaper "Than Nien", issued on 31 July 2013, informed that some provinces of northern part of Viet Nam, such as Dien Bien, Son La, Lao Cai and Yen Bai, were hit by flash floods in the night of Monday 29 July 2013. These provinces are the same provinces as the MRCFFG detected on the morning of Monday 29 August 2013.

The amount of daily rainfall of some hydro-meteorological stations located in the northern provinces during the last week of July rose up to 70-120 mm, which was the main factor for the flash flood occurrences at some districts of northern provinces in Viet Nam and Lao PDR.

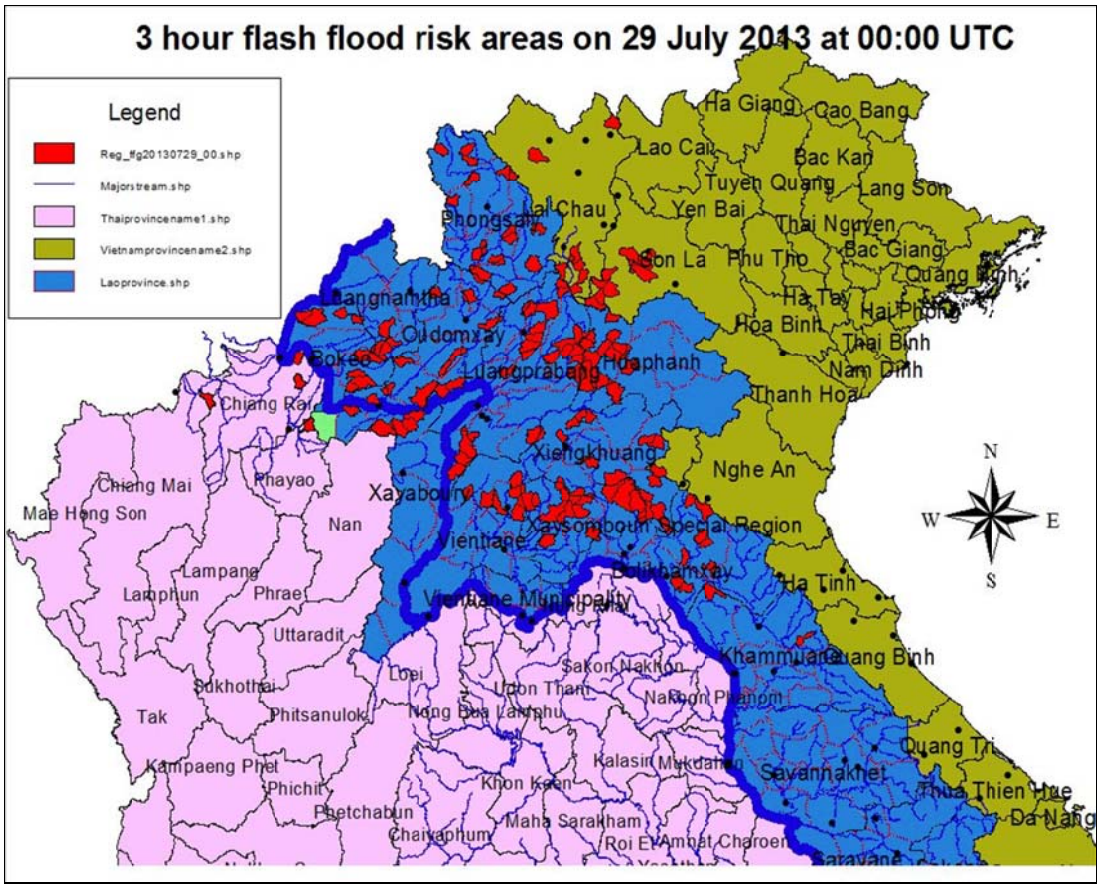


Figure 3.4-18 Flash flood risk areas detected by MRCFFG system on 29 July 2013 at 00:00 UTC.

3.4.5 Conclusions

1. During the last week of July from 23 to 31 July 2013 the Mekong region has been covered by low pressure and the Inter Tropical Convergence Zone (ITCZ). During this period some areas of central and northern parts of Lao PDR, as well as some areas of northern provinces of Viet Nam were covered by the heavy rainfall. This rainfall caused flash flooding in some districts of the northern provinces of Viet Nam while also flash flooding occurred at some village in provinces of central and northern parts of Lao PDR.

2. Heavy rainfall occurred in some areas in northern provinces of Viet Nam as well as in some areas of northern and central provinces of Lao PDR. The daily rainfall at some hydro-meteorological stations was close to 150 mm.

3. On morning of 28 July 2013 at 00:00 UTC (07:00 Local time) the MRCFFG system detected that some districts of northern provinces of Viet Nam, such as at Son La, Lai Chau, Bac Kan, Kon Tum, Gia Lai and Binh Thua, were at the risk of flash flood occurrences. The information on flash flood risk areas that were detected by MRCFFG system on 28 July 2013, at 00:00 UTC, was confirmed by the information published in the Viet Nam newspaper "Viet Nam Plus", dated 29 July 2013.

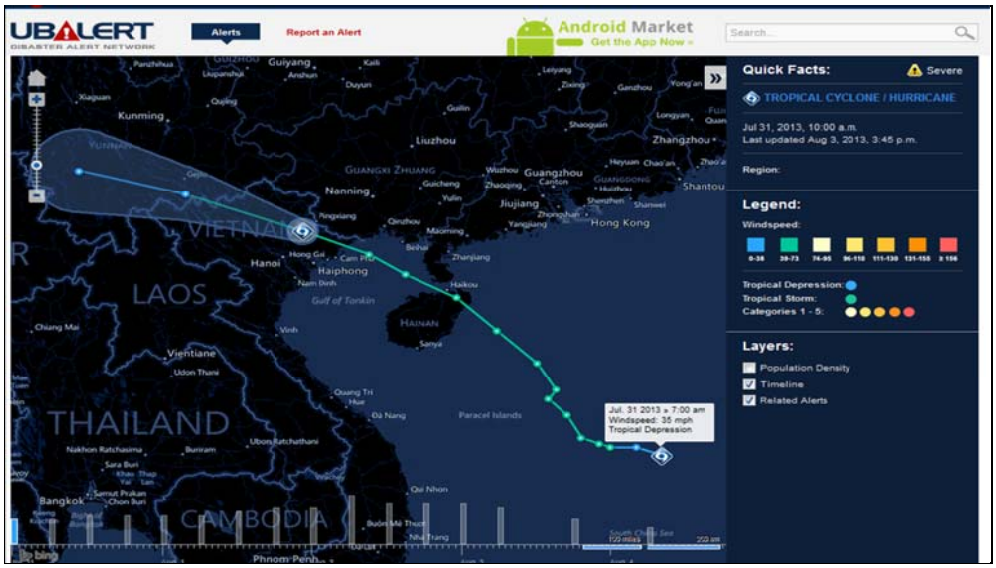
4. In the morning of 29 July 2013 at 00:00 UTC (07:00 Local time) the MRCFFG system detected that some villages of northern and central provinces of Lao PDR, such as Phonsaly, Luangnamtha, Oudomxay, Bokeo, Luang Prabang, Huaphanh, Xayaboury, Xiengkhuang,Vientiane, Xaysomboung, Bolikhamxay and Khammuane, were at the risk of flash flood occurrences. Also some districts in the northern provinces of Viet Nam, such as Lao Cai, Lai Chau, Son La, Dien Bien, Hao Binh, Nghe An and Hao Binh, were under the risk of flash flood occurances. The information on flash flood risk areas, detected by MRCFFG system on 29 July 2013 at 00:00 UTC, was confirmed by the information published in the Lao newspaper "Vientiane Times", dated 05 August 2013. Seven villages in Khop district ("green" color in Figure 3.4-16) of Xayabouri province were impacted by the flood. There were minor differences between the information provided in the Newspaper and the detection of the FFG system. The FFG system detected many villages in Hongsa, Ngeun, and Xienghon districts that are located close to the Khop district. The online newspaper "Than Nien", issued on 31 July 2013, informed that some provinces of northern part of Viet Nam had been hit by the flash floods in the night of Monday 29 July 2013, such as Dien Bien, Son La, Lao Cai, Yen Bai. These provinces were the same provinces as detected by the MRCFFG in the morning of Monday 29 August 2013.

5. There are minor differences in identifying the flash flood risk areas by MRCFFG system on 29 July 2013 at 00:00 UTC, compared with (real) reported situation. The flash flood occurred at another district, close to the one detected by MRCFFG system. This difference should be investigated in depth during the dry season.

3.5 Flash Floods caused by Tropical Storm JEBI (03-05 Aug 2013)

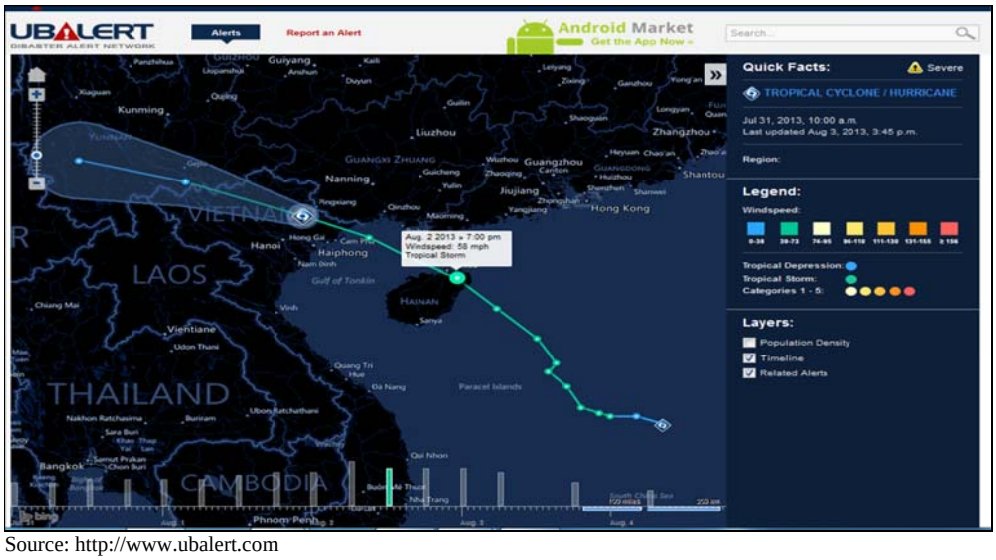
3.5.1 Tropical storm JEBI

At 07:00 AM local time on 31 July 2013 the Tropical depression JEBI developed in the middle of East Sea. Figure 3.5-1 presents the position of tropical depression at the East Sea near the Philippines. The storm then moved in westerly direction. On Friday 02 August 2013 at around 07:00 PM it began making its first landfall at the island of Hainam. See Figure 3.5-2. Subsequently it continued in westerly direction and made its second landfall at the northern provinces of Viet Nam on 3 August 2013. Figure 3.5-3 presents the track of tropical storm JEBI when it made a landfall at Northern part of Viet Nam.



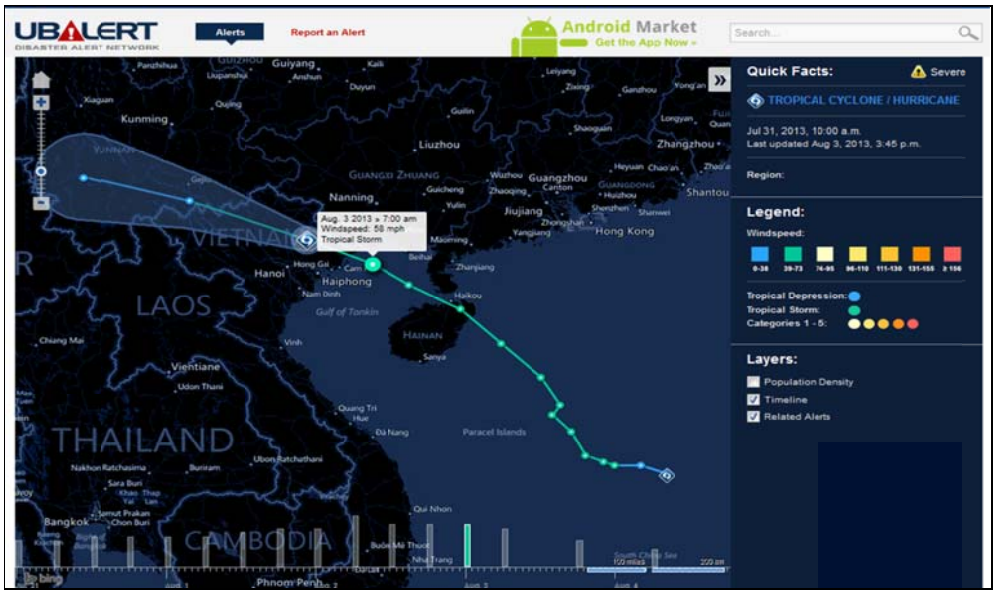
Source: http://www.ubalert.com

Figure 3.5-1 On July 31 2013 at 07:00 AM local time at East Sea the tropical depression JEBI was formulated and stated to move into west direction.



Source: http://www.ubalert.com

Figure 3.5-2 On August 2 2013 at 19:00 local time the tropical storm JEBI was made its first landfall at Hainan island.



Source: http://www.ubalert.com

Figure 3.5-3 On August 3 2013 at 19:00 local time the tropical storm JEBI was close to the coastal areas of northern part of Viet Nam.

3.5.2 Heavy rainfall during the period of TS JEBI

During the period 03 - 05 August 2013 when Tropical Storm JEBI was active in the region and transformed into a low pressure cell, heavy rainfall occurred in some areas of northern part of Viet Nam, and in central and northern parts of Lao PDR. The daily rainfall at some hydro-meteorological stations in the above mentioned areas recorded almost all up to 150 - 200 mm per day. Figure 3.5-4 to Figure 3.5-11 present the records of daily rainfall (daily rainfall – 24 hour accumulated rainfall from 07:00 AM previous day to 07:00 AM reported day) recorded at rainfall stations in the northern part of Viet Nam, and central and northern parts of Lao PDR. Figure 3.5-16 presents the map of location of rainfall stations, where records of daily rainfall was collected during the Tropical Storm JEBI.

3.5.3 Raising water level at some tributaries of Mekong River

Since the second week of July until the first week of August, the central and northern provinces of Lao PDR faced several severe weather situations, such as two times ITCZ and one Tropical Depression from TS JEBI. Rainfall occurred daily and the soil moisture content in those areas was completely saturated. The rainfall generated by the depression of Tropical Storm JEBI affected the flow regime at some tributaries of Mekong sub-catchments. Water levels steeply increased by 2 m at some hydrological stations, such as Nam Ngiep (at Moung Mai), Nam Ngum (at Ban Pakkanhoung), Nam Sane (at Moung Keo), Nam OU (at Moung Ngoy). Figure 3.5-12 to Figure 3.5-15 present the hydrograph of stations located in central and northern part of Lao PDR.

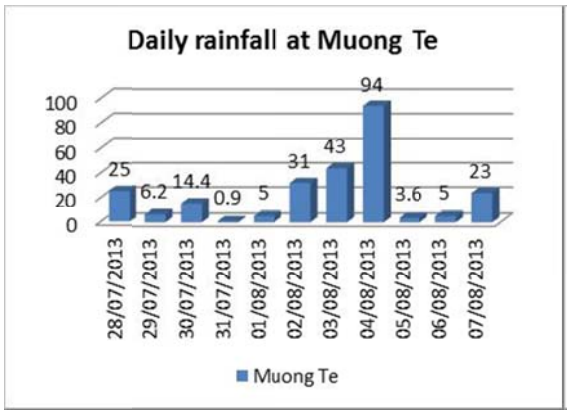


Figure 3.5-4 Daily rainfall (in mm) at Moung Te station.

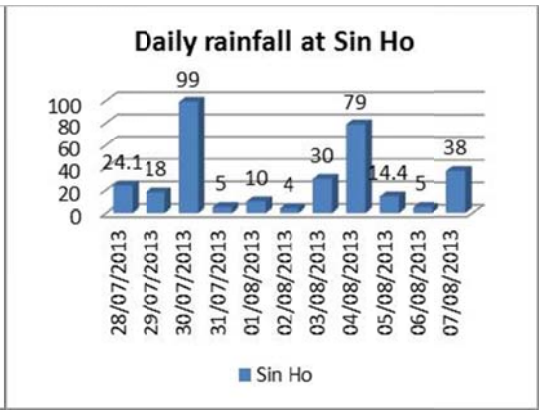


Figure 3.5-5 Daily rainfall (in mm) at Sin Ho station.

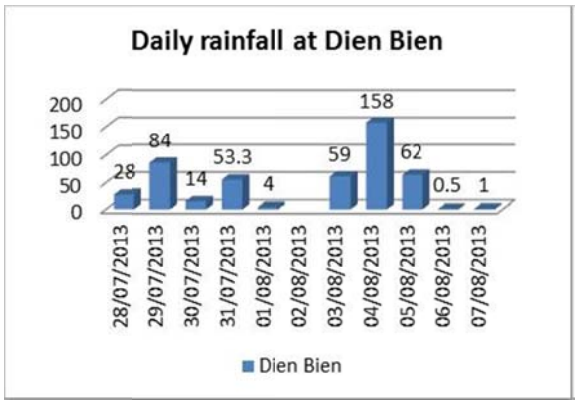


Figure 3.5-6 Daily rainfall (in mm) at Dien Bien station.

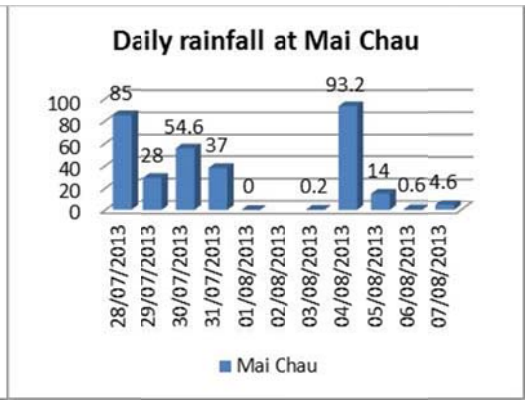


Figure 3.5-7 Daily rainfall (in mm) at Mai Chau station.

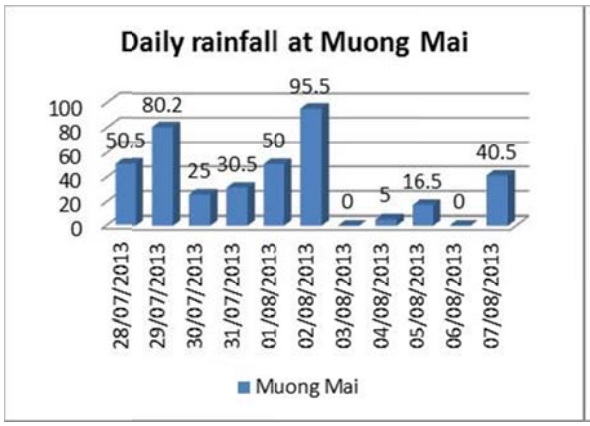


Figure 3.5-8 Daily rainfall (in mm) at Muong Mai station.

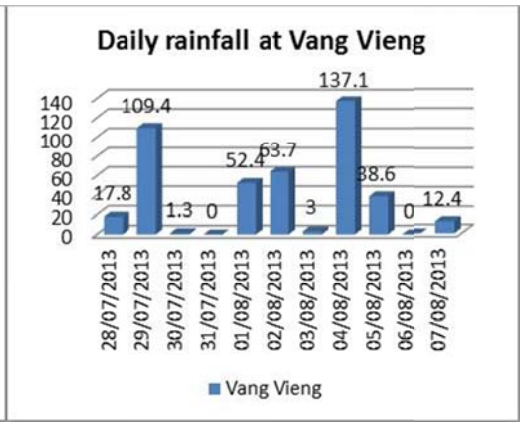


Figure 3.5-9 Daily rainfall (in mm) at Vang Vieng station.

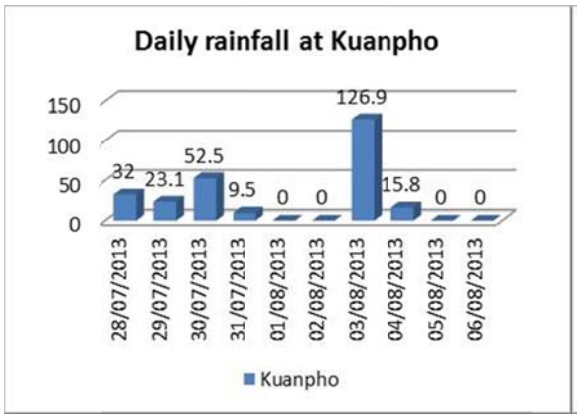


Figure 3.5-10 Daily rainfall (in mm) at Khuanpho station.

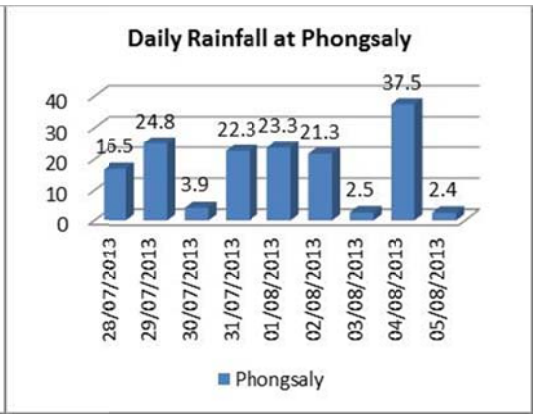


Figure 3.5-11 Daily rainfall (in mm) at Phonsaly.

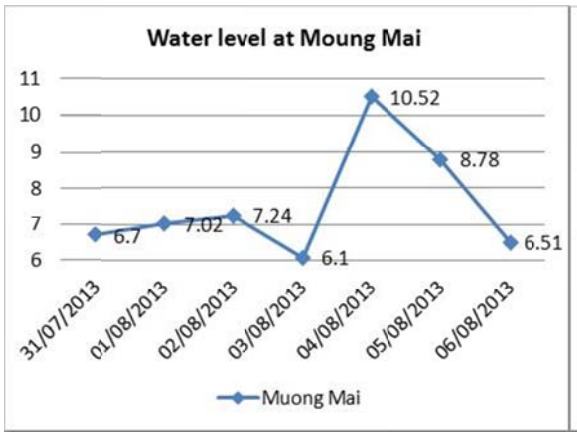


Figure 3.5-12 Daily water level (m) at 07:00 PM at Moung Mai station.

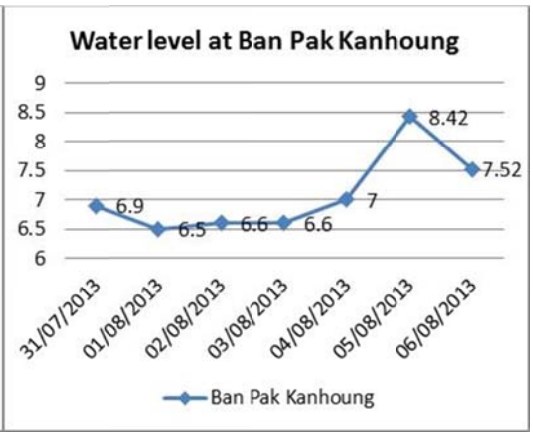


Figure 3.5-13 Daily water level (m) at 07:00 AM at Ban Pak Kanhoung station.

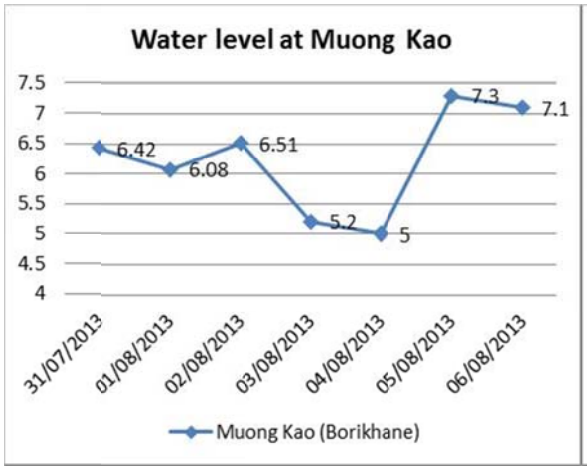


Figure 3.5-14 Daily water level (m) at 07:00 AM at Moung Kao station.

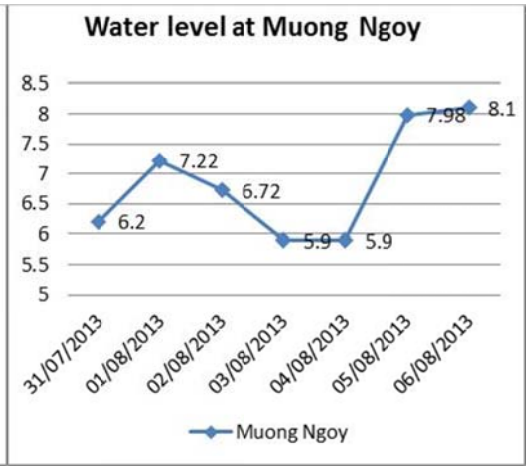


Figure 3.5-15 Daily water level (m) at 07:00 AM at Moung Ngoy station.

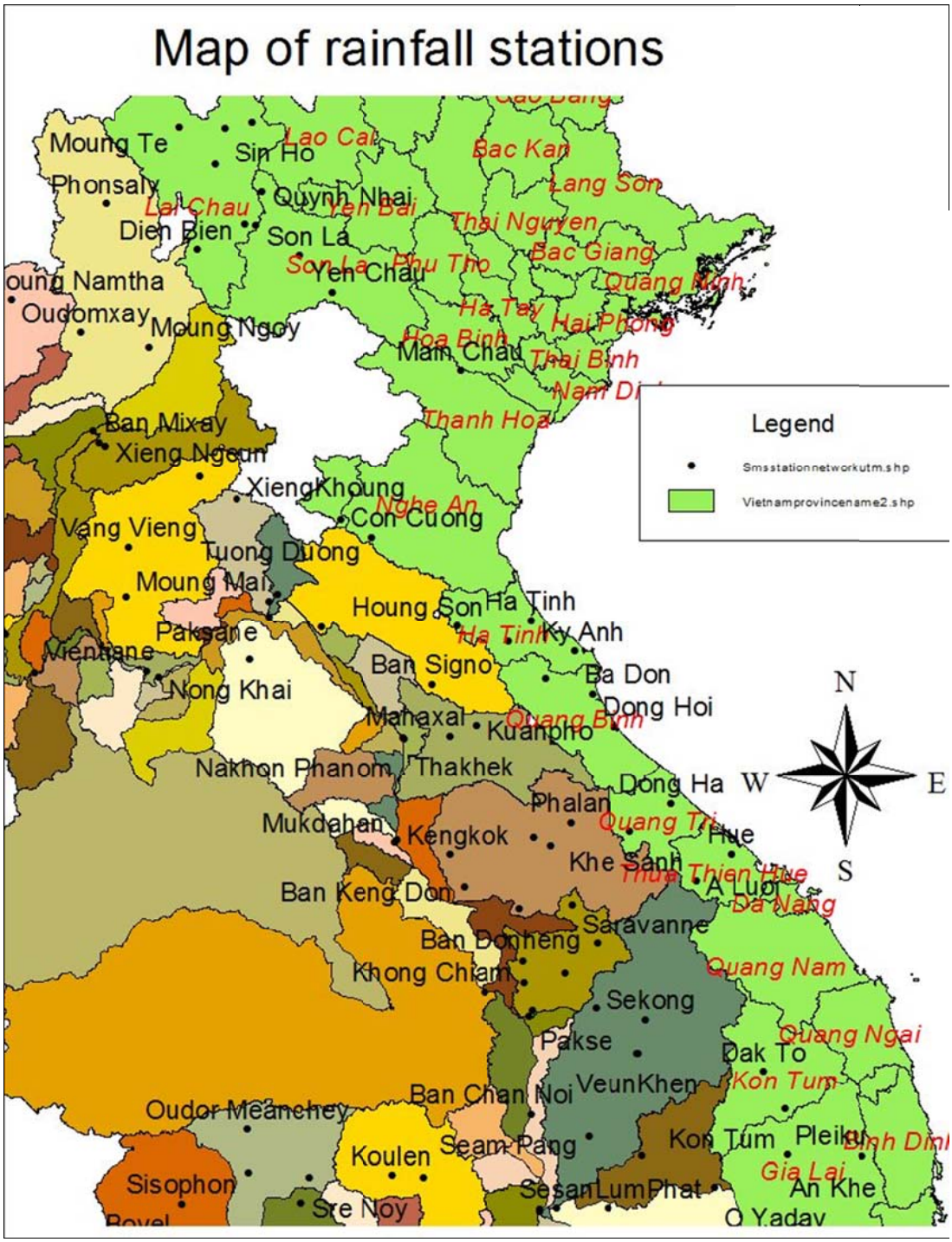


Figure 3.5-16 Map with location of rainfall stations; rainfall data were used for analysis of effects by TS JEBI.

3.5.4 Flash floods caused by TS JEBI in the northern provinces of Viet Nam

On 04 August 2013 at 00:00 UTC (07:00 AM local time) the MRCFFG system detected that various districts in the northern provinces of Viet Nam, such as Lao Cai, Bac Kan, Lai Chau, Hao Binh and Nghe An, were at the risk of flash flood occurrences. Figure 3.5-17 presents the 3 hour flash flood risk areas in some districts of Viet Nam and Lao PDR that were detected by the MRCFFG system on 04 August 2013 at 00:00 UTC. Figure 3.5-18 presents the location of 3 hourly flash flood risk areas at Bac Khan province in Viet Nam on 04 August 2013 at 00: 00 UTC. The information on flash flood areas on 04 August 2013 was

confirmed by the information published in the Viet Nam online newspaper "Nhan Dan", dated 05 August 2013 at 01:30 PM. This information is provided in the Annex 1.5.

3.5.5 Flash floods caused by TS JEBI in the central provinces of Lao PDR

One week before TS JEBI arrived over some areas in the central provinces of Lao PDR flash floods occurred due to ITCZ activity (see the information on flash floods in the central provinces of Lao PDR during the ITCZ 27-28 July 2013). During TS JEBI flash flood risk was detected (although the amount of daily rainfall recorded by stations located in these areas was less that 130 mm, soil moisture conditions were still saturated since the last flash floods). Figure 3.5-137 presents the 3 hour flash flood risk areas covering some districts of Viet Nam and Lao PDR that were detected by MRCFFG system on 04 August 2013 at 00:00 UTC.

The information on flash flood risk areas detected by MRCFFG system on 04 August 2013 on 00:00 UTC was confirmed by the information published in the Lao newspaper "Vientiane Times", dated 06 August 2013. Landslides and flash floods occurred in some villages of Bolikhamxay province. This information provide in the Annex 1.5.

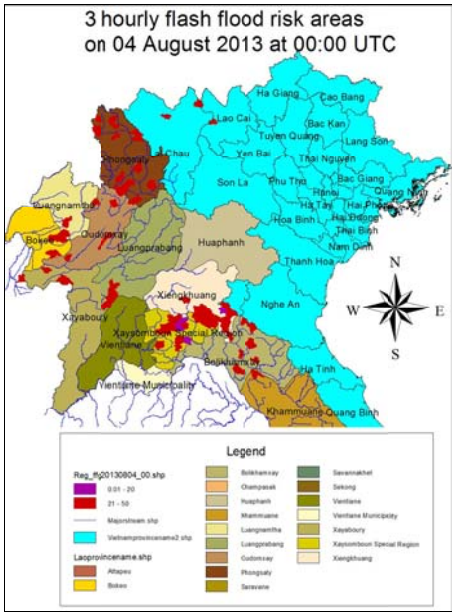


Figure 3.5-17 3 hourly flash flood risk areas at some districts of Viet Nam and Lao PDR was detected by MRCFFG system on 04 August 2013 at 00:00 UTC.

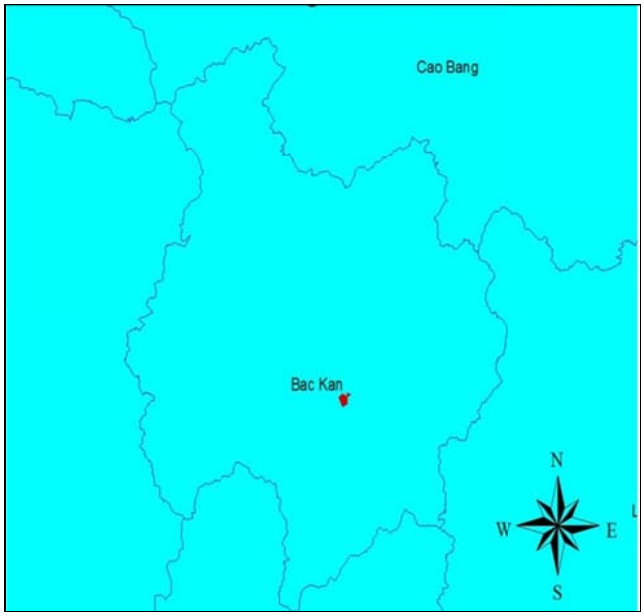


Figure 3.5-18 Location of 3 hourly flash flood risk areas detected at 00:00 UTC of 04 August 2013 at Bac Kan province of Viet Nam.

3.5.6 Conclusions

1. Tropical Storm JEBI" is fifth storm of year that hit the Viet Nam and caused serious damage to the northern provinces of Viet Nam.
2. Many rainfall stations located in the northern part of Viet Nam and Lao PDR recorded heavy rainfall during the period that TS JEBI hit the Mekong Region. Some of the rainfall stations recorded an amount of accumulated daily rainfall up to 150 mm.
3. Many hydrological stations along some tributaries of Mekong River recoreded increased water levels up to 4 meter a day during TS JEBI.
4. Since 04 August 2013 at 00:00 UTC (07:00 AM local time) the MRCFFG system detected that various districts of the northern provinces of Viet Nam (Lao Cai, Bac Kan, Lai Chau, Hao Binh and Nghe An) were at the risk of flash flood occurrences.
5. In the week before the TS JEBI arrived to some areas in central provinces of Lao PDR, flash floods had occurred due to ITCZ conditions (see the report of flash flood at central provinces of Lao PDR during the ITCZ 27 - 28 July 2013). Villages for which flash flood risk was detected due to ICZM, flash flood risk was detected again due to TS JEBI (eventhough the amount of daily rainfall from the stations located in the areas detected less than 130 mm, soil moisture conditions were saturated since the last flash floods).

3.6 Flash floods caused by Tropical Storm MANGKHUT

3.6.1 Weather condition during the beginning of August due to TS MANGKHUT

At 12:00 UTC on 06 August 2013 the Tropical Storm MANGKHUT developed over the center of the East Sea into the tropical depression, centered about 550 Km southeast of Ha Noi, Viet Nam. The storm moved in northwesterly direction. At 15:00 UTC on 07 August 2013 the center of TS MANGKHUT was very close to making landfall. Maximum sustained winds were near 35 knots, making it a minimal tropical storm. MANGKHUT was about 92 nautical miles/106 miles/170 km south of Hanoi, Vietnam, near 19.8 north latitude and 105.8 east longitude. MANGKHUT moved to the west-northwest with a speed of 13 knots/15 mph/24 kph. Earlier in the morning of 08 August 2013, TS MANGKHUT transformed into a tropical depression over the northern part of Viet Nam, Lao PDR and Thailand. Figure 3.6-1 and Figure 3.6-2 show the movement of TS MANGKHUT taken from Satellite.

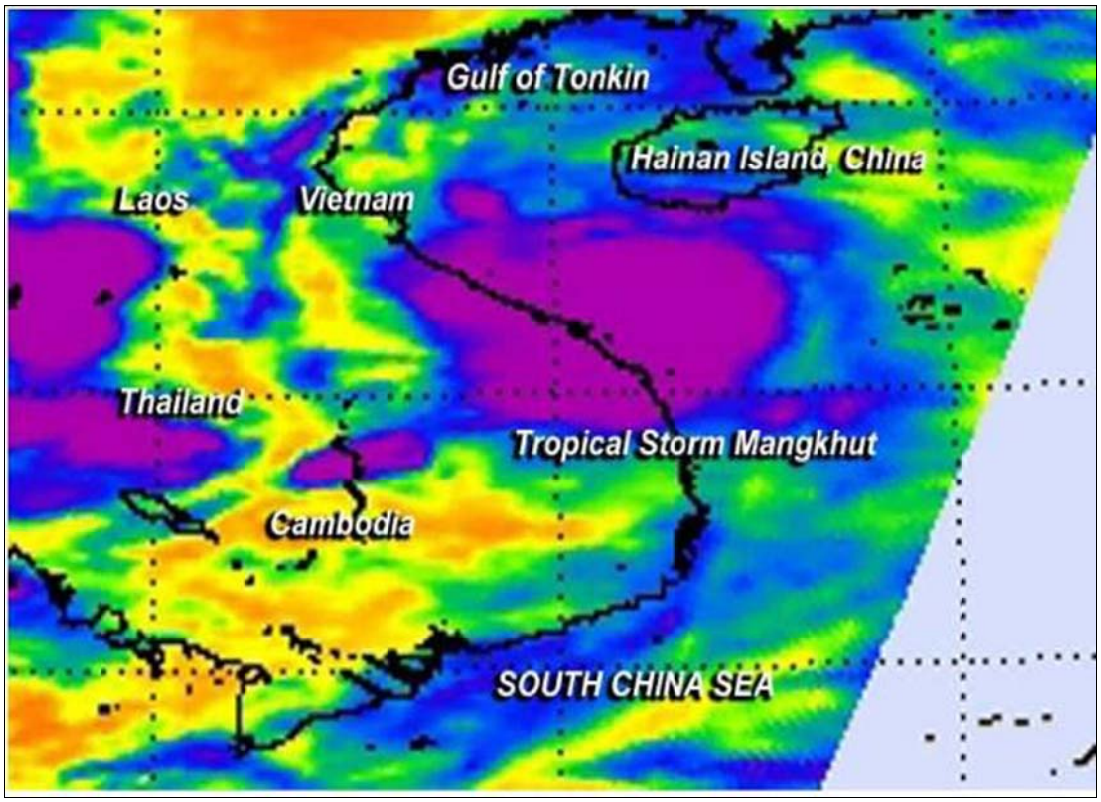


Figure 3.6-1 On 06 August 2013 infrared image from AIRS on NASA's Aqua satellite showed that cloud top temperatures in MANGKHUT are as cold as 210 kelvin/-81F/-63Ct (purple) indicating powerful storms.Image Credit: NASA/JPL.

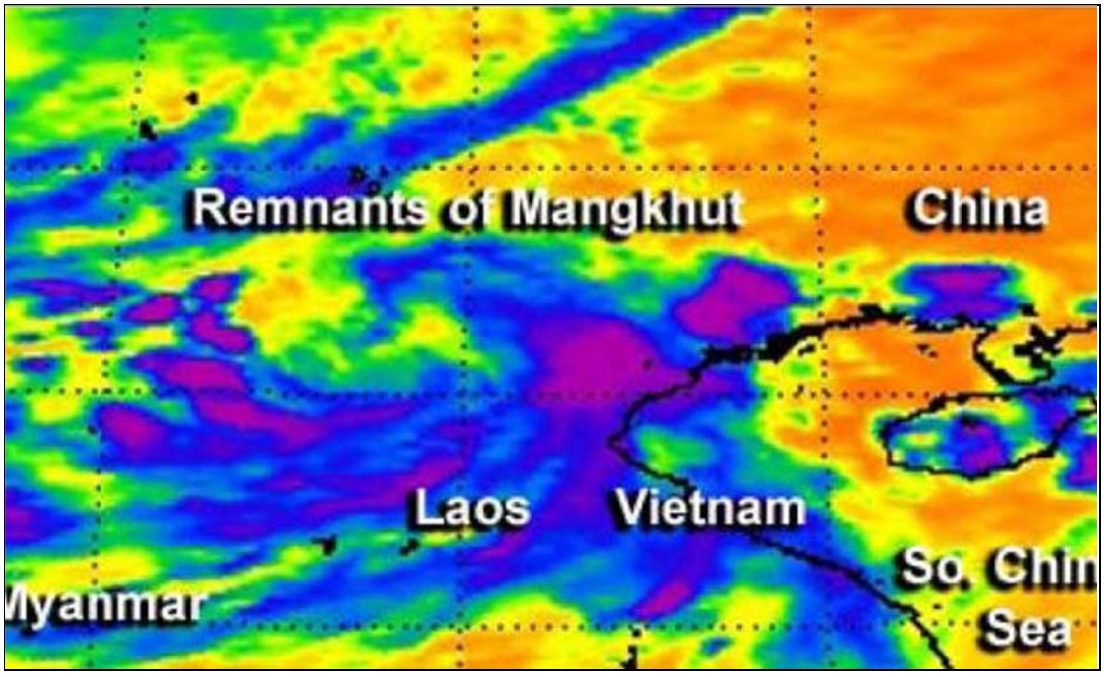


Figure 3.6-2 NASA's Aqua satellite captured this infrared image of MANGKHUT's remnants on 08 August 2013 at 02:17 AM EDT (06:17 AM UTC). Ex-Tropical Storm MANGKHUT's clouds and showers (blue) are over Northern Viet Nam, Laos and China. Image Credit: NASA JPL.

3.6.2 Heavy rainfall during the period of TS MANGKHUT

During the period 06 - 09 August 2013 Typhoon MANGKHUT was activate over the region; heavy rainfall occurred in some areas of northern part of Viet Nam, and in some sub-catchments of the Mekong River located in the northern and central part of Lao PDR, and northern part of Thailand, such as the Nam Ou, Nam Sane, Nam Ngum, Nam Nhiep, Xe Bang Fai, Nam Songkram, Nam Mae In, Nam Mae Kok catchments. Especially during 08 August 2013 the daily rainfall (daily rainfall - 24 hour accumulated rainfall from 7:00 AM of previous day to 7:00 AM of reported day) recorded in almost all hydro-meteorological stations of the above mentioned sub-catchments reached 100 mm per day. Figure 3.6-3 to Figure 3.6-17 present the records of daily rainfall for sub-catchments of the Lower Mekong Basin. Figure 3.6-18 to Figure 3.6-26 present the daily rainfall of stations in the northern part of Viet Nam as a result of TS MANGKHUT. Figure 3.6-27 presents the map with the location of the rainfall stations, where records of daily rainfall were collected during the TS MANGKHUT.

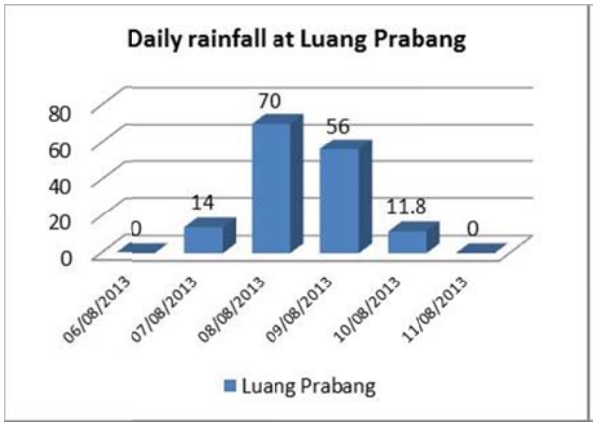


Figure 3.6-3 Daily rainfall (in mm) at Luang Prabang.

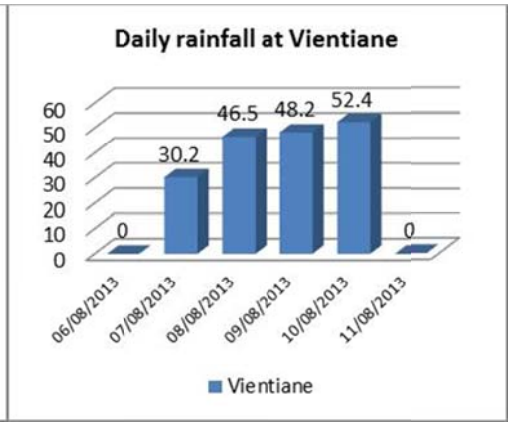


Figure 3.6-4 Daily rainfall (in mm) at Vientiane station.

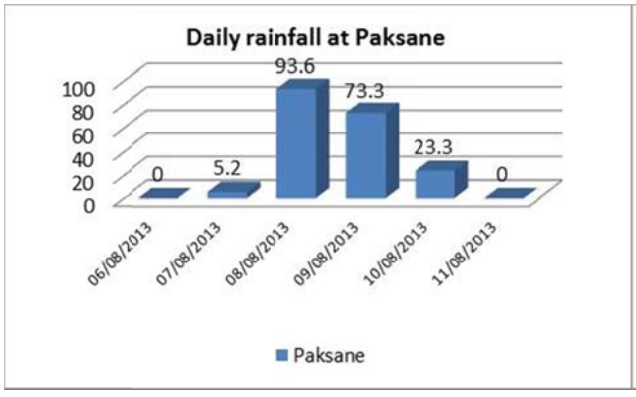


Figure 3.6-5 Daily rainfall (in mm) at Paksane station.

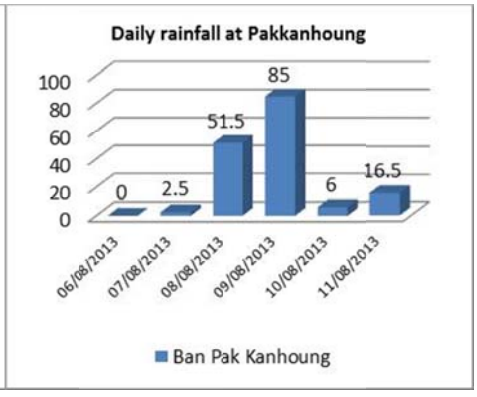


Figure 3.6-6 Daily rainfall (in mm) at Pakhanhoung station of Nam Ngum catchment.

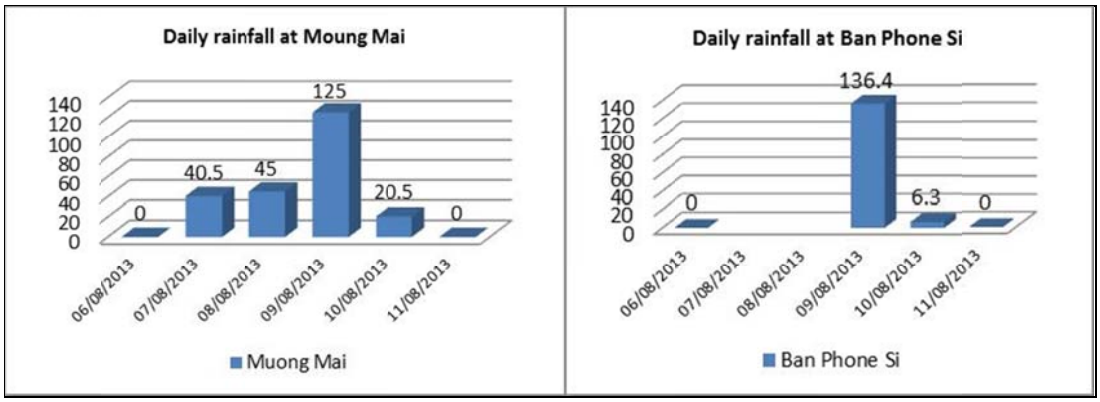


Figure 3.6-7 Daily rainfall (in mm) at Moung Mai station of Nam Nhiep catchment.

Figure 3.6-8 Daily rainfall (in mm) at Ban Phone Si station of Nam Cadine catchment.

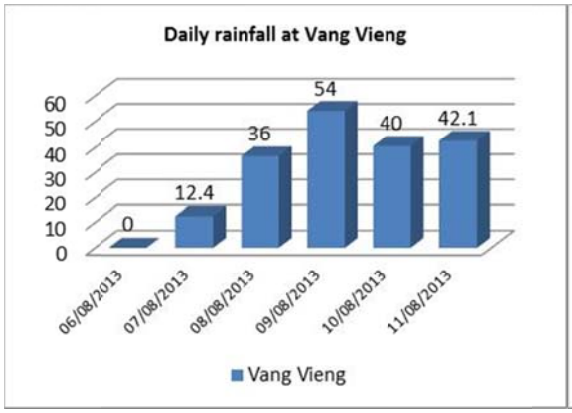


Figure 3.6-9 Daily rainfall (in mm) at Vang Vieng station of Nam Ngum catchment.

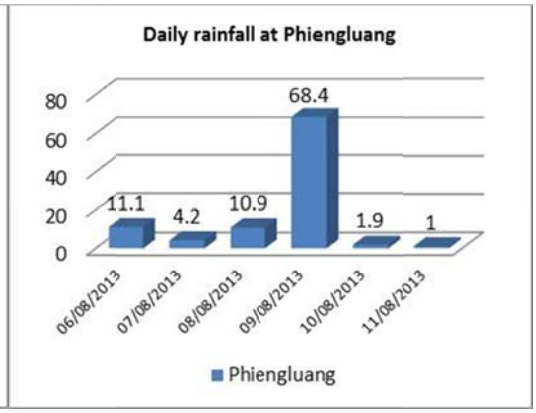


Figure 3.6-10 Daily rainfall (in mm) at Phiengluang station of Nam Ngum catchment.

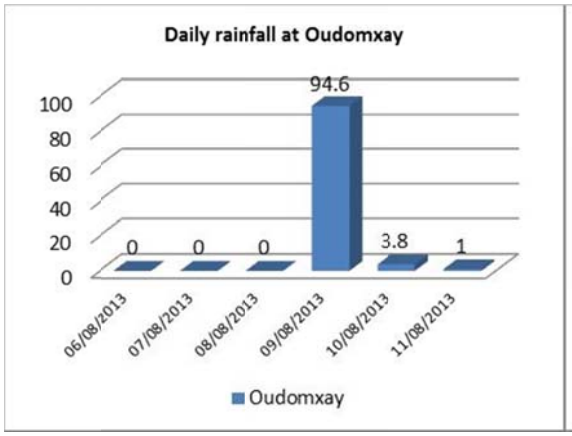


Figure 3.6-11 Daily rainfall (in mm) at Oudomxay station of Nam Ou catchment.

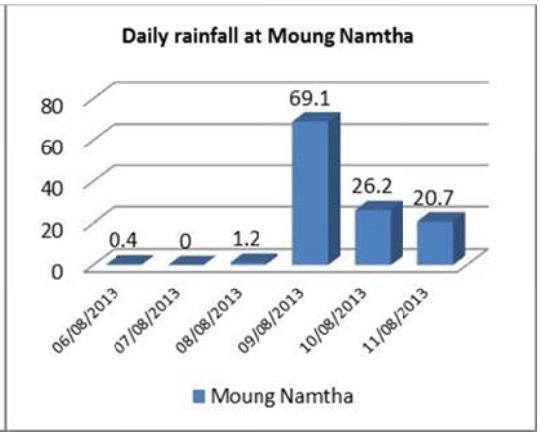


Figure 3.6-12 Daily rainfall (in mm) at Moung Namtha station of Nam Tha catchment.

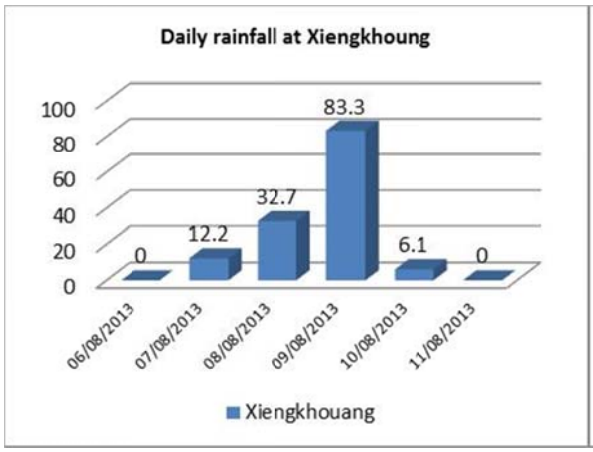


Figure 3.6-13 Daily rainfall (in mm) at Xiengkhuang station of Nam Nhiep catchment.

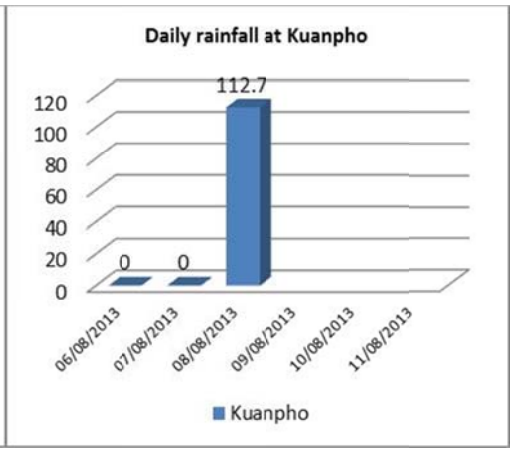


Figure 3.6-14 Daily rainfall (in mm) at Kuanpho station of Se banfi catchment.

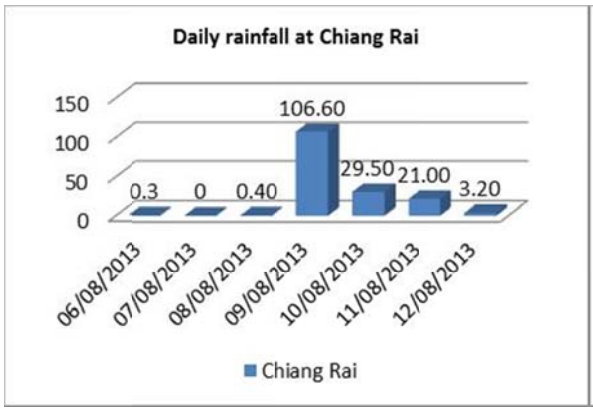


Figure 3.6-15 Daily rainfall (in mm) at Chiang Rai station of Nam Mae Kok catchment.

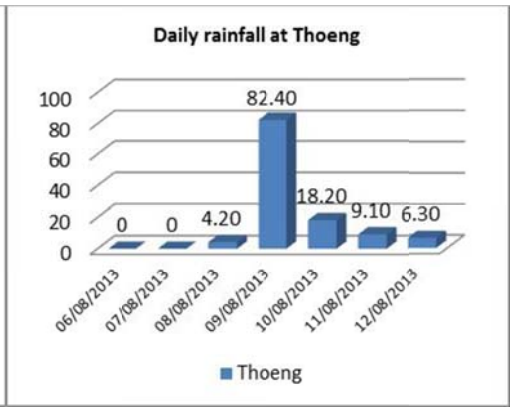


Figure 3.6-16 Daily rainfall (in mm) at Thoeng station of Nam Mae In catchment.

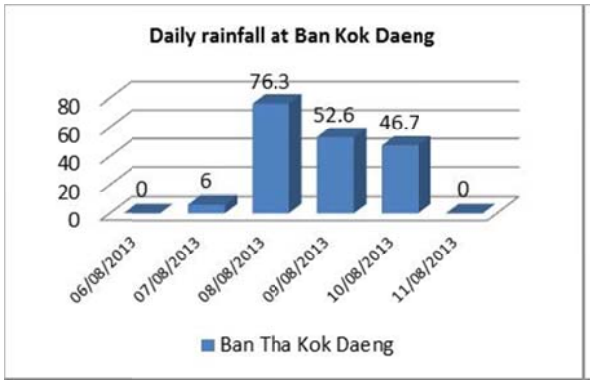


Figure 3.6-17 Daily rainfall (in mm) at Ban Kok Daeng station at Nam Songkhram catchment.

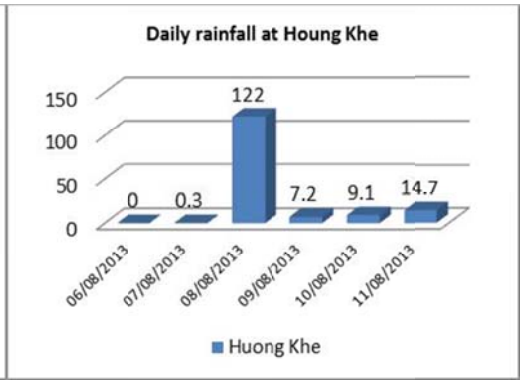


Figure 3.6-18 Daily rainfall (in mm) at Houng Khe station.

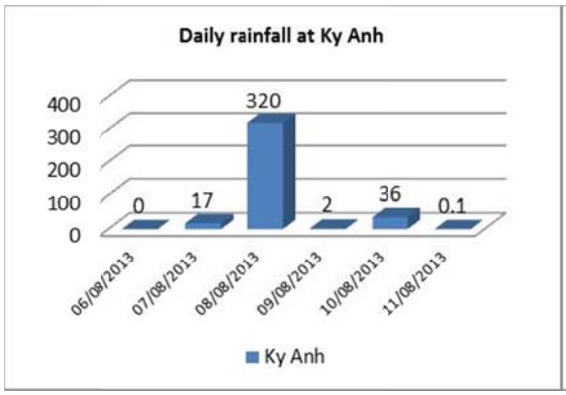


Figure 3.6-19 Daily rainfall (in mm) at Ky Anh station.

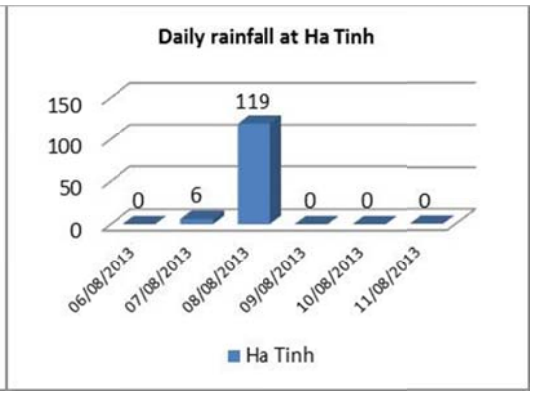


Figure 3.6-20 Daily rainfall (in mm) at Ha Tinh station.

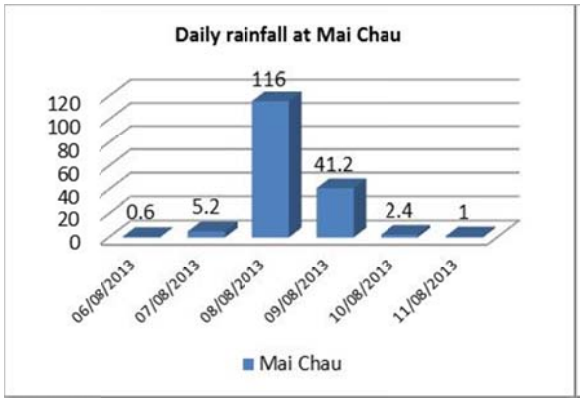


Figure 3.6-21 Daily rainfall (in mm) at Mai Chau station.

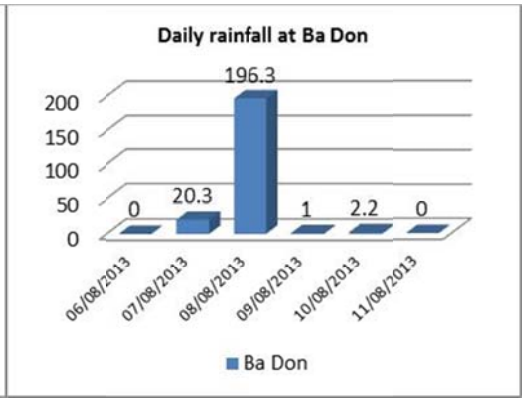


Figure 3.6-22 Daily rainfall (in mm) at Ba Don station.

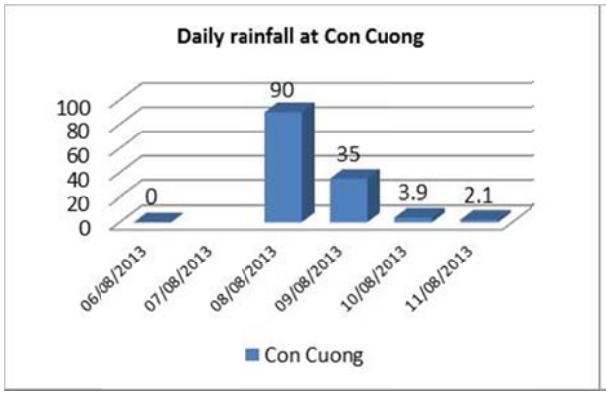


Figure 3.6-23 Daily rainfall (in mm) at Con Cuong station.

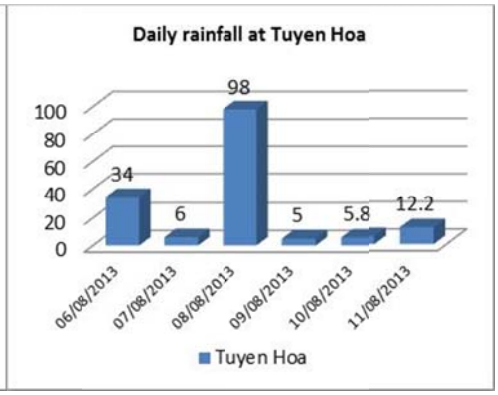


Figure 3.6-24 Daily rainfall (in mm) at Tuyen Hao station.

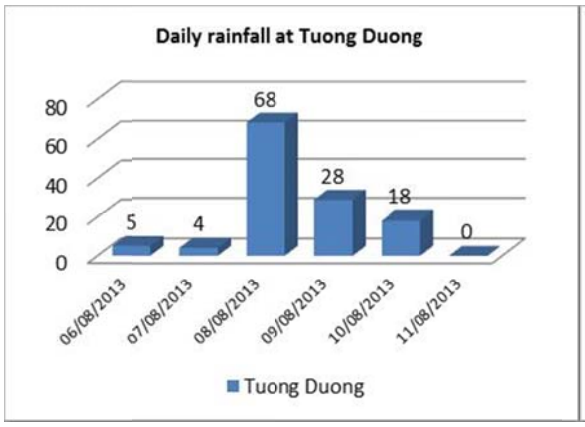


Figure 3.6-25 Daily rainfall (in mm) at Tuong Duong station.

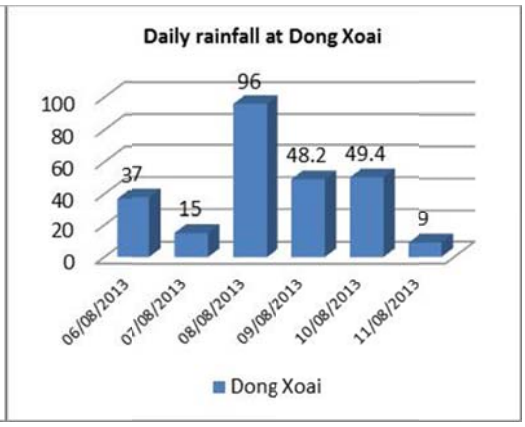


Figure 3.6-26 Daily rainfall (in mm) at Dong Xoai station.

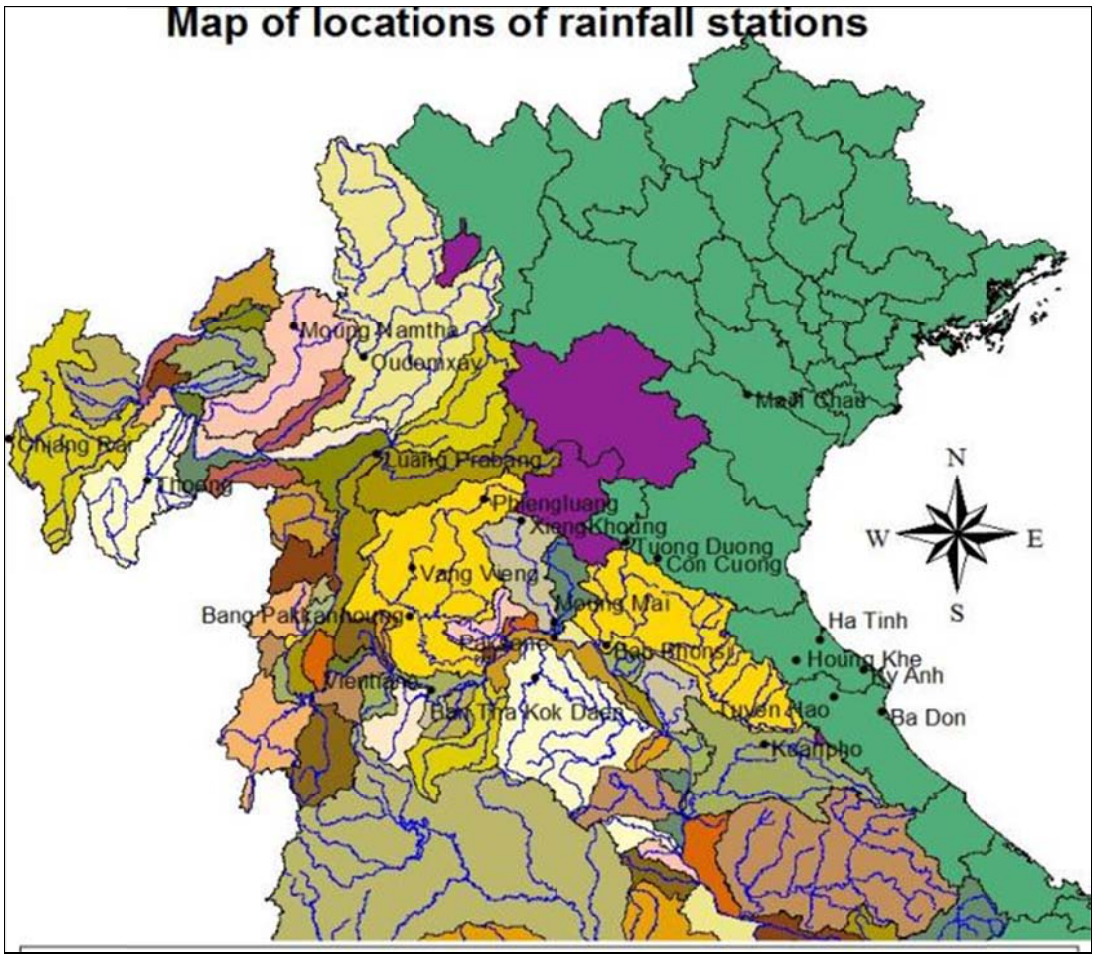


Figure 3.6-27 Map with location of rainfall stations where rainfall data were used for the analysis of the effects from TS MANGKHUT.

3.6.3 Flash floods caused by TS MANGKHUT in the northern and central provinces of Lao PDR

Since 08 August 2013 at 00:00 UTC (07:00 local time) the MRCFFG system detected that various villages of the northern provinces of Lao PDR, such as Luang Prabang, Xiengkhuang, Bolikhamxay, Khammuane, Xaysomboung provinces, were at the risk of flash flood occurrences. These flash flood risk areas extended to other villages at 09 August 2013

at 00:00 UTC. Figure 3.6-28 presents the 3 hour flash flood risk areas in Lao PDR that were detected by the MRCFFG system on 08 August 2013 at 00:00 UTC. Figure 3.6-29 presents the 3 hour flash flood risk areas that were detected by MRCFFG system on 09 August 2013 at 00:00 UTC, which were extended to the northern provinces in Lao PDR and the northern provinces of Thailand.

The information on flash flood areas on 08 - 09 August 2013 was confirmed by the information published in the Lao newspaper "Vientiane Times", dated 12 and 13 August 2013. This information is provided in the Annex 1.6 of this report.

Figure 3.6-28 3 hourly Flash Flood Guidance (FFG) system on 08 August 2013 at 00:00 UTC (07:00 local time) show a number of a number of flash flood risk in some villages of northern province of Lao PDR and Viet Nam.

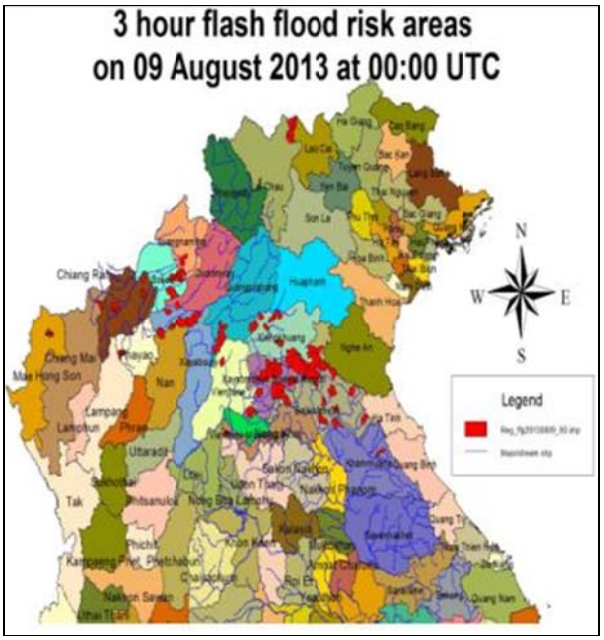


Figure 3.6-29 3 hourly Flash Flood Guidance (FFG) system on 09 August 2013 at 00:00 UTC (07:00 local time) show that the flash flood risk areas at lower Mekong Basin was extended to the some areas in the northern provinces of Lao PDR and also northern provinces of Thailand.

3.6.4 Flash floods caused by TS MANGKHUT in the northern provinces of Thailand

In the morning of 09 August 2013 the MRC flash flood guidance system detected that some districts of northern provinces of Thailand, such as Chiang Rai, Chiang Mai, Nan, Mae Hong Son, Lampang, Nong Khai and Phayoa, were at the risk of flash flood occurrences. See Figure 3.6-29.

The information on flash flood areas at some district of the northern provinces of Thailand on 09 August 2013 was confirmed by the information published in the Thai online newspaper " The Nation ", dated 09 August 2013 at 17:34, and also 12 August 2013. Based on this information it can be evaluated that flash floods in the flash flood risk areas detected by MRCFFG have occurred. This information is provided in the Annex 1.6 of this report.

3.6.5 Flash flood caused by TS MANGKHUT in the northern provinces of Viet Nam

In the morning of 08 August 2013 at 00:00 UTC the FFG system detected flash flood risk areas at some districts of provinces in the northern part of Viet Nam, such as at Ky Son district of Hao Binh province, Huong Son district of Ha Tinh province and Ba Xat district of Lao Cai province. Based on the available information from the online media the flash floods occurred at the same provinces (Hao Binh and Ha Tinh) but in different districts. For example at the Hao Binh province the flash flood actually occurred at Lac Thuy district, and for the Ha Tinh province the flash flood actually occurred at Ky Anh district. Based on primary investigation of the FFG system it was found that the 3 hour FFG value at the same time was 116.9 mm in the Lac Thuy district of Hao Binh province (according to the color scale of 3 hour FFG is indicated in "green") which was higher than the 3 hour FFG value at Ky Son district of Hao Binh province, which was only 15 mm. The same problem was found for 3 hour FFG value for Ky Anh district of Ha Tinh province, where the FFG value on 08 August 2013 at 00:00 UTC was 69.53 mm (according to color scale of the 3 hour FFG is indicated in "yellow"). This value, recorded at the same time, was higher than the FFG value of only 44.15 mm for Huong Son district of Ha Tinh province. One of the reasons could be that the MRCFFG system has difficulty in providing accurate FFG during storm conditions, especially when the storm is moving very fast. This problem should be investigated in depth with the NLA and with HRC.

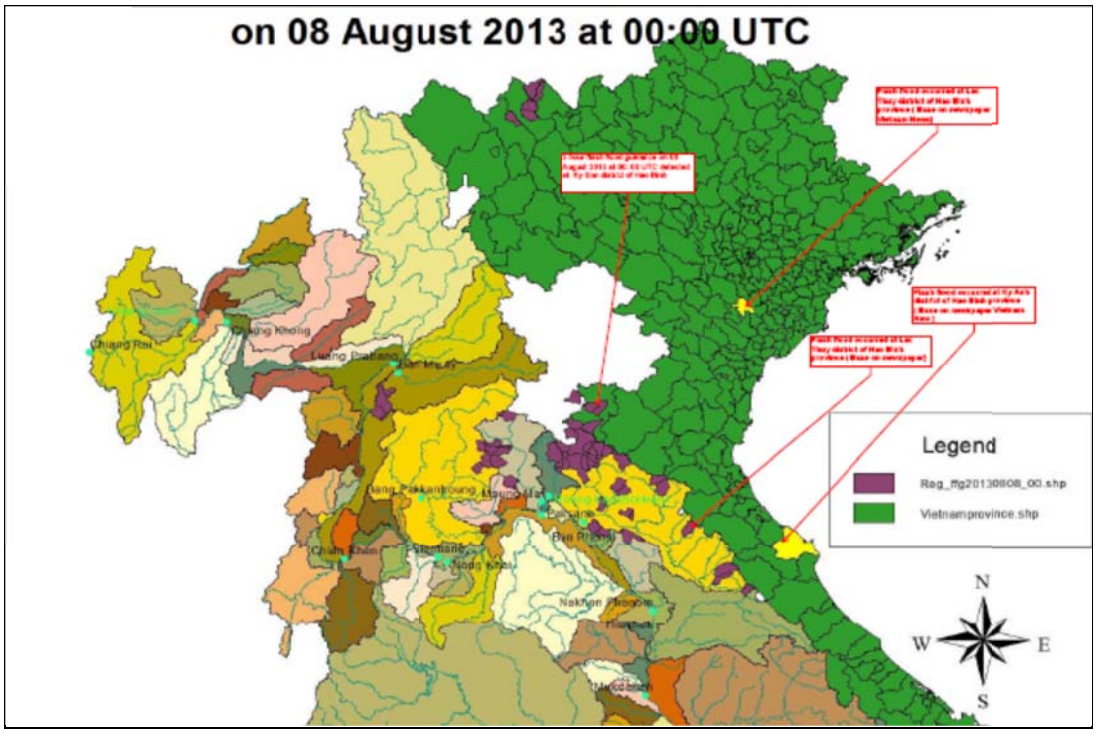


Figure 3.6-30 Map of flash flood risk areas detected by 3 hour FFG system on 08 August 2013 at 00:00 UTC (Pink color area), and the flash flood areas informed from the newspaper (yellow color area).

3.6.6 Impact of TS MANGKHUT to water levels in some tributaries of the Lower Mekong Basin

Heavy rainfall occurred in some Mekong sub-catchments located in the central and northern part of Lao PDR during TS MANGKHUT and led to quickly rising water levels at some

tributaries of Mekong sub-catchments, such as Nam Ngum, Nam Cadine, Nam Nhiep etc. in the period 08 - 10 August 2013. At the Moung Mai Hydrological station for example, the water level rose from 6.1 m on 08 August to the peak level of 11.28 m on 10 August 2013; at the Ban Phone Si hydrological station the water level rose from 8.32 m on 07 August 2013 to the peak level of 10.74 m on 09 August 2013; at the Ban Pakkanhoung hydrological station the water level rose from 6.8 m on 08 August 2013 to the peak level of 9.52 m on 10 August 2013. Figure 3.6-31 to Figure 3.6-36 present the hydrograph at some hydrological stations of Mekong tributaries. Figure 3.6-37 presents the Map of 3 hourly FFG on 09 August 2013 at 00:00 UTC with location of water level stations.

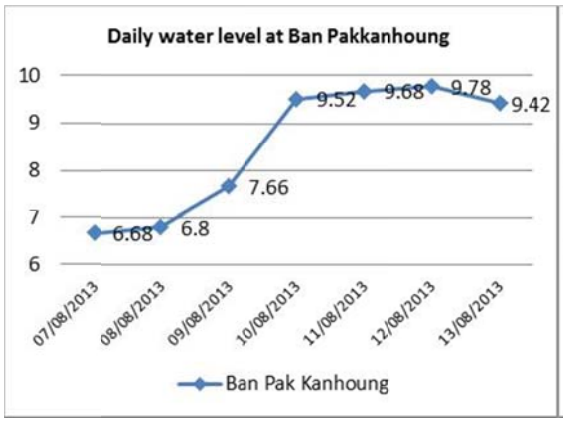


Figure 3.6-31 Hydrograph of Ban Pakkanhoung hydrological station during the TS MANGKHUT.

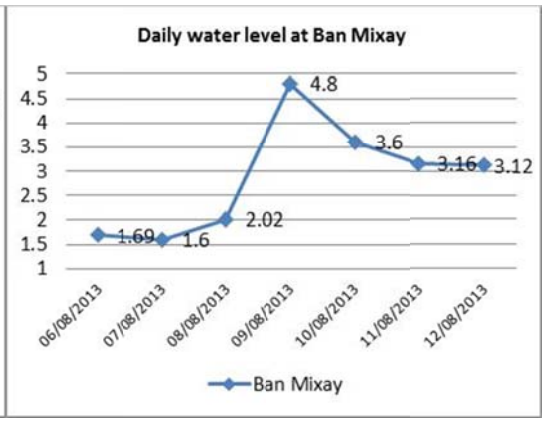


Figure 3.6-32 Hydrograph of Ban Mixai hydrological station during the TS MANGKHUT.

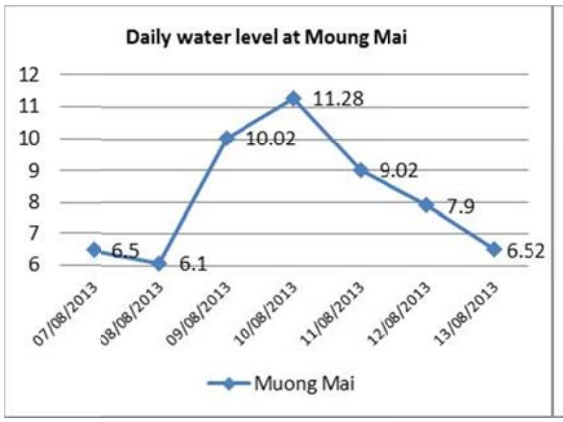


Figure 3.6-33 Hydrograph of Moung Mai hydrological station during the TS MANGKHUT.

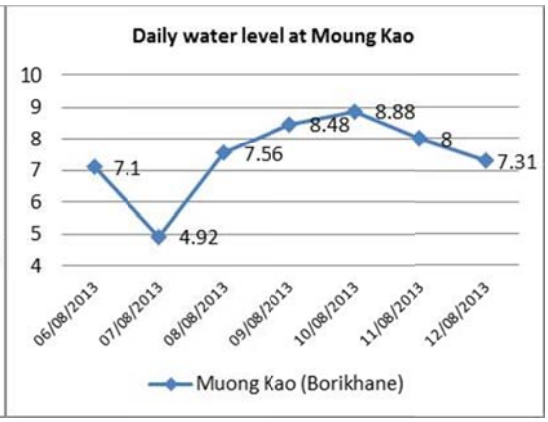


Figure 3.6-34 Hydrograph of Moung Kao hydrological station during the TS MANGKHUT.

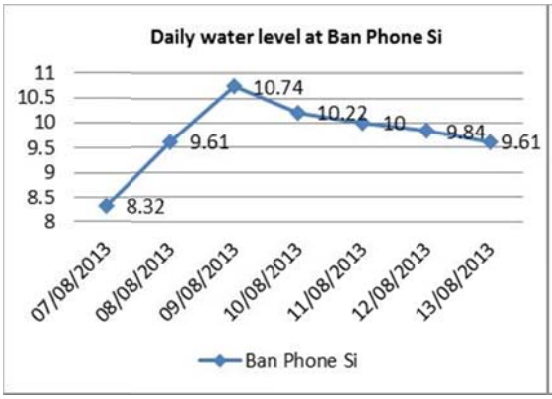


Figure 3.6-35 Hydrograph of Ban Phone Si hydrological station during the TS MANGKHUT.

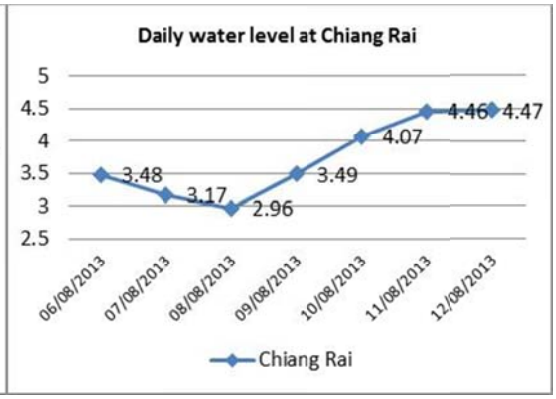


Figure 3.6-36 Hydrograph of Moung Kao hydrological station during the TS MANGKHUT.

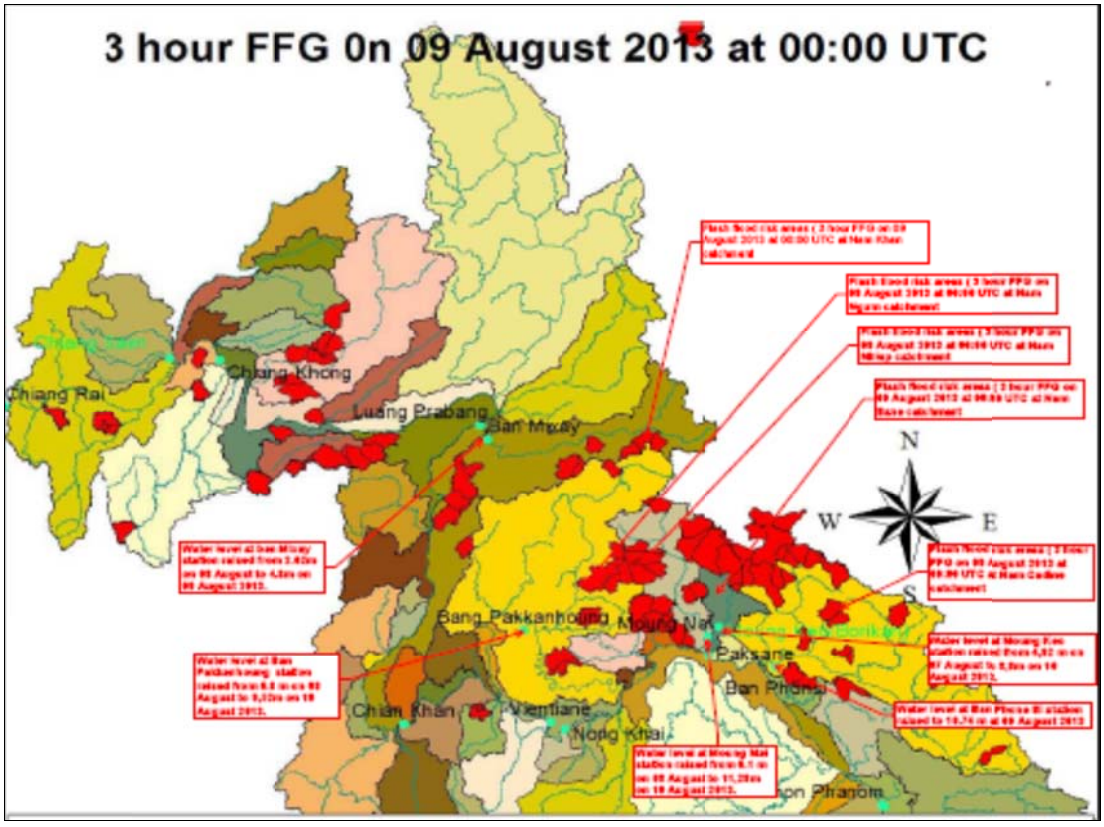


Figure 3.6-37 Map of 3 hour FFG on 09 August 2013 at 00:00 UTC (07:00 AM local time) with location of water level stations.

3.6.7 Impact of the TS MANGKHUT to water levels in the Mekong River mainstream

Quickly rising water levels in tributaries of central and northern parts of Lao PDR lead also to increasing water levels in the Mekong River mainstream in some monitoring stations from Chiang Saen station down to Mukdahan. For some monitoring stations along the Mekong River mainstream the water level started to rise from the evening on 09 August 2013 and

reached peak levels higher than the long term average daily value (except Chiang Saen station where the peak level was close to long term average value).

Figure 3.6-38 to Figure 3.6-47 present the hydrograph of monitoring stations along the Mekong mainstream from Chiang Saen station to Mukdahan station.

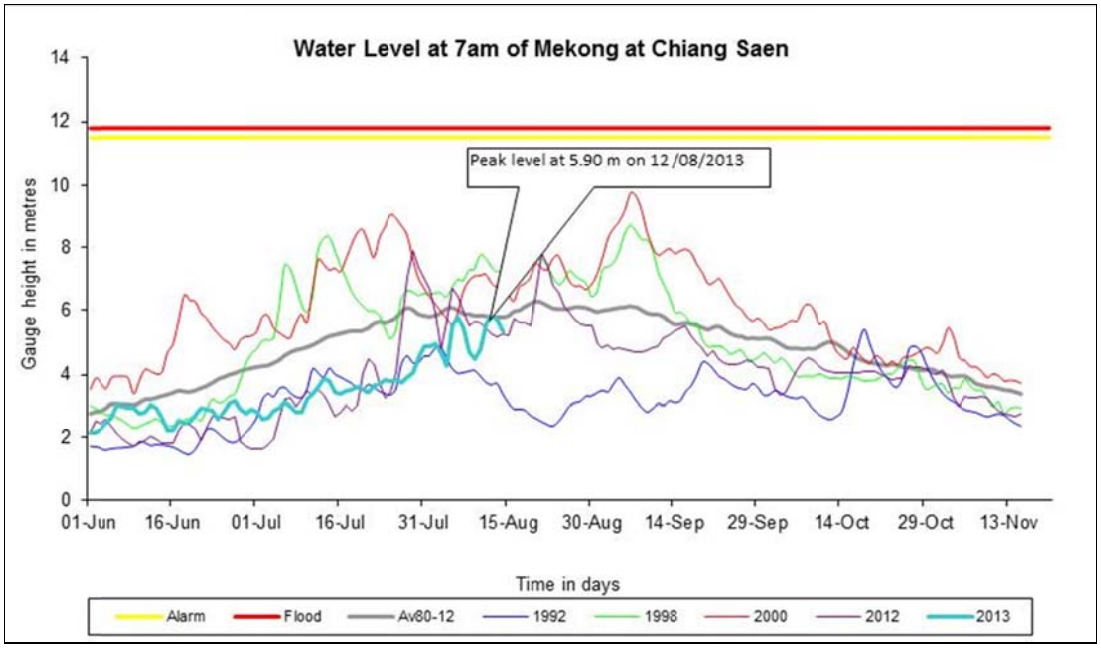


Figure 3.6-38 Hydrograph of Mekong at Chiang Saen, where water levels rose due to TS MANGKHUT.

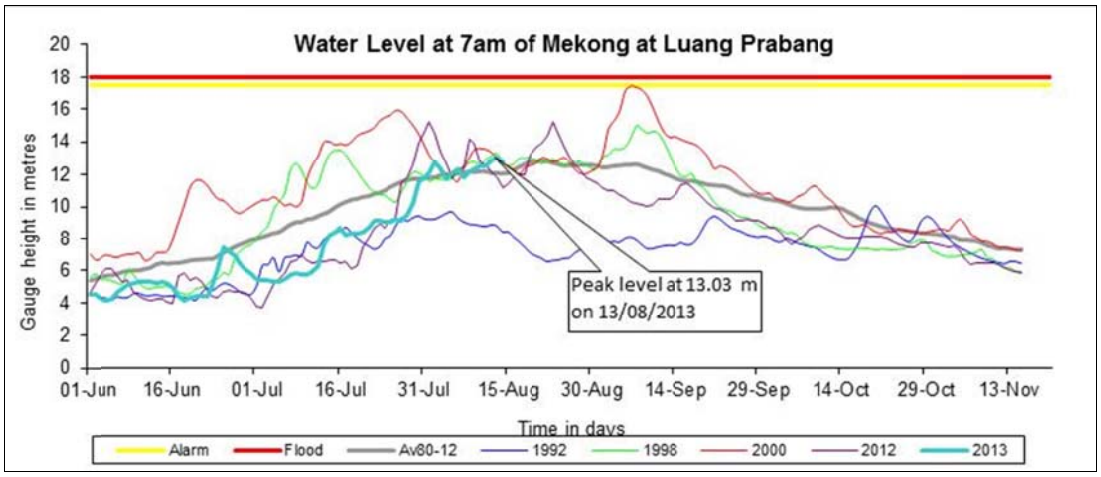


Figure 3.6-39 Hydrograph of Mekong at Luang Prabang, where water levels rose due to TS MANGKHUT

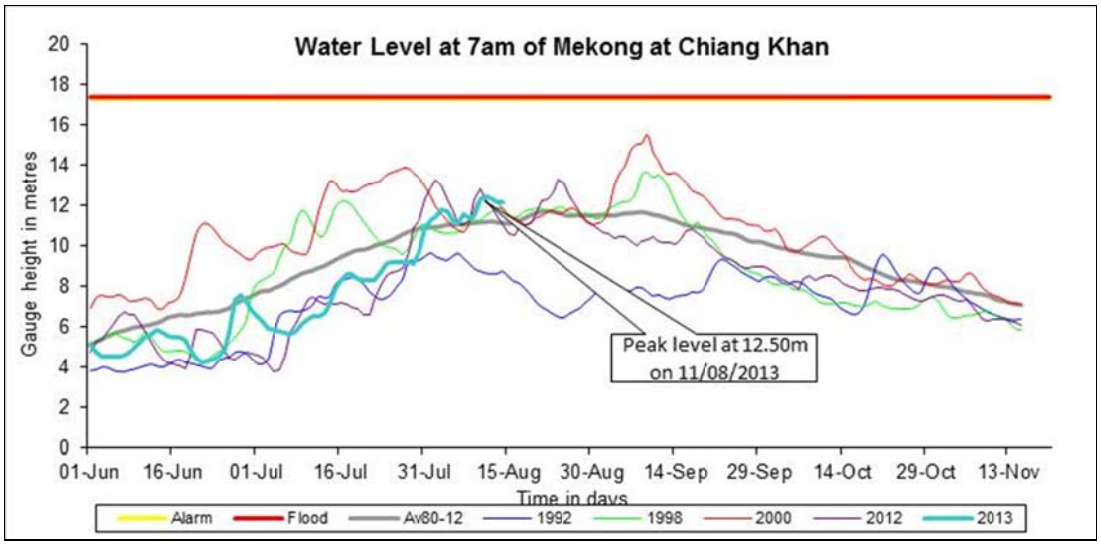


Figure 3.6-40 Hydrograph of Mekong at Chiang Khan, where water levels rose due to TS MANGKHUT.

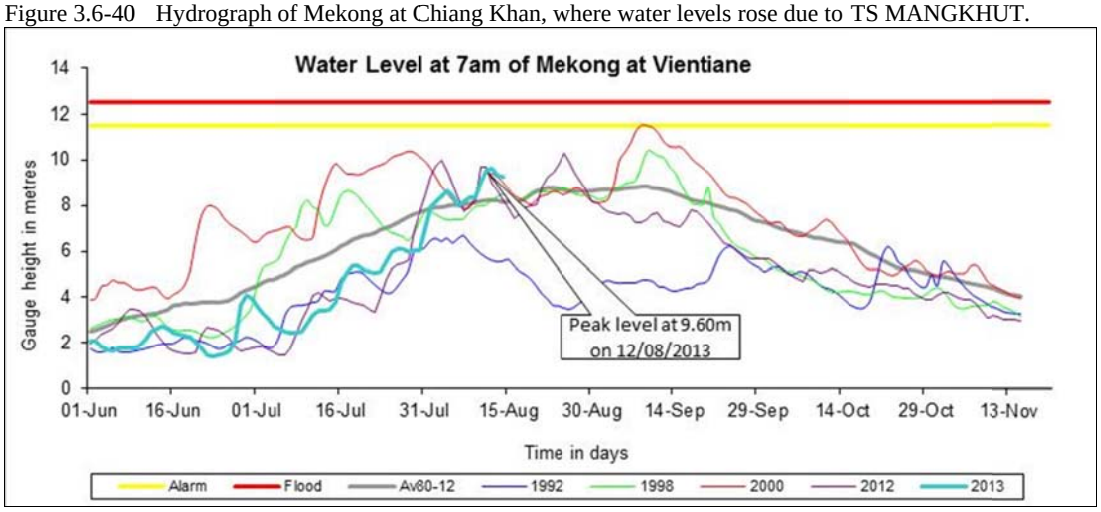


Figure 3.6-41 Hydrograph of Mekong at Vientiane, where water levels rose due to TS MANGKHUT.

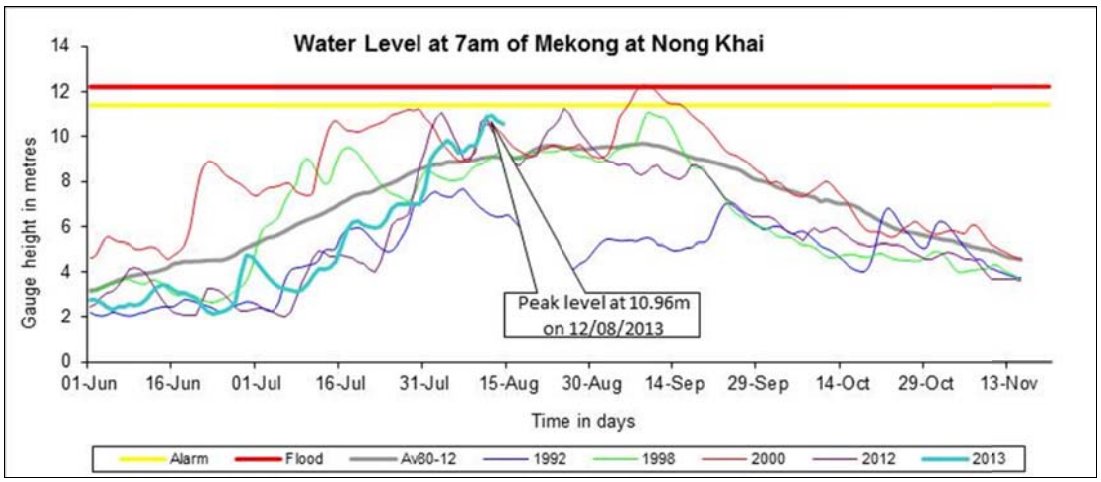


Figure 3.6-42 Hydrograph of Mekong at Nong Khai, where water levels rose due to TS MANGKHUT.

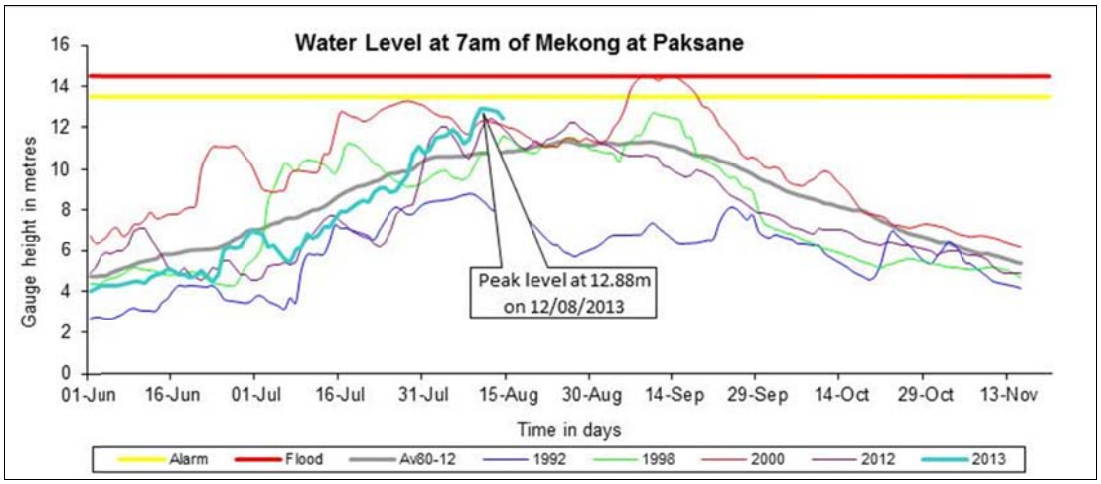


Figure 3.6-43 Hydrograph of Mekong at Paksane, where water levels rose due to TS MANGKHUT.

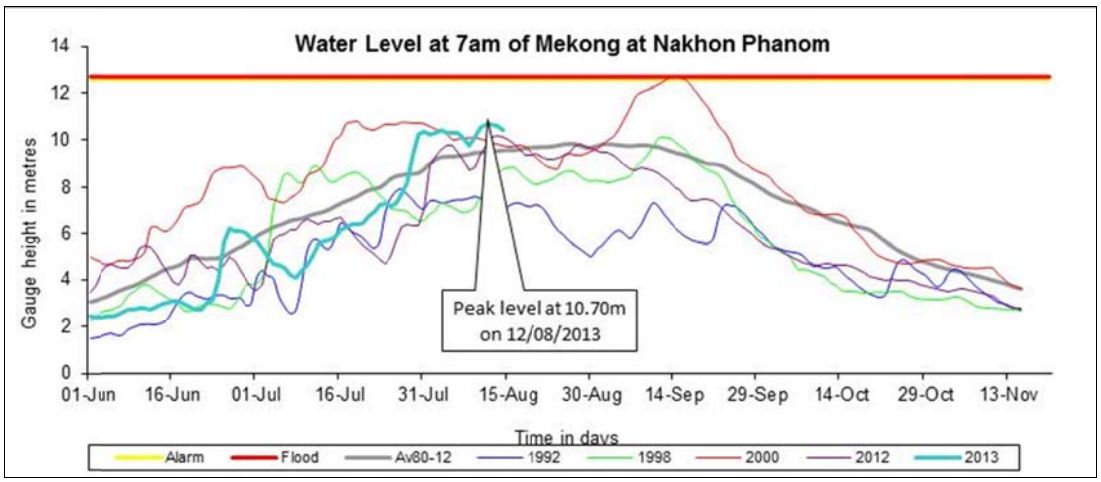


Figure 3.6-44 Hydrograph of Mekong at Nakhon Phanom, where water levels rose due to TS MANGKHUT.

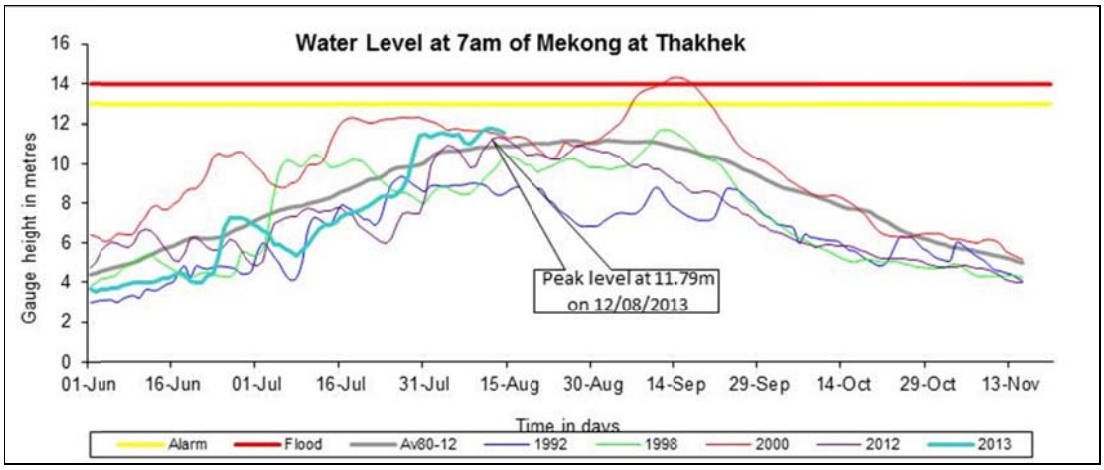


Figure 3.6-45 Hydrograph of Mekong at Thakhek, where water levels rose due to TS MANGKHUT.

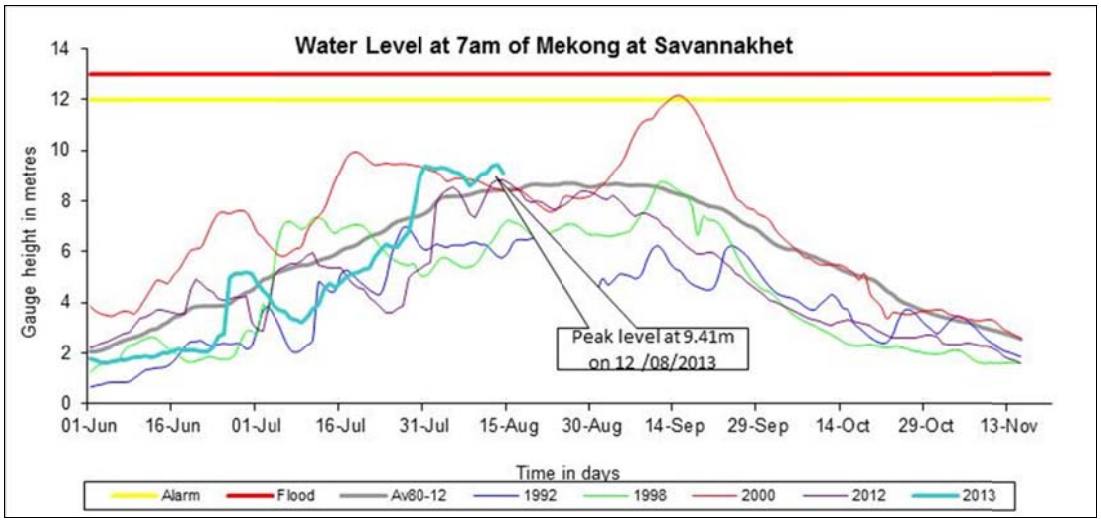


Figure 3.6-46 Hydrograph of Mekong at Savannakhet, where water levels rose due to TS MANGKHUT.

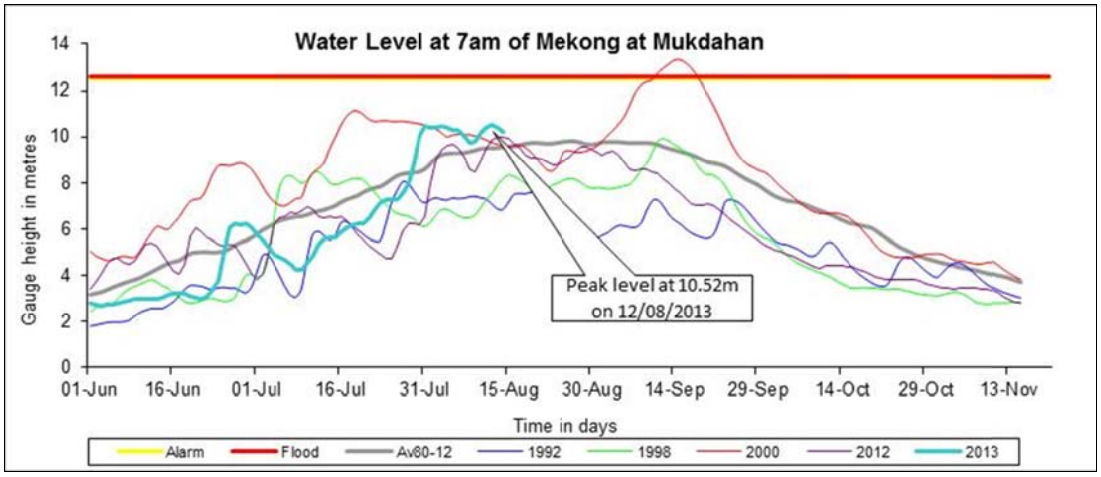


Figure 3.6-47 Hydrograph of Mekong at Mukdahan, where water levels rose due to TS MANGKHUT.

3.6.8 Conclusions

1. TS MANGKHUT was the sixth storm to hit Viet Nam in 2013. It was also the second storm that hit and impacted some sub-catchments of the Mekong River Basin, located in the central and northern part of Lao PDR and northern part of Thailand, such as Nam OU, Nam Nhiep, Nam Cadine, Nam Tha, Nam Ngum, Xe Bang Fai, Nam Mae Kok and Nam Mae In.
2. When TS MANGKHUT weakened to a tropical depression, this process was accompanied by heavy rainfall (60 – 150 mm per day) for many areas of the northern part of Viet Nam, but also for many sub-catchments of the LMB, located in northern and central parts of Lao PDR, and the northern part of Thailand.
3. Water levels at some hydrological stations situated in some tributaries of sub-catchment of Nam Nhiep, Nam Ngum, Nam Ou, Nam Tha, Nam Mae Kok, Nam

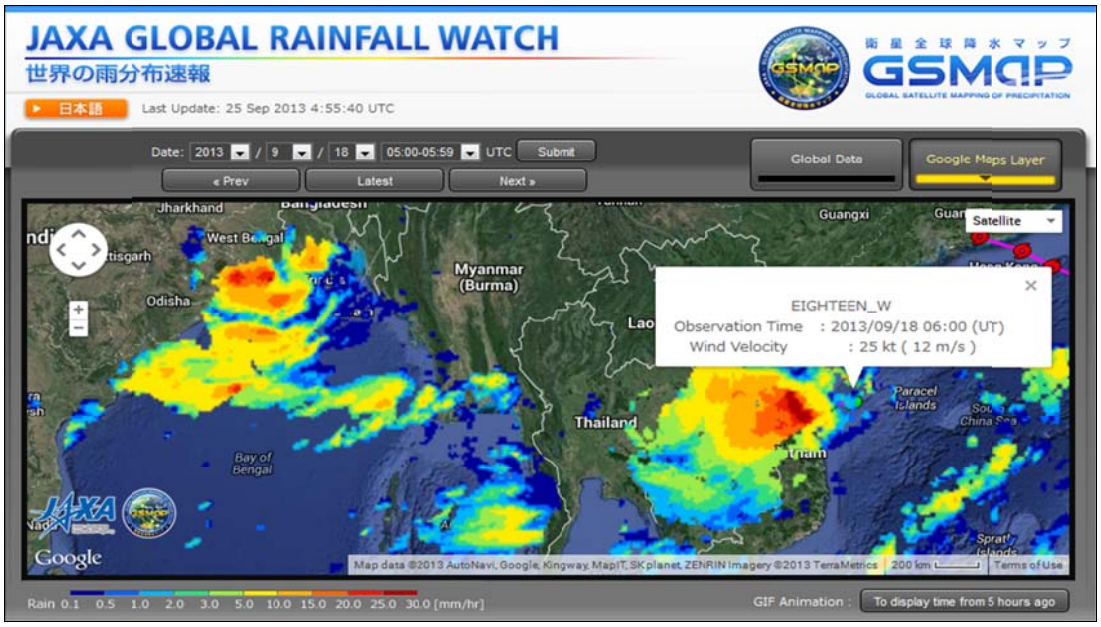
Sane rose quickly (2 - 3 m), which was caused by heavy rainfall from the depression of MANGKHUT.

4. Following the rising water levels in some tributaries, water levels at some monitoring stations of the Mekong mainstream (especially for the stations from Chiang Saen to Mukdahan) has been remarkably increased , for some of them has been reach to higher than the daily long term average .
5. The MRC flash flood Guidance system detected on 08 August 2013 at 00:00 UTC (07:00 local time) that various villages of the northern provinces of Lao PDR such as Luang Prabang, Xiengkhuang, Bolikhamxay, Khammuane, Xaysomboung provinces were at the risk of flash flood occurrences. These flash flood risk areas extended to other villages on 09 August 2013 at 00:00 UTC. These flash flood risk areas detected by MRCFFG system were confirmed by the information published in the Lao newspaper "Vientiane Times", dated 12 and 13 August 2013.
6. The MRC flash flood guidance system detected also in the morning of 09 August 2013 that some districts of the northern provinces of Thailand, such as Chiang Rai, Chiang Mai, Nan, Mae Hong Son, Lampang, Nong Khai and Phayoa, were at the risk of flash flood occurrences. The flash floods that occurred on 09 August 2013 in some districts of the northern provinces of Thailand were confirmed by the information published in the Thai online newspaper "The Nation", dated 09 August 2013 at 17:34, and also 12 August 2013.
7. The MRCFFG system detected in the morning of 08 August 2013 at 00:00 UTC flash flood risk areas at some districts of provinces in the northern part of Viet Nam, such as at Ky Son district of Hao Binh province, at Huong Son district of Ha Tinh province, and at Ba Xat district of Lao Cai province. Based on the available information from the online media the flash floods occurred at the same provinces (Hao Binh, Ha Tinh) but in different districts. For example the flash floods at the Hao Binh province actually occurred in the Lac Thuy district, and at the Ha Tinh province actually occurred in the Ky Anh district. This difference in estimation of the FFG value should be analyzed in depth; a solution should be developed in cooperation with the HRC who develop the MRCFFG system.

3.7 Flash Flood Caused by Tropical Depression EIGHTEEN

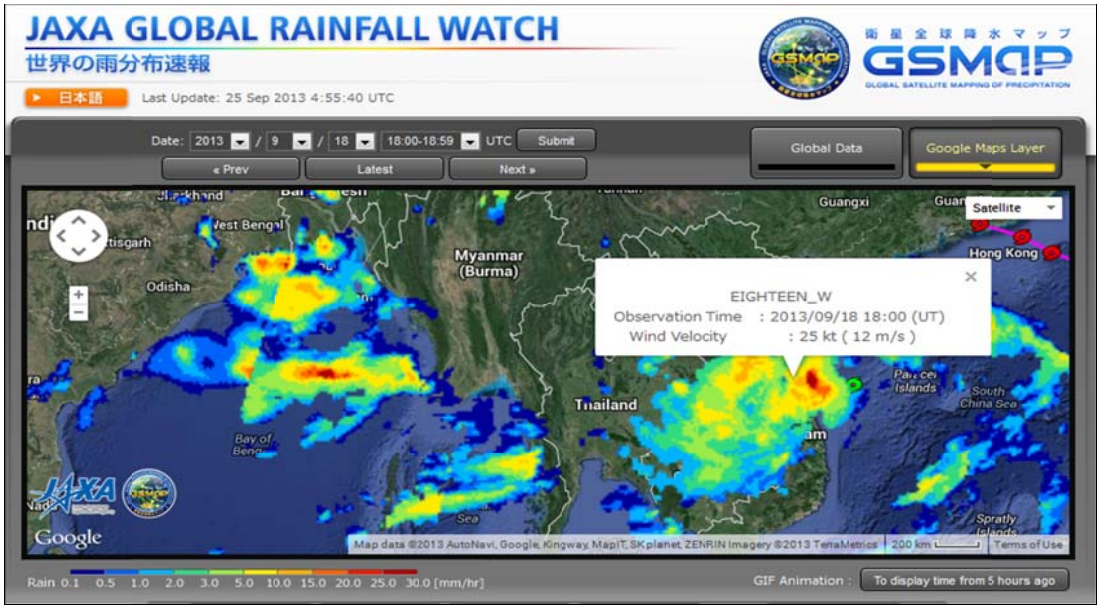
3.7.1 Tropical Depression EIGHTEEN

On 18 September 2013at 06:00 UTC the Tropical Depression developed in the central area of the East Sea. The TS moved in westerly direction and hit the coastal province Quang Tri of Viet Nam on 18 September 2013 at 18:00 UTC. It then continued to move in westerly direction across the Vietnamese territory to the southern provinces of Lao PDR. Figure 3.7-1 and Figure 3.7-2 show the movement of TD EIGHTEEN.



Source: Jaxa Global Rainfall Watch

Figure 3.7-1 On Sept18 2013 at 06:00 UTC at the East Sea the tropical depression was formed and started to move into the Viet Nam coastal areas.



Source: Jaxa Global Rainfall Watch

Figure 3.7-2 On Sept 18 2013 at 18:00 UTC the tropical depression EIGHTEEN hit the central province of Viet Nam (Quan Tri).

3.7.2 Heavy rainfall during the period of TD EIGHTEEN

During the period 18 - 19 September 2013 the Tropical Depression EIGHTEEN was activate in the region. Heavy rainfall occurred in some areas of the central part of Viet Nam, and also in some sub-catchments of the Mekong River, located in the southern and central part of Lao PDR, and in the Se San sub-catchment, especially during 19 September 2013. The daily rainfall at some hydro-meteorological stations of those above mentioned sub-catchments almost all reported up to 300 mm per day. Figure 3.7-3 to Figure 3.7-8 present the records of

daily accumulated rainfall for rainfall stations in the northern part of Viet Nam. Figure 3.7-9 to Figure 3.7-14 present the daily rainfall of rainfall stations in sub-catchment of the Lower Mekong Basin, as an effect of TD EIGHTEEN. Figure 3.7-15 presents the map of the location of the rainfall stations where records of daily accumulated rainfall were collected during TD EIGHTEEN.

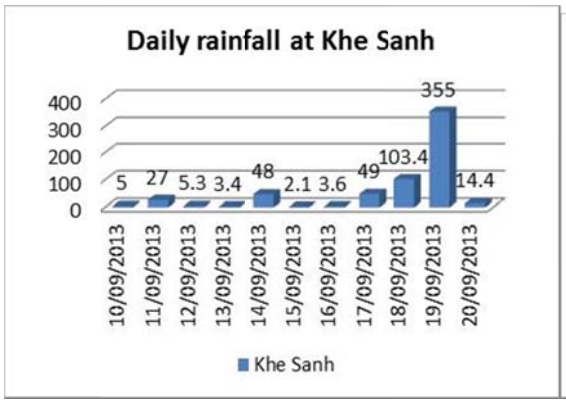


Figure 3.7-3 Daily rainfall (in mm) at Khe Sanh station.

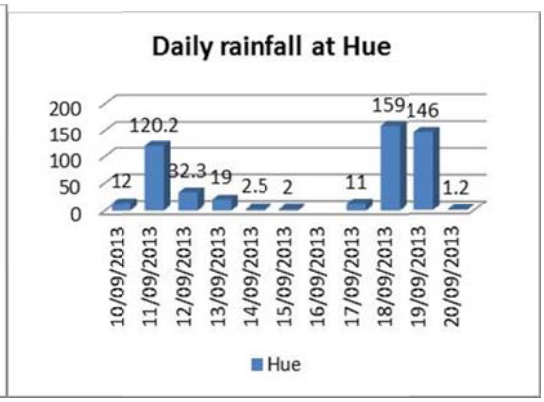


Figure 3.7-4 Daily rainfall (in mm) at Hue station.

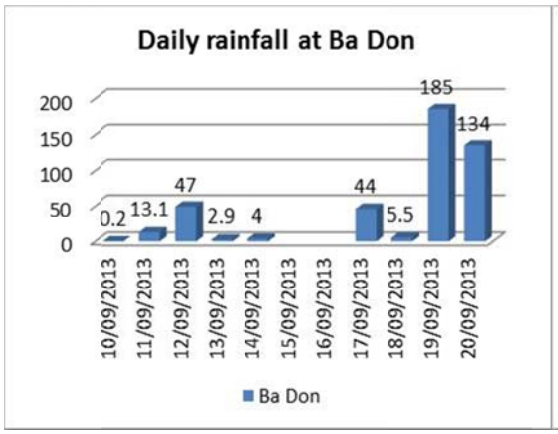


Figure 3.7-5 Daily rainfall (in mm) at Ba Don station.

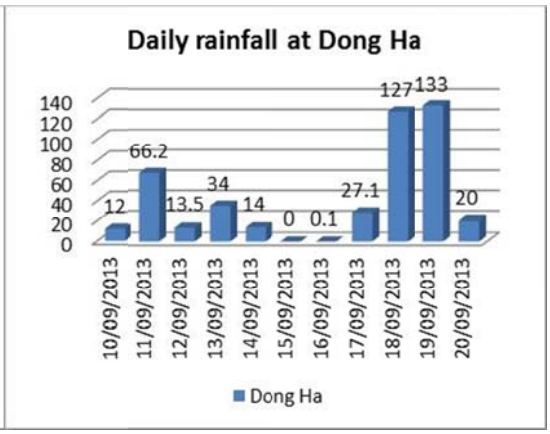


Figure 3.7-6 Daily rainfall (in mm) at Dong Ha station.

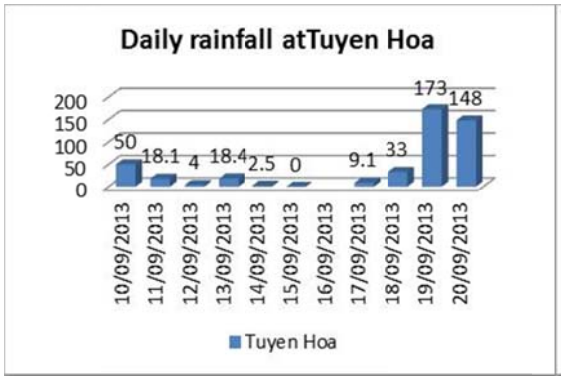


Figure 3.7-7 Daily rainfall (in mm) at Tuyen Hoa station.

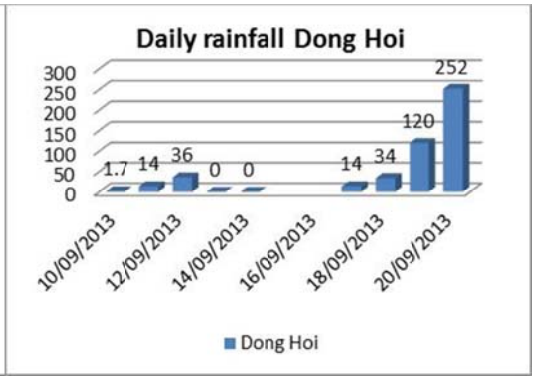


Figure 3.7-8 Daily rainfall (in mm) at Dong Hoi station.

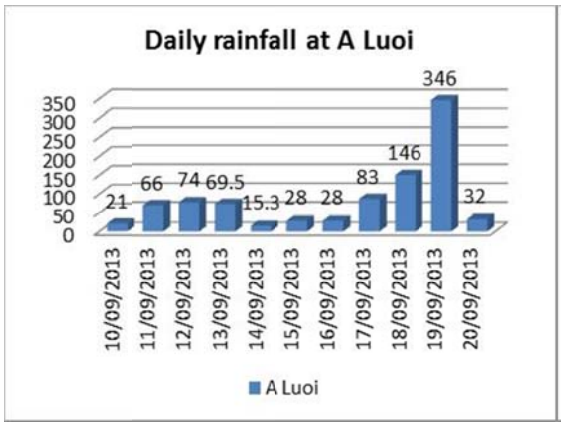


Figure 3.7-9 Daily rainfall (in mm) at A Luoi station of Se Kong catchment.

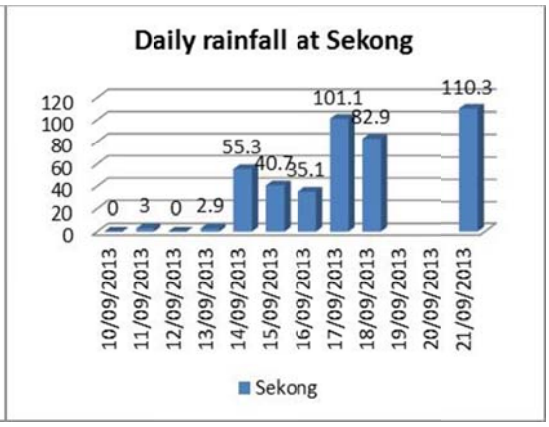


Figure 3.7-10 Daily rainfall (in mm) at Se Kong station of Se Kong catchment.

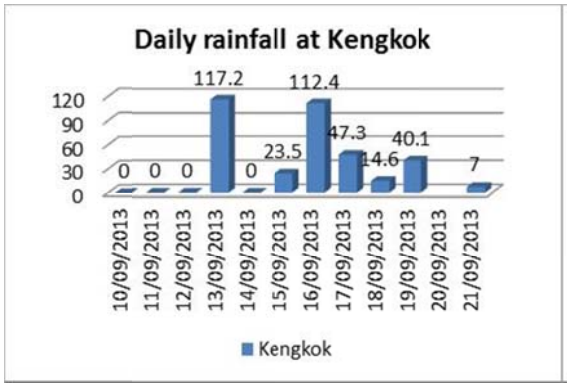


Figure 3.7-11 Daily rainfall (in mm) at Kengkok station of Se Banhieng catchment.

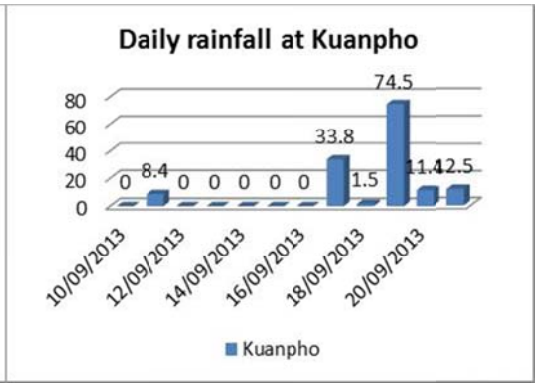


Figure 3.7-12 Daily rainfall (in mm) at Kuanpho station of Se Banfai catchment.

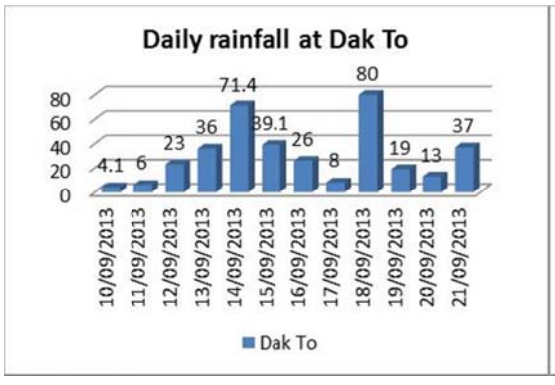


Figure 3.7-13 Daily rainfall (in mm) at Dak To station of Se san catchment.

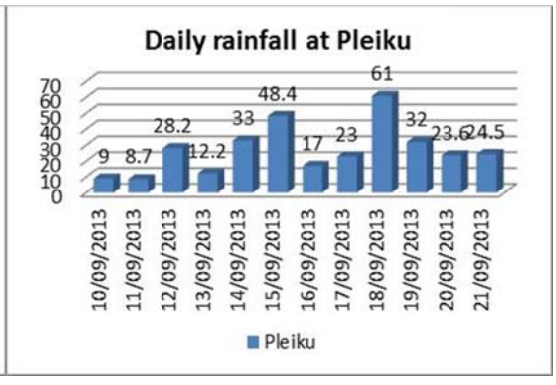


Figure 3.7-14 Daily rainfall (in mm) at Pleiku station of Se San catchment.

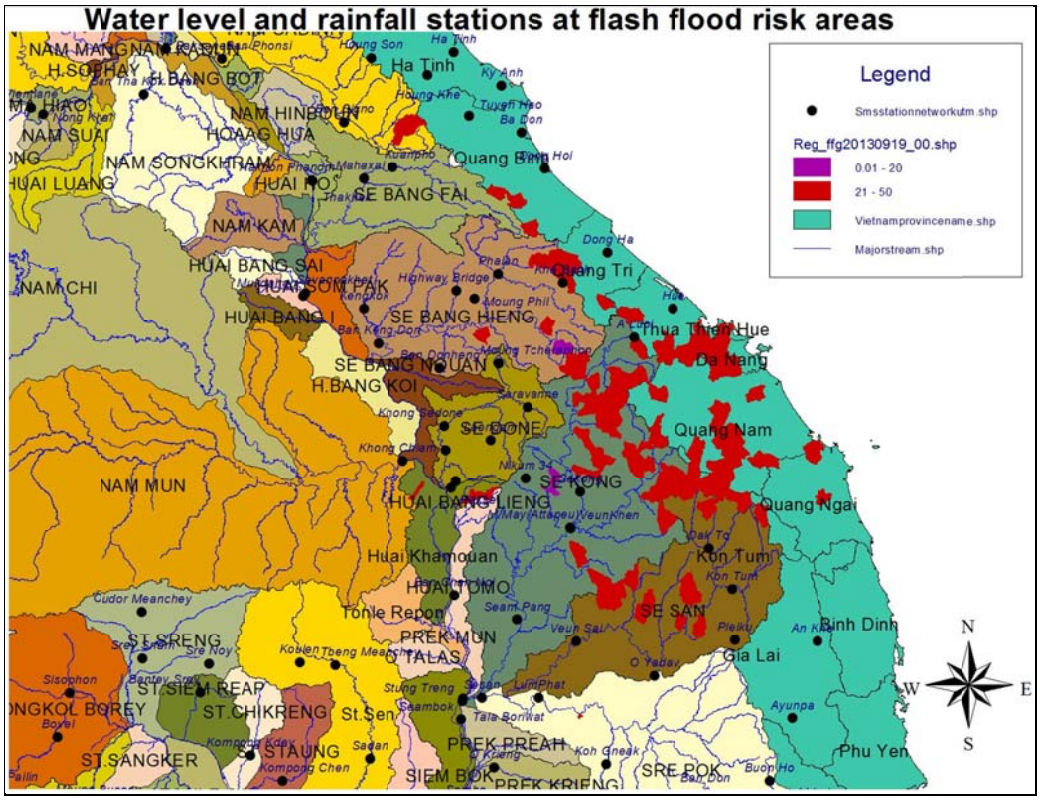


Figure 3.7-15 Map of location of rainfall stations, where rainfall data were used for analysis of the effects by TD EIGHTEEN.

3.7.3 Flash floods caused by TD EIGHTEEN in the central highlands and the central provinces of Viet Nam

On 18 September 2013 at 00:00 UTC (07:00 local time) the MRCFFG system detected that various districts in the central provinces of Viet Nam, such as Quang Nam, Quang Try, Da Nang, Quang Ngai, Koktum, Gia Lai, Dak Lak, Lam Dong and Binh Thuan, were at the risk of flash flood occurrences. These flash flood risk areas extended to other districts on 19 September 2013 at 00:00 UTC. Figure 3.7-16 presents the 3 hour flash flood risk areas in Viet Nam that were detected by MRCFFG system on 18 September 2013 at 00:00 UTC. Figure 3.7-17 presents the 3 hour flash flood risk areas extended to the southern provinces of Lao PDR that were detected by MRCFFG system on 19 September 2013. The information on flash flood areas on 18 September 2013 was confirmed by the information published in the Viet Nam newspaper "Viet Nam New", dated 19 September 2013. This information is presented in the Annex 1.7 of this report.

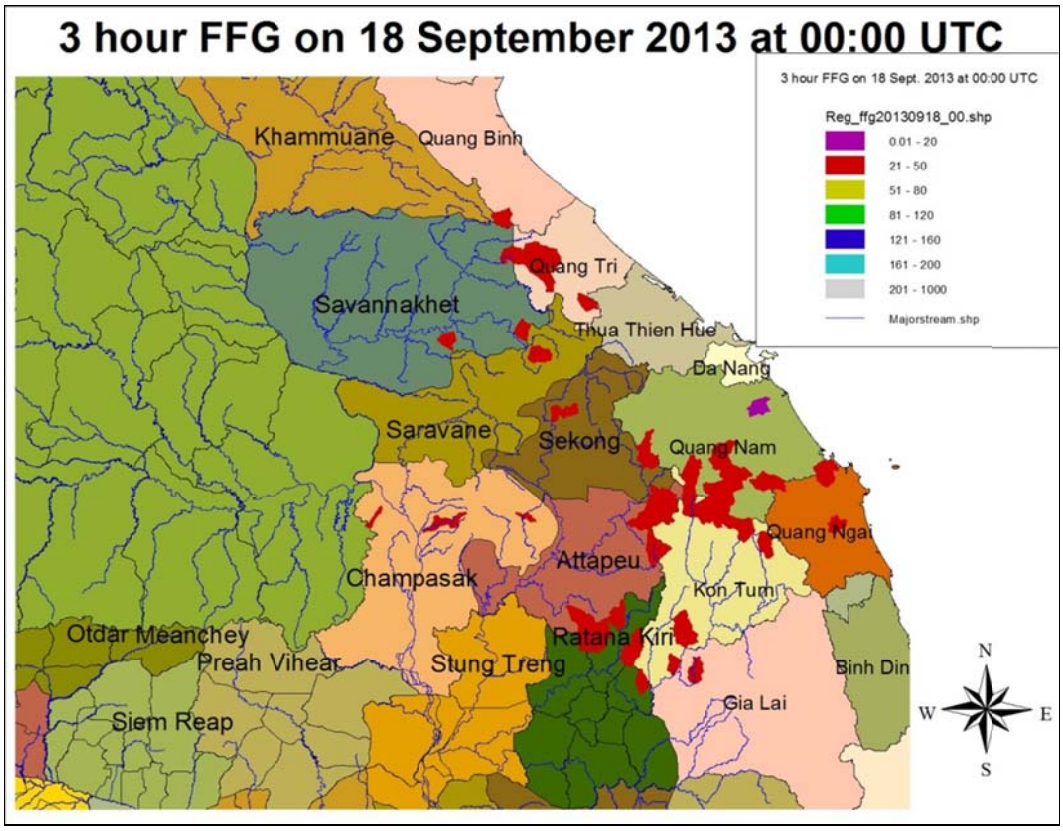


Figure 3.7-16 3 hourly Flash Flood Guidance (FFG) system on 18 September 2013 at 00:00 UTC show a number of flash flood risk in some districts of central highland and central province of Viet Nam.

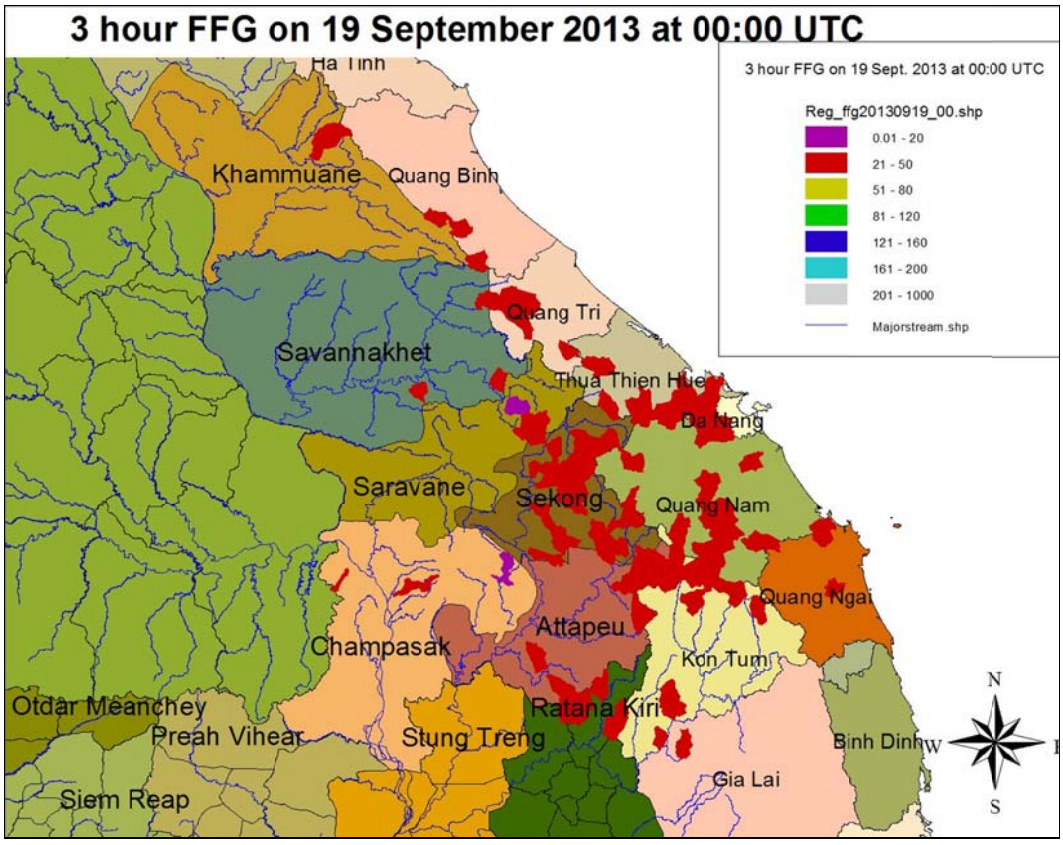


Figure 3.7-17 3 hourly Flash Flood Guidance (FFG) system on 19 September 2013 at 00:00 UTC show that the flash flood risk areas at lower Mekong Basin was extended to the some areas in the southern provinces of Lao PDR.

3.7.4 Flash floods caused by TD EIGHTEEN in the southern provinces of Lao PDR

In the morning of 18 September 2013 at 00:00 UTC the MRCFFG system detected the flash flood risk areas at some villages of provinces in the southern part of Lao PDR, such as Savannakhet, Saravane, Se Kong, Champasak and Attapeu. On 19 September 2013 the number of flash flood risk areas was extended to the other villages of above mentioned provinces, including some villages of Khammuane province. Based on the available information from the online media "Vientaine Times", dated 21 September 2013, flash floods occurred at the same provinces (Champasak, Saravane) but in different districts. For example at Champasak province the flash flood actually occurred at Champasak, Bachiengchaluersouk and Soukuma districts (see Figure 3.7-18, the districts with "yellow" color), while the FFG system detected only one district, Phonthong district as flash flood risk area. For Saravane province the flash flood occurred at Khongxedone district (Figure 3.7-18, district with "yellow" color), but the MRCFFG system detected flash flood risk areas at Ta Oi district in the eastern part of Saravane province. This difference should be investigated in depth in cooperation with NLA and also with HRC. The information from "Vientiane Times" is presented in Annex 1.7 of this report.

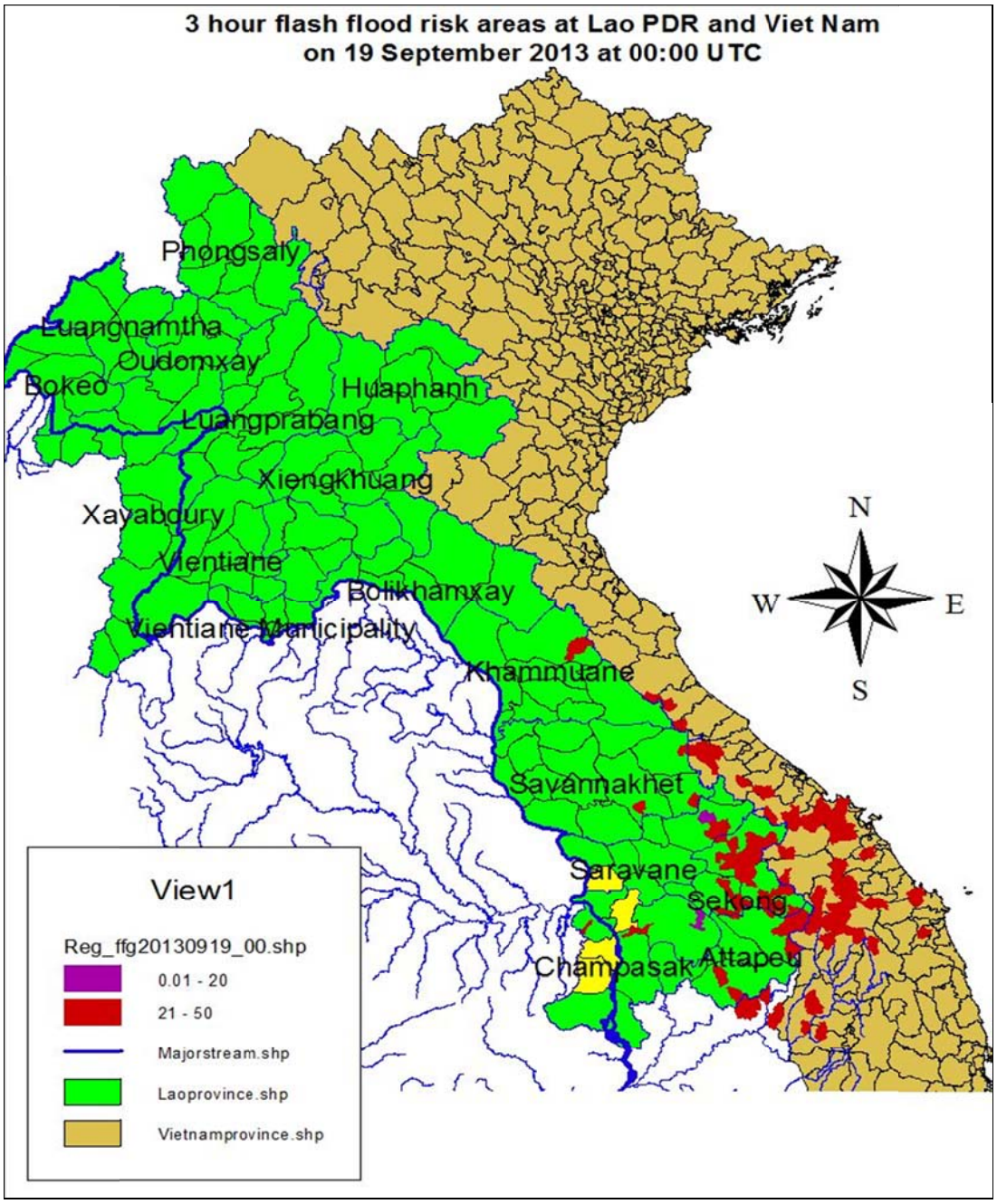


Figure 3.7-18 The 3 hour flash flood risk areas at southern provinces of Lao PDR and central provinces of Viet Nam on 19 September 2013 at 00:00 UTC.

3.7.5 Flash floods caused by TD EIGHTEEN in the north-eastern provinces of Thailand

On 18 September 2013 at 00:00 UTC, when the TD EIGHTEEN was active over the Lower Mekong Basin the 3 hour FFG detected some districts of Ubon Rachathani with the risk of flash flood occurances. Also on 19 September 2013 at 18:00 UTC when the TD EIGHTEEN was downgraded to a low pressure cell, the northeast provinces of Thailand, such as Surin, Kalasin, Si Saket, Ubon Ratchathani, Phitsanulok and Ayutthaya, received heavy rain and some districts of above mentioned provinces were faced with flash floods. Unfortunately the MRCFFG system on 19 September 2013 detected some districts of above mentioned provinces under the flash flood risk level 2 ("yellow" scale). See Figure 3.7-19. However,

according to Newspaper "The Nation" published on 21 September 2013, the seven provinces in the northeast (these were the same provinces that were detected by the MRCFFG under risk level 2) were covered by flood waters on 19 - 20 September 2013. This information is provided in Annex 1.7.

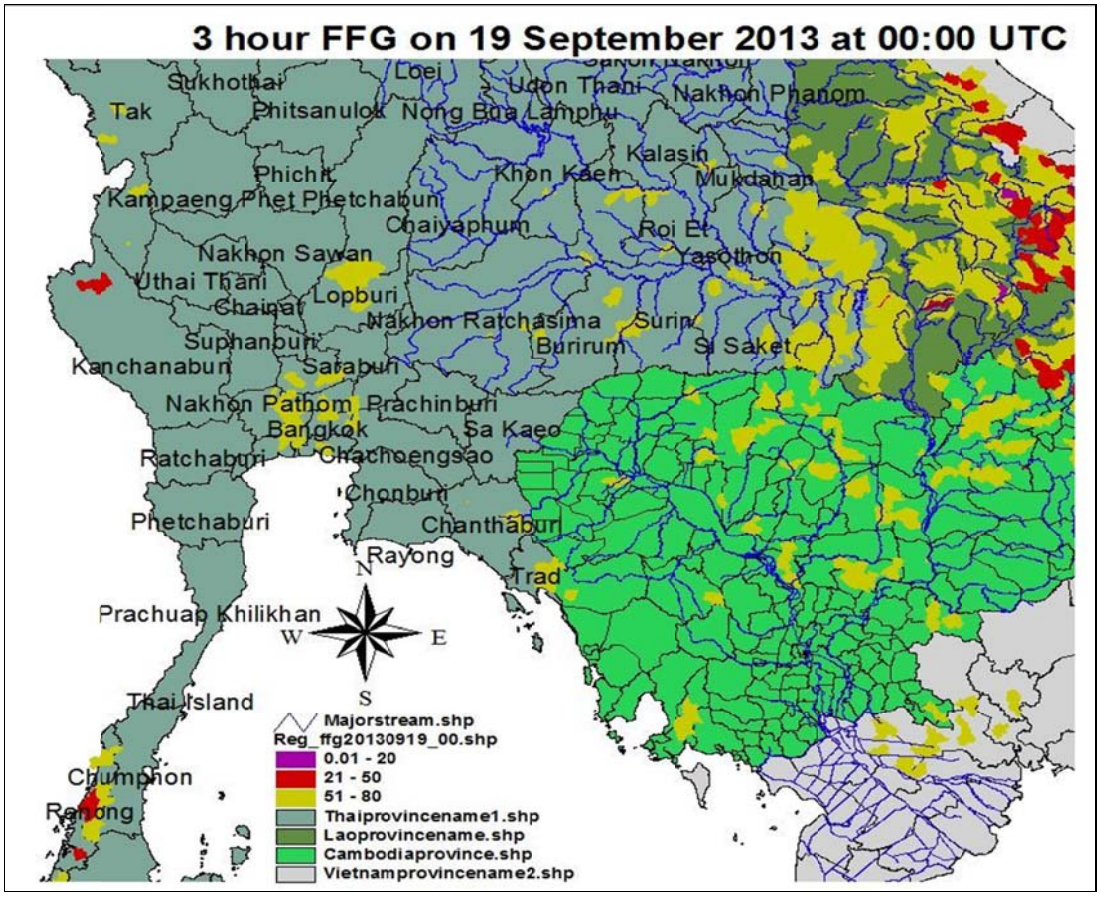


Figure 3.7-19 3 hour FFG on 19 September 2013 at 00:00 UTC shows that some districts of Ubon Ratchathani, Si Saket, Yasothon, Nakhon Ratchasima, Surin… are under the second level of flash flood risk areas.

3.7.6 Impact of TS EIGHTEEN to water levels in some tributaries of Lower Mekong Basin

Heavy rainfall occurred in some Mekong sub-catchments located in the central and northern parts of Lao PDR. The presence of TS EIGHTEEN lead to quickly rising water levels at some tributaries of Mekong sub-catchments, such as Se Kong, Se Sane, Xe Bang Hieng, Xe Bang Fai etc. on 18 to 20 September 2013. For example at the Ban Kengdone hydrological station of Xe Bang Hieng catchment the water level rose from 9.1 m on 18 September to the peak level at 15.00 m on 21 September 2013; at the Sopnam hydrological station the water level rose from 4.00 m on 18 September to the peak level at 16.00 m on 20 September 2013; at the Se Kong hydrological station of the Se Kong river (upper part of Se Kong catchment) the water level rose from 7.25m on 18 September 2013 to the peak level at 15.85 m on 19 September 2013. The quick rising water level was also noted at many stations along the Se San River, such as at Veun Sai station. The water level there rose from 5.85m on 18 September to the peak level of 9 m on 19 September 2013. Figure 3.7-20 to Figure 3.7-28 present the hydrograph at some hydrological stations of Mekong tributaries. Figure 3.7-29

present the Map of 3 hourly FFG on 19 September 2013 at 00:00 UTC with location of water level stations.

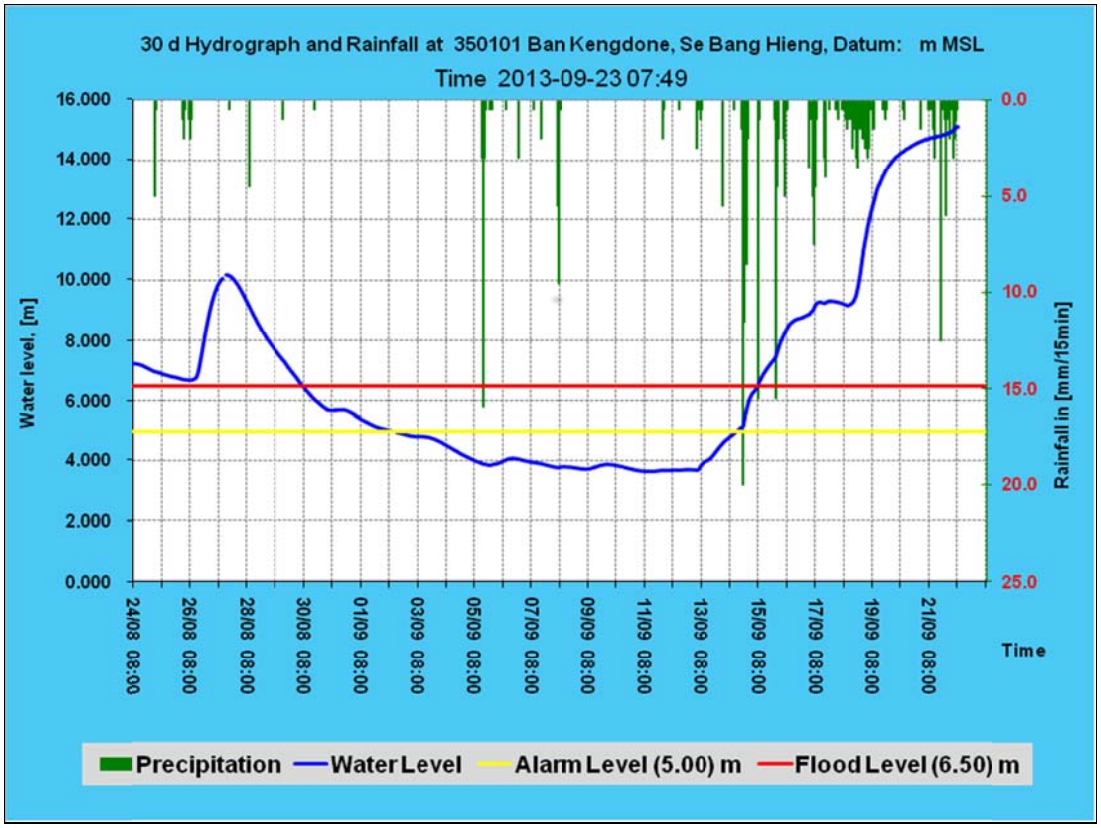


Figure 3.7-20 Risen water levels at Ban Kendone station of Xe Bang Hieng catchment during TD EIGHTEEN.

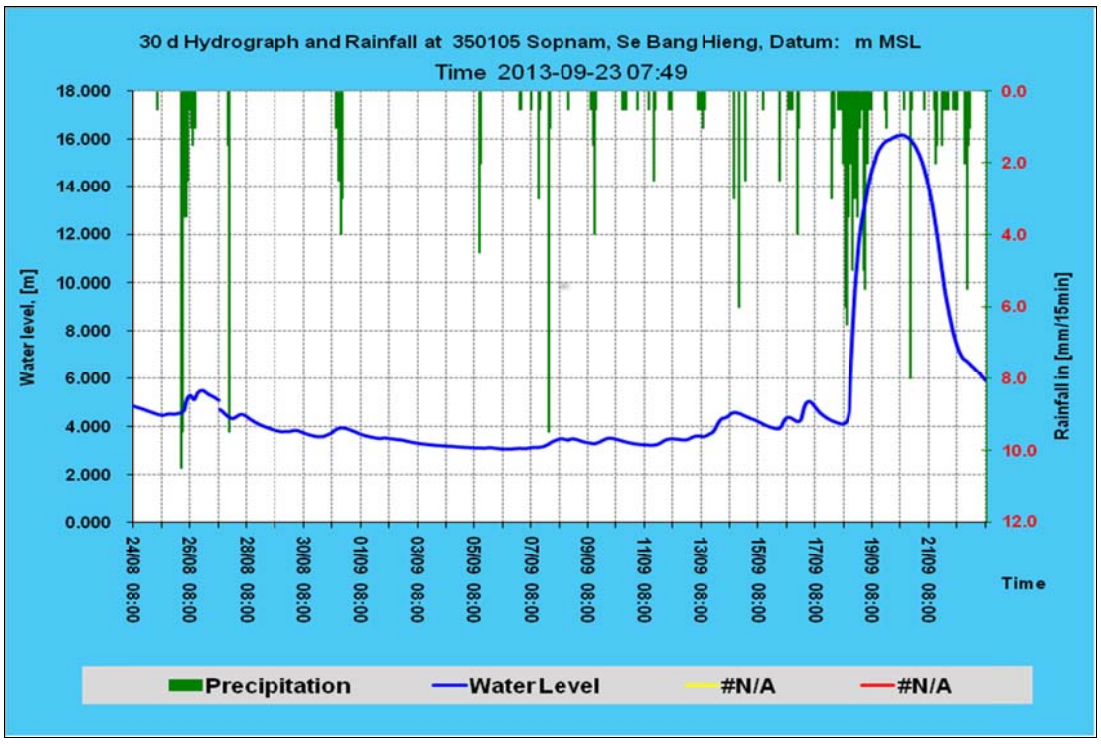


Figure 3.7-21 Risen water levels at Sopnam station of Xe Bang Hieng catchment during TD EIGHTEEN.

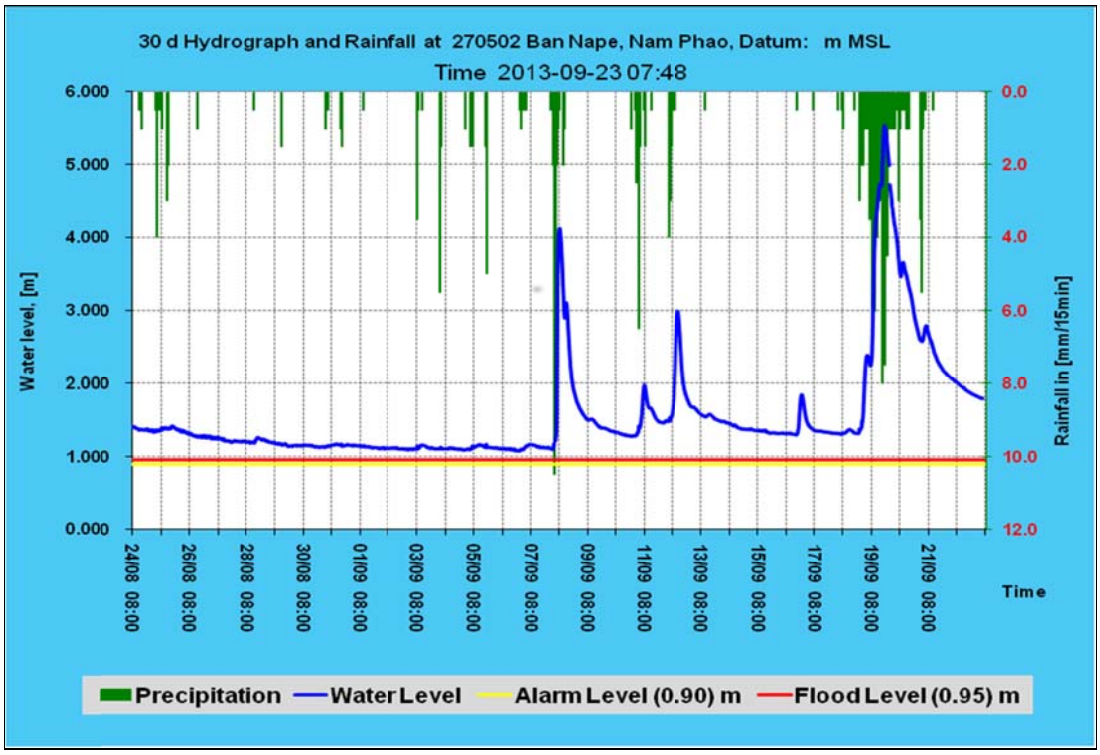


Figure 3.7-22 Rising water levels at Ban Nape station of Xe Bang Hieng catchment during TD EIGHTEEN.

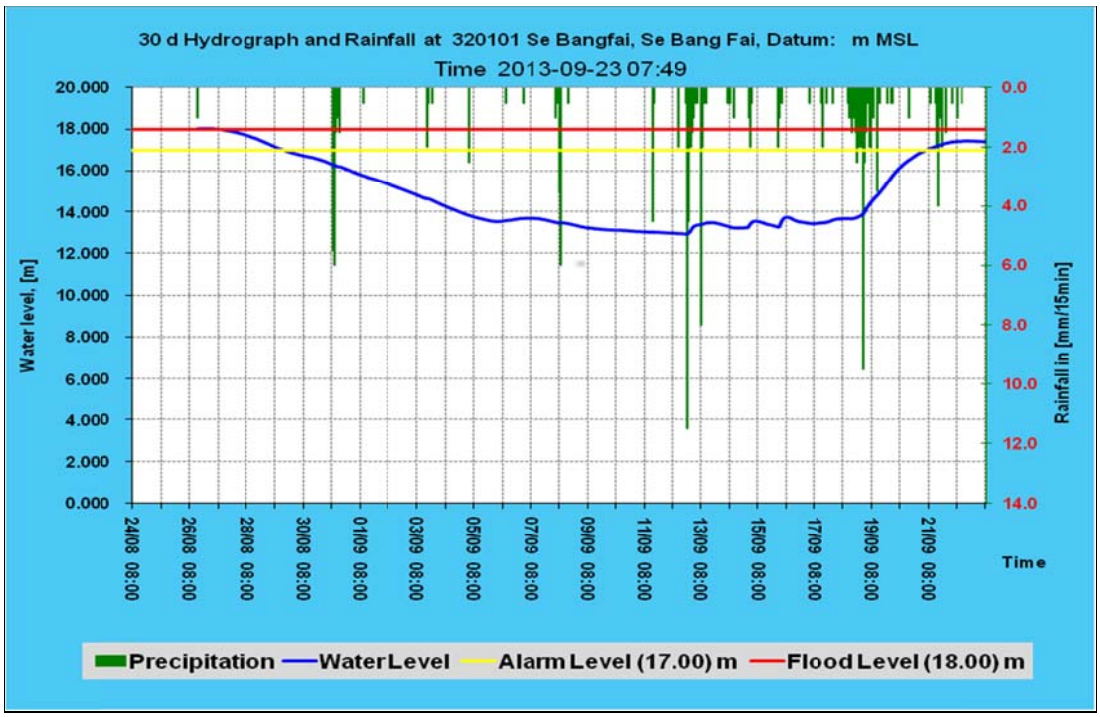


Figure 3.7-23 Rising water levels at Xe Bang Fai station of Xe Bang Fai catchment during TD EIGHTEEN.

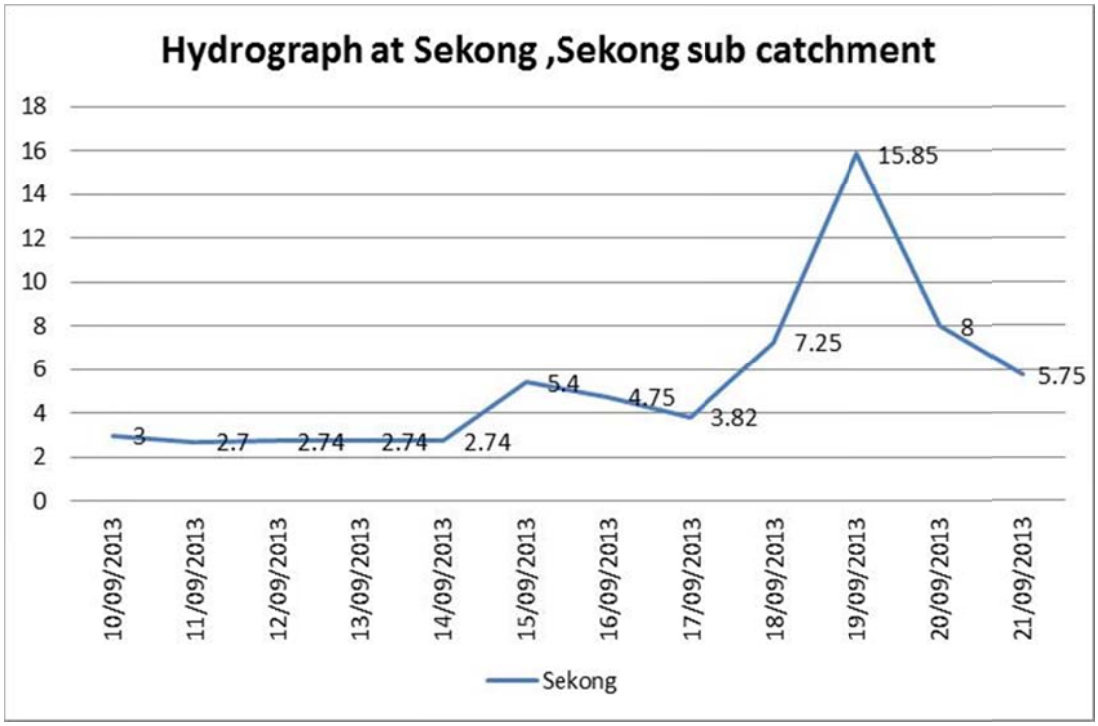


Figure 3.7-24` Rising water levels at Se Kong station of Se Kong catchment during TD EIGHTEEN.

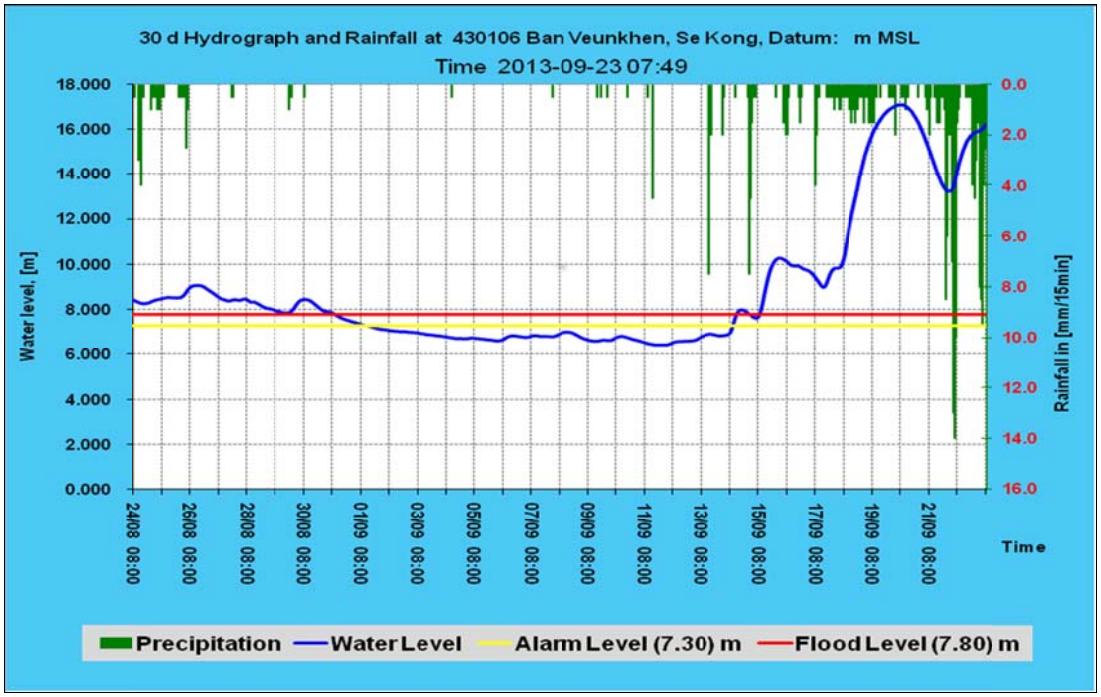


Figure 3.7-25 Rising water levels at Ban Veunkhen station of Se Kong catchment during TD EIGHTEEN.

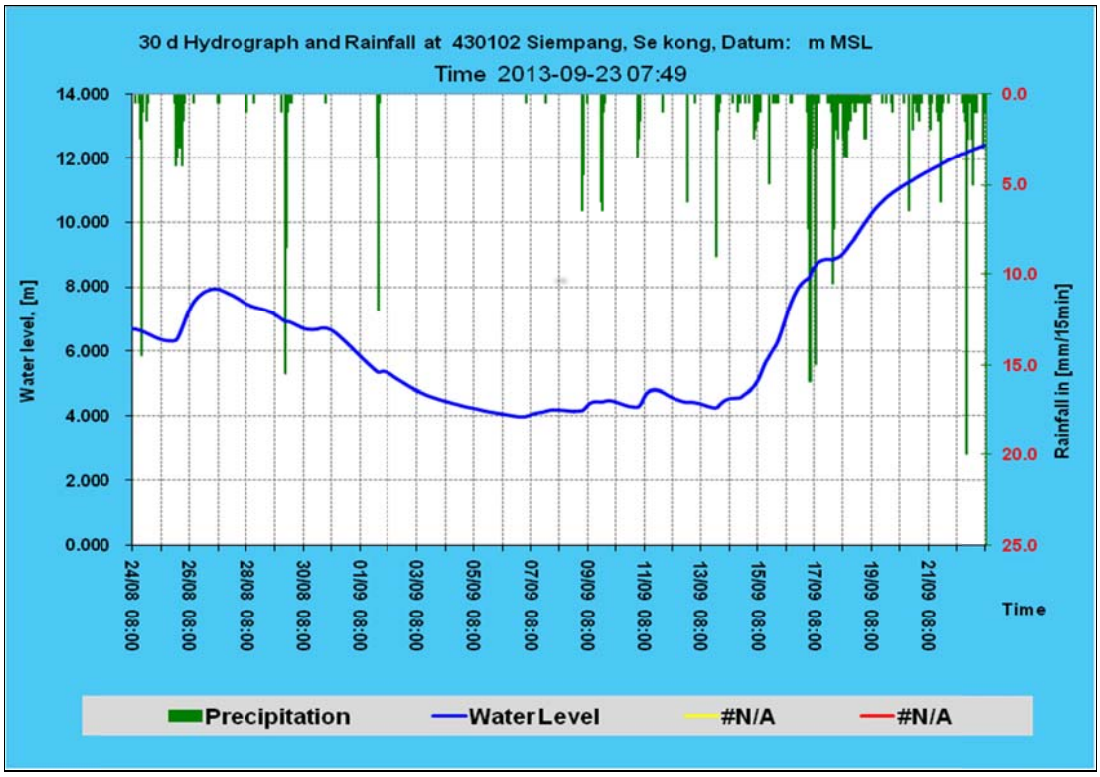


Figure 3.7-26 Rising water levels at Siempang station of Se Kong catchment during TD EIGHTEEN.

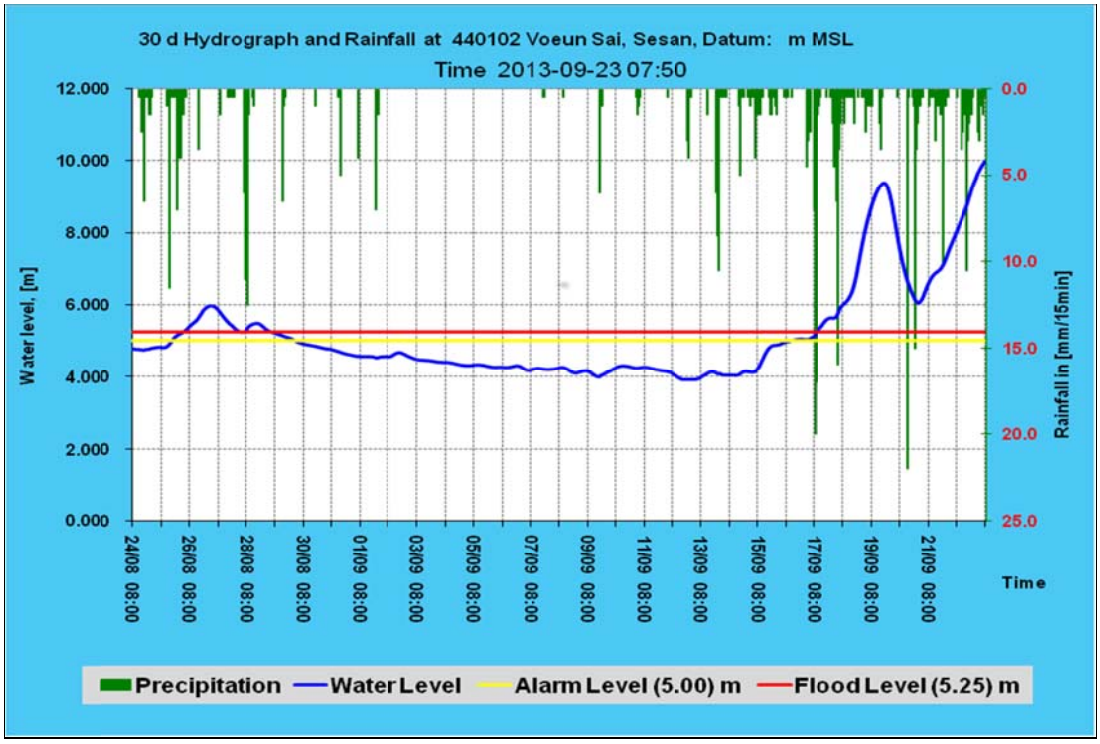


Figure 3.7-27 Raise of water level at Veun Sai station of Sesan catchment during TD EIGHTEEN.

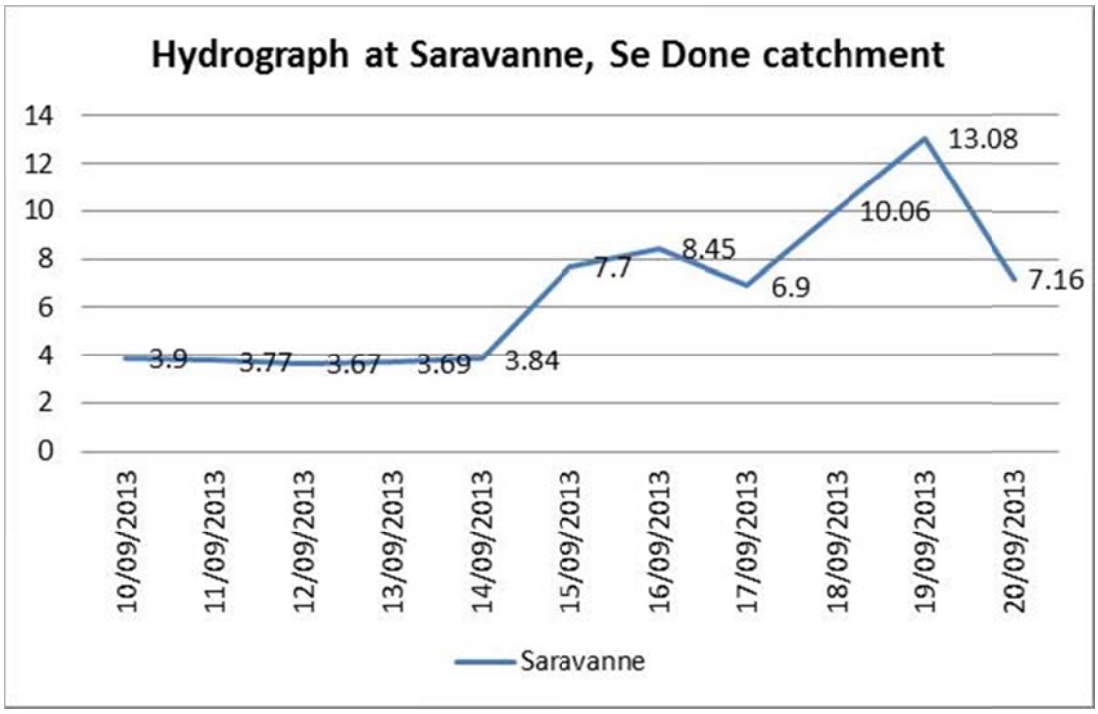


Figure 3.7-28 Raise of water level at Saravane station of Se Done catchment during TD EIGHTEEN.

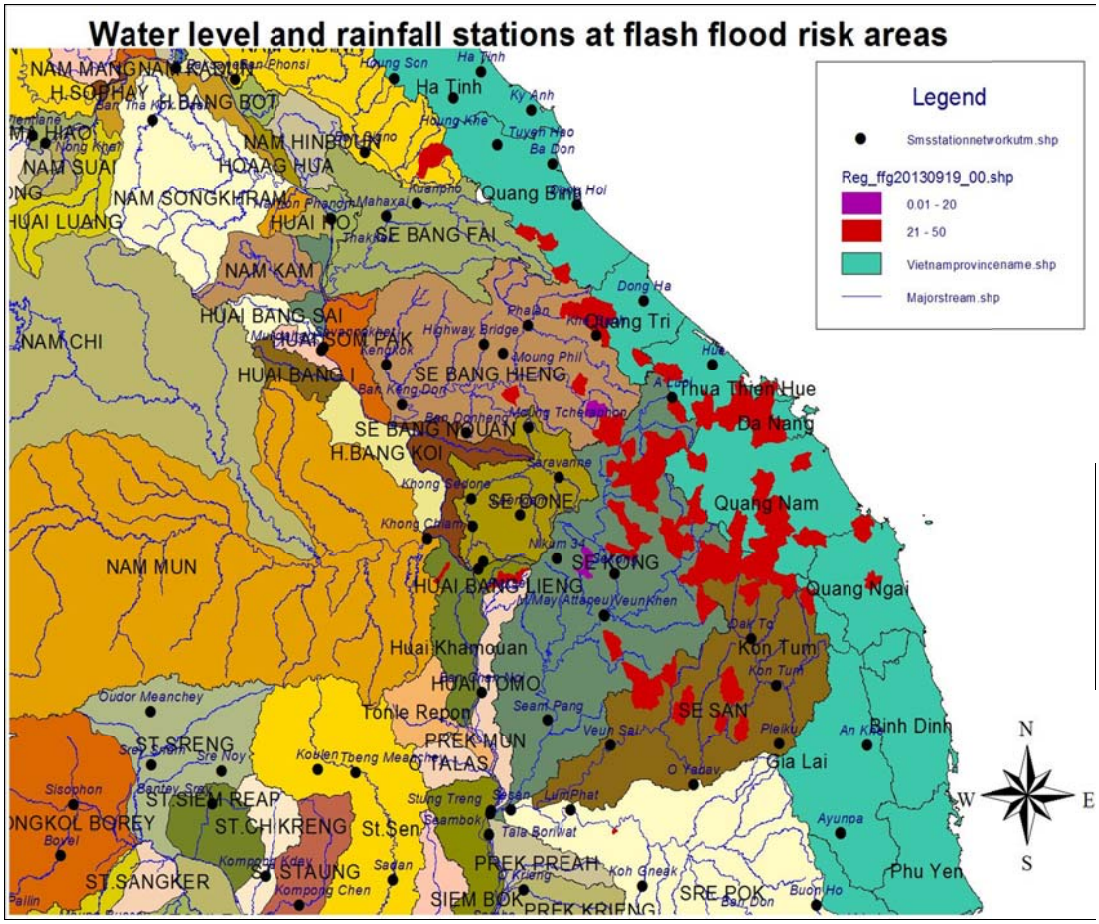


Figure 3.7-29 Map of 3 hour FFG on 19 September 2013 at 00:00 UTC with location of water level stations.

3.7.7 Impact of the TD EIGHTEEN to water levels in the Mekong mainstream

Quick rising water levels in tributaries of southern part of Lao PDR also lead to rising water levels in the Mekong mainstream in some monitoring stations from Khong Chiam station down to stations located in Mekong Delta. For some monitoring stations such as Pakse, Stung Treng, Kratie and Kampong Cham the alarm level was passed and the water level continued rising to the flood level. Figure 3.7-30 to Figure 3.7-34 present the hydrograph of monitoring stations along the Mekong mainstream from Khong Chiam station to Kampong Cham station.

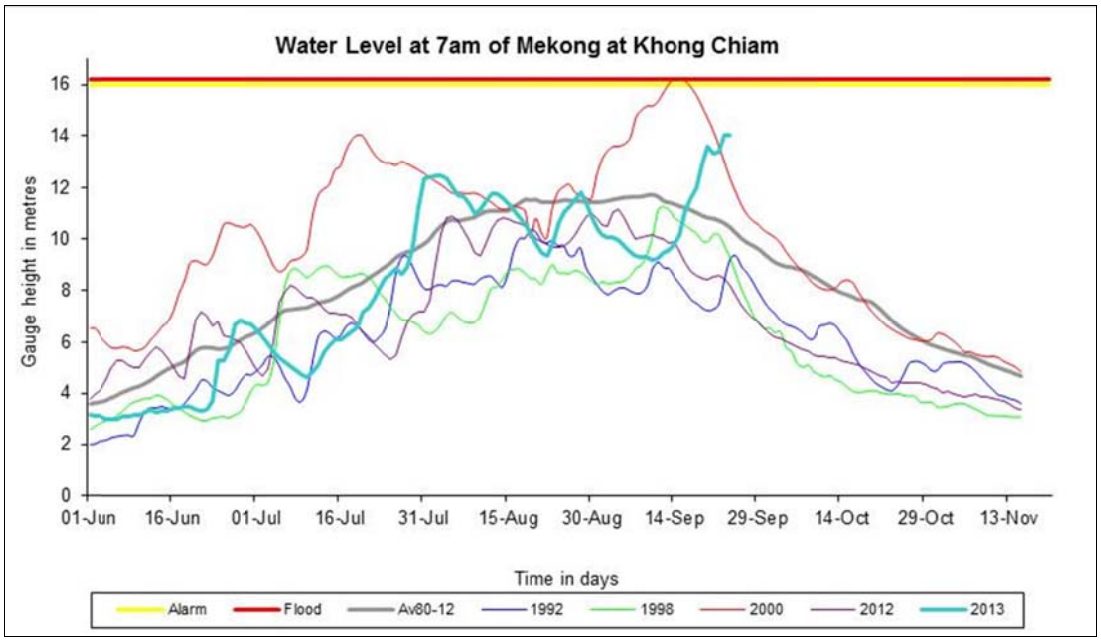


Figure 3.7-30 Hydrograph of Mekong at Khong Chiam, where water levels rose after TD EIGHTEEN.

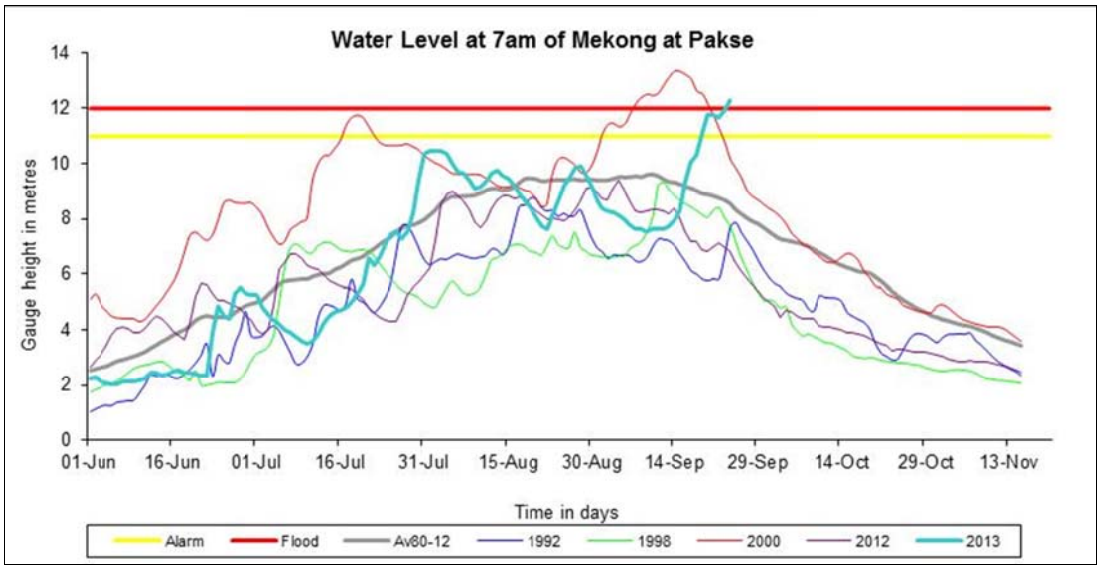


Figure 3.7-31 Hydrograph of Mekong at Pakse, where water levels rose after TD EIGHTEEN.

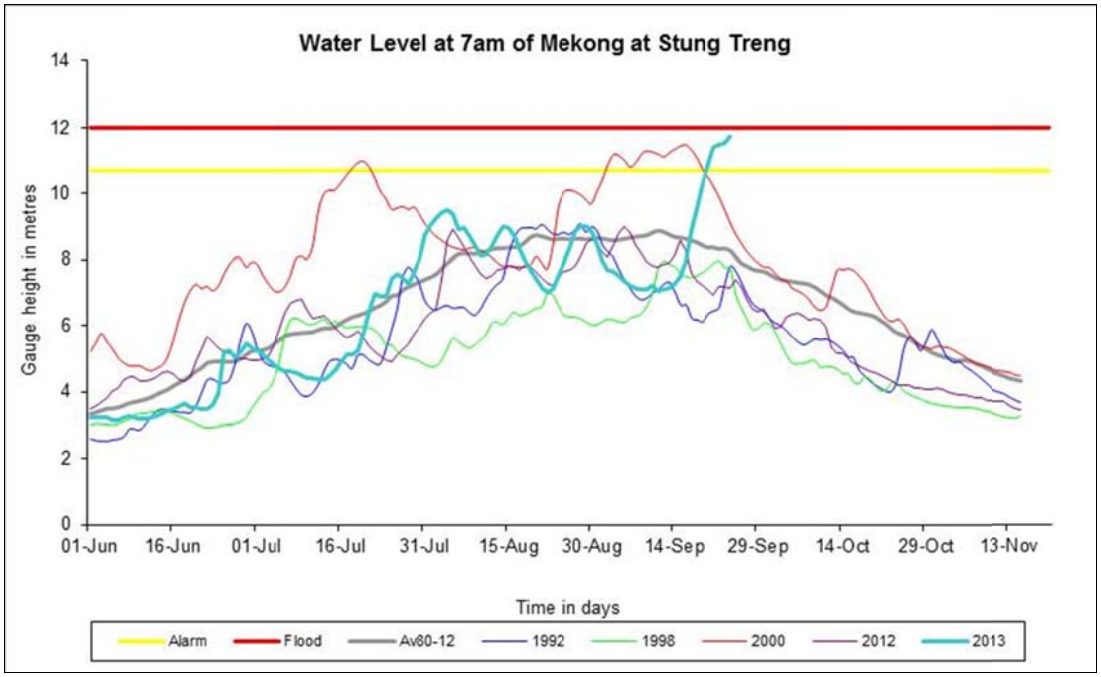


Figure 3.7-32 Hydrograph of Mekong at Stung Treng, where water levels rose after TD EIGHTEEN.

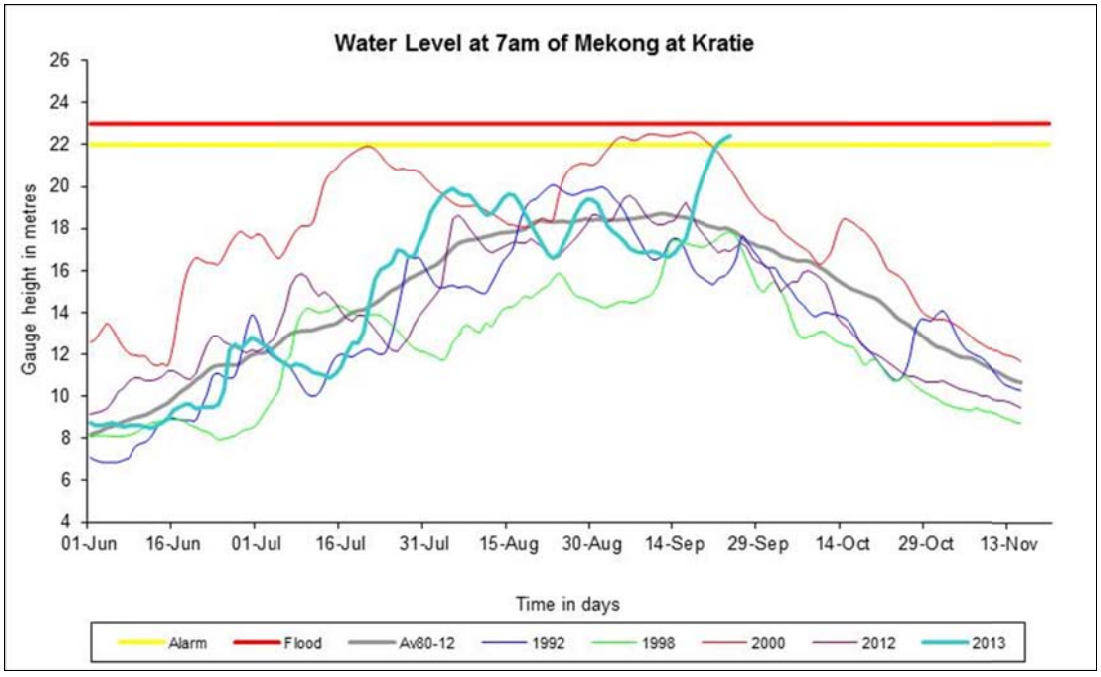


Figure 3.7-33 Hydrograph of Mekong at Kratie, where water levels rose after TD EIGHTEEN.

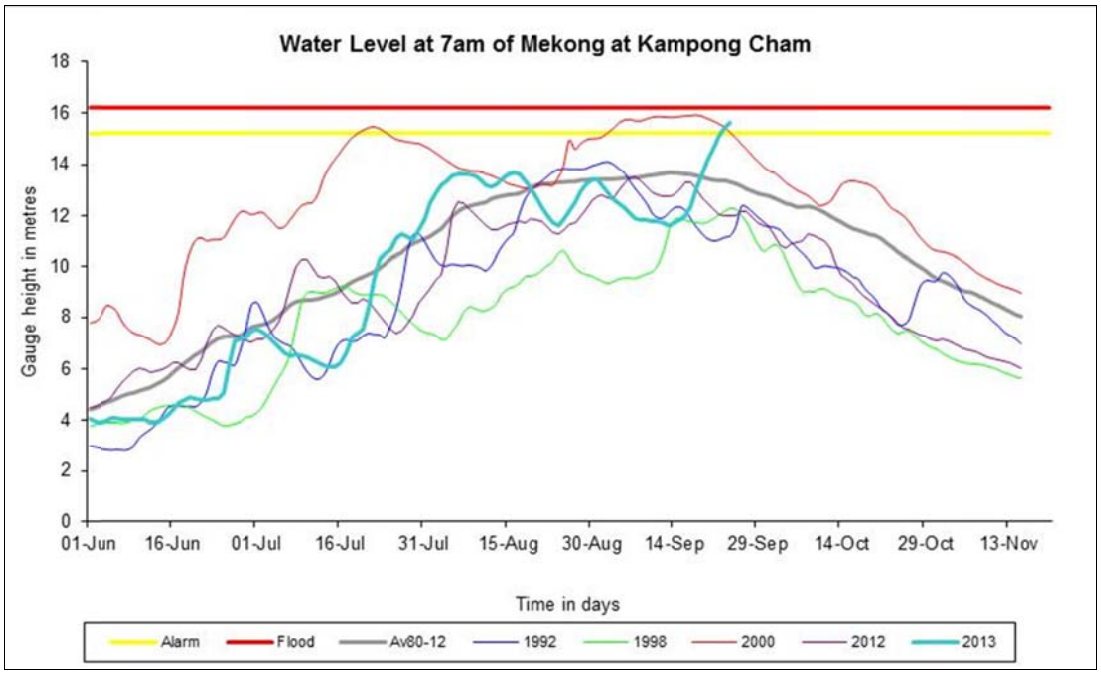


Figure 3.7-34 Hydrograph of Mekong at Kampong Cham, where water levels rose after TD EIGHTEEN.

3.7.8 Conclusions

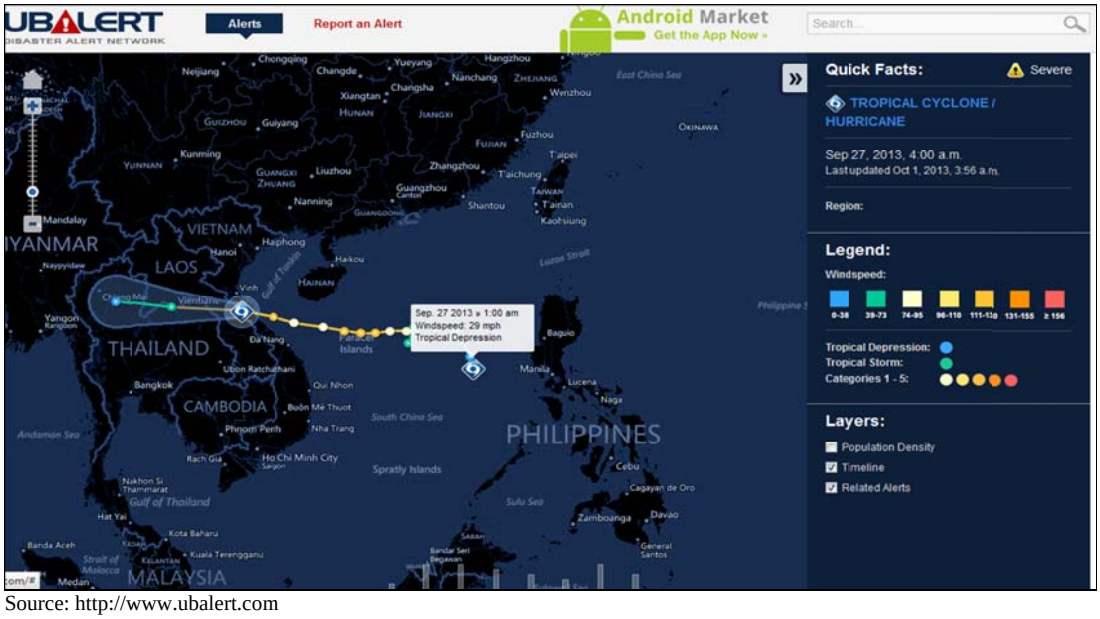
1. TS EIGHTEEN is the eighth storm to hit Viet Nam in 2013. It is also the third storm that hit and impacted some sub-catchments of the Mekong Basin located in the southern part of Lao PDR, such as Xe Bang Fai, Xe Bang Hieng, Nam Cadine, Se Done, Se Kong, Sesan, and also the central part of Thailand (Mum and Chi sub-catchments).
2. When TS EIGHTEEN weakened to a tropical depression, it was accompanied by heavy rain (100 - 350 mm per day) for many areas in the central part of Viet Nam, for many sub-catchments of the LMB located in the southern part of Lao PDR, like the 3S (Se Kong, Se San, Srepok) sub-catchment, located in the central highland of Viet Nam, and also for the Mum and Chi sub-catchments in Thailand.
3. Water levels at some hydrological stations, situated in some tributaries of the sub-catchment Nam Xe Bang Fai, Xe Bang Hieng, Nam Cadine, Se Done, Se Kong, Sesan, quickly rose (approximately 3 -8 m per day), which is caused by heavy rainfall from TD EIGHTEEN.
4. Following rising water level in some tributaries, the water levels at some monitoring stations of the Mekong mainstream (especially from Kong Chiam to Kampong Cham) remarkably increased; some of them passed the alarm level.
5. On 18 September 2013 at 00:00 UTC (07:00 local time) the MRCFFG system detected that various villages in the southern provinces of Lao PDR, such as Savannakhet, Saravane, Se Kong, Champasak and Attapeu, were at the risk of flash flood occurrences. These flash flood risk areas extended to other villages on the 19 September 2013 at 00:00 UTC. Based on the available information from the online media "Vientaine Times", dated 21 September 2013, it was concluded that flash floods occurred in the same provinces (Champasak, Saravane) but in different districts. Therefore the problem of accuracies in the FFG detection should be investigated in depth with NLA and also with HRC.

6. In the morning of 18 September 2013 the MRCFFG system detected that some districts in the Ubon Rachathani province in Thailand were at the risk of flash flood occurrences. On 19 September 2013 the FFG system detected some districts in the northeast provinces of Thailand, such as Si Saket, Yasothon, Nakhon Ratchasima and Surin, were under the flash flood risk level ("yellow" scale). Actually these provinces were flooded on 20 September 2013 according to the information from the Thai newspaper "The Nation" published on 21 September 2013.
7. In the morning of 18 September 2013 at 00:00 UTC the FFG system detected the flash flood risk areas in some districts in provinces on the central part of Viet Nam, such as Quang Nam, Quang Try, Da Nang, Quang Ngai, Koktum, Gia Lai, Dak Lak, Lam Dong and Binh Thuan provinces.

3.8 Flash Floods Caused by Tropical Storm WUTIP

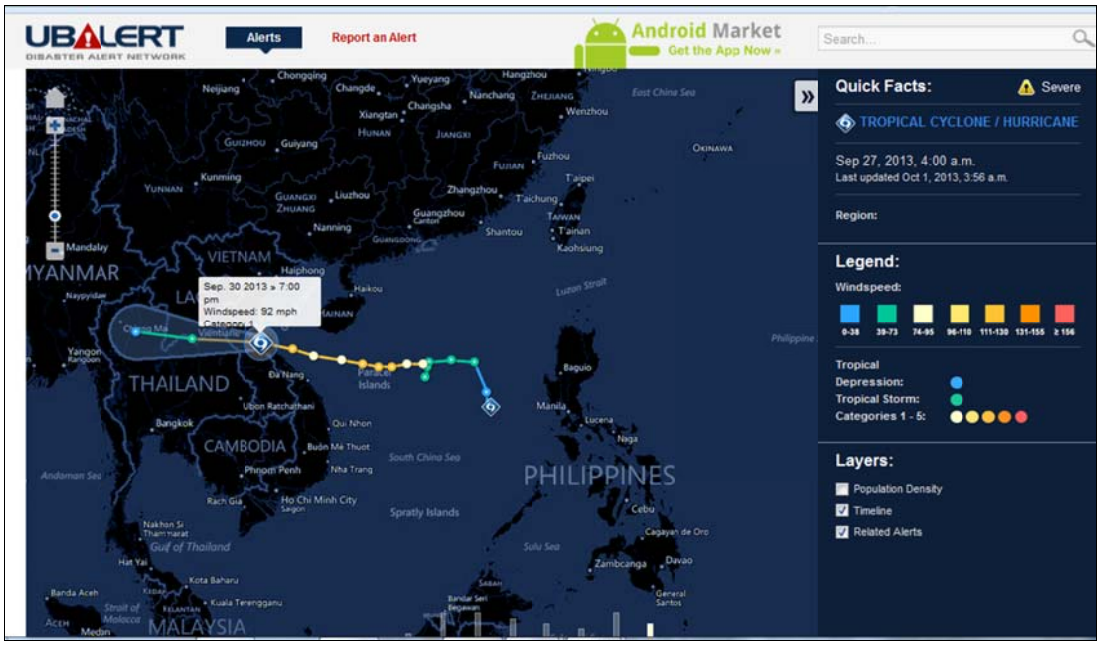
3.8.1 Tropical Strom WUTIP

At 01:00 AM local time on 27 September 2013 Tropical Depression WUTIP developed in the central part of the East Sea. Figure 3.8-1 presents the position of the tropical depression at the East Sea near the Philippines. The storm moved in westerly direction and on Monday 30 September 2013 at 09:00 UTC (16:00 local time) was near 17.6 north and 106.8 east, approximately north of Da Nang (near Dong Hoi, Viet Nam) as it began making landfall (see Figure 3.8-2). Then it continued moving in westerly direction and disappeared as a low pressure cell at the Viet Nam / Lao border. Figure 3.8-3 present the track of TS WUTIP.



Source: http://www.ubalert.com

Figure 3.8-1 On 27 September 2013 at 01:00 AM local time at the East Sea the tropical depression WUTIP was formed and started to move into westerly direction.



Source: http://www.ubalert.com

Figure 3.8-2 On 30 September 2013 at 16:00 local time the tropical storm WUTIP made land fall near Da Nang in Viet Nam.

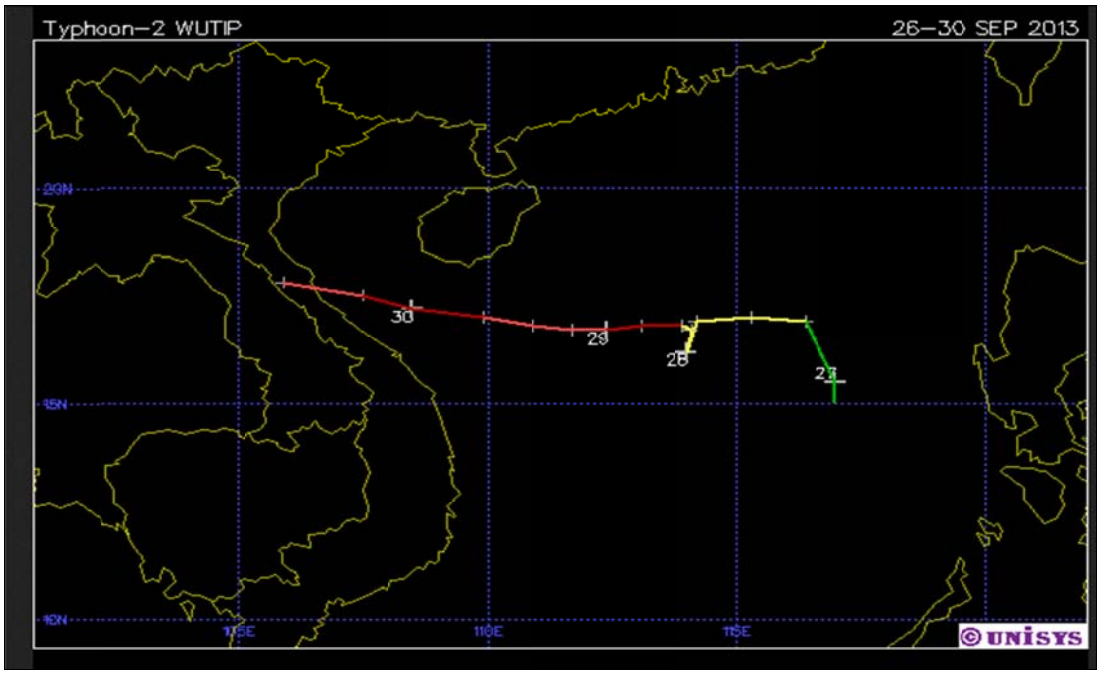


Figure 3.8-3 The tropical storm track of WUTIP. Source : UNiSYS`.

3.8.2 Heavy rainfall during the period of TS WUTIP

During the period 30 September - 01October 2013, when Typhoon Storm WUTIP was active in the region and transforming into a low pressure cell, heavy rainfall occurred in some areas of the central part of Viet Nam, especially during the period 30 September - 01 October 2013. The daily rainfall at some hydro-meteorological stations in the affected areas reached values up to 150 -300 mm per day. Figure 3.8-4 to Figure 3.8-13 present the records of daily rainfall (daily rainfall – 24 hour accumulated rainfall from 7:00 AM previous day to 7:00

AM reported day) of rainfall stations in the central part of Viet Nam. Figure 3.8-14 presents the map of the locations of rainfall stations, where records of daily rainfall were collected during the TS WUTIP.

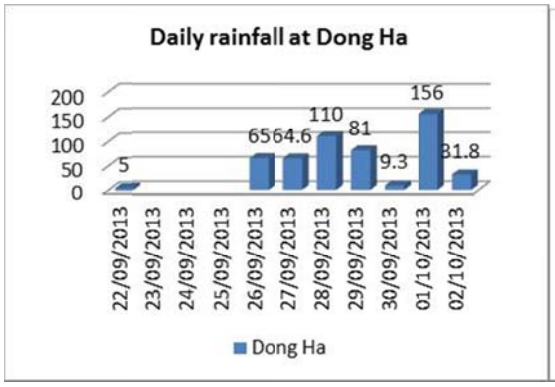


Figure 3.8-4 Daily rainfall (in mm) at Don Ha station.

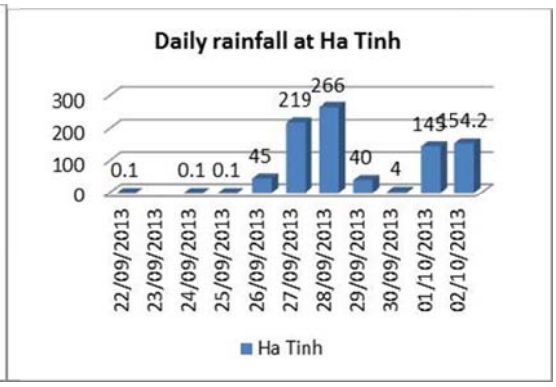


Figure 3.8-5 Daily rainfall (in mm) at Ha Tinh station.

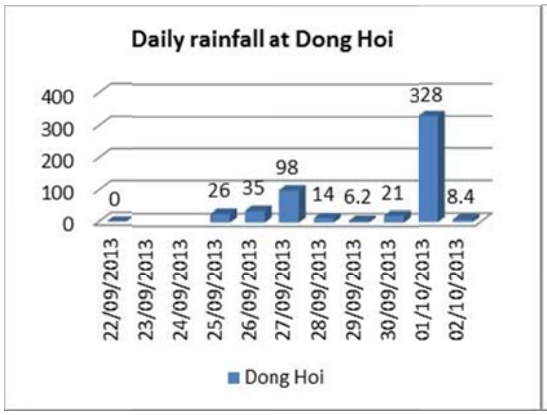


Figure 3.8-6 Daily rainfall (in mm) at Dong Hoi station.

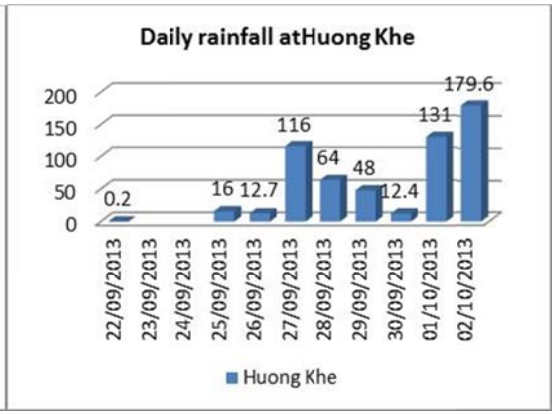


Figure 3.8-7 Daily rainfall (in mm) at Huong Khe station.

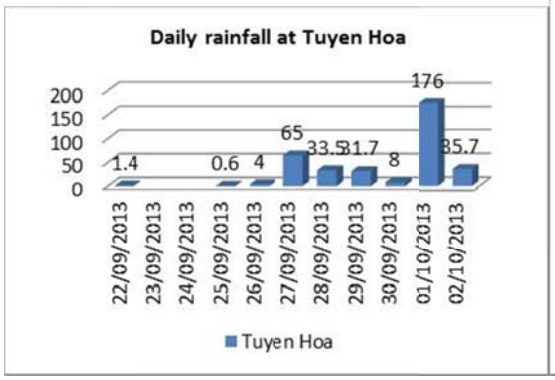


Figure 3.8-8 Daily rainfall (in mm) at Tuyen Hao station.

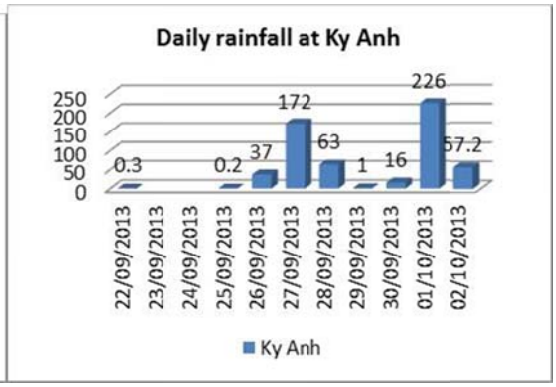


Figure 3.8-9 Daily rainfall (in mm) at Ky Anh station.

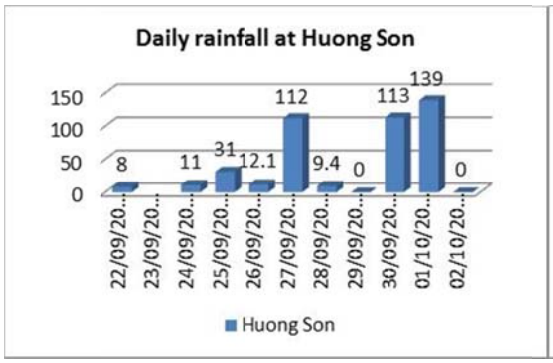


Figure 3.8-10 Daily rainfall (in mm) at Houng Son station.

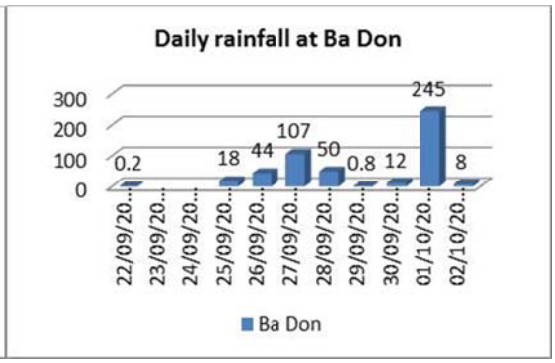


Figure 3.8-11 Daily rainfall (in mm) at Ba Dong station.

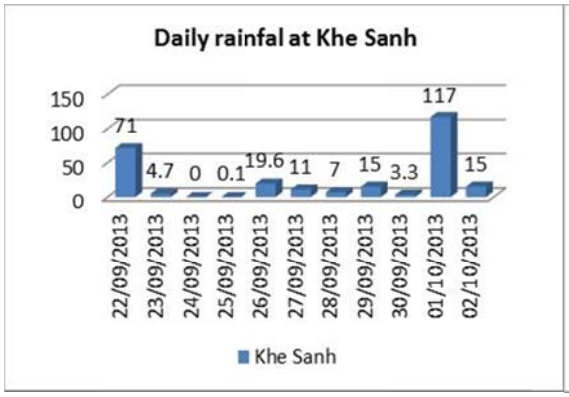


Figure 3.8-12 Daily rainfall (in mm) at Khe Sanh station.

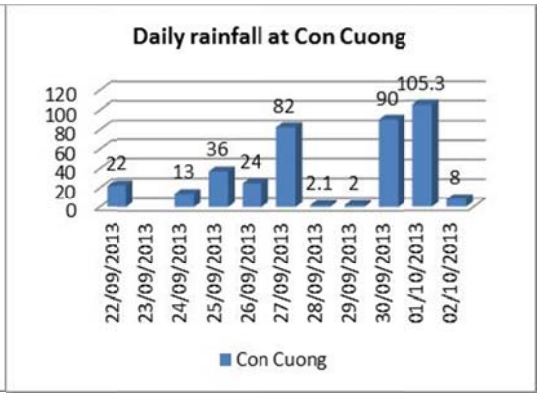


Figure 3.8-13 Daily rainfall (in mm) at Con Cuong station.

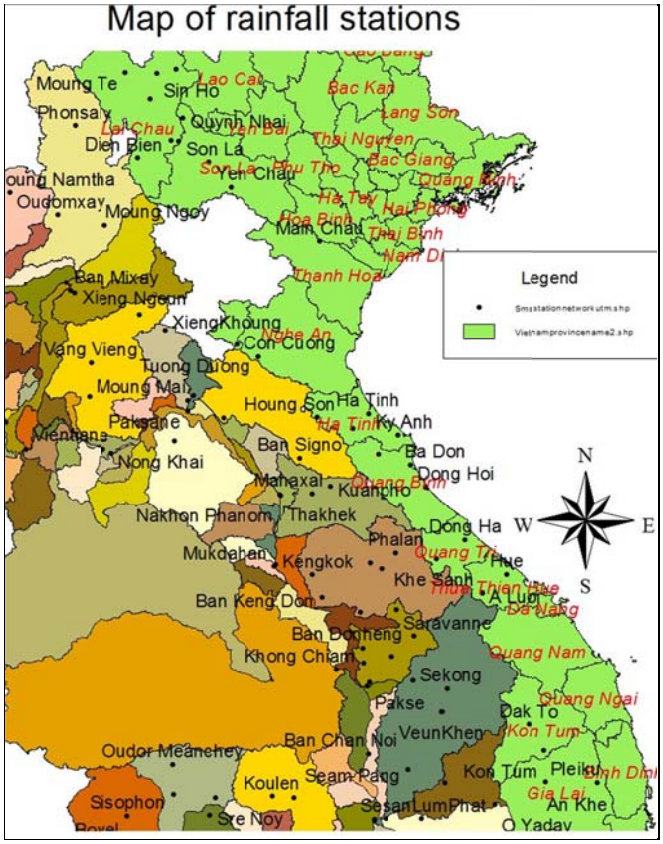


Figure 3.8-14 Map of location of rainfall stations, where rainfall data were used for analysis of the effect by TS WUTIP.

3.8.3 Flash floods caused by TS WUTIP in the central provinces of Viet Nam

Since 30 September 2013 at 00:00 UTC (07:00 AM local time) the MRC flash flood Guidance system detected that various districts of the central province of Viet Nam (Quang Nam) was at the risk of flash flood occurrences. These flash flood risk areas extended to other districts of central provinces of Viet Nam as well, such as Quang Nam, Quang Binh and Ha Tinh on 01 October 2013 at 00:00 UTC. Figure 3.8-15 presents the 3 hour flash flood risk areas in some districts of Viet Nam that were detected by MRCFFG system on 30 September 2013 at 00:00 UTC. Figure 3.8-16 presents the 3 hour flash flood risk areas detected by MRCFFG system on 01 October 2013at 00:00 UTC. The information on flash flood areas on 30 September and 01 October 2013 was confirmed by information published in the Viet Nam newspaper "Thanh Nien", dated 30 September 2013 at 12:00, as well asin the newspaper "Viet Nam News ", dated 02 October 2013. This information is presented in Annex 1.8.

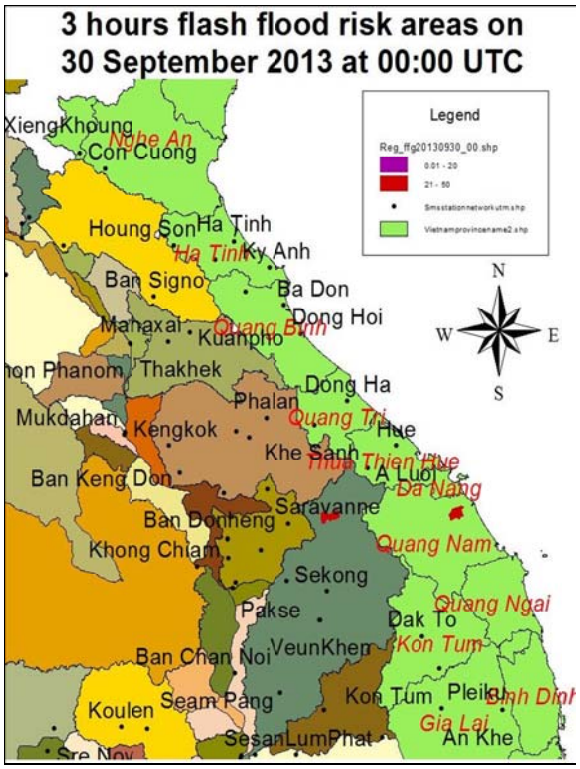


Figure 3.8-15 3 hour flash flood risk areas in some districts of Viet Nam on 30 September 2013 at 00:00 UTC.

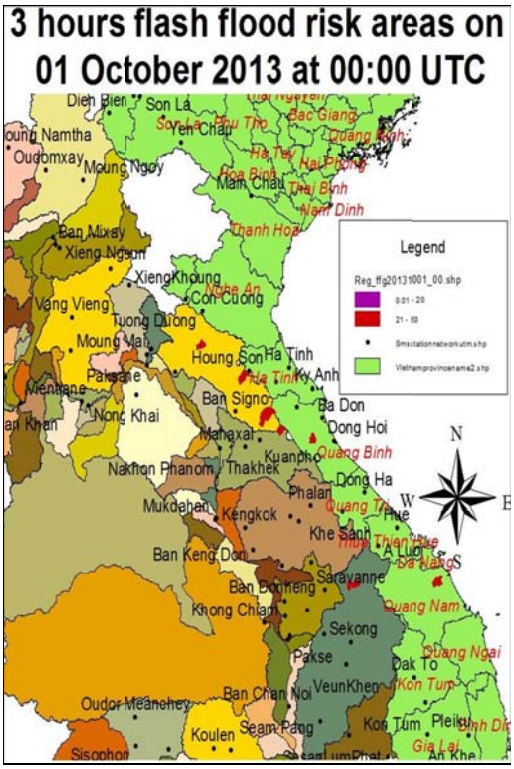


Figure 3.8-16 3 hour flash flood risk areas detected by MRCFFG system on 01 October 2013 at 00:00 UTC.

3.8.4 Impact of TS WUTIP to tributaries of the Lower Mekong Basin

During the period 30 September - 01 October 2013 when TS WUTIP was active in the region and transformed to the low pressure cell, the heavy rainfall occurred in some areas of central part of Lao PDR, especially during 30 September and 01 October 2013. The daily rainfall at some hydro-meteorological stations in the above mentioned areas reached almost all 100 mm per day. Figure 3.8-17 to Figure 3.8-20 present the rainfall recorded at rainfall stations of some Mekong sub-catchments, located in the central part of Lao PDR.

Increased rainfall in some sub-catchments of the Lower Mekong Basin affected the flow regime of some tributaries of Mekong River, such as Nam Cadin, Xe Bang Fai, Xe Bang

Hieng and Se Kong, where water levels at Sopnam, Mahaxai, Xe Bang Fai and Veunkheun rose 3 - 5 m in the period 01 - 03 October 2013. Figure 3.8-21 to Figure 3.8-24 present the hydrograph of hydrological stations located in the central part of Lao PDR. Figure 3.8-25 presents the map of hydrological stations, which water level records has been used for analysis.

According to the newspaper "Vientiane Times", published on 02 October 2013, TS WUTIP did not create serious floods in the central provinces of Lao PDR. This newspaper is presented in Annex 1.8 of this report.

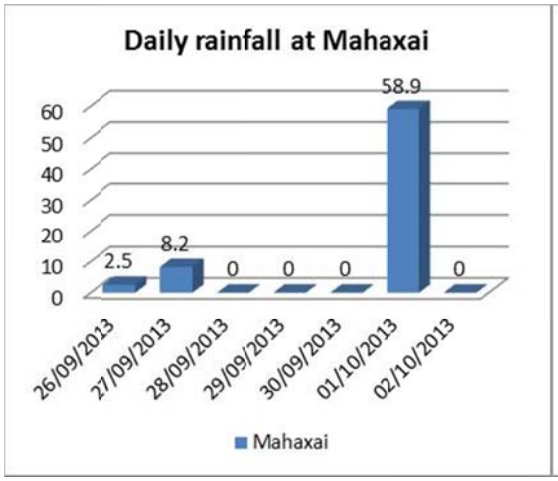


Figure 3.8-17 Daily rainfall at Mahaxai station (Xe Bang Fai).

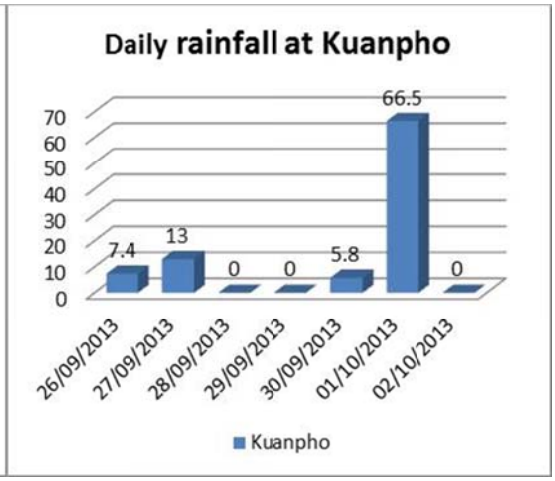


Figure 3.8-18 Daily rainfall at Kuanpho station (Xe Bang Fai).

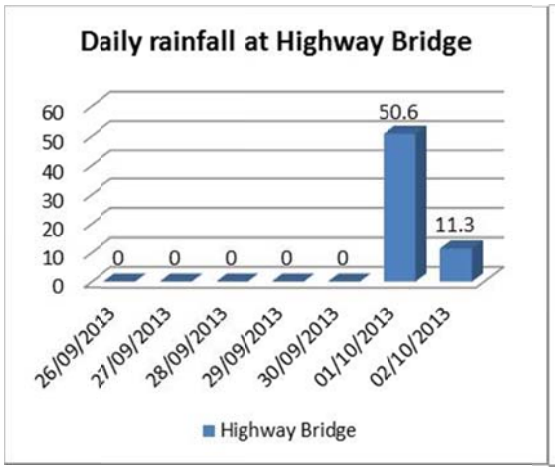


Figure 3.8-19 Daily rainfall at Highway bridge station (Xe Bang Hieng).

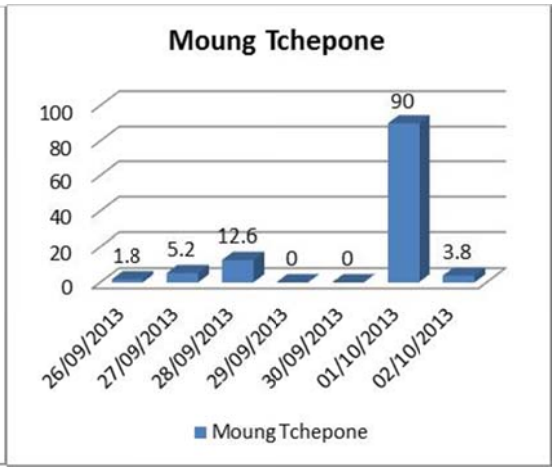


Figure 3.8-20 Daily rainfall at Moung Tchepone station (Se Done).

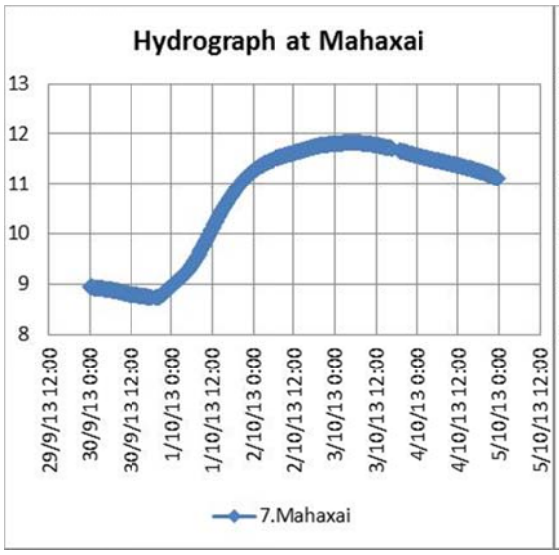


Figure 3.8-21 Hydrograph of Xe Bang Fai River at Mahaxai station (Xe Bang Fai).

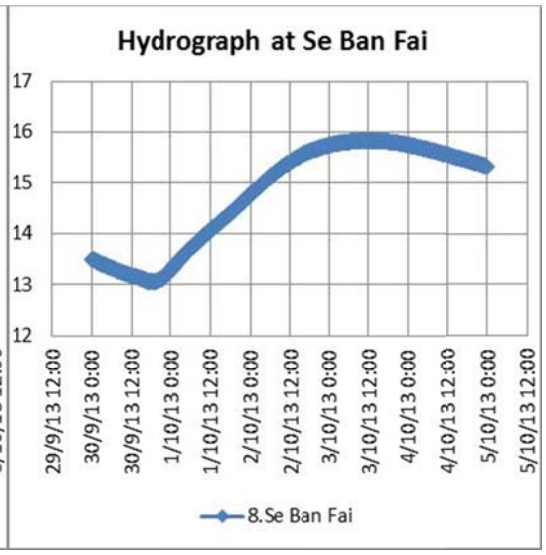


Figure 3.8-22 Hydrograph of Xe Bang Fai River at Xe Bang Fai stations (Xe Bang Fai).

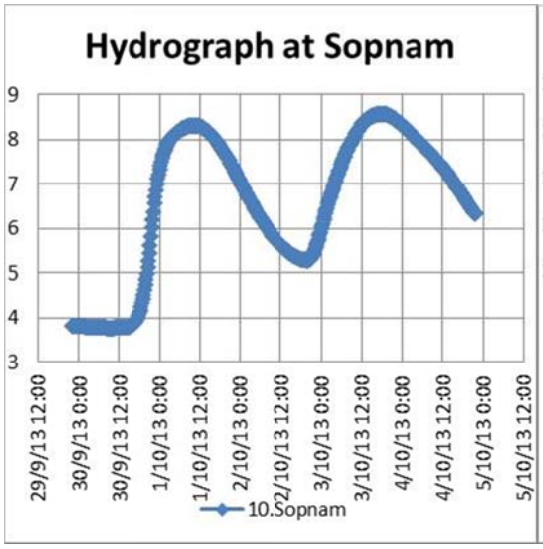


Figure 3.8-23 Hydrograph of Xe Bang Hieng River at Sopnam station (Xe Bang Hieng).

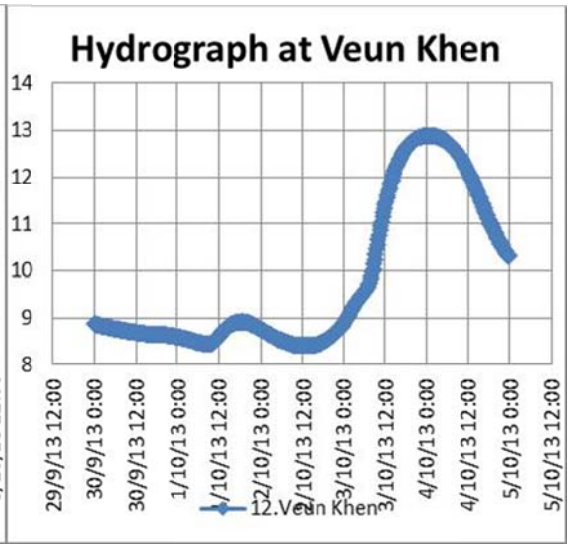


Figure 3.8-24 Hydrograph of Se Kong River at Ban Veunkhen station (Se Kong).

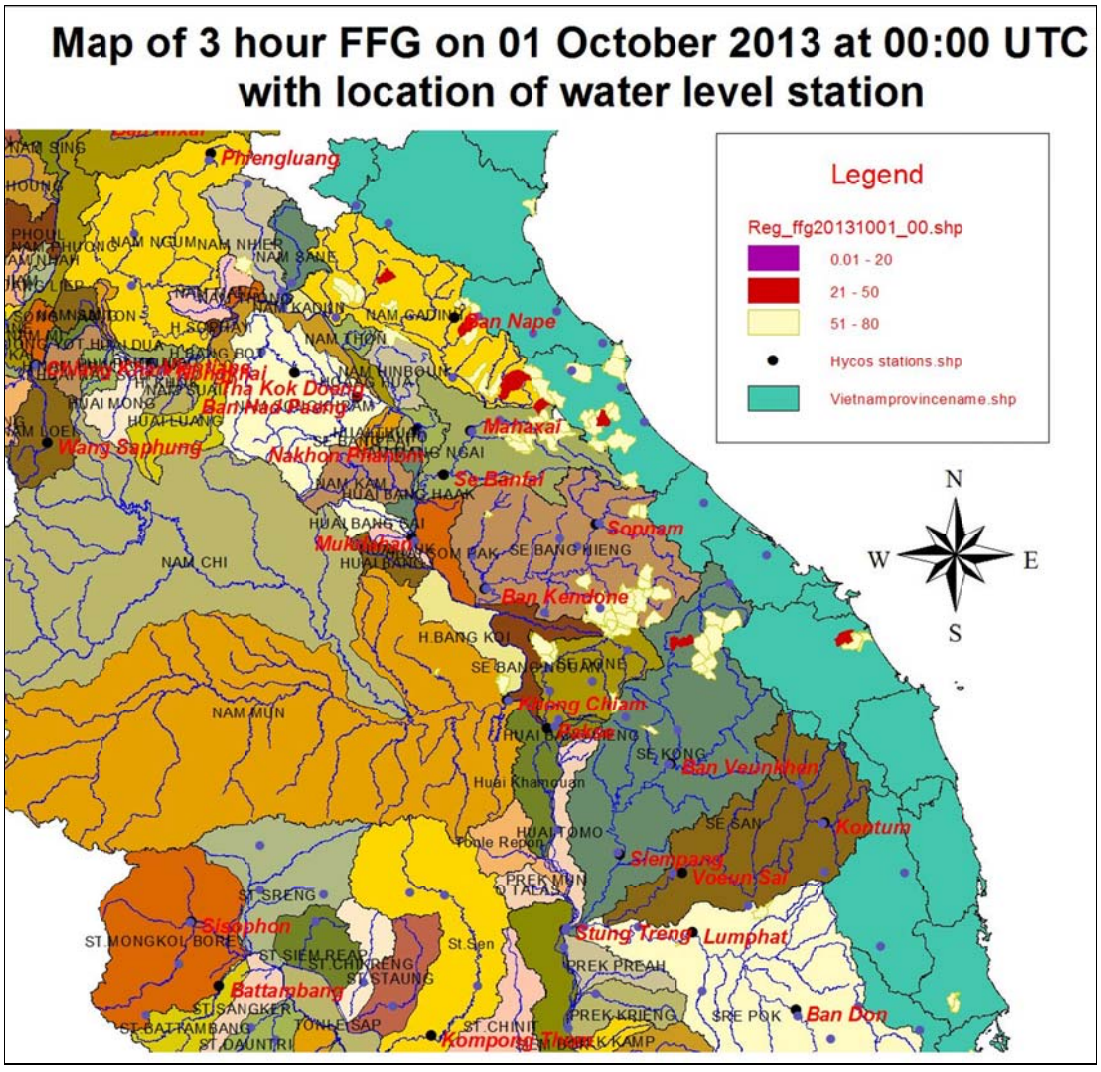


Figure 3.8-25 3 hour flash flood risk areas on 01 October 2013 at 00:00 UTC with the location of hydrological statiosn and Mekong sub-catchments.

3.8.5 Conclusions

1. TS WUTIP is the 10th storm to hit Viet Nam in 2013. It has brought serious damages to central Viet Nam with torrential rains and flash floods.
2. After WUTIP hit central Viet Nam, some rainfall stations located in the central region of Viet Nam, recorded heavy rainfall. The amount of daily rainfall at those stations reached 250 - 350 mm per day.
3. On the morning of 30 September 2013 at 00:00 UTC (07:00 AM local time) the MRC flash flood Guidance system detected that various districts in the central province of Viet Nam (Quang Nam) was at the risk of flash flood occurrences. These flash flood risk areas extended to other districts of the central provinces of Viet Nam, such as Quang Nam, Quang Binh, Ha Tinh at 01 October 2013 at 00:00 UTC.
4. The location of flash floods detected by MRCFFFG at 30 September and 01 October was confirmed by Vietnamese newspapers.
5. When TS WUTIP hit the Mekong region, high rainfall levels were also recorded at some rainfall stations located in the central part of Lao PDR.

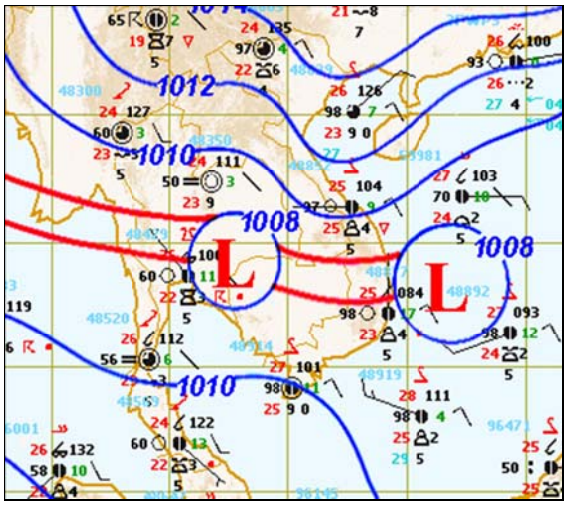
6. Water levels at some stations of Mekong sub-catchments, located in the central part of Lao PDR, rose 3 - 4 m.

3.9 Flash floods caused by ITCZ on 03-05 October 2013

3.9.1 Weather condition during the first week of October

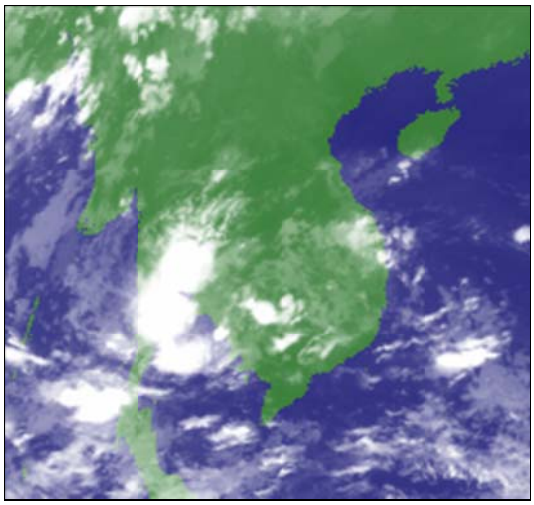
On 01 October 2013 at 01.00 am Local Cambodia Time (LCT), the latitude from 00N to 280N and the longitude from 900E to 1250E, the Inter Tropical Convergence Zone (ITCZ) was located across the Southeast of Myanmar, the lower Center and East of Thailand, the Center of Cambodia and the South of Viet Nam, and was connected with a low pressure cell in the East Sea.

During 04 – 06 October 2013 the ITCZ continued its presence across the South of Myanmar, the lower Central of Thailand, the Central of Cambodia and the South of Viet Nam, and its connection with the low pressure cell in the East Sea. Heavy rain showers with isolated very heavy rainfall occurred in many areas in the Southeast of Myanmar, the East, Center and South of Thailand, the South of Viet Nam, the South, Southwest, West, Northwest, Center and East of Cambodia during 03 - 06 October. Figure 3.9-1 presents the weather chart during the ITCZ on 03 October 2013 at 18:00 UTC. Figure 3.9-2 presents the infrared image from MTSAT IR taken on 03 October 2013 at 23:00 UTC.



Source: Thai Meteorological Department

Figure 3.9-1 Weather Chart issued at 18:00 UTC on 03 October 2013.



Source: Japan Meteorological Agency

Figure 3.9-2 Infrared Image, MTSAT IR, at 23.00 UTC on 03 October 2013.

3.9.2 Heavy rainfall in the western and north-western provinces of Cambodia during the first week of October 2013

During the period 01 - 06 October 2013 when the ITCZ covered the Lower Mekong Basin, heavy rainfall occurred in some areas of central and southern part of Thailand, as well in some sub-catchments of Tonle Sap, located in the west and north-west parts of Cambodia. Especially during the period 03 - 05 October 2013 all rainfall stations located in the west and north- west part of Cambodia recorded high rainfall values. The daily rainfall at those hydro-meteorological stations reached 100-180 mm per day. Figure 3.9-3 to Figure 3.9-12 present

the records of daily rainfall (daily rainfall – 24 hour accumulated rainfall from 07:00 AM previous day to 07:00 AM reported day) for of rainfall stations of west and north-west part of Cambodia. Figure 3.9-13 presents the map of the location of rainfall stations, where records of daily rainfall were collected during the ITCZ.

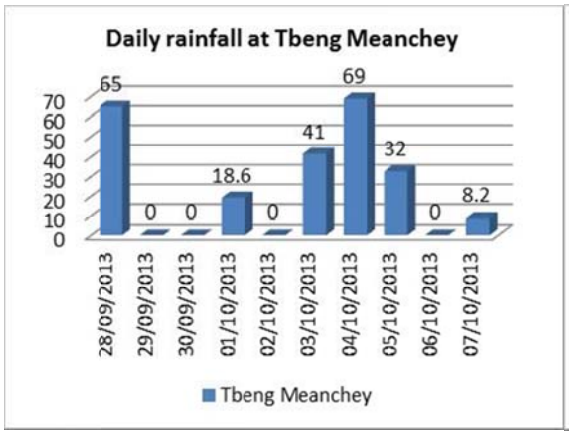


Figure 3.9-3 Daily rainfall at Tbeng Meanchey (Preah Vihear province).

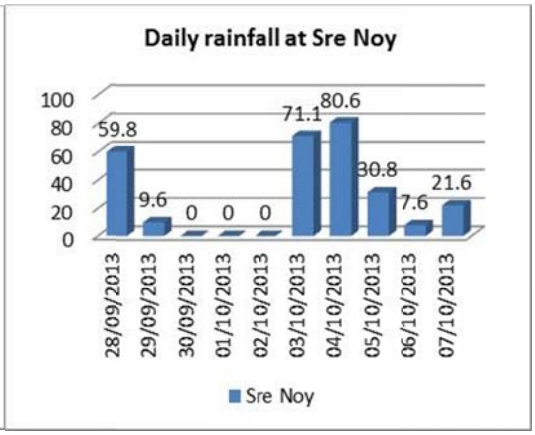


Figure 3.9-4 Daily rainfall at Sre Noy (Siem Reap province).

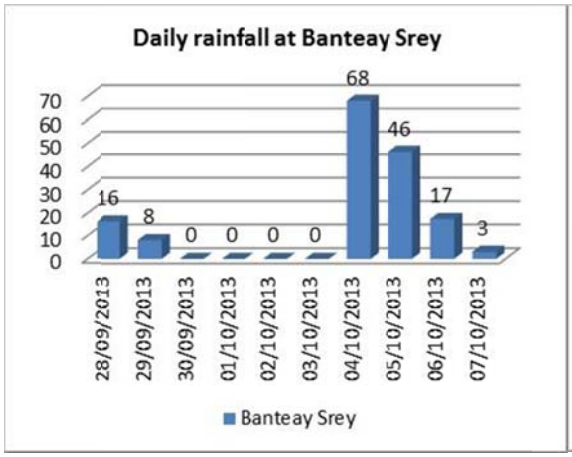


Figure 3.9-5 Daily rainfall at Banteay Srey (Siem Reap province).

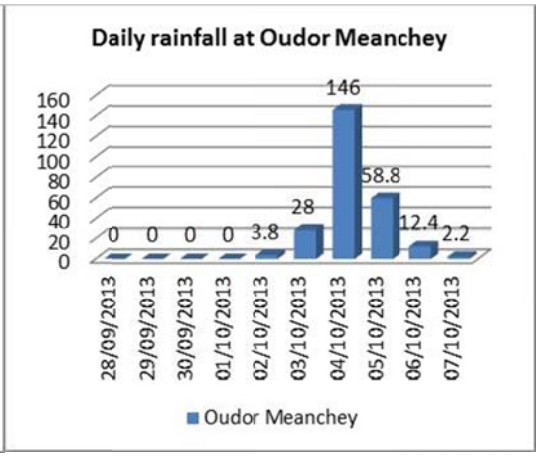


Figure 3.9-6 Daily rainfall at Oudor Meanchey (Oudor Meanchey province).

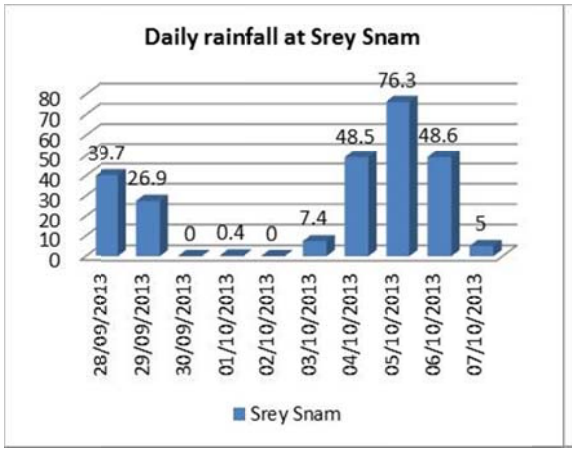


Figure 3.9-7 Daily rainfall at Srey Snam (Siem Reap province).

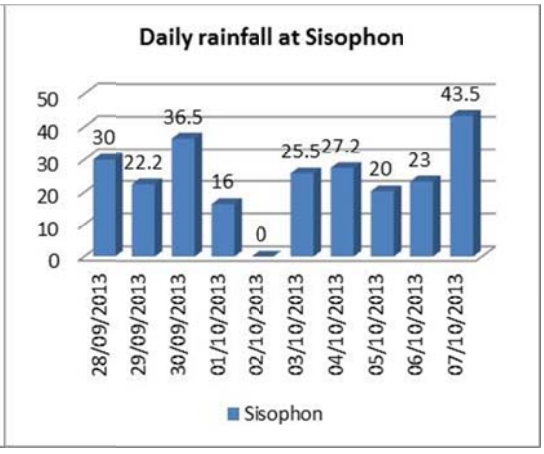


Figure 3.9-8 Daily rainfall at Sisophon (Banteay Meanchey province).

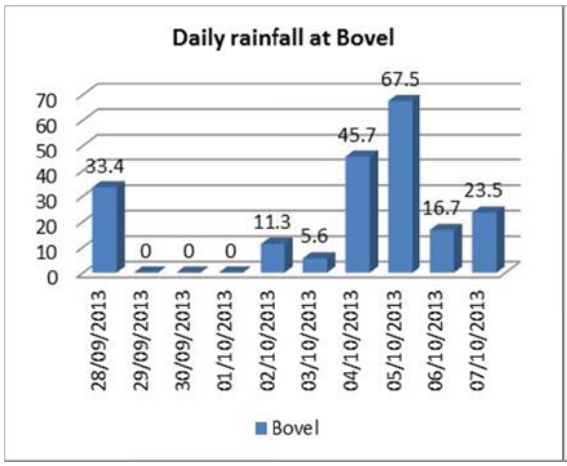


Figure 3.9-9 Daily rainfall at Bovel (Battambang province).

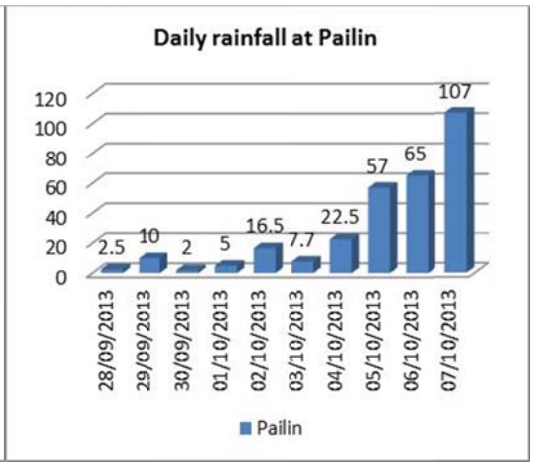


Figure 3.9-10 Daily rainfall at Pailin (Pailin province).

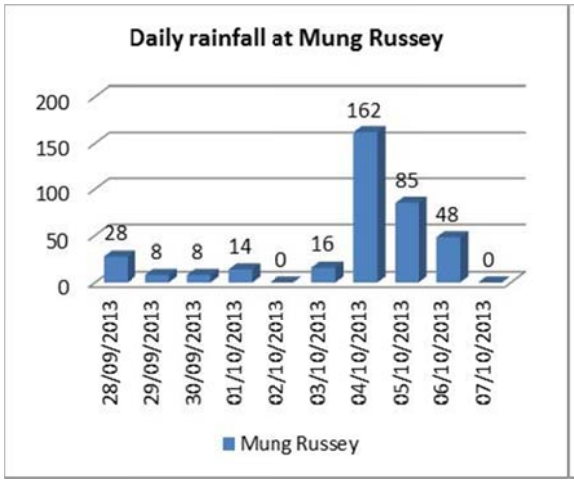


Figure 3.9-11 Daily rainfall at Mung Russey (Battambang province).

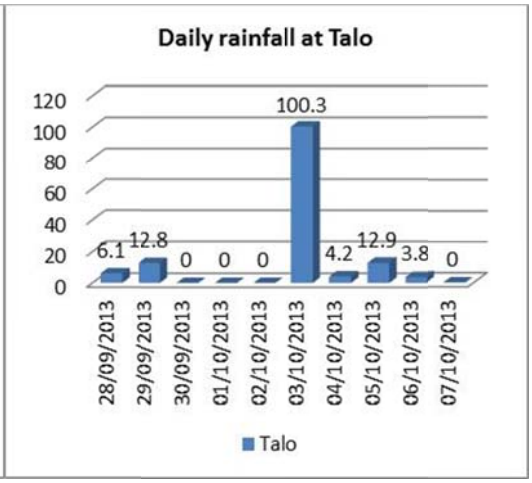


Figure 3.9-12 Daily rainfall at Talo (Pursat province).

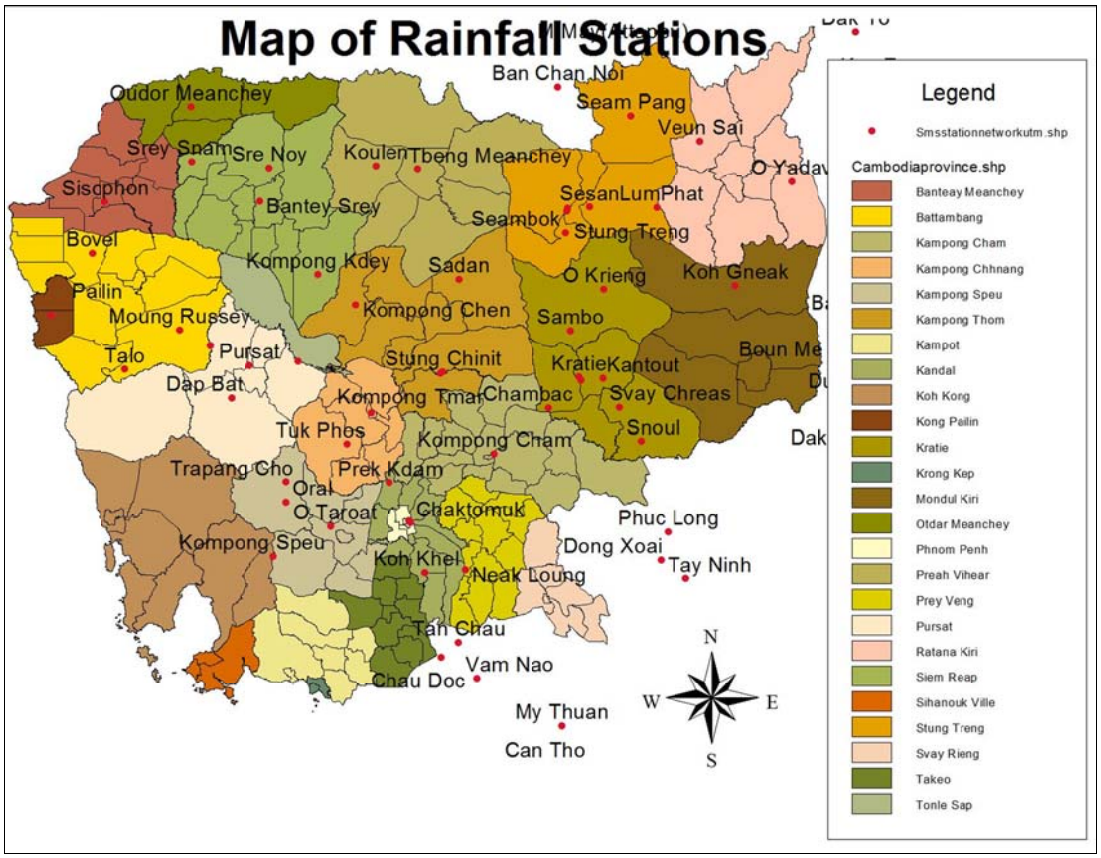


Figure 3.9-13 Map of rainfall stations which used to record rainfall during the ITCZ in the period 01-07 October 2013.

3.9.3 Flash floods caused by ITCZ in the western and north-western provinces of Cambodia in the period 01-06 October 2013

Heavy rainfall occurred since 01 October 2013 over the north and north-west provinces of Cambodia during the ITCZ. In the evening of 05 October 2013 flash floods occurred in some areas of the provinces Odour Meanchey and Bantey Meachey. The flash floods extended to Pailin province in the afternoon of 06 October 2013. Referrence is made to the online newspaper of "Radio Free Asia" (FRA) that 9 districts of Bantey Meanchey province were flooded. Annex 1.9 presents the newspaper article published by RFA.

Unfortunately during the period 04 - 07 October 2013 the MRCFFG system could not properly detect the flash flood risk areas in the above mentioned provinces. The MRCFFG system detected that some areas around the Poipet and Battambang districts were under flash flood risk level 2 ("yellow" color scale) at 05 October 2013 at 18:00 UTC (01:00 AM of 06 October 2013, local time). Also on 06 October 2013 at 18:00 UTC the MRCFFG system showed that some areas in the western province of Cambodia were under the flash flood risk level 2 ("yellow" color scale). Figure 3.9-14 and Figure 3.9-15 present the 3 hour FFG on 05 October 2013 at 18:00 UTC and on 06 October 2013 at 18:00 UTC. Insufficient detection by the MRCFFG system on flash flood risk areas of the above mentioned provinces also happened during the flood season of the year 2012. Investigation of the model parameters, such as the bias correction factor or the soil moisture parameter, for the above mentioned areas is recommended.

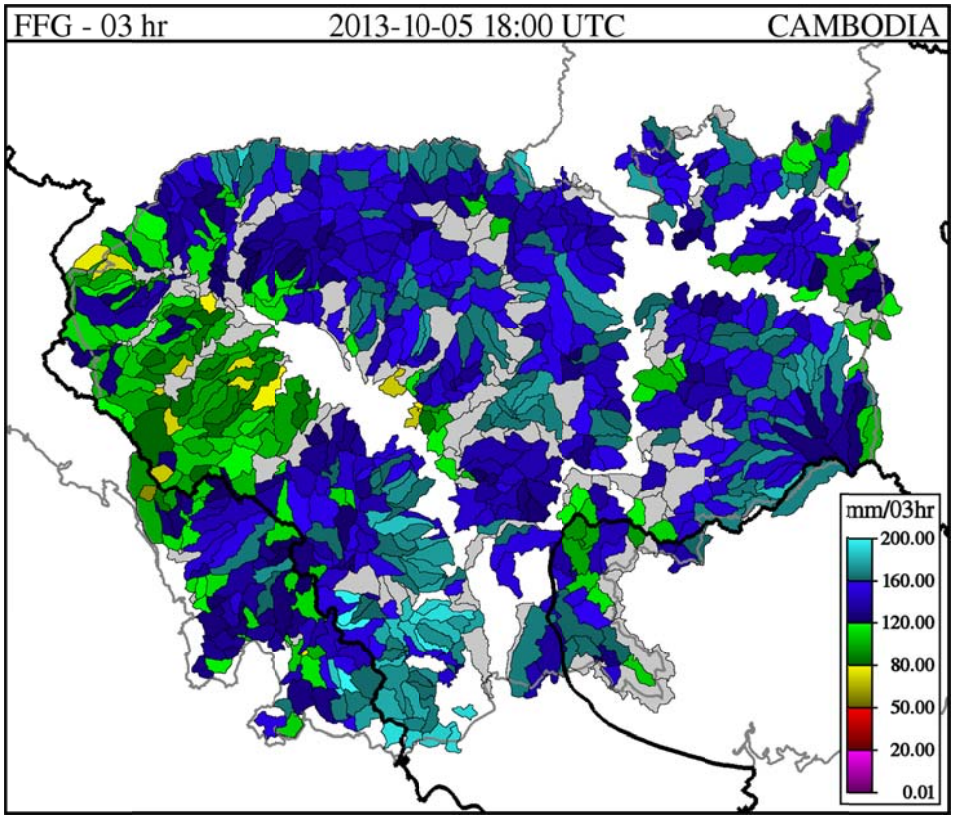


Figure 3.9-14 3 hourly FFG on 05 October 2013 at 18:00 UTC shows that Poipet and Battambang are under the flash flood risk level 2 ("yellow" color scale).

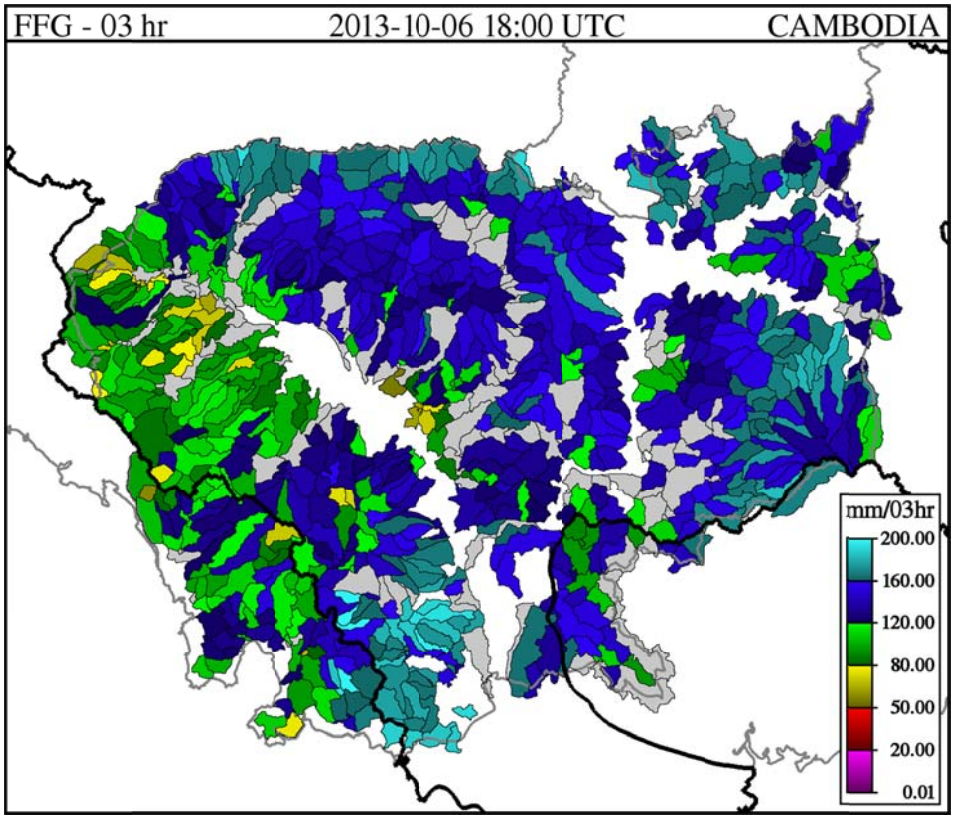


Figure 3.9-15 3 hourly FFG on 06 October 2013 at 18:00 UTC shows that Poipet and Battambang, Pailin are under the flash flood risk level 2 ("yellow" color scale).

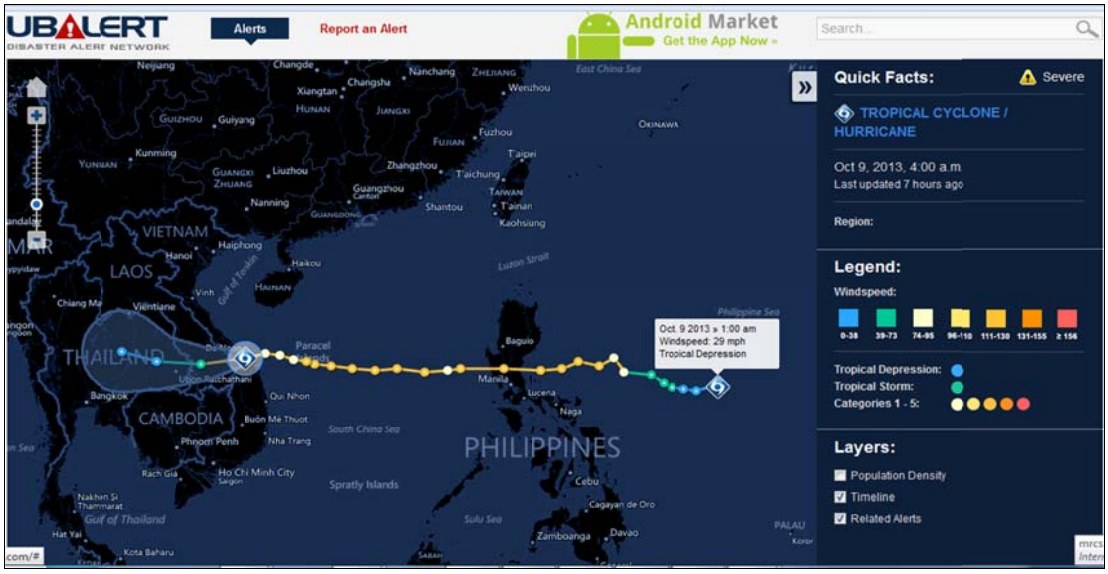
3.9.4 Conclusions

1. During the period 01- 06 October 2013 when the western and north-western part of Cambodia was under the influence of the ITCZ heavy rainfall occurred in those areas. Rainfall records at many stations located in west and north-west Cambodia reached up to 100 - 180 mm per day, especially on 05-06 October.
2. The water level of the Stung Sanker River (a tributary of Tonle Sap) at Battambang raised about 4 meters within the period 04 - 05 October 2013.
3. In the period 05 - 06 October 2013 flash floods occurred in many areas of the western and north-western provinces in Cambodia. Unfortunately the MRCFFG system did not detect properly, as the system indicated for those areas less than flash flood risk level 2. This insufficient detection by the MRCFFG system needs to be investigated. Some model parameters, such as the bias correction factor, may need adjustment of the MAP product.

3.10 Flash floods caused by Tropical Storm NARI

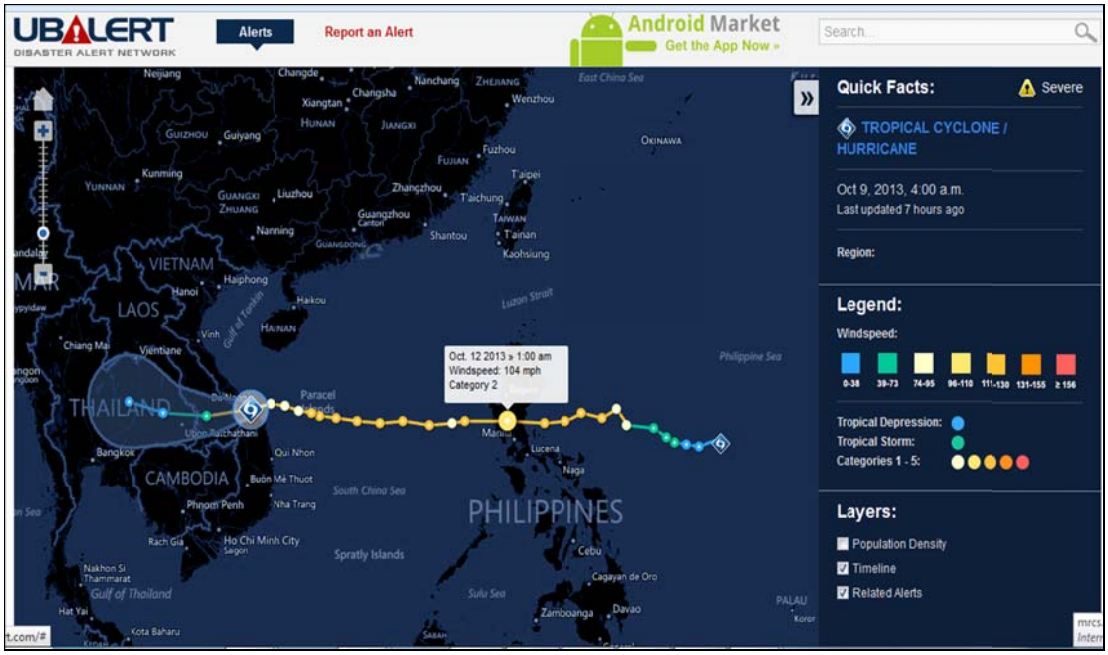
3.10.1 Tropical Storm NARI

At 01:00 UTC of 09 October 2013 Tropical Depression NARI developed at the central part of the Philippine Sea. Figure 3.10-1 presents the position of tropical depression at Philippine Sea. The storm moved to the west and made its first landfall at the Philippines (Manila) around 01:00 UTC on 12 October 2013. See Figure 3.10-2. It continued moving in westerly direction across the East Sea and made its second landfall at Da Nang Province, Viet Nam around 07:00 UTC on 15 October 2013. Subsequently it continued in westerly direction across the southern provinces of Lao PDR before it transformed into a tropical depression over the Mun & Chi catchments of LMB in Thailand. Figure 3.10-3 shows the track of TS NARI when it made the landfall at Da Nang City in central Viet Nam.



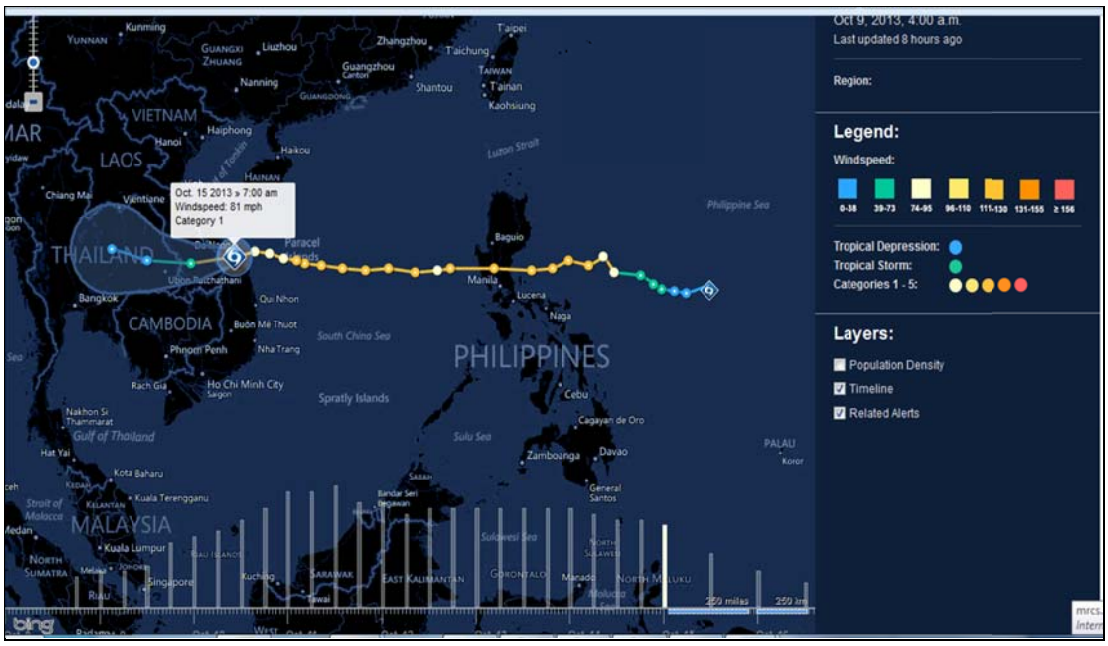
Source: http://www.ubalert.com

Figure 3.10-1 On October 09 2013 at 01:00 UTC at Philippine Sea tropical depression NARI developed and started to move into the Philippines.



Source: http://www.ubalert.com

Figure 3.10-2 On October 12 2013 at 01:00 UTC tropical storm NARI made its first landfall at Manila in the Philippines.



Source: http://www.ubalert.com

Figure 3.10-3 On 15 October 2013 at 07:00 UTC tropical storm NARI made its second landfall at Da Nang in central Viet Nam.

3.10.2 Heavy rainfall during the period of TS NARI

During the period 15 - 16 October 2013, when TS NARI impacted the region, heavy rainfall occurred in some areas of central part of Viet Nam and in some sub-catchments of Mekong River Basin located in the southern and central parts of Lao PDR. It also impacted the Se San, Se Kong and Srepok sub-catchments especially during 15 and 16 September 2013. The

daily rainfall at some hydro-meteorological stations reached 300-400 mm per day. Figure 3.10-4 to Figure 3.10-12 present the records of daily rainfall (daily rainfall – 24 hour accumulated rainfall from 7:00 AM previous day to 7:00 AM reported day) at rainfall stations in the central part of Viet Nam. Figure 3.10-13 to Figure 3.10-21 present the daily rainfall at rainfall stations of sub-catchments in the Lower Mekong Basin that were affected by TS NARI. Figure 3.10-22 present the map of the location of rainfall stations where records of daily accumulated rainfall were collected during the TS NARI.

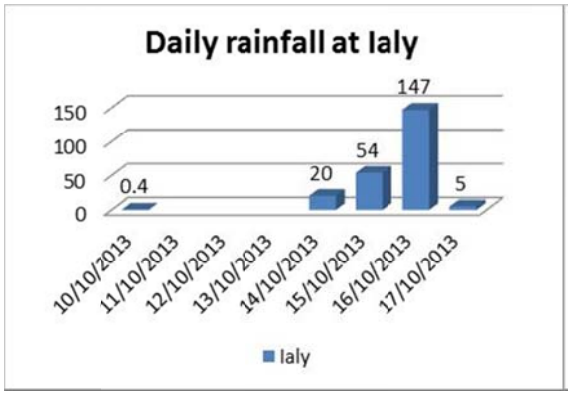


Figure 3.10-4 Daily rainfall (in mm) at Ialy station of Sesan catchment.

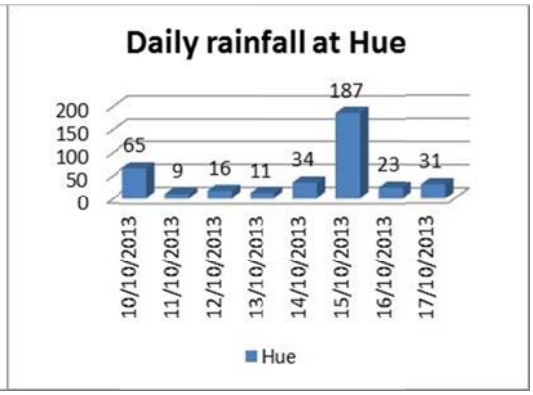


Figure 3.10-5 Daily rainfall (in mm) at Hue station.

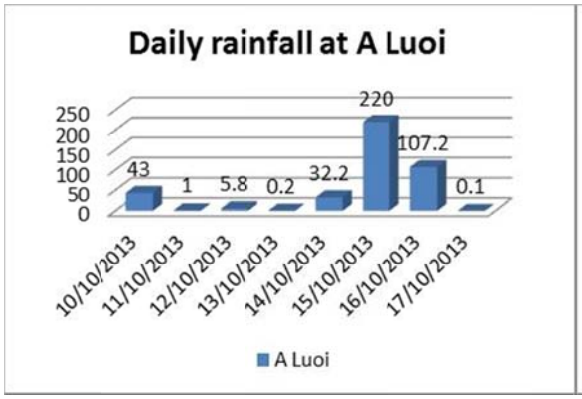


Figure 3.10-6 Daily rainfall (in mm) at A Loui station of Se Kong catchment.

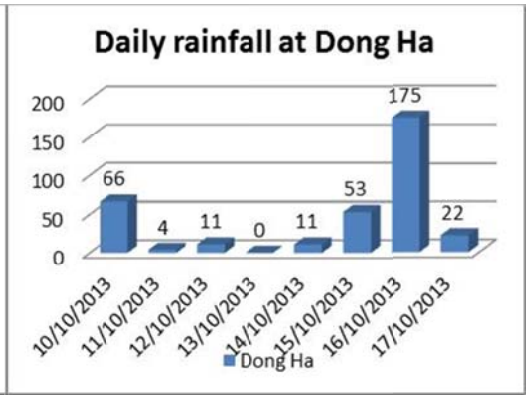


Figure 3.10-7 Daily rainfall (in mm) at Dong Ha station.

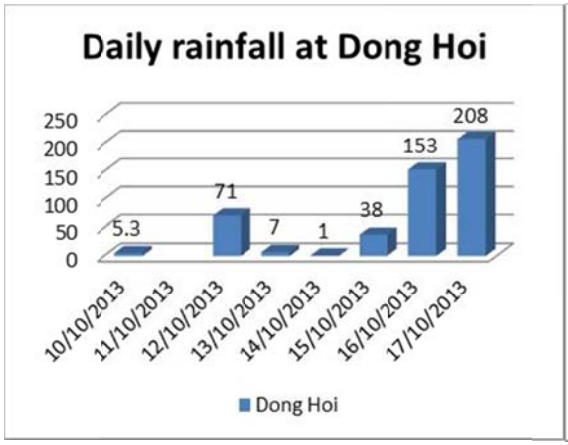


Figure 3.10-8 Daily rainfall (in mm) at Dong Hoi station.

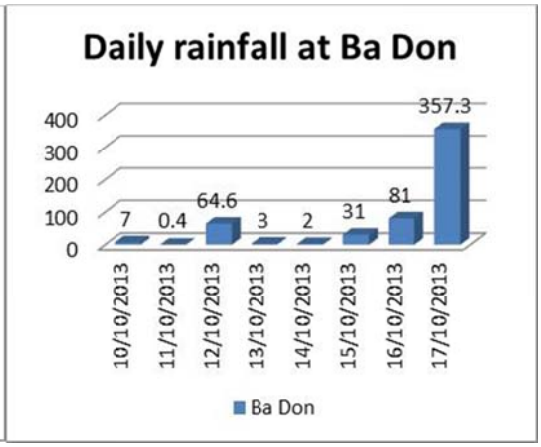


Figure 3.10-9 Daily rainfall (in mm) at Ba Don station.

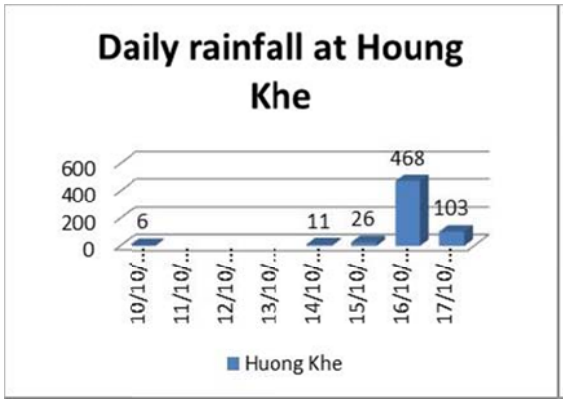


Figure 3.10-10 Daily rainfall (in mm) at Houng Khe station.

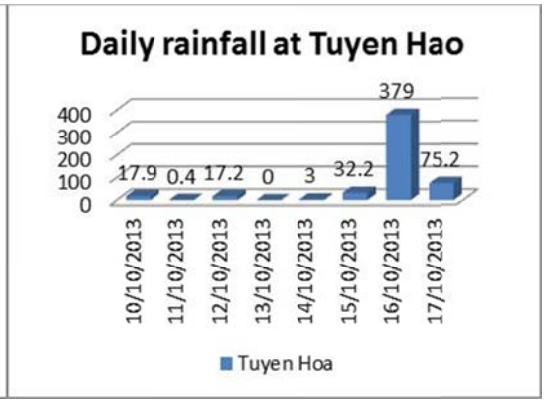


Figure 3.10-11 Daily rainfall (in mm) at Tuyen Hao station.

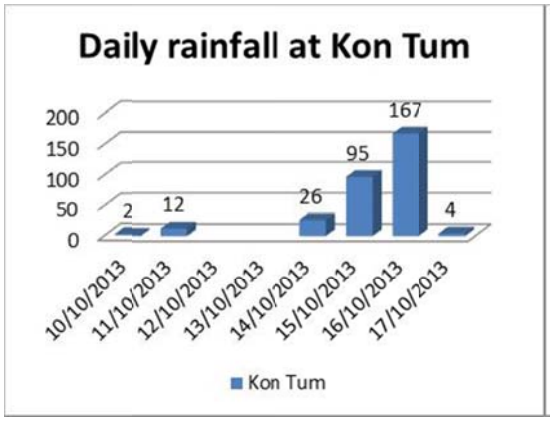


Figure 3.10-12 Daily rainfall (in mm) at Kon Tum station of Se San catchment.

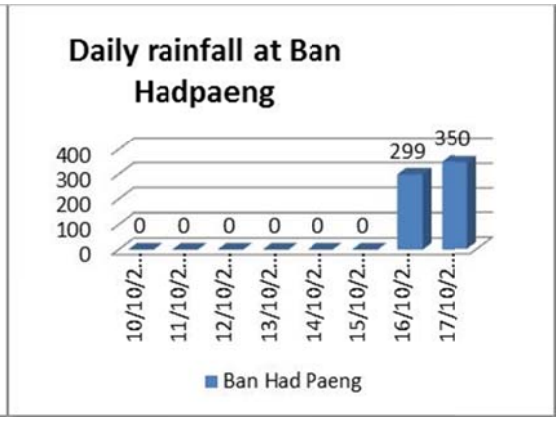


Figure 3.10-13 Daily rainfall (in mm) at Ban Hadpaeng station.

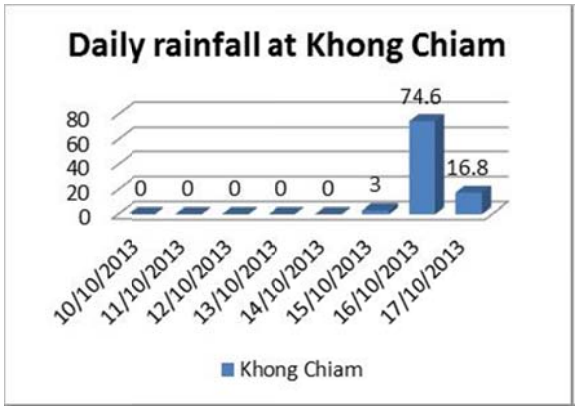


Figure 3.10-14 Daily rainfall (in mm) at Khong Chiam station.

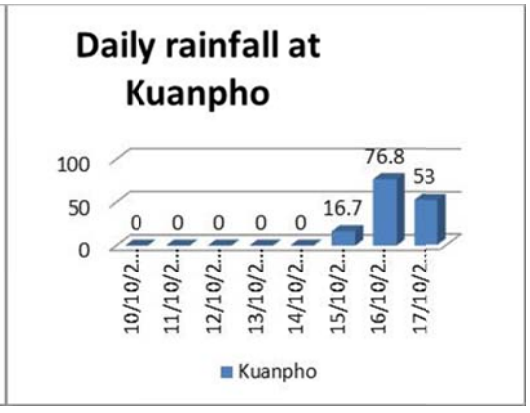


Figure 3.10-15 Daily rainfall (in mm) at Kuanpo station of Xe Bang Fai catchment.

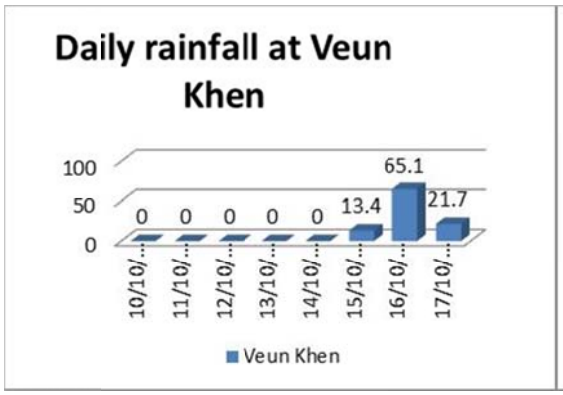


Figure 3.10-16 Daily rainfall (in mm) at Veun Khen station of Se Kong catchment.

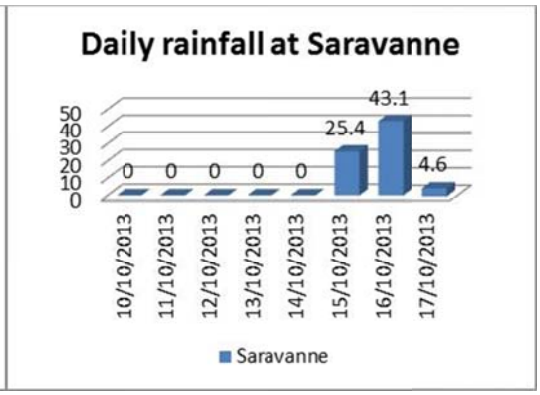


Figure 3.10-17 Daily rainfall (in mm) at Saravanne station of Se Done catchment.

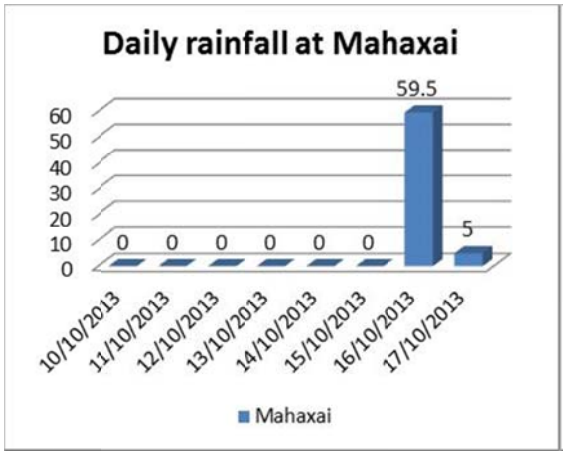


Figure 3.10-18 Daily rainfall (in mm) at Mahaxai station of Xe Bang Fai catchment.

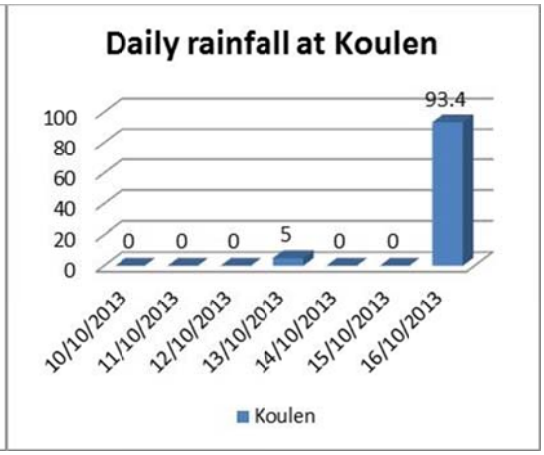


Figure 3.10-19 Daily rainfall (in mm) at Koulen station of Stung Sreng catchment, tributary of Tonle Sap.

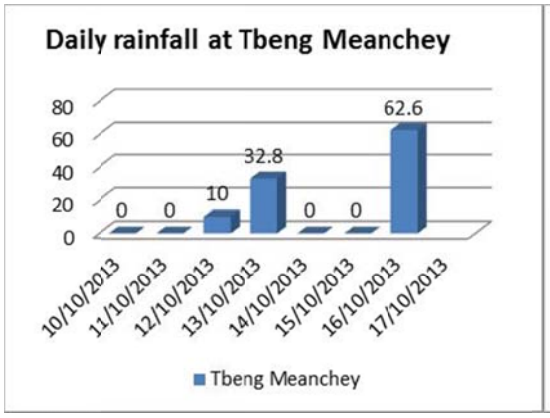


Figure 3.10-20 Daily rainfall (in mm) at Tbeng Meanchey station of Stung Sreng catchment, tributary of Tonle Sap.

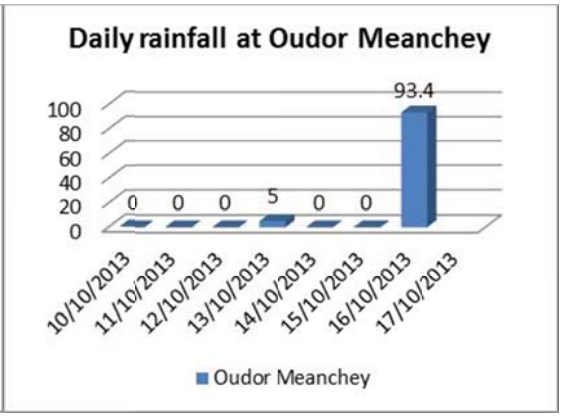


Figure 3.10-21 Daily rainfall (in mm) at Oudor Meanchey station of Stung Sreng catchment, tributary of Tonle Sap.

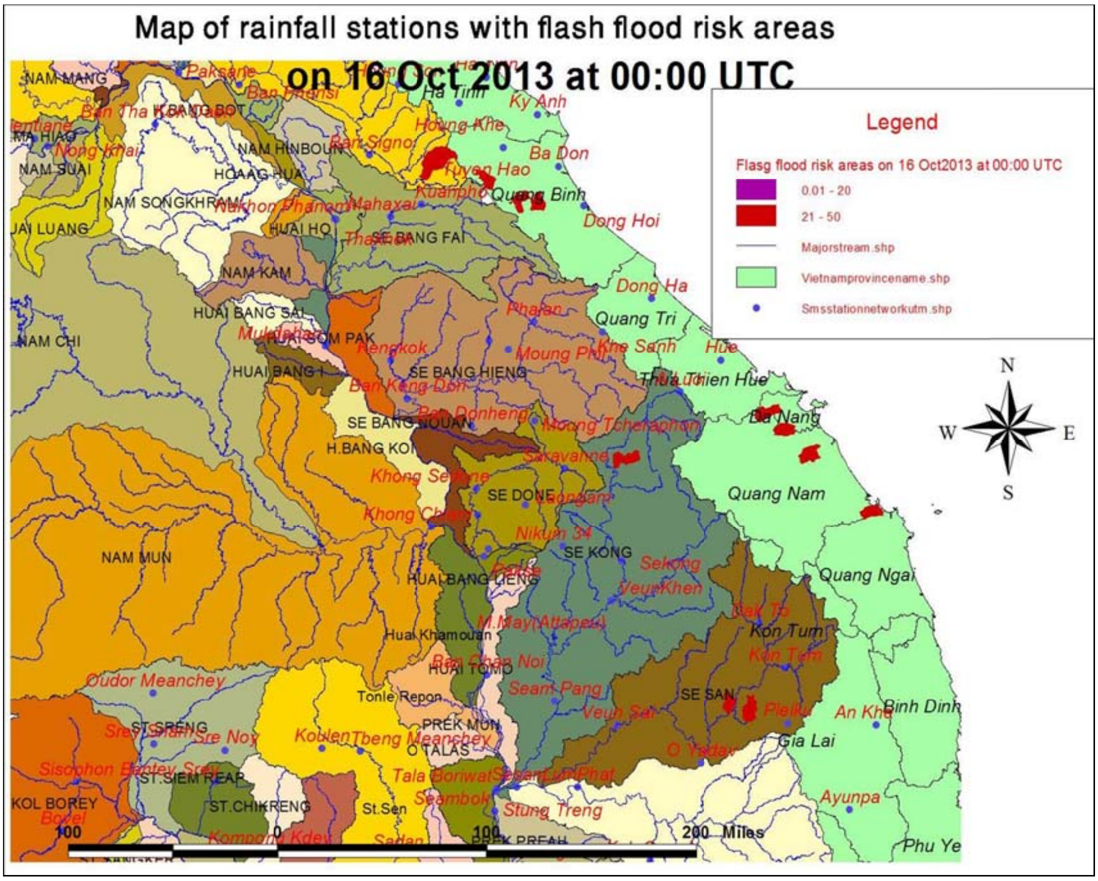


Figure 3.10-22 Map of location of rainfall stations, where rainfall data were used for the analysis of the impacts from TS NARI.

3.10.3 Flash flood caused by TS NARI in the central highlands and the central provinces of Viet Nam

On 14 October 2013 at 18:00 UTC (15 October 2013 at 01:00 AM local time) the MRCFFG system detected that various districts in the central province Quang Nam of Viet Nam were at risk of flash flood occurrences. These flash flood risk areas extended on 15 August 2013 at 00:00 UTC to other districts of the central provinces of Viet Nam, such as Da Nang, Quang Nam, Quang Ngai. Later on 16 October at 00:00 UTC the areas extended further to some districts in Quang Binh, Thua Thien Hue, Kon Tum and Gia Lai provinces. Figure 3.10-23 presents the 3 hour flash flood risk areas at some areas in Viet Nam that were detected by MRCFFG system on 15 October 2013 at 00:00 UTC. Figure 3.10-24 presents the 3 hour flash flood risk areas that were detected by MRCFFG system on 16 October 2013at 00:00 UTC. The information regarding flash flood areas on 15 - 16 October 2012 was confirmed by the information published in the Viet Nam newspaper "Thanh Nien", dated 16 October 2013 at 17:00, as well as by the online newspaper "Nhan Dan", dated 15 October 2013 at 17:13. This information is presented in Annex 1.10.

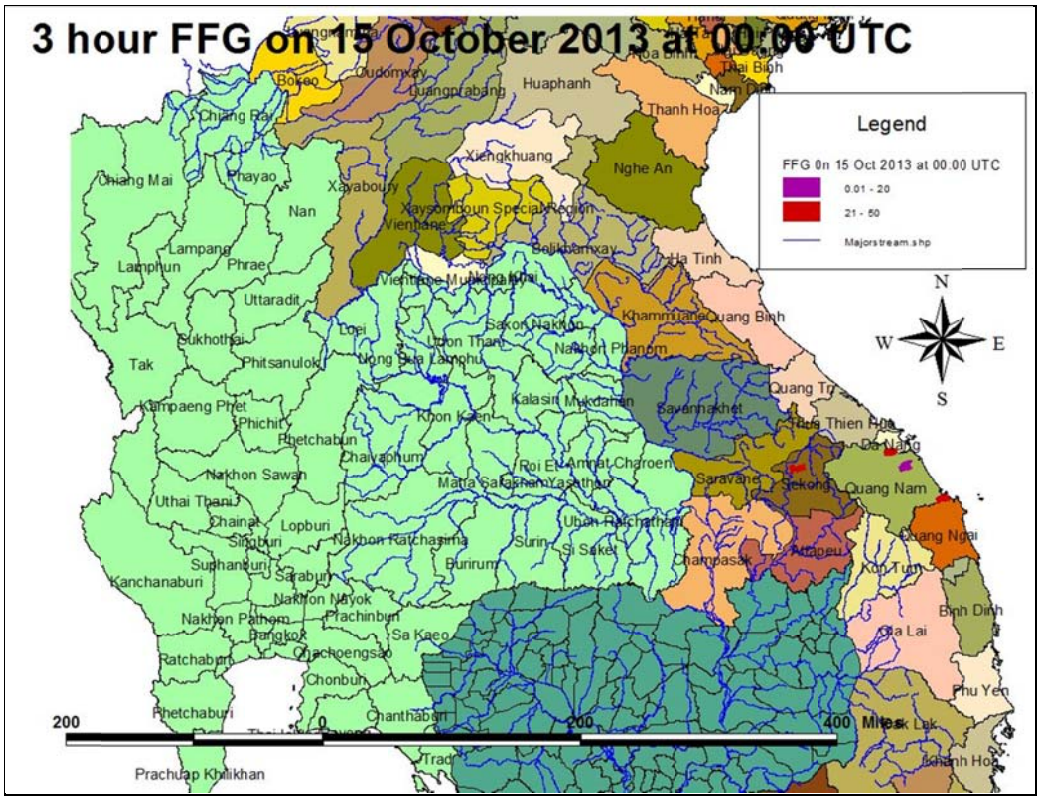


Figure 3.10-23 3 hourly Flash Flood Guidance (FFG) system on 15 October 2013 at 00:00 UTC flash flood risk areas in some districts of Quang Nam in the Central Provinces of Viet Nam, and the Se Kong Province of Lao PDR.

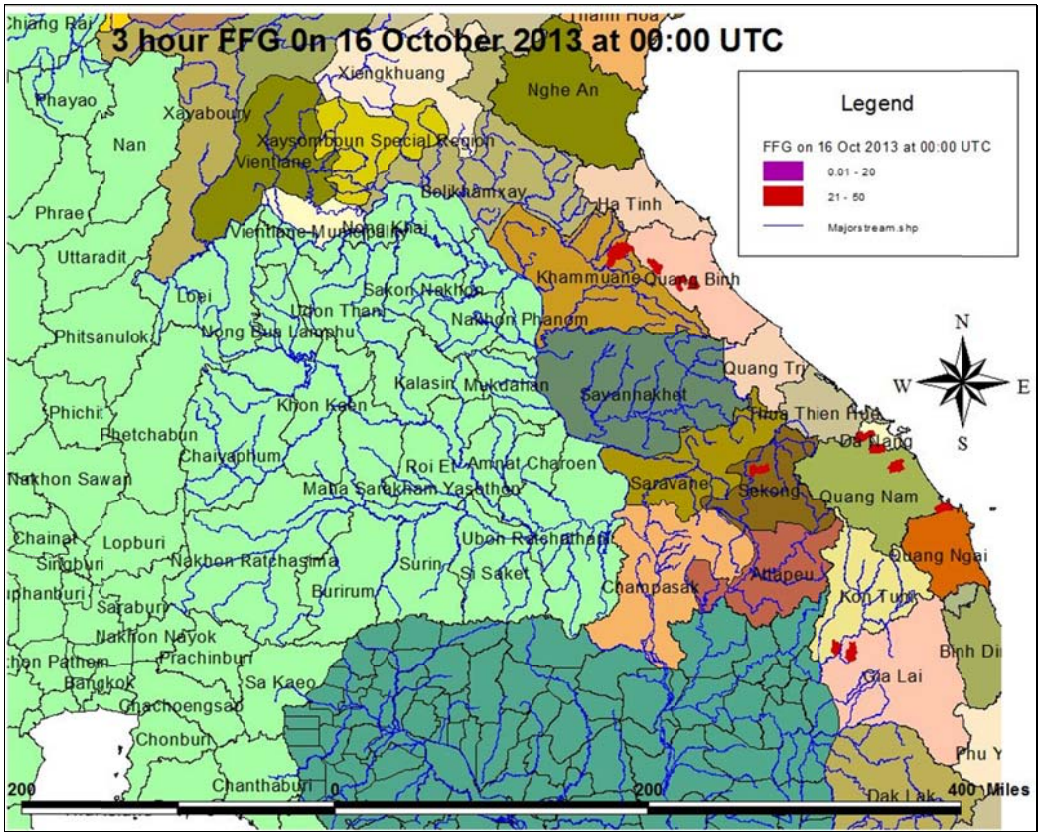


Figure 3.10-24 3 hourly Flash Flood Guidance (FFG) system on 16 October 2013 at 00:00 UTC shows that the flash flood risk areas extended to the some districts in the central provinces and the central highland of Viet Nam, and also the central province of Khammuane in Lao PDR.

3.10.4 Flash floods caused by TD NARI in the southern provinces of Lao PDR

On the morning of 15 October 2013 at 00:00 UTC the FFG system has been detected the flash flood risk areas at some villages of Se Kong provinces on the southern part of Lao PDR. And on 16 October 2013 the number of flash flood risk areas was extended to the other villages of Khammuane Province in central part of Lao PDR. Unfortunately there have not any Lao newspaper has been informed on the flash flood occurred on those areas. In case no flash flood information can be retrieved from the newspaper, the RFMMC tries to evaluate the FFG system by using available hydrological data received from DMH from the stations Ban Phonesi, Veun Khen and Se Kong, which located at downstream of flash flood risk areas (see Figure 3.10-25), and an analysis is made of the changing (rising) of water levels at both stations. It was recognized that water levels at those stations rapidly increased with 7m to 9 m within 12 hours. The quick rising water levels at Nam Cadin and Se Kong rivers can be characterized as flash floods. The hydrograph of Nam Cadin at Ban Phonesi and Se Kong rivers at Se Kong and Veun Khen stations are presented in the next paragraph.

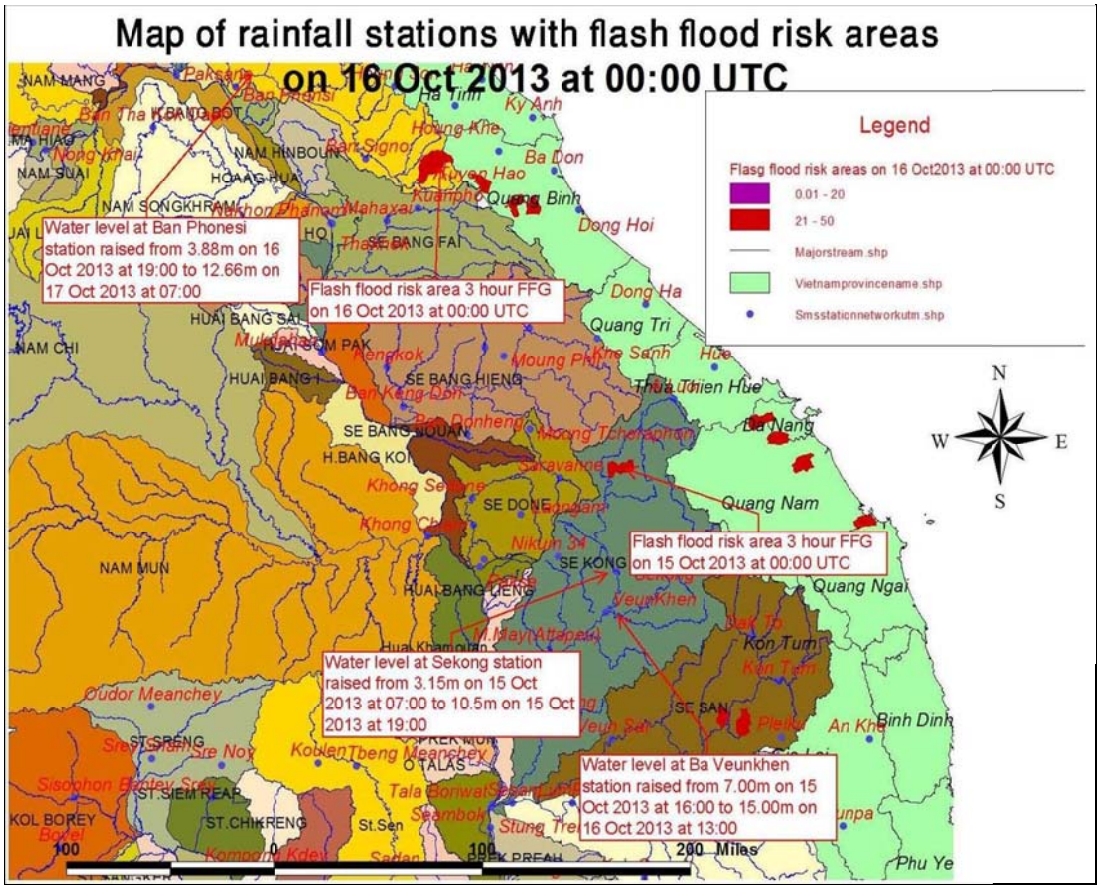


Figure 3.10-25 The 3 hour flash flood risk areas at southern provinces of Lao PDR and central provinces of Viet Nam on 15 and 16 October 2013 at 00:00 UTC and locations of Ban Phonesi, Se Kong and Veunhen stations.

3.10.5 Impacts by TS NARI to water levels in some tributaries of the Lower Mekong Basin

As a result of TS NARI heavy rainfall occurred at some Mekong sub-catchments located in the central and northern part of Lao PDR. This led in the period 15 - 17 October 2013 to quickly rising water levels in some tributaries of Mekong sub-catchments, such as Se Kong,

Se Sane, Xe Bang Hieng, Xe Bang Fai etc. For example at Sopnam, where water levels rose from 3.50 m on 15 October 2013 at 12:00 AM to the peak level of 15:50 m at 08:00 AM of 16 October 2013. That was second highest peak within 30 days period. For the Se Kong River at Veun Khen, water levels rose from 7:00 m on 15 October 2013 at 16:00 to the peak level of 15:50 m at 13:00 of 16 October 2013. That was the second highest peak within 30 days period. Figure 3.10-26 to Figure 3.10-34 present the hydrograph at some hydrological stations of Mekong tributaries. Figure 3.10-35 presents the map of 3 hourly FFG on 16 October 2013 at 00:00 UTC with location of water level stations.

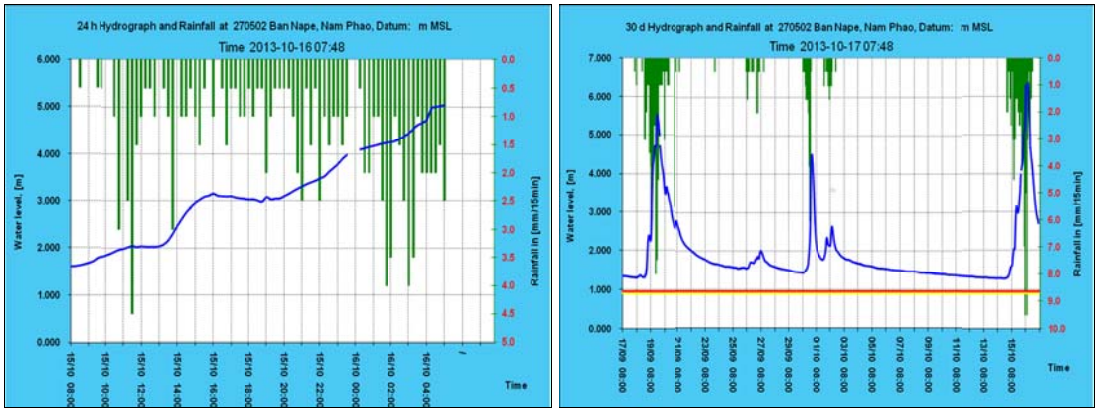


Figure 3.10-26 Hydrograph of Nam Phao river at Ban Nape, where water levels started rising from 1.50 m on 15 October 2013 at 08:00 AM to the peak level of 5 m at 06:00 AM of 16 October 2013. That was the highest peak in 30 days.

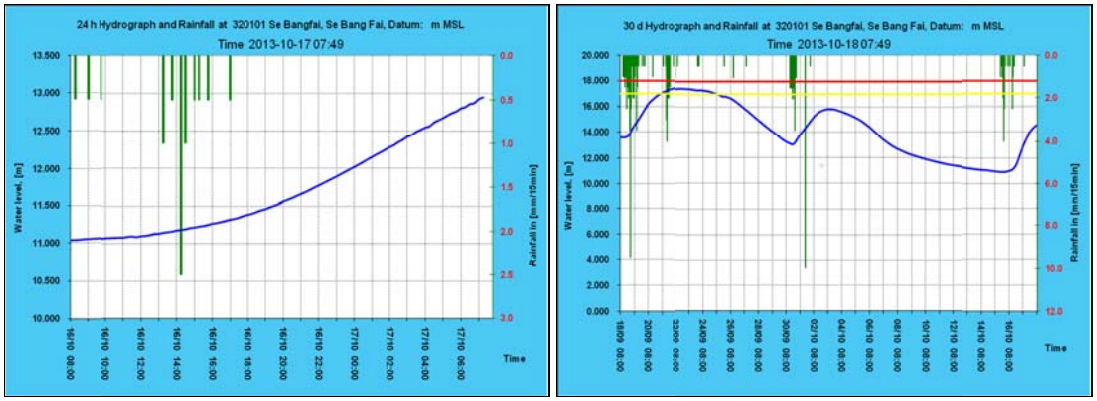


Figure 3.10-27 Hydrograph of Xe Bang Fai River at Xe Bang Fai, where water levels started rising from 11.00 m on 16 October 2013 at 06:00 AM to the peak level of 14.55 m at 07:00 AM of 18 October 2013.

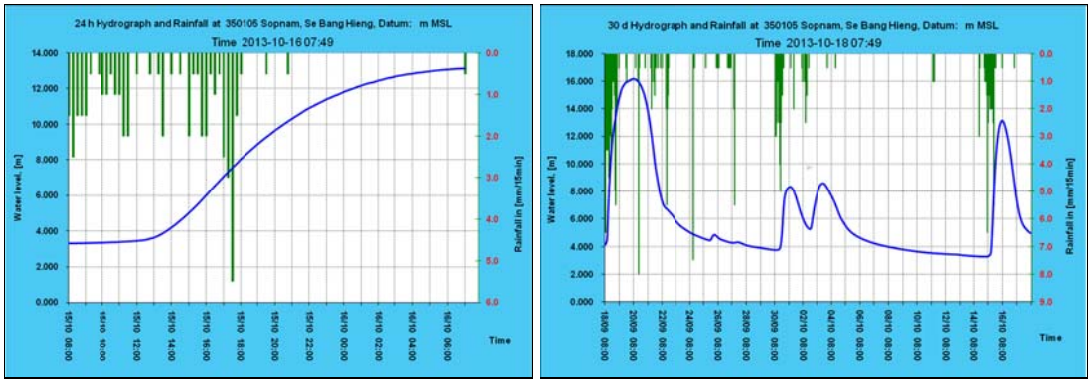


Figure 3.10-28 Hydrograph of Xe Bang Hieng River at Sopnam, where water levels started rising from 03.50 m on 15 October 2013 at 12:00 AM to the peak level at 15.50 m at 08:00 AM of 16 October 2013. This was the second highest peak in 30 days.

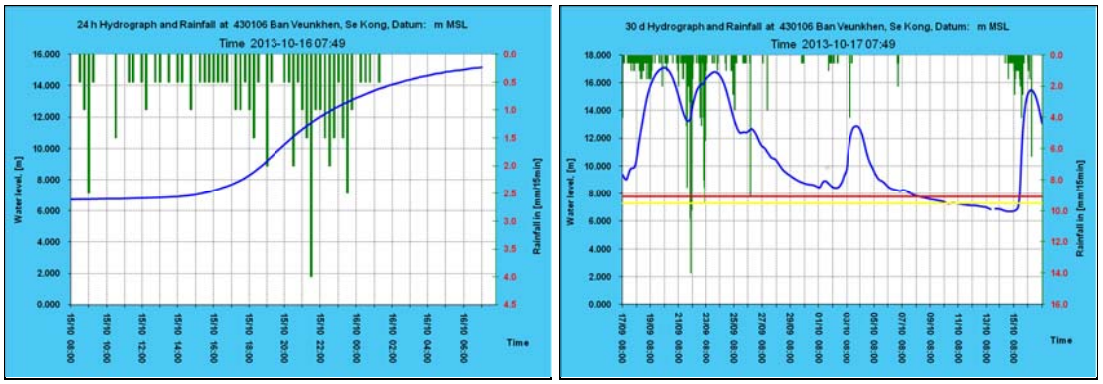


Figure 3.10-29 Hydrograph of Se Kong river at Veunkhen, where water levels started rising from 07:00 m on 15 October 2013 at 16:00 to the peak level of 15.50 m at 13:00 of 16 October 2013. It was the second highest peak in 30 days.

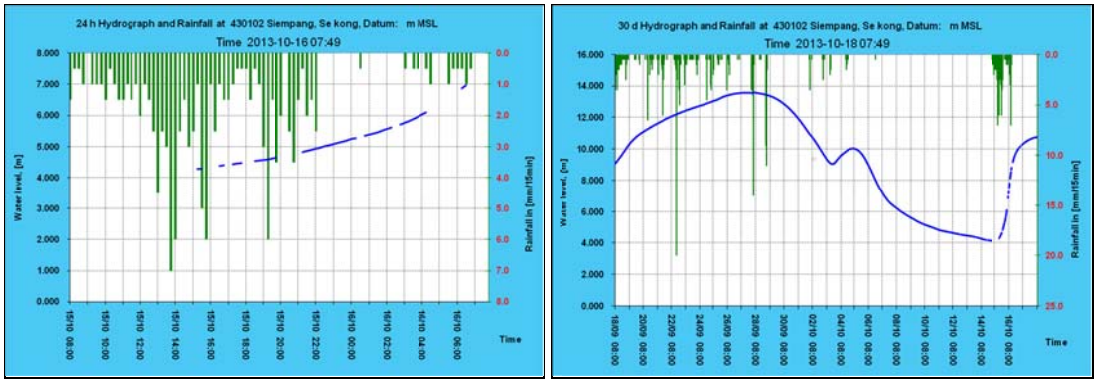


Figure 3.10-30 Hydrograph of Se Kong River at Siempang, where water levels started rising from 04.50 m on 15 October 2013 at 18:00 to the peak level of 10.70 m at 14:00 of 18 October 2013. This was the second highest peak in 30 days.

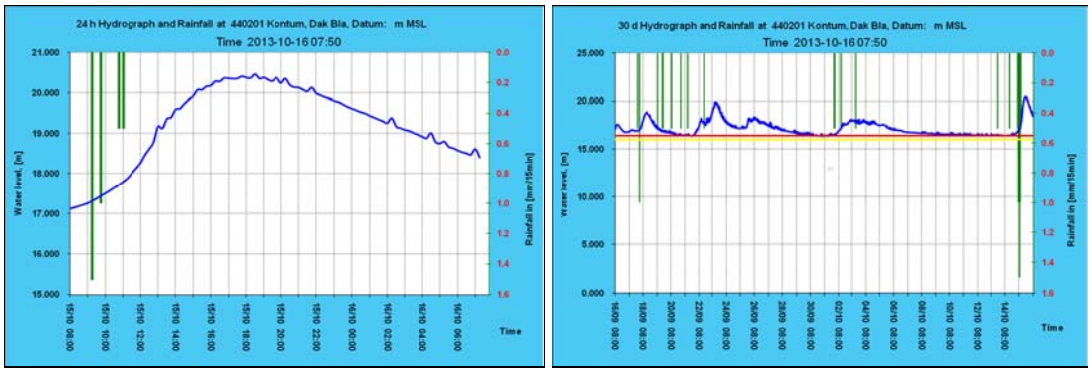


Figure 3.10-31 Hydrograph of Se San River at Kontum, where water levels started rising from 7.10 m on 15 October 2013 at 08:00 to the peak level of 20.30 m at 17:00 of 15 October 2013. That was the second highest peak in 30 days.

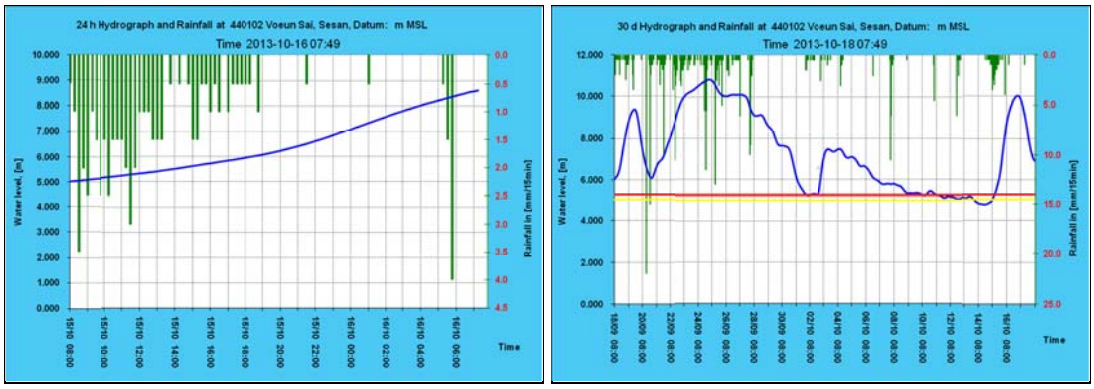


Figure 3.10-32 Hydrograph of Se San River at Veunsai, where water levels started rising from 05.00 m on 15 October 2013 at 08:00 AM to the peak level at 10.00 m at 00:00 of 17 October 2013. That was the second highest peak in 30 day.

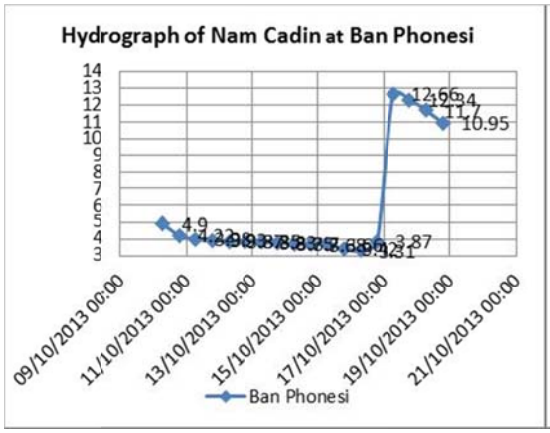


Figure 3.10-33 Hydrograph of Nam Cadin during the TS NARI.

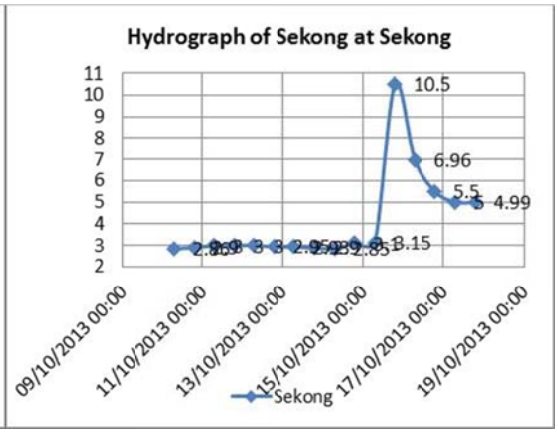


Figure 3.10-34 Hydrograph of Se Kong during the TS NARI.

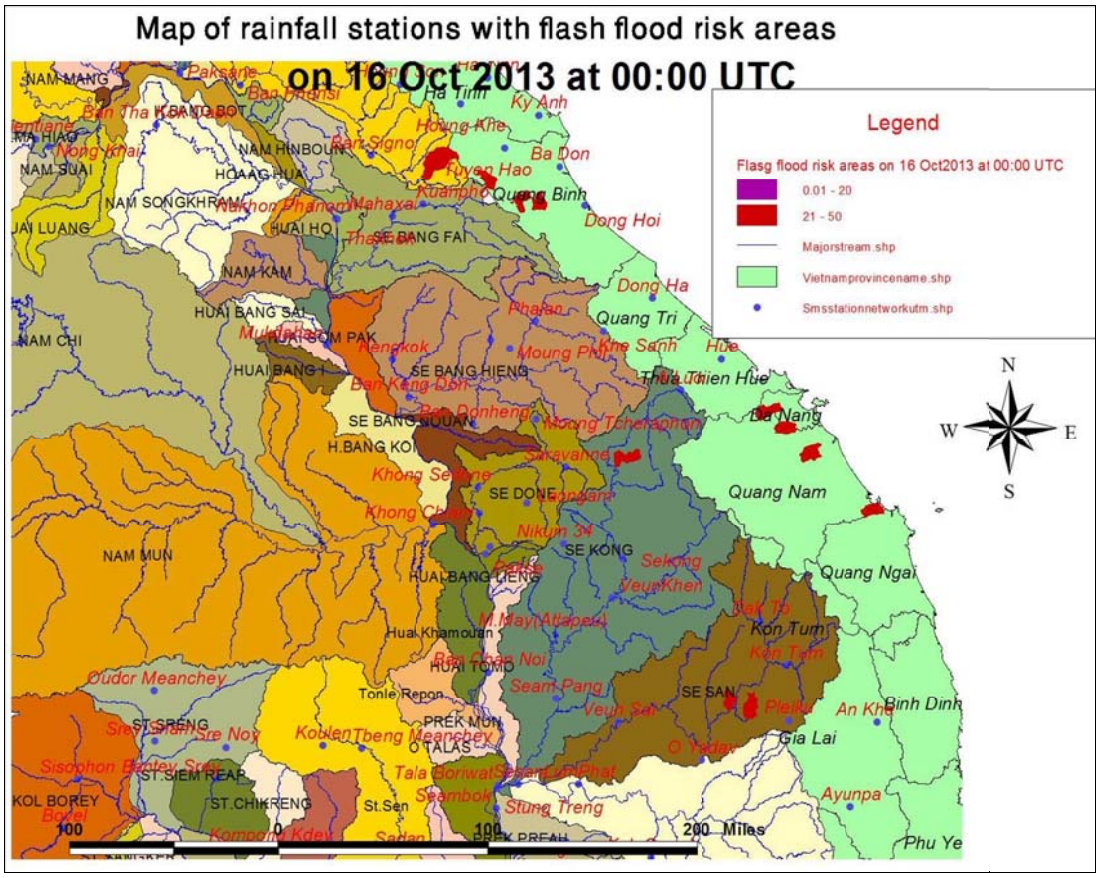


Figure 3.10-35 Map of 3 hour FFG on 16 October 2013 at 00:00 UTC with location of water level stations.

3.10.6 Impact of the TD NARI to water levels of the Mekong mainstream

Quickly rising water levels in tributaries of southern and central parts of Lao PDR also caused rising water levels on the Mekong mainstream in some monitoring stations from Nakhon Phanom station down to stations located in Mekong Delta. Rising water levels at those monitoring stations did not have any serious impact to the water levels at the mainstream because the water level at many monitoring stations on the Mekong mainstream were falling before the arrival of TS NARI. Figure 3.10-36 to Figure 3.10-44 present the hydrograph of monitoring stations along the Mekong mainstream from Nakhon Phanom to Kampong Cham.

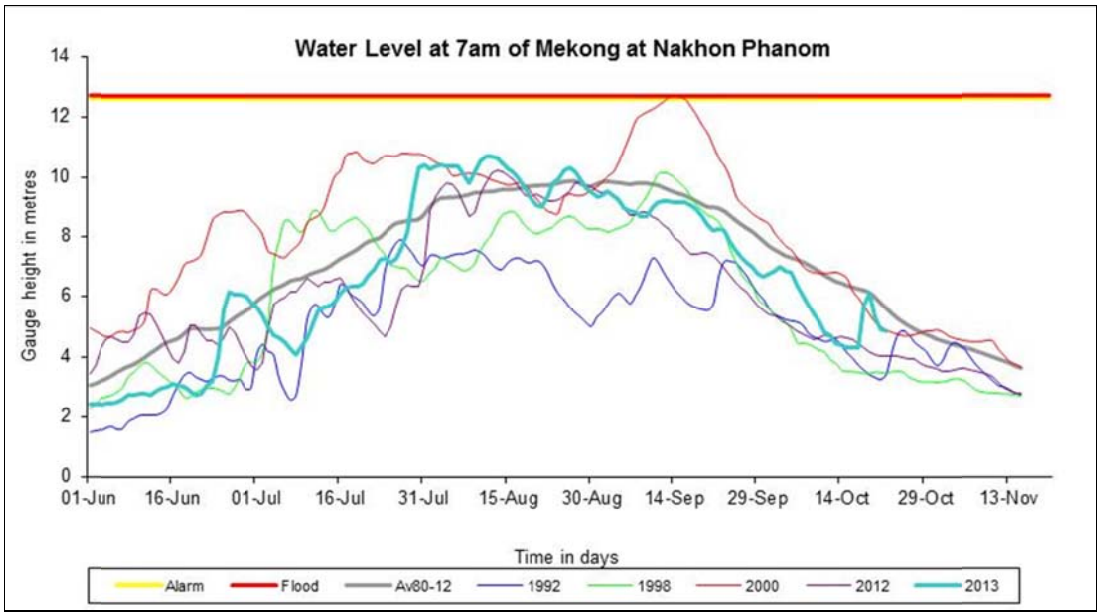


Figure 3.10-36 Hydrograph of Mekong mainstream at Nakhon Phanom, where WLs rose due to TS NARI.

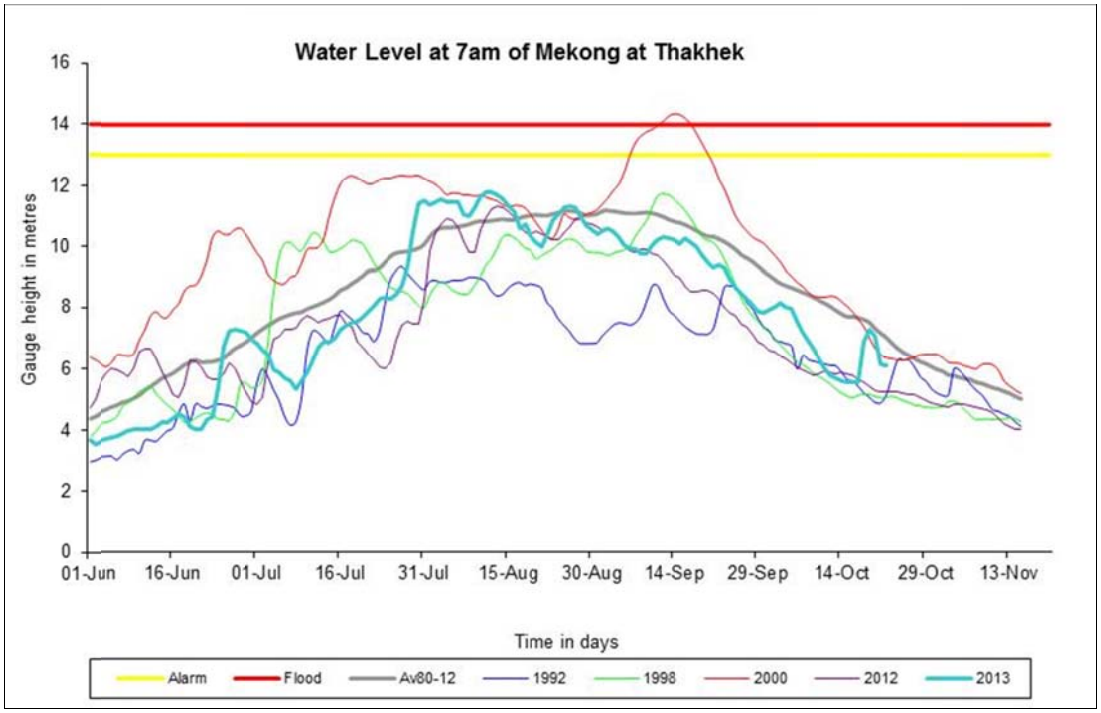


Figure 3.10-37 Hydrograph of Mekong mainstream at Thakhek, where WLs rose due to TS NARI.

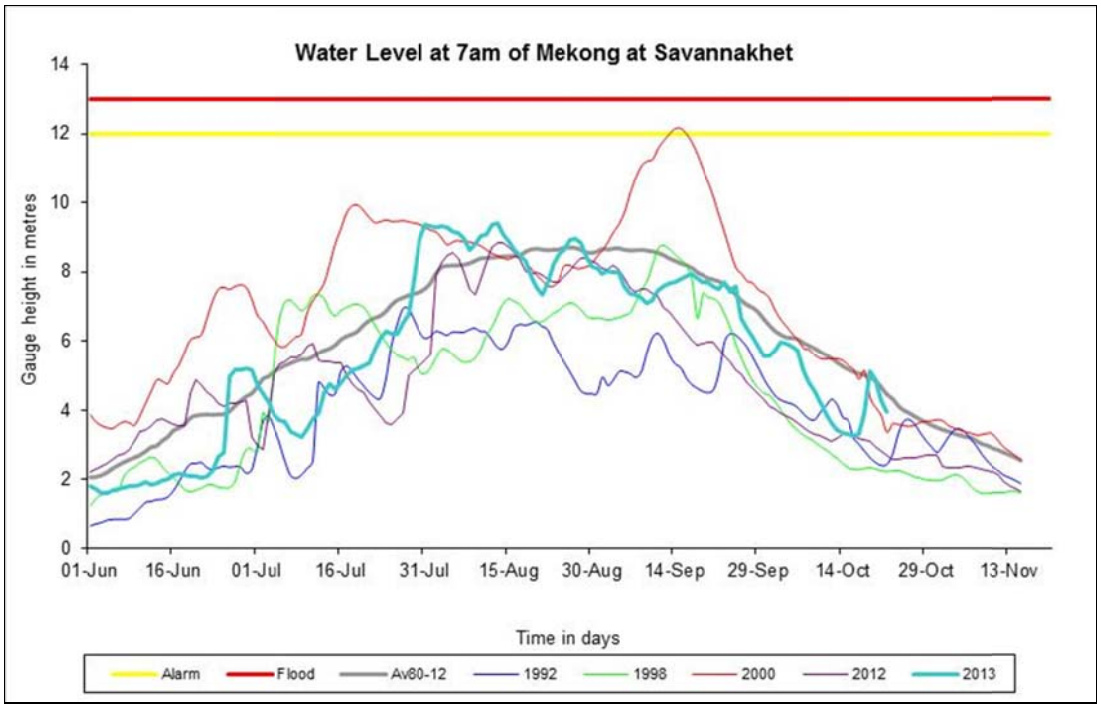


Figure 3.10-38 Hydrograph of Mekong mainstream at Savannakhet, where WLs rose due to TS NARI.

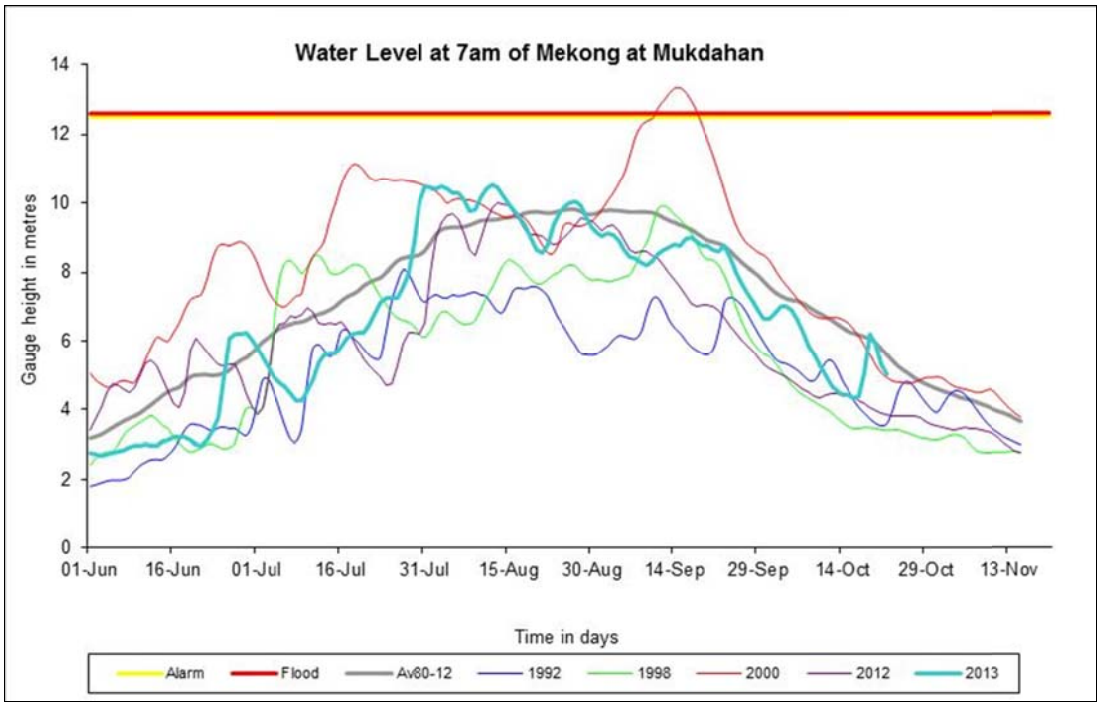


Figure 3.10-39 Hydrograph of Mekong mainstream at Mukdahan, where WLs rose due to TS NARI.

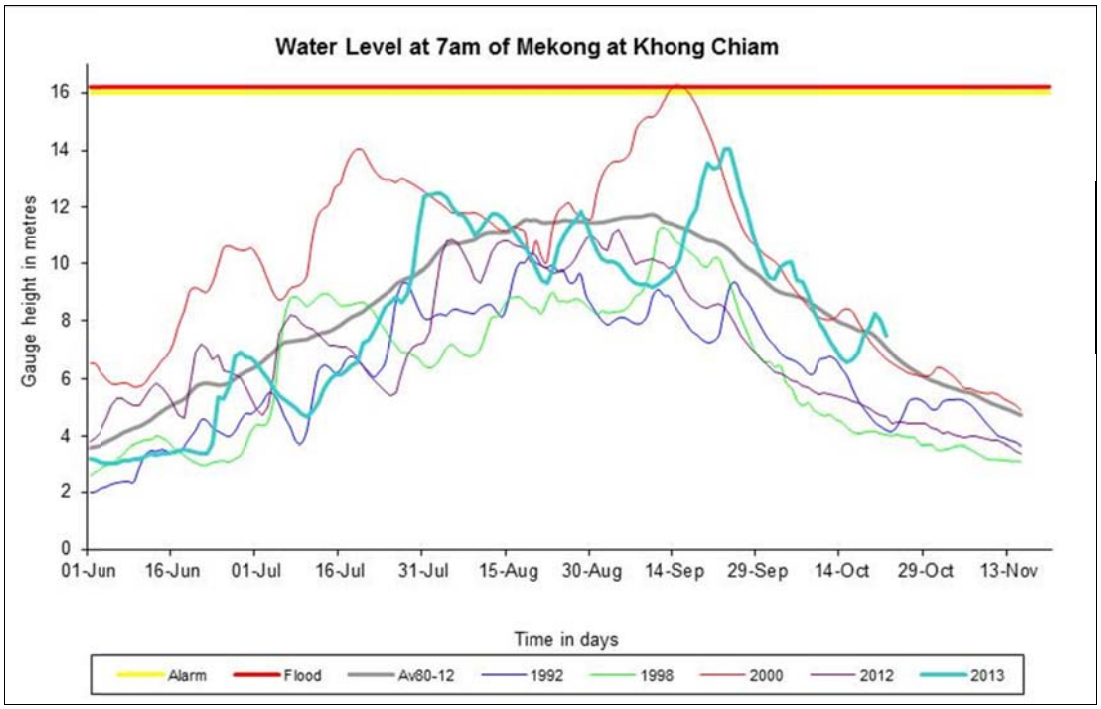


Figure 3.10-40 Hydrograph of Mekong mainstream at Khong Chiam, where WLs rose due to TS NARI.

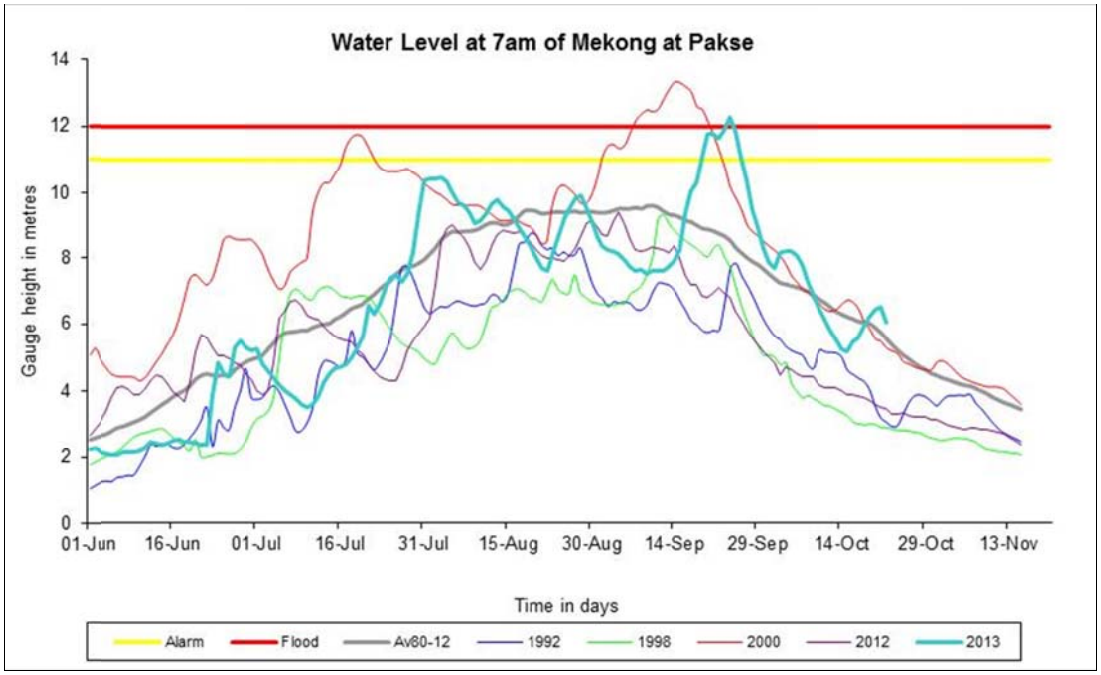


Figure 3.10-41 Hydrograph of Mekong mainstream at Pakse, where WLs rose due to TS NARI.

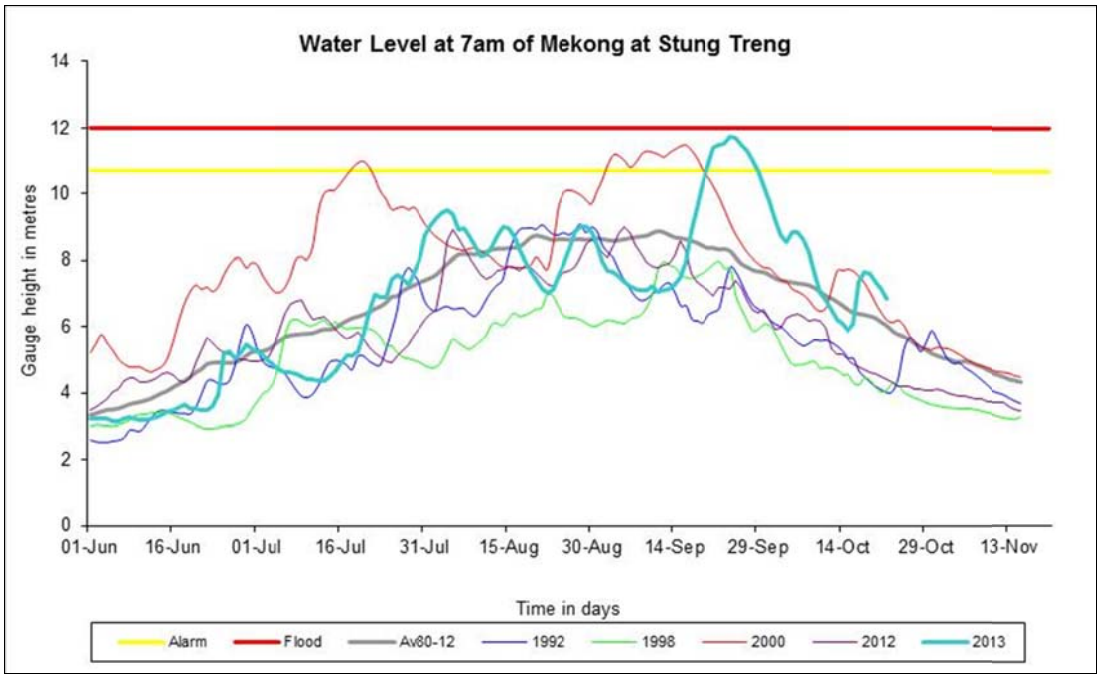


Figure 3.10-42 Hydrograph of Mekong mainstream at Stung Treng, where WLs rose due to TS NARI.

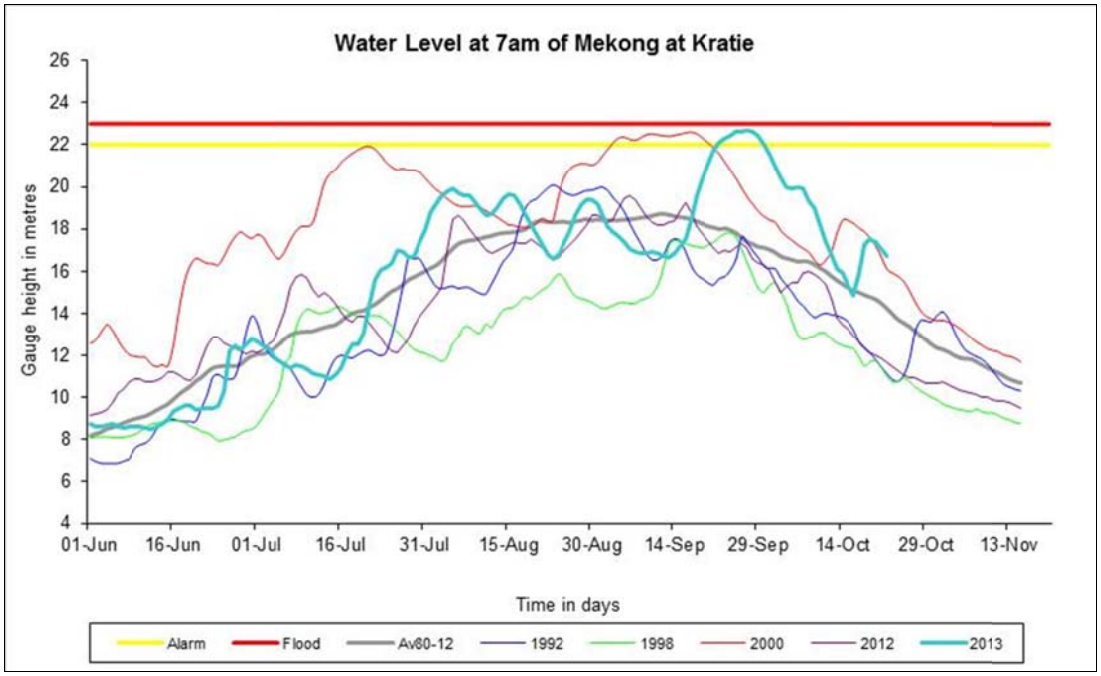


Figure 3.10-43 Hydrograph of Mekong mainstream at Kratie, where WLs rose due to TS NARI.

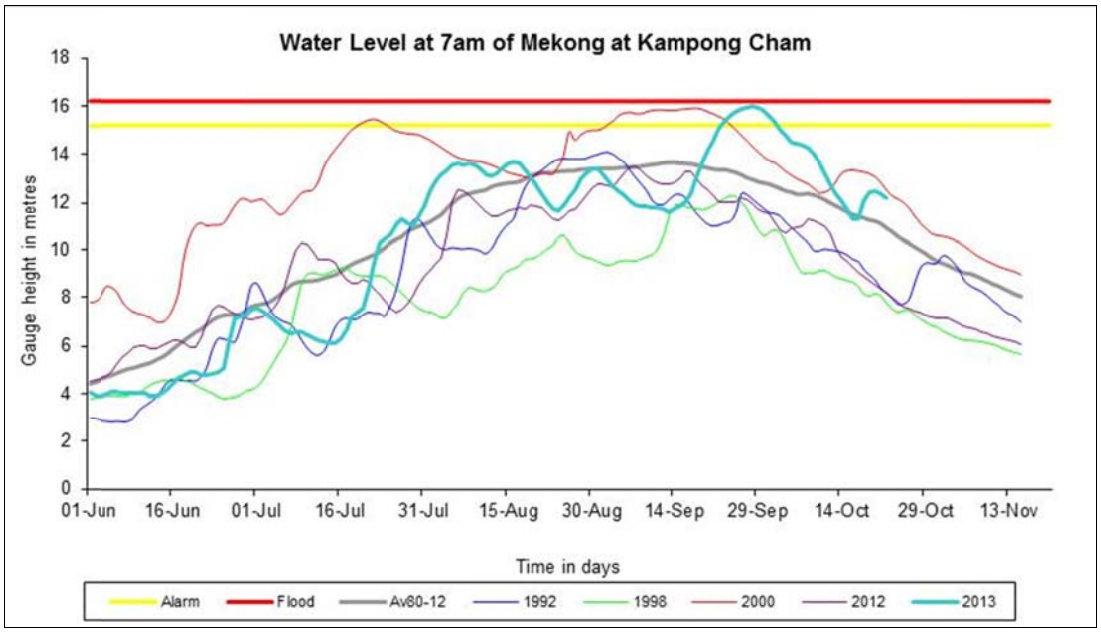


Figure 3.10-44 Hydrograph of Mekong mainstream at Kampong Cham, where WLs rose due to TS NARI.

3.10.7 Conclusions

1. TS NARI was the eleventh storm to hit Viet Nam in 2013. It is also the fourth storm that hit and impacted some sub-catchment of Mekong River Basin located in the southern part of Lao PDR, such as Xe Bang Fai, Xe Bang Hieng, Nam Cadine, Se Done, Se Kong and Se San, and also the central part of Thailand (Mun and Chi sub-catchments).
2. When TS NARI weakened to a tropical depression, this process was accompanied by heavy rainfall (100 - 400 mm per day) in many areas in the central part of Viet Nam, and also for many sub-catchments of LMB located in the southern part of Lao PDR, the 3S area sub-catchments (Se Kong, Se San, Srepok), located in the central highland of Viet Nam, as well as for many sub-catchment of the Tonle Sap Lake of Cambodia, and Mum & Chi sub-catchments in Thailand.
3. Water levels at some hydrological stations situated in some tributaries of the sub-catchment of Nam Xe Bang Fai, Xe Bang Hieng, Nam Cadine, Se Done, Se Kong, Se San quickly rose (approximately 3 - 10 m within 10 - 14 hours) which was caused by heavy rainfall from TD NARI.
4. Following the rising water levels at some tributaries, the water levels at some monitoring stations of the Mekong mainstream (especially for the stations from Nakhon Phanom to Kampong Cham) did remarkably rise.
5. On 15 October 2013 at 00:00 UTC (07:00 local time) the MRCFFG system detected that various villages of Se Kong Province at the southern part of Lao PDR were at the risk of flash flood occurrence. These flash flood risk areas extended on the 16 October 2013 at 00:00 UTC to other villages of Khammuane Province in the central part of Lao PDR.
6. In the morning of 15 October 2013 at 00:00 UTC the MRCFFG system detected flash flood risk areas in some districts of provinces in the central part of Viet Nam. Also on 16 October 2013 at 00:00 UTC the flash flood risk areas extended to other

districts in the central provinces of Viet Nam, such as Quang Nam, Quang Binh, Da Nang, Quang Ngai, Kontum, Gia Lai and Thua Thien Hue provinces.

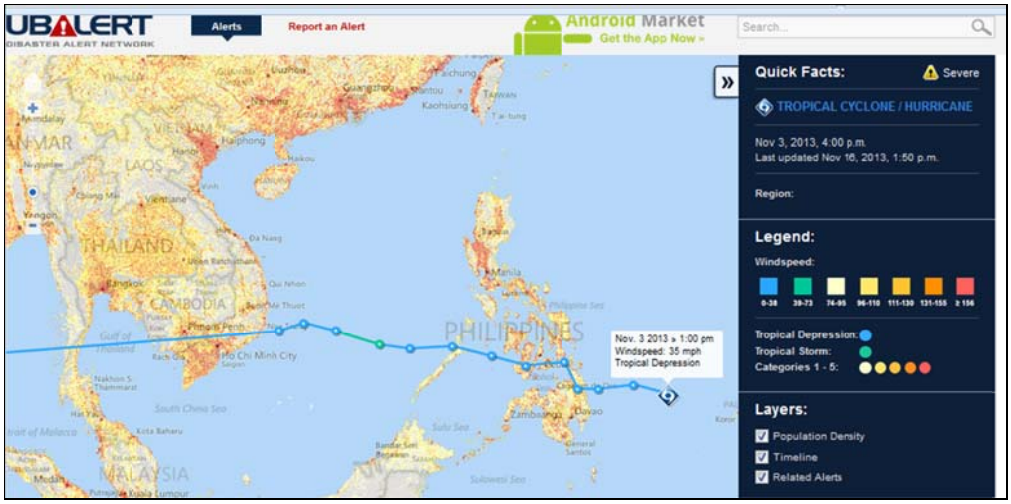
3.10.8 Recommendations

The Hydromet Network of the Mekong River Commission relies on the network infrastructure in each of the Member Countries. In order to improve the early warning for circumstances such as caused by TS NARI, it is of vital importance that the existing network is properly maintained. Besides that, additional automatic waterlevel and rainfall recording stations (of the M-Hycos type) need to be installed along main tributaries and in isolated sub-catchments of the Lower Mekong Basin to improve the national and regional flood forecasting and early warning services. At the same time such stations will provide the Member Countries the tools to further validate and improve the reliability of the MRC Flash Flood Guidance system. This system since the start of its operation in 2010 has gained interest from the Member Countries, as it appears to be an increasingly effective system to provide alerts and warning for flash floods risks at village and district level in the Lower Mekong Basin.

3.11 Flash Flood Caused by Tropical Depression THIRTY

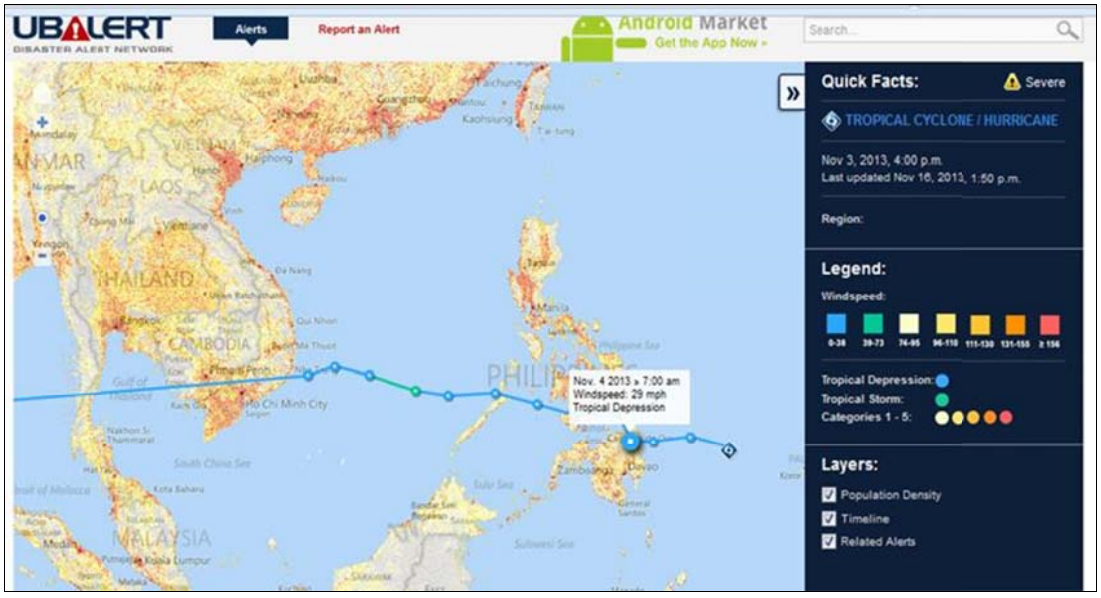
3.11.1 Weather Condition during the first week of November 2013

At 01:00 PM UTC on 03 November 2013 Tropical Depression THIRTY developed in the middle of the Philippine Sea. Figure 3.11-1 presents the position of the tropical depression in the Philippine Sea. The storm was moved in westerly direction and made the first landfall in Philippines around 07:00 AM UTC of 04 November 2013. See Figure 3.11-2. It continued moving to the west across the East Sea and made its second landfall at Phu Yen province in Viet Nam around 01:00 PM UTC on 06 November 2013. It continued in westerly direction across the southern provinces of Viet Nam and Cambodia before it crossed the southern provinces in Thailand. The Figure 3.11-3 shows the track of TS THIRTY with the position when it made the landfall at Phu Yen province in Viet Nam.



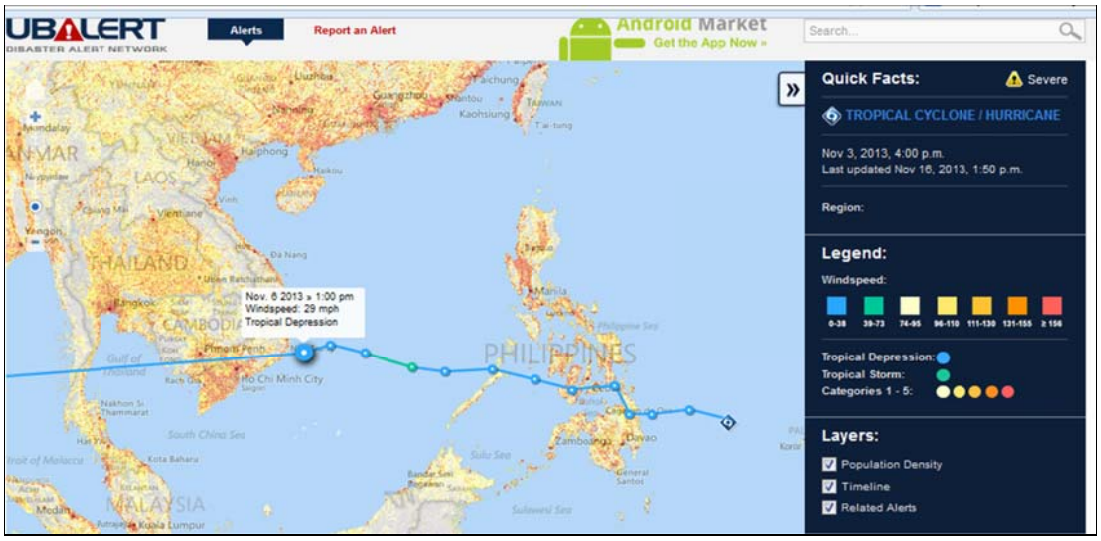
Source: http://www.ubalert.com

Figure 3.11-1 On 03 November 2013 at 01:00 PM UTC in the Philippine Sea Tropical Depression THIRTY was formed and started moving into the Philippines.



Source : http://www.ubalert.com.

Figure 3.11-2 On 04 November 2013 at 07:00 AM UTC Tropical Storm THIRTY made its first landfall at Pallawan Island in the Philippines.



Source : http://www.ubalert.com

Figure 3.11-3 On 06 November 2013 at 01:00 PM UTC Tropical Storm THIRTY made its second landfall in Phu Yen province in southern Viet Nam.

3.11.2 Heavy rainfall caused by TD THIRTY

During the period 06 - 07 November 2013, when TS THIRTY was active over the region, heavy rainfall occurred in some areas of central highland and in the central part of Viet Nam. The daily rainfall at some hydro-meteorological stations in the areas reached 100 - 400 mm per day. Figure 3.11-4 to Figure 3.11-7 present the records of daily rainfall (daily rainfall – 24 hour accumulated rainfall from 07:00 AM previous day to 07:00 AM reported day) for of rainfall stations in the central part of Viet Nam. Figure 3.11-14 presents the map of location

of rainfall stations, where records of daily accumulated rainfall were collected during the TD THIRTY.

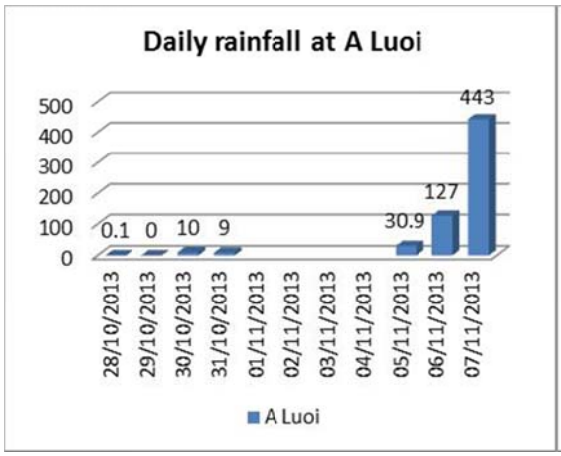


Figure 3.11-4 Daily rainfall (in mm) at A Luoi station.

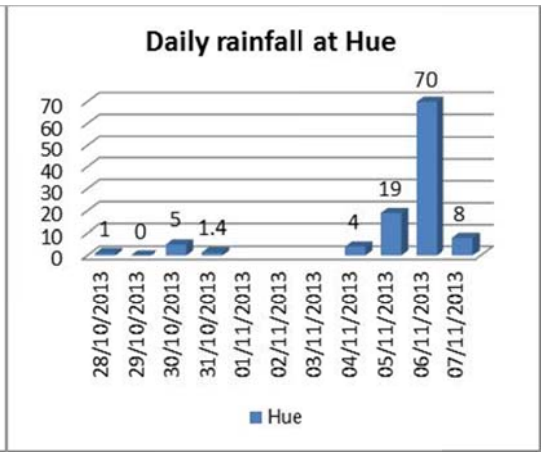


Figure 3.11-5 Daily rainfall (in mm) at Hue station.

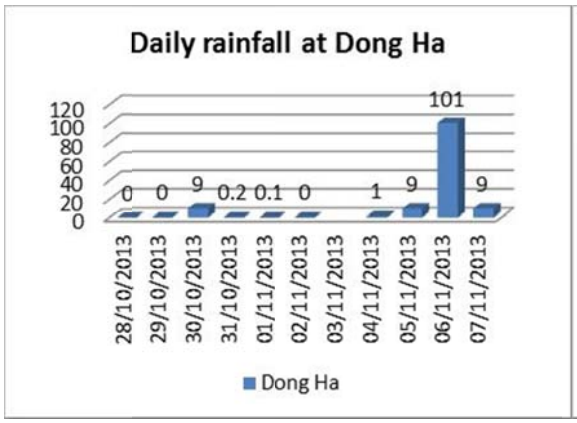


Figure 3.11-6 Daily rainfall (in mm) at Dong Ha station.

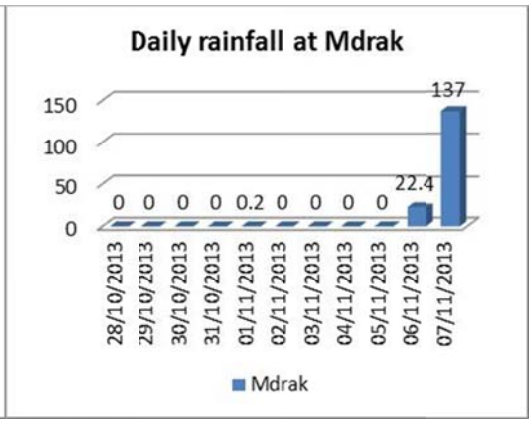


Figure 3.11-7 Daily rainfall (in mm) at Mdrak station.

3.11.3 Rising water levels at some stations located in tributaries of the Lower Mekong Basin

TS THIRTY caused heavy rainfall in some Mekong sub-catchments located in the southern part of Lao PDR and the central highlands of Viet Nam. It led to quickly rising water levels in some tributaries of the Mekong sub-catchments, such as Se Kong, Se Sane, Sreprok, Xe Bang Hieng etc. For example at Sopnam station of the Xe Bang Hieng river water levels rose from 4.00 m on 06 November 2013 at 10:30 AM to the peak level at 09.67 m at 09:00 AM of 08 November 2013; at Veunkhen station of the Se Kong river water levels rose from 6.30 m on 07 November 2013 at 03:00 AM to the peak level of 11.56 m at 05:00 AM of 08 November 2013. Figure 3.11-8 to Figure 3.11-13 present the hydrograph at some hydrological stations of Mekong tributaries. Figure 3.11-14 present the Map of 3 hourly FFG on 16 October 2013 at 00:00 UTC with location of water level and rainfall stations.

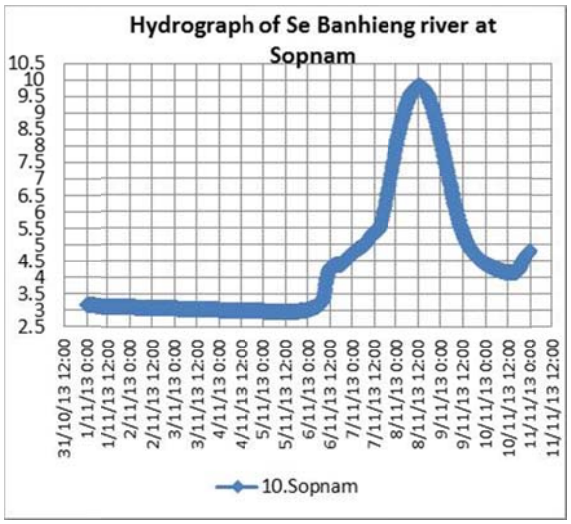


Figure 3.11-8 Hydrograph of Xe Bang Hieng river at Sopnam.

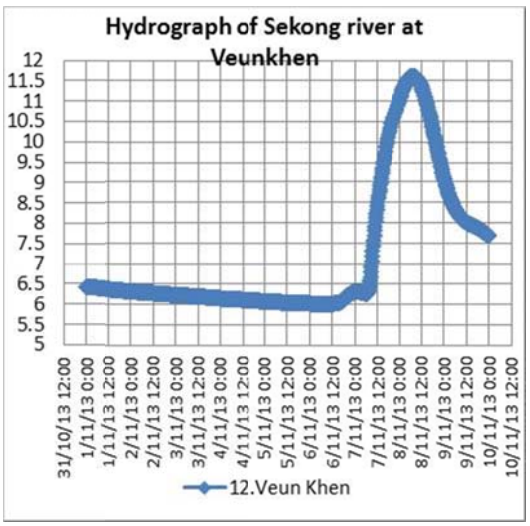


Figure 3.11-9 Hydrograph of Se Kong river at Veunkhen.

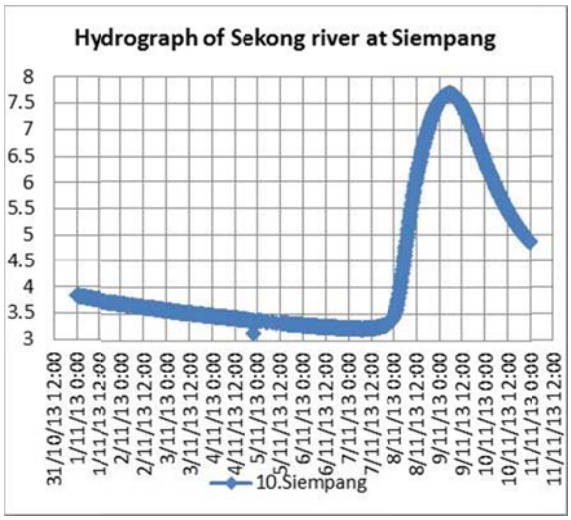


Figure 3.11-10 Hydrograph of Se Kong river at Siempang.

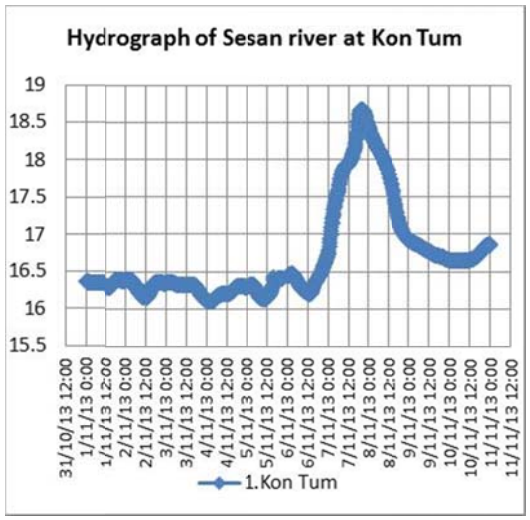


Figure 3.11-11 Hydrograph of Se San river at Kon Tum.

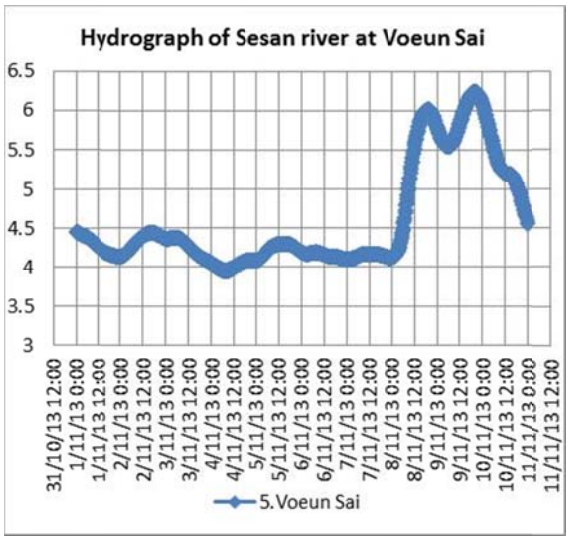


Figure 3.11-12 Hydrograph of Se San river at Voeun Sai.

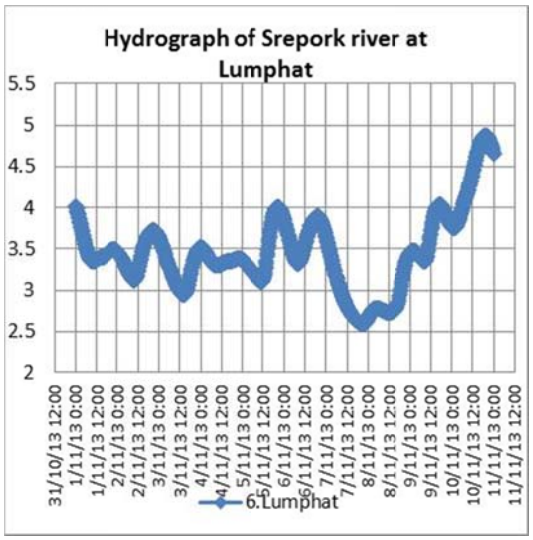


Figure 3.11-13 Hydrograph of Srepork river at Lumphat.

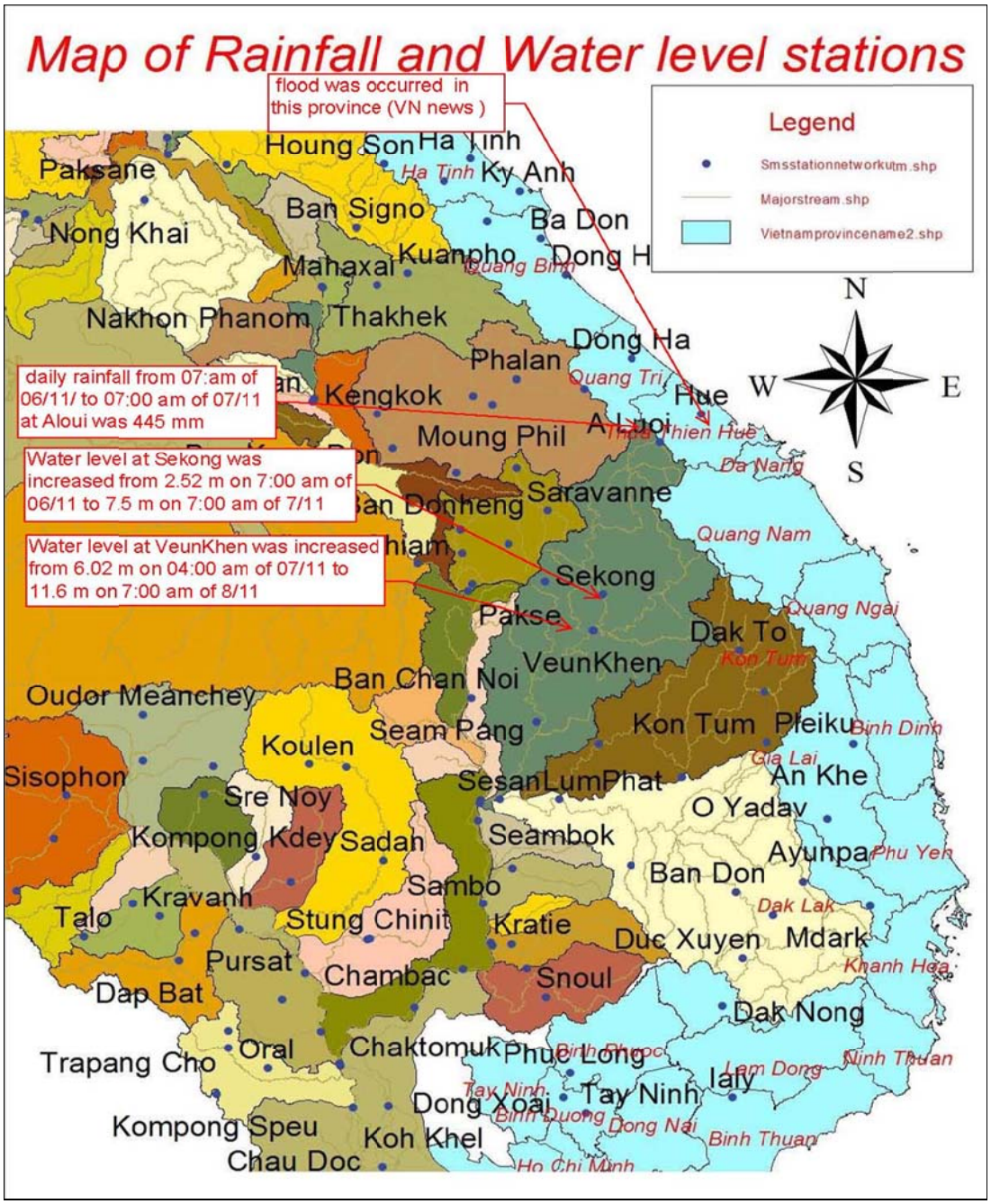


Figure 3.11-14 Map of rainfall and water level stations, where data were collected during the TD THIRTY.

3.11.4 Flash floods caused by Typhoon Depression THIRTY

The Tropical Depression THIRTY caused heavy rainfall in areas of the provinces of the central highlands in Viet Nam. Rainfall started on 03 November 2013 and in the evening of 07 November 2013 flash floods occurred in some areas of the Quang Dien and Houng Tra districts of Than Thieu Hue province in central Viet Nam. Reference is made to the online newspaper "Viet Nam News", published on 08 November 2013. Annex 1.11 presents the article published by "Viet Nam News".

Unfortunately on 07 November 2013 at 06:00 UTC the MRCFFG system did not properly detected the flash flood risk areas at the above mentioned province. The MRCFFG system

detected that some areas in Tuy Hoa, Van Ninh and Ninh Hao districts of Phu Yen and Khanh Hao provinces were under flash flood risk. Figure 3.11-15 presents 3 hour FFG on 07 November 2013 at 06:00 UTC.

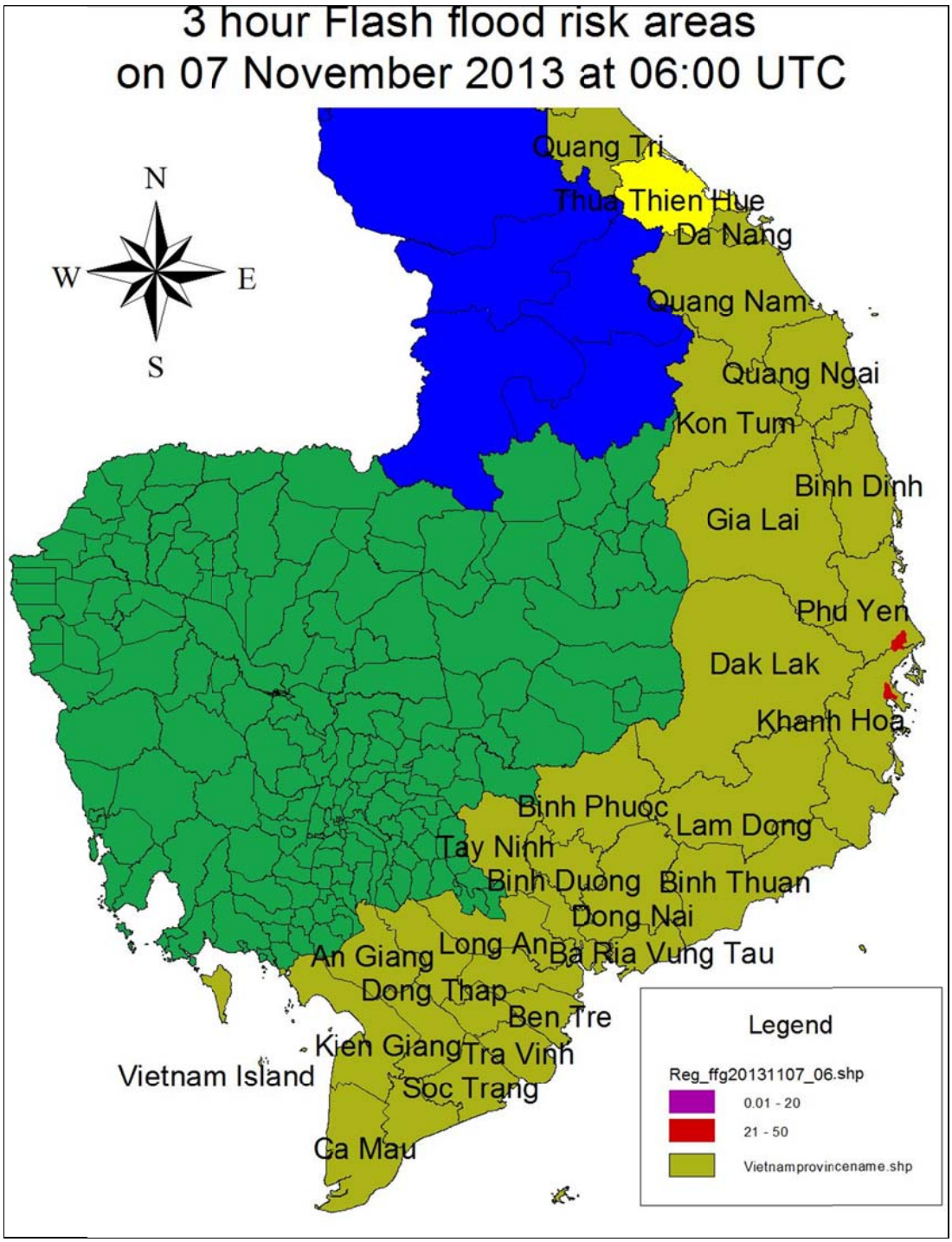


Figure 3.11-15 3 hour flash flood risk areas on 7 November 2013 at 06 November 2013 at 06:00 UTC; MRCFFG information and information provided by Newspaper "Viet Nam News" differ.

Based on an initial analysis the error of detection of MRCFFG system is mainly caused by the underestimation of the satellite rainfall estimate, compared with the rainfall data from ground observed rainfall stations. It could also be caused by an inappropriate Bias correction factor which is used to calculate the satellite rainfall into Main Aerial Precipitation (MAP).

Figure 3.11-16 present the error of rainfall (underestimation) from the Hydroestimator. Figure 3.11-17 present the error of MAP product caused of incorrect bias correction factor.

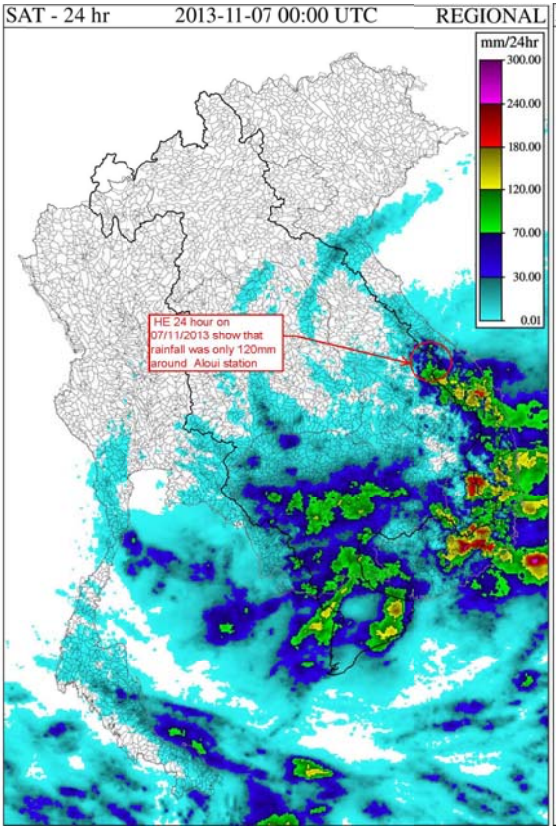


Figure 3.11-16 24 hours accumulated rainfall from Hydroestimator is underestimated compared with the 24 hour accumulated rainfall at A Loui station.

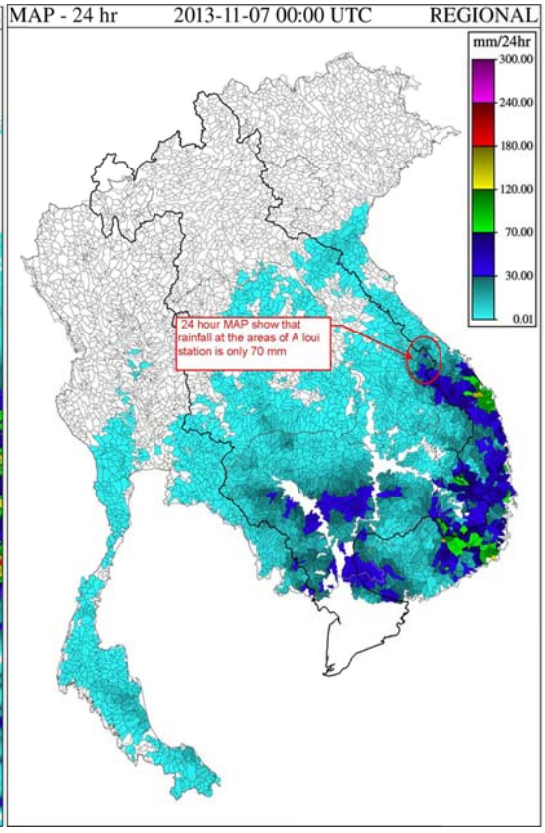


Figure 3.11-17 The error value of rainfall from MAP is high compare with the observed rainfall at A Loui station. This difference may be caused by using an incorrect bias correction factor.

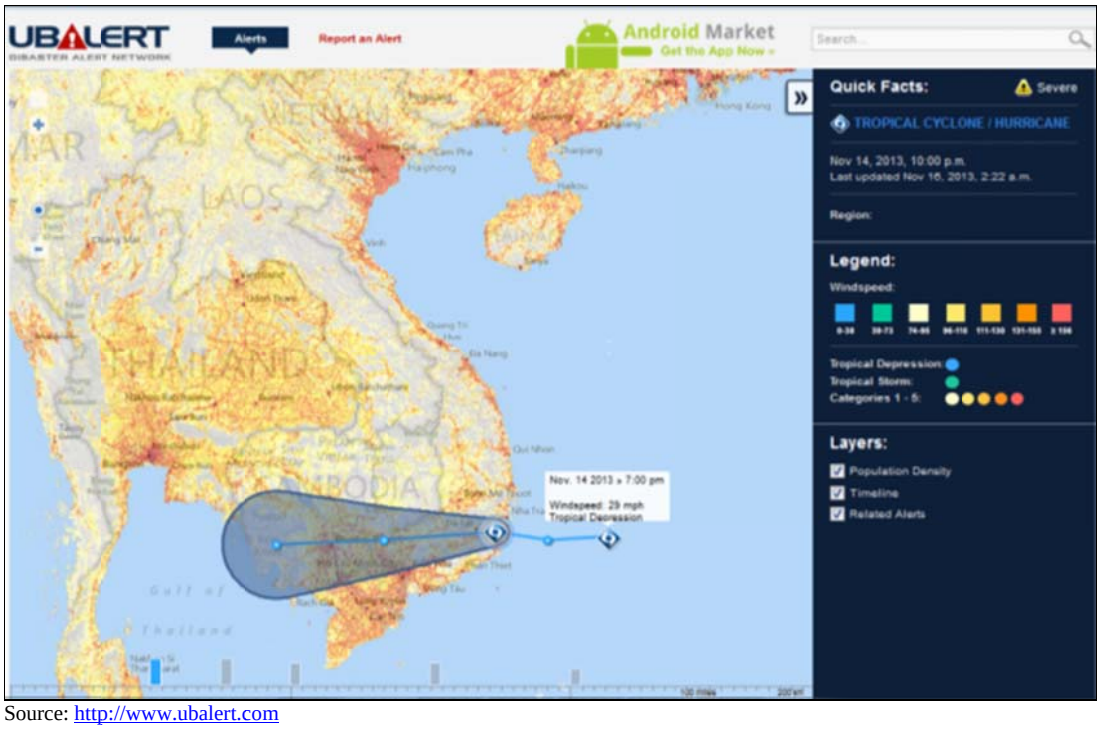
3.11.5 Conclusions

1. During the period 05 - 07 October 2013 Typhoon Depression THIRTY passed the Lower Mekong region, causing heavy rainfall in some areas in the central highlands of Viet Nam. Rainfall records of many stations located in the central highlands of Viet Nam indicated rainfall values of 100- 400 mm per day.
2. Water levels at some hydrological stations located in the Xe Bang Hieng, Se Kong, Se San and Sreprok catchments rapidly rose about 4 - 6 meter within the period 07 - 08 November 2013 .
3. On 07 November 2013 flash floods occurred in many areas of Thuan Thien Hue province in Viet Nam. Unfortunately the MRCFFG did not properly detect. The in sufficient detection of MRCFFG system may be caused by underestimation of the satellite rainfall and an inappropriate Bias correction factor which is used to convert satellite rainfall to Mean Aerial Precipitation (MAP). This problem needs to be investigated and some model parameters, such as bias correction factor, should be reassessed in order to adjust the MAP product.

3.12 Flash floods caused by Tropical Storm PODUL

3.12.1 Tropical Storm Podul

At 07:00 PM local time on 14 November 2013 Tropical Depression PODUL developed in the central part of the East Sea. Figure 3.12-1 presents the position of the tropical depression in the East Sea. The storm moved in westerly direction. On Friday 15 November 2013 at around 07 AM it began making landfall in the coastal areas of the southern part of Viet Nam. See Figure 3.12-2. After it continued in westerly direction across Cambodia, it was downgraded to the low pressure cell at the upper golf of Thailand.



Source: http://www.ubalert.com

Figure 3.12-1 On 14 November 2013 at 07:00 PM local time Tropical Depression PODUL was formed in the East Sae and started moving into westerly direction.

Source: http://www.ubalert.com

Figure 3.12-2 On 15 November 2013 at 07:00 local time Tropical Storm PODUL made landfall in the coastal zone of the southern provinces of Viet Nam.

3.12.2 Heavy rainfall by TS PODUL in the period 15 – 17 November 2013

During the period 15 - 17 November 2013 Tropical Storm PODUL was active in the region and transformed into a low pressure cell. Heavy rainfall occurred in some areas of the southern part of Viet Nam. The daily rainfall at some hydro-meteorological stations in the affected areas reached 150 -300 mm per day. Figure 3.12-3 to Figure 3.12-8 present the records of daily rainfall (daily rainfall – 24 hour accumulated rainfall from 7:00 AM previous day to 7:00 AM reported day) of rainfall stations in the southern part of Viet Nam. Figure 3.12-9 presents the map of the location of rainfall stations, where records of daily accumulated rainfall were collected during the TS PODUL.

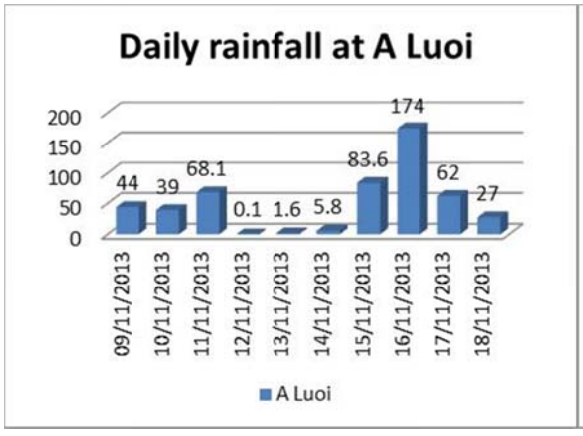


Figure 3.12-3 Daily rainfall (in mm) at A Luoi station.

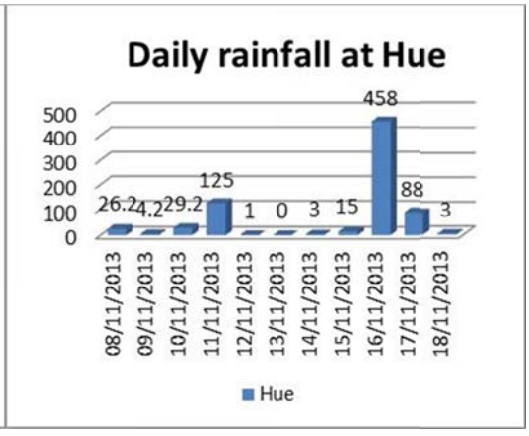


Figure 3.12-4` Daily rainfall (in mm) at Hue station.

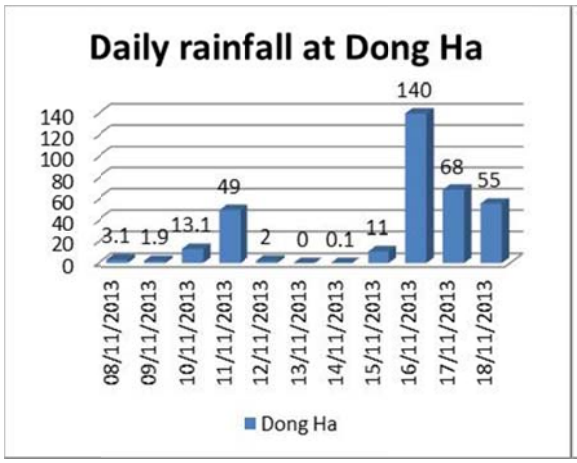


Figure 3.12-5 Daily rainfall (in mm) at Dong Ha station.

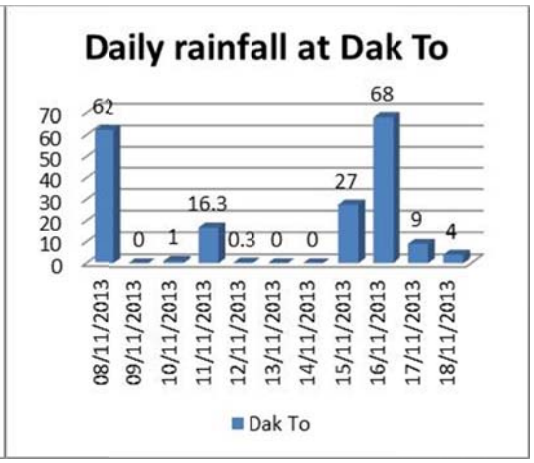


Figure 3.12-6 Daily rainfall (in mm) at Dak To station.

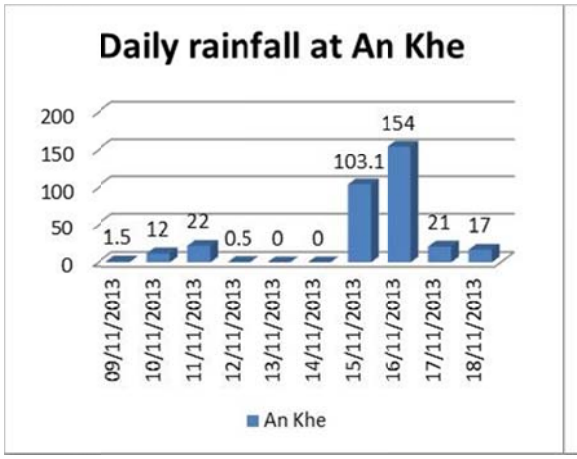


Figure 3.12-7 Daily rainfall (in mm) at An Khe station.

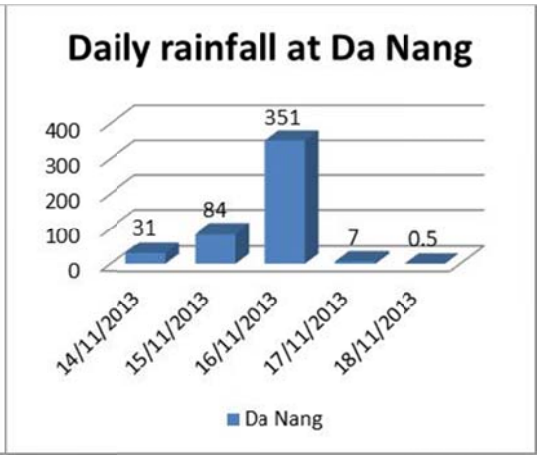


Figure 3.12-8 Daily rainfall (in mm) at Da Nang station.

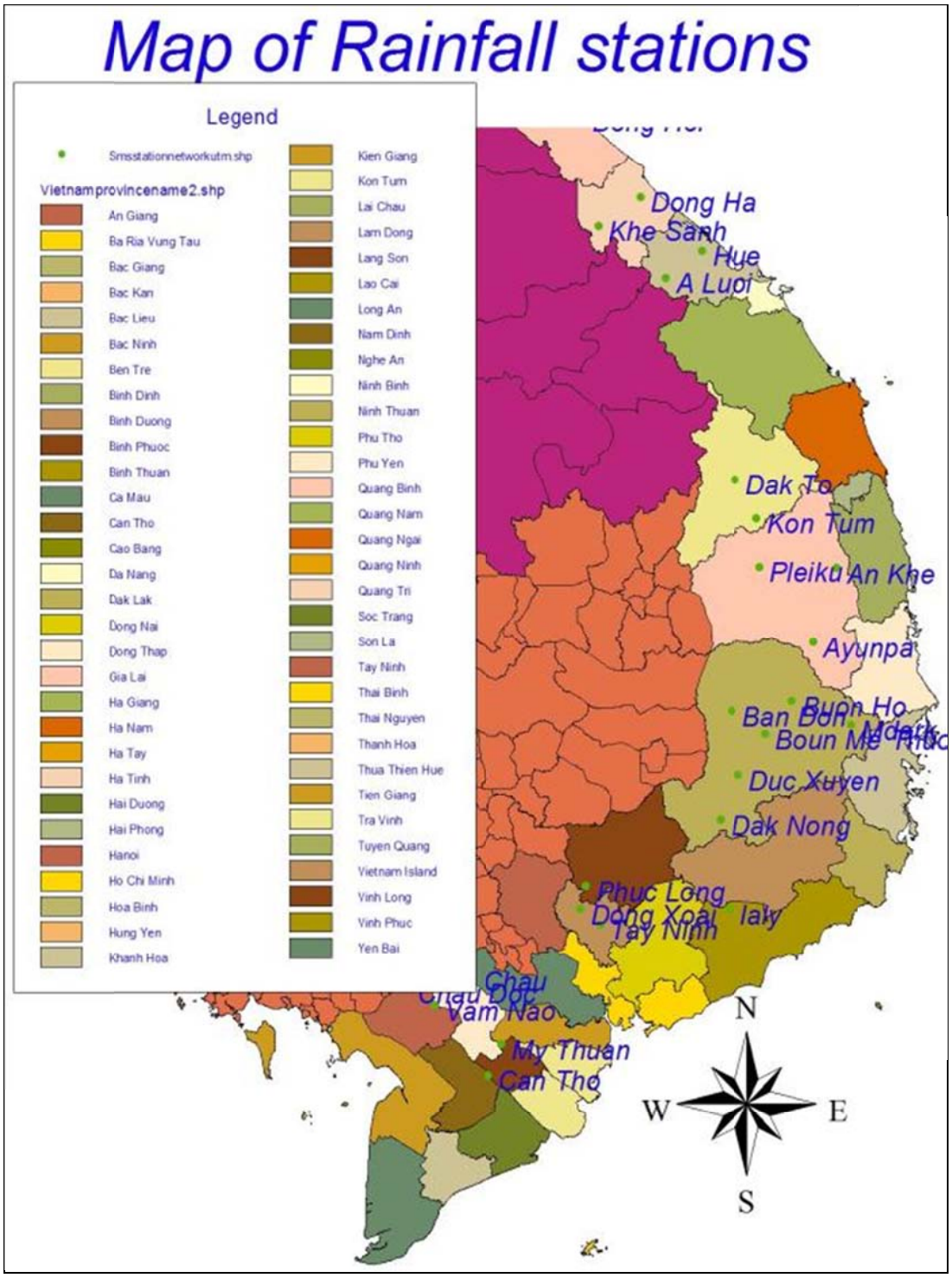


Figure 3.12-9 Map of location of rainfall stations, where rainfall data are used for analysis of impacts by TS PODUL.

3.12.3 Rising water levels in some tributaries of the Mekong River

TS PODUL caused heavy rainfall in some Mekong sub-catchments located in the southern part of Lao PDR and the central highland of Viet Nam, which lead to quickly rising water levels in some tributaries of Mekong sub-catchments, such as Se Kong, Se Sane, Sreprok, Xe Bang Hieng etc. For example at Sopnam station of Xe Bang Hieng river water levels rose from 04.00 m on 06 November 2013 at 10:30 AM to the peak level of 09.67 m at 09:00 AM

on 08 November 2013; at Veunkhen station of the Se Kong river water levels rose from 06.30 m on 07 November 2013 at 03:00 AM to the peak level at 11.56 m at 05:00 AM of 08 November 2013. Figure 3.12-10 to Figure 3.12-14 present the hydrograph at some hydrological stations of Mekong tributaries. Figure 3.12-15 present the map of water level stations, where recorded data were collected during the TS PODUL.

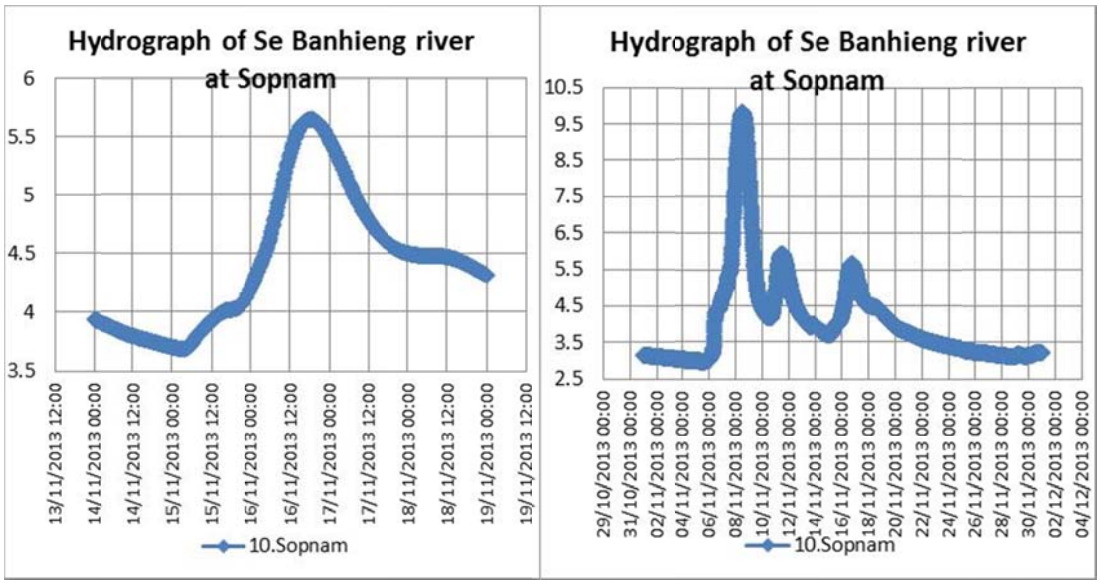


Figure 3.12-10 Hydrograph of Xe Bang Hieng river at Sopnam, where water levels rose from 04.00m on 15 November 2013 at 19:45 to the peak level at 05.6 m at 16:00 of 16 November 2013. This was the second highest peak level of November.

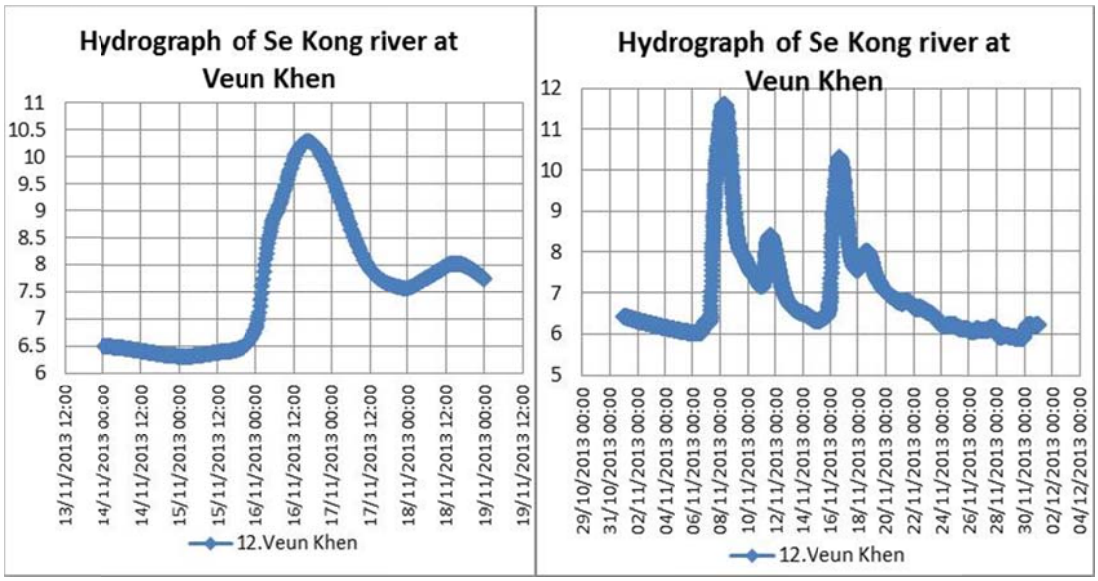


Figure 3.12-11 Hydrograph of Se Kong river at Veun Khen, where water levels rose from 06.56 m on 15 November 2013 at 21:00 to the peak level of 10.27 m at 15:30 of 16 November 2013. This was the second highest peak level of November.

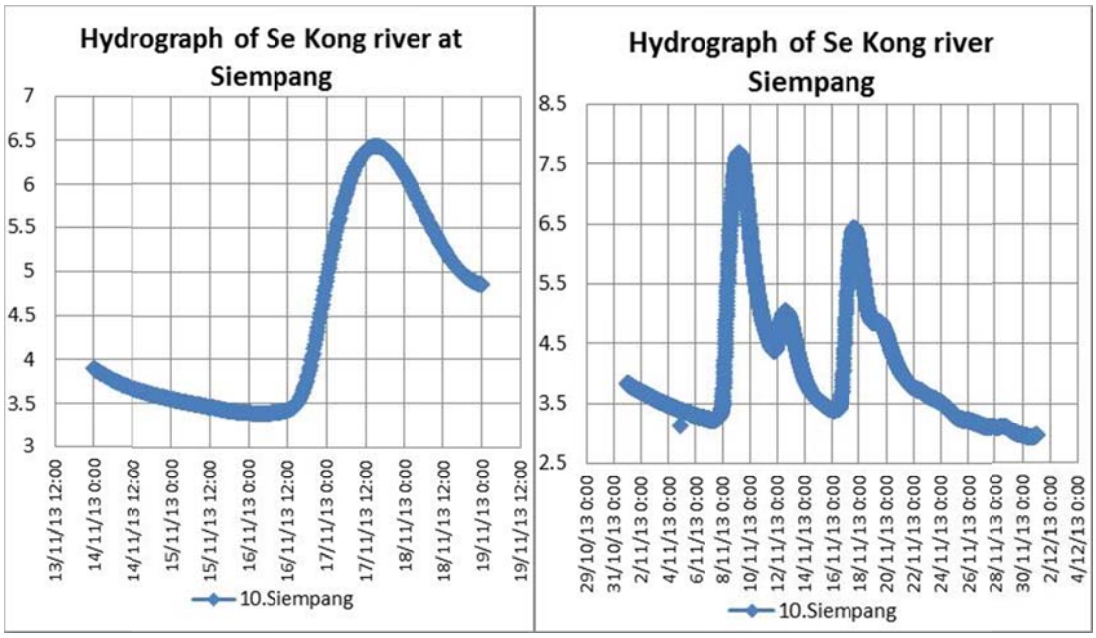


Figure 3.12-12 Hydrograph of Se Kong river at Siempang, where water levels rose from 03.45m on 16 November 2013 at 13:35 to the peak level of 06.43 m at 15:45 of 17 November 2013. This was the second highest peak level of November.

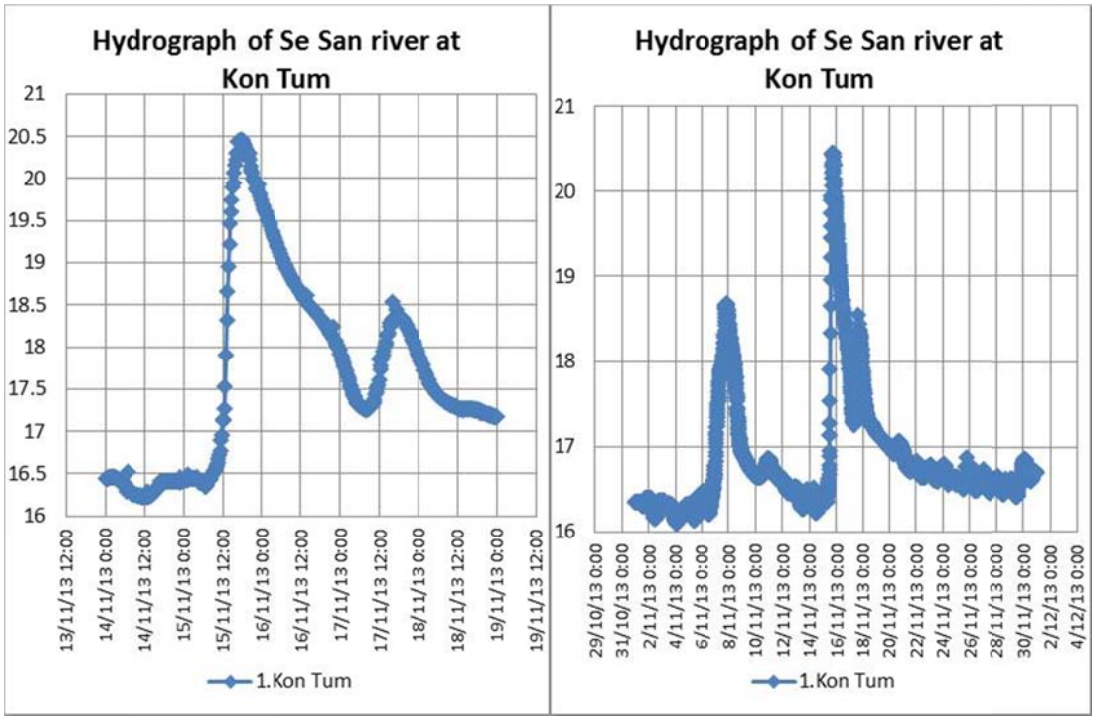


Figure 3.12-13 Hydrograph of Se San river at Kon Tum, where water levels rose from 16.56 m on 15 November 2013 at 09:45 to the peak level at 20.45 m at 17:30 of 15 November 2013. This was the highest peak level of November.

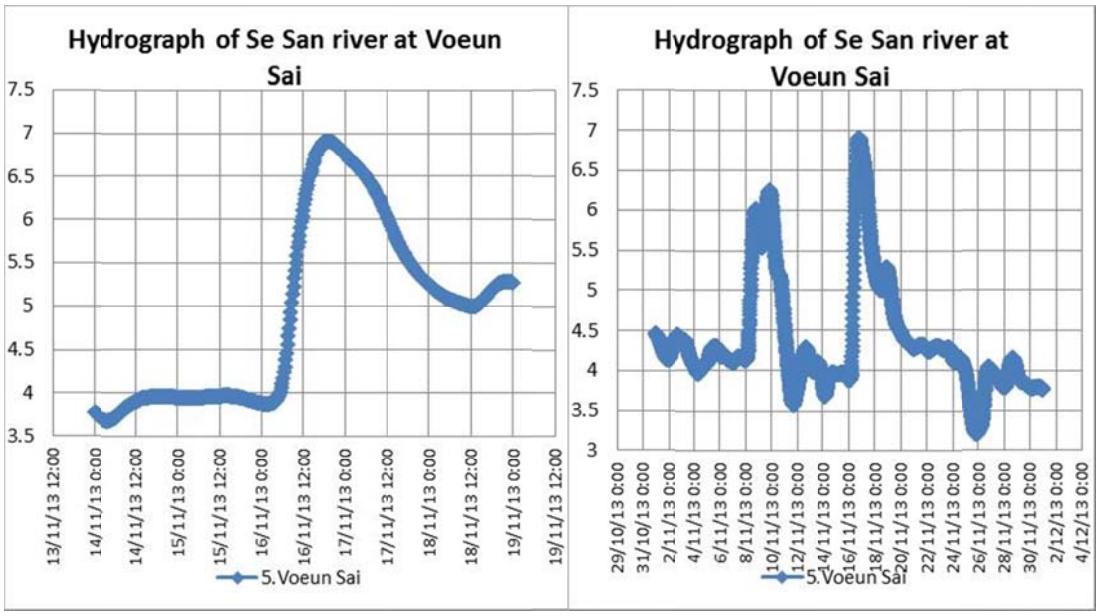


Figure 3.12-14 Hydrograph of Se San river at Voeun Sai, where water levels rose from 03.93m on 16 November 2013 at 04:30 to the peak level at 06.91 m at 19:00 of 16 November 2013. This was the highest peak level of November.

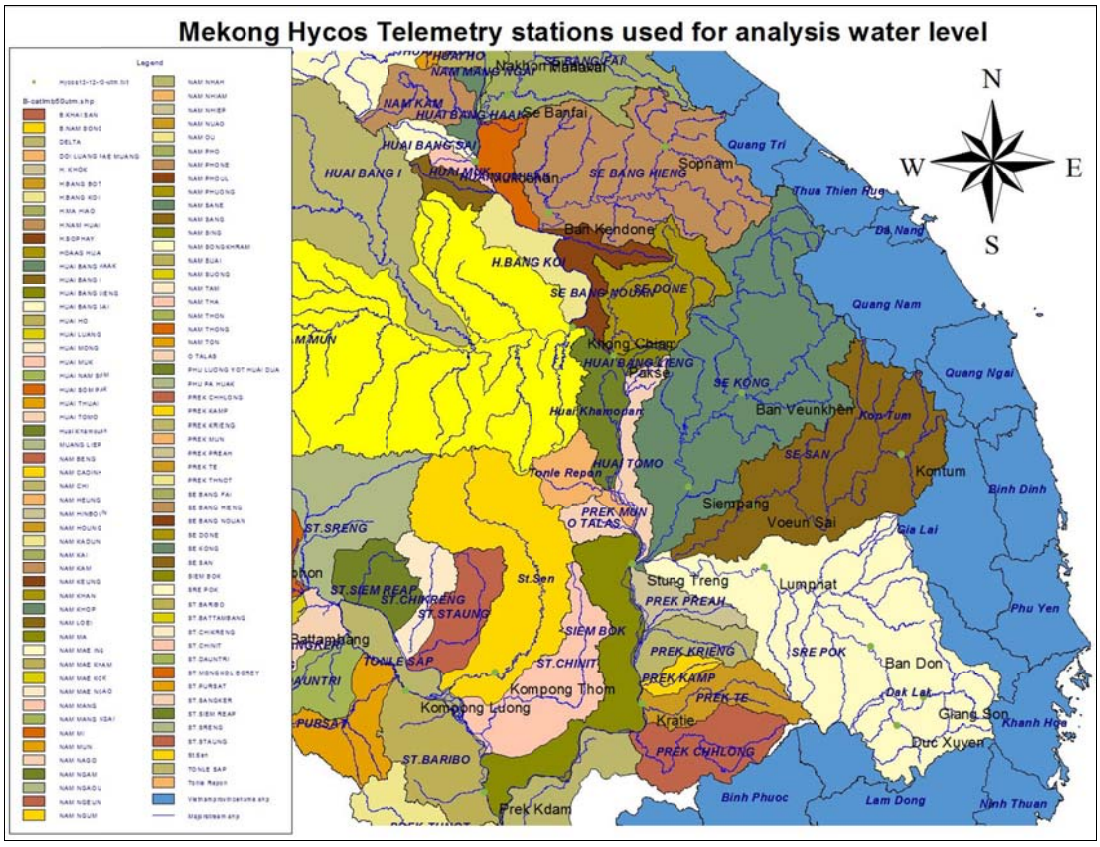


Figure 3.12-15 Map of location of Mekong Hycos telemetry stations that recorded water level data for the analysis of the impacts by TS PODUL to the flow regime in Mekong tributaries.

3.12.4 Flash floods caused by TS PODUL in the southern provinces of Viet Nam

On 15 November 2013 at 06:00 UTC (13:00 local time) the MRCFFG system detected that various districts in the southern provinces of Viet Nam, Quang Nam, Binh Dinh, Phu Yen, Khanh Hoa, Gia Lai, Dak Lak, Ninh Thuan, were at the risk of flash flood occurrences. In the morning of 16 November 2013 the flash flood risk areas were extended to other districts of the above mentioned provinces, and also to other districts of the Da Nang and Kon Tum provinces. Table 3.12-1 and Table 3.12-2 present the list of provinces and districts for which flash flood risks were detected by the MRCFFG system on 15 and 16 November 2013. Figure 3.12-16 presents the 3 hour flash flood risk areas in some districts of Viet Nam that were detected by the MRCFFG system on 15 November 2013 at 06:00 UTC. Figure 3.12-17 present the location of 3 hourly flash flood risk areas that were detected on 16 November 2013 at 00:00 UTC. The information regarding flash flood areas on 15 and 16 November 2013 was confirmed by the information published in the Vietnamese online newspaper "Nhan Dan", dated 16 November 2013 at 10:09 PM, and the Vietnamese newspaper "Viet Nam News", dated 17 November 2013 at 17:31. This information is presented in Annex 1.12 of this report.

Table 3.12-1 List of province and district that were detected by the MRCFFG on 15 November 2013 at 06:00 UTC.

Date of FFG products 15/11/2013 06:00 UTC time

1hour Flash Flood Guidance in Vietnam				**3hours Flash Flood Guidance in Vietnam**		
Provinces	Districts	FFG value		Provinces	Districts	FFG Value
Quang Nam	Dien Ban	23.99		Quang Nam	Dien Ban	30.46
Quang Nam	Duy Xuyen	23.99		Quang Nam	Duy Xuyen	30.46
Quang Nam	Que Son	23.99		Quang Nam	Que Son	30.46
Phu Yen	Tuy Hoa	16.9		Binh Dinh	Van Canh	48.01
Khanh Hoa	Van Ninh	16.9		Phu Yen	Dong Xuan	48.01
Khanh Hoa	Cam Ranh	19.34		Phu Yen	Tuy Hoa	29.13
Dak Lak	Dak Nong	19.19		Phu Yen	Song Hinh	34.72
Ninh Thuan	Ninh Son	19.34		Khanh Hoa	Van Ninh	29.13
Ninh Thuan	Ninh Hai	19.34		Khanh Hoa	Ninh Hoa	41.27
				Khanh Hoa	Cam Ranh	30.76
				Khanh Hoa	Khanh Son	44.78
				Gia Lai	KBang	47.27
				Gia Lai	Mang Yang	47.27
				Dak Lak	Dak Nong	25.45
				Ninh Thuan	Ninh Son	38.94
				Ninh Thuan	Ninh Hai	27.25

Table 3.12-2 List of provinces and districts where the MRCFFG detected on 16 November 2013 at 00:00 UTC

Date of FFG products 16/11/2013 00:00 UTC time

1hour Flash Flood Guidance in Vietnam				**3hours Flash Flood Guidance in Vietnam**		
Provinces	Districts	FFG value		Provinces	Districts	FFG Value
Da Nang	Hoa Vang	10.35		Da Nang	Hoa Vang	32.52
Quang Nam	Hien	10.35		Quang Nam	Hien	32.52
Quang Nam	Dai Loc	10.35		Quang Nam	Dai Loc	32.52
Quang Nam	Dien Ban	12.43		Quang Nam	Dien Ban	18.37
Quang Nam	Duy Xuyen	12.43		Quang Nam	Duy Xuyen	18.37
Quang Nam	Que Son	12.43		Quang Nam	Que Son	18.37
Quang Nam	Nui Thanh	22.48		Quang Nam	Nui Thanh	30.77
Quang Nam	Tra My	17.57		Quang Nam	Tra My	36.49
Quang Ngai	Binh Son	21.50		Quang Ngai	Binh Son	29.67
Quang Ngai	Tra Bong	20.19		Quang Ngai	Tra Bong	32.61
Quang Ngai	Son Ha	20.41		Quang Ngai	Son Tay	43.03
Quang Ngai	Tu Nghia	20.41		Quang Ngai	Son Ha	28.10
Quang Ngai	Nghia Hanh	20.41		Quang Ngai	Tu Nghia	28.10
Quang Ngai	Minh Long	20.41		Quang Ngai	Nghia Hanh	28.10
Phu Yen	Tuy Hoa	18.18		Quang Ngai	Minh Long	28.10
Khanh Hoa	Van Ninh	18.18		Phu Yen	Dong Xuan	42.34
Gia Lai	KBang	24.32		Phu Yen	Tuy Hoa	30.93
Gia Lai	Mang Yang	24.32		Phu Yen	Song Hinh	33.97
Dak Lak	Dak Nong	19.47		Khanh Hoa	TP. Nha Trang	44.57
				Khanh Hoa	Van Ninh	29.06
				Khanh Hoa	Ninh Hoa	33.26
				Khanh Hoa	Dien Khanh	44.57
				Khanh Hoa	Cam Ranh	41.00
				Khanh Hoa	Khanh Son	44.57
				Kon Tum	Kon Plong	39.22
				Gia Lai	KBang	34.91
				Gia Lai	Mang Yang	34.91
				Gia Lai	Kong Chro	48.18
				Gia Lai	Ayun Pa	42.34
				Gia Lai	Krong Pa	36.50
				Dak Lak	Dak Nong	25.75
				Ninh Thuan	Ninh Son	40.11
				Ninh Thuan	Ninh Hai	40.11

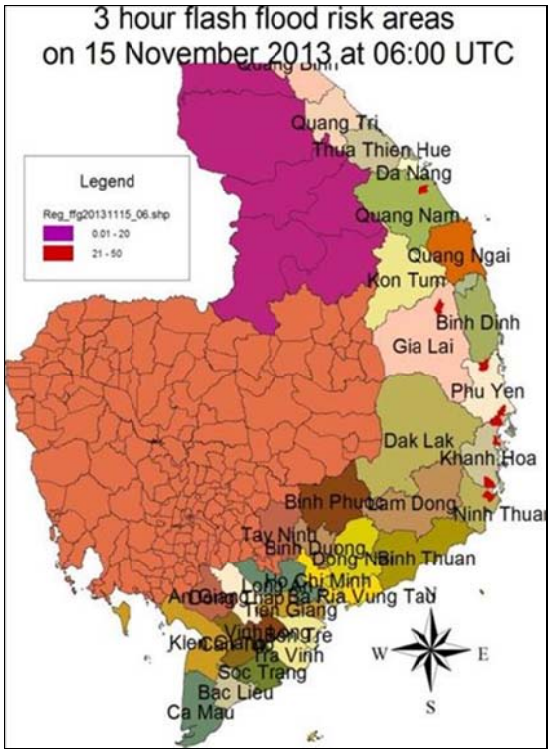


Figure 3.12-16 3 hourly flash flood risk areas at some districts of Viet Nam was detected by MRCFFG system on 15 November 2013 at 06:00 UTC.

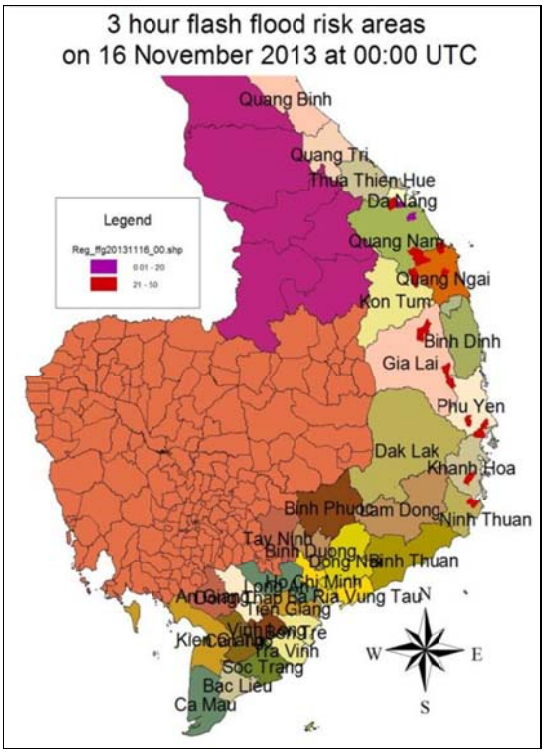


Figure 3.12-17 3 hourly flash flood risk areas detected by MRCFFG system on 16 November 2013 show that it extended to other districts of Southern provinces of Viet Nam.

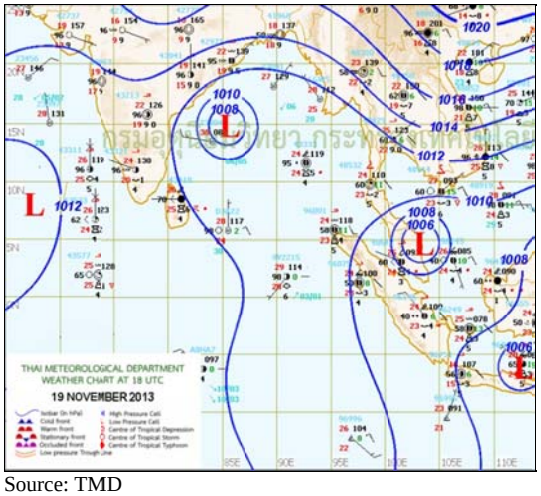
3.12.5 Conclusion

1. TS PODUL made the landfall on Friday 15 November 2013 at the coastal areas of the southern provinces of Viet Nam.
2. When PODUL weakened to a tropical depression, it was accompanied by heavy rain (100 - 350 mm per day) in many areas of provinces in the central and southern parts of Viet Nam.
3. On 15 November 2013 at 06:00 UTC (13:00 local time) the MRCFFG system detected that various districts in the southern provinces of Viet Nam (Quang Nam, Binh Dinh, Phu Yen, Khanh Hoa, Gia Lai, Dak Lak, Ninh Thuan) were at the risk of flash flood occurrences. Those flash flood risk areas did expand to other districts in the same provinces, but also to other provinces on 16 October 2013 at 00:00 UTC.
4. During the TS PODUL the MRCFFG system was able to detect the flash flood risk areas at some districts of Quang Nam, Binh Dinh, Phu Yen, Khanh Hoa, Gia Lai, Dak Lak, Ninh Thuan, Da Nang, Kon Tum at least 6 - 12 hours before flash floods occurred.

3.13 Flash floods in the southern provinces of Viet Nam and the southern provinces of Thailand in the period 22 - 23 November 2013

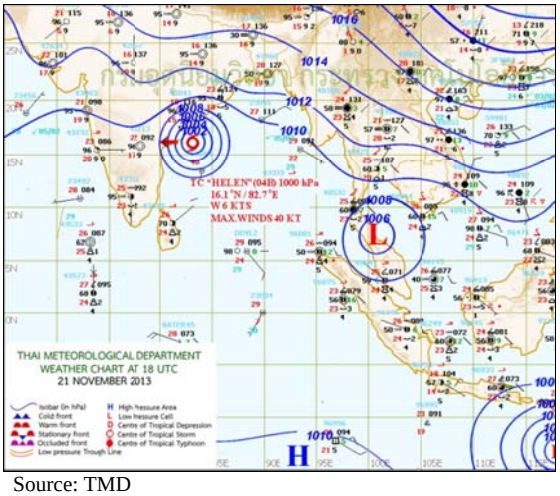
3.13.1 Weather condition during the last week of November 2013

During the last week of November 2013 the southern part of Lower Mekong Basin was covered by the low pressure cell that caused heavy rainfall in some areas of the southern provinces of Viet Nam and Thailand. Figure 3.13-1 and Figure 3.13-2 present the weather chart of the Mekong region during the period 19 -21 November 2013.



Source: TMD

Figure 3.13-1 Weather chart of Mekong region during 19 November 2013 at 18:00 UTC.



Source: TMD

Figure 3.13-2 Weather chart of Mekong region during 21 November 2013 at 18:00 UTC.

3.13.2 Rainfall during the period 20 - 21 November 2013

During the last week of November 2013, especially in the period 20 - 22 November 2013, heavy rainfall occurred in the southern part of Viet Nam and Thailand and caused serious flash floods in some districts of southern provinces of Viet Nam. These areas received heavy rain one week earlier (14 - 15 November 2013) during TS PODUL. Figure 3.13-3 and Figure 3.13-4 show hourly rainfall at 07:00 UTC of 20 November 2013 and at 18:00 UTC of 21 November that occurred in some provinces of southern part of Viet Nam and Thailand.

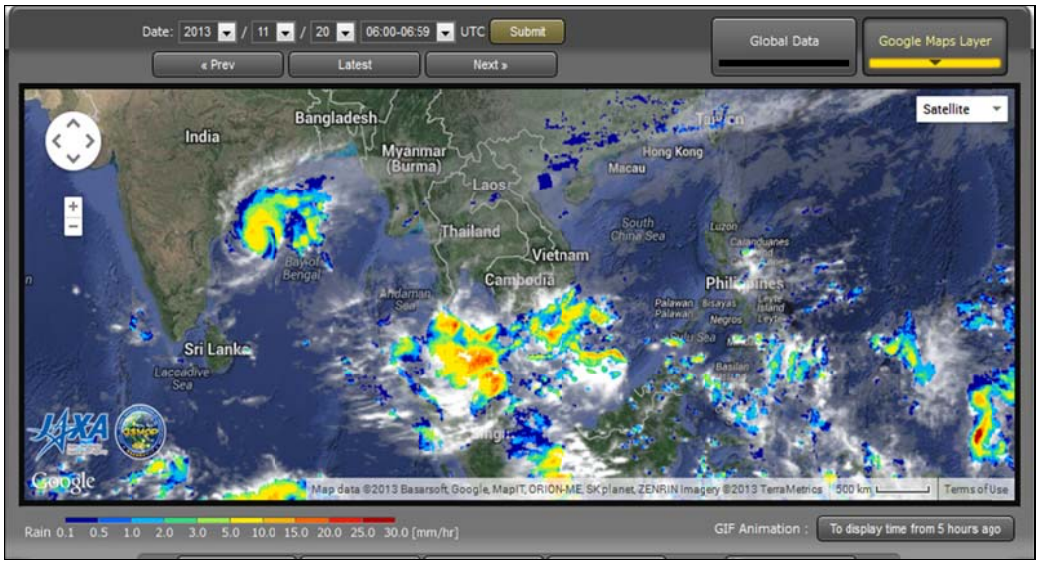


Figure 3.13-3 Hourly satellite rainfall at 07:00 UTC on 20 November 2013.

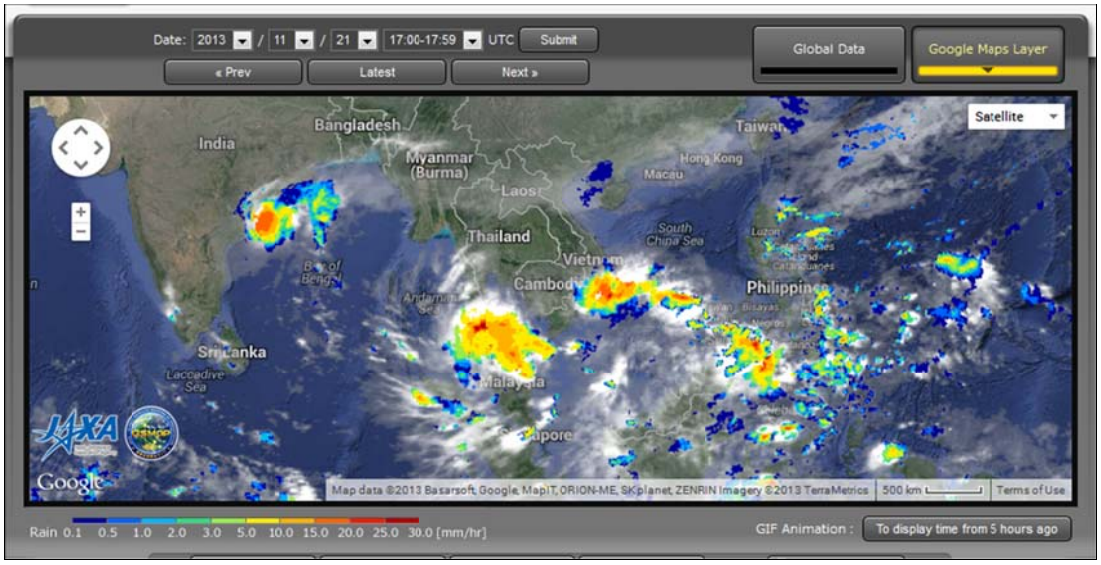


Figure 3.13-4 Hourly satellite rainfall at 18:00 UTC on 21 November 2013.

3.13.3 Flash floods in the southern province of Viet Nam (Phu Yen) on Friday 22 November 2013

Heavy rainfall occurred in areas of the central highland provinces of Viet Nam during 20 - 21 November 2013. In the morning of 22 November 2013 flash floods occurred in the Tay Hao district of Phu Yen province in central Viet Nam. Reference is made to the online newspaper "Viet Nam News", published on 26 November 2013. Annex 1.13 presents the article published by "Viet Nam News".

Unfortunately during the period from 21 November 2013 at 12:00 UTC to 22 November 2013 at 00:00 UTC the MRCFFG system did not properly detect the flash flood risk areas at the above mentioned province. The system detected tthat the Tay Hao district of PhuYen province was under the flash flood risk level 2 ("yellow" color scale). Figure 3.13-5 presents the 3 hour flash flood risk areas on 21 November 2013 at 12:00 UTC when the Tay Hao district of Phu Yen province is under the flash flood risk level 2 ("yellow" color scale).

Figure 3.13-6 presents 3 hour flash flood risk areas on 22 November 2013 at 00:00 UTC when the Tay Hao district of Phu Yen province was still under the flash flood risk level 2 ("yellow" color scale).

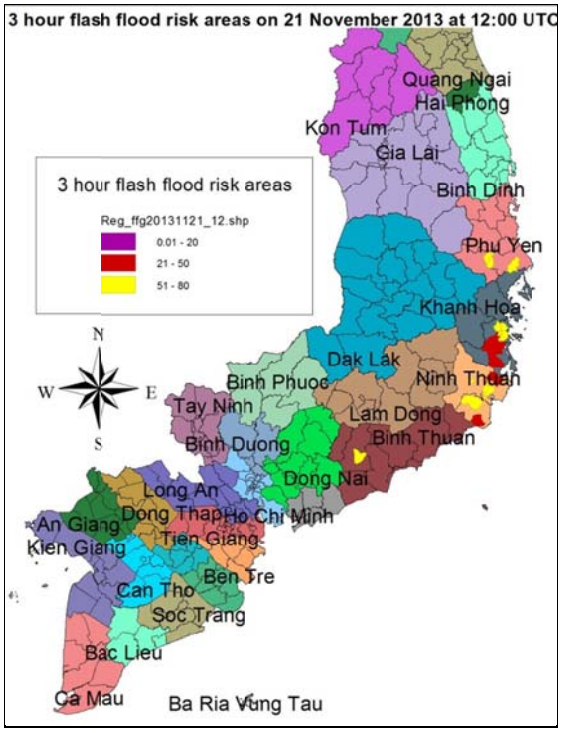


Figure 3.13-5 3 hour FFG on 21 November 2013 at 12:00 UTC (19:00 Local time).

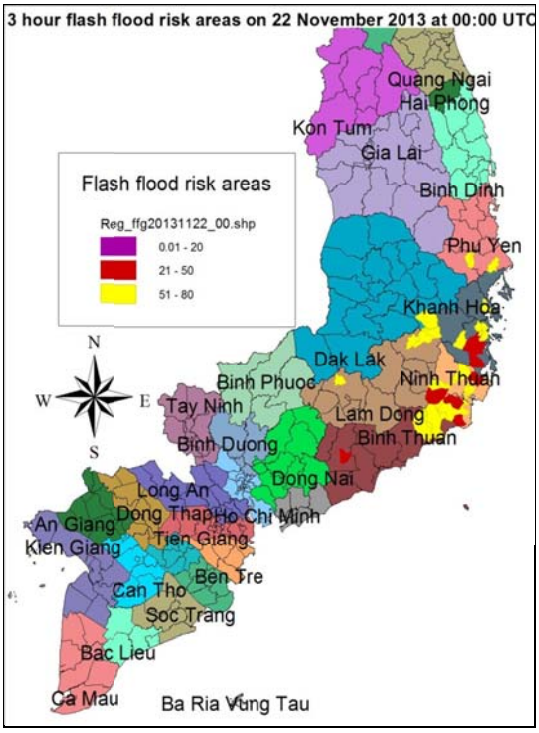


Figure 3.13-6 3 hour FFG on 22 November 2013 at 00:00 UTC (07:00 Local time).

Due to the absence of ground observation stations in the affected areas, the analysis of incorrect detection of MRCFFG system during this period is not possible.

3.13.4 Flash floods in the southern provinces of Thailand

Heavy rainfall occurred in the period 20 - 22 November 2013 in the southern part of Thailand, and caused damages in many districts of southern provinces of Thailand, such as Songkhla, Chumphon, Nakhorn Sithammarat, Surathani, Phatthaluong and Trang. According to the information from The Thai newspaper "The Nation", published on Sunday 24 November 2013 at 1:00 AM, flash floods occurred on Saturday 23 November 2013 in 5 districts of Chumphon province, 11 districts of Nakhorn Sithammarat province, 8 districts of Songkhla province, 5 districts of Trang province, some districts of Surat Thani and Phatthalung provinces. The information from newspaper "The Nation" is presented in Annex 1.13 of this report.

The 3 hour MRCFFG system detected on 22 November 2013 at 06:00 UTC that 32 districts of the 7 provinces were at risk of flash flood occurances. See Table 3.13-1 below. Figure 3.13-7 presents the 3 hour flash flood risk areas on 22 November 2013 at 00:00 UTC. All districts of Chumphon, Ranong, Nakhorn Sithammarat provinces were under the threat of flash flood risk level 1 and level 2 ("yellow" color scale). Figure 3.13-8 presents the 3 hour flash flood risk areas on 22 November 2013 at 06:00 UTC, when the flash flood risk areas were expanded to other districts.

Table 3.13-1 Flash flood risk areas level 1 (red color scale) detected by MRCFFG system at 00:00 UTC of 22 November 2013

Date of FFG products 22/11/2013 00:00 UTC time

1hour Flash Flood Guidance in Thailand				**3hour Flash Flood Guidance in Thailand**		
Provinces	Districts	FFG Value		Provinces	Districts	FFG Value
Chumphon	Phato	15.18		Thai Island		33.51
Nakhon Si Thammarat	Muang	20.92		Chumphon	Phato	30.25
Nakhon Si Thammarat	Sichon	14.37		Trang	Palian	47.17
Nakhon Si Thammarat	Tha Sala	21.66		Nakhon Si Thammarat	Muang	31.92
Nakhon Si Thammarat	Phi Pun	15.57		Nakhon Si Thammarat	Sichon	21.01
Nakhon Si Thammarat	Chawang	16.28		Nakhon Si Thammarat	Tha Sala	30.62
Nakhon Si Thammarat	Phromkhili	17.17		Nakhon Si Thammarat	Phi Pun	22.78
Nakhon Si Thammarat	Lan Saka	18.48		Nakhon Si Thammarat	Chawang	23.85
Nakhon Si Thammarat	Nabon	16.84		Nakhon Si Thammarat	Phromkhili	27.63
Nakhon Si Thammarat	Thung Song	16.84		Nakhon Si Thammarat	Lan Saka	29.15
Nakhon Si Thammarat	King Amphoe Phaphom	14.79		Nakhon Si Thammarat	Nabon	25.21
Nakhon Si Thammarat	King Amphoe Tha Sa La	15.23		Nakhon Si Thammarat	Thung Song	25.21
Nakhon Si Thammarat	King Amphoe Phaphom	20.17		Nakhon Si Thammarat	King Amphoe Phaphom	21.86
Ranong	Muang Ranong	15.92		Nakhon Si Thammarat	King Amphoe Tha Sa La	22.27
Ranong	La-un	15.18		Nakhon Si Thammarat	King Amphoe Phaphom	29.21
Ranong	Kapoe	8.72		Phangnga	Khura Buri	33.51
Surat Thani	Thachang	8.72		Phangnga	Thai Muang	49.56
Surat Thani	Bannasan	14.37		Phangnga	Takua Thung	49.56
				Phatthalung	Khao Chaison	47.17
				Phatthalung	Kong Ra	47.17
				Phatthalung	Tamot	47.17
				Ranong	Muang Ranong	26.24
				Ranong	La-un	30.25
				Ranong	Kapoe	13.44
				Ranong	Suk Samran	33.51
				Songkhla	Rattaphum	38.30
				Songkhla	Hat Yai	38.30
				Songkhla	Sadao	38.30
				Songkhla	Khlong Hoikhong	38.30
				Satun	Khuankalong	38.30
				Surat Thani	Chaiya	47.55
				Surat Thani	Thachang	32.83
				Surat Thani	Ban Takhun	35.51

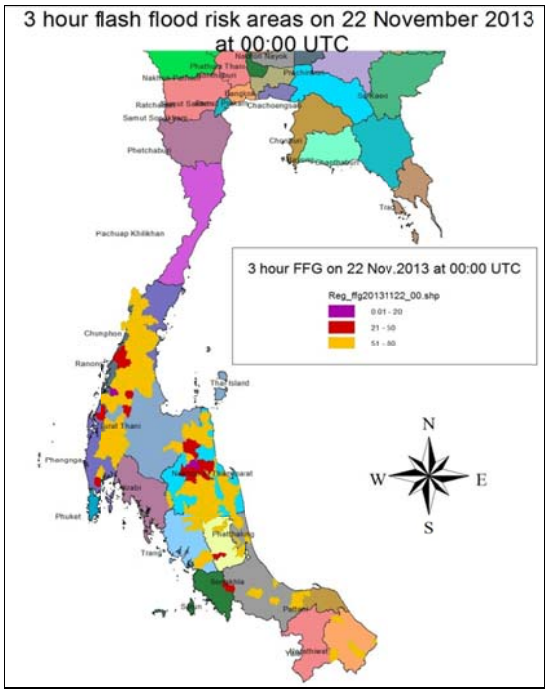


Figure 3.13-7 Present 3 hour flash flood risk areas on 22 November 2013 at 00:00 UTC.

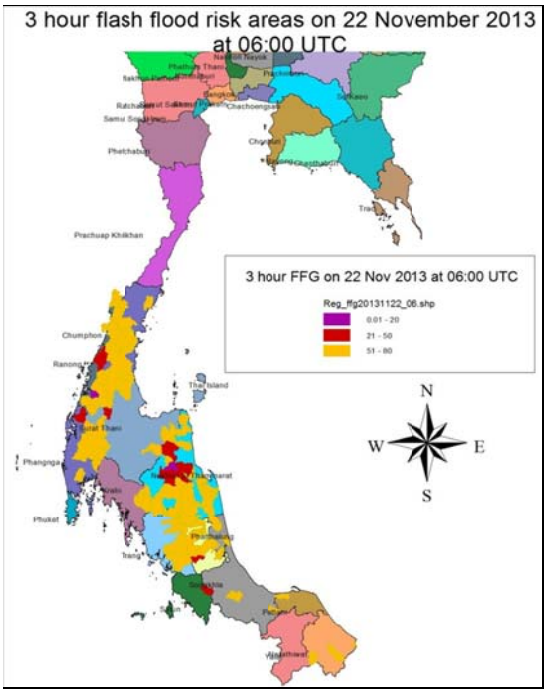


Figure 3.13-8 Present the 3 hour flash flood risk areas on 22 November 2013 at 06:00 UTC.

3.13.5 Conclusions

1. During the period 20 – 21 November 2013 heavy rainfall occurred in some areas in southern part of Viet Nam and in the southern part of Thailand.
2. Flash floods occurred on 22 November 2013 at Tay Hao district of Phu Yen province of Viet Nam. The MRCFFG unfortunately did not detect this. In sufficient detection by the MRCFFG system may be caused by underestimation of satellite rainfall and an inappropriate of Bias correction factor that is used to convert satellite rainfall to Mean Aerial Precipitation (MAP). This problem could be investigated in case rainfall data from the ground observation stations would be made available through the national line agencies (to make a comparison with the satellite rainfall from the Hydroestimator, while also some model parameters could be improved, such as bias correction factors for adjustment MAP product).
3. On 22 November 2013 at 00:00 UTC and at 06:00 UTC the MRCFFG system detected that many districts of 7 provinces in the southern part of the Thailand were at risk of flash flood occurances. This information has been confirmed by the Thai newspaper “The Nation“, published on 23 November 2013.

4. CONCLUSIONS AND RECOMMENDATIONS

The current report is the fourth evaluation report of the MRC Flash Flood Guidance (MRCFFG) system after 4 years of operation. Although this evaluation report does not cover all of the flash floods that occurred during the 2013 flood season (from 01 May to 30 November 2013), it is based on the available flash flood information that was collected from newspapers of the four riparian countries.

The alternative evaluation method is to compare the flash flood risk areas detected by the MRCFFG with changing water levels downstream of these areas, which have been used in this report. However these do not fully reflect the flash flood characteristics, because the available water levels and rainfall data in the operational database of the RFMMC are recorded once daily, while the flash floods mostly occur within a 6 hourly period.

Notwithstanding this, it can be concluded that the MRCFFG system during severe weather conditions in region, such as tropical storms, tropical depressions or ITCZ and low pressure, detected almost all flash flood risk areas in the Mekong region. There were only a few flash flood events that could not be detected by the system. Based on the experiences hitherto a number of recommendations are presented below, which are considered useful for further fine-tuning of the MRCFFG products during the 2014 flood season implementation:

4. Improvement of the Mean Aerial Precipitation (MAP) product by updating the bias correction factor for satellite rainfall (Hydroestimator) processing.
5. After updating the bias correction factor for satellite rainfall processing, the MRCFFG operator should rerun the FFG system and check the results with the available flash flood information.
6. To carry out an in-depth investigation of the flash flood event at Bantey Meanchey Province in order to fully understand why the MRCFFG system did not sufficiently detect the flash flood conditions in those areas on 05-06 October 2013 (the system did however detect “flash flood risk areas warning level 2”).
7. To carry out in-depth investigation of flash flood event during the TD THIRTY in order to fully understand why the MRCFFG system did not sufficiently detect the flash flood condition in some areas of Quang Dien and Houng Tra districts of Than Thieu Hue province of central Viet Nam.
8. Updating the GIS (provincial administration database). The current GIS information (provincial administrative database, villages, districts and provincial names) is collected from national line agencies in 2003. It may be concluded that this information does not reflect the present situation, as some countries in the region recently revised provincial boundaries.
9. According to the information from the newspaper, the flood has been occurred also for many districts under flash flood risk level 2 (“yellow” color scale), which detected by MRCFFG on 22 November 2013 at 06:00 UTC. It is recommended that MRCFFG operator should also provide the warning list for district, which are under the risk level 2 (“yellow” color scale).
10. It is recommended that the RFMMC cooperates with HRC to develop short-term forecast rainfall (6 to 12 hours), which is necessary to help the FFG operator improving the accuracies of FFG warning.

11. Strengthening the connection between the RFMMC and the National FFG operations for the region in order to receive additional information on areas where flash floods occurred. Such information will improve this present FFG evaluation report.
12. Conducting Refreshment Training Courses of FFG system operation in combination with the Annual Flash Flood Gathering with the purpose to improve the knowledge on FFG operation, to introduce the new tool for FFG operation, and to exchange the experiences between National Center's and RFMMC operators.
13. The RFMMC's MRCFFG operator should develop, in close cooperation with the GIS expert of IKMP, an additional tool for the identification of Mekong sub-catchments where flash floods occurred, as well as for the identification of the location of hydrological stations in those sub-catchments where rising water levels may have been recorded. If possible this tool should be connected "real time" with the FFG website.
14. Updating the MRCFFG information in the MRC webpage three times during daytime with 6 hourly intervals, at 07:00 AM, 01:00 PM and at 07:00 PM. During severe weather conditions such as tropical storms, tropical depressions, ITCZ etc. flash floods can occur at any time in any area of the LMB.

ANNEX 1 NEWSLETTER

Annex 1.1 "Viet Nam News" and "Vientiane Times" on Flash floods by TS BEBINCA

Road deaths prompt renewed safety call

HÀ NỘI — The PM called on authorities to take urgent measures to curb traffic accident following news that several collisions involving trucks and buses resulted in 15 deaths and more than 50 injuries during the first two weeks of this month.

The Prime Minister has also ordered local authorities to step up inspections of transport companies and driver training centres.

Localities in co-operation with traffic inspectors were asked to improve their databases on coach itinerary supervision to ensure drivers do not speed or drive when they are too tired.

The Ministry of Transport is responsible for making a quick review of legal regulations on operations of transport companies and requirements of issuing driving licences and supplementing legal conditions to settle all current loopholes that resulted in violations by these companies and their drivers.

The ministry is also entrusted to add more legal regulations on technical safety conditions and expired vehicle registrations.

Regarding management of loading capacity, random inspections, especially on key highways will be conducted. Meanwhile, construction of loading capacity checking stations will be boosted.

The Ministry of Public Security is responsible for holding regular patrols to prevent common violations such as speeding and drunk driving.

The ministry is also required to focus on investigating causes of recent traffic accidents to take the violators to the court.

The PM asked these two ministries and leaders of provincial-level People's Committees to manage inspections on their officials to detect whether they participate in covering up violations related to the operation of transport companies or driver training centres.

Leaders of localities were told to take responsibility for directing transport companies to conduct regular health checks for their drivers, especially coach and truck drivers. — VNS

One killed and two injured in Thái Nguyên

THÁI NGUYÊN — A collision between a bus and a motorbike on northern Thái Nguyên City's National Highway 37 yesterday killed one person and injured two others.

According to the initial investigation, the bus managed by Việt Vinh Trade and Tourism Company suddenly went out of control on the highway and collided head-on with the motorbike, which was traveling in the opposite way.

The bus then crashed in a nearby paddy field.

The 43-year-old driver of the motorbike died on the scene and two injured bus passengers were taken to the city's hospital.

The cause of the accident is under investigation. — VNS

Potato smugglers caught red-handed

LÂM ĐỒNG — Authorities in Đà Lạt City, Central Highland Lâm Đồng Province, have launched inspections in local markets after hundreds of sub-standard potatoes imported from China were found last weekend.

Inspectors uncovered two shops storing 30 tonnes of Chinese potatoes for sale at the Đà Lạt farm produce market in the city's Ward 11.

Workers at these stalls were caught literally red-handed, scraping dirt off the potatoes before coating them with Đà Lạt's distinctive red soil to disguise them as home-grown.

Chinese potatoes sell at VNĐ3,400 (US$0.16) per kilo while ones grown in Đà Lạt cost about VNĐ20,000 ($1).

Lao Động (Labour) newspaper quoted a local truck driver saying that a disguised kilo of Chinese potatoes would sell at VNĐ20,000 in wholesale and VNĐ35,000 ($1.7) at retail markets.

Inspectors have already taken five large samples of potatoes from markets, including two samples of Chinese potatoes. All were found to be safe, said Head of Lâm Đồng Plant Protection Department Lại Thế Hưng.

He reported that Chinese potatoes started being widely sold in the markets early last year as a result of higher local demand for potatoes.

"Đà Lạt potatoes have long been a favourite food of customers nationwide, so traders try to disguise Chinese potatoes as Đà Lạt-grown ones to sell them at markets across the country," he said.

Continued Page 4

Residents in the northern province of Hải Phòng's Tiên Lãng District deal with the aftermath of Typhoon Bebinca. An area of 44 hectare of crops and over two hectares of aquaculture farms were destroyed by the storm.—VNA/VNS Photo Hoàng Hùng-Quang Quyết

Floods remain a threat after Typhoon Bebinca

HÀ NỘI — People in northern and central provinces have been warned to be vigilant for flash floods and landslides following heavy rain brought by Typhoon Bebinca.

The National Centre for Hydro-Meteorological Forecasting said that while the typhoon had weakened, flood threats were still high.

Some districts saw a great amount of rain on Sunday, with the largest downpours in places such as the northern province of Nam Định's Vân Lý District with 130mm rainfall, as well as the central province of Nghệ An's Con Cuông and Đô Lương districts with 209mm and 319mm, respectively.

Two people are missing following floods in Nghệ An province.

The typhoon submerged more than 1,300ha of aquaculture ponds and resulted in the loss of a fishing ship and about 2,000ha of oysters in the northern province of Thái Bình.

Supervision on the operation of irrigation systems in the province has been strengthened to prevent more than 3,700ha of rice seedling from being waterlogged.

The northern mountainous province of Yên Bái has moved residents from areas at high risk of land slides, including Yên Bái City, Trấn Yên and Yên Bình districts.

Local rescue teams and authorities are on standby to respond quickly to any emergencies.

In the northern province of Ninh Bình, which saw 108-195mm of rain, more than 1,700ha of rice were submerged by yesterday afternoon. Out of 162 spillway dams in the province, 49 were opened.

All 106 fishing ships were safe thanks to good preparation and preventive measures.

The typhoon also caused a loss of VNĐ150 billion (US$7.1 million) for the northern province of Nam Định. There, seawater rose up to 2.5m on Sunday, submerging the Quất Lâm tourism area in the province's Giao Thủy District and the Thành Long tourism area in Hải Hậu District and damaging the sluice systems in both areas.

More than 1,500ha of aquaculture land were damaged by flooding and landslides. Across 150ha, many shrimp and fish died due to the environmental shock.

In the northern port city of Hải Phòng, the residential area in Nam Village, Phù Long Commune was flooded and completely destroyed. Additionally, a three-tonne ship was wrecked and nearly 100m of embankments and hundreds of metres of dike in Cát Hải District were damaged. — VNS

Work stops at hydro-plant after massive dam breach

HÀ NỘI — The State Department for Construction Quality Assessment under the Ministry of Construction has asked Gia Lai Province's People's Committee to re-assess the design of the Ia Krel 2 dam after a 40-metre breach appeared two weeks ago.

The Central Highlands province will take responsibility for checking the quality of the five-megawatt project.

If necessary, the left part of the dam will be removed to prevent negative impacts.

Construction would only recommence when the dam was re-checked and verified by relevant authorities and consultants, according to the department.

The ministries of Construction and Natural Resources and Environment have been investigating the cause of the breach.

According to the province, it was focusing on totalling up the losses of residents in Đức Cơ District which were initially reported at more than VNĐ3 billion (US$142,800).

The project's investor, the Bảo Long-Gia Lai Hydro-electricity Industry Company, has agreed to rebuild the houses that were damaged following the breach.

When the dam broke two weeks ago, 10 residents were swept away by the torrent, but escaped unharmed.

The Ia Krel 2 project started in 2009 and was expected to go into operation in the third quarter of this year.

A report from the Ministry of Industry and Trade showed that Central Highlands provinces had recently inspected hydro-electricity projects and shut down 33 of them. — VNS

Briefs

Workers to compete in world skills comp

HÀ NỘI — Vietnamese workers are to participate in the 42nd World Skills contest to begin tomorrow in Germany and end on July 8.

The competition involving 46 skills has attracted more than 1,000 contestants from 67 countries and regions.

Vietnamese workers will compete in six industries: transportation and logistics, construction and building technology, manufacturing and engineering technology, information and communication technology, social and personal services and creative arts and fashion.

The country's contestants, planned to number 13, were chosen for high-level training, based on their high results in the 9th ASEAN skills competition.

Việt Nam ranked 23th out 43 countries in the 41st World Skills held in London in 2011.

Upgrade work begins on National Highway 14

ĐẮK LẮK — The expansion and upgrading of Hồ Chí Minh route (National Highway 14), through the Central Highlands province of Đắk Lắk, started on Sunday.

The expansion covers 25km, with two lanes allowing speeds up to 80kph.

The project, worth VNĐ836 billion (US$39million), is expected to come into operation in early 2016.

Authorities bust cross-border drug ring

QUẢNG BÌNH — Border guards in the central province of Quảng Bình in collaboration with Lao police have busted a ring trafficking drug into Việt Nam.

Two Lao nationals were arrested at the provincial Cha Lo Border Gate on Friday with 3 kilos of methamphetamine worth VNĐ5 billion (US$238,000) in their car, announced as the largest-ever drug haul at the gate.

The border guards and police had spent 20 days following the suspects. — VNS

Date of FFG products 23/06/2013 06:00 UTC time

1hour Flash Flood Guidance in Vietnam		
Provinces	Districts	FFG value
Dak Lak	Dak R'Lap	22.7
Dak Lak	Dak Nong	22.7
Lam Dong	Bao Lam	22.7

3hours Flash Flood Guidance in Vietnam		
Provinces	Districts	FFG Value
Lao Cai	Bat Xat	45.61
Lao Cai	Sa Pa	38.81
Lao Cai	Than Uyen	32.46
Lai Chau	Phong Tho	45.46
Hoa Binh	Ky Son	40.39
Nghe An	Tuong Duong	37.30
Nghe An	Con Cuong	37.30
Ha Tinh	Huong Son	48.80
Kon Tum	Dak Glei	42.03
Kon Tum	Ngoc Hoi	38.72
Kon Tum	Sa Thay	38.05
Gia Lai	Chu Pah	38.41
Gia Lai	Ia Grai	34.92
Dak Lak	Dak R'Lap	31.35
Dak Lak	Dak Nong	32.88
Lam Dong	Bao Lam	32.72
Binh Phuoc	Bu Dang	33.84
Binh Thuan	Ham Thuan Nam	38.45
Binh Thuan	Tanh Linh	38.45

Home news

Secondary school students sit final exams

Phaisythong Chandara

Students in their last year of secondary school began their all important final exams on Tuesday, with more than 45,000 students lining up for the tests, though some were absent due to the ongoing outbreak of dengue fever.

It is a tense time for those who are sitting the exams, with their results set to determine the direction of their future studies.

The exams, which run until Friday, cover eight subjects. On Tuesday, students took literature tests in the morning and biology in the afternoon. Yesterday, their knowledge of physics and geography was scrutinised, while today they will sit exams in chemistry and social science.

On the last day of the exams tomorrow they will be tested in mathematics and history, following which they will have an anxious wait ahead of the results being announced in mid-July.

The science subjects have multiple choice answers, while the other subjects require written responses.

For those unfortunate students who were struck down with dengue fever, alternative arrangements will have to be made. Some students in Borikhamxay province may not be able to complete their exams either, after a flash flood warning was issued for some areas recently.

Deputy Director General of the Secondary Education Department of the Ministry of Education and Sports, Dr Sisouk Vongvichit, told *Vientiane Times* yesterday that new tests will have to be written for those students who missed the exams, to make it fair for all concerned.

Meanwhile, strict measures are being enforced to ensure the integrity of the examinations underway, to ensure that the most diligent and conscientious students are those who actually get the best scores, and that there is no cheating by students who hadn't prepared as well as they should have.

Dr Sisouk, who is in charge of the exams, said the tests would serve to help the ministry assess the quality of teaching and learning standards across the nation.

"It is important that students are honest and do not cheat because the exams will help them to continue their studies at college or university in the future," she said.

"So far we have not seen any students using calculators, mobile phones or other devices during the exams."

Dr Sisouk encouraged all adjudicators to ensure that no communication devices entered the examination rooms and compromised the testing process.

More than 8,200 students are sitting the exams in Vientiane.

One student at Salakham Secondary School in Hadxaifong district, Ms Singkham Chansy, said she would do her best and hoped to get a high score.

"I'm a bit nervous and I think the exams will be quite difficult, especially maths and physics, but I hope to do my best so that I can continue my education," Ms Singkham said.

Teachers at Vientiane Secondary School look on as final year students sit an exam yesterday.

Information, culture and ... FROM PAGE 1

Mr Asang, who is also a Politburo member, said media outlets should provide the public with more information on science and technology so they could use modern methods to boost productivity and improve their living standards.

The media should also encourage young people to preserve the traditional Lao culture and lifestyle, he said.

Mr Asang advised the information sector to train up good quality officials by encouraging them to study overseas to acquire more experience.

He also said it was extremely important to ensure that villages what this means.

Mr Asang also paid tribute to those involved in bringing the award for World's Best Tourist Destination to Laos for 2013 from the European Council on Tourism and Trade. But he said the tourism sector shouldn't get carried away with its success because it will be difficult to retain the award next year. He said officials must work extra hard if they want to win it a second time.

"We need to review and evaluate our tourism programme to make it workable and sustainable. We have to identify the best places for visitors to stay and eat, and then improve them so that people receive a warm tourism resource, it will bring more tourists to Laos and locals will benefit from it," he added.

On the same occasion, Minister of Information, Culture and Tourism Prof. Dr Bosengkham Vongdara reported on achievements following on from the 9th Party Congress and, in particular, work accomplished during the current five year socio-economic development plan.

His report noted that since 2010 the information sector has expanded through both print and electronic media. Traditional culture has been promoted and preserved and is keeping the country's history and traditions alive for future generations.

Clean water reaches rural people in Oudomxay

Times Reporters

Residents of Mokkhokang village in Pakbaeng district, Oudomxay province, now have clean water for their daily use after a new gravity fed water system was installed in the area.

The construction of the new system was supported by the USA's Lao Rehabilitation Foundation at a cost of over 169.7 million kip.

A handover ceremony for the new water system was held in the village last week after construction of the facility began in February and took one month to complete.

Attending the ceremony was the President of the Lao Rehabilitation Foundation Dr Luc Janssens, the district authority's officer Mr Kethsana Sabanhuck, local villagers and other guests.

The village is located in a rural part of the district and is home to more than 650 people in 117 families. Most of them are farmers and gardeners.

In the past these villagers lacked latrines and clean water and have had to use unsafe water, which often led to disease.

To address the issue, officials from the provincial Health Department led by Dr Bounlian Vongpasith teamed up with the district authority's officers and local people to build the new water system.

Mr Kethsana Sabanhuck (right) presents a certificate of merit to Dr Luc Janssens in recognition of his contribution to the construction of the new gravity fed water system.

Speaking at the ceremony, Dr Bounlian said the new water supply meant women and children would no longer have to carry water over long distances.

"This new water system also means the basic health of people in the village will improve step by step, especially among mothers with young babies," he said.

"Clean water is a very important part of human life, especially for the people here who have not had access to clean water before. People are able to avoid common illnesses such as coughs, colds and diarrhoea if they can use clean water."

Dr Bounlian said the water supply would also help local people with crop farming and animal rearing.

"Despite the district authorities receiving financial support to build the plant, they plan to seek funding from NGOs and other donors to build additional water systems in other villages nearby," Mr Kethsana said.

The National Growth and Poverty Eradication Strategy, under which all development programmes are implemented, has identified clean water and improved sanitation as one of four priorities.

Flooding likely to cause rice shortage in Borikhamxay

Times Reporters

Many families in Borikhan district, Borikhamxay province, may experience a shortage of rice in the coming months after their rice stores were damaged by recent flash flooding.

Heavy rain last weekend caused the Nam Xan river to rise rapidly. It broke its banks in many places, flooding houses and rice barns and inundating croplands.

Some livestock were also swept away in several villages of the district, according to the provincial disaster management office.

More than 1,500 families were affected by the flooding but the authorities have yet to estimate the cost of the damages, because access remains difficult in some areas and they are awaiting information from district officials.

The flooding peaked at around 3am on Monday, with the floodwaters beginning to recede on Tuesday, but some families with houses in low lying areas are still isolated.

Many families are now cleaning the silt from their houses but no assistance has been forthcoming for the affected villagers as yet, provincial disaster management authorities reported yesterday.

Numerous roads and tracks remain underwater, making travel and transport difficult. The new road linking Pakxan district, the capital of Borikhamxay province, to Xieng Khuang was closed on Monday after a landslide blocked the road in Borikhan district.

The landslide is about one kilometre from the urban centre of Borikhan, according to a report from the provincial route management section Deputy Head, Mr Chanthaboum Mokhasombath.

Many buses and other travellers using the road had to wait all day Monday at the site of the landslide before the provincial public works and transport department finally cleared the soil from the road, which opened to traffic on Tuesday morning.

"However, people who are using this route to travel between Borikhamxay and Xieng Khuang provinces may still experience difficulties and delays because, although the soil was cleared, further subsidence may see the road blocked again," Mr Chanthaboun said.

"We are stopping work every hour to allow traffic to pass. Ongoing rainfall is causing us problems but we are working as hard as possible to ensure the road stays open," he assured motorists.

Rain will continue to fall across the country this week, with heavy rains forecast for some areas and isolated showers and drizzle for others, according to the Meteorology and Hydrology Department.

This year, the rains arrived in early May, slightly earlier than the average annual onset in the middle of the month, Head of the Weather Forecasting and Aeronautical Meteorology Division, Mr Vandy Duangmala, reported.

Rainfall has been persistent since last weekend, with some parts of the country experiencing heavy downpours and localised flooding.

Date of FFG produc 23/06/2013 12:00 UTC time

1hour Flash Flood Guidance in Lao				3hour Flash Flood Guidance in Lao			
Provinces	Districts	Villages	FFG Value	Provinces	Districts	Villages	FFG Value
Xiengkhuang	Khoune	SIBOUNHEUANG	23.29	Xiengkhuang	Khoune	SIBOUNHEUANG	31.25
Xiengkhuang	Khoune	NONG	23.29	Xiengkhuang	Khoune	NONG	31.25
Xiengkhuang	Khoune	TAN NEUA	23.29	Xiengkhuang	Khoune	TAN NEUA	31.25
Xiengkhuang	Khoune	TAN TAI	23.29	Xiengkhuang	Khoune	TAN TAI	31.25
Xiengkhuang	Khoune	PIENG	23.29	Xiengkhuang	Khoune	PIENG	31.25
Xiengkhuang	Khoune	PHAKHING	23.29	Xiengkhuang	Khoune	PHAKHING	31.25
Xiengkhuang	Khoune	POUNG	23.29	Xiengkhuang	Khoune	POUNG	31.25
Xiengkhuang	Khoune	BOUA TAI	23.29	Xiengkhuang	Khoune	BOUA TAI	31.25
Xiengkhuang	Khoune	NA PA SAD	23.29	Xiengkhuang	Khoune	NA PA SAD	31.25
Xiengkhuang	Khoune	KEK	23.29	Xiengkhuang	Khoune	KEK	31.25
Xiengkhuang	Khoune	KANG	23.29	Xiengkhuang	Khoune	KANG	31.25
Xiengkhuang	Morkmay	THAMNONG	18.58	Xiengkhuang	Morkmay	THAMNONG	25.69
Xiengkhuang	Morkmay	THAMHIA	18.58	Xiengkhuang	Morkmay	THAMHIA	25.69
Xiengkhuang	Morkmay	THAM MAI	18.58	Xiengkhuang	Morkmay	THAM MAI	25.69
Xiengkhuang	Morkmay	SAMCHAE	18.58	Xiengkhuang	Morkmay	SAMCHAE	25.69
Xiengkhuang	Morkmay	NONG-OR	18.58	Xiengkhuang	Morkmay	NONG-OR	25.69
Bolikhamxay	Pakkading	NAMDEUA	18.34	Xiengkhuang	Morkmay	NAMHONG	40.5
Bolikhamxay	Pakkading	NAKHEUA NOK	18.34	Xiengkhuang	Morkmay	NAMOUANG	40.5
Bolikhamxay	Pakkading	NAKHEUA NAY	18.34	Xiengkhuang	Morkmay	MAI(LAOLOUM)	40.5
Bolikhamxay	Pakkading	NAHIN	18.34	Xiengkhuang	Morkmay	PHOULOM	40.5
Bolikhamxay	Pakkading	THONGHURB	18.34	Xiengkhuang	Morkmay	NATHEU	40.5
Bolikhamxay	Pakkading	NABOY	18.34	Xiengkhuang	Morkmay	NAMYEUN	40.5
Bolikhamxay	Pakkading	NAMKHOU	21.9	Xiengkhuang	Morkmay	KHANGVIENG	40.5
Bolikhamxay	Pakkading	THONGNAMI	21.9	Bolikhamxay	Pakkading	NAMDEUA	25.81
Bolikhamxay	Khamkheut	NAHANG	19.64	Bolikhamxay	Pakkading	NAKHEUA NOK	25.81
Bolikhamxay	Khamkheut	NAHAY	19.64	Bolikhamxay	Pakkading	NAKHEUA NAY	25.81
Bolikhamxay	Khamkheut	NAMOUANG	19.64	Bolikhamxay	Pakkading	NAHIN	25.81
Bolikhamxay	Viengthon	SOBSOR	15.23	Bolikhamxay	Pakkading	THONGHURB	25.81
Bolikhamxay	Viengthon	PHADAENG	15.23	Bolikhamxay	Pakkading	NABOY	25.81
Bolikhamxay	Viengthon	NATIK	22.25	Bolikhamxay	Pakkading	NAMKHOU	31.25
Bolikhamxay	Viengthon	PHAPHIENG	22.25	Bolikhamxay	Pakkading	THONGNAMI	31.25
Bolikhamxay	Viengthon	NONGBUA(NONG	15.23	Bolikhamxay	Khamkheut	PHONKHAM	45.25
Bolikhamxay	Viengthon	VANGPENE	15.23	Bolikhamxay	Khamkheut	NAHANG	28.21
Khammuane	Hinboon	PHON THONG	16.85	Bolikhamxay	Khamkheut	NAHAY	28.21
Khammuane	Hinboon	KHOUN NGEUN	16.85	Bolikhamxay	Khamkheut	NAKADOK	45.25
Khammuane	Hinboon	KHOUN KHAM	16.85	Bolikhamxay	Khamkheut	NATHORN	45.25
Khammuane	Hinboon	NAM SA NAM	16.85	Bolikhamxay	Khamkheut	NAMOUANG	28.21
Khammuane	Hinboon	THAM TAME	16.85	Bolikhamxay	Khamkheut	NAPHOUANG	45.25
Khammuane	Hinboon	NA KHAM	16.85	Bolikhamxay	Viengthon	XIENGMAEN	40.39
Khammuane	Hinboon	VANG TA KHONG	16.85	Bolikhamxay	Viengthon	KOKKIENG	40.39
Champasak	Pathoomph	NAMPHAAK	24.78	Bolikhamxay	Viengthon	NAXUANG	40.39
Xaysomboun Spe	Xaysombou	PHOUHUAXANG	17.64	Bolikhamxay	Viengthon	SOBSOR	21.72
Xaysomboun Spe	Xaysombou	NAMCHIA	17.64	Bolikhamxay	Viengthon	PHADAENG	21.72
Xaysomboun Spe	Xaysombou	KHIXANG	17.64	Bolikhamxay	Viengthon	NATIK	30.97
Xaysomboun Spe	Xaysombou	NONGXANG	17.64	Bolikhamxay	Viengthon	PHAPHIENG	30.97
Xaysomboun Spe	Xaysombou	TIABALE	17.64	Bolikhamxay	Viengthon	NONGBUA(NONGL	21.72
Xaysomboun Spe	Xaysombou	NONGNADI	17.64	Bolikhamxay	Viengthon	VANGPENE	21.72
Xaysomboun Spe	Xaysombou	THONGKHOUN	17.64	Khammuane	Hinboon	PHON THONG	24.77
Xaysomboun Spe	Xaysombou	MAI	17.64	Khammuane	Hinboon	KHOUN NGEUN	24.77
Xaysomboun Spe	Xaysombou	NAKHOUN	17.27	Khammuane	Hinboon	KHOUN KHAM	24.77
Xaysomboun Spe	Thathom	PHONXAI	23.91	Khammuane	Hinboon	NAM SA NAM	24.77
Xaysomboun Spe	Hom	VIENGKEO	20.09	Khammuane	Hinboon	THAM TAME	24.77
				Khammuane	Hinboon	NA KHAM	24.77
				Khammuane	Hinboon	VANG TA KHONG	24.77
				Khammuane	Bualapha	NA PHAO	41.02
				Khammuane	Bualapha	NONG BOUA	41.02

Annex 1.2 "Vietnam People Army News" on Flash floods by TS RUMBIA

PEOPLE'S ARMY NEWSPAPER ONLINE
ORGAN OF THE MILITARY CENTRAL COMMISSION AND VIETNAMESE MINISTRY OF NATIONAL DEFENSE
THE VOICE OF THE ARMED FORCES AND PEOPLE

Northern provinces hit by floods, rains

QĐND - Thursday, July 04, 2013, 20:48 (GMT+7)

Print

Heavy rains and floods as consequences from Rumbia, the third tropical storm of the year heading to Vietnam, have claimed one life and caused property damage to three northern provinces of Dien Bien, Ha Giang and Thai Nguyen.

In the hardest-hit Dien Bien province, one people was killed and three others injured during landslides caused by rains, while property damage was initially estimated up to 11 billion VND, according to local authorities.

Vu Van Duc, Vice Chairman of Tuan Giao district's People's Committee, said that the flood on July 2 was the biggest in almost five decades. Local officials have directed the emergency forces to inspect high risk locations and move 50 households in dangerous areas to safe shelters.

Meanwhile, thousands of ethnic people in Ban May village, Ha Giang province's Hoang Su Phi district, have been isolated after a steel-reinforced concrete bridge was swept away following three days of heavy rains. Many roads in the province have been blocked due to landslides.

The provincial steering board for flood and storm control has asked rescue teams to immediately carry out measures to overcome consequences of the natural disaster.

Thai Nguyen province has also been struck by heavy rain which is reported to have been the biggest so far this year, said the provincial hydrometeorology forecast centre.

Several main roads in the locality, especially in Thai Nguyen city, have been submerged, leading to difficulties in transportation for local people, especially students who struggled to find their ways to register for the national university entrance exams.

More rains are forecast to continue until July 4 in Thai Nguyen, said the centre.

Source: VNA

1442/GP - BTTTT 15-10-2009

Editor-in-Chief: Lieutenant General LE PHUC NGUYEN

Deputies Editor-in-Chief: Major General HO ANH THANG, Colonel PHAM VAN HUAN, Colonel HA MANH TUONG, Colonel NGUYEN KIM TON

Annex1.3 "Vietnam Plus" and "Viet Nam News" on flash floods from ITCZ on 19 - 20 July 2013

Northern region asked to act against storm

20/07/2013 | 18:27:00

Illustrative image (Source: VNA)

The Central Steering Committee for Flood and Storm Control issued an urgent notice on July 19 requesting all northern mountainous and north-central regions to brace themselves against an upcoming tropical low pressure system.

The committee has asked local ministries to monitor vessels which are about to set sail and continually notify ship owners about the movement of the low pressure, making it easier for them to avoid the danger zone.

Coastal provinces are responsible for stopping ships from going out to sea when the low pressure conditions get stronger.

All northern and central mountainous provinces need to examine reservoirs and take preventive measures at areas prone to flooding and landslides. Search and rescue forces must also be at the ready.

According to the National Centre for Hydro-Meteorology Forecasting, the epicentre of the low pressure system was 220km northeast of central Ha Tinh and Quang Tri provinces by 4pm on July 20.

On July 20, the committee reported that flooding in northern mountainous provinces killed a child and left two others missing in Dien Bien and Thai Nguyen.

It also damaged many houses, inundated crops and submerged streets.-VNA

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Việt Nam News

THE NATIONAL ENGLISH LANGUAGE DAILY

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TODAY'S WEATHER
Hà Nội: ..... rainy. 26-32°C
Hải Phòng: ..... rainy. 25-29°C
Đà Nẵng: ..... rainy. 25-33°C
HCM City: ..... rainy. 25-30°C

Chairman starts visits to S Korea, Myanmar

HÀ NỘI — Chairman of the National Assembly Nguyễn Sinh Hùng left Hà Nội yesterday for a three-day official visit to South Korea at the invitation of its National Assembly Speaker Kang Chang-hee.

South Korea is one of Việt Nam's most important economic partners, ranking fourth (after Japan, Taiwan and Singapore) out of 96 countries and territories investing in Việt Nam.

Investors from the country are carrying out more...

Continued Page 4

PM Abe wins big in Japan upper house poll

TOKYO — Voters handed Prime Minister Shinzo Abe athumping victory in upper house elections yesterday, exit polls showed, likelyushering in a new period of stability for politically volatile Japan.

The projected victory means both chambers will be under government control, unblocking the bottleneck that has hampered legislation for the last six short-term premiers.

That will strengthen Abe's hand as he tries to push...

Continued Page 10

Deputy PMs pay visits to mark War Invalids and Martyrs' Day

BẮC GIANG — Deputy Prime Ministers Nguyễn Xuân Phúc and Nguyễn Thiện Nhân on Saturday made separate visits to families of war invalids and martyrs in Bắc Giang and Lâm Đồng provinces on the occasion of War Invalids and Martyrs' Day (July 27).

Speaking to war invalids living at the Lang Giang care centre, Phúc said the Party and State always kept in miad the great contributions of war martyrs and invalids during the national construction and defence.

He praised the centre staff for their efforts to take good care of the war invalids and commended the provincial Party Committee and authorities for their measures to improve the material and spiritual lives of war invalids and those who had made contributions to the nation.

Deputy Prime Minister Nguyễn Xuân Phúc (right) visits invalids at the Lang Giang Invalids Care Centre in Bắc Giang Province on Saturday. — VNA/VNS Photo Anh Tuấn

Phúc also visited Heroic Mother Nguyễn Thị Kính, whose husband and only son laid down their lives for the country, in Dĩnh Trì commune.

Continued Page 2

Heavy rain causes deadly landslides

NORTHERN REGION — At least one child and two other people were missing in Điện Biên and Thái Nguyên provinces after flashfloods and landslide ravaged northern mountainous areas over the weekend due to heavy rains.

In Lào Cai Province, the rain affected most areas yesterday with up to 107mm falling in Bảo Yên District.

Local authorities have warned that heavy rains could still continue in Lào Cai Province over the next few days. Damage has not been estimated but most of the rice crops were inundated and landslides also caused obstructions on national and provincial highways.

Local authorities helped people move to safe areas and warned residents not to pick up wood and trash in floodwaters due to rising water levels of the Chảy River and Cốc Ly Hydropower Plant reservoir.

In Hà Giang, landslides, flash floods and heavy rains caused crop and property damage of up to VNĐ16 billion (US$762,000).

Heavy rain caused one house in Đồng Văn District to...

Continued Page 4

Heavy rain caused landslides and traffic jams in Sìn Hồ District, Lai Châu Province. At least one child and two other people are missing in Điện Biên and Thái Nguyên provinces after flashfloods and landslides ravaged northern mountainous areas over the weekend. — VNA/VNS Photo Quang Duy

Annex1.4 "Vietnam Plus", "Thanh Nien" and "Vientiane Times" on Flash floods from ITCZ 28 - 29 July 2013

Print

Floods, landslides blight northern Vietnam

29/07/2013 | 11:14:00

Heavy rain causes flooding in the northern mountainous province of Dien Bien (Source: VNA)

Many provinces in northern Vietnam are suffering from flooding and landslides caused by prolonged heavy rain and are working to deal with the situation.

In Lao Cai province, on July 28, a 37-year-old man was swept away by a flood while trying to cross a stream in Liem Phu commune, Van Ban district, according to the local authority. His body was retrieved the same day by local residents.

In Quang Ninh province, prolonged rain for over two days created landslides around the dams in Ha Long city, causing local houses to collapse. As a result, many households had to be urgently evacuated to safer places.

According to the Ha Long city People's Committee, dozens of households were more or less affected by the landslides caused by the heavy rain. Among them, four households were seriously affected and one home completely collapsed.

In Son La province, many roads have been inundated by flooding, causing serious congestion.

One part of the National Highway 6 passing through Chieng Mung commune in Mai Son district, in particular, was completely submerged by water, creating traffic backups of nearly one kilometre that lasted for over two hours.

In response, the local authorities intervened by redirecting traffic along a new route.

Landslides have also blocked the way on three other roads in the province and causing heavy traffic congestion.

Damages from the flood and landslides in Son La are so far unknown, but the crops of many local households were reported to be seriously damaged.

Tuyen Quang province has been also considerably affected by the prolonged heavy rain.

In particular, the rain has broken the dams surrounding the Hoang Tan Reservoir in Ninh Lai commune, Son Duong district, causing damage to dozens of hectares of crops and plants grown by the locals and killing thousands of poultry.

Local authorities in affected provinces are still working to deal with the consequences of flooding and landslide and prevent further damages.-VNA

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Rains, floods kill 6 in northern Vietnam

Last Updated: Wednesday, July 31, 2013 02:30:00

People wade through a flooded road in Yen Bai Province. Photo by Duc Toan

At least six people were killed and six others injured in floods caused by torrential rains in the northern highlands before a low-pressure zone causing the rains intensified into a typhoon Wednesday.

Two of those killed were in Son La Province and the others from Dien Bien, Thai Nguyen, Yen Bai, and Lao Cai.

Quang Thuy Dung, 33, of Yen Bai was swept away, while the other victims' identities and cause of death are not known.

Local authorities said the trough, packing winds of 39-49 kilometers per hour, also caused thousands of hectares of crops to be flooded.

It was first spotted off the central coast Monday night, but has been moving toward the northern mountains after strengthening into Typhoon Jebi, the year's fifth storm over the East Sea.

Local authorities have been ordered to move people out of vulnerable places.

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By Bui Tran – Phan Hau, Thanh Nien News

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Vientiane Times
The First National English Language Newspaper
TUESDAY JULY 30, 2013 ISSUE 176 4500 kip

Oudomxay station construction to begin this year

Times Reporters

Laos and Vietnam have confirmed construction on a transmission station for Lao National Television and Radio in Oudomxay province will begin this year after ensuring the project would be of a high quality.

Relevant officials from the two countries made the joint announcement at a meeting held in Vientiane yesterday, attended by Lao Deputy Minister of Information, Culture and Tourism, Mr Savankhone Razmountry, and Vietnam Television (VTV) Deputy Director General, Mr Tran Dung Trinh.

The project follows an agreement made at a meeting in Vientiane last year between the Lao-Vietnamese Cooperation Commission and other officials from the two countries.

The station in Oudomxay will be one of several radio and television stations across the country built with funding support from the Vietnamese government, including two in Luang Prabang and Champassak provinces already operational.

At yesterday's meeting, Lao officials recommended the station be constructed with a good design and equipped with modern digital technology able to transmit at least eight channels or frequencies at the same time.

Mr Pineprathana Phanthamaly (*right*) and Mr Dang Truong sign the minutes of meeting.

Mr Savankhone suggested both sides review the successes and shortcomings in the construction of the two already-completed stations to ensure the Oudomxay station is of the highest possible quality.

He called for strict inspections to be carried out regularly throughout the design and construction of the facility, and said lessons should be learnt from the irregular monitoring of the previous two stations, which lead to unsatisfactory results in both timeliness and quality.

Mr Savankhone said he wanted the project to be an outstanding outcome for cooperation between the two countries as per the desires of the two nations' highest leaders.

Lao-Vietnamese Cooperation Commission Office Head, Mr Viengsavanh Vilayphone, suggested the involvement of a consultancy company to ensure the project's quality.

Mr Tran Dung Trinh promised the project would be implemented in the same way as an investment project would be in Vietnam. He suggested both sides work closely together to discuss every detail of the works.

He asked the Lao side move quickly to decide on the standard equipment for the project to save time for construction, and committed to completing the project in a timely manner, ensuring effectiveness and efficiency.

CONTINUED PAGE 2

Universities expect to see enrolment numbers jump

Times Reporters

Five state universities are expected to offer more places for successful applicants to study bachelor-degree courses to fulfill growing demand amid closure of the courses in state and private colleges.

An increase of secondary school leavers this year, which saw 44,171 graduates and up by 5.28 percent compared to a year before, contributed to the rising demand, according to officials from the Ministry of Education and Sports.

Apparently, entrance applicants will face tough competition for courses in the universities after the ministry announcement recently, which prohibited both private and state colleges from opening new positions for bachelor and higher-level courses next academic year.

Only the five state universities are allowed to admit new students at bachelor and higher level-courses but state and private colleges will be allowed after 2015 as part of its improvement scheme, however existing students will be allowed to continue in state and private colleges as normal.

"However, the precise figure which the five universities will take in for the coming academic year 'is still being finalised," Deputy Director General of the ministry's Planning and Cooperation Department, Mr Amphavanh Kouangmanivanh said yesterday.

"It is expected the five universities will accept more students. The figure is being considered and it should be made available by next week," he told the *Vientiane Times*.

Amid high demand for bachelor's course enrolment, the National University of Laos estimates it will receive as many as 20,000 application forms, which is a significant increase compared to last year's 13,239 forms, according to Vientiane Mai Newspaper, citing the university's Technical Office Head Associate Professor Dr Khamphong Nammavongsay.

He added the university entrance exam will take place on August 28-29 with six subjects selected that applicants will be required to pass. The subjects are mathematics, physics, chemistry, geography, history and Lao literature.

Deputy Minister of Education and Sports Dr Kongsy Sengmany said recently that the temporary ban on new

CONTINUED PAGE 2

Flash flooding hampers heavy vehicle movement in Borikhamxay

Phonesavanh Sangsomboun

Heavy vehicle crossings on the Namthone Bridge on the No.13 South Road have been temporarily suspended after heavy rains caused landslides and flash flooding in Borikhamxay province over the weekend.

The Department of Public Works and Transport said the landslide along the bridge that links the southern provinces to Borikhamxay and Vientiane posed a risk to its structure, and heavy vehicles would not be able to use the bridge until further notice.

Empty buses are allowed to cross the bridge if passengers disembark and walk over to the opposite side in order to avoid too much strain from excessive weight.

The landslide and flooding occurred after heavy rain began early on Sunday and continued throughout the day.

Floodwaters created difficulties for those who use the No.13 South Road, one of the country's main economic corridors, forcing commuters to take another route.

Many areas along the road in Borikhamxay experienced heavy rain, particularly the Km 20 junction road, where flood levels reached about 1.2m, cutting off transport and affecting housing and rice paddies.

The flood impacted about one kilometre of road and delayed a number of buses.

Health official Mr Xang, who was due to travel with his team to Saravan province on Sunday, told *Vientiane Times* the flood forced his team to return to Borikhamxay for the night before they could set off again the next morning.

"Luckily, we decided to move back quickly after the water began to the rise. Many cars were waiting in a long line to travel to the south and some got stuck there. If we didn't retreat in our car we would have been caught in the middle of the flood, like one bus," he said.

Road conditions returned to normal yesterday, while low-lying areas with houses and rice paddies remain under threat from flooding.

According to some residents, flood levels were higher than what was officially recorded. Villagers explained the flood flash was higher than the record for the area.

They have been told to remain alert, with rain continuing to fall and floodwaters not yet totally receded.

Residents living in the low-lying areas around the Xebangfai River in Khammuan province have also been put on notice of possible rising water levels.

The weather bureau has warned drivers to check up-to-date information on current conditions before making the journey on the Road No.13 South.

The Km 20 junction road in Borikhamxay province was one of the most flood-affected areas on Sunday. --*Photo Nakhonephet Vorasan*

Annex 1.5 "Vietnam Plus", "VNA" and "Vientiane Times" on Flash floods from TS JEBI

Vietnam

Print

Storm Jebi hits northern, central localities

03/08/2013 | 18:53:31

Strong tropical storm Jebi hit Vietnam's mainland on August 3, bringing intense rain and strong gales that have grounded flights and caused damages to many northern and central localities.

The fifth tropical storm to hit Vietnam this year, Jebi made landfall in Mong Cai city, the northern province of Quang Ninh at 9 a.m, packing whirlwind and heavy rain that have blown down two 42-metre telecommunications masts and 10 power poles, and unroofed a school and 212 houses.

Strong winds also made four houses collapse, injuring one person. No death was reported so far in the province.

The storm has isolated Cat Hai island district in the northern port city of Hai Phong , causing a power cut in the area at 11:30 a.m. on August 3.

However, all residents have been moved to safe places with prepared food, drinks and necessary commodities.

The storm has forced the national flag carrier Vietnam Airlines to cancel 44 domestic and international flights on August 3, including all flights to and from the hard-hit city of Hai Phong .

The Committee for Flood Prevention and Control of all levels has closely directed people and vessels in affected localities to evacuate to safe shelters in order to minimise losses.

Earlier on August 2, Jebi landed in south China's Hainan province, grounding flights and halting maritime traffic.-VNA

News

Storm Jebi kills three in Hoa Binh province

05/08/2013 09:45 (GMT + 7)

Print

Storm Jebi has killed three in Hoa Binh and injured four others in Quang Ninh and Bac Giang when it swept through these northern provinces.

The storm also battered hundreds of houses, submerged thousands of hectares of rice and vegetable crops and damaged major infrastructural facilities in the provinces and other northern localities.

According to the Offices of the Steering Committee for Flood and Storm Prevention and Control and the National Committee on Search and Rescue, the storm cost Quang Ninh province an economic damage of around 10 billion VND.

In Hoa Binh province, torrential rains that came as a follow-up of Jebi, submerged around 500 houses in Hoa Binh city.

In Bac Giang province, 1,500 ha of rice and vegetables were inundated and 10 metres of Duong Duc embankment, Lang Giang district were broken.

Bac Ninh province reported damage of 745 hectares of subsidiary crops while Lang Son province said 105 houses had roofs blown up.

According to the National Centre for Hydro-meteorological Forecast, water levels on the rivers in the north are rising strongly, which would come together with floods.

The Steering Committee for Flood and Storm Prevention and Control has asked northern and midland provinces to continue keeping an eye on changing weather patterns to take prompt prevention activities.

VNA/VNP

Vientiane Times

Tuesday August 6, 2013 | Home news | 3

New economic zone under consideration

Times Reporters

A new specific economic zone (SEZ) in 4,500 hectares in Pakkading district of Borikhamxay province will be developed soon to attract investors and speed up economic growth once it is approved by the government.

At present, many investors both locally and from neighbouring countries have come to see the location and review the plans and have expressed a desire to open businesses there, but the provincial authorities have not yet been able to give approval as they are waiting for confirmation from the government.

This information was confirmed yesterday by the provincial Planning and Investment Department Deputy Director, Mr Bounthanh Vongsana, saying "the area will become the hub of a transport link between Thailand and Vietnam once it is developed."

"Developing the zone is part of our national socio-economic growth after creating more options for investors to do business in the province with better facilities and incentives," Mr Bounthanh said.

The SEZ is 90 km from the provincial capital and is located at the three junctions of Viengkham village. Most of the area is state owned and Thailand.

In order to prepare for the development of the SEZ, Mr Bounthanh, who is in charge of this work, told *Vientiane Times* that the authorities have worked to develop basic infrastructure, especially by improving road access and water supplies as well as installing electricity delivery systems.

Mr Bounthanh said the authorities would build a warehouse, hotel, resort, park, healthcare centres and other facilities to attract investment.

"Construction of another friendship bridge across the Mekong River to Thailand and building a detour to ease traffic congestion is part of the development plan," he said.

In addition, the construction of a check-point and port at Thasa-ard village funded by locally-based Heuangsy Development and Construction Company at a cost of over 40 billion kip is now complete, according to a department report.

Mr Bounthanh said these two new facilities are now opened twice a week for providing transportation services between local people of the two countries, adding "I strongly believe that the SEZ will contribute directly to socio-economic growth in the province, especially through helping unemployed young locals to get jobs."

Flood leaves families hungry in Borikhomaxay

Phonesavanh Sangsomboun

Borikhomaxay province residents have faced unsafe drinking water and food shortages since the area was slammed by flash flooding last weekend, with damage costs estimated at about 28 billion kip.

Residents and authorities described the disaster as they most devastating they have seen in Pakkading district's Khonesong and Namthone villages, where families lost cattle and faced damage to rice paddies, houses and wells.

More than 50 people were affected by the flooding and landslides which occurred from last Sunday to Tuesday, bringing masses of sand from the river and burying agricultural areas and rice fields in the vicinity.

The landslide also hit the Namthone Bridge, a vital economic corridor which has since been reopened but is still undergoing repairs.

Long-term residents said last week they encountered several disasters in the villages in the past, but none as serious as this.

Floodwaters rapidly came up to local houses and left a thick layer of sand in their wake.

Provincial disaster management office head, Mr Soukan Chiengsavang, said authorities were facing difficulties in recovery in the area, particularly because of food shortages and damages to water wells.

"A lack of modern equipment makes it hard for us to ensure the water from the wells is hygienic enough to drink and use," he said.

"We have told the villagers to be patient and share the food that they have until they receive assistance."

The office estimates damages from the disaster to cost about 28 billion kip, and workers are still looking for a way to remove the sand which now coats the village and surrounding farmlands.

"We urgently need to handle the sand and we anticipate that a large amount of money will be used in a survey before the clean up," Mr Soukan said.

Authorities are also on the lookout for more than 60 cattle missing after the flood.

Namthone village Deputy Head, Mr Khamsing Lormany, said while normally villagers were not affected by such natural disasters, some families were already struggling to find enough food to eat day to day.

He said the devastation following the flood had made villagers' lives even worse.

Namthone resident, Ms Khen Somsavath, said she lost household equipment and some poultry in the unexpected flood.

"Moreover, half of my rice paddy has been badly damaged," she said. "Every year I have sufficient rice to feed my family, but this year I think I will face a rice shortage."

Ms Khen has lived in Namthone her entire life, and said this was the most destructive natural disaster she had ever faced.

Sand poured into villages in Borikhomaxay province during the flood, damaging farming land and rice paddies.

Annex 1.6 "Viet Nam News", "Bangkok Post" and "Vientiane Time" on Flash flood from TS "MANHGKHUT"

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TODAY'S WEATHER
Hà Nội: ..... rainy, 23-29°C
Hải Phòng: ..... rainy, 22-29°C
Đà Nẵng: ..... cloudy, 25-35°C
HCM City: ..... rainy, 24-33°C

Culture agencies to imbue people with national identity

HÀ NỘI — The culture sector and other agencies should make the best of the market economy to build an advanced culture deeply imbued with national identity and traditions, Prime Minister Nguyễn Tấn Dũng said.

He was speaking at a meeting in Hà Nội yesterday to review 15 years' implementation of a Resolution of the Communist Party of Việt Nam's Central Committee, eighth tenure, on building and developing an advanced Vietnamese culture with national identity.

Theoretical issues and practicalities emerging from the implementation of the Resolution have touched upon the need to highlight the obvious role of culture in sustainable economic development.

"Culture provides a spiritual foundation for society, being a target and a driving force that spurs the country's development," Dũng said.

The Party and State had always given due attention to cultural development, identifying it as an important front in the ideological field that contributed vastly to the triumph of the nation's revolutionary cause, he affirmed.

The Resolution demonstrated the Party's strategic vision and revolutionary thinking in the renewal process, Dũng said, making clear that the role of culture was vital to the country's political and socio-economic development as well as intellectual life in the process of national modernisation and industrialisation.

Continued Page 4

A ceremony marks the Hùng Kings anniversary at the Hùng Temples Historical Relic Area in Phú Thọ Province. — VNA/VNS File Photo

Spurs go on at delayed highway site

HÀ NỘI — Minister of Transport Đinh La Thăng has asked all local authorities and contractors involved in the Hà Nội-Hải Phòng Expressway Project to work together and overcome any difficulties to make it ready for traffic by the first quarter of 2015.

At a meeting on Wednesday with the ministry's agencies, along with representatives from the project's investor, and local authority leaders, Thăng emphasised the significance and importance of the expressway.

He said, "this is a key national transpot project which will help to boost the socio-economic development of not only the Red River Delta, but the entire north and the whole country in general."

It is the first large-scale expressway under a BOT contract, with a total investment capital of VNĐ24.5 trillion (US$1.17 billion) and has been built to international standards.

The first priority was to ensure the progress and effectiveness of the project as well as the sub-contractors, he added.

Continued Page 4

Storm kills 3, damages crops

Tropical storm Mangkhut causes waves at Đồ Sơn beach in Hải Phòng City late yesterday afternoon. At least three people, including a teenager, were killed by the storm on Wednesday and yesterday. — VNA/VNS Photo Quang Quyết

HÀ NỘI — At least three people, including a teenager, were killed in the last two days as tropical storm Mangkhut brought strong winds and torrential rain to Việt Nam's north and central localities, including Hà Nội, Hải Phòng and Lào Cai Province.

In Hà Nội, a man was killed after being struck by a falling tree on Bà Triệu Street early yesterday morning.

According to local residents, the old tree had been partially uprooted a week ago. Residents had informed local authorities but no response had been given.

In northern Hải Phòng City, the body of a 16-year-old boy was discovered this morning after he was swept away by seven-metre storm waves, whilst walking along Đồ Sơn Beach on Wednesday afternoon.

Continued Page 5

Security tight as Indonesia takes a break

AKARTA — Tens of millions of Muslims in Indonesia celebrated the Eid al-Fitr holiday yesterday as fears of fresh attacks at Buddhist sites prompted a security clampdown days after a temple bombing.

The past week has seen an exodus from cities in the world's most populous Muslim-majority nation, with people taking to cars, boats and planes to head home to their families across the archipelago of more than 17,000 islands.

Indonesia is one of the first countries in the Islamic world to kick off Eid celebrations, with people ending the fasting month of Ramadan with lavish feasts and by attending services at mosques and taking part in processions.

Muslims in Australia were among the first to celebrate and Afghan President Hamid Karzai is due to deliver an address at Eid prayers in Kabul.

Malaysians also marked Eid yesterday, with Gulf states expected to follow. Pakistan and North Africa are expected to start festivities today.

Continued Page 10

Storm kills...

FROM PAGE 1

The teenager had visited the beach to see the big waves created by the storm.

In the Bát Xát District of Lào Cai Province, a 52-year-old man was also swept away by flash floods with rescue teams still unable to find the man's body.

In central Hà Tĩnh Province, local border police rescued three fishermen after strong waves lashed the vessel.

Lieutenant Colonel Đinh Mã Phong, head of Vũng Áng Border Guard Post, said the men were suffering from exhaustion and a cold but were otherwise in good health.

According to Phong, rescue efforts had been "extremely difficult" due to the hazardous weather conditions.

In central Thanh Hóa Province, the storm caused widespread damage to homes and farms. Up to 14 houses collapsed and more than 700 homes had roofs blown off. Up to 4,000ha of crops were demolished in the storm

More than 13km of power lines were torn down with blackouts reported in many districts around the province.

In Hậu Lộc District, around 1,000ha of oyster farming was destroyed after being hit by storm waves.

In northern Ninh Bình Province, approximately 1,000ha of rice were inundated and 600 trees collapsed in the heavy rain.

Only in Ninh Bình Province, initial estimates have put the damage bill at VNĐ167 billion (US$7.8 million).

Provincial authorities have already begun assisting residents affected by the storm by pumping water out of flooded areas and connecting broken power line. Roads and dykes destroyed in the deluge are also under repair and authorities have commenced efforts to locate missing persons.

According to the National Centre for Hydro-meteorological Forecasting, the storm has weakened into a tropical low-pressure system with wind speeds now under 39kph.

Torrential rains will retreat in the northern region and several central provinces by the end of today.

Northern mountainous provinces are still on high alert, threatened by the possibility of flash floods and landslides. — VNS

August 9, 2013 5:34 pm

With the Mangkhut storm hovering over the country's North, floods have already hit several provinces in the region.

Inundation on Friday destroyed more than 100 houses and over 500 rai of farmland in Chiang Mai's Chai Prakan district.

"We are urgently handing out relief items," Tambon Chai Prakan Municipality's mayor Suchart Buakham said.

He said his municipality also warned people in risky zones to move their belongings to higher ground and evacuate to safe places as another round of downpours could trigger further flooding.

Nussara Kantasee, the vice chair of the Tambon Si Dong Yeng Administrative Organisation in Chai Prakan district, said fou villages in her area were also flooded because the Fang River overflowed.

In Mae Hong Son, floodwater spread over the Mae Hong Son - Ban Kung Mai Sak Road. A landslide also hit a highway. Relevant officials were trying to drain floodwater and clear the land masses from traffic surface as of press time.

In Nan, flooding ravaged vast farmland in Thung Chang and Muang districts.

"We are now closely monitoring the situation," Nan disasterpreventionandmitigation chief Nitiwat Nitinantarn said.

In Uttaradit, relevant officials were on alert and closely checking the rainfall.

"If the situation turns worrying, we will immediately issue warnings and evacuate people," the province's disasterpreventionandmitigation chief Surachai Tatchakawin said.

Date of FFG products 09/08/2013 00:00 UTC time

1hour Flash Flood Guidance in Thailand		
Provinces	Districts	FFG Value
Chiang Rai	Chiang Khong	8.03
Chiang Rai	Chiang Saen	8.03
Chiang Rai	Mae Suai	18.82
Chiang Mai	Fang	18.82
Chiang Mai	Mae Ai	18.82
Nan	Thung Chang	21.79
Nan	King Amphoe Song Kh	21.79
Mae Hong Son	Muang Mae Hong Son	24.45
Mae Hong Son	Pai	24.45
Mae Hong Son	King Amphoe Pangma	24.45

3hour Flash Flood Guidance in Thailand		
Provinces	Districts	FFG Value
Chiang Rai	Muang Chiang Rai	48.41
Chiang Rai	Chiang Khong	30.21
Chiang Rai	Chiang Saen	24.40
Chiang Rai	Mae Suai	37.59
Chiang Rai	King Amphoe Mae Lao	48.41
Chiang Mai	Fang	26.76
Chiang Mai	Mae Ai	26.76
Nan	Thung Chang	36.79
Nan	King Amphoe Song Khai	34.84
Nan	Song Kwae	43.93
Mae Hong Son	Muang Mae Hong Son	32.74
Mae Hong Son	Pai	32.74
Mae Hong Son	King Amphoe Pangmaph	32.74
Lampang	Ngao	35.41
Lampang	Wang Nua	35.41
Nong Khai	Sang Khom	42.74
Udon Thani	Na Yung	42.74
Phayao	Muang Phayao	35.41
Phayao	Chiang Kham	43.93

LAO PRESS IN FOREIGN LANGUAGES

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Flooding, landslides hit northern Laos

Times Reporters

The recent torrential rains in the north of the country have brought flooding and landslides, most notably in Luang Prabang and Xayaboury provinces, according to reports from provincial authorities on Friday.

The flooding and landslides took place after the Tropical Storm Mangkhut hit the northern and central parts of Laos after crossing the coast of Vietnam recently.

In Luang Prabang town itself, several roads were flooded due to the fact that the drainage system cannot draw off the flood water. In addition, the flooding has inundated farmland and other agricultural areas, destroying their crops and other property.

The heavy rains also caused a landslide in urban areas of Luang Prabang provincial town, particularly in the area near a medical school. Landslides also took place in various districts of the province and authorities are working to address the issue.

There have been numerous landslides in Luang Prabang, including one in the provincial town.

Meanwhile, in Xayaboury province, numerous rivers overflowed their banks, causing flooding in various areas which has inundated the farmland of villagers in Ngeun district. Some bridges were washed away, causing some regions to be cut off.

The torrential rains also caused landslides in some areas of Xayaboury, making it difficult for people to travel from one district to another. The provincial authorities are working to repair the broken bridges to normalise the traffic of people and vehicles.

They also issued a warning to villagers to stay on alert as flooding and landslides could take place at any time due to the heavy rains. The warning

CONTINUED PAGE 2

Vientiane embankment nearly finished

Khonesavanh Latsaphao

Construction of the 12 kilometre embankment for flood protection in Vientiane will be completed on schedule by December this year.

Director of the Vientiane Public Works and Transport Department, Mr Dedsongkham Thammavong, told the *Vientiane Times* on Friday that completion of the project is not too far away now.

Nearly two kilometres more needs to be finished and then the project is complete. The workers are carrying this out at Vattay-Yai village in Sikhottabong district.

The project, which began in 2009, called for the construction of riverbank protection from an area near the Australian Embassy in Sisattanak district to the Tadthong junction in Sikhottabong district.

In addition to providing secure flood protection, the development has given Vientiane an additional and beautiful area of land for residents and visitors to enjoy, from Don Chan Island through

Workers building the Vientiane riverbank flood protection in Wattay Yai village on Friday.

Chao Anou Park.

The overall cost of construction is more than US$30 million, which the Republic of Korean provided as a low-interest loan to the Lao government.

In March 2006, the Korea Overseas International Cooperation Agency gave a grant of US$800,000 to the Lao government for a feasibility study on the project.

In September 2007, the Lao government officially adopted the project in a bid to prevent erosion along the riverbank.

Laos has lost more than 80 square kilometres of land along the bank of the Mekong River since 1975. It disappeared into the river due to a lack of riverbank protection, according to the Ministry of Public Works and Transport.

At present there is only limited riverbank protection along the Mekong River in Laos as it is prohibitively expensive, so large scale erosion often occurs in the rainy season when the river flows fast, and large sections of riverbank can collapse quite suddenly.

The Mekong River floods perennially during the rainy season around July and

CONTINUED PAGE 3

Chao Fangum road to become one-way

Times Reporters

The Vientiane Administration Office informed the public that traffic on Chao Fangum road is to be restricted to one direction only and trials will take place during August and September.

The announcement was approved by Vientiane Authorities on August 6. The changeover to one way is part of traffic management measures to reduce congestion on the roads in Vientiane, especially during rush hours.

The original plan was to start the one way trial on August 1 but with the many preparations required they were not quite ready to start then so now it is expected to start this week. The one-way change means that traffic will no longer be allowed to travel eastwards along Chao Fangum road from the T-junction at Pakpasak college in Sikhottabong district.

Police officers and officials from involved sectors will be stationed on Chao Fangum road to give advice to drivers during the next two months of the trial.

"We will cooperate with the Ministry of Public Works and Transport as well as the media to help with giving advice and information about the change, and we expect to station our people on the road this week," said Deputy Head of the Traffic Police Advertisement Unit of the Vientiane Traffic Police Office, Police Caption Sangkhom Phommalath.

He told the *Vientiane Times* last Friday that there were no traffic policemen along the road last week because further planning and discussion was needed before going to station in the area this week.

"After the next two months, other involved sectors will join with us in a meeting to analyse the trial before submitting the results to the Mayor," he said.

Vientiane Department of Transport Traffic Management Divisios Director, Mr Somnuk Mektakul, said that now traffic management is going to be adjusted in Vientiane in order to ensure a smoother flow along the main roads in the city.

"Chao Fangum road

CONTINUED PAGE 3

Home news

Students working assist anti-dengue campaign in the capital

Times Reports

Vientiane health authorities are continuing to utilise the assistance of university students studying medical science and nursing science, who are working with health sector staff to destroy mosquito breeding grounds and treat people suffering from dengue.

The aim to build momentum in the ongoing campaign to spread awareness about the need to destroy mosquito breeding sources and encourage local people to increase their attention to clean living and healthy lifestyles.

Through the activities over the past month, people in each target village have a better understanding about the danger of dengue fever and the number of people who went to hospitals and clinics increased after they received health education.

Almost 300 medical science and nursing students gathered at the Friendship Hospital in Vientiane on Saturday to summarise the activities over the past month and plan the activities in the months ahead.

The ceremony was attended by Minister of Health, Dr Eksavang Vongvichat, the National Avian and Human Influenza Coordination Office (NAHICO) Director, Dr Bounlay Phommasack along with Vientiane health officials.

"Throughout the course of the campaign, we have divided the groups of students and medical staff to go to each village to join with village heath volunteers and visit each house to destroy mosquito breeding sites and advise them about health awareness and the danger of dengue fever," a team leader, Dr Vathsana Inthavong reported at the meeting.

"Over the past month, we checked 130,800 households in some 658 villages through eight districts of the capital, all except Sangthong district," he said.

Of around 130,800 households, the team killed mosquito larvae at more than 20,229 houses and some 557,000 materials which might house mosquitoes were checked, of which 37,900 were found to be housing larvae.

The team requested access to every house and then announced the objective of the activity and provided advice to the house owner and helped them to clean and destroy mosquito breeding sites by emptying or flushing all containers storing water and where necessary sprinkling chemical sands to kill mosquito larvae.

The team has also plastered stickers on public transport vehicles and other visible places in dengue outbreak areas warning about the dengue fever outbreak in the area.

"However, people in some villages are still not participating in the destruction of mosquito breeding sources or aware of the fact they need to go to hospital or a clinic when they get sick," said Dr Vathsana.

Over the following month, the team will bring heath sciences students within the targeted districts to check one village a day or may divide into two groups to check two villages. The team will report to the village head when they encounter mosquito larvae in that house and then the village head may call the house owner to talk.

To control the dengue fever outbreak, the Ministry of Health has sent more than 900 health sciences and nursing students to implement this activity in the capital and the five provinces of Bokeo, Xayaboury, Borikhamxay, Xekong and Saravan, while other provinces with universities were left to second their own students to the task.

Vientiane authorities convened a meeting recently to assess the progress of the anti-dengue campaign over the past month.

Deputy Minister of Planning and Investment, Dr Bounthavy Sisouphanthong (*right*), shakes hands with Mr Plew Trivisvavet after signing the agreement.

Nam Bak 1 development agreement signed

Times Reporters

Major energy investor Nam Ngum 2 Power Company Limited last week signed a project development agreement with the Lao government for the Nam Bak 1 hydropower project.

The agreement allows the company to begin work on more detailed studies on the project, including its engineering and design, concession agreements and financial support.

"We expect that all these works will be complete within one year, and project construction will start by the end of next year," company Chairman Mr Plew Trivisvavet said.

Nam Ngum 2 Power Company signed the agreement with the Ministry of Planning and Investment, on behalf of the Lao government, on Thursday in Vientiane.

Representatives from the ministries of Planning and Investment, Energy and Mines and Natural Resources and Environment, as well as the Thai Embassy to Laos attended the event.

Mr Plew said construction on Nam Bak 1, located in Vientiane province, would take about three years to complete.

The project is estimated to cost about 5 trillion kip (20 billion Thai baht).

"However we have to complete all of our detailed studies to know how much the investment cost will be," he said.

Mr Plew said the completed project would have an installed capacity of 160 megawatts, which could generate about 740GWh of electricity per year.

"We will sell all the generated energy to Electricite du Laos," he said.

The chairman said the company would not know how long it would own and operate the project for until after a concession agreement had been finalised with the Lao government.

Police seek information to identify corpse

Soukniludon Southivongnorath

Savannakhet Police Headquarters have sent messages to the media and involved sectors about a dead body floating in the Mekong River in Kaysone Phomvihane district, seeking information as to his identity.

The officials have been trying to find the dead man's family or relatives in both Laos and Thailand since August 8 but so far there has been no response.

The head of the Scientific Crime division Lieutenant Thanousone Kandavong, told *Vientiane Times* last week that they had already given details to both Lao and Thai immigration officials as well as local media trying to find anyone who could identify him.

"We issued a statement that the body belonged to a man who was no more than 30 years old, who had two small tattoos on his right forearm, a small knife tattoo on the underside and a dragon on the topside. We also gave details of his clothing," he said.

Police received the report about a dead body floating in the Mekong River near the Savannakhet hospital in the early morning of August 8, from a couple who spotted it while they were out fishing in the area.

"After getting the report, we went to the place and brought the dead and decomposing body onto the riverbank and checked him over. There was no paper or anything else we could use to indentify who he was, there was just some chewing gum in his pocket," Lieutenant Thanousone said.

He said that the man was wearing a tartan shirt with a grey vest underneath as well as green trousers, but no shoes.

"The green trousers caused local people in the area to wonder as they looked similar to police and military uniform trousers. Many people made enquiries to us so we rechecked and found that there was a similarity to our uniforms. However, these green trousers are commonly sold in several markets in Savannakhet province," he added.

According to provincial police records dead bodies floating in the river in Savannakhet province are not an unusual occurrence and are found about three times a year. Many of them remain unidentified but some get recognised by families or relatives who claim the bodies to take home.

Lieutenant Thanousone also told the public that if they have a family member missing they should immediately report this to local officials who will help them to investigate the disappearance or possibly help them to make an identification if their relative ends up as a dead body floating in the Mekong River.

A dead body floating in the Mekong River in Savannakhet province.

Flooding, landslides hit ... FROM PAGE 1

is mainly focused on villagers who live along the Nam Yang and Nam Ngeun rivers.

Meanwhile in Vientiane, it has been raining for several days since Tropical Storm Mangkhut hit the country, but not as heavily as in the north. The rain has affected transportation and movement of people in the capital, but there has been no real flooding so far.

In Borikhamxay province, flooding took place in Hadkhai village in Thaphabath district as heavy rains caused the nearby Nam Mang River to breach its banks.

On Thursday, Nam Mang rose rapidly, submerging houses and farmland located in low-lying areas. The heavy rains and rising river had caused flooding along some parts of the road to Phoubia Mountain in Xieng Khuang province, which passes through Hadkhai.

The floodwaters reached more than a metre high on about five sections of the road, which lies about 3km off Road No. 13 South. The rains also degraded the quality of local roads, and some have been churned to a quagmire after flooding and frequent heavy vehicle traffic.

Every year, Laos suffers from flooding and landslides, which destroy vast swathes of crops in the major rice producing provinces of Borikhamxay, Khammuan and Savannakhet.

In 2011, tropical storms Haima and Nock-Ten and other monsoonal weather events affected more than 429,900 people in 1,790 villages of 96 districts across 12 provinces that resulted in 30 fatalities. The government has spent billions of kip to assist flood victims.

Flooding in Ngen district Xayaboury province.

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1hour Flash Flood Guidance in Lao				3hour Flash Flood Guidance in Lao			
Provinces	Districts	Villages	FFG Value	Provinces	Districts	Villages	FFG Value
Luangprabang	Xieng nge	NAMLIN	23.53	Luangprabang	Xieng nge	NAMLIN	31.42
Luangprabang	Xieng nge	NONGPA	23.53	Luangprabang	Xieng nge	NONGPA	31.42
Luangprabang	Xieng nge	NALENG	23.53	Luangprabang	Xieng nge	NALENG	31.42
Luangprabang	Xieng nge	PAKSANAM	23.53	Luangprabang	Xieng nge	PAKSANAM	31.42
Luangprabang	Nan	PHANIP	23.53	Luangprabang	Nan	PHANIP	31.42
Luangprabang	Nan	KHORNLONG	23.53	Luangprabang	Nan	KHORNLONG	31.42
Luangprabang	Nan	PADONG	23.53	Luangprabang	Nan	PADONG	31.42
Luangprabang	Nan	NAMOUANG GN.	23.53	Luangprabang	Nan	NAMOUANG GNAI	31.42
Luangprabang	Nan	NAMOUANG KAI	23.53	Luangprabang	Nan	NAMOUANG KANG	31.42
Luangprabang	Nan	PONGDEUA	23.53	Luangprabang	Nan	PONGDEUA	31.42
Luangprabang	Nan	HOUAYLATH	23.53	Luangprabang	Nan	HOUAYLATH	31.42
Luangprabang	Nan	DAN	23.53	Luangprabang	Nan	DAN	31.42
Luangprabang	Nan	HOUAYHOY	23.53	Luangprabang	Nan	HOUAYHOY	31.42
Luangprabang	Nan	NAMPHAK	23.53	Luangprabang	Nan	NAMPHAK	31.42
Luangprabang	Nan	HOUAYME	23.53	Luangprabang	Nan	HOUAYME	31.42
Luangprabang	Nan	HOUAYLONG	23.53	Luangprabang	Nan	HOUAYLONG	31.42
Luangprabang	Nan	SISAATH	23.53	Luangprabang	Nan	SISAATH	31.42
Luangprabang	Nan	PHOKHAM	18.35	Luangprabang	Nan	PHOKHAM	25.97
Luangprabang	Nan	PAKLAN	18.35	Luangprabang	Nan	PAKLAN	25.97
Luangprabang	Nan	PHONXAY	18.35	Luangprabang	Nan	PHONXAY	25.97
Luangprabang	Nan	HOUAYTHIP	18.35	Luangprabang	Nan	HOUAYTHIP	25.97
Luangprabang	Nan	HOUAYXI	18.35	Luangprabang	Nan	HOUAYXI	25.97
Luangprabang	Nan	PHONSANA	18.35	Luangprabang	Nan	PHONSANA	25.97
Luangprabang	Nan	HOUAYPHAKNA	18.35	Luangprabang	Nan	HOUAYPHAKNAOH	25.97
Luangprabang	Nan	PHONTHONG	18.35	Luangprabang	Nan	PHONTHONG	25.97
Luangprabang	Nan	HOUAYHIA	18.35	Luangprabang	Nan	HOUAYHIA	25.97
Xiengkhuang	Morkmay	THAMNONG	8.15	Xiengkhuang	Nonghed	SANDONE-A	49.83
Xiengkhuang	Morkmay	THAMHIA	8.15	Xiengkhuang	Nonghed	SANDONE-B	49.83
Xiengkhuang	Morkmay	THAM MAI	8.15	Xiengkhuang	Nonghed	NONG-OR	49.83
Xiengkhuang	Morkmay	SAMCHAE	8.15	Xiengkhuang	Nonghed	KEOPATOU	49.83
Xiengkhuang	Morkmay	NONG-OR	8.15	Xiengkhuang	Nonghed	NONGSAMCHAE	49.83
Xiengkhuang	Morkmay	NAMHONG	15.4	Xiengkhuang	Nonghed	THAMTHOUM	49.83
Xiengkhuang	Morkmay	THONGPEU	15.5	Xiengkhuang	Nonghed	PAHOK	49.83
Xiengkhuang	Morkmay	NAMOUANG	15.4	Xiengkhuang	Nonghed	HUAYKHILINGYAI	49.83
Xiengkhuang	Morkmay	MAI(LAOLOUM)	15.4	Xiengkhuang	Nonghed	PUAKSEU	49.83
Xiengkhuang	Morkmay	PHOULOM	15.4	Xiengkhuang	Nonghed	SANYOM	49.83
Xiengkhuang	Morkmay	NATHEU	15.4	Xiengkhuang	Khoune	NAXAI	36.31
Xiengkhuang	Morkmay	NAMYEUN	15.4	Xiengkhuang	Khoune	HUAYCHAE	36.31
Xiengkhuang	Morkmay	THASOI	15.5	Xiengkhuang	Khoune	NASI	36.31
Xiengkhuang	Morkmay	THONG	15.5	Xiengkhuang	Khoune	XANG	36.31
Xiengkhuang	Morkmay	KHANGVIENG	15.4	Xiengkhuang	Khoune	NA-OU	36.31
Bolikhamxay	Viengthon	NAMNGAAT	12.39	Xiengkhuang	Khoune	THAMHOIXAI	36.31
Xiengkhuang	Morkmay	NAMXONG	15.5	Xiengkhuang	Khoune	PHONEXAI	36.31
Xiengkhuang	Morkmay	NAMBUAK	15.5	Xiengkhuang	Khoune	DONGDAAN	36.31
Bolikhamxay	Pakkading	NAMDEUA	9.93	Xiengkhuang	Khoune	NONGPHUE	36.31
Bolikhamxay	Pakkading	NAKHEUA NOK	9.93	Xiengkhuang	Khoune	MEUANG	36.31
Bolikhamxay	Pakkading	NAKHEUA NAY	9.93	Xiengkhuang	Khoune	NA TO	36.31
Bolikhamxay	Pakkading	NAHIN	9.93	Xiengkhuang	Pek	HOY	36.31
Bolikhamxay	Pakkading	THONGHURB	9.93	Xiengkhuang	Khoune	NA BONG	36.31
Bolikhamxay	Pakkading	NABOY	9.93	Xiengkhuang	Morkmay	THAMNONG	12.78
Bolikhamxay	Pakkading	NAMKHOU	18.4	Xiengkhuang	Morkmay	THAMHIA	12.78
Bolikhamxay	Pakkading	THONGNAMI	18.4	Xiengkhuang	Morkmay	THAM MAI	12.78
Bolikhamxay	Viengthon	XIENGMAEN	18.52	Xiengkhuang	Morkmay	SAMCHAE	12.78
Bolikhamxay	Viengthon	KOKKIENG	18.52	Xiengkhuang	Morkmay	NONG-OR	12.78
Bolikhamxay	Viengthon	NAXUANG	18.52	Xiengkhuang	Morkmay	NAMHONG	22.73
Bolikhamxay	Viengthon	SOBSOR	10.78	Xiengkhuang	Morkmay	THONGPEU	22.63

Bolikhamxay	Pakkading	NABOY	26.73
Bolikhamxay	Pakkading	NAMKHOU	39.44
Bolikhamxay	Pakkading	THONGNAMI	39.44
Bolikhamxay	Khamkheut	NAMGNANG	49.87
Bolikhamxay	Khamkheut	NAHANG	49.81
Bolikhamxay	Khamkheut	NAHAY	49.81
Bolikhamxay	Khamkheut	NAMOUANG	49.81
Bolikhamxay	Khamkheut	PHONENGAM	49.87
Bolikhamxay	Khamkheut	PHONESA-ATH	49.87
Bolikhamxay	Khamkheut	HOUAYNGA	49.87
Bolikhamxay	Khamkheut	GNORTKHI	49.87
Bolikhamxay	Khamkheut	GNORTTOUM	49.87
Bolikhamxay	Khamkheut	THAMKEIR	49.87
Bolikhamxay	Khamkheut	SOBSACK	49.87
Bolikhamxay	Khamkheut	SOBKHORN	49.87
Bolikhamxay	Khamkheut	SOBHIA	49.87
Bolikhamxay	Khamkheut	MOUANGCHAM	49.87
Bolikhamxay	Khamkheut	SOBSANG	49.87
Bolikhamxay	Viengthon	XIENGMAEN	38.91
Bolikhamxay	Viengthon	KOKKIENG	38.91
Bolikhamxay	Viengthon	NAXUANG	38.91
Bolikhamxay	Viengthon	SOBSOR	32.94
Bolikhamxay	Viengthon	PHADAENG	32.94
Bolikhamxay	Viengthon	NATIK	39.85
Bolikhamxay	Viengthon	PHAPHIENG	39.85
Bolikhamxay	Viengthon	NONGBUA(NONGL	32.94
Bolikhamxay	Viengthon	VANGPENE	32.94
Khammuane	Hinboon	PHON THONG	38.3

Date of FFG produc 09/08/2013 00:00 UTC time

1hour Flash Flood Guidance in Lao				3hour Flash Flood Guidance in Lao			
Provinces	Districts	Villages	FFG Value	Provinces	Districts	Villages	FFG Value
Luangnamtha	Viengphou	NAMTIENG	18.76	Vientiane	Thoulakho	KHOUTSAMBAT	47.23
Luangnamtha	Viengphou	TONGMANG	19.71	Vientiane Muni	Xaythany	THONGMANG	47.23
Luangnamtha	Viengphou	LAIYANG	18.76	Luangnamtha	Viengphou	NAMKIENG	40.36
Luangnamtha	Nalae	LA ANG	19.71	Luangnamtha	Viengphou	NAMSEUA	40.36
Luangnamtha	Nalae	TAKHEUNG	19.71	Luangnamtha	Viengphou	PHOULET	40.36
Luangnamtha	Nalae	KAYE	18.76	Luangnamtha	Viengphou	KATANGKOUAK	40.36
Luangnamtha	Nalae	KHANEUNG	18.76	Luangnamtha	Viengphou	NAMTIENG	26.13
Luangnamtha	Nalae	SALEUANG	18.76	Luangnamtha	Viengphou	TONGMANG	27.63
Luangnamtha	Nalae	MONGKHO	18.76	Luangnamtha	Viengphou	LAIYANG	26.13
Luangnamtha	Nalae	SAKRANG	18.76	Luangnamtha	Nalae	LA ANG	27.63
Luangnamtha	Nalae	NEUNGPHET	18.76	Luangnamtha	Nalae	TAKHEUNG	27.63
Bokeo	Pha Oudo	KANG	17.99	Luangnamtha	Nalae	KAYE	26.13
Bokeo	Pha Oudo	MOKPORN	17.99	Luangnamtha	Nalae	KHANEUNG	26.13
Bokeo	Pha Oudo	MOKSOUK	17.99	Luangnamtha	Nalae	SALEUANG	26.13
Bokeo	Pha Oudo	BONGLAOSOUN	19.71	Luangnamtha	Nalae	MONGKHO	26.13
Bokeo	Pha Oudo	HANGDOI	19.71	Luangnamtha	Nalae	SAKRANG	26.13
Bokeo	Pha Oudo	MOKKHA KANG	17.99	Luangnamtha	Nalae	NEUNGPHET	26.13
Bokeo	Pha Oudo	SIBOUNHEUANG	17.99	Oudomxay	Pakbeng	PHIENG	41.79
Bokeo	Pha Oudo	PHA OU DOM	17.99	Oudomxay	Pakbeng	PING	41.79
Bokeo	Pha Oudo	THINKEO NEUA	17.99	Oudomxay	Pakbeng	KHAM	41.79
Bokeo	Pha Oudo	SAMIN	19.71	Oudomxay	Pakbeng	HUAYXAENG	41.79
Luangprabang	Xieng nge	NAMLIN	20.81	Oudomxay	Pakbeng	CHAENG	41.79
Luangprabang	Xieng nge	NONGPA	20.81	Oudomxay	Pakbeng	NGON	41.79
Luangprabang	Xieng nge	NALENG	20.81	Oudomxay	Pakbeng	PHOUHONGTHEUI	41.79
Luangprabang	Xieng nge	PAKSANAM	20.81	Oudomxay	Pakbeng	PHOUHONGLOUNI	41.79
Luangprabang	Nan	PHANIP	20.81	Oudomxay	Pakbeng	TONHAI	41.79
Luangprabang	Nan	KHORNLONG	20.81	Bokeo	Pha Oudo	KANG	25.63
Luangprabang	Nan	PADONG	20.81	Bokeo	Pha Oudo	MOKPORN	25.63
Luangprabang	Nan	NAMOUANG GN.	20.81	Bokeo	Pha Oudo	MOKSOUK	25.63
Luangprabang	Nan	NAMOUANG KAI	20.81	Bokeo	Pha Oudo	TAKHING	33.44
Luangprabang	Nan	PONGDEUA	20.81	Bokeo	Pha Oudo	BONGLAOSOUNG	27.63
Luangprabang	Nan	HOUAYLATH	20.81	Bokeo	Pha Oudo	HANGDOI	27.63
Luangprabang	Nan	DAN	20.81	Bokeo	Pha Oudo	TINPHA	33.44
Luangprabang	Nan	HOUAYHOY	20.81	Bokeo	Pha Oudo	MOKKHA KANG	25.63
Luangprabang	Nan	NAMPHAK	20.81	Bokeo	Pha Oudo	SIBOUNHEUANG	25.63
Luangprabang	Nan	HOUAYME	20.81	Bokeo	Pha Oudo	PHA OU DOM	25.63
Luangprabang	Nan	HOUAYLONG	20.81	Bokeo	Pha Oudo	THINKEO NEUA	25.63
Luangprabang	Nan	SISAATH	20.81	Bokeo	Pha Oudo	SAMIN	27.63
Luangprabang	Nan	PHOKHAM	17.85	Luangprabang	Xieng nge	NAMLIN	28.5
Luangprabang	Nan	PAKLAN	17.85	Luangprabang	Xieng nge	NONGPA	28.5
Luangprabang	Nan	PHONXAY	17.85	Luangprabang	Xieng nge	NALENG	28.5
Luangprabang	Nan	HOUAYTHIP	17.85	Luangprabang	Xieng nge	PAKSANAM	28.5
Luangprabang	Nan	HOUAYXI	17.85	Luangprabang	Nan	PHANIP	28.5
Luangprabang	Nan	PHONSANA	17.85	Luangprabang	Nan	KHORNLONG	28.5
Luangprabang	Nan	HOUAYPHAKNA	17.85	Luangprabang	Nan	PADONG	28.5
Luangprabang	Nan	PHONTHONG	17.85	Luangprabang	Nan	NAMOUANG GNAI	28.5
Luangprabang	Nan	PASACK	24.4	Luangprabang	Nan	NAMOUANG KANG	28.5
Luangprabang	Nan	BANKANG	24.4	Luangprabang	Nan	PONGDEUA	28.5
Luangprabang	Nan	SAENGSAVANG	24.4	Luangprabang	Nan	HOUAYLATH	28.5
Luangprabang	Nan	HOUAYHIA	17.85	Luangprabang	Nan	DAN	28.5
Luangprabang	Nan	PHONXAY	24.4	Luangprabang	Nan	HOUAYHOY	28.5
Xayaboury	Xienghon	MOK SA KIEN	19.38	Luangprabang	Nan	NAMPHAK	28.5
Xayaboury	Xienghon	HONG KHOU	19.38	Luangprabang	Nan	HOUAYME	28.5
Xayaboury	Xienghon	KEW KENE	19.38	Luangprabang	Nan	HOUAYLONG	28.5
Xayaboury	Xienghon	NGEW	19.38	Luangprabang	Nan	SISAATH	28.5
Xayaboury	Xienghon	NAM BENG	19.38	Luangprabang	Nan	PHOKHAM	25.44

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Xayaboury	Xienghon	LAO SA NO	19.38
Xiengkhuang	Khoune	NAXAI	20.95
Xiengkhuang	Khoune	HUAYCHAE	20.95
Xiengkhuang	Khoune	NASI	20.95
Xiengkhuang	Khoune	XANG	20.95
Xiengkhuang	Khoune	NA-OU	20.95
Xiengkhuang	Khoune	THAMHOIXAI	20.95
Xiengkhuang	Khoune	PHONEXAI	20.95
Xiengkhuang	Khoune	DONGDAAN	20.95
Xiengkhuang	Khoune	NONGPHUE	20.95
Xiengkhuang	Khoune	MEUANG	20.95
Xiengkhuang	Khoune	NA TO	20.95
Xiengkhuang	Pek	HOY	20.95
Xiengkhuang	Khoune	NA BONG	20.95
Bolikhamxay	Pakkading	NAMDEUA	19.98
Bolikhamxay	Pakkading	NAKHEUA NOK	19.98
Bolikhamxay	Pakkading	NAKHEUA NAY	19.98
Bolikhamxay	Pakkading	NAHIN	19.98
Bolikhamxay	Pakkading	THONGHURB	19.98
Bolikhamxay	Pakkading	NABOY	19.98
Xaysomboun Spe	Xaysombou	MOUANG OM	18.25
Xaysomboun Spe	Xaysombou	NAMEUEUNG	18.25
Xaysomboun Spe	Xaysombou	NADI	18.25
Xaysomboun Spe	Xaysombou	NAMLA	18.25
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Luangprabang	Nan	PHONXAY	25.44
Luangprabang	Nan	HOUAYTHIP	25.44
Luangprabang	Nan	HOUAYXI	25.44
Luangprabang	Nan	PHONSANA	25.44
Luangprabang	Nan	HOUAYPHAKNAOH	25.44
Luangprabang	Nan	PHONTHONG	25.44
Luangprabang	Nan	PASACK	31.42
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Xayaboury	Hongsa	NAM KHAM	45.62
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Xayaboury	Hongsa	HOUY DOU	41.29
Xayaboury	Hongsa	HOUY LAI	41.29
Xayaboury	Hongsa	NAM TUP	41.29
Xayaboury	Hongsa	CHAM PA	45.62
Xayaboury	Hongsa	NONG VY	41.9
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Xayaboury	Hongsa	PHOU LENG TAI	41.9
Xayaboury	Hongsa	KIEW NGIEW	41.9
Xayaboury	Hongsa	THENE	41.9
Xayaboury	Hongsa	NA POUNG	41.9
Xayaboury	Hongsa	NAM KENE	41.9
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Xayaboury	Hongsa	SI BOUN HEUANG	45.62
Xayaboury	Hongsa	PUNG KIET	45.62
Xayaboury	Hongsa	KEW PEUAK	41.29
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Xayaboury	Ngeun	PHIA NGAM	40.03
Xayaboury	Ngeun	BI MI	40.03
Xayaboury	Ngeun	KANG	40.03
Xayaboury	Ngeun	LUANG	40.03
Xayaboury	Ngeun	DONE MOUNE	40.03
Xayaboury	Ngeun	DONE XAI	40.03
Xayaboury	Ngeun	NONG VENE	40.03
Xayaboury	Ngeun	NA YANG	40.03
Xayaboury	Ngeun	DONE KHAM	40.03
Xayaboury	Ngeun	NA NGOUA	40.03
Xayaboury	Ngeun	HOUY HOK	40.03
Xayaboury	Ngeun	PUNG FAT	40.03

Vientiane	Thoulakho	PHAKHO	37.13
Vientiane	Thoulakho	NONGPONG TAI	37.13
Vientiane	Thoulakho	NAKEO	37.13
Vientiane	Thoulakho	NAXANGLEK	37.13
Vientiane	Thoulakho	NATAO	37.13
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Vientiane	Thoulakho	VATTHAT	37.13
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Vientiane	Thoulakho	NAKANG	37.13
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Vientiane	Thoulakho	PHATHAO	37.13
Vientiane	Thoulakho	NAWA	37.13
Vientiane	Thoulakho	PHONEMUANG	37.13
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Vientiane	Thoulakho	NANOU	37.13
Vientiane	Thoulakho	NALONG	37.13
Vientiane	Thoulakho	SIVILAI	37.13
Vientiane	Thoulakho	NALA	37.13
Vientiane	Thoulakho	PHONNGAM(BANB	37.13
Vientiane	Thoulakho	NAM ANG	37.13
Vientiane	Kasy	PHONESAWAN	33.05
Vientiane	Kasy	NALAN	33.05
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Vientiane	Kasy	HUAYPHANLA	33.05
Bolikhamxay	Pakxanh	XAYSAVANG	49.94
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Bolikhamxay	Pakkading	NAKHEUA NOK	26.73
Bolikhamxay	Pakkading	NAKHEUA NAY	26.73
Bolikhamxay	Pakkading	NAHIN	26.73
Bolikhamxay	Pakkading	THONGHURB	26.73
Bolikhamxay	Pakkading	NABOY	26.73
Bolikhamxay	Pakkading	NAMKHOU	39.44
Bolikhamxay	Pakkading	THONGNAMI	39.44
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Bolikhamxay	Khamkheut	NAHANG	49.81
Bolikhamxay	Khamkheut	NAHAY	49.81
Bolikhamxay	Khamkheut	NAMOUANG	49.81
Bolikhamxay	Khamkheut	PHONENGAM	49.87
Bolikhamxay	Khamkheut	PHONESA-ATH	49.87
Bolikhamxay	Khamkheut	HOUAYNGA	49.87
Bolikhamxay	Khamkheut	GNORTKHI	49.87
Bolikhamxay	Khamkheut	GNORTTOUM	49.87
Bolikhamxay	Khamkheut	THAMKEIR	49.87
Bolikhamxay	Khamkheut	SOBSACK	49.87
Bolikhamxay	Khamkheut	SOBKHORN	49.87
Bolikhamxay	Khamkheut	SOBHIA	49.87
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Bolikhamxay	Viengthon	PHAPHIENG	39.85
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Ministry drafts new law on state employees

Times Reporters

The Ministry of Home Affairs is drafting a new law concerning government employees, aiming to improve public administration and service delivery as Laos becomes more integrated with the region and the world.

The new law comes as the government refines the selection process for state officials by requiring them to take exams to ensure they are employed on merit, in an effort to recruit more talent into the government.

Deputy Minister of Home Affairs Mr Khammoun Viphongxay told Vientiane Times on Monday that more people are seeking employment in government offices since a salary increase came into effect last year, with further increases planned until 2015.

"The new law will help us to improve our work while addressing the challenges to our plans," said Mr Khammoun.

"I believe that as more people look for jobs in the public sector, we will have more opportunities to select qualified and competent people to work for the government and drive the country's development."

The draft law was discussed at the government's monthly meeting on August 1-2 which was chaired by Prime Minister Thongsing Thammavong and attended by cabinet members.

The new law, which incorporates information from various decrees relating to state employees, is expected to be submitted to the National Assembly later this year for consideration and approval.

The development of the sector and the management of officials from department directors general to lower ranks are currently regulated by Prime Ministerial decrees.

Mr Khammoun said the new law will cover broader aspects and officials in higher positions.

The government meeting recommended that the Ministry of Home Affairs study the issue in detail and obtain more input from the relevant sectors to ensure the law is wide-ranging.

Currently, about 150,000 civil servants work for ministries, government organisations and local authorities, accounting for more than 2 percent of the country's population. Of this number, more than half hold lower or intermediate level diplomas.

Mr Khammoun admitted that Laos did not have sufficient skilled and qualified officials and employed a large number of officials of low standard. This was inconsistent with the urgent need to develop the country.

The government aims to address this issue by streamlining the selection process.

The government also plans to allocate a larger quota of state employees at the local level, to realise the objectives of the 'Three Builds' directive.

Laos now has more than 90 laws which have been passed by the National Assembly to regulate state and socio-economic development. According to a report on the NA's five-year plan, it is expected that 90 more laws will be passed in the next few years towards building a state governed by the rule of law.

Farmers in flooded areas urged to protect cattle against disease

Xayxana Leukai

The National Animal Health Centre is advising cattle farmers in flooded areas of Luang Prabang, Xayaboury and Borikhamxay provinces to vaccinate their animals against haemorrhagic fever.

Deputy Director of the centre, Dr Signa Kittiphone, told Vientiane Times yesterday that staff have advised veterinarians in these provinces to encourage people to bring their cattle for vaccinations.

"Animal health in flooded areas must be given special attention. There is a high risk of a haemorrhagic fever outbreak if animals from different areas are penned together in one place. Prevention of haemorrhagic fever is very important because it is difficult to save animals if they become infected with the virus," he said.

Dr Signa also said cattle should be moved to higher land to avoid flooding and reduce the likelihood of contracting the disease.

Farmers should not hesitate to bring their animals for vaccination when a vet visits their village. They should also ensure that their cattle have sufficient grass on which to graze. "If animals have a full stomach, they will be healthy," he said.

Vets stressed that even though animals had previously been vaccinated against haemorrhagic fever, it was advisable to give them another dose. "This way they will be better protected against the virus," he said.

In addition to haemorrhagic fever, foot-and-mouth disease and diarrhoea are two other commonly occurring diseases among animals in the wet season. Diarrhoea can be treated fairly easily.

Throughout the wet season, the centre urges vets around the country to provide vaccines against haemorrhagic fever as well as foot-and-mouth and black leg diseases.

This year, the centre is advising all staff across the country to take special precautions against the possible outbreak of these diseases as the floodwaters recede.

Floods hit Vientiane province

Villagers in Vientiane province use a boat to get around after heavy rains caused the neighbourhood to flood.

Khonesavanh Latsaphao

The mountainous districts of Meuangfeuang and Kasy in Vientiane province were severely affected by flooding during heavy rainfall on August 8.

Deputy Governor of Vientiane province and Head of Prevention and Disaster Preparedness in the province, Mr Bounmy Phouttavong, went to visit the flooded areas with provincial authorities on Sunday after receiving a report on the situation.

The local authorities reported that thousands of people in 35 villages in Meuangfeuang district and 33 villages in district Kasy district had been affected by the floods.

The first assessment of Kasy district showed that 1,500 of 3,800 hectares of rice fields were under water. In addition, the floods caused seven electricity poles to collapse when fast-flowing water undermined them.

These poles are part of the national grid and supply electricity to Maed district and the Phalak development area. As of yesterday, power had still not been restored.

In Kasy district roads suffered damage or were impassable, while a fire occurred in one house.

In Meuangfeuang district, 35 of 44 villages were flooded, inundating 1,500 of 5,000 hectares of rice fields and killing some cows. Three irrigation systems, some roads, temples and schools are still under water.

According to the Vientiane province authorities, packs containing household items such as soap, detergent and toothpaste as well as dried food, have been distributed to people in need.

Mr Bounmy stressed that the authorities must continue with their surveillance of the area to help local people. They would need to assess the extent of the damage and he would then ask the government for assistance.

Head of the Lao Red Cross (LRC) in Vientiane province, Mr Thonglien Sinyot, told *Vientiane Times* on Monday they had discussed with Oxfam Australia the possibility of additional assistance.

Mr Thonglien also said the provincial LRC on Friday donated 500,000 kip to both Meuangfeuang and Kasy districts for the purchase of bottled water and noodles for local households.

The amount donated was relatively small because Vientiane province authorities reported that only three villages in each district were flooded.

It was also reported on Friday that Hadkhai village in Borikhamxay province's Thaphabath district was flooded after heavy rains caused the Nam Mang River to overflow.

The flooding in Borikhamxay and Vientiane provinces came after Tropical Storm Mangkhut moved in from Vietnam to lash the northern and central provinces of Laos.

Major drug dealer arrested in Vientiane

Mr Sone Inladeth after his arrest in That Luang village, Vientiane.

Times Reporters

Vientiane Police Office last week arrested a major drug dealer in That Luang village, Xaysettha district, Vientiane.

Police charged Mr Sone Inladeth, 41, with drug production and dealing. The accused is believed to have been renting a house in the village as a base for operations.

Chief of the Vientiane Police Office, Lieutenant Colonel Salong Sengathid, told *Vientiane Times* yesterday that Mr Sone was a long-time target of the department and only after they gathered all the relevant information did they swoop in to make an arrest on August 9.

"Our efforts paid off. We found an explosive device in his possession, as well as other evidence including 200g of yabaa (amphetamine), 35g of ice (methamphetamine) and over 2.5 kg of various other narcotics. There was also what appeared to be production equipment at the scene," he said.

Lt Col Salong added that officials also found a motorcycle, three mobile phones, 350,000 kip, and 100 Chinese yuan (about 127,600 kip). "His place looked like a drugs factory set up to produce and distribute illegal substances," he said.

"This is a major problem we are facing in Laos, similar to other developing nations. We can't avoid these issues any longer."

The police chief said drugs were a prime influence for people to steal valuables and money. "Officials are doing their best to crack down on these criminals but we are struggling to eradicate the problem from society."

Lt Col Salong asked for more cooperation from the responsible sectors in tackling this issue, saying solidarity and greater dedication to the task can help to address it.

"Families should keep an eye on their children and what they are doing and where they go, as well as paying attention to their behaviour.

If there is something suspicious going on, they should ask what's happening," he advised.

Officials are also investigating other drug-related incidents and plan to make more progress in their efforts to quash this growing social problem.

New Zealand, Laos tighten...

FROM PAGE 1

by the expansion of Asean-Australia-New Zealand cooperation. He praised the New Zealand proposal on the four projects of economic, security, social, and environmental cooperation in the East Asia Summit framework.

Mr Choummaly said Laos was pleased to support New Zealand on the regional and international stages, while he asked for support from New Zealand on Laos' candidacy for membership of the UNFPA Executive Board and the United Nations Human Rights Council for 2016-2018.

Laos and New Zealand established diplomatic relations on July 15, 1965, with the New Zealand Embassy to Laos based in Bangkok, Thailand, and the Lao Embassy to New Zealand based in Canberra, Australia.

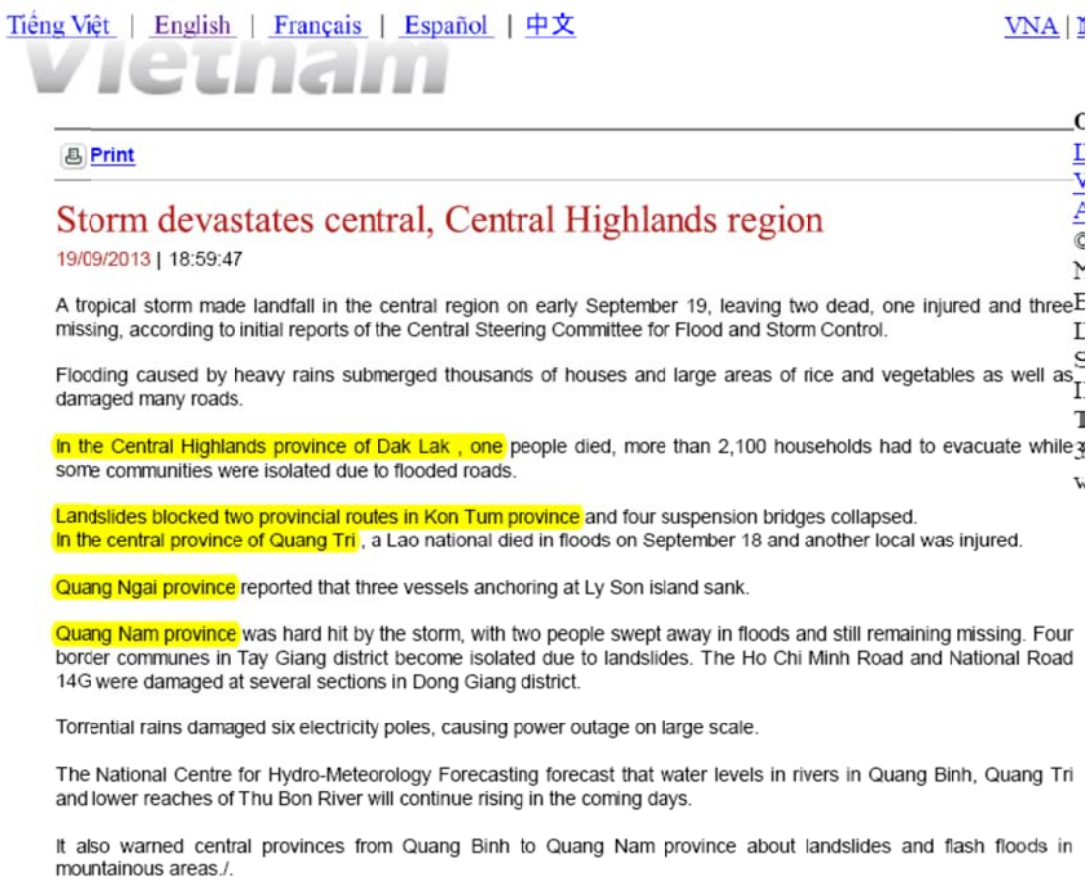
Both sides expressed their satisfaction and valued the friendly relationship and cooperation that has continued over 48 years, and agreed to continue strengthening their ties for their mutual benefit. They also agreed on the continuation of exchanges by visiting delegations at various levels.

They confirmed the continuation of economic, education, health, agriculture, human resource development and information cooperation within bilateral and multilateral frameworks.

Later in the day Sir Jerry Matepare and his delegation also visited Prime Minister Thongsing Thammavong and National Assembly President Ms Pany Yathortou.

Today the delegation will visit Xieng Khuang province for a ceremony to hand over the New Zealand supported pavilion of war remains and tourism information, visit provincial Governor Professor Dr Somkot Mangnomek, and watch a demonstration of unexploded ordnance destruction.

Annex 1.7 "Vietnam Plus", "Vientiane Times" and "The Nation" on Flash floods from TD EIGHTEEN



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Print

Storm devastates central, Central Highlands region

19/09/2013 | 18:59:47

A tropical storm made landfall in the central region on early September 19, leaving two dead, one injured and three missing, according to initial reports of the Central Steering Committee for Flood and Storm Control.

Flooding caused by heavy rains submerged thousands of houses and large areas of rice and vegetables as well as damaged many roads.

In the Central Highlands province of Dak Lak , one people died, more than 2,100 households had to evacuate while some communities were isolated due to flooded roads.

Landslides blocked two provincial routes in Kon Tum province and four suspension bridges collapsed.
In the central province of Quang Tri , a Lao national died in floods on September 18 and another local was injured.

Quang Ngai province reported that three vessels anchoring at Ly Son island sank.

Quang Nam province was hard hit by the storm, with two people swept away in floods and still remaining missing. Four border communes in Tay Giang district become isolated due to landslides. The Ho Chi Minh Road and National Road 14G were damaged at several sections in Dong Giang district.

Torrential rains damaged six electricity poles, causing power outage on large scale.

The National Centre for Hydro-Meteorology Forecasting forecast that water levels in rivers in Quang Binh, Quang Tri and lower reaches of Thu Bon River will continue rising in the coming days.

It also warned central provinces from Quang Binh to Quang Nam province about landslides and flash floods in mountainous areas./.

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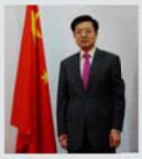
INSIDE



Tropical depression causes severe flooding in the South

Times Reporters

Recent heavy rainfall in the south of Laos has caused widespread flooding in six districts of Champassak province and Khongxedon district in Saravan province, although Xekong and Attapeu provinces were much less affected.

According to a report yesterday in the *Champamat* weekly newspaper in Champassak province, flooding caused the death of a married couple from Oudomsouk village in Bachiengchaluernsouk district, when a landslide swept down on them while they were working on their land.

One other person, from Nondaeng village in Soukouma district, disappeared after floodwaters poured into the area.

The heavy rain which occurred from September 17 to 19 also caused damage to 4,319 hectares of agricultural land in six districts, of which 2,320 hectares in Soukouma district were the worst hit.

The next most badly affected areas were 1,300 hectares in Champassak district followed by 315 hectares in Mounlapamok district, 181 hectares in Sanasomboun district, 154 hectares in Bachiengchaluernsouk district, and 50 hectares in Pakxe district.

Children enjoy a boat ride at the Soukhouma Morning Market in Champassak district where floodwaters are up to 1 metre high in places. Many local shops have moved their goods to higher ground. --Photo Tony Deary

Various sectors in these provinces are teaming up to help the victims of the flooding.

According to the Socio-economic Newspaper, 48 houses in Soukhouma district were also damaged by the floods and farmers lost hundreds of livestock, while the electricity and access roads were cut off.

The heavy rain also caused severe flooding in Khongxedon district, Saravan province, when the Xedon River overflowed its banks flooding 21 villages.

The floodwater inundated about 160 hectares of rice fields and 5.8 hectares of cash crops, and badly affected 227 families.

Head of the Information, Culture and Tourism Department in Xekong province, Mr Somvang Khammavong, said yesterday the Xekong River is now receding but had reached a height of 17.8 metres in the last few days and it too overflowed its banks and caused flooding in some lower areas. But this wasn't serious and didn't affect nearby communities very much.

Deputy Head of the Information, Culture and Tourism Department in Attapeu, Ms Boudsady Xayason, said the province was also not badly affected

CONTINUED PAGE 3

Tropical depression... FROM PAGE 1

and only a few low-lying areas were flooded.

A further warning on the website of the Meteorology and Hydrology Department on September 20 said the tropical depression, which was covering the south of the country, was expected to cause more moderate to heavy rainfall in the area.

The rain also caused the Mekong River in Champassak province to rise above the danger level of 11 metres, to 11.77 metres.

Branches of the Xebangfay River in Khammuan province swelled to 16.06 metres, close to the danger level of 17.5 metres.

The website predicted that the level of these rivers will rise even further in the next two days.

The department is informing all local authorities and people who live alongside the Mekong and Xebangfay rivers in these provinces to be alert to the danger of flooding.

Authorities and residents should take all necessary precautions including moving livestock and possessions to higher ground where flooding is not such a threat, secure their rice stores, weigh down loose objects, stock up on essential supplies, and monitor weather reports.

The Labour and Social Welfare Department in Champassak province asks members of the public who can provide assistance to contact them on phone numbers: +856-31 212500, +856-20 54276641, +856-20 22270133.

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September 25, 2013, 10:21 am

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Flood

7 provinces flooded as rain continues

The Nation September 21, 2013 1:00 am

People in Nakhon Ratchasima wade through a flooded street yesterday.

Tropical depression downgrades, few days of light rain forecast for Bangkok

At least seven provinces, mostly in the Northeast, are under water due to rain that has continued for several days under the influence of a tropical depression.

As of press time, the depression had downgraded to a low-pressure cell but was still expected to bring more downpours. With the cell reaching the Central region, Bangkok will also be hit with rain for the next few days.

Chatchai Phromlert, director-general of the Disaster Prevention and Mitigation Department, said yesterday that 54 tambons in Surin, Kalasin, Si Sa Ket, Ubon Ratchathani, Phitsanulok, Ayutthaya and Angthong were under water.

"We have deployed rapid response teams to help the victims," he said.

More than 7,000 residents in Si Sa Ket are now flooded, with Governor Prateep Keeratirekha saying Khun Han district has been hit the hardest.

In Surin, the Ban Truat School in Sri Narong district reported that water levels were rising so fast that some 20 students had been left stranded.

"The floodwater is over a metre high. Small vehicles can't travel around anymore. So, we need to contact relevant authorities to provide a military truck that can give the children a safe ride home," teacher Teetat Phuttiteerawong said.

The Meteorological Department has announced that the low-pressure cell hovering over the Central region will bring rain to Phitsanulok, Phetchabun, Nakhon Ratchasima, Nakhon Nayok, Prachin Buri, Chachoengsao, Chon Buri, Rayong, Chanthaburi, Trat, Nakhon Sawan, Uthai Thani, Chai Nat, Sing Buri, Saraburi, Lop Buri, Ang Thong, Suphan Buri, Ayutthaya and Bangkok.

Nakhon Ratchasima has been hit with floods after a few days of heavy rain.

"Things happened so fast. At around 9am, a rush of water broke down the wall surrounding our housing estate and flood waters started rushing in," Supoj Kongsupa, a board member of Krissada Garden Village, said yesterday.

Flood levels went well over the metre mark in an hour, forcing residents to call for help.

The Second Army Area sent in five military trucks to evacuate the stranded victims.

Governor Sukhumbhand Paribatra, meanwhile, has assured Bangkokians that they should not worry about floods. "There's no sign of a crisis," he said.

Adisak Khantee, director of the Bangkok Metropolitan Administra-tion's Department of Drainage and Sewerage, said Bangkok would continue being hit by rain over the next few days, but it would only be light.

"The areas hit by rain will also gradually reduce. Rain will cover 70 per cent of the capital over the weekend and then reduce to 60 per cent on Monday," he said.

Hydro and Agro Informatics Institute director Royol Chitradon, who leads a subcommittee of the Water and Flood Management Commission, also said with flood-prevention measures taken since early this month, the situation in Bangkok should be under control.

Relevant authorities are now closely monitoring the storm Usagi, which is moving towards Hong Kong, to see if it will hit Thailand.

Annex 1.8 "Thanh Nien", "Viet Nam News" and "Vientiane Times" on Flash floods from TS WUTIP

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Wednesday, November 06, 2013 14:14

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Typhoon hits Vietnam after leaving dozens missing

Last updated: Monday, September 30, 2013 00:00

People (L) take shelter beside a fallen tree as strong winds batter the coastal area in the Ky Anh district of Vietnam's central Ha Tinh province on September 30, 2013. Vietnam evacuated tens of thousands of people from high-risk coastal areas on September 30 as a powerful typhoon that left dozens of fishermen missing in the South China Sea slammed into the country. AFP PHOTO

Vietnam evacuated tens of thousands of people from high-risk coastal areas Monday as a powerful typhoon that left dozens of fishermen missing in the East Sea, internationally known as the South China Sea, slammed into the country.

China deployed navy warships and aircraft to search for survivors after three Chinese fishing boats sank in rough waters whipped up by Typhoon Wutip.

More than 70 people were missing, Beijing's official *Xinhua* news agency reported, citing maritime authorities.

Vietnam closed schools, ordered all boats ashore and moved some 70,000 people to shelters in vulnerable areas along its central coastline, as high winds and heavy rains uprooted trees and tore the roofs off houses.

Wutip made landfall on Vietnam's central coast soon after 5:00 pm (10:00 GMT) packing winds of up to 103 kilometres (64 miles) per hour and gusts of up to 133 kph, Vietnam's National Hydro-Meteorological Forecasting Center said.

Authorities scrambled to move people from areas at risk of landslides and flash floods, as soldiers joined efforts to build walls of sandbags around coastal villages.

"We have evacuated thousands of people, prepared vehicles, mobilised 5,000 police and soldiers," Nguyen Duc Cuong, a local communist party official in Quang Tri province, told state-run *VTV*.

Torrential rain and strong winds battered neighboring Quang Nam Province, with the popular tourist town of Hoi An also affected by heavy flooding.

"This is a big typhoon with strong wind and heavy rain and we urge people to stay overnight in shelters," Nguyen Van Bong, an official in nearby Ky Anh district, told state television.

Local authorities will be "on duty around the clock" to ensure the area's reservoirs and vast hydro-electric dams are not damaged or made unsafe by the typhoon, he added.

People in central Vietnam told *AFP* that there were already sporadic power cuts in several districts.

Vietnam is hit by an average of eight to 10 tropical storms every year, often causing heavy material and human losses, as well as frequent flooding.

In recent weeks floods have killed at least 24 people in Vietnam and claimed

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Blast rips through commune Party chief's office in central Vietnam

In Vietnam, police chase, arrest man for robbing Japanese tourist

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Thanh Nien News
My classmates described the dish as only "soup;" Hannuri's menu describes it as a "kimchi hotpot." I can only tell you that it's exactly what I've been looking for for three years. You can locate Hannuri, on a Saturday evening, by following the cherry-faced men stumbling out the front door like signal flares.

Hannuri's Proustian pickle pot
www.thanhniennews.com

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Former director faces fraud prosecution

HÀ NỘI— Nguyễn Văn Tuấn, former general director and chairman of the management board of the Ha Noi Import, Export and Construction Investment and Development one-member limited company was prosecuted by the police on Monday.

He is also temporarily imprisoned for four months so that the police can investigate his involvement with the B5 Cầu Diễn tenement house project in Từ Liêm District's Cầu Diễn Town in the capital city.

The project, with a total investment of VNĐ1,000 billion (US$47.6 million), is a joint venture between the company and the Housing Group.

It includes six 40-floor buildings with 2,000 apartments. The company contributed 40 per cent of the capital for the project's land area and the Housing Group was in charge of the remaining investment money.

During the implementation process, the joint venture signed capital investment agreements with hundreds of customers. Tuấn alone signed contracts worth nearly VNĐ200 billion ($9.52 million) but did not carry out the project and used the money for other purposes.

Since 2010, the project has been frozen, causing concerns for capital contributors. Concerned about feasibility, customers sent letters denouncing the faults of the project to state agencies.

One year ago, Tuấn was required to step down from holding two positions in the company and was assigned as the head of the debt recovery section.

He was prosecuted by the Police Investigations Department for Economic Crimes under the Ministry of Public Security.

Talking with Thanh Niên Online newspaper, Housing Group general director Trần Văn Thành confirmed the information and said that the arrest of Tuấn did not make any impact on Housing. He added that Tuấn signed contracts to stabilize capital by himself.

The Hà Nội City People's Committee asked the Housing corporation to carry out the project and take responsibilities for capital contributors' rights. — VNS

A collapsed antenna tower crushed a car in central Quảng Nam Province after being toppled by Storm Wutip. The storm ravaged central areas ranging from Hà Tĩnh to Thừa Thiên Huế, damaging thousands of buildings in the region. — VNA/VNS Photo Võ Thị Dung

Storm Wutip wreaks havoc across central VN killing 3

THỪA THIÊN HUẾ — The strongest storm that hit Việt Nam in six years, Storm Wutip, has claimed three lives and left 35 injured.

The storm ravaged central areas ranging from Hà Tĩnh to Thừa Thiên Huế, damaging thousands of buildings in the region.

Yesterday morning, three reservoirs burst due to heavy rain in Tĩnh Gia District of Thanh Hóa Province, submerging thousands of households in up to two metres of water.

In Hà Tĩnh Province, three people were injured and around 1,545 houses were damaged, while a total of 1,190 hectares of agricultural crops were lashed.

In Quảng Trị Province, 17 people were injured and 3,710 buildings were damaged. Around 12,912ha of commercially grown trees, cassava, chilli peppers, orchards and vegetables were also destroyed by the storm; with around 500ha of shrimp farming, 74 electricity poles and 1km of dyke land dishevelled in the abusive weather conditions.

Thừa Thiên Huế estimated damages around VNĐ25 billion (US$1.2 million), asking Government support in delivering coastal erosion solutions, infrastructure repairs and supplies to storm-hit areas.

In the province, the storm left two people injured, 374 damaged buildings, 249ha of agricultural crops destroyed, and 15 electricity poles uprooted, while causing severe land slides in 220ha of aquaculture land and a 44km stretch of riverbank.

Quảng Bình sustained the heaviest damage as the storm eye passed through the province. Three people were killed when an antenna tower collapsed, while 13 others were injured. Around 90,000 buildings collapsed and had their rooves blown off by the severe weather conditions.

Around 10,000ha of trees were uprooted while 40 boats in the coastal areas sank and sustained heavy damage.

The National Meteorology and Hydrology Forecast Centre warned heavy rains threatened the provinces stretching from Thanh Hóa to Quảng Trị, with a high risk of flooding.

In Quảng Bình, high water levels rose in local rivers, while the local People's Committee demanded relevant departments to urgently repair power lines and closely monitor local areas, to prevent hunger and homelessness after the storm.

Deputy Prime Minister Hoàng Trung Hải yesterday visited the storm-affected areas in Quảng Bình. He encouraged locals to bounce back from the storm to continue daily life and production.

Hải also urged local authorities to give urgent support to victims of the storm.

Electricity of Việt Nam (EVN) in the provinces is working hard to supply power to residents. — VNS

BRIEFS

Man stabbed in heart saved by star doctor

LAI CHÂU — A 40-year-old man from northern Lai Châu Province was saved by doctors at the province's General Hospital after being stabbed in the heart.

Tạ Khoa Bản, of the provincial Ma Lù Thàng Border Gate, was stabbed in his chest by a sharp tool and suffered significant blood loss after falling from a height of one meter on Saturday.

He was taken to the hospital, where he underwent cardiovascular surgery. His condition is now satisfactory and he will be discharged from the hospital in the next few days.

This was a difficult task for a provincial hospital, said Associate Professor Nguyễn Hữu Ước, head of the Thoracic-cardiovascular Surgery Ward of the Hà Nội-based Việt Nam-Germany Hospital, which assisted the Lai Châu General Hospital to conduct the surgery.

Điện Biên sentences four drug traffickers

ĐIỆN BIÊN — The northern province of Điện Biên's People's Court handed down one life imprisonment and a total of 55 years in jail yesterday to four drug traffickers.

Ly A Lù, born in 1996, and Sùng Khua Gầu, born in 1955, will be jailed for 15 and 20 years respectively for trafficking 128 grammes of heroin.

Lò Văn Hồng, born in 1983, got to death penalty for trading 358.7 grammes heroin and 598 methamphetamine pills (52.65 grammes).

Lường Văn Chính, 34, who was caught selling a 359.38-gramme heroin cake, received a 20-year imprisonment sentence.

Japanese lecturer killed in hit and run

HCM CITY — A Japanese lecturer from the HCM City University of Social Sciences and Humanities was killed while travelling home on Sunday afternoon when she was struck by a bus at a bus station near HCM City's Bến Thành Market.

Kakinuma Joji, 50, was using crutches to cross the street near Quách Thị Trang

Vientiane Times

Wednesday October 2, 2013 | Home news | 3

Laos reflects on success at Asean agriculture meeting

Tropical storm Wutip spares Laos

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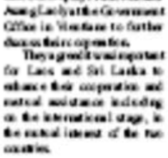

Annex 1.9 "RFA" on Flash floods in the North and North-West of Cambodia

Radio Free Asia

ស្ថានភាពទឹកជំនន់នៅតាមខេត្តមួយចំនួន

ទឹកជំនន់កំពុងគំរាមកំហែងនៅតាមបណ្តាខេត្តក្រុងមួយចំនួន ក្នុងនោះមានខេត្តសៀមរាប បន្ទាយមានជ័យ ប៉ៃលិន និងខេត្តបាត់ដំបង ជាដើម។

ដោយ ហង្ស សាវយុត និង សួន សុផលមុន្នី

2013-10-06

៦-តុលា-២០១៣៖ ទឹកជំនន់ដែលបណ្តាលមកពីបាក់ទំនប់តាការ បានហូរកាត់កំណាត់ផ្លូវកៅស៊ូ ចន្លោះពីប្រាសាទអង្គរវត្ត និងអាកាសយានដ្ឋានអន្តរជាតិសៀមរាប។
RFA/Hang Savyouth

មន្ត្រីសាលាខេត្តសៀមរាប បានឱ្យដឹងថា យ៉ាងហោចណាស់លំនៅឋានជាង ២០០ខ្នង នៅភូមិគោកតាច័ន្ទ សង្កាត់គោកចក នៃក្រុងសៀមរាប កំពុងលិចលង់ក្នុងទឹកជំនន់ ហើយប្រជាពលរដ្ឋជាង ២០០គ្រួសារក៏កំពុងជម្លៀសខ្លួនចេញពីលំនៅឋាន។

អាជ្ញាធរនិងសមត្ថកិច្ចខេត្តនេះ កំពុងប្រើប្រាស់អូប៉ះ និងទូកមួយចំនួន ដើម្បីធ្វើប្រតិបត្តិការសង្គ្រោះ ជា

បន្ទាន់ ជួយដល់អ្នកភូមិ ចាប់តាំងតែពីយប់ថ្ងៃទី៥ រហូតមកដល់ព្រឹកថ្ងៃទី៦ ខែតុលា។

អភិបាលខេត្តសៀមរាប គឺលោក ឃឹម ប៊ុនសុង។ លោកបានមានប្រសាសន៍កាលពីព្រឹកថ្ងៃអាទិត្យ ទី៦ ខែតុលា ថា ទឹកជំនន់បានហូរចូលមកក្នុងភូមិគោកតាច័ន្ទ នៅចន្លោះពីប្រាសាទអង្គរវត្ត និង អាកាសយានដ្ឋានយ៉ាងឆាប់រហ័ស បន្ទាប់ពីទំនប់ទឹកមួយកន្លែង ឈ្មោះតាការ បានបាក់។ ទឹកជំនន់នេះ កំពុងគំរាមកំហែងលំនៅឋានប្រជាពលរដ្ឋមួយចំនួនទៀត ក្នុងទីក្រុង នៅម្តុំភូមិវប្បធម៌ ក៏ប៉ុន្តែ មិនបាន ប៉ះពាល់ដល់អាកាសយានដ្ឋានអន្តរជាតិទេ។

លោក ឃឹម ប៊ុនសុង៖ *«មួយចំហៀងខាងលើនេះលិចទាំងអស់ហើយ ប្រជាជននៅខាងលើប្រហែលជា ២០០គ្រួសារជាងនេះ លិចទាំងអស់ហើយ ១ភូមិនេះ។ បុកទៅខាងក្នុងក្រុងហ្នឹង ឥឡូវវាទៅមិនទាន់ដល់ ទេ ប៉ុន្តែថ្ងៃបន្តិចទៀតនេះ វានឹងអាចចូលទៅដល់ខាងក្នុងក្រុងហើយ។ យើងកំពុងតែមានវិធានការទប់ ស្កាត់ទំនប់បាក់នេះ។ ឥឡូវខាងអប្សរា កំពុងដឹកគ្រាក់ដឹកអីដើម្បីទៅវាយចាំងកៅស៊ូនៅកន្លែងនោះ ដើម្បី ទប់ទំនប់ហ្នឹងឡើងវិញ។ ចាប់ពីយប់ម៉ោង ៧ ចាប់ផ្តើមភ្លាមយើងប្រកាសអាសន្នភ្លាម ឱ្យបងប្អូន ប្រជាពលរដ្ឋត្រៀមលក្ខណៈជញ្ជូនស្បៀងអាហារ អីវ៉ាន់ក្នុងផ្ទះគាត់ឡើងថ្នល់ជាតិ»*។

អាជ្ញាធរបានអះអាងថា បើទោះបីជាទឹកជំនន់បានលិចភូមិគោកតាច័ន្ទ យ៉ាងឆាប់រហ័ស ក៏ប៉ុន្តែមិនមាន គ្រោះថ្នាក់ដល់ជីវិតមនុស្ស និងសត្វណាមួយឡើយ។

ក្រុមប្រជាពលរដ្ឋជាច្រើនបានជម្លៀសខ្លួននិងសត្វចិញ្ចឹមចេញពីតាមផ្ទះ ដោយសារខ្លាចក្រែងមានគ្រោះ ថ្នាក់ដោយទឹកហូរកួច និងឆក់ចរន្តអគ្គិសនី។ ពួកគេខ្លះបានប្រក់តង់កៅស៊ូស្នាក់នៅជាបណ្តោះអាសន្ន តាមចិញ្ចើមថ្នល់។
ស្ត្រីអ្នកភូមិគោកតាច័ន្ទ ម្នាក់ឈ្មោះ ម៉ៅ ណូរី បានមានប្រសាសន៍ថា ទឹកបានហូរលឿនចូលមកដល់ផ្ទះ របស់គាត់យ៉ាងឆាប់រហ័ស តាំងតែពីវេលាម៉ោង ៩យប់ថ្ងៃទី៥ ខែតុលា៖ *«តែ៥នាទី គិឡើងវិលៗតែម្តង ត្រឹមចង្កេះ ហើយឡានឡើងកប់កង់ហើយ យកអីវ៉ាន់អីអត់ទាន់។ យកបានតែរបស់របរ សំខាន់ៗ ឯទូ ត្រែ អី គិទុកចោលអណ្តែតនៅពេញផ្ទះ។ ខ្លាចឆេះផ្ទះហើយ ខ្លាចឆក់ខ្សែភ្លើងផង ចោលផ្ទះទាំងយប់ នៅលើ ថ្នល់។ ឥឡូវត្រឹមកខ្ញុំ ទឹកនៅតែហូរខ្លាំង»*។

កាលពីឆ្នាំ២០១០ កន្លងទៅ ទឹកធ្លាប់ជនលិចភូមិគោកតាច័ន្ទ នោះម្តងមកហើយ ក៏ប៉ុន្តែកាលនោះកម្រិត ទឹកមិនខ្លាំងក្លាដូចពេលនេះទេ។

ចាប់តាំងតែពីសប្តាហ៍មុន ទឹកបានជន់លិចស្រុកចំនួន ៦ ដូចជាស្រុកអង្គរជុំ ស្រុកវ៉ារិន ស្រុកអង្គរជុំ ស្រុក ពួក ស្រុកក្រឡាញ់ ស្រុកស្រីស្នំ ព្រមទាំងក្រុងសៀមរាបផង ដែលធ្វើឱ្យប៉ះពាល់ដល់ជំណាំគ្រួសារស្រូវ និងហេដ្ឋារចនាសម្ព័ន្ធរបស់រដ្ឋមួយចំនួន។

អាជ្ញាធរខេត្តសៀមរាប បានប៉ាន់ប្រមាណថា គេអាចនឹងចំណាយប្រាក់ច្រើនជាង ១លានដុល្លារអាមេរិក ដើម្បីជួសជុលនិងកែលម្អផ្លូវស្ពាន និងថ្នល់ឡើងវិញ នៅក្រោយពេលទឹកជំនន់នៅឆ្នាំនេះ។

ខេត្តភាគពាយ័ព្យ

ចំណែកនៅឯខេត្តភាគពាយ័ព្យនៃប្រទេសកម្ពុជា ក៏កំពុងរងការជន់លិចដោយសារទឹកជំនន់ដែរ។

៦-តុលា-២០១៣៖ ទឹកជន់លិចក្រុងបាត់ដំបង ខេត្តបាត់ដំបង។ RFA/Soun Sophalmony

គ្រោះធម្មជាតិដែលបង្កឡើងដោយទឹកភ្លៀងកំពុងជន់លិចនៅតាមស្រុកក្រុងមួយចំនួនក្នុងខេត្ត
បន្ទាយមានជ័យ ខេត្តប៉ៃលិន និងខេត្តបាត់ដំបង។ ក្រុមអាជ្ញាធរមូលដ្ឋាននិងកងកម្លាំងសមត្ថកិច្ចនៅតា
ខេត្តទាំងបីនេះ កំពុងត្រៀមកម្លាំងការពារ និងចាត់វិធានការជួយសង្គ្រោះប្រជាពលរដ្ឋជាបន្ទាន់ ស្របពេ
ដែលជំនន់ទឹកភ្លៀងកំពុងមានសន្ទុះកើនឡើងខ្លាំង។

អភិបាលខេត្តបន្ទាយមានជ័យ លោក ទ្រី ណារិន បញ្ជាក់កាលពីថ្ងៃទី៦ ខែតុលា ថា ជំនន់ទឹកភ្លៀងបាន
ជន់លិចស្រុកក្រុងចំនួន ៩ នៅក្នុងខេត្តបន្ទាយមានជ័យ។ បញ្ហាចំពោះមុខអាជ្ញាធរបានបញ្ជូនកងទាហ
ចំនួន ៥០០នាក់ ទៅប្រចាំការនៅតំបន់មានអាងទឹកធំមួយចំនួននៅខេត្តបន្ទាយមានជ័យ រង់ចាំជួយ
សង្គ្រោះកុំឲ្យអាងទឹកនោះ បាក់ធ្លាយទឹកជន់លិចធ្ងន់ធ្ងរថែមទៀតទៅលើប្រជាពលរដ្ឋ។

ទន្ទឹមគ្នានេះនៅតាមស្រុកមួយចំនួនក្រុមអាជ្ញាធរបានជម្លៀសអ្នកភូមិទៅកាន់ទីទួលសុវត្ថិភាពជាបណ្តើរ
ហើយ៖ *«យប់មិញនេះខ្ញុំចុះទៅមួយយប់ប៉ុន្មានកន្លែងដែលឡើងទីទួលសុវត្ថិភាពហ្នឹងមានរបស់របរ
តិចតួចដែលឲ្យគាត់ចំពោះមុខ ដើម្បីយើងសុំទៅគ្រោះមហន្តរាយ និងកាកបាទក្រហមជួយអំណោយ
ស្បៀងអាហារផ្សេងទៀត ប៉ុន្តែចំពោះមុខយើងមានមីជួយគាត់បណ្តោះអាសន្នសិន»*។

លោកបន្តថា គ្រោះទឹកជំនន់ដំណាក់កាលទី២នេះ នៅពុំទាន់មានរបាយការណ៍ស្លាប់អាយុជីវិតរបស់ប្រជាពលរដ្ឋទេ ហើយការខូចខាតផលដំណាំ លំនៅឋានរបស់ប្រជាពលរដ្ឋ និងហេដ្ឋារចនាសម្ពន្ធផ្លូវថ្នល់នោះ ក៏ពុំទាន់អាចសរុបបានដែរ ប៉ុន្តែផលប៉ះពាល់ជាទូទៅមានស្ថានភាពធ្ងន់ធ្ងរ។

លោក ទ្រី ណារិន បញ្ជាក់ថា គ្រោះធម្មជាតិនេះអាចមានស្ថានភាពធ្ងន់ធ្ងរថែមទៀត បើសិនមេឃនៅតែបន្តធ្លាក់ភ្លៀង។ ក្រៅពីខេត្តបន្ទាយមានជ័យ ជំនន់ទឹកភ្លៀងដូចគ្នានេះបានកើតមានឡើងនៅខេត្តប៉ៃលិន ដែលជាតំបន់សំបូរព្រៃភ្នំ។

អភិបាលខេត្តប៉ៃលិន លោក អ៊ី ឈាន ថ្លែងថា ជំនន់ទឹកភ្លៀងកើតមានឡើងពីរថ្ងៃជាប់គ្នានៅក្នុងក្រុងប៉ៃលិន និងស្រុកសាលាក្រៅ។ ក្រុមអាជ្ញាធរខេត្តនិងអាជ្ញាធរមូលដ្ឋានកំពុងចាត់វិធានការជួយសង្គ្រោះប្រជាពលរដ្ឋ។

លោកបញ្ជាក់ថា មិនមានប្រជាពលរដ្ឋណារងគ្រោះស្លាប់នោះទេរហូតមកដល់ពេលនេះ ចំណែកឯផលប៉ះពាល់ដោយសារជំនន់ទឹកភ្លៀងនេះ មានស្ថានភាពធ្ងន់ធ្ងរ ប៉ុន្តែក្រុមអាជ្ញាធរពុំទាន់អាចបូកសរុបការខូចខាតនោះបានទេ ដោយសារទឹកកំពុងជន់លិចនៅឡើយ៖ *«លិចខូចខាតអស់ច្រើនណាស់មកដល់ថ្ងៃនេះ ទាំងដំណាំ ទាំងទ្រព្យសម្បត្តិខ្លះ។ ៥០% ដែលលិច ប៉ុន្តែយើងមិនទាន់វាយតម្លៃបានទេ ពីព្រោះទឹកនេះវាខុសពីកន្លែងផ្សេងៗ ទឹកនេះហូរចាក់ខ្លាំងមកពីលើភ្នំ ប៉ុន្តែបងប្អូនប្រជាពលរដ្ឋអត់អីទេ យើងជួយសង្គ្រោះបានអត់ចោទទេ»*។

នៅឯខេត្តបាត់ដំបងវិញ ជំនន់ទឹកភ្លៀងដូចគ្នាក៏កំពុងជន់លិចក្រុងបាត់ដំបង និងនៅតាមស្រុកមួយចំនួនផ្សេងទៀត។ ក្រុងបាត់ដំបង កំពុងលិចលង់ដោយសារកម្ពស់ទឹកនៅក្នុងដងស្ទឹងសង្កែឡើងខ្ពស់ ហើយទឹកបានហូរតាមប្រព័ន្ធលូបណ្តាលឲ្យជន់លិចផ្លូវថ្នល់ លិចផ្សារ និងលំនៅឋានប្រជាពលរដ្ឋ អគារសាលារៀនជាច្រើនកន្លែង។ ក្រៅពីក្រុងបាត់ដំបង នៅមានស្រុកមួយចំនួនទៀត ដូចជាស្រុកកំរៀង ស្រុកបវេល ស្រុករុក្ខគិរី និងស្រុកគាស់ក្រឡ កំពុងរងការជន់លិចដោយសារជំនន់ទឹកភ្លៀងដូចគ្នា។

មន្ត្រីនាំពាក្យសាលាខេត្តបាត់ដំបង លោក វ៉ឹង មុនី ថ្លែងថា អាជ្ញាធរខេត្តនៅថ្ងៃអាទិត្យ ទី៦ ខែតុលា បានកោះប្រជុំជាបន្ទាន់មួយ ហើយបានដាក់ផែនការត្រៀមការពារនិងត្រៀមជួយសង្គ្រោះប្រជាពលរដ្ឋ៖ *«ទី១ យើងណែនាំអោយកម្លាំងសមត្ថកិច្ចហ្នឹងយកចិត្តទុកដាក់តាមដានកម្រិតនៃទឹកជំនន់ ហើយមានវិធានការជាបន្ទាន់ បើសិនណាជាប្រឈមនឹងការគ្រោះថ្នាក់។ យើងបានណែនាំរួចហើយតាមរយៈគណៈបញ្ជាការឯកភាពជាមួយខាងសមត្ថកិច្ចគ្រប់ថ្នាក់ ឥឡូវយើងកំពុងស្វែងយល់អំពីការកើនឡើងហ្នឹង ដោយសារទឹកឥឡូវនេះបើសិនណាអត់មានភ្លៀង យើងសង្ឃឹមថា ទឹកហ្នឹងវាអាចស្រក»*។

ស្នងការនគរបាលខេត្តបាត់ដំបង លោកឧត្តមសេនីយ៍ ស ថេត គូសបញ្ជាក់ថា លោកបានកោះប្រជុំកងកម្លាំងប៉ូលិសនៅគ្រប់ស្រុកក្រុងទាំងអស់ក្នុងខេត្តបាត់ដំបង ដើម្បីត្រៀមជើងការជួយសង្គ្រោះប្រជាពលរដ្ឋនៅគ្រាដែលទឹកជំនន់នេះមានកម្ពស់កើនឡើង។

លោកបន្តថា រហូតមកដល់ពេលនេះពុំមានប្រជាពលរដ្ឋណារងគ្រោះស្លាប់ដោយសារទឹកជំនន់នេះនៅឡើយ។ ទន្ទឹមគ្នានេះ ស្នងការនគរបាលខេត្តបាត់ដំបង បានទិញទូកជួយសង្គ្រោះជាច្រើនគ្រឿងមកពីប្រទេសថៃ ដើម្បីត្រៀមជួយសង្គ្រោះប្រជាពលរដ្ឋ៖ *«បើលិចនៅស្រុកណា យើងរុញទៅដើម្បីជួយសង្គ្រោះភ្លេងៗ ដាក់របស់របរបាន ហើយខ្ញុំទិញប្រហែលល្ងាចមកដល់។ ក្រៅពីហ្នឹងខ្ញុំបានប្រមូលកម្លាំងទាំងអស់នៅអធិការ នៅស្នងការ ដើម្បីចុះជួយ។ ឧទាហរណ៍មានលិចនៅភូមិណា ស្រុកណា ចំណុចណាមួយ។ យើងសំខាន់បំផុតយកអាយុជីវិតប្រជាពលរដ្ឋសិន បន្ទាប់យកសម្ភារៈ និងរកទីទួលសុវត្ថិភាពឲ្យគាត់មកស្នាក់នៅបណ្តោះអាសន្ន»*។

នៅក្នុងឱកាសបុណ្យភ្ជុំបិណ្ឌកន្លងទៅនេះគេសង្កេតឃើញថា មានភ្លៀងធ្លាក់ទាំងនៅពេលថ្ងៃនិងពេលយប់ជាប់គ្នា ហើយទឹកភ្លៀងនេះបានបង្កឲ្យមានទឹកជំនន់កើតឡើងជន់លិចនៅក្នុងខេត្តបន្ទាយមានជ័យ ខេត្តប៉ៃលិន និងខេត្តបាត់ដំបង។ កាលពីថ្ងៃទី៥ ខែតុលា ក្រសួងធនធានទឹកនិងឧតុនិយមប្រកាសថា ដោយសារមានឥទ្ធិពលនៃប្រព័ន្ធសម្ពាធទាបអូសបន្លាយកាត់លើព្រះរាជាណាចក្រកម្ពុជា និងសម្ពាធសកម្មមួយ កំពុងឋិតនៅភាគខាងកើតខេត្តកោះកុង។

សម្ពាធនេះបង្កឲ្យមានភ្លៀងធ្លាក់ច្រើនថែមទៀត រហូតដល់ថ្ងៃទី៧ ខែតុលា ឆ្នាំ២០១៣។ មេឃភ្លៀងអាចបន្តធ្លាក់នៅខេត្តមួយចំនួន ដូចជាខេត្តកោះកុង កំពត កែប ព្រះសីហនុ កំពង់ស្ពឺ តាកែវ កណ្តាល កំពង់ឆ្នាំង ពោធិ៍សាត់ បាត់ដំបង ប៉ៃលិន បន្ទាយមានជ័យ សៀមរាប កំពង់ធំ និងខេត្តឧត្តរមានជ័យ។ បណ្តាខេត្តទាំងនេះ នឹងបន្តប្រឈមនឹងជំនន់ទឹកភ្លៀង។

ក្រសួងធនធានទឹកនិងឧតុនិយមប្រកាសឲ្យក្រសួងស្ថាប័នពាក់ព័ន្ធ អាជ្ញាធរដែនដី និងសាធារណជន ពិសេសចំពោះបងប្អូនប្រជាពលរដ្ឋ ត្រូវបង្កើតការយកចិត្តទុកដាក់ខ្ពស់ដើម្បីចៀសវាងគ្រោះថ្នាក់ផ្សេងៗ ដែលអាចកើតមានឡើង៕

Annex 1.10 "Thanh Nien" and "Nhan Dan" on Flash floods from TS NARI

THANH NIEN NEWS .com

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2 dead in central Vietnam in flooding caused by typhoon Nari

Last updated: Wednesday, October 16, 2013 17:00

A flooded road in Quang Binh Province

At least two people have died and five others are reported missing in massive flooding after a tropical storm triggered heavy rains in central Vietnam.

Typhoon Nari, which has moved over Laos after leaving a trail of destruction in Vietnam, caused dangerous floods in the north-central provinces of Quang Binh and Ha Tinh.

Early Wednesday two men, Mai Phu and Phan Son, both 50, were killed when a wall was blown over by a gust in a village in Quang Binh.

The gust, which lasted 15 minutes, also knocked down many houses in the village and injured 24 people.

Also Wednesday morning two women, Nguyen Thi Luc and Nguyen Thi Bich Thuong, both teachers, were swept away by flash floods while they were on their way to school in Quang Binh's Bo Trach District. They have not been found yet.

Some places in Quang Binh received more than 50 cm of rainfall, which saw water levels in rivers rise to record highs.

Local authorities fear the flooding could reach the historic levels of 2010.

Heavy rains also inundated hundreds of houses and roads in Le Thuy District.

In Ha Tinh Province, heavy rains in the last two days left three missing and more than 1,000 houses submerged under water.

Authorities in Huong Khe District evacuated more than 90 families to safer places.

Floods also disrupted traffic and isolated some mountainous districts.

Typhoon Nari, which slammed into central Vietnam early Tuesday, had claimed four lives, caused injuries to 49 others, and left six missing as of Tuesday evening.

It also damaged thousands of houses, knocked down trees, sank dozens of fishing boats, and destroyed crops and other properties.

The total loss is estimated at VND1.5 trillion (US$71 million), with Da Nang and Quang Ngai saying they are the hardest hit.

By Quang Nam, Thanh Nien News

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Nari slams central region, leaving three dead

Tuesday, 15/10/2013 - 05:13 PM (GMT+7)

Strong waves batter Hoang Sa road in Da Nang city

Nhan Dan Online – Tropical storm Nari, the 11th major storm to hit Vietnam this year, has killed three pe central region, according to initial reports.

After killing 13 people in the Philippines, Nari remains very strong and has caused extensive damage in central Viet

Da Nang city and Quang Nam province were hardest hit, with three deaths reported in Quang Nam and many more

The storm has caused many houses to collapse, blowing down trees and upsetting transportation routes. Water lev rising at an alarming rate. Detailed statistics on the number of houses collapsed have yet to be tabulated.

On major routes in Da Nang city, strong winds blew the roofs off many houses and downed trees and electricity p Phu, Bach Dang, Quang Trung, Nguyen Van Linh, Yen Bai, and Nguyen Tat Thanh roads. Hoang Sa road in Son with five-metre wide strips of asphalt washed away.

The Da Nang municipal Committee for Flood and Storm Prevention and Control held an urgent meeting this mo discuss ways to overcome the storm's aftermath.

The storm has also brought heavy rains and strong winds to Quang Nam province. Early this morning, straight severe damage to thousands of houses and schools. Many roads in Tam Ky and Hoi An cities were inundated Quang Nam province has suffered blackouts since last night.

Still in the restoration process following Tropical Storm Wutip two weeks ago, Con Co Island in Quang Tri prov morning.

According to Chairman of the Con Co island district People's Committee Le Quang Lanh, Typhoon Nari, with wind roofs off houses under repair after being damaged by Wutip. Waves in excess of 3 metres crashed repeatedly eroding many sections. Power cuts continue across the island.

Annex 1.11 "Viet Nam News" on Flash floods from TD THIRTY

Human rights major priority for Việt Nam

HÀ NỘI — Việt Nam had made many achievements in ensuring human rights in civil affairs, politics, economics, culture and society which had been recognised by the international community.

Foreign Ministry spokesperson Lương Thanh Nghị made the statement while answering queries regarding Việt Nam's bid for a seat on the UN Human Rights Council at a regular press briefing in Hà Nội yesterday.

The promotion of human rights and the active participation of the people in all aspects of the country's socio-economic life were important factors that led to the success of Việt Nam's renewal process, Nghị added.

Việt Nam wished to participate in the UN Human Rights Council for the 2014-16 tenure to make a positive contribution to the international community's joint efforts to promote and protect human rights around the world, the spokesman said.

Việt Nam believed it was capable of undertaking the role as a member of the UN Human Rights Council and committed to contributing to the council's activities to improve its effectiveness, transparency, objectiveness and equality on the basis of dialogue, co-operation, equality and mutual respect, he stated.

In response to a question on when Việt Nam would join the UN Convention against Torture, Nghị said Việt Nam always made practical contributions to the three sectors of UN concern: peace-security, development and ensuring human rights.

He further said that on Tuesday, Prime Minister Nguyễn Tấn Dũng signed Resolution 118/NQ-CP authorising the head of Việt Nam's permanent mission to the UN to sign the UN Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment.

The country's participation in the convention showed its respect and strict implementation of its human rights commitments within the framework of the universal periodic review (UPR), as well as the commitments it made when it voluntarily nominated itself for the UN Human Rights Council, Nghị said. — VNS

Hospitals set rules for treating malnutrition

HCM CITY — The Paediatrics Hospital No.1 in HCM City has been asked to work with the city's Nutrition Centre to draw up guidelines for the treatment of severe malnutrition in children.

At a workshop on malnutrition prevention yesterday, Nguyễn Hữu Hưng, the department's deputy head, said the guidelines would be used in hospitals in the city's districts.

Hưng also asked the hospital for health exams and nutrition consulting were malnourished.

Of 7,479 malnourished children, nearly 18 per cent suffered either severe malnutrition or very severe malnutrition.

For the same period, the hospital treated 1,388 malnourished inpatients. Of that number, more than 45 per cent of them were severely malnourished and 14.8 per cent were very severely malnourished.

Central provinces make preparations for typhoon

Thousands of people commuting to jobs in inner HCM City from Thủ Đức District are stuck on flooded Kha Vạn Cân Street yesterday. — VNS Photo Thu Hằng

HÀ NỘI — Typhoon Haiyan was moving towards the East Sea and was forecast to make landfall Sunday night, according to the National Centre for Hydro-meteorological Forecasting.

At 7pm yesterday, the eye of the year's 13th storm was about 370km to the east of the Island of Mindanao off the Filippino coast, and was moving in a west and north-west direction with wind speeds ranging from 202 to 221 km per hour.

In the next 48 hours, the powerful storm will be 380km east to the coastline of central provinces from Thừa Thiên-Huế to Bình Định, with strong winds of 167-183 km per hour.

Under the circumstances, Prime Minister Nguyễn Tấn Dũng sent an urgent message to coastal provinces and cities yesterday, ordering authorised agencies to minimise damage by taking prompt action and calling offshore ships back to the mainland before 7pm on Saturday.

Central provinces from Thanh Hóa To Bình Định were asked to monitor ships operating along the coastline and around estuaries, and a ban will be put in place on Sunday.

Localities were instructed to evacuate high-risk areas and help people to shore up their houses.

The Ministry of Industry and Trade has been ordered to check and ensure the safe operation of power transmission systems and reservoirs and ensure food supplies, especially for people living in areas that are likely to be isolated by floods.

The Ministry of Transport is also preparing emergency vehicles to tackle any problems on key roads and instruct people where to go in areas hit by the storm.

High tides

Heavy rains and high tides caused severe floods on many major roads in HCM City, resulting in traffic jams during rush hour yesterday morning.

Streets along Tân Hóa-Lò Gốm Canal are affected the most by tides, including Hòa Bình Street where the water level reached one metre.

Lạc Long Quân and Tân Hóa streets in District 11, and Chu Văn An, Đinh Bộ Lĩnh and Bùi Đình Túy streets in Bình Thạnh District were flooded. Huỳnh Tấn Phát Street in District 7 was also affected.

At the Cây Gõ Roundabout in District 6, vehicles were unable to move for hours due to severe traffic congestion.

Thousands of people commuting to their jobs in inner HCM City from Thủ Đức District were stuck on flooded Kha Vạn Cân Street.

Meanwhile, flood waters from the Hương and Bồ rivers in central Thừa Thiên Huế Province have inundated lowland areas in Quảng Điền and Hương Trà districts.

This follows rainfall of 150-300mm on Wednesday.

Forecasters said heavy rain was still lifting river water levels. Families in danger areas have been warned of the potential risks. — VNS

BRIEFS

Thousands of people left without safe water

KHÁNH HÒA — More than 2,000 households with nearly 9,000 residents in the central province of Khánh Hòa's Diên Khánh Town are using contaminated water from wells as there is no clean water system.

The chairman of the Diên Khánh People's Committee, Lê Xuân Nhàn, said that the water system project had not been implemented due to the lack of capital.

As a result, local residents have to use aluminuous and foul smelling water from family wells and the Cái river.

Many have to spend hundreds of millions of đồng to dig deep wells to obtain clean water but afterwards the polluted water returns, he said.

Pig-based pathogen transmitted to human

LONG AN — Ngô Văn Hoàng, director of the Preventive Medicine Centre in Mekong Delta Long An Province, said the first case of Streptococcus suis bacteria, a pig-based pathogen, was reported in provincial Tân An City, on Wednesday.

The patient, Nguyễn Thị Hiền, was hospitalised with symptoms of fever, vomiting and diarrhea and was treated at Long An General Hospital on October 22.

Streptococcus suis was determined to be the cause of her illness.

The patient is reported to be in good health. However the precise source of the infection is still unknown.

Metro line plans released in capital

HÀ NỘI — The office of the Hà Nội People's Committee has announced the plan for the city's sixth metro line.

The line will run from Thanh Trì District's Ngọc Hồi Commune to Nội Bài International Airport with a station at the intersection point of urban railway line 2A connecting Cát Linh and Hà Đông.

The line could be connected to the fifth line between Nam Hồ Tây and Láng – Hòa Lạc in the future.

Annex 1.12 "Nhan Dan", "Vietnam Plus" on Flash floods from TS PODUL

Society

Print page

At least 15 dead in central region flooding

Saturday, 16/11/2013 - 10:09 PM (GMT+7)

Flooding in Hue city

Nhan Dan/VNA – Floods caused by a tropical depression have killed at least 15 people and have caused significant damage in the central and Central Highlands regions.

According to the National Committee for Search and Rescue, as of 7:30am on November 16, the floods had caused the deaths of seven people in Quang Ngai province, five in Binh Dinh, and one in Quang Nam, Phu Yen and Gia Lai provinces. One person in Gia Lai and three others in Quang Ngai were reported missing.

Torrential rains have inundated 29 communes in Quang Nam, 9 communes in Quang Ngai, 14 in Binh Dinh, and 8 in Phu Yen.

In Quang Ngai alone, floods have made 17 houses collapse, unroofed 35 others, damaged 200 hectares of rice and submerged 1,400 hectares of industrial crops.

The urgent situation has prompted localities to evacuate thousands of households in vulnerable areas.

Local authorities are urgently carrying out measures to deal with the consequences of the flooding.

Print

Death toll rises to 31 in central region floods

17/11/2013 | 17:31:00

Flood in Hoa Vang district, Da Nang city. Photo: VNA

Floods triggered by torrential rains in the central region have killed at least 31 people, left two missing and seriously injured three others, disaster officials said on November 17.

The National Search and Rescue Committee announced that the floods also inundated and damaged nearly 10,000 houses and 431 hectares of rice and crops.

In Quang Nam alone, as many as 29 communes across four districts were completely submerged.

Rescue forces have been working to move over 63,000 people in Da Nang, Quang Nam, Quang Ngai, Binh Dinh and Phu Yen cities out of the dangerous and isolated areas to safe shelters.

On November 17, flood water started to recede in some areas and rains focused mainly in the Quang Tri-Quang Ngai provinces.

According to the National Centre for Hydro-Meteorology Forecasting, the rain amount in the Thua Thien-Hue, Quang Ngai and Binh Dinh provinces on November 16 ranged from 30 – 149 mm.

Floods in Quang Ngai-Binh Dinh provinces are forecast to continue, while river waters from Thua Thien-Hue to Quang Nam and Phu Yen provinces will slowly go down.-VNA

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Floods in central Vietnam have left at least 31 people dead and 3 missing as of 7am on November 17, according to figures released by the Central – Central Highlands Center for floods control and prevention.

>> In photos: Flood rescue efforts in central Vietnam
>> 18 dead, 7 missing in heavily flooded central Vietnam

Among the dead, 13 were found in Binh Dinh, 13 in Quang Ngai, two in Quang Nam, one in Kon Tum, one in Gia Lai, and one in Phu Yen, said.

Three people have been reported missing in Quang Nam and Gia Lai.

Dien Ban, Dai Loc, Duy Xuyen districts and Hoi An town in Quang Nam province are submerged on a large-scale while 40 communes in Quang Ngai province are under deep water and many areas in the province have been isolated by the flooding.

As many as 98,094 houses in 41 communes in Binh Dinh province are deeply inundated. On Nov 16, heavy rains of up to 80mm were recorded in Thua Thien Hue, Quang Ngai and Binh Dinh provinces.

The river level from Quang Ngai to Binh Dinh is rising while the level from Thua Thien Hua to Quang Nam and Phu Yen is slowly subsiding according to the National Center for Hydro-Meteorological Forecastii (NCHMF).

The water level in rising rivers from Quang Ngai to Binh Dinh is forecast to reach its peak later today (Nov 17), said NCHMF.

Annex 1.13 "VIET NAM NEWS" and "The Nation" on Flash floods from Low Pressure 22 - 25 November

Amended family law protects citizens' rights

HÀ NỘI — Amendments to the Law on Marriage and Family had been drafted to ensure all citizens' rights are legally upheld within the union of marriage and family, said Deputy Minister of Justice Hoàng Thế Liên.

Citizen's rights would be ensured with special regards to gender equality, the protection of children, mothers and disadvantaged members of society, he told a legal policy dialogue on the assessment of the draft amendments yesterday.

"At the same time, the Government would like to study international examples to ensure any amendments are appropriate in the context of Việt Nam's unique cultural, legal and socio-economic characteristics, while being compatible with its domestic laws and any international conventions that Việt Nam is a party to," he said.

At the workshop, participants heard an overall assessment of the draft amendments to the Law on Marriage and Family 2000 from a human rights-based perspective and, proposed and outlined amendments.

UNDP Country Director in Việt Nam Louise Chamberlain tabled several issues from a human rights-based perspective, saying that the gender division of labour at home, with women traditionally sharing a significantly larger burden of unpaid household work, made women and children vulnerable, especially in cases of separation and divorce.

"Other forms of discrimination on the basis of sexual orientation and gender identity also need to be addressed as part of this law, as same sex couples, transgender and bisexual people are forming families and having children. According to international human rights law, they have a right to equality just like anybody else in the community," she added.

The law will be revised or supplemented with a focus on issues customary to marriage and families, including the permitted age for marriage, living as husband and wife without marriage registration, same sex couples living together, and the personal rights of a husband and wife, including their assets.

Identification of birth parents and children, surrogacy for humanitarian purposes, divorce and separation; and marital and familial relationships between Vietnamese people and other nationalities will also be revised.

Human rights

Meanwhile, another workshop on research and education on human rights in Việt Nam yesterday said that human rights awareness in Việt Nam was limited, and there were only five official educational establishments in the field nationwide.

The study of human rights has not delved into the details of theory involved in regional and international laws and mechanisms. Urgent issues such as security, terrorism, freedom of information, climate change, development and poverty had not been addressed.

Delegates stressed that it was necessary to pay more attention to promoting education of human rights at all educational levels in Việt Nam. — VNS

Police investigate

Rescuers search for a missing victim after four men in central Phú Yên Province's Tây Hòa District were swept away by floods following a landslide last Friday. — VNA/VNS Photo Trịnh Bang Nhiệm – Võ Xuân Triệu

Landslides, flash floods batter central provinces

CENTRAL REGION — People in central provinces are being battered by constant landslides and flash floods triggered by torrential rains.

The situation was typical for central and central highlands regions during the rainy season, Võ Bình Dũng, Head of Directorate for Roads of Việt Nam's Road Management Centre 5 in central Đà Nẵng City, told *Lao Động* (Labour) newspaper.

In Phú Yên Province, the fourth victim of a flash flood on Friday is still missing, despite the best efforts of local rescue teams in Sơn Thành Tây Commune.

Deputy chairman of the communal People's Committee Trần Đức Hòa said four men aged 30-34 had set up camp at a shed near a local stream and gone into the forest to gather wild orchids.

Local soldiers and rescuers, he continued, discovered the bodies of three of the men about 300 metres from the shed on Saturday morning after a six-hour search.

According to Hòa, the committee would send more people to seek the last victim.

Phan Công Thắng, chairman of the communal People's Council, believed this flash flood was the largest the commune had ever seen because it swept away many tall trees as well as rocks weighing tens of tonnes.

In Quảng Ngãi Province, about 20,000 cubic metres of mud and rock filled the first floor of the Animal Health Centre, Agriculture Promotion Centre and Plant Protection Centre in Sơn Tây District on Saturday afternoon, said Lê Văn Tùng, chairman of the district People's Committee.

Up to 100 local soldiers were sent to remedy the situation, he said, adding that fortunately, no human losses were reported.

The district's committee plans to build stone embankments behind the buildings to prevent landslides when the rainy season ended.

Tùng said that the risks of landslides in mountainous areas had become more and more unpredicted and severe. He blamed this change on the destruction of forest to build hydro-power plants and the cutting of mountains for construction projects.

However, solving the problem was out of the hands of local authorities, he said. The only way to ensure safety was to predict when floods would occur and help local people to evacuate in small groups.

The rainy season occurs between October and December in the central region and between June and December in central highland region.

According to Dũng from the road management centre, damages were estimated to reach thousands of billions of đồng each year in the transport sector alone, yet localities could not afford the necessary repair. — VNS

Briefs

One dead, one injured in Đồng Nai accident

ĐỒNG NAI — A driver was injured and his assistant killed during an accident on National Highway 51 in southern Đồng Nai Province's Long Thành District yesterday.

Their truck was reportedly hit a truck stopped on the roadside and were, themselves, struck by a container truck.

The container truck also collided with yet another truck travelling in the same lane.

The injured driver was brought to Long Thành General Hospital in Đồng Nai Province where he was admitted to receive treatments. An investigation is ongoing.

Lạng Sơn invests to upgrade commune

LẠNG SƠN — The northern mountain province of Lạng Sơn will invest more than VND93 billion (US$4 million) to upgrade and build medical centres in 95 communes by 2015.

As part of the newly-announced project, commune medical centres will receive funding to upgrade their facilities.

Medical staffs will also be provided with training to improve the quality of health services targetted at local people.

Most of the centres, built in the 1990s with only five-six functional rooms and an area of about 50-60sq.m each, have been seriously degraded.

Work starts on new Red River bridge

LÀO CAI — A ceremony was held yesterday in Lào Cai City to begin construction of the Giang Đông Bridge, the fourth to span the Red River in the region.

The six-span bridge, 296 metres long and 14 metres wide, is designed to withstand an earthquake up to a magnitude 7 on the Richter scale, according to officials.

The cost for the first phase of the project is VND167 billion ($7.9 million) and is expected to be finished within two years.

Speaking at the event, Chairman of the Lào Cai provincial People's Committee Nguyễn Văn Vịnh said the project would not only help

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Floods ravage key towns in the South

The Sunday Nation November 24, 2013 1:00 am

Strong waves lash boats anchored near a beach on Phi Phi island in Krabi yesterday. More than 20 boats were sunk.

Songkhla, Chumphon among areas hit; 23 hurt as bus overturns in Surat Thani

Rainfall has ravaged many areas in the South (javascript:void(0);) with officials in Nakhon Si Thammarat declaring 11 districts as disaster zones. Eight Songkhla's 16 districts have also been classed as disaster zones.

Five districts in Chumphon - Sawi, Thung Tako, Phato, Lamae and Lang Suan - were also flooded yesterday. Staff at Lang Suan Hospital, which is surrounded by water 50cm-deep, were preparing to evacuate patients yesterday to safer ground.

Several sections of the Asia 41 Highway were also flooded. Khao Chairat sub-district in Pathiu, Chumphon, had some 100 homes and 1,000 rai of rubber plantations damaged by strong winds at 2am yesterday.

Nakhon Si Thammarat Governor Apinan Suethanuwong signed a disaster zone declaration after 105,156 people in 11 districts were affected by floods. Some 50 schools were forced to close - 34 in Chu-uat district.

Army Region 4 sent soldiers to help residents in Ban Tha Sung Bon in Tha Sala district, where some 100 homes were damaged by a storm surge. Meanwhile, in Nopphitam district, forest run-off hit three villages in Krung Ching sub-district and marooned 200 households there, while a house was also reportedly damaged by landslide.

Songkhla's disaster zones were Muang, Chana, Singha Nakhon, Ranot, Sathing Phra, Khuan Niang, Krasae Sin and Rattaphum. Provincial authorities dispatched 26 flat-bottom boats to help victims in severest-hit Ranot, Sathing Phra and Chana districts, provincial disaster prevention and mitigation head Amnat Polmat said.

But flooding in Songkhla has started to subside since rain stopped Friday night. To date 34,041 people in 63 sub-districts in eight districts were affected, although no deaths or injuries were reported, he said.

In Surat Thani's Tha Chana district, some 2,000 households in the municipal area were swamped as two roads were under 70cm of water. With more water expected later last night from the brimming Khlong Pa reservoir plus runoff from Prasong sub-district upstream, officials urged residents to move their belongings to higher ground.

In Phunphin district, a bus from carrying 42 passengers from Phuket to Bangkok lost control amid heavy rain on the Asia Highway at 3pm, which left 23 people injured.

Phatthalung governor Seri Srihatrai was also set to declare all districts as disaster zones, if the situation did not improve. Runoff from the Banthat mountain range inundated Pak Phayun, Pa Bon, Bang Kaeo, Khao Chaison, Khuan Khanun and Muang districts.

Villagers had to use boats for transport in the wake of a flood up to 1.5m deep in hard-hit parts of Muang and Khuan Khanun districts.

In Trang, over 2,500 homes in five districts were hit by floods. Na Yong district saw floodwater rise to 50-70cm deep, cutting three sections of Phetchkasem Highway, so motorists going to Phattalung had to use other routes. One death was reported in Ratsada district, when a six-year-old boy was swept away and drowned.

In Prachuap Khiri Khan's Bang Saphan district, rainfall since 2am caused flash floods in some areas of Bang Saphan and Bang Saphan Noi sub-districts, affecting 15 villages. But district chief Thawil Chanthawora-nurak said water should go down quickly, as a canal gate connected to sea had been opened 20 metres to drain water out faster.

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Two die in South flash floods

The Nation November 25, 2013 1:00 am

4 Surat districts disaster zones, 120 Prachuab Khiri Khan households evacuatec

AN 8-YEAR-OLD boy who was seen being washed away in a flash flood from a train station in Surat Thani's Tha Chana district on Saturday afternoon was found dead yesterday morning. His body was located 100 metres downstream.

He was the first casualty of the current flooding in the South. A man was later reported drowned in Phatthalung while fishing at a lake.

Heavy flooding has hit several southern provinces following torrential rains in the past few days, including Prachuap Khiri Khan in the upper region, and Phatthalung and Surat Thani in the lower areas.

In Prachuap Khiri Khan, 120 households have been evacuated in a village in Bang Saphan Noi district after one-metre-deep floodwater inundated their homes. Heavy flooding also affected neighbouring Bang Saphan and |Muang districts, where floodwalls were erected urgently around urban areas.

Strong winds levelled a home and damaged more than 100 rai of palm and rubber plantations.

In Surat Thani, four districts have been declared disaster zones after sustaining damage estimated at Bt21 million. Flooding, 70cm in height, has threatened to loosen the foundations of the main, much-revered pagoda at Wat Phra Borommathat Chaiya in Chaiya district. The pagoda contains Buddha relics. Urgent work is underway to drain floodwater from the temple compound..

Three other districts declared disaster zones are Kanchanadit, Na Derm and Tha Chana, where 4,070 households have been affected, while 41 roads and 21 bridges have been left impassable or damaged.

In Phatthalung, four of 11 districts are under deep floodwater, with the highest at two metres in tambon Phaya Khan and Chai Buri of Muang district.

The provincial Disaster Mitigation Office has warned of possible mudslides in Srinagaridra, Kong Ra and Si Banphot districts, where general soil conditions are softer.

ANNEX 2 ANALYSIS OF ACCURACIES OF SATELLITE RAINFALL ESTIMATE (HYDROESTIMATOR) AND MEAN AERIAL PRECIPITATION (MAP) USED IN THE MRCFFG SYSTEM, COMPARED WITH GROUND OBSERVED RAINFALL

1. Objective of analysis

The MRCFFG system has been developed and put in operation since 2010. During the 4 years of operation of MRCFFG system we learned that occationally the MRCFFG system did not detect well. This may be caused by inaccuracies of the input satellite rainfall estimate (Hydroestimator), but also inaccuracies of Mean Aerial Precipitation (MAP) which is caused by the use of inappropriate bias correction factors used to convert the Satellite rainfall estimate (Hydroestimator) into the mean aerial precipitation. Analysis of the differences between the Hydroestimator, MAP and observed rainfall data from the ground observed stations, that are available in the operational flood forecasting database (Hydmet), is the only way to identify the accuracy of the MRCFFG by comparing the satellite rainfall estimate and MAP with the ground rainfall observations.

2. Methodology

2.1 Calculation rainfall value of satellite rainfall estimates at the ground observed rainfall stations

The satellite rainfall estimate (Hydroestimator) was provided in vector format (Latitude, Longitude and rainfall value) of each grid . Using the Arcview geo-processing tool with the sharp file of ground observed rainfall network, one can allocate the satellite rainfall value to the each ground observed station from the nearest grid point. Table A-1 presents the list of observed rainfall network and the coordinates of grid point of satellite rainfall estimate (Hydroestimator) which is located nearest to the ground observation station.

Table A-1 Coordinate of observe rainfall stations comparing with the nearest point of grid satellite rainfall estimate.

No	Station _NAME	Coordinate of stations		Distance from station	Coordinate of grid point	
		LONGitude	LATitude	to grid point	LONGitude	LATitude
1	Kompong Speu	104.05225	11.34596	0.013	104.062698	11.354004
2	Oral	104.13423	11.68993	0.012	104.146027	11.687340
3	O Taroat	104.42020	11.53895	0.025	104.437698	11.520672
4	Trapeang	104.13323	11.81893	0.014	104.146027	11.812340
5	Pailin	102.61440	12.86083	0.012	102.604347	12.854015
6	Pursat	103.89625	12.55187	0.010	103.896027	12.562346
7	Maung Russey	103.44630	12.77285	0.009	103.437691	12.770681
8	Dap Bat	103.78327	12.34488	0.015	103.771027	12.354012
9	Kravanh	103.64428	12.67686	0.011	103.646027	12.687347

No	Station _NAME	Coordinate of stations		Distance from station	Coordinate of grid point	
		LONGitude	LATitude	to grid point	LONGitude	LATitude
10	Tuk Phos	104.52418	12.05691	0.006	104.521034	12.062342
11	Stung Chinit	105.14310	12.51189	0.009	105.146034	12.520679
12	Cham Bac	105.82303	12.28292	0.016	105.812706	12.270678
13	Peam Te	106.03400	12.45491	0.022	106.021042	12.437346
14	Svay Chreas	106.27897	12.28492	0.016	106.271042	12.270678
15	Kantout	106.17198	12.46891	0.019	106.187714	12.479012
16	Seam Bork	105.93500	13.39184	0.005	105.937714	13.395687
17	Tala Boriwat	105.95099	13.54783	0.020	105.937714	13.562355
18	Sesan	106.09197	13.55383	0.015	106.104378	13.562355
19	Seam Pang	106.36293	14.13480	0.014	106.354378	14.145693
20	Bovel	102.87336	13.25480	0.025	102.854355	13.270685
21	Paklay	101.41300	18.20800	0.027	101.396011	18.187391
22	Thakhek	104.80700	17.39299	0.006	104.812698	17.395718
23	Ban Phonsi	104.09895	18.30201	0.012	104.104362	18.312393
24	Ban Chan Noi	105.88700	14.31700	0.010	105.896042	14.312361
25	Moung Mai	103.65800	18.50500	0.020	103.646027	18.520727
26	Kuanpho	105.42800	17.49700	0.020	105.437706	17.479053
27	Ban Keng don	105.31700	16.18500	0.005	105.312706	16.187374
28	Highway bridge	105.91300	16.57700	0.022	105.896042	16.562378
29	Kengkok	105.20300	16.44500	0.017	105.187706	16.437378
30	Saravanne	106.45000	15.71000	0.023	106.437714	15.729038
31	Souvanna Khill	105.82500	15.39700	0.012	105.812706	15.395702
32	M. May (attapeu	106.84300	14.80700	0.013	106.854385	14.812365
33	Ban Donghene	105.78300	16.00000	0.024	105.771042	16.020706
34	Phalan	106.23300	16.70000	0.013	106.229378	16.687378
35	Moung Phine	106.05000	16.51700	0.013	106.062714	16.520710
36	Laongam	106.16700	15.46700	0.024	106.187714	15.479036
37	Moung Tchepone	106.23300	16.03300	0.013	106.229378	16.020706
38	Moung Nong	105.90000	15.16700	0.021	105.896042	15.187366
39	Nikum 34	106.43300	15.18300	0.006	106.437714	15.187366
40	Se Kong	106.85000	15.08300	0.021	106.854385	15.062366
41	Kg. Chhnang	104.68216	12.25290	0.019	104.687698	12.270678
42	Kompong Kdei	104.33519	13.12883	0.026	104.354362	13.145683
43	Kompong Chen	104.57916	12.93885	0.017	104.562698	12.937349
44	Kg. Thmar	105.12710	12.50289	0.026	105.146034	12.520679
45	Talo	103.65910	12.51880	0.013	103.646027	12.520679
46	Sambor	105.97670	12.77950	0.009	105.979378	12.770681
47	Snoul	106.42580	12.07480	0.017	106.437714	12.062342
48	Sisophon	102.97050	13.60910	0.010	102.979355	13.604021
49	Battambang	103.20000	13.10000	0.013	103.187683	13.104017
50	Chong Kal	103.58340	13.95000	0.024	103.562691	13.937357
51	Banteay Srey	103.96530	13.59810	0.015	103.979362	13.604021

No	Station _NAME	Coordinate of stations		Distance from station	Coordinate of grid point	
		LONGitude	LATitude	to grid point	LONGitude	LATitude
52	Srey Snam	103.52310	13.84310	0.011	103.521027	13.854023
53	Sondan	105.25000	13.10000	0.021	105.229370	13.104017
54	Muong Tchepon	106.23330	16.03330	0.013	106.229378	16.020706
55	Vangvieng	102.45000	18.93330	0.013	102.437683	18.937397
56	Muong Kao(Borik	103.73330	18.56670	0.006	103.729355	18.562393
57	Sayaboury	101.36670	19.23330	0.013	101.354340	19.229065
58	Pakkanhoung	102.43330	18.53330	0.013	102.437683	18.520727
59	Xieng Ngeun	102.23330	19.75000	0.021	102.229347	19.770737
60	Ban Phiengluang	103.05000	19.51670	0.013	103.062683	19.520735
61	Muong Namtha	101.40000	20.93000	0.008	101.396011	20.937412
62	Oudomxay	102.00000	20.68000	0.022	101.979347	20.687412
63	Phongsaly	102.20000	21.73330	0.013	102.187683	21.729086
64	Dak Nong	107.68000	12.00000	0.022	107.687721	12.020676
65	Buon Me Thuot	108.08300	12.60000	0.021	108.062729	12.604013
66	Buon Ho	108.27000	12.92000	0.017	108.271057	12.937349
67	MDrak	108.75000	12.73000	0.021	108.729401	12.729013
68	An Khe	108.65000	13.95000	0.013	108.646065	13.937357
69	AyunPa	108.45000	13.38000	0.020	108.437729	13.395687
70	Pleiku	107.90000	14.01700	0.005	107.896057	14.020691
71	Dak To	107.83000	14.65000	0.018	107.812729	14.645697
72	Hue	107.58000	16.43000	0.019	107.562721	16.437378
73	ALuoi	107.28000	16.22000	0.013	107.271057	16.229042
74	Dong Ha	107.08000	16.85000	0.018	107.062721	16.854046
75	BaDon	106.42000	17.75000	0.027	106.437714	17.770721
76	Dong Hoi	106.60000	17.48000	0.004	106.604385	17.479053
77	Tuyen Hoa	106.02000	17.88000	0.016	106.021042	17.895721
78	Ha Tinh	105.90000	18.35000	0.006	105.896042	18.354059
79	Huong Khe	105.70000	18.18000	0.014	105.687706	18.187391
80	Ky Anh	106.27000	18.10000	0.004	106.271042	18.104057
81	Dien Bien	103.00000	21.37000	0.026	102.979355	21.354084
82	Quynh Nhai	103.57000	21.85000	0.008	103.562691	21.854088
83	Son La	103.90000	21.33000	0.018	103.896027	21.312416
84	Tuan Giao	103.42000	21.58000	0.025	103.437691	21.562418
85	Muong Te	102.83000	22.37000	0.024	102.812683	22.354092
86	Lai Chau	103.15000	22.07000	0.009	103.146019	22.062422
87	Sin Ho	103.23000	22.37000	0.016	103.229355	22.354092
88	Tam Duong	103.48000	22.42000	0.017	103.479355	22.437424
89	Xieng Kok	100.64200	20.89670	0.004	100.645996	20.895746
90	Chiang Saen	100.08300	20.27340	0.021	100.062660	20.270741
91	Chiang Khong	100.41000	20.26840	0.014	100.395996	20.270741
92	Pak Beng	101.11500	19.85830	0.011	101.104340	19.854071
93	Luang Prabang	102.13700	19.89170	0.010	102.146011	19.895737

No	Station _NAME	Coordinate of stations		Distance from station	Coordinate of grid point	
		LONGitude	LATitude	to grid point	LONGitude	LATitude
94	Paklay	101.41300	18.20830	0.027	101.396011	18.229057
95	Vien Tiane	102.62000	17.92830	0.018	102.604347	17.937389
96	Chiang Khan	101.66800	17.89670	0.020	101.687675	17.895721
97	Nong Khai	102.72000	17.87670	0.021	102.729355	17.895721
98	Paksane	103.66700	18.37170	0.027	103.687691	18.354059
99	Nakhon Phanom	104.80300	17.39840	0.010	104.812698	17.395718
100	Thakhek	104.80700	17.39330	0.006	104.812698	17.395718
101	Savannakhet	104.74700	16.56170	0.018	104.729370	16.562378
102	Mukdahan	104.73700	16.54000	0.021	104.729370	16.520710
103	Khong Chiam	105.50000	15.31840	0.021	105.479370	15.312368
104	Pakse	105.80000	15.11670	0.018	105.812706	15.104033
105	Kratie	105.98700	12.23977	0.008	106.021042	12.479012
106	Kompong Cham	105.38800	11.90934	0.016	105.396042	11.895674
107	Tan Chau	105.24300	10.80340	0.016	105.229370	10.812332
108	My Thuan	105.90000	10.27340	0.005	105.896042	10.270660
109	Neak Luong	105.28400	11.26086	0.016	105.271042	11.270670
110	Phnom Penh Port	104.92300	11.57499	0.019	104.937698	11.562338
111	Prek Kdam	104.80400	11.81329	0.009	104.812698	11.812340
112	Kampong Luong	104.21500	12.57517	0.019	104.229362	12.562346
113	Bassac Chaktomo	104.93300	11.55164	0.012	104.937698	11.562338
114	Koh Khel	105.04000	11.23958	0.022	105.021034	11.229002
115	Chau Doc	105.13300	10.70670	0.023	105.146034	10.687332
116	Can Tho	105.79000	10.03340	0.023	105.771042	10.020658
117	Chiang Rai	99.85000	19.91840	0.019	99.854324	19.937405
118	Thoeng	100.19200	19.68670	0.004	100.187668	19.687403
119	Jinghong	100.78000	22.30000	0.015	100.771004	22.312424
120	Manan	101.26000	21.91000	0.018	101.271004	21.895754
121	Muong Ngoy	102.75800	20.70170	0.019	102.771019	20.687412
122	Ban Mixay (Ban	102.17700	19.78670	0.019	102.187683	19.770737
123	Ban Pak Kanhoun	102.55000	18.41830	0.023	102.562683	18.437393
124	Muong Mai	103.65800	18.50500	0.020	103.646027	18.520727
125	Muong Borikhane	103.73700	18.56170	0.008	103.729355	18.562393
126	Ban Phone Si	104.09800	18.30170	0.012	104.104362	18.312393
127	Ban Signo	105.05200	17.84500	0.014	105.062698	17.854055
128	Ban Tha Kok Dae	103.78000	17.86170	0.012	103.771027	17.854055
129	Mahaxai	105.20200	17.41330	0.023	105.187706	17.395718
130	Ubon	104.86200	15.22170	0.011	104.854370	15.229034
131	Khong Sedone	105.81500	15.57500	0.013	105.812706	15.562370
132	M.May (Attopeu)	106.84300	14.80670	0.013	106.854385	14.812365
133	Voeun Sai	106.81400	13.96763	0.011	106.812714	13.979025
134	Kontum	108.00800	14.34340	0.017	108.021057	14.354027
135	Ban Don	107.78300	12.85000	0.013	107.771057	12.854015

No	Station _NAME	Coordinate of stations		Distance from station	Coordinate of grid point	
		LONGitude	LATitude	to grid point	LONGitude	LATitude
136	Vam Nao	105.35700	10.57500	0.013	105.354370	10.562330
137	Huong Son	105.26000	18.31000	0.011	105.271042	18.312393
138	Okrieng	106.18306	13.03333	0.013	106.187714	13.020683
139	O Yadav	107.34527	13.66944	0.020	107.354385	13.687355
140	Koh Gneak	107.02138	13.03888	0.018	107.021049	13.020683
141	Koulen	104.71111	13.81944	0.020	104.729370	13.812357
142	Tbeng Meanchey	104.98027	13.80361	0.009	104.979370	13.812357
143	Oudor Meanchey	103.51416	14.18667	0.007	103.521027	14.187359
144	Stung Treng	106.01700	13.54500	0.018	106.021042	13.562355
145	Veun Khene	106.77800	14.81000	0.007	106.771049	14.812365
146	Xiengkhouang	103.36700	19.33300	0.024	103.354355	19.312401
147	Pha Din	103.52000	21.57000	0.008	103.521027	21.562418
148	Khe Sanh	106.73000	16.63000	0.016	106.729385	16.645712

2.2 Calculation of MAP Value at the ground observed rainfall stations

MAP is the mean aerial precipitation and is one of the products of the MRCFFG system. It is calculated for each FFG sub-catchment hourly, 3 hourly, 6 hourly and 24 hourly. For this study we will select the product of 24 hour MAP as we have the daily records rainfall from the ground observed stations. To select the sub-areas of MAP we used the ARCVIEW geo-processing tool to indentify the locations of stations in the MAP sub-areas (or close to that sub-area). The Table A-2 present the locations of ground observed stations and MAP sub-areas number.

Table A-2 Coordinate of observe rainfall stations comparing with FFG sub-basin number (MAP) sub-basin number.

No	Hymos_id	Station_name	X_coord	Y_coord	FFG Basin number
1	14501	Stung Treng	602677.21	1495467.11	10072
2	14901	Kratie	611272.16	1379180.51	10475
3	19802	Kompong Cham	551420.63	1325951.33	10688
4	33401	Chaktomuk	493533.41	1277459.91	10735
5	20101	P.P. Port	492461.94	1279227.83	10729
6	20102	Prek Kdam	478651.67	1305895.30	10728
7	19806	Neak Loung	531477.64	1244337.09	10895
8	33402	Koh Khel	503163.98	1242557.66	10927
9	20103	Kompong Chnnang	465854.69	1354221.41	10470
10	620101	Kompong Tmar	514231.74	1381848.08	10621
11	570101	Kompong Kdey	428365.22	1451158.72	10377
12	600101	Kompong Chen	454774.38	1430092.01	10400
13	20106	Kompong Loung	414661.00	1390341.00	10400
14	450101	LumPhat	665453.11	1498255.52	10069
15	440102	Veun Sai	695951.47	1544936.20	10044
16	130322	Bantey Srey	387503.00	1502503.00	10294

No	Hymos_id	Station_name	X_coord	Y_coord	FFG Basin number
17	130505	Sadan	527096.00	1448093.00	10537
18	120505	Sambo	605274.00	1411786.00	10416
19	120606	Snoul	654533.00	1334589.00	10667
20	130326	Srey Snam	340070.00	1530404.00	10106
21	120309	Talo	293566.00	1384688.00	10362
22	130309	Sre Noy	394400.00	1526000.00	10099
23	130202	Sisophon	279742.00	1502150.00	10189
24	130200	O Krieng	628700.00	1441100.00	10333
25	134010	O Yadav	760500.00	1516500.00	10158
26	130220	Koh Gneak	721000.00	1443600.00	10150
27	134910	Koulen	469080.27	1527518.07	10598
28	134813	Tbeng Meanchey	498259.95	1525287.38	10554
29	141112	Oudor Meanchey	339634.06	1568931.40	10123
30	110404	Kompong Speu	397004.92	1254083.78	10812
31	110433	Oral	406066.44	1292094.49	10745
32	110434	O Taroat	437199.76	1275319.00	10739
33	110445	Trapang Cho	406001.23	1306359.47	10746
34	120202	Pailin	241515.33	1422626.52	10235
35	120302	Pursat	380512.84	1387511.90	10421
36	120303	Moung Russey	331767.41	1412202.68	10359
37	120304	Dap Bat	368132.18	1364672.55	10421
38	120312	Kravanh	353206.46	1401464.46	10368
39	120420	Tuk Phos	448635.41	1332573.99	10696
40	120423	Stung Chinit	515969.41	1382844.15	10621
41	120520	Chambac	589922.75	1357656.74	10502
42	120602	Peam Te	612793.81	1376757.40	10475
43	120607	Svay Chreas	639510.50	1358072.18	10660
44	120611	Kantout	627784.47	1378368.21	10476
45	130506	Seambok	601655.31	1480340.15	10167
46	130507	Tala Boriwat	603320.62	1497599.59	10072
47	140605	Sesan	618573.87	1498327.16	10072
48	140603	Seam Pang	647530.35	1562740.74	10041
49	130208	Bovel	269998.30	1465975.00	10220
50	10402	Xieng Kok	46408.00	2316876.89	21035
51	10901	Pak Beng	93004.88	2200133.00	20954
52	11201	Luang Prabang	199500.00	2200587.00	20412
53	11401	Paklay	120942.00	2016588.00	20366
54	11901	Vientiane	248303.00	1983507.00	20322
55	12703	Paksane	359141.78	2031826.44	20693
56	13102	Thakhek	479921.00	1922717.00	20693
57	13401	Savannakhet	473430.00	1830796.00	20132
58	13901	Pakse	593581.80	1671129.00	20774
59	230101	Bang Pakkanhoung	229430.00	2050761.00	20271

No	Hymos_id	Station_name	X_coord	Y_coord	FFG Basin number
60	250101	Moung Mai	358754.60	2046260.00	20224
61	270101	Ban Phonsi	405195.00	2023509.00	20669
62	260101	Moung Keo(Borikan)	366721.00	2053063.00	20134
63	320107	Mahaxai	521875.00	1924931.00	20703
64	390102	Khong Sedone	587803.30	1721769.80	20778
65	390103	Saravanne	655794.00	1737067.60	20790
66	430106	VeunKhen	691762.40	1637747.30	20836
67	430105	M.May(Attapeu)	691321.50	1638048.00	20836
68	100102	Moung Ngoy	250226.60	2275742.00	20528
69	120101	Ban Mixay	204635.00	2190052.00	20588
70	190103	Sayaboury	118385.37	2130276.16	20406
71	190205	Xieng Ngeun	210439.00	2185857.00	20590
72	180207	Vang Vieng	231859.00	2095028.00	20331
73	230113	Phiengluang	295797.22	2158871.39	20292
74	200204	Oudomxay	187870.00	2289297.00	20508
75	210201	Phonsaly	210783.00	2405568.00	20445
76	200101	Moung Namtha	125922.00	2318279.00	21008
77	270903	Ban Signo	505719.60	1971385.60	20200
78	190302	XiengKhoung	328876.00	2138157.00	20236
79	14301	Ban Chan Noi	596079.00	1582647.80	20007
80	170505	Kuanpho	545857.50	1934264.00	20713
81	350101	Ban Keng Don	534306.00	1789102.00	20037
82	350106	Highway Bridge	597822.00	1832659.70	20049
83	160505	Kengkok	522092.00	1817847.50	20102
84	390104	Souvanna Khill	588951.30	1702084.00	20777
85	160506	Phalan	631880.00	1846451.00	40078
86	160605	Moung Phil	612473.50	1826093.00	20052
87	150604	Laongam	625612.60	1709997.00	20803
88	160602	Moung Nong	597105.30	1676673.90	20774
89	150607	Nikum 34	654360.40	1678749.17	20845
90	160601	Moung Tcheraphon	632327.90	1772654.90	20787
91	150609	Se Kong	699261.56	1668020.00	20840
92	160504	Ban Donheng	584197.00	1768770.00	20764
93	10501	Chiang Saen	-13862.92	2249162.37	31018
94	10801	Chiang Khong	20353.55	2247621.39	30973
95	11903	Chian Khan	146947.58	1981787.60	30068
96	13801	Khong Chiam	553666.71	1693425.04	30330
97	12001	Nong Khai	258447.59	1977893.72	30114
98	13101	Nakhon Phanom	479078.29	1923440.38	30067
99	13402	Mukdahan	471941.80	1828540.08	30212
100	70103	Thoeng	-4421.34	2176322.90	30980
101	50104	Chiang Rai	-127699.00	2213657.00	31027
102	290102	Ban Tha Kok Daen	341240.00	1993987.00	30158

No	Hymos_id	Station_name	X_coord	Y_coord	FFG Basin number
103	19803	Tan Chau	526657.12	1193891.17	40764
104	19804	My Thuan	598976.66	1135419.04	40598
105	39801	Chau Doc	514965.02	1183269.55	
106	39803	Can Tho	586994.77	1108849.83	
107	980601	Vam Nao	539476.19	1168693.96	
108	451305	Ban Don	802498.49	1421861.16	40064
109	440201	Kon Tum	824512.08	1587817.12	40690
110	220201	Moung Te	276981.40	2475063.99	41068
111	220303	Tam Duong	343980.09	2479779.24	41044
112	220302	Sin Ho	318178.97	2474524.70	41024
113	220301	Lai Chau	309534.27	2441404.88	41046
114	210305	Tuan Giao	336842.76	2386841.79	41410
115	210301	Dien Bien	293050.90	2364088.86	40080
116	210303	Quynh Nhai	352650.95	2416582.48	41020
117	160611	Khe Sanh	684947.80	1839098.54	40078
118	210304	Son La	386348.71	2358740.98	41105
119	180505	Houng Khe	574450.74	2009916.41	41560
120	180504	Ha Tinh	595510.57	2028818.93	41590
121	180601	Ky Anh	634798.92	2001387.09	41593
122	170603	Tuyen Hao	608477.99	1976879.98	41598
123	170601	Ba Don	650968.23	1962771.16	41597
124	170602	Dong Hoi	670308.00	1933044.65	40107
125	160706	Dong Ha	722037.63	1863804.12	40131
126	160705	A Luoi	744146.01	1794302.80	40090
127	160704	Hue	775937.92	1817932.61	40149
128	140715	Dak To	805262.67	1621198.80	40683
129	140703	Pleiku	826726.94	1546165.27	40703
130	130803	An Khe	894906.27	1544907.98	40341
131	130804	Ayunpa	874165.88	1481445.26	40353
132	120801	Boun Me Thuoc	831737.93	1402259.18	40070
133	120806	Mdark	907771.63	1409899.01	40359
134	120712	Dak Nong	792258.41	1327655.30	40517
135	120805	Buon Ho	855308.71	1430235.55	40754
136	180506	Houng Son	527897.22	2024177.85	41555
137	220401	Pha Din	347178.87	2385641.08	41096
138	220402	Yen Chau	415207.28	2325367.25	41108
139	220403	Main Chau	531716.86	2254349.35	41388
140	220403	Tuong Duong	422606.85	2119484.92	41500
141	220405	Con Cuong	450954.80	2103895.34	41504
142	220407	Tay Ninh	686024.79	1238319.37	40440
143	220406	Phuc Long	673830.43	1271435.76	40639
144	220408	Dong Xoai	668481.70	1251496.39	40441
145	220409	Ialy	800168.57	1251571.24	40560

No	Hymos_id	Station_name	X_coord	Y_coord	FFG Basin number
146	450701	Duc Xuyen	807740.61	1366774.63	40712

Note: For stations Chau Doc , Vam nao, Cantho , have not identify MAP basin number as its located in the Mekong delta.

2.3 Selected period for analysis

The best period for analysis of differences between Hydroestimator , MAP and ground rainfall observation is flood season from the June to end of November during those months the Lower Mekong Basin was covered by several severe weather situations such as Tropical storm, Tropical depression ITCZ , Low pressure which caused a heavy rainfall for some Mekong Sub-catchments.

3. Results of analysis on differences between Hydroestimator, MAP and observed rainfall

3.1 Analysis of the differences between Hydroestimator, MAP and observed rainfall values during flood season 2013

The analysis of differences between Hydroestimator, MAP and the observed rainfall was made for the 2013 flood season (June – November) and for each severe weather situation.

Considering the whole flood season 2013 period the station with the maximum number of days of underestimated rainfall (Hydroestimator) was Aloue station with 114 days underestimated of the total number of 183 days of daily observations. The station with the maximum number day of overestimated rainfall (Hydroestimator) was Tan Chau station with 137 days overestimated of the total number of 183 days of daily observations. The stations with a maximum rainfall error values were Hue, Hong Khe, Khe San and Aloue stations with raindfall error values of 350 - 430 mm/day. Table A-3 presents the result of comparison of Hydroestimator, MAP with observed rainfall for the whole period of flood season 2013 (01 June – 30 November).

Table A-3 Result of comparison of Hydroestimator, Map with observed rainfall during the flood season 2013 in the period 01 June - 30 November.

Station Name	StaID		Number of day overestimated	Number of days underestimated	equal (day)	Max. error (mm)	Occurred at date	Remark
Stung Treng	14501	Hyd-RF	89	42	52	165.22	04/06/13	
Stung Treng	14501	Map-RF	73	61	49	-83.96	22/07/13	
Kratie	14901	Hyd-RF	101	40	42	87.48	03/06/13	
Kratie	14901	Map-RF	92	57	34	-71.74	20/07/13	
Kompong Cham	19802	Hyd-RF	117	25	41	81.73	16/07/13	
Kompong Cham	19802	Map-RF	105	44	34	-44.88	30/09/13	
Chaktomuk	33401	Hyd-RF	121	36	26	113.12	16/07/13	
Chaktomuk	33401	Map-RF	108	55	20	-88.69	15/07/13	
Neak Loung	19806	Hyd-RF	126	29	28	104.81	05/06/13	

Station Name	StaID		Number of day overestimated	Number of days underestimated	equal (day)	Max. error (mm)	Occurred at date	Remark
Neak Loung	19806	Map-RF	128	38	17	-67.88	11/09/13	
Koh Khel	33402	Hyd-RF	121	32	30	81.36	07/11/13	
Koh Khel	33402	Map-RF	126	38	19	-49.39	22/11/13	
Prek Kdam	20102	Hyd-RF	114	30	39	104.51	16/07/13	
Prek Kdam	20102	Map-RF	118	41	24	-47.75	16/11/13	
Bantey Srey	130322	Hyd-RF	97	47	39	102.00	19/09/13	
Bantey Srey	130322	Map-RF	86	64	33	-86.94	23/07/13	
Sadan	130505	Hyd-RF	109	24	50	85.03	20/07/13	
Sadan	130505	Map-RF	105	37	41	-82.38	24/07/13	
Sambo	120505	Hyd-RF	97	32	54	-319.60	13/10/13	Error of rainfall
Sambo	120505	Map-RF	97	42	44	-319.60	13/10/13	data from station
Snoul	120606	Hyd-RF	102	36	45	-157.91	16/07/13	
Snoul	120606	Map-RF	93	53	37	-165.77	16/07/13	
Srey Snam	130326	Hyd-RF	111	41	31	110.23	03/08/13	
Srey Snam	130326	Map-RF	102	53	28	-67.32	05/10/13	
Talo	120309	Hyd-RF	102	43	38	99.43	05/10/13	
Talo	120309	Map-RF	102	58	23	-76.41	03/10/13	
Sre Noy	130309	Hyd-RF	106	43	34	115.41	03/08/13	
Sre Noy	130309	Map-RF	84	66	33	-83.51	05/06/13	
Sisophon	130202	Hyd-RF	117	25	41	-96.41	14/08/13	
Sisophon	130202	Map-RF	102	45	36	-133.81	14/08/13	
O Krieng	130200	Hyd-RF	102	22	59	163.86	04/06/13	
O Krieng	130200	Map-RF	91	40	52	67.37	04/06/13	
O Yadav	134010	Hyd-RF	68	60	55	-82.81	02/06/13	
O Yadav	134010	Map-RF	78	59	46	-85.08	02/06/13	
Koh Gneak	130220	Hyd-RF	78	48	57	-87.54	20/07/13	
Koh Gneak	130220	Map-RF	68	70	45	-94.92	20/07/13	
Koulen	134910	Hyd-RF	109	20	54	82.08	01/06/13	
Koulen	134910	Map-RF	95	47	41	-46.07	02/09/13	
Tbeng Meanchey	134813	Hyd-RF	95	40	48	81.04	28/07/13	
Tbeng Meanchey	134813	Map-RF	88	53	42	-59.84	13/06/13	
Oudor Meanchey	141112	Hyd-RF	115	25	43	118.72	02/06/13	
Oudor Meanchey	141112	Map-RF	108	41	34	-130.13	04/10/13	Flash flood occur.
Kompong Speu	110404	Hyd-RF	98	51	34	-57.18	11/08/13	
Kompong Speu	110404	Map-RF	115	51	17	-57.85	01/10/13	
Oral	110433	Hyd-RF	109	43	31	82.08	16/07/13	
Oral	110433	Map-RF	104	53	26	35.94	16/07/13	
O Taroat	110434	Hyd-RF	126	18	39	78.74	16/07/13	
O Taroat	110434	Map-RF	131	25	27	-70.16	01/10/13	
Trapang Cho	110445	Hyd-RF	107	43	33	99.41	05/06/13	

Station Name	StaID		Number of day overestimated	Number of days underestimated	equal (day)	Max. error (mm)	Occurred at date	Remark
Trapang Cho	110445	Map-RF	98	61	24	-81.00	04/07/13	
Pailin	120202	Hyd-RF	112	34	37	89.84	05/06/13	Flash flood occur.
Pailin	120202	Map-RF	106	51	26	-85.82	07/10/13	
Pursat	120302	Hyd-RF	107	46	30	90.30	20/09/13	
Pursat	120302	Map-RF	99	61	23	-70.10	27/10/13	
Moung Russey	120303	Hyd-RF	122	28	33	86.03	08/08/13	
Moung Russey	120303	Map-RF	118	41	24	-123.14	04/10/13	Flash flood occur.
Dap Bat	120304	Hyd-RF	122	29	32	100.93	20/09/13	
Dap Bat	120304	Map-RF	116	44	23	-76.44	03/10/13	
Kravanh	120312	Hyd-RF	107	35	41	161.68	05/10/13	
Kravanh	120312	Map-RF	90	56	37	-70.12	08/11/13	
Tuk Phos	120420	Hyd-RF	101	42	40	137.28	04/06/13	
Tuk Phos	120420	Map-RF	98	55	30	-58.32	23/07/13	
Stung Chinit	120423	Hyd-RF	107	33	43	123.42	04/06/13	
Stung Chinit	120423	Map-RF	95	49	39	-65.84	15/06/13	
Chambac	120520	Hyd-RF	113	20	50	90.35	07/07/13	
Chambac	120520	Map-RF	104	33	46	-69.60	15/06/13	
Peam Te	120602	Hyd-RF	106	40	37	89.94	03/06/13	
Peam Te	120602	Map-RF	97	57	29	-51.26	10/09/13	
Svay Chreas	120607	Hyd-RF	108	27	48	135.96	26/09/13	
Svay Chreas	120607	Map-RF	104	49	30	-123.12	07/08/13	
Kantout	120611	Hyd-RF	101	30	52	-108.17	07/08/13	
Kantout	120611	Map-RF	92	49	42	-113.46	07/08/13	
Seambok	130506	Hyd-RF	87	42	54	148.96	04/06/13	
Seambok	130506	Map-RF	95	49	39	-74.99	07/10/13	
Tala Boriwat	130507	Hyd-RF	96	36	51	149.87	04/06/13	
Tala Boriwat	130507	Map-RF	79	56	48	64.33	04/06/13	
Sesan	140605	Hyd-RF	94	30	59	171.84	04/06/13	
Sesan	140605	Map-RF	84	47	52	-60.16	20/07/13	
Seam Pang	140603	Hyd-RF	87	45	51	103.08	19/09/13	
Seam Pang	140603	Map-RF	76	66	41	-87.76	07/07/13	
Bovel	130208	Hyd-RF	105	35	43	267.52	01/06/13	
Bovel	130208	Map-RF	96	48	39	63.67	01/06/13	
Pak Beng	10901	Hyd-RF	76	31	76	-120.78	22/07/13	
Pak Beng	10901	Map-RF	80	32	71	-120.63	22/07/13	
Luang Prabang	11201	Hyd-RF	59	37	87	124.88	25/08/13	
Luang Prabang	11201	Map-RF	65	39	79	-99.34	21/08/13	
Paklay	11401	Hyd-RF	77	27	79	83.16	11/07/13	
Paklay	11401	Map-RF	80	29	74	-57.39	25/10/13	
Vientiane	11901	Hyd-RF	87	26	70	113.06	06/06/13	

Station Name	StaID		Number of day overestimated	Number of days underestimated	equal (day)	Max. error (mm)	Occurred at date	Remark
Vientiane	11901	Map-RF	90	33	60	-63.81	16/09/13	
Paksane	12703	Hyd-RF	69	48	66	-161.62	27/06/13	
Paksane	12703	Map-RF	48	71	64	-171.78	27/06/13	
Thakhek	13102	Hyd-RF	79	35	69	118.89	30/07/13	
Thakhek	13102	Map-RF	64	52	67	-113.95	21/07/13	
Savannakhet	13401	Hyd-RF	89	26	68	79.04	25/08/13	
Savannakhet	13401	Map-RF	79	39	65	-51.22	28/06/13	
Pakse	13901	Hyd-RF	87	32	64	-151.01	16/09/13	
Pakse	13901	Map-RF	105	28	50	-160.62	16/09/13	
Bang Pakkanhoung	230101	Hyd-RF	75	29	79	127.22	29/07/13	
Bang Pakkanhoung	230101	Map-RF	64	51	68	-76.72	22/08/13	
Moung Mai	250101	Hyd-RF	57	54	72	-181.96	27/06/13	
Moung Mai	250101	Map-RF	68	50	65	-182.15	27/06/13	
Ban Phonsi	270101	Hyd-RF	66	38	79	172.67	08/08/13	
Ban Phonsi	270101	Map-RF	85	34	64	144.59	08/08/13	
Moung Keo(Borikan)	260101	Hyd-RF	68	40	75	-277.14	24/06/13	
Moung Keo(Borikan)	260101	Map-RF	82	38	63	-266.32	24/06/13	
Mahaxai	320107	Hyd-RF	66	39	78	138.07	23/06/13	
Mahaxai	320107	Map-RF	77	39	67	129.72	23/06/13	
Khong Sedone	390102	Hyd-RF	82	43	58	-147.37	23/09/13	
Khong Sedone	390102	Map-RF	83	44	56	-145.50	23/09/13	
Saravanne	390103	Hyd-RF	84	47	52	102.90	01/10/13	
Saravanne	390103	Map-RF	82	54	47	-137.54	19/09/13	
VeunKhen	430106	Hyd-RF	73	49	61	155.04	23/09/13	
VeunKhen	430106	Map-RF	70	64	49	-110.14	23/06/13	
Moung Ngoy	100102	Hyd-RF	59	31	93	63.23	26/08/13	
Moung Ngoy	100102	Map-RF	73	22	88	92.69	26/08/13	
Sayaboury	190103	Hyd-RF	76	30	77	-64.96	06/09/13	
Sayaboury	190103	Map-RF	79	37	67	-66.81	06/09/13	
Vang Vieng	180207	Hyd-RF	39	73	71	-111.56	04/08/13	
Vang Vieng	180207	Map-RF	53	69	61	-115.90	04/08/13	
Phiengluang	230113	Hyd-RF	64	51	68	69.62	25/08/13	
Phiengluang	230113	Map-RF	70	49	64	64.02	25/08/13	
Oudomxay	200204	Hyd-RF	72	27	84	129.24	29/07/13	
Oudomxay	200204	Map-RF	73	28	82	119.12	29/07/13	
Phonsaly	210201	Hyd-RF	54	42	87	74.48	21/06/13	
Phonsaly	210201	Map-RF	50	48	85	64.35	21/06/13	
Moung Namtha	200101	Hyd-RF	65	39	79	60.80	06/06/13	
Moung Namtha	200101	Map-RF	78	39	66	57.73	21/08/13	
XiengKhoung	190302	Hyd-RF	73	32	78	141.66	24/06/13	

Station Name	StaID		Number of day overestimated	Number of days underestimated	equal (day)	Max. error (mm)	Occurred at date	Remark
XiengKhoung	190302	Map-RF	82	30	71	116.75	24/06/13	
Kuanpho	170505	Hyd-RF	62	51	70	-162.62	29/08/13	
Kuanpho	170505	Map-RF	75	47	61	-157.85	29/08/13	
Highway Bridge	350106	Hyd-RF	84	27	72	105.94	03/08/13	
Highway Bridge	350106	Map-RF	87	30	66	101.28	03/08/13	
Kengkok	160505	Hyd-RF	91	23	69	-111.12	13/09/13	
Kengkok	160505	Map-RF	89	32	62	-113.95	13/09/13	
Phalan	160506	Hyd-RF	99	9	75	189.94	18/09/13	
Phalan	160506	Map-RF	121	13	49	58.72	18/09/13	
Moung Phil	160605	Hyd-RF	97	7	79	108.22	03/08/13	
Moung Phil	160605	Map-RF	110	9	64	-63.03	18/09/13	
Moung Tcheraphon	160601	Hyd-RF	81	33	69	-114.20	19/09/13	
Moung Tcheraphon	160601	Map-RF	99	30	54	75.69	11/06/13	
Se Kong	150609	Hyd-RF	77	38	68	138.62	11/06/13	
Se Kong	150609	Map-RF	86	45	52	-110.30	21/09/13	
Chiang Saen	10501	Hyd-RF	72	39	72	62.60	27/07/13	
Chiang Saen	10501	Map-RF	74	41	68	-62.37	30/07/13	
Chian Khan	11903	Hyd-RF	82	31	70	-112.54	13/09/13	
Chian Khan	11903	Map-RF	80	38	65	-121.32	13/09/13	
Nong Khai	12001	Hyd-RF	100	18	65	161.31	08/08/13	
Nong Khai	12001	Map-RF	90	34	59	-60.47	07/08/13	
Nakhon Phanom	13101	Hyd-RF	80	37	66	118.89	30/07/13	
Nakhon Phanom	13101	Map-RF	64	53	66	-97.12	21/07/13	
Mukdahan	13402	Hyd-RF	92	23	68	93.13	25/08/13	
Mukdahan	13402	Map-RF	79	39	65	-60.62	14/09/13	
Khong Chiam	13801	Hyd-RF	85	47	51	-181.02	20/07/13	
Khong Chiam	13801	Map-RF	88	49	46	-189.43	20/07/13	
Thoeng	70103	Hyd-RF	68	44	71	-79.94	22/08/13	
Thoeng	70103	Map-RF	74	45	64	-79.48	22/08/13	
Ban Tha Kok Daen	290102	Hyd-RF	74	36	73	-147.02	28/07/13	
Ban Tha Kok Daen	290102	Map-RF	73	47	63	-224.47	28/07/13	
Chiang Rai	50104	Hyd-RF	66	55	62	-91.22	28/07/13	
Chiang Rai	50104	Map-RF	56	76	51	-89.92	28/07/13	
Tan Chau	19803	Hyd-RF	137	21	25	116.45	12/06/13	
Tan Chau	19803	Map-RF	139	31	13	47.74	12/06/13	
My Thuan	19804	Hyd-RF	124	32	27	71.54	15/09/13	
My Thuan	19804	Map-RF	122	44	17	-71.66	23/09/13	
Ban Don	451305	Hyd-RF	79	48	56	64.40	22/06/13	
Ban Don	451305	Map-RF	88	56	39	-103.04	28/09/13	
Kon Tum	440201	Hyd-RF	66	74	43	116.29	02/08/13	
Kon Tum	440201	Map-RF	56	91	36	-133.38	16/10/13	

Station Name	StaID		Number of day overestimated	Number of days underestimated	equal (day)	Max. error (mm)	Occurred at date	Remark
Moung Te	220201	Hyd-RF	28	82	73	-179.25	21/06/13	
Moung Te	220201	Map-RF	39	74	70	251.99	10/06/13	
Tam Duong	220303	Hyd-RF	26	91	66	-89.93	04/07/13	
Tam Duong	220303	Map-RF	37	80	66	93.31	10/06/13	
Sin Ho	220302	Hyd-RF	14	111	58	-137.87	29/06/13	
Sin Ho	220302	Map-RF	22	103	58	-137.14	29/06/13	
Lai Chau	220301	Hyd-RF	37	74	72	-153.06	03/07/13	
Lai Chau	220301	Map-RF	39	76	68	-161.29	03/07/13	
Tuan Giao	210305	Hyd-RF	41	65	77	-123.63	03/07/13	
Tuan Giao	210305	Map-RF	37	75	71	-135.55	03/07/13	
Dien Bien	210301	Hyd-RF	40	71	72	-96.90	04/08/13	
Dien Bien	210301	Map-RF	48	66	69	-103.22	04/08/13	
Quynh Nhai	210303	Hyd-RF	44	66	73	60.06	10/06/13	
Quynh Nhai	210303	Map-RF	43	72	68	63.47	10/06/13	
Khe Sanh	160611	Hyd-RF	80	73	30	-348.23	16/10/13	
Khe Sanh	160611	Map-RF	61	101	21	-379.98	16/10/13	
Son La	210304	Hyd-RF	45	70	68	150.81	25/06/13	
Son La	210304	Map-RF	49	68	66	157.72	25/06/13	
Houng Khe	180505	Hyd-RF	44	92	47	-436.08	16/10/13	
Houng Khe	180505	Map-RF	44	95	44	-448.94	16/10/13	
Ha Tinh	180504	Hyd-RF	66	58	59	-274.24	20/10/13	
Ha Tinh	180504	Map-RF	59	74	50	-277.60	20/10/13	
Ky Anh	180601	Hyd-RF	58	69	56	-206.08	17/10/13	
Ky Anh	180601	Map-RF	46	84	53	-249.33	08/08/13	
Tuyen Hao	170603	Hyd-RF	64	80	39	-269.74	03/10/13	
Tuyen Hao	170603	Map-RF	66	83	34	-277.38	03/10/13	
Ba Don	170601	Hyd-RF	52	73	58	-279.48	17/10/13	
Ba Don	170601	Map-RF	67	70	46	-239.84	17/10/13	
Dong Hoi	170602	Hyd-RF	58	70	55	-239.54	01/10/13	
Dong Hoi	170602	Map-RF	54	83	46	-293.45	01/10/13	
Dong Ha	160706	Hyd-RF	65	75	43	-132.59	16/10/13	
Dong Ha	160706	Map-RF	65	87	31	-155.17	16/10/13	
A Luoi	160705	Hyd-RF	45	109	29	-406.52	07/11/13	Flash flood occur.
A Luoi	160705	Map-RF	51	114	18	-423.53	07/11/13	Flash flood occur.
Hue	160704	Hyd-RF	57	82	44	-424.71	16/11/13	Flash flood occur.
Hue	160704	Map-RF	63	90	30	-436.54	16/11/13	Flash flood occur.
Dak To	140715	Hyd-RF	51	90	42	-81.00	16/06/13	
Dak To	140715	Map-RF	46	101	36	-80.83	16/06/13	
Pleiku	140703	Hyd-RF	74	73	36	124.54	03/10/13	
Pleiku	140703	Map-RF	52	102	29	-84.04	08/11/13	

Station Name	StaID		Number of day overestimated	Number of days underestimated	equal (day)	Max. error (mm)	Occurred at date	Remark
An Khe	130803	Hyd-RF	84	65	34	-175.65	08/11/13	
An Khe	130803	Map-RF	67	86	30	-213.23	08/11/13	
Ayunpa	130804	Hyd-RF	69	74	40	-113.71	27/09/13	
Ayunpa	130804	Map-RF	71	81	31	-103.28	27/09/13	
Boun Me Thuoc	120801	Hyd-RF	76	69	38	78.24	09/07/13	
Boun Me Thuoc	120801	Map-RF	56	91	36	-63.91	15/09/13	
Mdark	120806	Hyd-RF	73	70	40	114.85	16/11/13	
Mdark	120806	Map-RF	77	76	30	-111.11	11/08/13	
Dak Nong	120712	Hyd-RF	83	70	30	-81.90	18/06/13	
Dak Nong	120712	Map-RF	86	71	26	95.20	16/11/13	
Buon Ho	120805	Hyd-RF	74	71	38	137.33	07/11/13	
Buon Ho	120805	Map-RF	64	91	28	-71.15	19/09/13	
Houng Son	180506	Hyd-RF	80	63	40	-244.08	17/10/13	
Houng Son	180506	Map-RF	69	77	37	-271.44	17/10/13	
Pha Din	220401	Hyd-RF	40	72	71	-76.90	03/07/13	
Pha Din	220401	Map-RF	41	75	67	-85.95	03/07/13	

Note: Negative value mean that rainfall (Hydroestimator) or MAP are underestimate.

3.2 Analysis of the differences between Hydroestimator, MAP and observed rainfall values during severe weather situations in 2013

For a detailed indentification of the accuracies of Hydroestimator and MAP values during severe weather conditions, such as tropical storms, tropical depressions, ITCZ, low pressure situation etc., an analysis was conducted of the accumulated (5 - 7 days) rainfall of three differences rainfall sources: i) Hydroestimator, ii) MAP and iii) observed rainfall for some stations during each weather situation, including 4-5 days before the flash flood occurred.

3.2.1 Analysis of Hydroestimator and MAP during TS BEBINCA

According to the newspaper the flash floods caused by TS BEBINCA occurred in the period 23 – 24 June 2013 in many districts of the northern provinces of Viet Nam and of the central and northern provinces of Lao PDR. Based on the analysis of rainfall data for some stations which were affected by TS BEBINCA, it was recognized that the MAP values during this period were underestimated compared with the ground observed rainfall values. Figure A-1 to Figure A-11 present the chart of accumulated rainfall before and during the storm at some rainfall stations located in the northern part of Viet Nam and in the central part of Lao PDR.

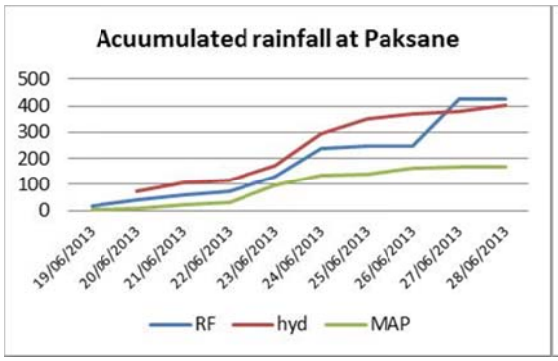

Figure A-1 Accumulated rainfall at Paksane station before and during the TS BEBINCA.

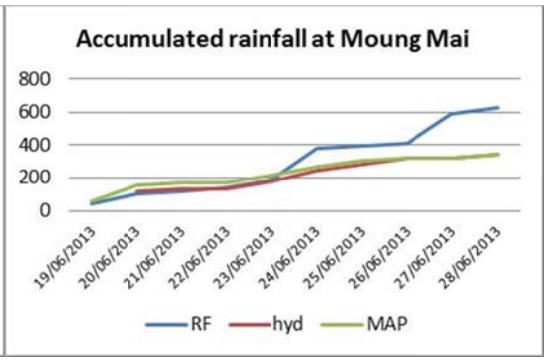

Figure A-2 Accumulated rainfall at Moung Mai station before and during the TS BEBINCA.

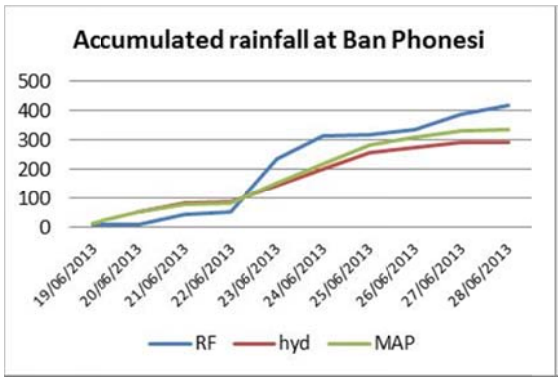

Figure A-3 Accumulated rainfall at Ban Phonesi station before and during the TS BEBINCA.

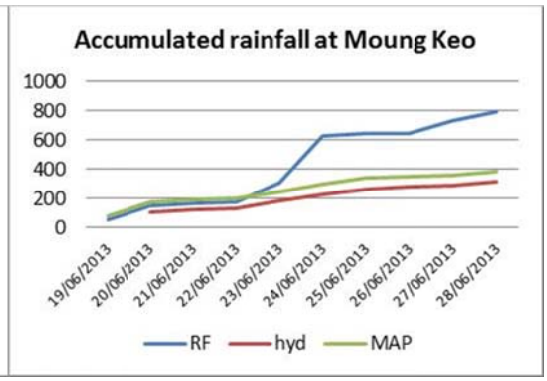

Figure A-4 Accumulated rainfall at Moung Keo station before and during the TS BEBINCA.

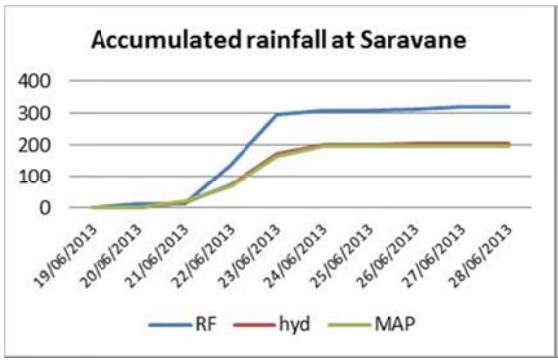

Figure A-5 Accumulated rainfall at Saravane station before and during the TS BEBINCA, where observed rainfall was higher than Hydroestimator and MAP.

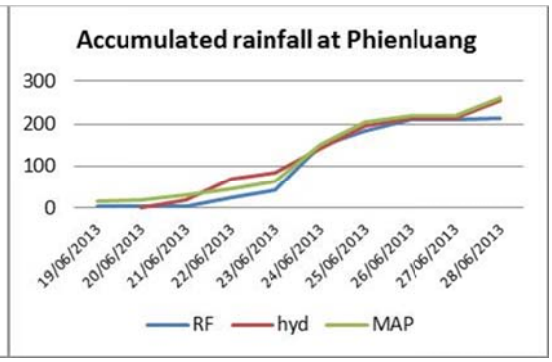

Figure A-6 Accumulated rainfall at Phiengluang station before and during the TS BEBINCA, where observed rainfall was same value with Hydroestimator and MAP.

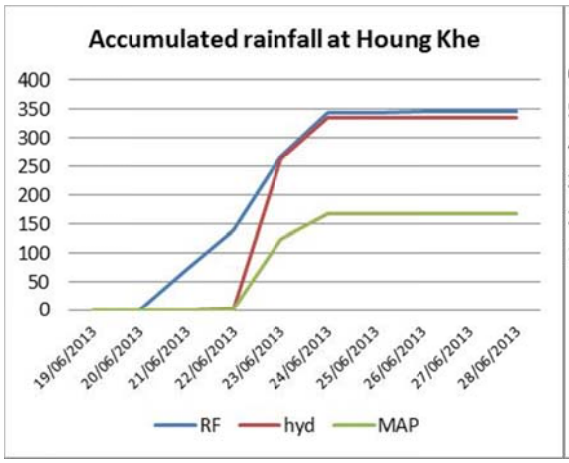

Figure A-7 Accumulated rainfall at Houng Khe station before and during the TS BEBINCA, where observed rainfall was same value with Hydroestimator, but Map was lower.

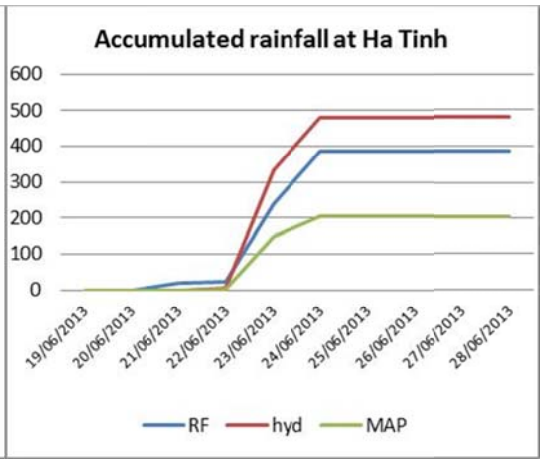

Figure A-8 Accumulated rainfall at Ha Tinh station before and during the TS BEBINCA, where observed rainfall was lower than Hydroestimator, but quite higher than MAP.

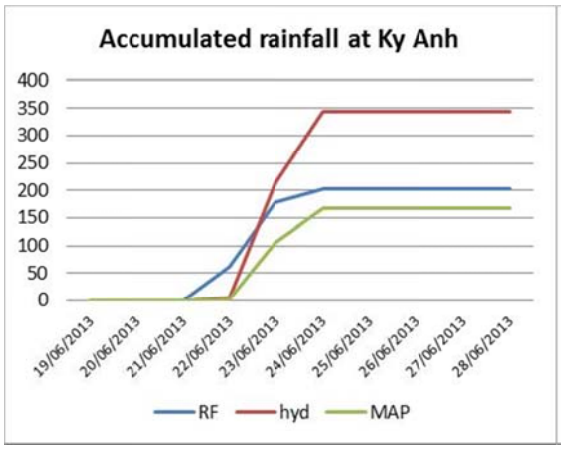

Figure A-9 Accumulated rainfall at Ky Anh station before and during the TS BEBINCA, where observed rainfall was lower value than Hydroestimator, but little bit higher than MAP.

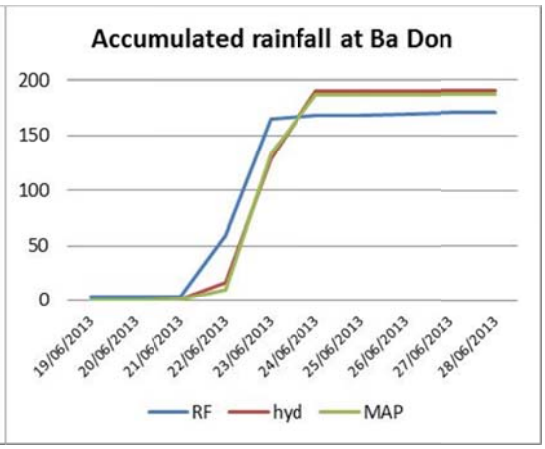

Figure A-10 Accumulated rainfall at Ba Don station before and during the TS BEBINCA, where observed rainfall was little bit lower than Hydroestimator and MAP.

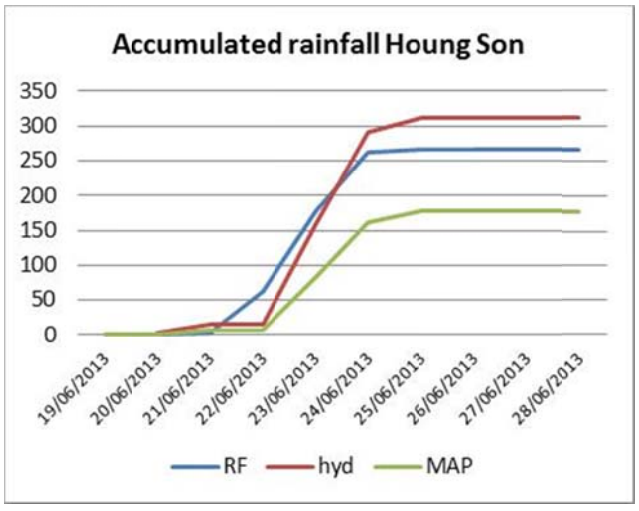

Figure A-11 Accumulated rainfall at Houng Son station before and during the TS BEBINCA, where observed rainfall was lower value than Hydroestimator, but was higher than MAP.

3.2.2 Analysis of Hydroestimator, MAP during tropical storm RUMBIA:

TS Rumbia hit the Mekong region on 1 July 2013 and caused heavy rainfall in many areas in the northern provinces of Viet Nam. Based on the available rainfall records from the stations located in the affected areas, the observed rainfall during the storm was higher than Hydroestimator and MAP values. According to the result of analysis the 3 sources of rainfall data it was concluded that the MAP values were lower than the observed rainfall collected from ground stations. Figure A-12 to Figure A-17 present the chart of accumulated rainfall of Hydroestimator, MAP and observed rainfall from the stations, located in the affected areas.

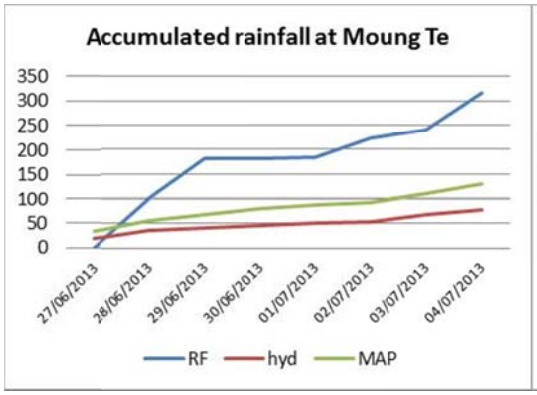

Figure A-12 Accumulated rainfall at Moung Te station before and during the TS RUMBIA, where observed rainfall was higher than Hydroestimator, and also MAP.

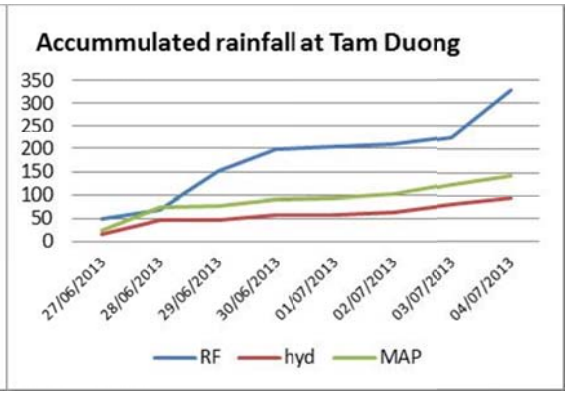

Figure A-13 Accumulated rainfall at Tam Duong station before and during the TS RUMBIA, where observed rainfall was higher than Hydroestimator, and also MAP.

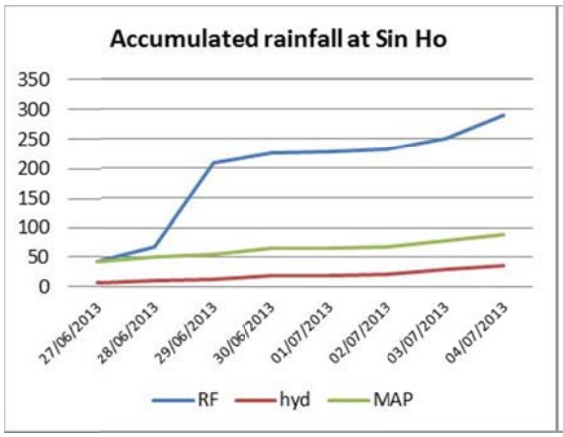

Figure A-14 Accumulated rainfall at Sin Ho station before and during the TS RUMBIA, where observed rainfall was higher than Hydroestimator, and also MAP.

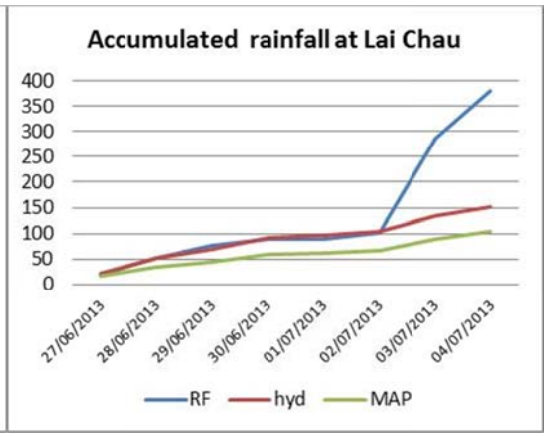

Figure A-15 Accumulated rainfall at Lai Chau station before and during the TS RUMBIA, where observed rainfall was higher than Hydroestimator, and also MAP at 03 July.

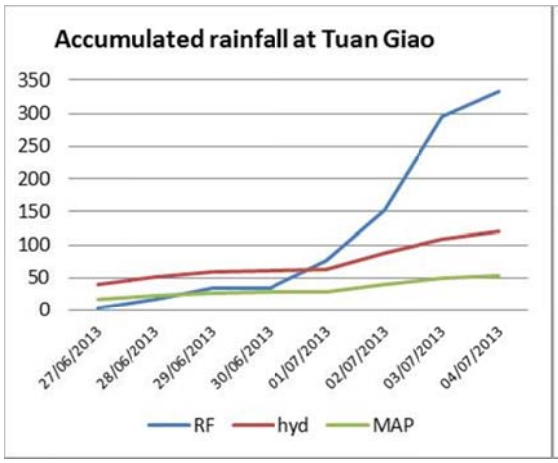

Figure A-16 Accumulated rainfall at Tuan Giao station before and during the TS RUMBIA, where observed rainfall was higher than Hydroestimator, and also MAP at 01 July to 04 July.

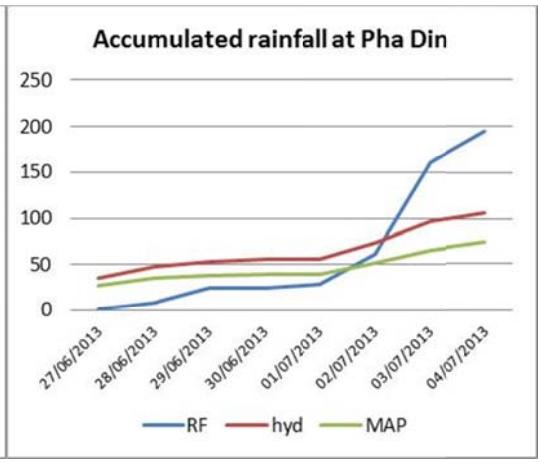

Figure A-17 Accumulated rainfall at Pha Din station before and during the TS RUMBIA, where observed rainfall was higher than Hydroestimator, and also MAP at 03 July.

3.2.3 Analysis of Hydroestimator and MAP during ITCZ (19 - 20 July 2013)

During the whole third week of July 2013 the Lower Mekong Basin was covered by ITCZ. Heavy rainfall was recorded at some hydrological stations located in the central part of Laos PDR and northern part of Viet Nam. Based on the comparison between Hydroestimater and MAP values with available of recorded rainfall values during this period, it was concluded that the recorded rainfall was higher than Hydro estimator and MAP values. Figure A-18 and Figure A-19 present the accumulated rainfall of stations located in the northern provinces of Viet Nam.

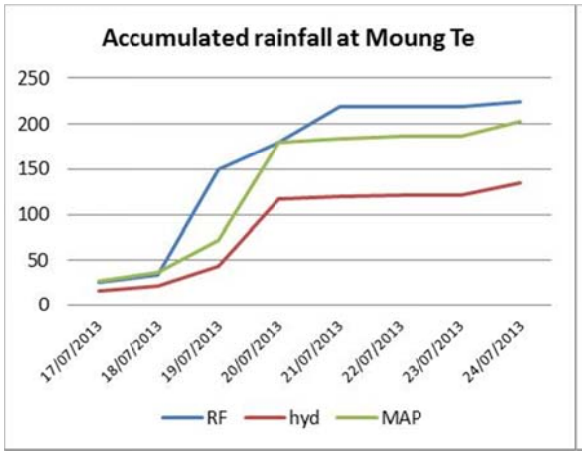

Figure A-18 Accumulated rainfall at Moung Te station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and also MAP.

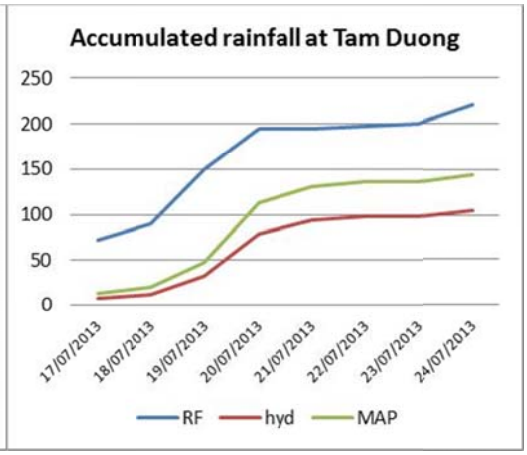

Figure A-19 Accumulated rainfall at Tam Duong station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and also MAP.

3.2.4 Analysis of Hydroestimator and MAP during ITCZ (28 - 29 July 2013)

Again at the end of July the Lower Mekong Basin region was covered by the ITCZ , which caused a heavy rainfall at many areas in northern and central part of Viet Nam and also at central provinces of Lao PDR. There still have a differences of rainfall value between the observed rainfall and Hydroestimator also MAP, for many hydrological stations during this ITCZ the MAP value was lower than observed rainfall. The Figure A-20 to Figure A-31 present the accumulated rainfall of three rainfall sources – Observed rainfall, Hydroestimator and MAP of hydrological stations where effected by ITCZ.

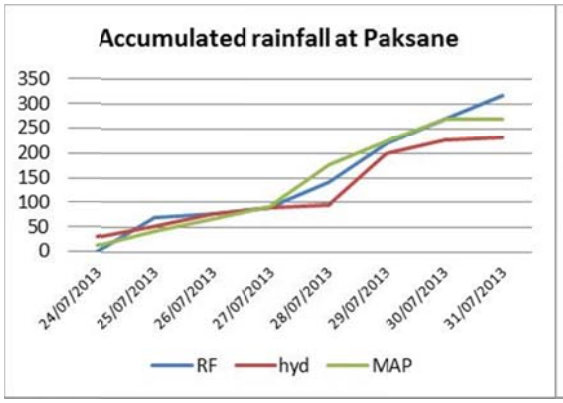

Figure A-20 Accumulated rainfall at Paksane station before and during the ITCZ, where observed rainfall was higher than Hydroestimator.

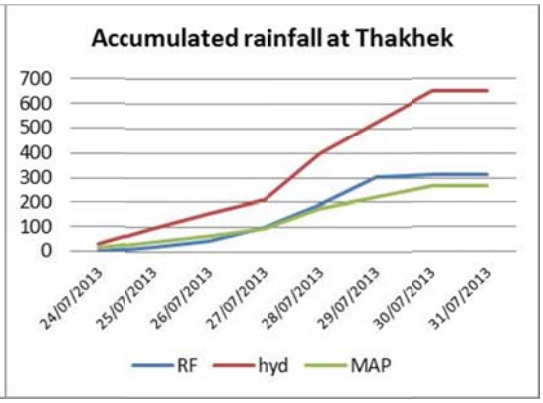

Figure A-21 Accumulated rainfall at Thakhek station before and during the ITCZ, where observed rainfall was lower than Hydroestimator.

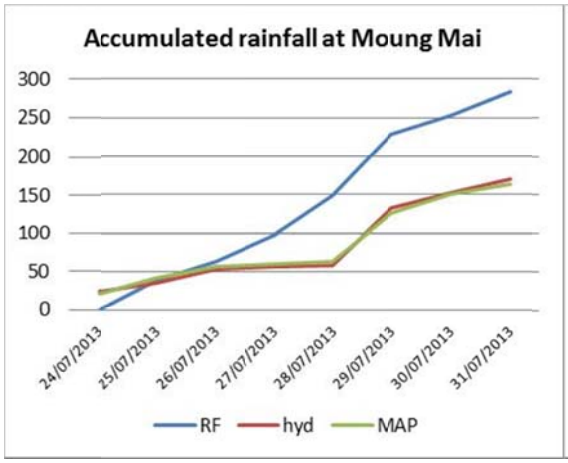

Figure A-22 Accumulated rainfall at Moung Mai station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and also MAP.

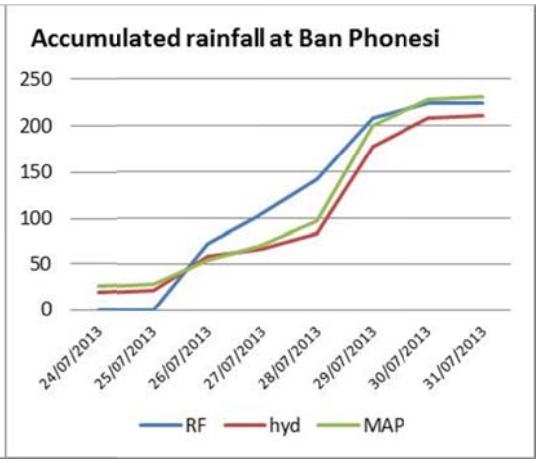

Figure A-23 Accumulated rainfall at Ban Phonesi station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and also MAP.

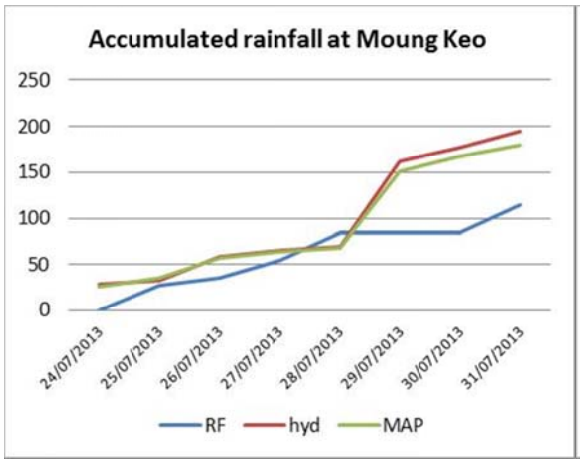

Figure A-24 Accumulated rainfall at Moung Keo station before and during the ITCZ, where observed rainfall was lower than Hydroestimator, and also MAP.

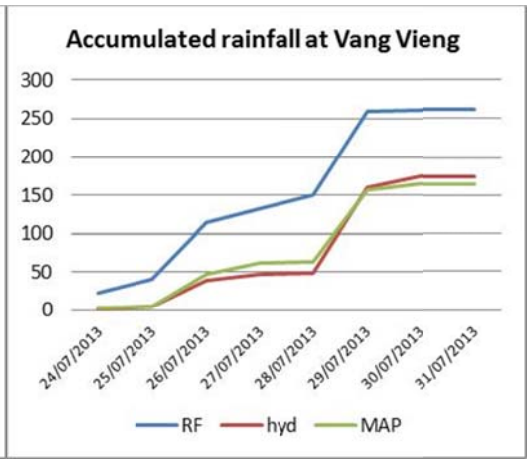

Figure A-25 Accumulated rainfall at Vang Vieng station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and also MAP.

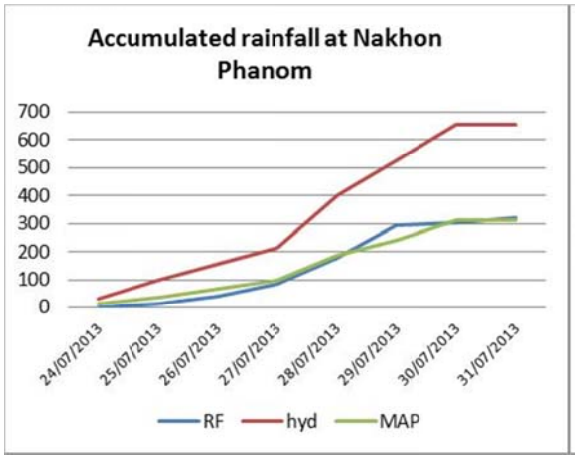

Figure A-26 Accumulated rainfall at Nakhon Phanom station before and during the ITCZ, where observed rainfall was lower than Hydroestimator, but have same value as MAP.

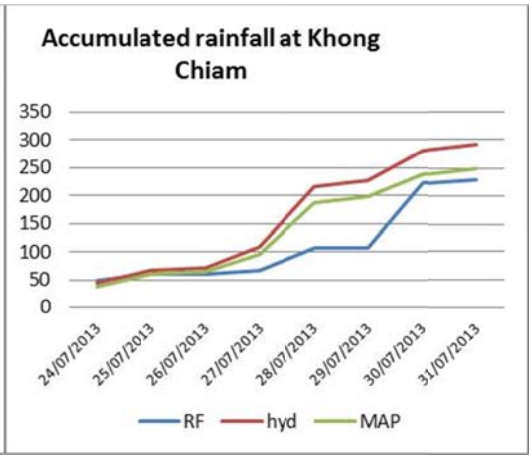

Figure A-27 Accumulated rainfall at Khong Chiam station before and during the ITCZ, where observed rainfall was lower than Hydroestimator, and also MAP.

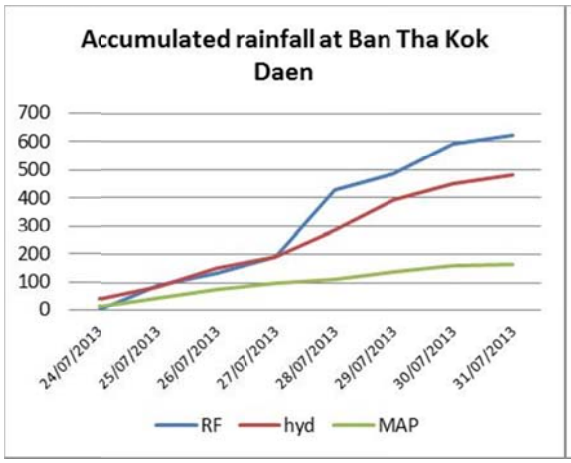

Figure A-28 Accumulated rainfall at Ban Tha Kok Daen station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and also MAP.

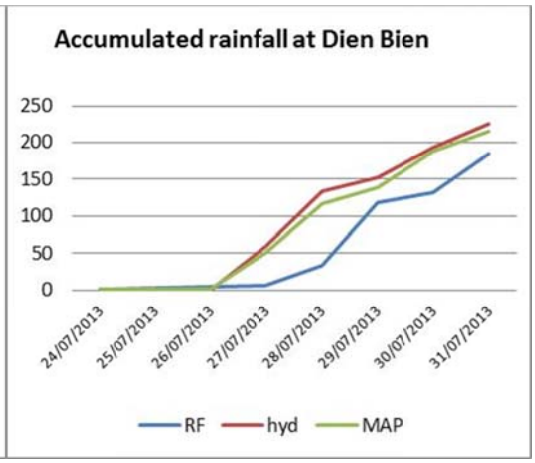

Figure A-29 Accumulated rainfall at Dien Bien station before and during the ITCZ, where observed rainfall was lower than Hydroestimator, and also MAP.

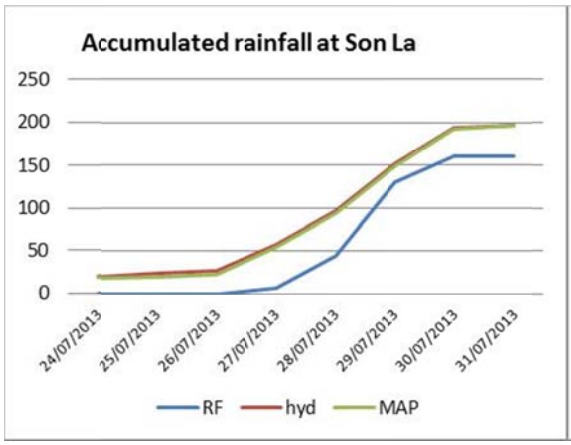

Figure A-30 Accumulated rainfall at Son La station before and during the ITCZ, where observed rainfall was lower than Hydroestimator, and also MAP.

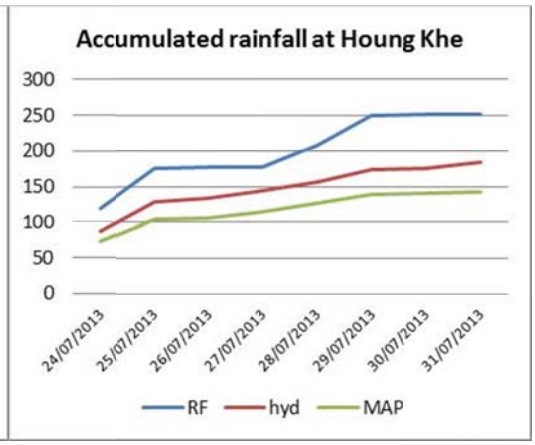

Figure A-31 Accumulated rainfall at Houng Khe station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and also MAP.

3.2.5 Analysis of Hydroestimator and MAP during TS JEBI

TS JEBI hit the northern part of Viet Nam on 03 August 2013. Flash floods occurred in many districts of the northern provinces of Viet Nam and also in some village in the northern and central provinces of Lao PDR. Based on analysis of the 3 sources of rainfall data – observed rainfall, Hydroestimator and MAP during this period of TS JEBI, it was concluded that the rainfall values of hydroestimaor and MAP were lower than the observed rainfall for all stations, except for Phonsaly station. Figure A-32 to Figure A-38 present the accumulated rainfall for some stations located in the central and northern parts of Lao PDR and in the northern part of Viet Nam.

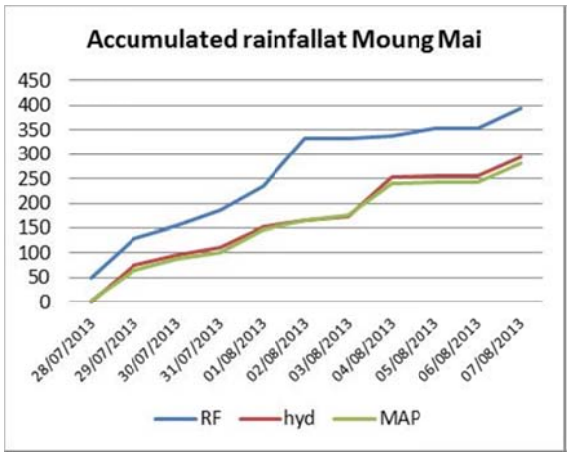

Figure A-32 Accumulated rainfall at Moung Mai station before and during JEBI, where observed rainfall was higher than Hydroestimator, and also MAP.

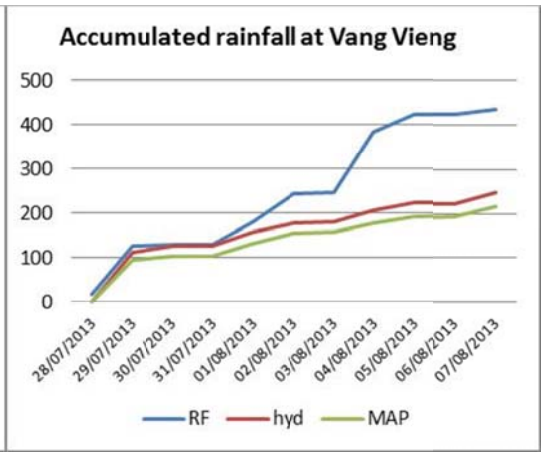

Figure A-33 Accumulated rainfall at Vang Vieng station before and during JEBI, where observed rainfall was higher than Hydroestimator, and also MAP.

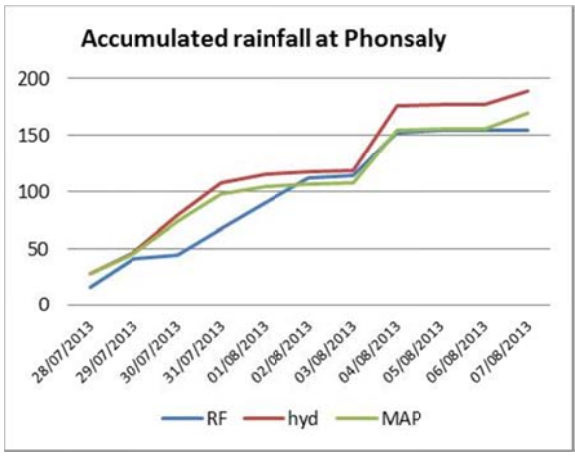

Figure A-34 Accumulated rainfall at Phonsaly station before and during JEBI, where observed rainfall was almost same value as Hydroestimator, and also MAP.

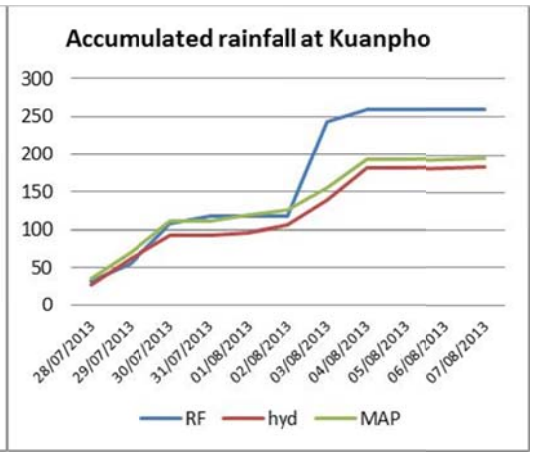

Figure A-35 Accumulated rainfall at Kuanpho station before and during JEBI, where observed rainfall was higher than Hydroestimator, and also MAP.

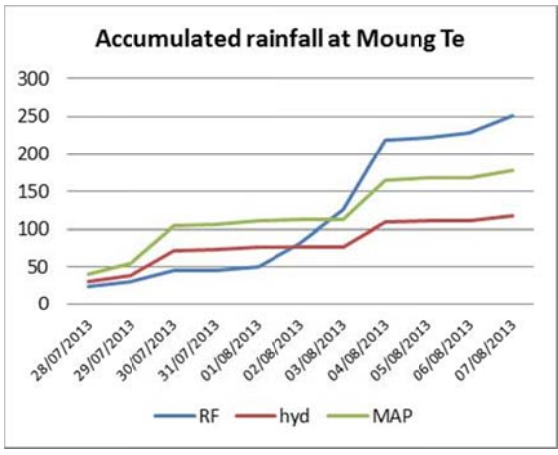

Figure A-36 Accumulated rainfall at Moung Te station before and during JEBI, where observed rainfall was higher than Hydroestimator, and also MAP.

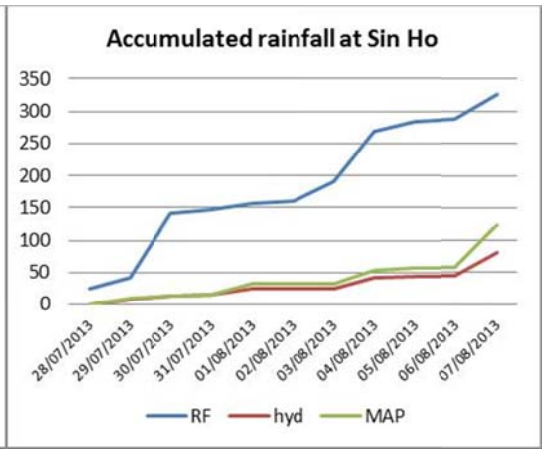

Figure A-37 Accumulated rainfall at Sin Ho station before and during JEBI, where observed rainfall was higher than Hydroestimator, and also MAP.

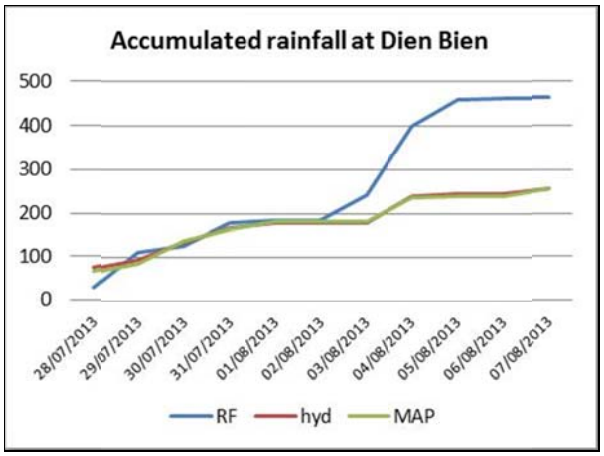

Figure A-38 Accumulated rainfall at Dien Bien station before and during JEBI, where observed rainfall was higher than Hydroestimator, and also MAP.

3.2.6 Analysis of Hydroestimator and MAP during TS MANGKHUT

TS MANGKHUT was the sixth storm that hit Viet Nam and Mekong Region in 2013. During the period 07 - 08 August 2013 heavy rainfall caused flash floods in many districts in the central and northern provinces of Viet Nam and many villages of the central and northern part of Lao PDR. Analysis of the values of the Hydroestomator and MAP were compared with observed rainfall during this storm period. It was concluded that the observed rainfall for the all stations located in the storm affected areas was higher than the values of the Hydroestimator, and particularly higher than the MAP values. Figure A-39 to Figure A-57 present the accumulated rainfall in the storm affected areas.

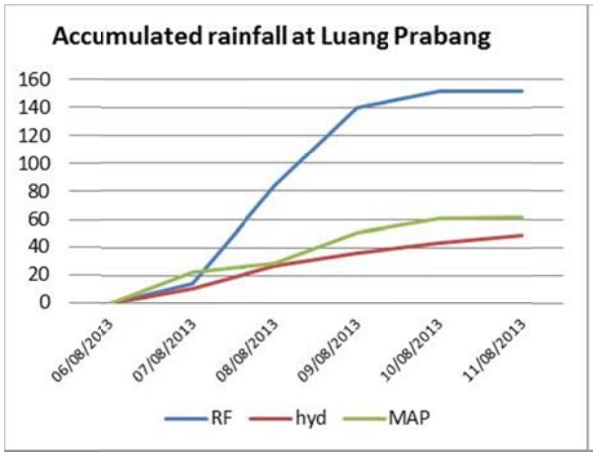

Figure A-39 Accumulated rainfall at Luang Prabang station before and during TS MANGKHUT, where observed rainfall was higher than Hydroestimator, and also MAP.

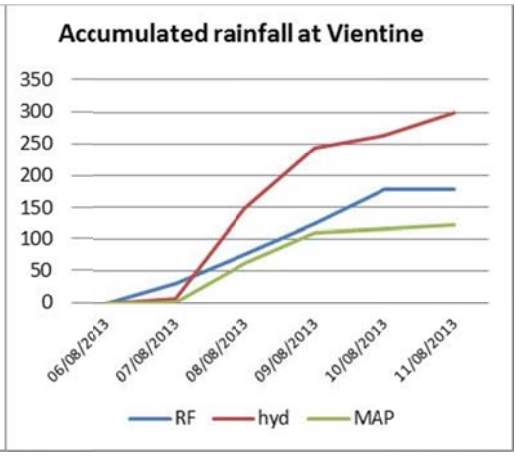

Figure A-40 Accumulated rainfall at Vientiane station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, but higher than MAP.

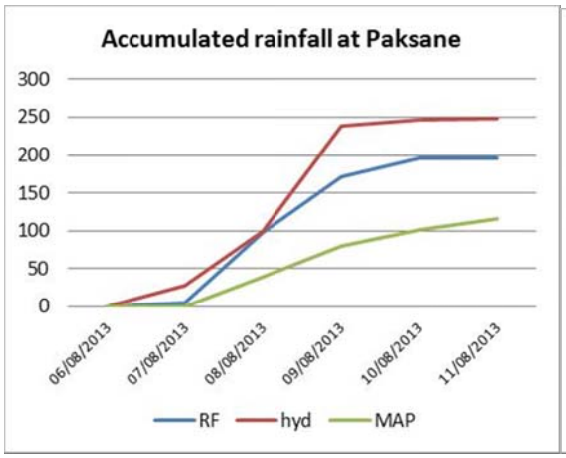

Figure A-41 Accumulated rainfall at Paksane station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, but higher than MAP.

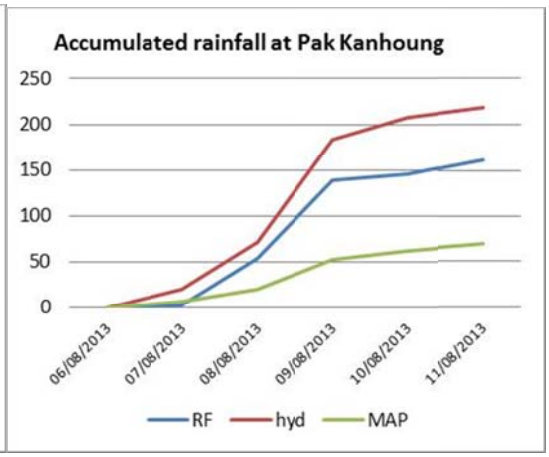

Figure A-42 Accumulated rainfall at Pak Kanhoung station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, but higher than MAP.

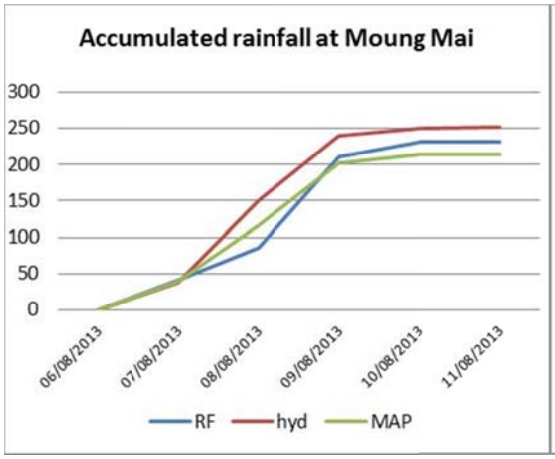

Figure A-43 Accumulated rainfall at Moung Mai station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, but has same value as MAP.

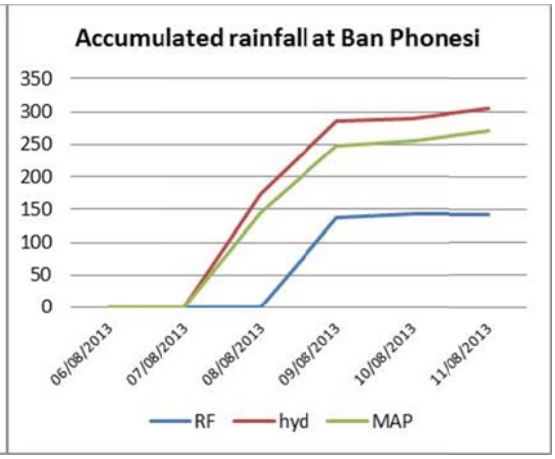

Figure A-44 Accumulated rainfall at Ban Phonesi station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, and MAP (this may be caused by the non availability of observed data on 08 August).

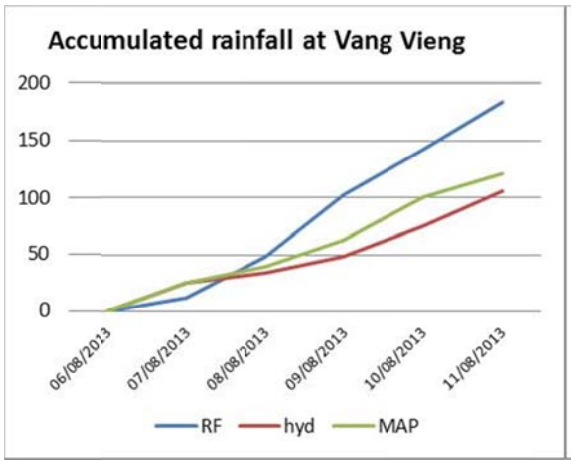

Figure A-45 Accumulated rainfall at Vang Vieng station before and during TS MANGKHUT, where observed rainfall was higher than Hydroestimator, and MAP.

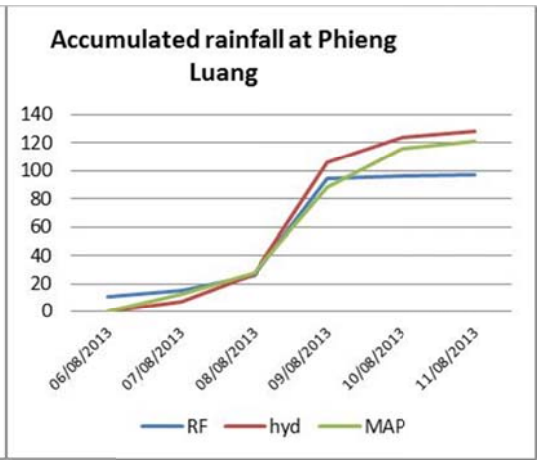

Figure A-46 Accumulated rainfall at Phieng Luang station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, but have same value with MAP.

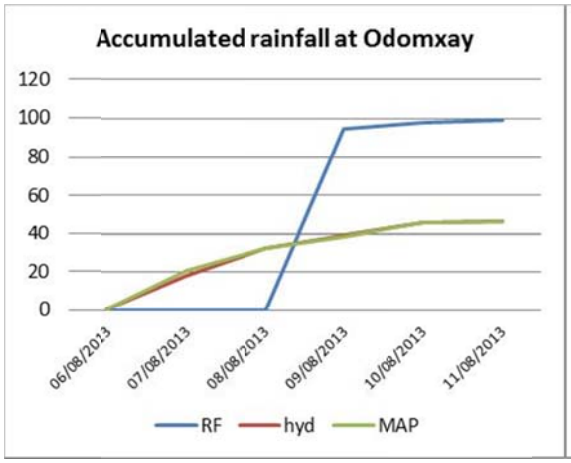

Figure A-47 Accumulated rainfall at Odomxay station before and during TS MANGKHUT, where observed rainfall was higher than Hydroestimator, and MAP.

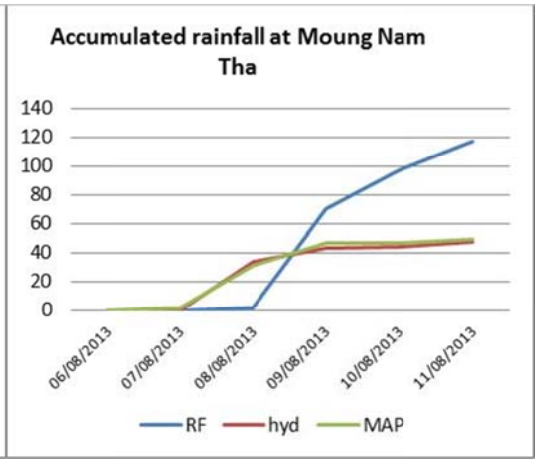

Figure A-48 Accumulated rainfall at Moung Nam Tha station before and during TS MANGKHUT, where observed rainfall was higher than Hydroestimator, and MAP on 09 August onward.

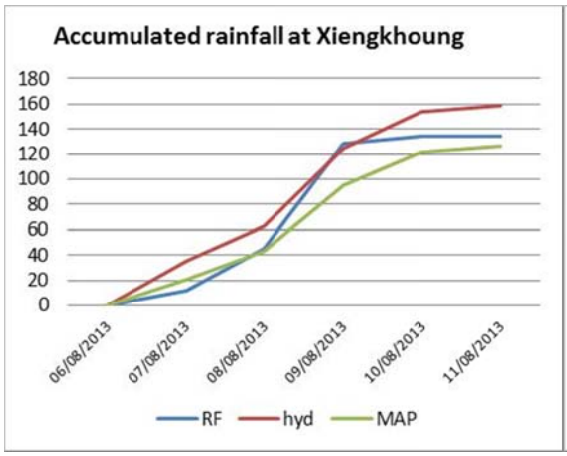

Figure A-49 Accumulated rainfall at Xiengkhuang station before and during TS MANGKHUT, where observed rainfall was almost same value as Hydroestimator, but higher than MAP.

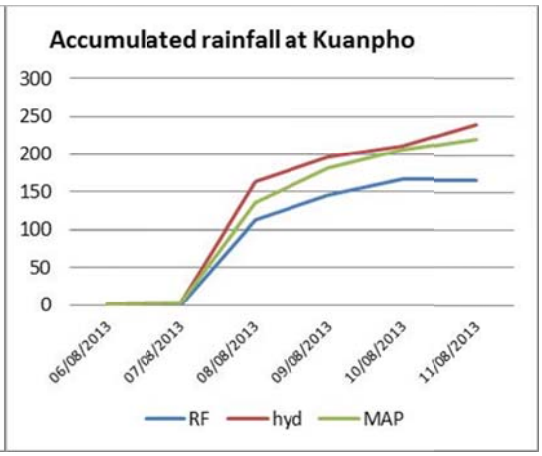

Figure A-50 Accumulated rainfall at Khuanpho station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, but higher than MAP.

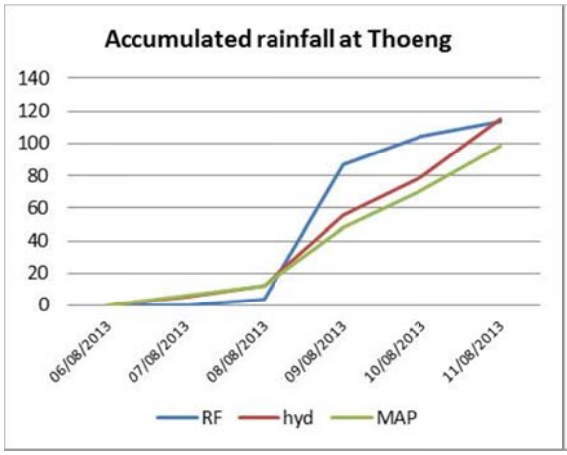

Figure A-51 Accumulated rainfall at Thoeng station before and during TS MANGKHUT, where observed rainfall was higher than Hydroestimator, and MAP.

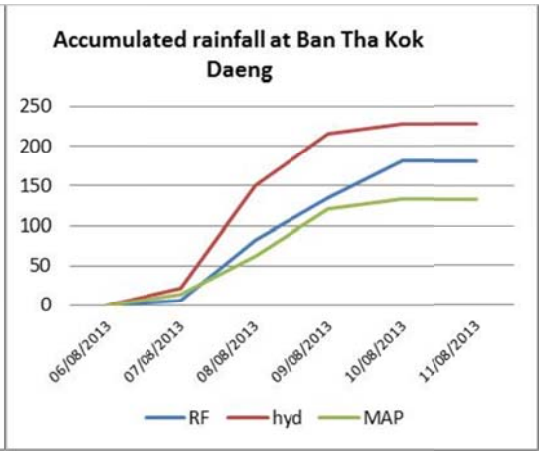

Figure A-52 Accumulated rainfall at Ban Tha Kok Daeng station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, but higher than MAP.

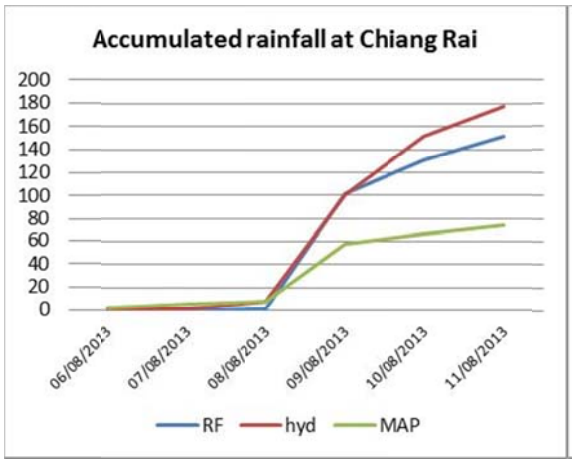

Figure A-53 Accumulated rainfall at Chiang Rai station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, but higher than MAP.

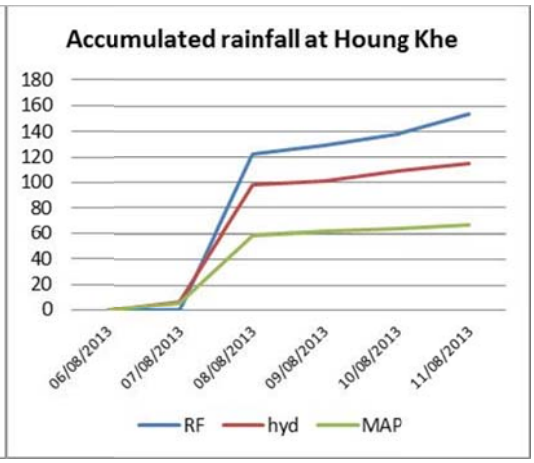

Figure A-54 Accumulated rainfall at Houng Khe station before and during TS MANGKHUT, where observed rainfall was higher Hydroestimator, and MAP.

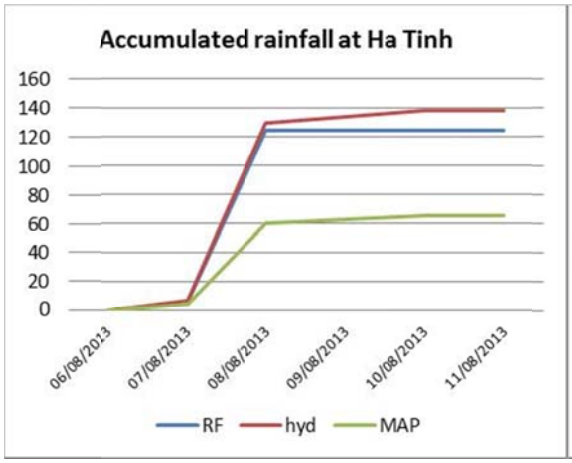

Figure A-55 Accumulated rainfall at Ha Tinh station before and during TS MANGKHUT, where observed rainfall was lower than Hydroestimator, but higher than MAP.

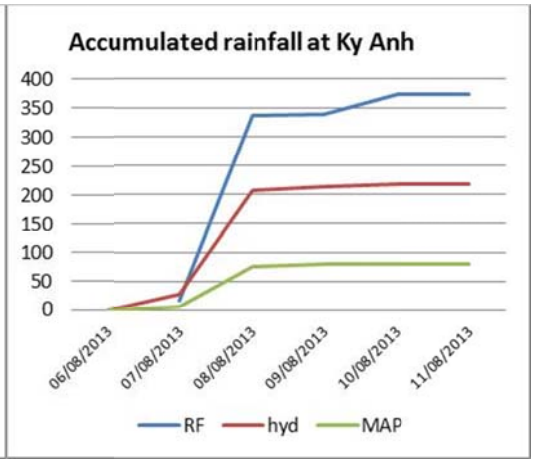

Figure A-56 Accumulated rainfall at Ky Anh station before and during TS MANGKHUT, where observed rainfall was higher than Hydroestimator, and MAP.

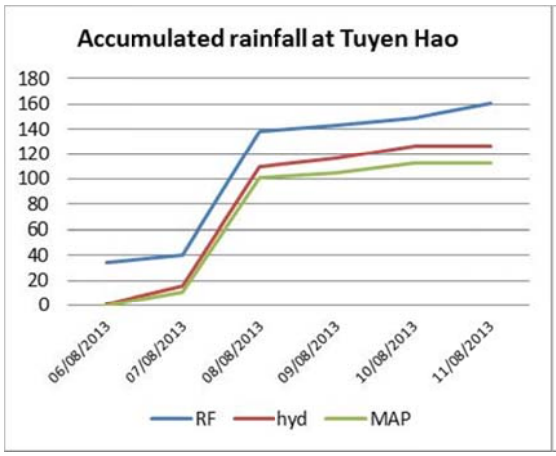

Figure A-57 Accumulated rainfall at Tuyen Hao station before and during TS MANGKHUT, where observed rainfall was higher than Hydroestimator, and MAP.

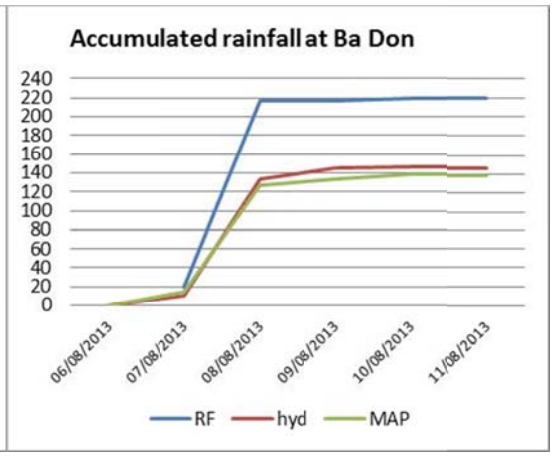

Figure A-58 Accumulated rainfall at Ba Don station before and during TS MANGKHUT, where observed rainfall was higher than Hydroestimator, and MAP.

3.2.7 Analysis of Hydroestimator and MAP during TD EIGHTEEN

TD EIGHTEEN hit Viet Nam at central highland and the central region of Viet Nam, and also expanded to the southern provinces of Lao PDR. According to the analysis of the comparison between values of the Hydroestimator, MAP and observed rainfall, it was concluded that MAP values were lower than the observed rainfall for many stations located in the affected areas. Figure A-59 to Figure A-70 present the accumulated rainfall at the stations located in the central highland and the central region of Viet Nam, and in the southern part of Lao PDR.

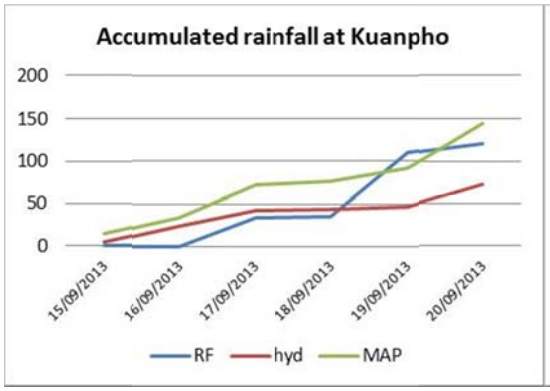

Figure A-59 Accumulated rainfall at Kuanpho station before and during TD EIGHTEEN, where observed rainfall was higher than Hydroestimator at 19/09.

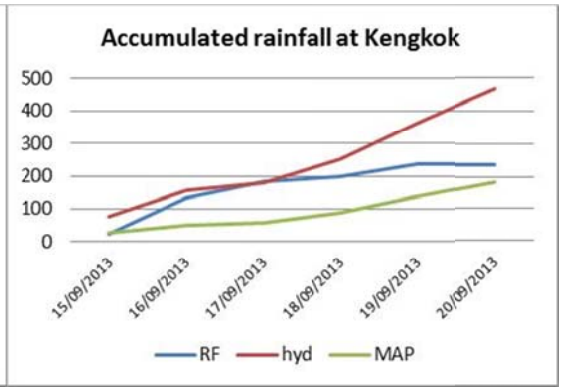

Figure A-60 Accumulated rainfall at Kengkok station before and during TD EIGHTEEN, where observed rainfall was lower than Hydroestimator, but higher than MAP.

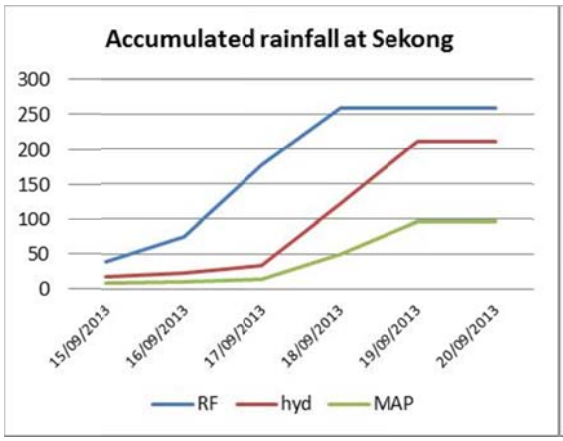

Figure A-61 Accumulated rainfall at Se Kong station before and during TD EIGHTEEN, where observed rainfall was higher than Hydroestimator, and MAP.

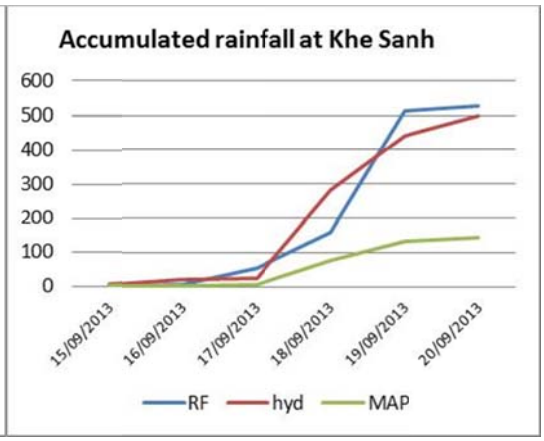

Figure A-62 Accumulated rainfall at Khe Sanh station before and during TD EIGHTEEN, where observed rainfall was almost same value with Hydroestimator, but higher than MAP.

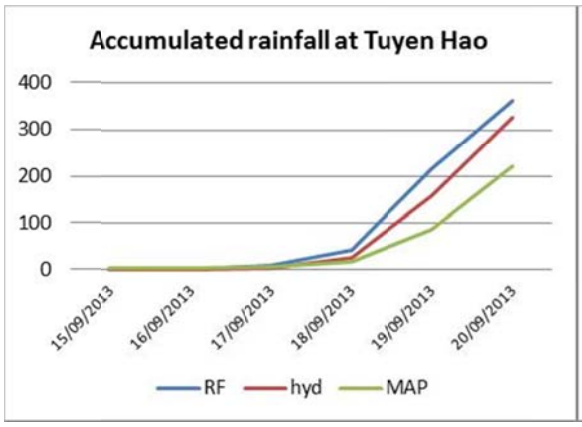

Figure A-63 Accumulated rainfall at Tuyen Hao station before and during TD EIGHTEEN, where observed rainfall was almost same value with Hydroestimator, but higher than MAP.

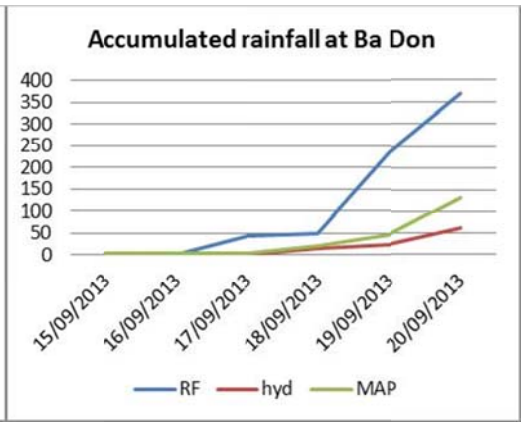

Figure A-64 Accumulated rainfall at Ba Don station before and during TD EIGHTEEN, where observed rainfall was higher than Hydroestimator, and MAP.

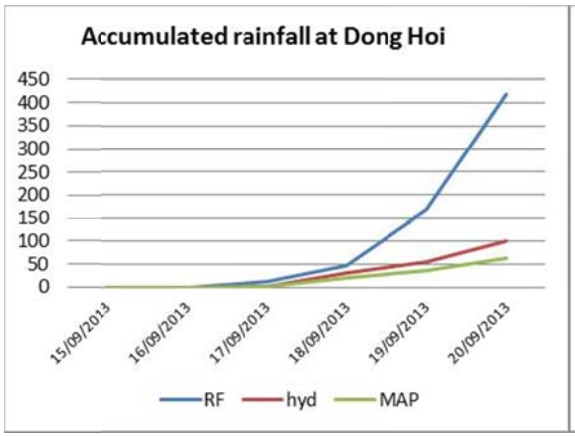

Figure A-65 Accumulated rainfall at Dong Hoi station before and during TD EIGHTEEN, where observed rainfall was higher Hydroestimator, and MAP.

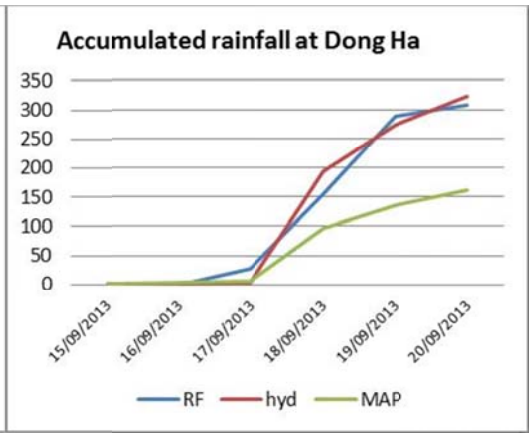

Figure A-66 Accumulated rainfall at Dong Ha station before and during TD EIGHTEEN, where observed rainfall was almost same value with Hydroestimator, but higher than MAP.

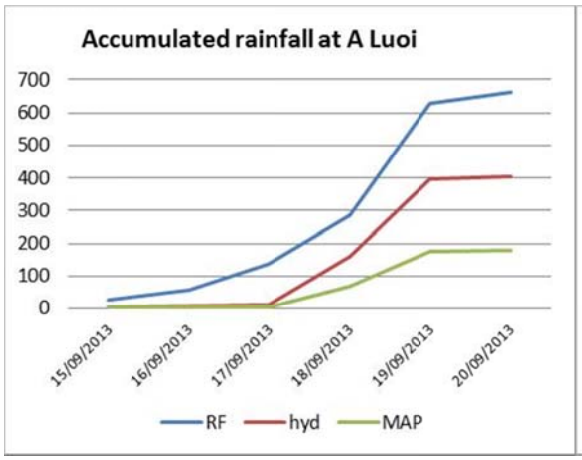

Figure A-67 Accumulated rainfall at A Luoi station before and during TD EIGHTEEN, where observed rainfall was higher than Hydroestimator, and MAP.

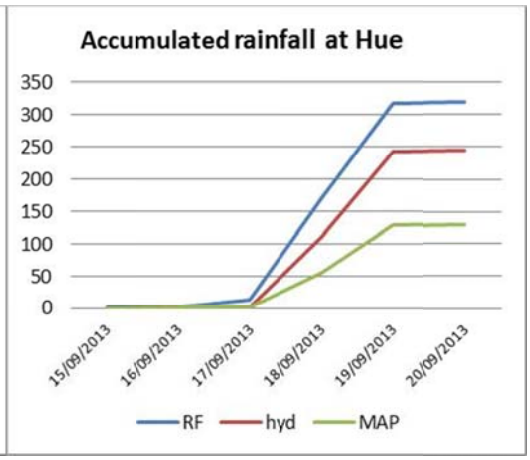

Figure A-68 Accumulated rainfall at Hue station before and during TD EIGHTEEN, where observed rainfall was higher than Hydroestimator, and MAP.

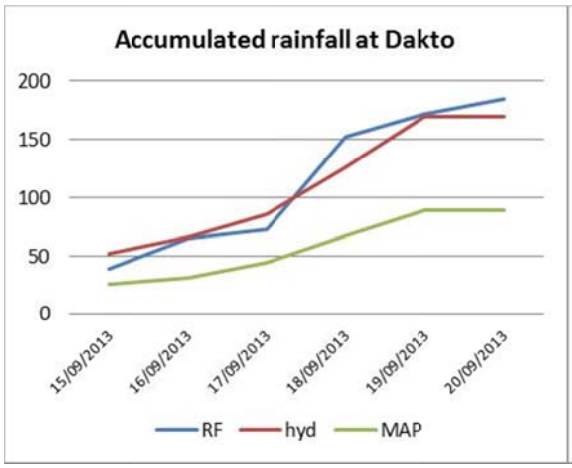

Figure A-69 Accumulated rainfall at Dakto station before and during TD EIGHTEEN, where observed rainfall was almost same value with Hydroestimator, but higher than MAP.

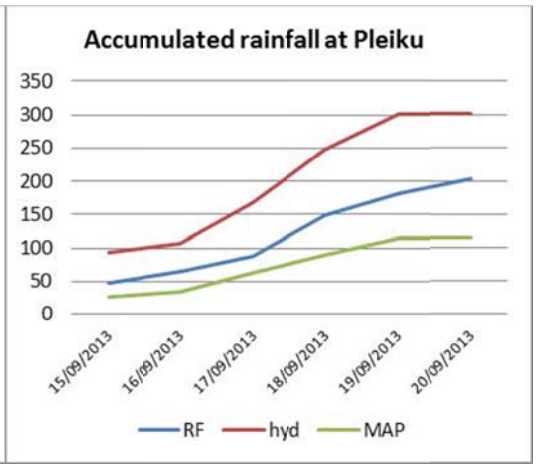

Figure A-70 Accumulated rainfall at Pleiku station before and during TD EIGHTEEN, where observed rainfall was lower than Hydroestimator, but higher than MAP.

3.2.8 Analysis of Hydroestimator and MAP during TS WUTIP

TS WUTIP hit the region at the central provinces of Viet Nam and affected the central part of Lao PDR in the period 30 September - 1 October 2013. During this period heavy rainfall was recorded in many stations of central Lao PDR and Viet Nam. According to the analysis of 3 differences rainfall source, it was concluded that for many stations in Viet Nam the MAP was lower than the observed rainfall, but for the stations located in Lao PDR the MAP and Hydroestimator values were higher than the observed rainfall. Figure A-71 to Figure A-80 present the chart of accumulated rainfall during the TS WUTIP from stations in the central part of Lao PDR and Viet Nam.

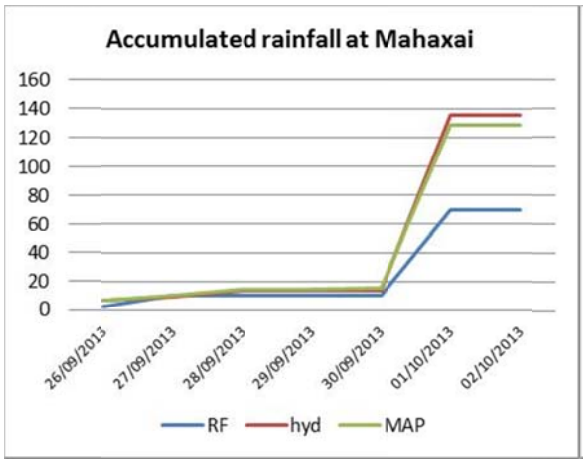

Figure A-71 Accumulated rainfall at Mahaxai station before and during TS WUTIP, where observed rainfall was lower than Hydroestimator, and MAP.

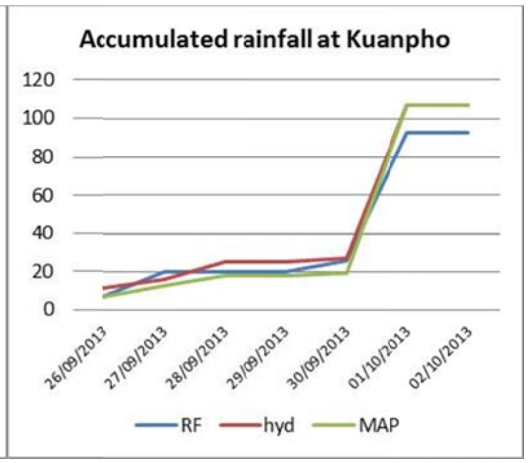

Figure A-72 Accumulated rainfall at Kuanpho station before and during TSWUTIP, where observed rainfall was lower than Hydroestimator, and MAP.

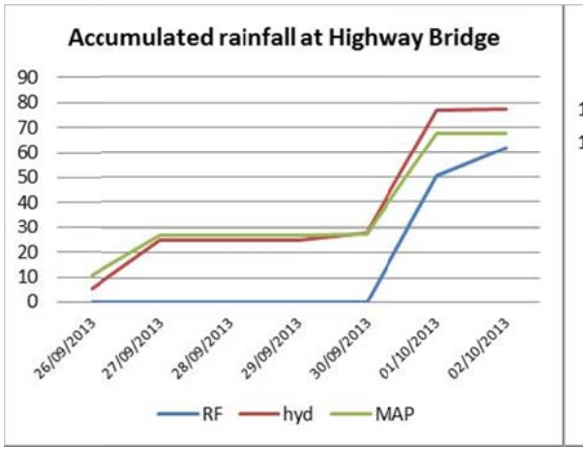

Figure A-73 Accumulated rainfall at Highway Bridge station before and during TS WUTIP, where observed rainfall was lower than Hydroestimator, and MAP.

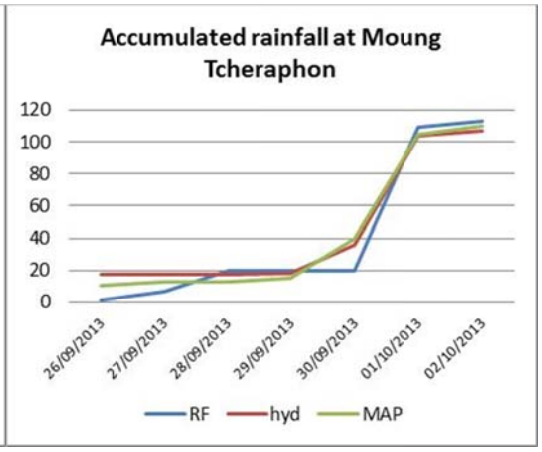

Figure A-74 Accumulated rainfall at Moung Tcheraphon station before and during TS WUTIP, where observed rainfall was almost same value with Hydroestimator, and MAP.

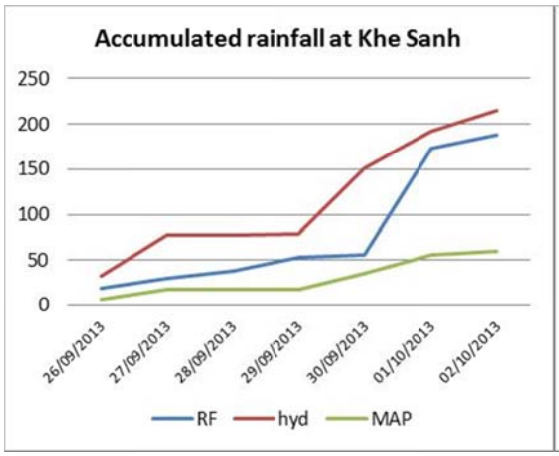

Figure A-75 Accumulated rainfall at Khe Sanh station before and during TS WUTIP, where observed rainfall was lower than Hydroestimator, but higher than MAP.

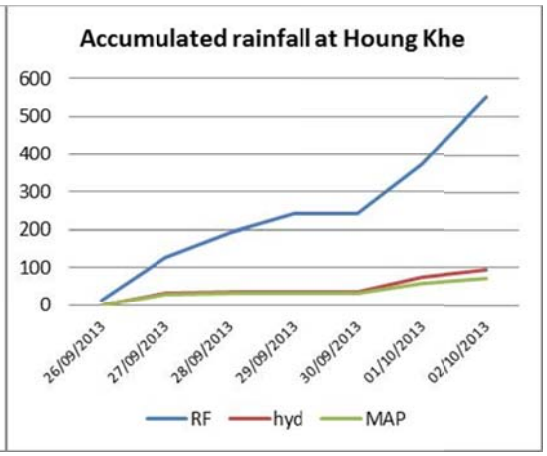

Figure A-76 Accumulated rainfall at Houng Khe station before and during TS WUTIP, where observed rainfall was higher than Hydroestimator, and MAP.

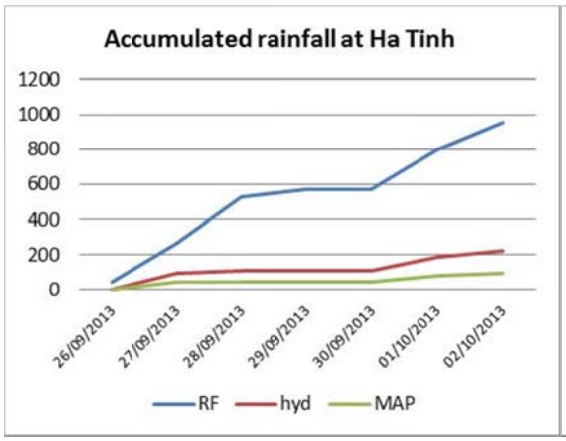

Figure A-77 Accumulated rainfall at Ha Tinh station before and during TS WUTIP, where observed rainfall was higher than Hydroestimator, and MAP.

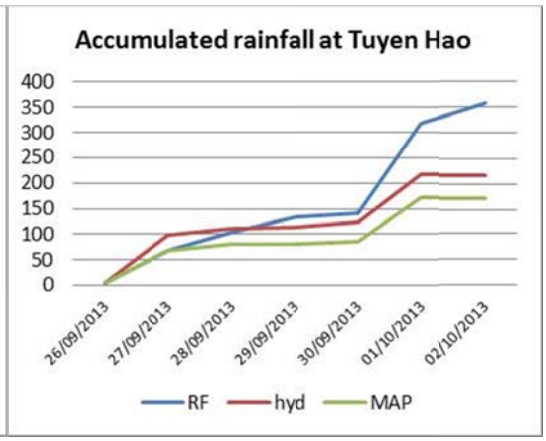

Figure A-78 Accumulated rainfall at Tuyen Hao station before and during TS WUTIP, where observed rainfall was higher than Hydroestimator, and MAP.

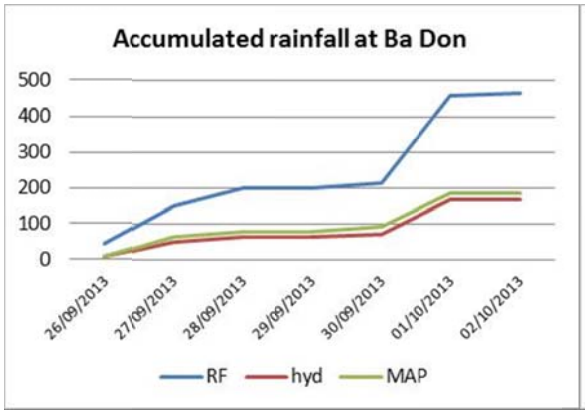

Figure A-79 Accumulated rainfall at Ba Don station before and during TS WUTIP, where observed rainfall was higher than Hydroestimator, and MAP.

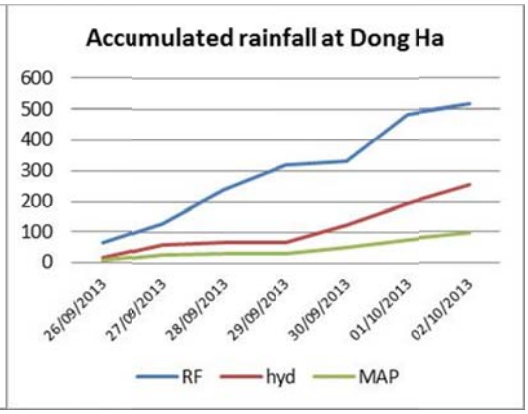

Figure A-80 Accumulated rainfall at Don Ha station before and during TS WUTIP, where observed rainfall was higher than Hydroestimator, and MAP.

3.2.9 Analysis of Hydroestimator and MAP during ITCZ

In the period 01 - 06 October 2013 the north-western provinces of Cambodia were covered by the ITCZ; heavy rain was recorded at many rainfall stations on the north-western provinces of Cambodia; flash floods occurred as a result in some villages of those provinces. Based on the recorded rainfall data from 3 differences sources, such as observed rainfall, Hydroestimator and MAP, it was concluded that MAP value was lower than the observed rainfall values for all stations, except Bovel. Figure A-81 to Figure A-90 present the chart of accumulated rainfall during the ITCZ from rainfall stations located in west and north-western part of Cambodia.

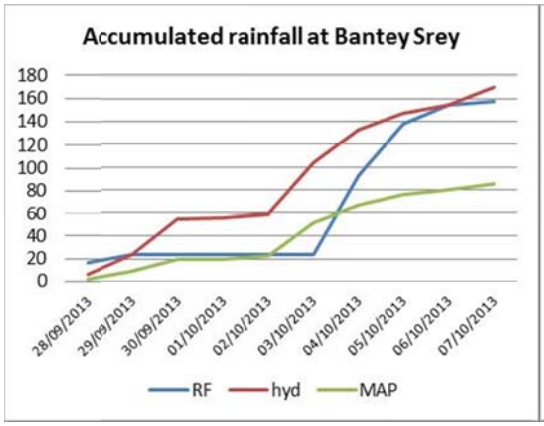

Figure A-81 Accumulated rainfall at Bantey Srey station before and during the ITCZ, where observed rainfall was lower than Hydroestimator, but higher than MAP.

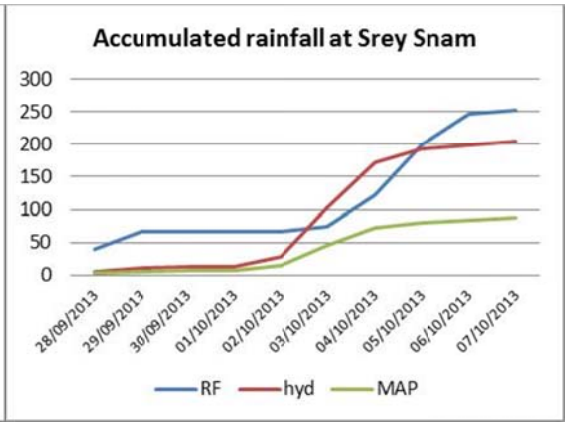

Figure A-82 Accumulated rainfall at Srey Snam station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and MAP.

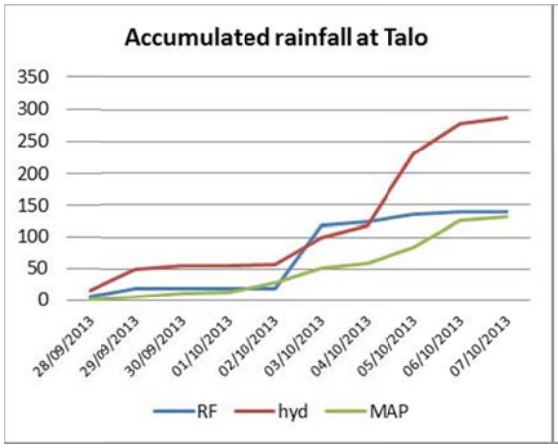

Figure A-83 Accumulated rainfall at Talo station before and during the ITCZ, where observed rainfall was lower than Hydroestimator, but higher than MAP.

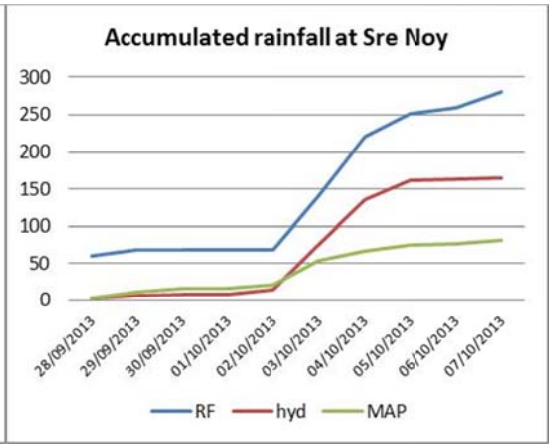

Figure A-84 Accumulated rainfall at Sre Noy station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and MAP.

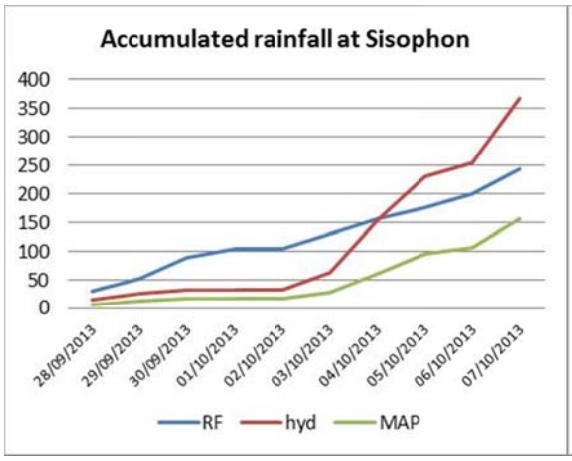

Figure A-85 Accumulated rainfall at Sisophon station before and during the ITCZ, where observed rainfall was lower than Hydroestimator (at 04/10/2013), but higher than MAP.

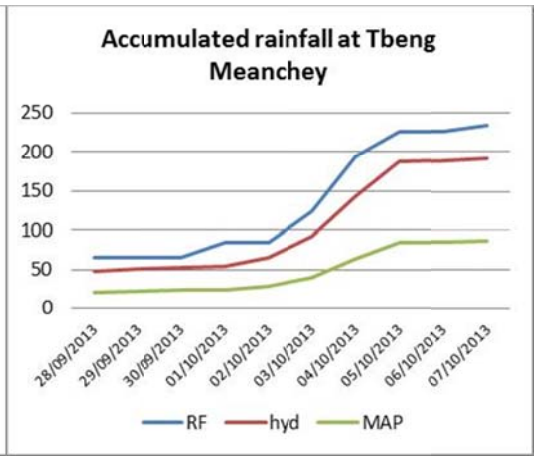

Figure A-86 Accumulated rainfall at Tbeng Meanchey station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and MAP.

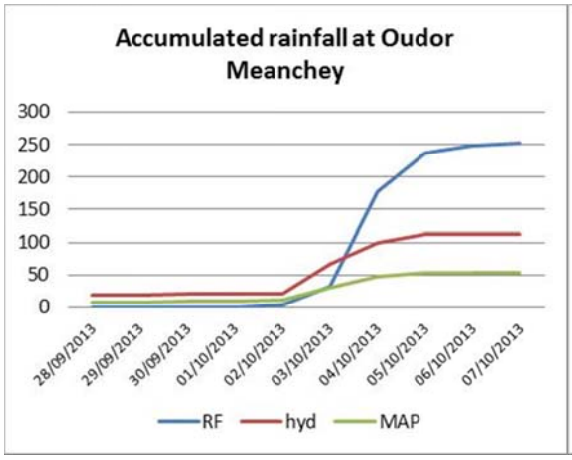

Figure A-87 Accumulated rainfall at Oudor Meanchey station before and during the ITCZ, where observed rainfall was higher than Hydroestimator, and MAP.

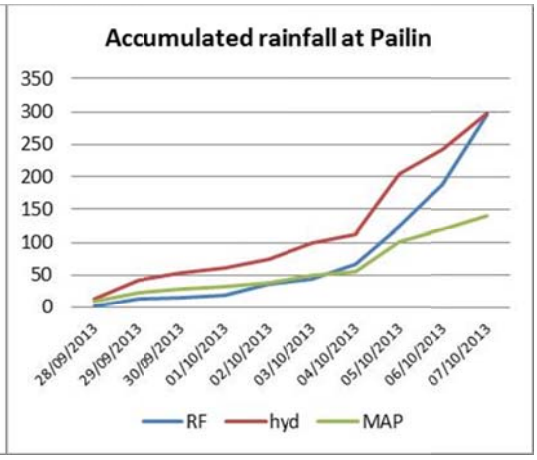

Figure A-88 Accumulated rainfall at Pailin station before and during the ITCZ, where observed rainfall was lower than Hydroestimator, but higher than MAP.

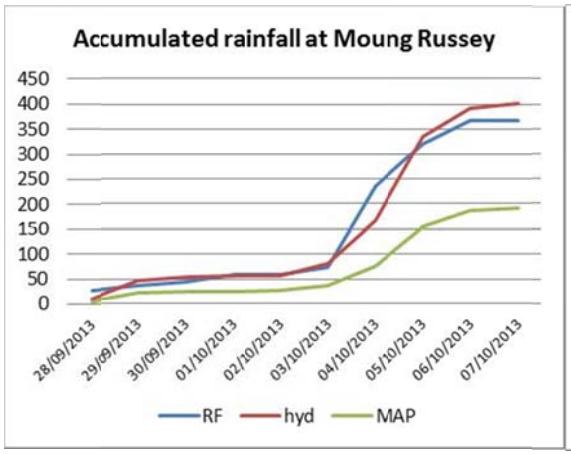

Figure A-89 Accumulated rainfall at Moung Russey station before and during the ITCZ, where observed rainfall was almost same value with Hydroestimator, but higher than MAP.

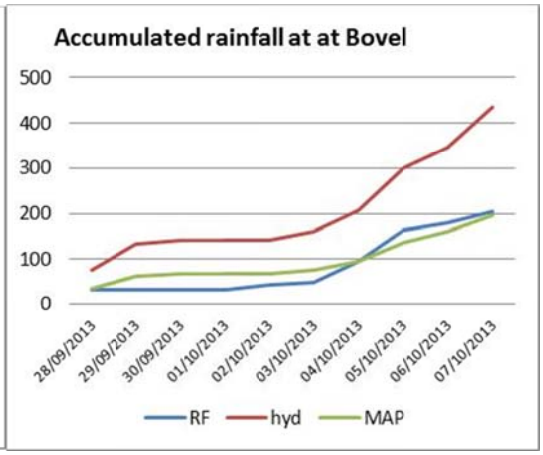

Figure A-90 Accumulated rainfall at Bovel station before and during the ITCZ, where observed rainfall was lower than Hydroestimator, and MAP.

3.2.10 Analysis of Hydroestimator and MAP during TS NARI

At the middle of October TS NARI hit Da Nang City in the central region of Viet Nam. It continued crossing the southern provinces of Lao PDR and disappeared at the Mum-Chi basin in Thailand. During the storm period heavy rain was recorded at many rainfall stations located in the central highlands and the central part of Viet Nam, at southern provinces of Lao PDR, and at the western and north-western provinces of Cambodia. The analysis of the rainfall from 3 differences sources, such as Hydroestimator, MAP and observed rainfall from the rainfall stations, it was concluded that the MAP value during the period of TS NARI was lower than observed rainfall, except for the Kong Chiam station. Figure A-91 to Figure A-104 present the accumulated rainfall at the stations located in storm affected areas.

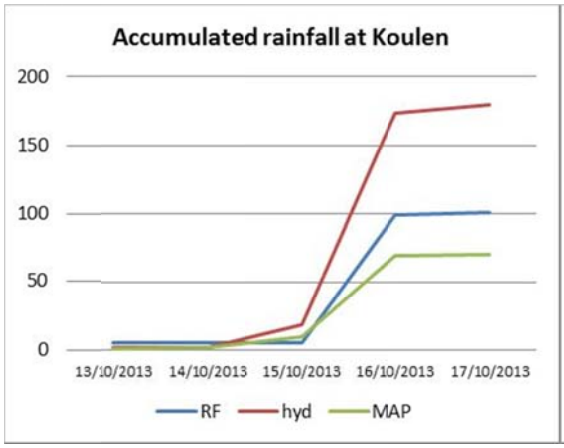

Figure A-91 Accumulated rainfall at Koulen station before and during TS NARI, where observed rainfall was lower than Hydroestimator, but it was higher than MAP.

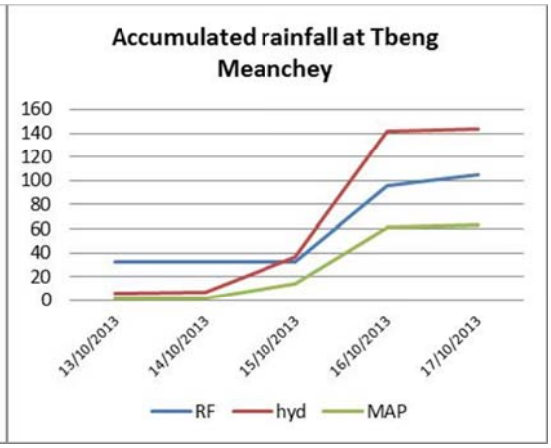

Figure A-92 Accumulated rainfall at Tbeng Meanchey station before and during TS NARI, where observed rainfall was lower than Hydroestimator, but it was higher than MAP.

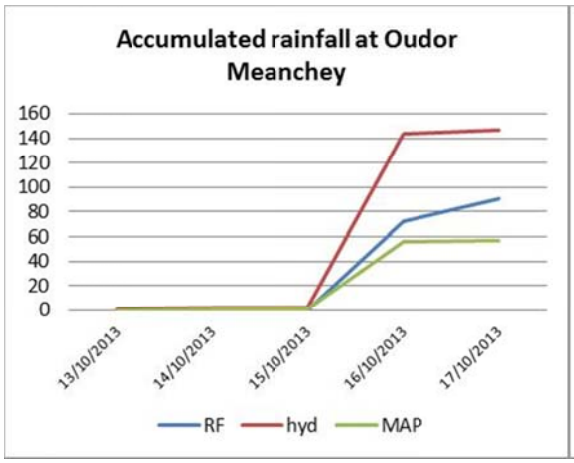

Figure A-93 Accumulated rainfall at Oudor Meanchey station before and during TS NARI, where observed rainfall was lower than Hydroestimator, but it was higher than MAP.

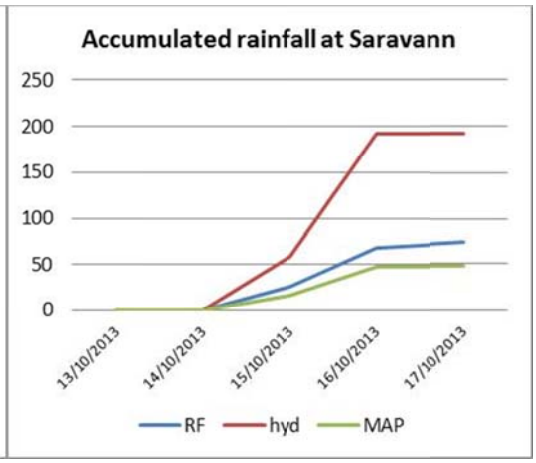

Figure A-94 Accumulated rainfall at Saravann station before and during TS NARI, where observed rainfall was lower than Hydroestimator, but it was higher than MAP.

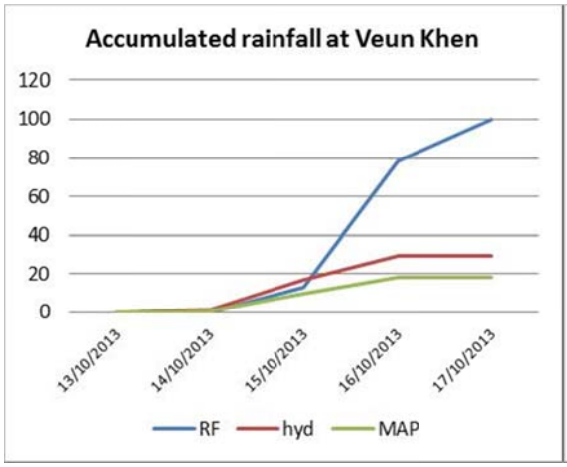

Figure A-95 Accumulated rainfall at Koulen station before and during TS NARI, where observed rainfall was higher than Hydroestimator, and MAP.

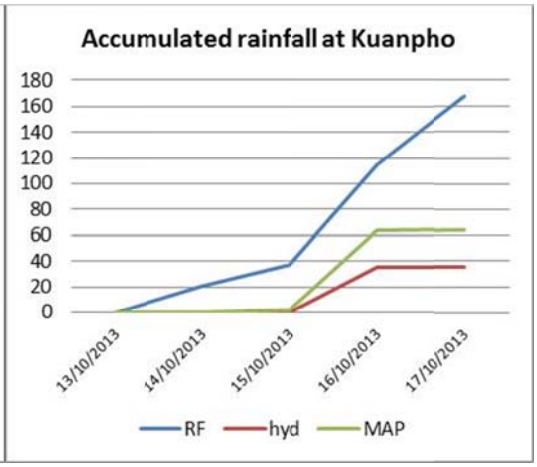

Figure A-96 Accumulated rainfall at Kuanpho station before and during TS NARI, where observed rainfall was lower than Hydroestimator, and MAP.

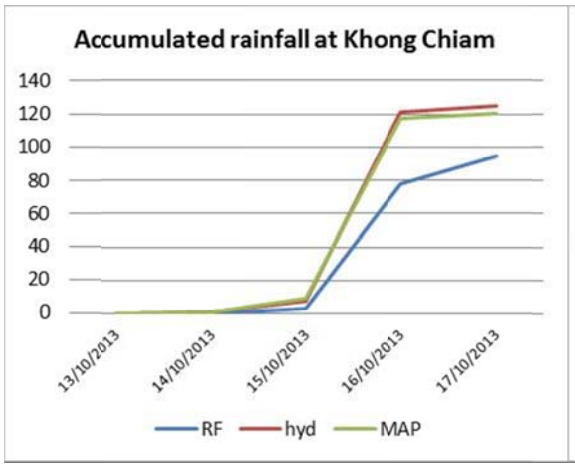

Figure A-97 Accumulated rainfall at Khong Chiam station before and during TS NARI, where observed rainfall was lower than Hydroestimator, and MAP.

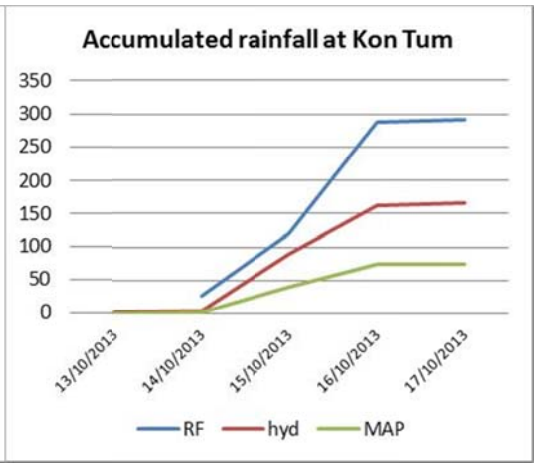

Figure A-98 Accumulated rainfall at Kon Tum station before and during TS NARI, where observed rainfall was higher than Hydroestimator, and MAP.

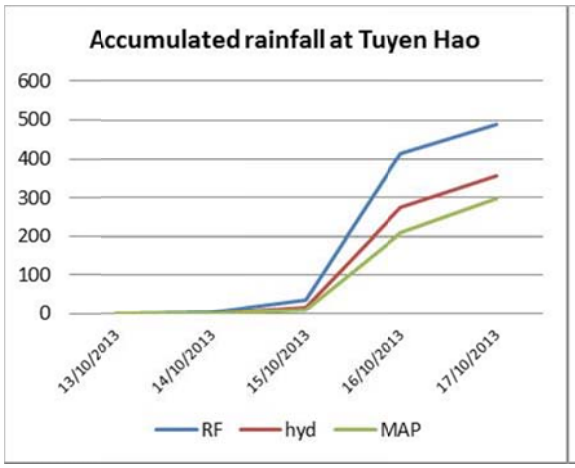

Figure A-99 Accumulated rainfall at Tuyen Hao station before and during TS NARI, where observed rainfall was higher than Hydroestimator, and MAP.

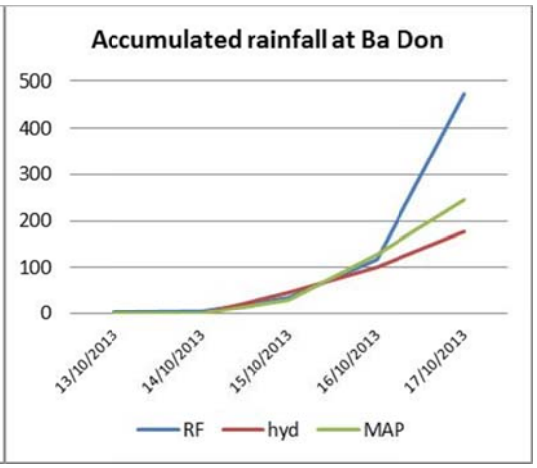

Figure A-100 Accumulated rainfall at Ba Don station before and during TS NARI, where observed rainfall was higher than Hydroestimator, and MAP.

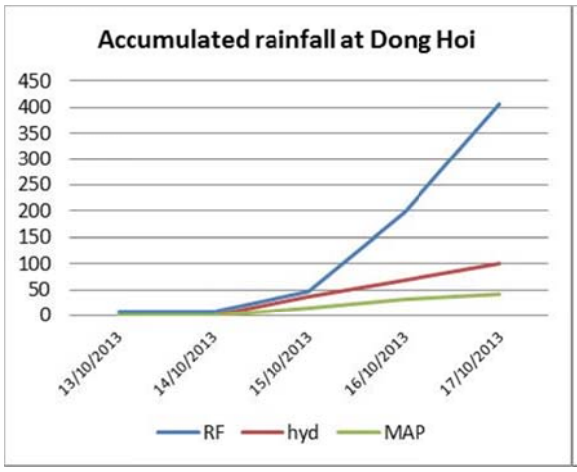

Figure A-101 Accumulated rainfall at Dong Hoi station before and during TS NARI, where observed rainfall was higher than Hydroestimator, and MAP.

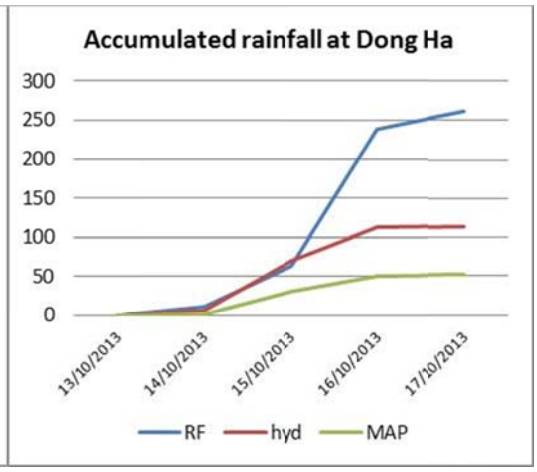

Figure A-102 Accumulated rainfall at Koulen station before and during TS NARI, where observed rainfall was higher than Hydroestimator, and MAP.

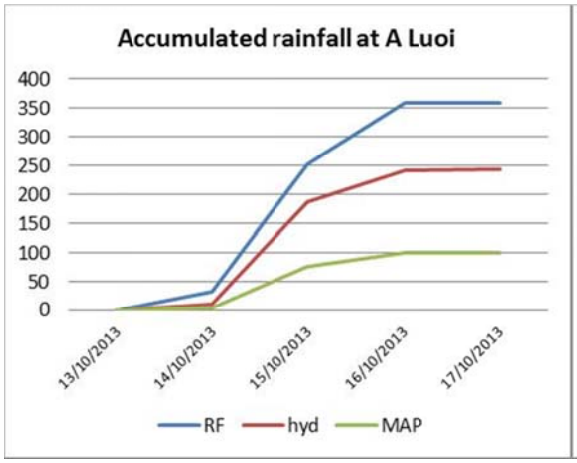

Figure A-103 Accumulated rainfall at A Luoi station before and during TS NARI, where observed rainfall was higher than Hydroestimator, and MAP.

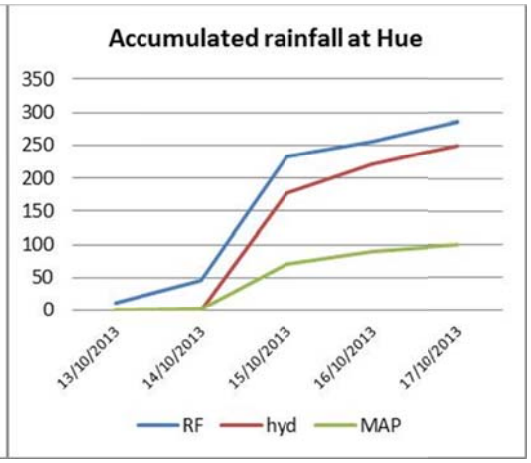

Figure A-104 Accumulated rainfall at Hue station before and during TS NARI, where observed rainfall was higher than Hydroestimator, and MAP.

3.2.11 Analysis of Hydroestimator and MAP during TD THIRTY

The tropical depression THIRTY made second land fall at Phu Yen province of Viet Nam around 01:00 PM UTC of 06 November 2013. then it was continued to the west direction across the southern provinces of Viet Nam and Cambodia , before it crossed the southern provinces in Thailand .During that time many rainfall stations located in southern and central provinces of Viet Nam was recorded a heavy rain about 100 mm to 150mm per day . It was seem that the Hydroestimator during the tropical depression was underestimated comparing with the observed rainfall, and also the MAP has been made an inappropriate adjustment by a reduction the hydrestimator value again. The Figure A-105 to Figure A-107 present the chart of accumulated rainfall of 3 difference source: observed rainfall, Hydroestimator and MAP , where show that the Hydroestimaor was under estimated , and the MAP has been made inappropriate bias correction by decreasing the rainfall value which estimated by Hydrestimator (instead it should increase the rainfall value of Hydroestimator).

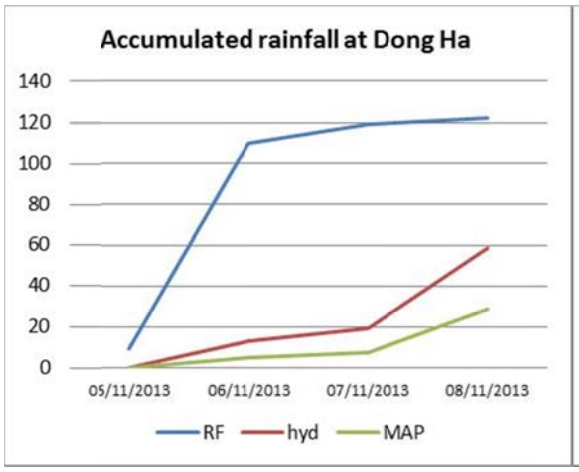

Figure A-105 Accumulated rainfall at Dong Ha station before and during TD THIRTY, where observed rainfall was higher than Hydroestimator, and MAP (it seem the heavy rain occurred 1 day before the Hydroestimator estimated).

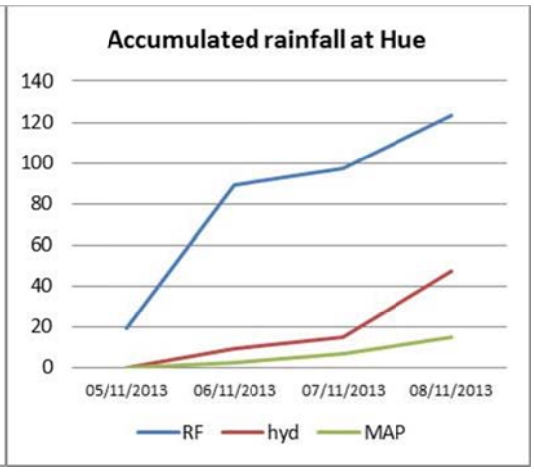

Figure A-106 Accumulated rainfall at Hue station before and during TD THIRTY, where observed rainfall was higher than Hydroestimator, and MAP (it seem the heavy rain occurred 1 day before the Hydroestimator estimated).

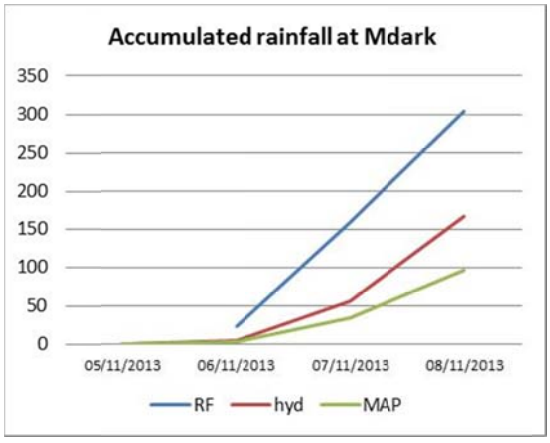

Figure A-107 Accumulated rainfall at Dong Ha station before and during TD THIRTY, where observed rainfall was higher than Hydroestimator, and MAP.

3.2.12 Analysis of Hydroestimator and MAP during TS PODUL

PODUL is the last storm of flood season 2013 which hit the Lower Mekong Region. The storm hit the southern provinces of Viet Nam with the heavy rainfall on 15 to 16 November 2013. During the storm period the Hydroestimator did not well estimate the rainfall. The rainfall values from the Hydroestimator were lower than the observed rainfall. Most likely inappropriate adjustment of the MAP values was through bias corrections of the Hydroestimator values. Figure A-108 to Figure A-111 present the charts of accumulated rainfall from the rainfall stations of the central and central highlands of Viet Nam during the TS PODUL.

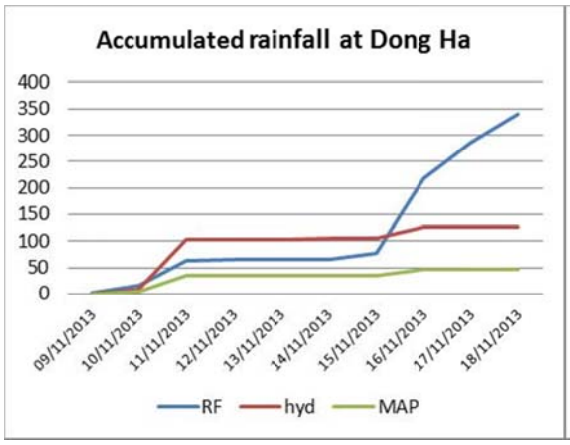

Figure A-108 Accumulated rainfall at Dong Ha station before and during TS PODUL, where observed rainfall was higher than Hydroestimator, and MAP.

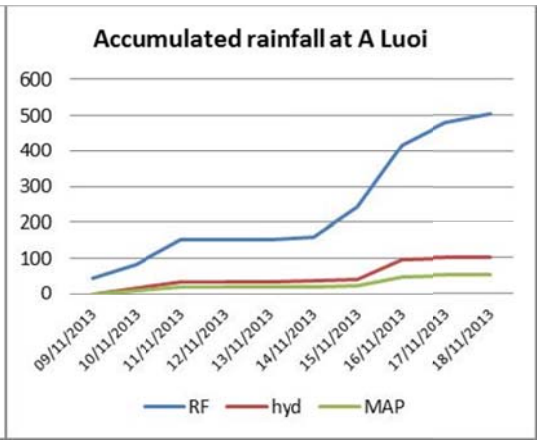

Figure A-109 Accumulated rainfall at A Luoi station before and during TS PODUL, where observed rainfall was higher than Hydroestimator, and MAP.

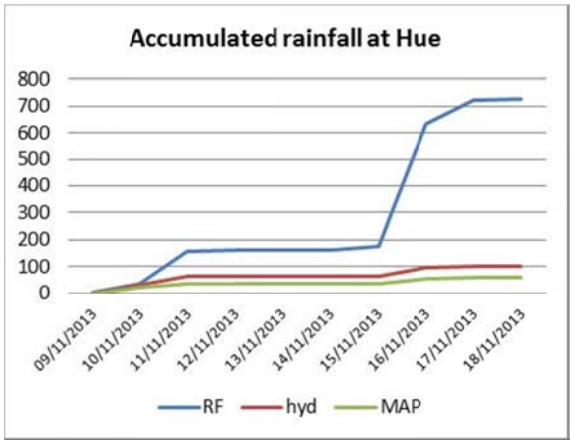

Figure A-110 Accumulated rainfall at Hue station before and during TS PODUL, where observed rainfall was higher than Hydroestimator, and MAP.

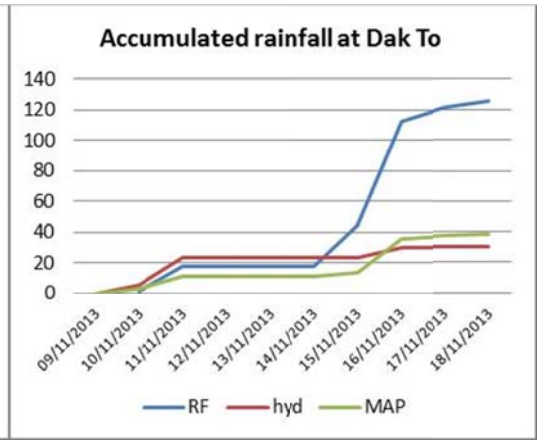

Figure A-111 Accumulated rainfall at Dak To station before and during TD PODUL, where observed rainfall was higher than Hydroestimator, and MAP.

4. Conclusions and Recommendations

During the flood season 2013 the MRCFFG system successfully detected many flash flood events during severe weather situations, except in a few cases when the system could not properly detect the flah flood risk. Insufficient capacity of the flash flood detection of the MRCFFG system may cause inaccuracies of the satellite rainfall estimate, but also inappropriate bias correction factors which are used to correct the satellite rainfall estimate (Hydroestimator) to Mean Aerial Precipitation (MAP). Based on the analysis of rainfall from 3 differences sources, such as the Hydroestimator, the MAP and daily recorded rainfall from the rainfall stations during period of the 12 severe weather conditions, the following conclusions and recommendations are formulated:

1- During severe weather situations, such as tropical storms, tropical depressions, low pressure and inter tropical convert zone (ITCZ), the rainfall values from the satellite rainfall estimate (Hydroestimator) in many areas was under estimated compared with the rainfall observed from the ground observed stations.

2- The MAP value was lower than the observed rainfall value (especially for areas located in southern part of LMB (Cambodia, southern part of Viet Nam). This is probably caused by incorrect bias correction factors of MAP.
3- It is recommendation to look into the scale factor of the Hydroestimator, as the maximal scale of Hydroestimator for 24 accumulated rainfalls was set up to 300 mm only. However according to the real rainfall records the 24 hour accumulated rainfall (daily rainfall) for many stations in the north and central part of Viet Nam was more than 400 mm.
4- It is recommended to review the bias correction factor for some areas, especially for the areas located in the southern part of LMB (including Cambodia, Southern part of Viet Nam, and the southern provinces of Lao PDR).
5- It is recommended that after the review the bias correction factor for those areas to rerun the model and make the rainfall analysis again by comparing the new MAP values with the observed rainfall.
6- During the analysis it was found that some rainfall values of the recorded rainfall from some stations were not correct (may because of mistyping). It is recommended that the Hydmet operators at the national line agencies should carried out a post-quality check of all rainfall and water level data collected during the 2013 flood season.