

### Weekly Flood Situation Report for the Mekong River Basin

Prepared on: 05/09/2011, covering the week from the 29<sup>th</sup> to the 04<sup>th</sup> September, 2011

### Weather Patterns, General Behaviour of the Mekong River and Flood Situation

#### General weather patterns

During the week of the 29<sup>th</sup> August to the 04<sup>th</sup> September 2011, four weather bulletins were issued by the Department of Meteorology (DOM) of Cambodia. The weather charts of the 30<sup>th</sup> August and the 03<sup>rd</sup> September 2011 bulletins are presented in the figures below:

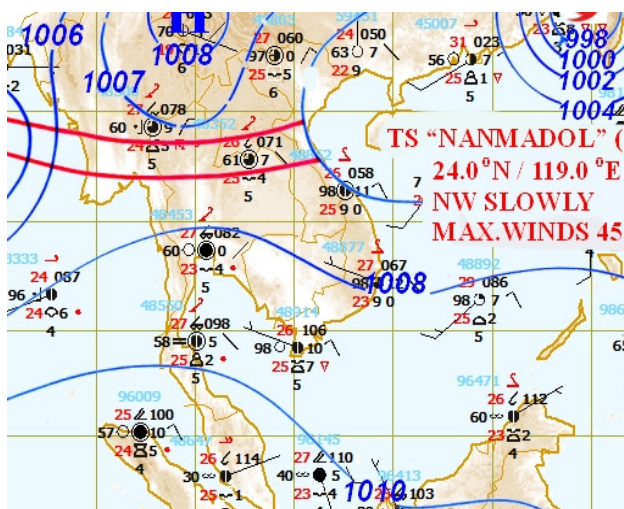


Figure 1: Weather map for 30<sup>th</sup> August 2011

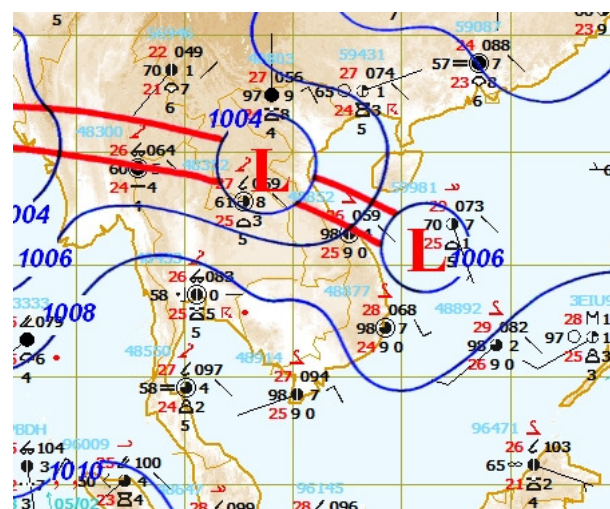


Figure 2: Weather map for 03<sup>rd</sup> September 2011

#### Moderate South-West (SW) Monsoon

Strong SW monsoon prevailed over Andaman Sea, the Gulf of Thailand, Thailand and Cambodia at the surface from the beginning of last week and was weakened from mid to end of last week (Figure 1 and 2).

#### Inter Tropical Convergence Zone (ITCZ)

ITCZ laid across the upper and middle of Myanmar, Thailand, Cambodia and the lower Viet Nam from the first half and nearly the end of last week (Figure 1 and 2).

#### Tropical depressions (TD), tropical storms (TS) or typhoons (TY)

No Tropical Depression, Tropical Storm or Typhoon has significant affected to the LMB in last week. (Tropical Storm "Nanmadol" had moved Northwest from China sea to China) (Figure 1).

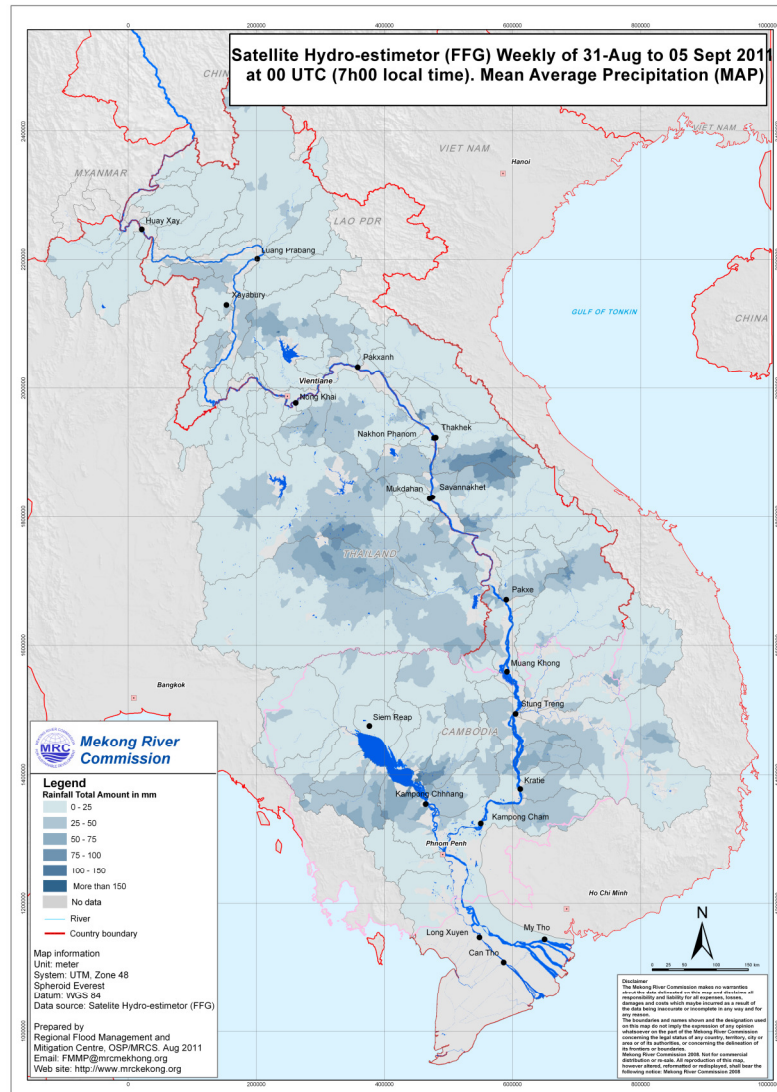
#### Other weather phenomena that affect the discharge

No other weather phenomena affecting the discharge were observed.

#### Over weather situation

Normal weather situation prevailed for the whole week. As the result of appearances of ITCZ in the first half of the week and low pressure trough laid across Myanmar, Thailand, Lao PDR, Cambodia

and Viet Nam at the height 1.5 km (850 hPa), scattered rain shower with isolated heavy rain occurred in the upper and central of Thailand, Lao PDR and central of Cambodia. Figure 3 illustrates rainfall amount distribution over the LMB, covering last week. During last week, heavy rain occurred in the middle and lower parts of LMB from Pakse to Stung Treng and the amounts of rainfall covering last week were recorded at Pakse (157.1mm) and Stung Treng (115.5mm).



**Figure 3: Rainfall distribution over the LMB, covering the week 31<sup>st</sup> August– 05<sup>th</sup> September, 2011**

### General behaviour of the Mekong River

Water levels at most stations in the upper and middle part of LMB along the Mekong river were below the long-term average except Paksane and Nakhon Phanom where by the end of the week water level was higher than the long-term average for this time of the year. Water levels at lower part of LMB were above the long-term average for this time of the year. While water levels in the Mekong show a falling trend at stations in the upper and middle of the reach, water levels at stations in the lower reach were slowly recess during reporting period. Regarding to two stations in downstream at Tan Chau and Chau Doc, water levels at those two stations were fluctuated by tidal with increasing trend in the monitoring period.

***For stations from Chiang Saen to Vientiane/Nong Khai***

Water level at Chiang Saen recessed and raised below the long-term average at the beginning and end of last week; water level at Luang Prabang and Nong Khai were recessed below the long-term average for this time of the year.

***For stations Paksane to Thakhek/Nakon Phanom***

Water levels at Paksane and Nakon Phanom were falling since the beginning just above the long-term average at the end of last week. Water level at Thakhet was recessing below the long-term average for this time of the year.

***For stations Savannakhet/Mukdahan to Pakse***

Water levels at these stations showed falling trend in the monitoring period and were below the long-term average for this time of the year except water level at Pakse station which was just above the average.

***For stations from Stung Treng to Phnom Penh Port/ Phnom Penh Bassac***

Water level of Stung Treng station was raising and falling during last week but slightly falling at Phnom Penh Port/ Phnom Penh Bassac stations. These stations were recording levels that are above the long-term average for this time of the year.

***Tan Chau and Chau Doc***

Water levels were slightly falling till the end of the week and were above flood alarm stage. Both stations were recording levels that are above the long-term average for this time of the year and significantly affected by tidal.

**Note:** for areas between forecast stations, please refer to the nearest forecast station.

**Flood Situation**

- Flood stage or alarm stage:
  - The Mekong reached alarm situation at Tan Chau since last two weeks.
  - The Mekong reached alarm situation at Chau Doc since 25<sup>th</sup> August, 2011.

- Damage or victims:

No damage or loss of life due to river flooding was recorded anywhere along the Mekong River during the past week.

For more details see the following annex:

- tables and graphs for water level and rainfall for the last week in Annex A
- a graph for accuracy in Annex B
- a table of forecast achievement in Annex B
- tables and graphs for performance in Annex B
- the water level graphs showing the observed water level for the season in Annex C

## Annex A: Graphs and Tables

Table A1: observed water levels

unit in m

2011	Jinghong	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
29/08	536.97	5.88	13.00	12.37	9.82	11.08	12.52	10.54	11.55	10.32	9.13	12.35	10.30	9.12	20.30	14.48	9.43	8.56	7.35	6.90	8.39	3.82	3.18
30/08	536.99	5.66	12.50	12.12	9.57	10.96	12.50	10.43	11.47	10.14	9.04	12.12	10.05	8.87	20.14	14.42	9.42	8.56	7.35	6.90	8.41	3.81	3.18
31/08	537.87	5.51	12.10	11.77	9.24	10.66	12.37	10.33	11.34	9.98	8.96	11.98	9.91	8.60	19.83	14.27	9.41	8.55	7.34	6.90	8.42	3.79	3.19
01/09	537.63	5.39	11.74	11.56	9.06	10.41	12.16	10.23	11.25	10.03	8.81	12.02	10.02	8.59	19.51	14.06	9.37	8.52	7.32	6.88	8.39	3.77	3.18
02/09	536.59	5.50	11.46	11.23	8.74	10.13	12.05	10.17	11.14	9.93	8.73	12.18	10.14	8.80	19.56	13.95	9.34	8.49	7.31	6.87	8.39	3.76	3.19
03/09	537.45	5.06	11.25	10.96	8.42	9.80	11.82	10.01	11.00	9.75	8.65	12.12	10.10	8.99	19.80	13.96	9.34	8.49	7.30	6.85	8.39	3.75	3.20
04/09	536.56	4.61	11.06	10.76	8.14	9.48	11.63	9.89	10.85	9.64	8.59	11.94	9.97	8.84	19.87	14.01	9.35	8.50	7.28	6.84	8.39	3.75	3.20
05/09	537.18	4.95	10.92	10.68	7.94	9.27	11.44	9.83	10.78	9.62	8.46	11.79	9.75	8.66	19.69	13.98	9.36	8.51	7.29	6.83	8.42	3.74	3.19
Flood level		11.80	18.00	17.40	12.50	12.20	14.50	12.70	14.00	12.60	13.00	16.20	12.00	12.00	23.00	16.20	12.00	11.00	7.90	8.00	10.00	4.20	3.50

Table A2: observed rainfall

Unit in mm

2011	Jinghong	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
29/08	0.0	nr	nr	nr	nr	nr	nr	17.8	20.7	nr	nr	0.8	60.5	2.5	11.2	9.8	nr	-	nr	0.0	nr	1.5	-
30/08	0.0	nr	nr	1.6	nr	13.3	2.0	1.3	nr	4.7	nr	33.5	37.6	48.5	13.0	8.8	1.4	-	nr	nr	nr	0.0	1.2
31/08	0.0	7.0	nr	1.5	nr	nr	nr	0.3	10.6	13.4	nr	35.0	3.5	nr	nr	nr	nr	-	nr	nr	nr	0.0	-
01/09	0.0	nr	nr	nr	26.0	12.2	1.6	2.7	6.8	56.3	49.0	16.7	7.0	20.0	nr	10.5	nr	-	9.6	7.4	nr	nr	-
02/09	10.0	nr	10.0	nr	9.0	nr	54.8	nr	nr	7.7	6.5	4.6	7.3	2.5	17.6	nr	12.9	-	nr	18.2	nr	0.0	-
03/09	0.0	4.9	nr	nr	5.5	nr	42.8	4.1	nr	12.4	19.2	2.1	41.2	31.0	4.8	5.4	nr	-	nr	nr	nr	nr	-
04/09	16.0	1.0	0.7	nr	nr	nr	34.6	37.6	28.2	0.3	nr	7.6	nr	11.0	nr	nr	nr	-	6.5	nr	nr	0.0	-
05/09	1.0	2.4	20.0	3.7	nr	nr	28.1	1.9	0.7	2.2	3.3	21.0	7.5	nr	2.2	0.3	nr	-	42.5	1.8	nr	0.0	-

Figure A1: Water level and rainfall for Jinghong, Chiang Saen, and Luang Prabang

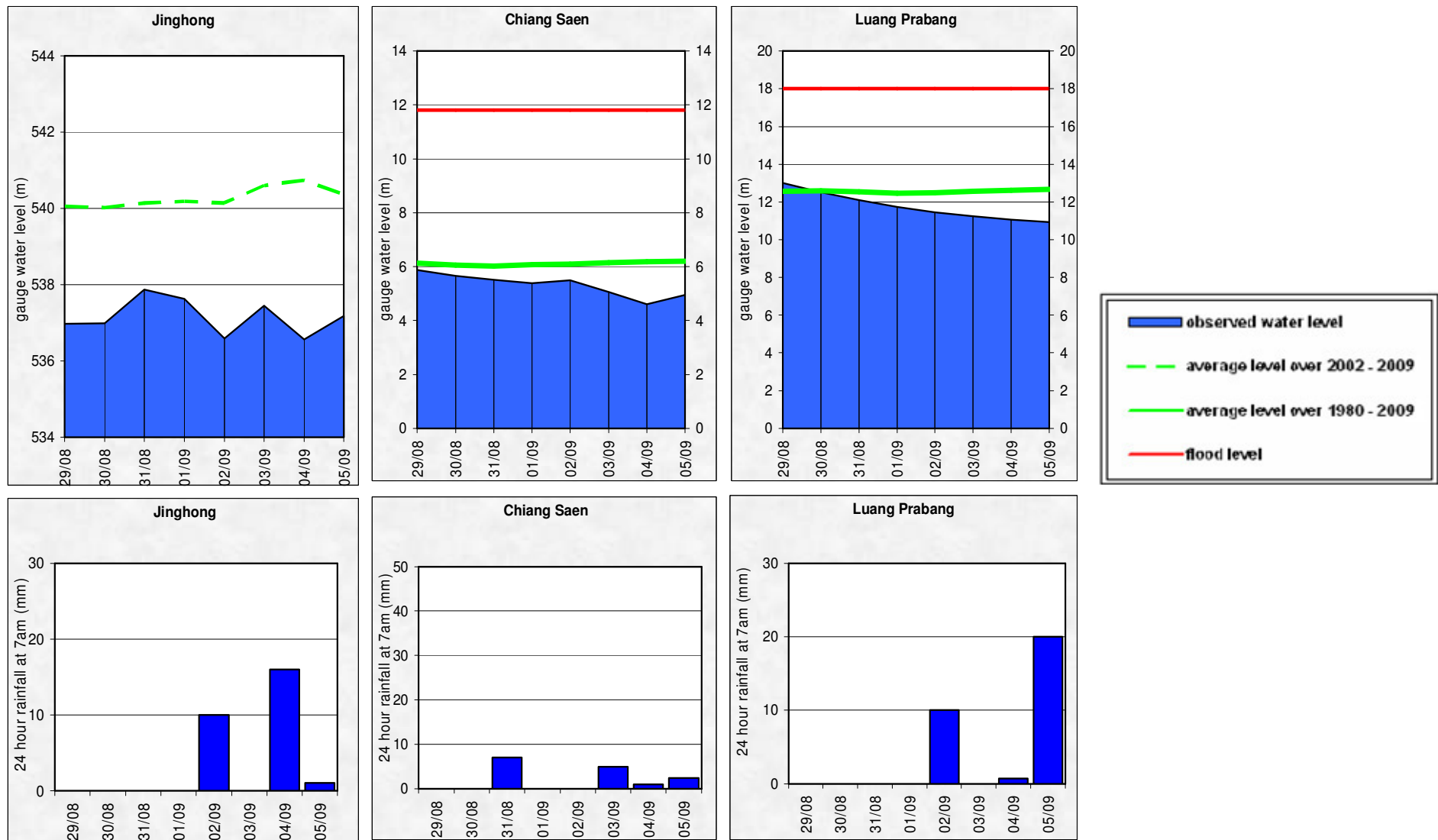


Figure A2: Water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

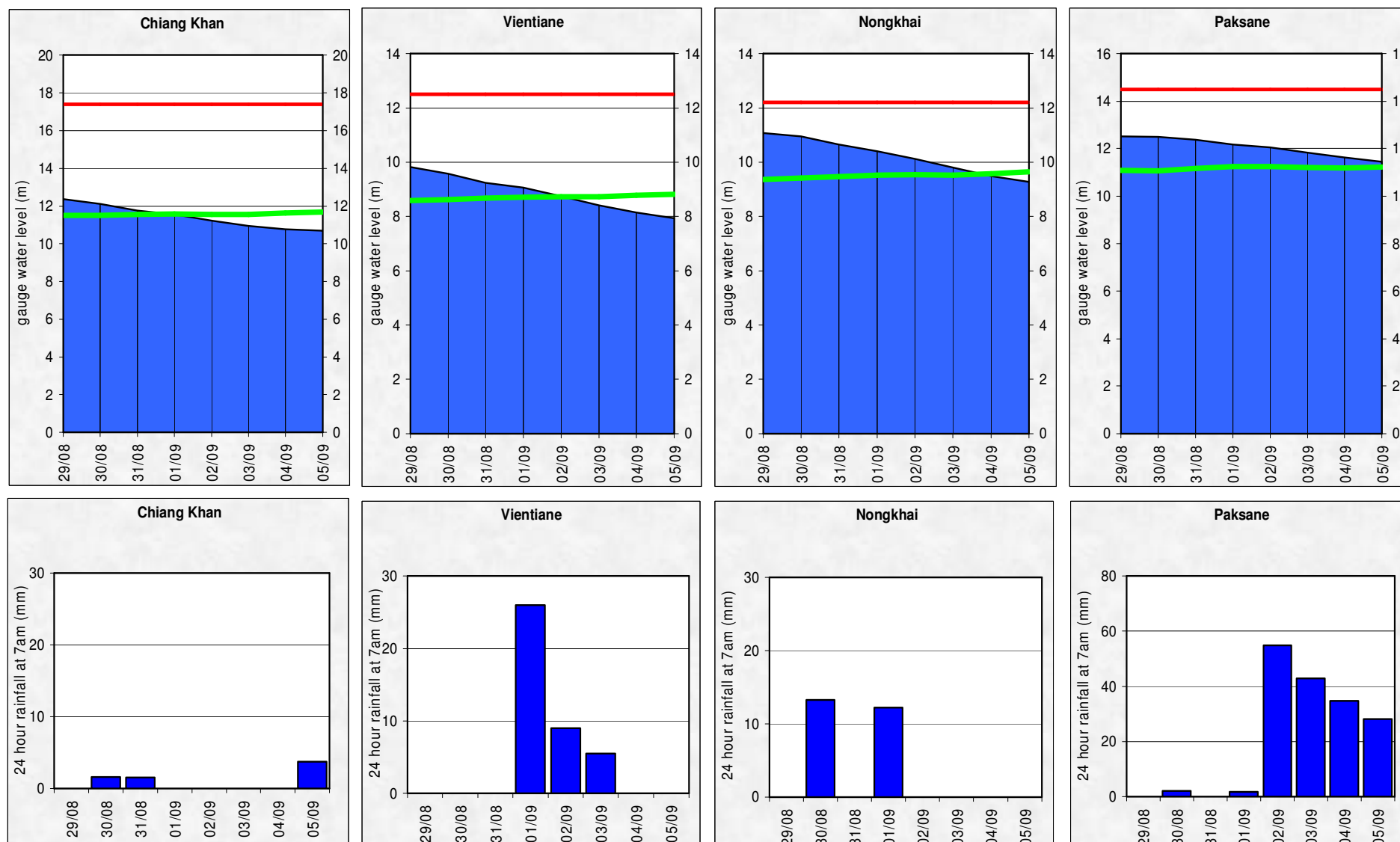


Figure A3: Water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

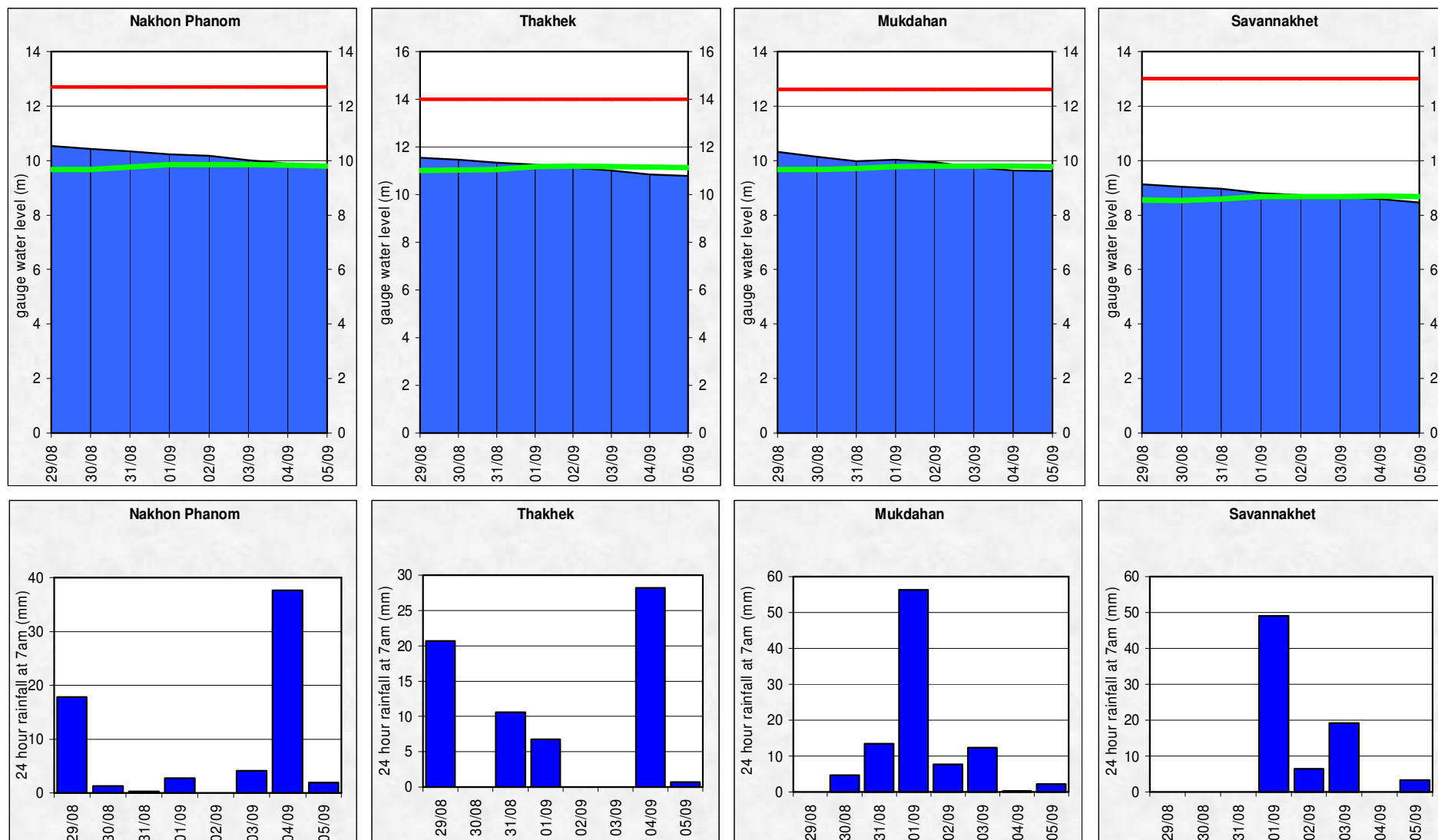




Figure A4: Water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

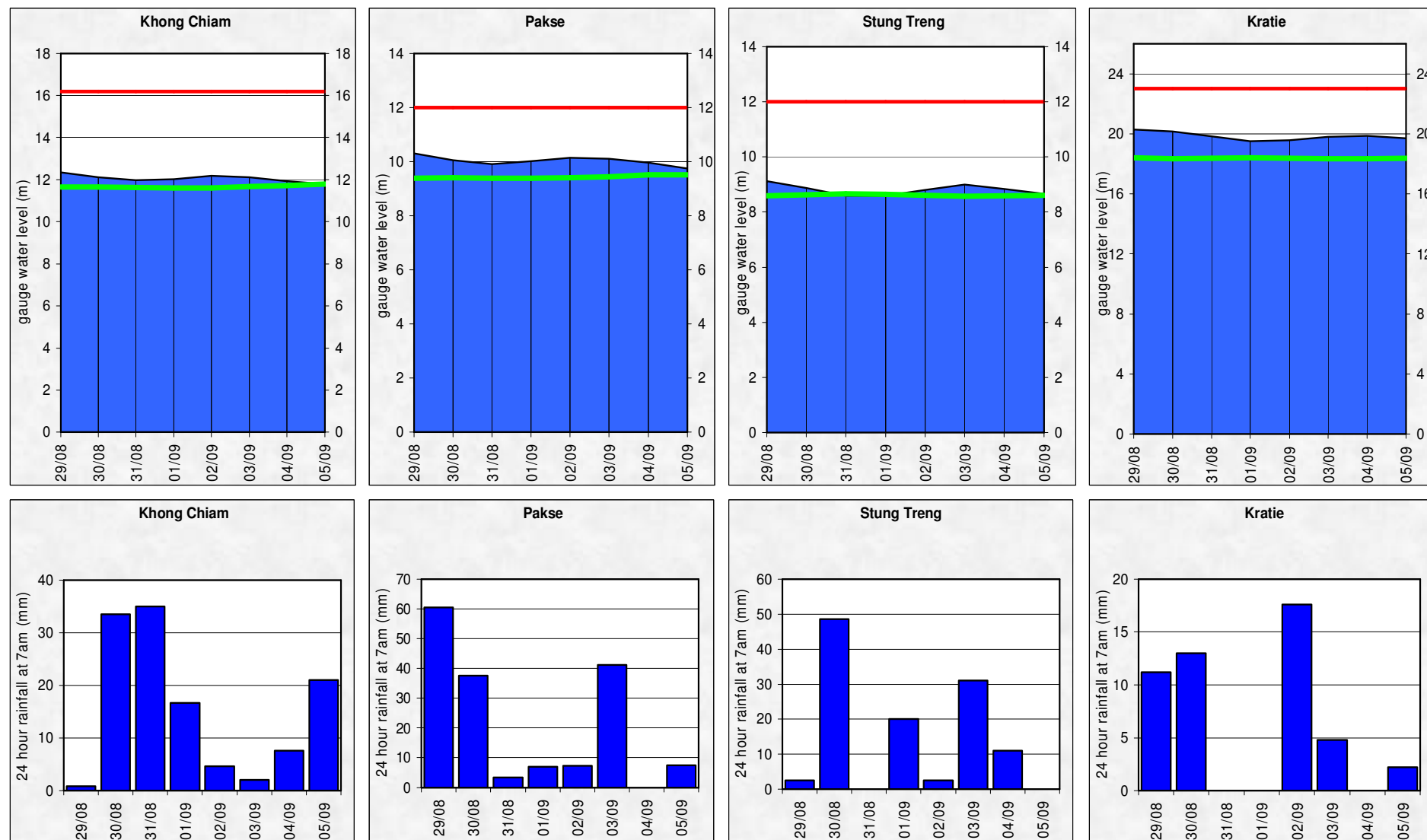




Figure A5: Water level and rainfall for Kompong Cham, Phnom Penh (Bassac and Port), and Koh Khel

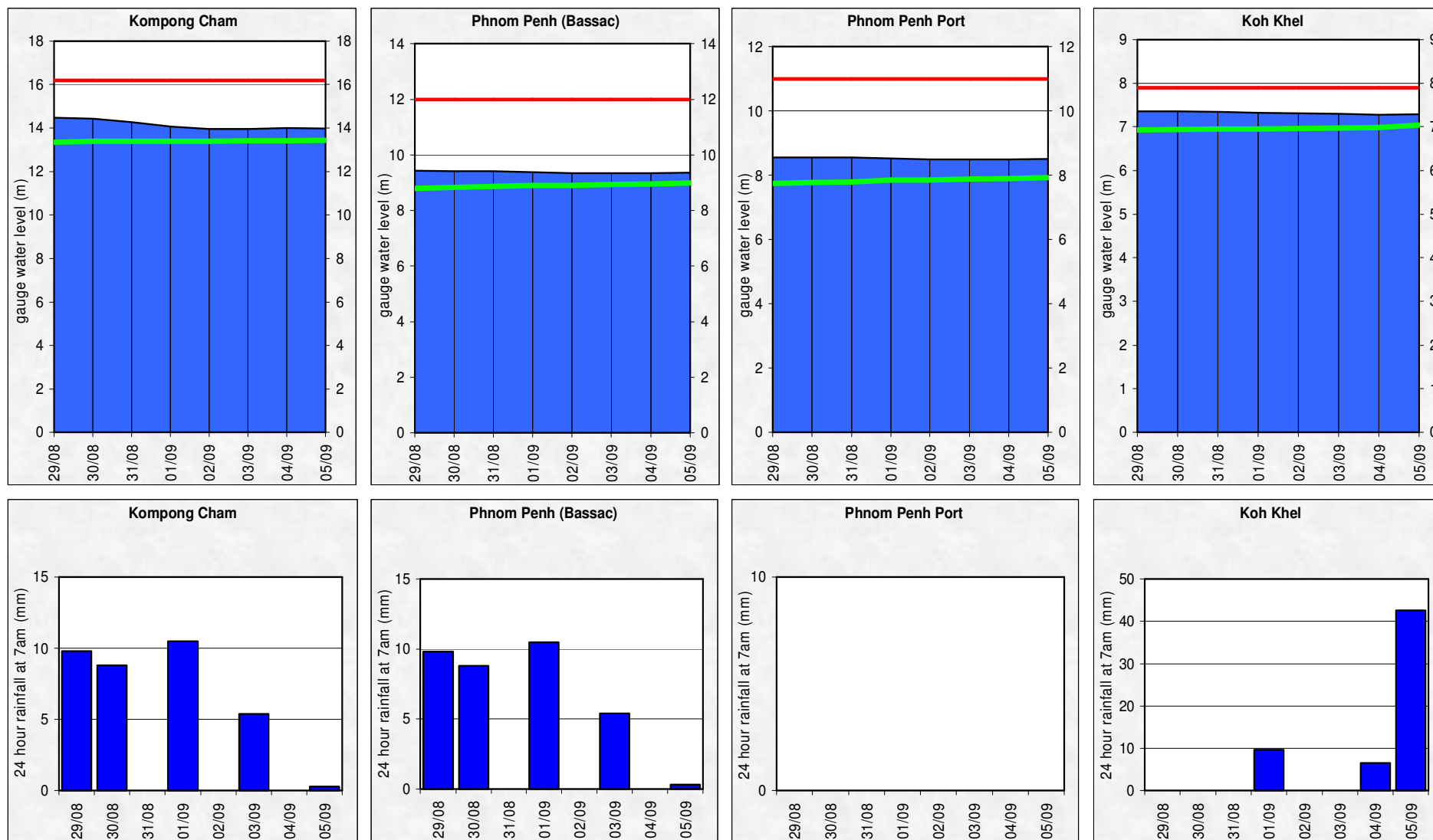
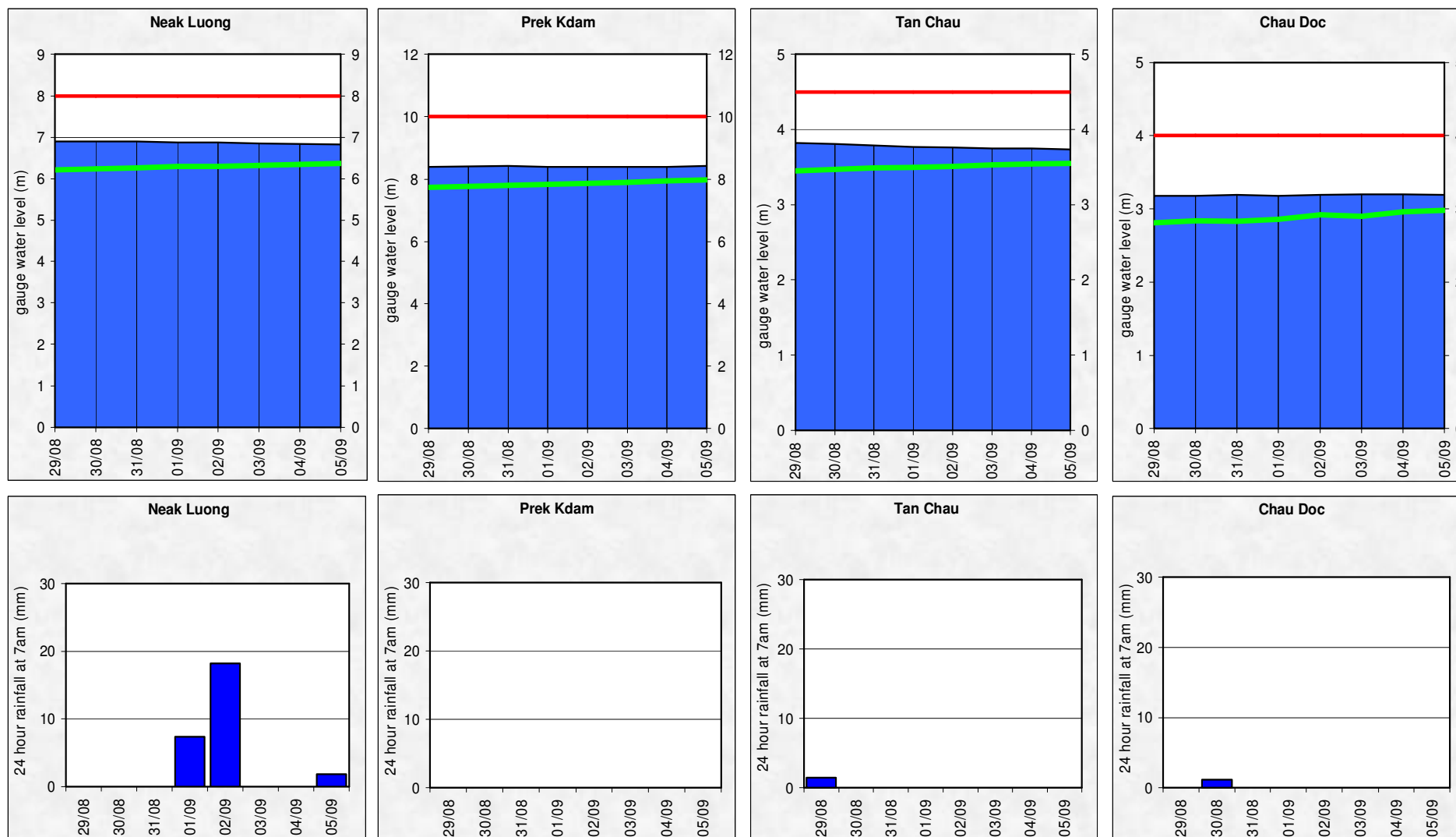


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



## Annex B: Accuracy and performance

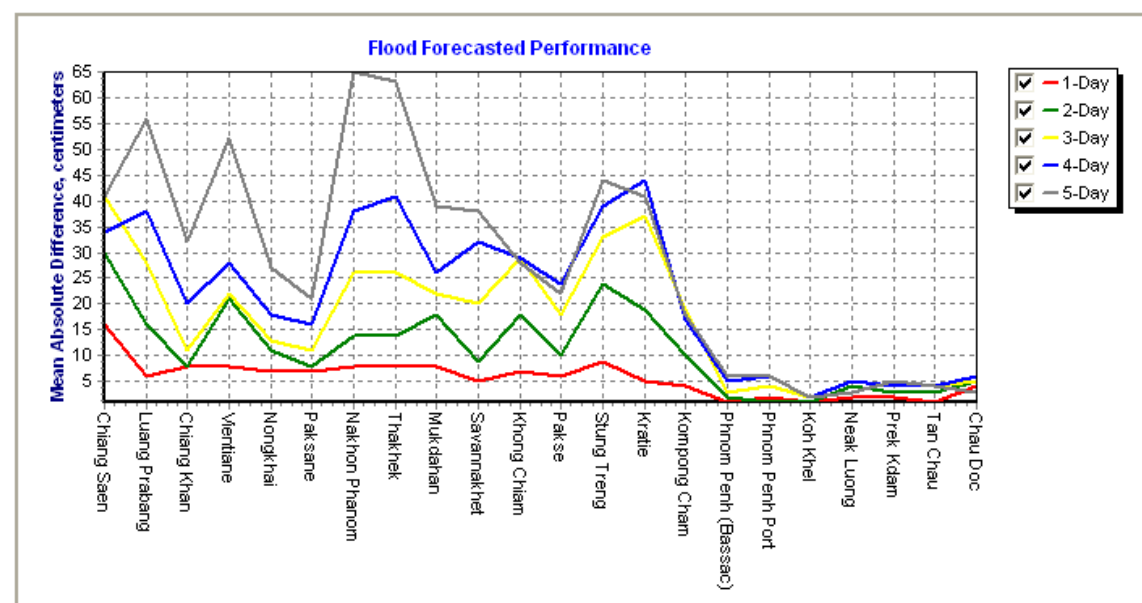
### Accuracy

“Accuracy” describes the accuracy of the adjusted and published forecast, based on the results of the MRC Mekong Flood Forecasting System, which are then adjusted by the Flood Forecaster in Charge taking into consideration known biases in input data and his/her knowledge of the response of the model system and the hydrology of the Mekong River Basin. The information is presented as a graph below, showing the average flood forecasting accuracy along the Mekong mainstream.

The graph of average difference between forecast and actual water levels for the past week shows the abnormal pattern, in which the accuracies at stations Chiang Saen and Luang Prabang in the upper reach of LMB were better than that in middle reach. In general, the overall accuracy is quite good for 1-day to 5-day forecast lead time at most stations; however the peaks at Stung Treng for 1-day and 2-day forecast and Kratie for 3-day forecast were less than expected.

The above differences perhaps caused by internal model functionality in forecasting for upper and middle reach of the LMB in taking into account flow contribution from left bank tributaries of Lao PDR, for which the parameter adjustment in the model is not possible.

Figure B1: Average flood forecast accuracy along the Mekong mainstream



**Forecast Achievement**

The forecast achievement indicates the % of days that the forecast at a particular station for a lead-time is successful against a respective benchmark (Table B2).

Table B1: Achievement of daily forecast against benchmarks

unit in %

	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc	Average	
1-day	71.4	100.0	100.0	71.4	85.7	85.7	71.4	71.4	71.4	85.7	85.7	85.7	42.9	100.0	85.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	87.0
2-day	83.3	100.0	100.0	50.0	83.3	100.0	66.7	83.3	83.3	100.0	66.7	100.0	33.3	83.3	83.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	87.1
3-day	60.0	80.0	100.0	60.0	80.0	100.0	60.0	60.0	60.0	80.0	60.0	80.0	40.0	20.0	80.0	100.0	100.0	100.0	80.0	100.0	100.0	80.0	80.0	76.4
4-day	100.0	75.0	100.0	100.0	100.0	100.0	50.0	50.0	100.0	100.0	75.0	100.0	50.0	50.0	100.0	75.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	87.5
5-day	100.0	66.7	66.7	66.7	66.7	100.0	33.3	33.3	33.3	100.0	66.7	100.0	33.3	66.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	78.8

Table B2: Benchmarks of success (Indicator of accuracy in mean absolute error)

Unit in cm

	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
1-day	25	25	25	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	1
2-day	50	50	50	25	25	25	25	25	25	25	25	25	25	25	25	10	10	10	10	10	10	1
3-day	50	50	50	25	25	25	25	25	25	25	25	25	25	25	25	10	10	10	10	10	10	1
4-day	75	75	50	50	50	50	50	50	50	50	50	50	50	50	50	10	25	10	25	25	10	1
5-day	75	75	50	50	50	50	50	50	50	50	50	50	50	50	50	25	25	25	25	25	25	2

**Note:** An indication of the accuracy given in the Table B2 is based on the performance of the forecast made in 2008 from the new flood forecasting system and the configuration for the 2009 flood season and is published on the website of MRC (<http://ffw.mrcmekong.org/accuracy.htm>).

A new set of performance indicators that is established by combining international standards and the specific circumstances in the Mekong River Basin is applied officially for the flood season of 2011 onward.

## Performance

Performance is assessed by evaluating a number of performance indicators, see table and graphs below:

Table B3: Overview of performance indicators for the past 5 days including the current report date

	Flood Forecast: time sent				Arrival time of input data (average)							Missing data (number)						
2011	FF completed and sent (time)	stations without forecast	FF2 completed and sent (time)	Weather information available (number)	NOAA data	China	Cambodia - DHRW	Cambodia - DOM	Lao PDR - DMH	Thailand - DWR	Viet Nam - NCHMF	NOAA data	China	Cambodia - DHRW	Cambodia - DOM	Lao PDR - DMH	Thailand - DWR	Viet Nam - NCHMF
<i>week</i>	10:37	0	-	3	08:10	08:10	07:17	05:40	09:18	07:45	07:09	0	0	1	32	146	1	76
<i>month</i>	10:34	0	-	13	08:11	08:13	07:32	05:51	09:06	07:43	07:03	0	0	2	117	471	3	191
<i>season</i>	10:29	1	-	56	08:11	08:21	07:32	06:02	09:04	07:47	07:10	1	16	38	852	1707	22	568

*Week* is the week for which this report is made; *Month* is actually the last 30 days (or less if the flood season has just begun); *Season* is the current flood season up to the date of this report.

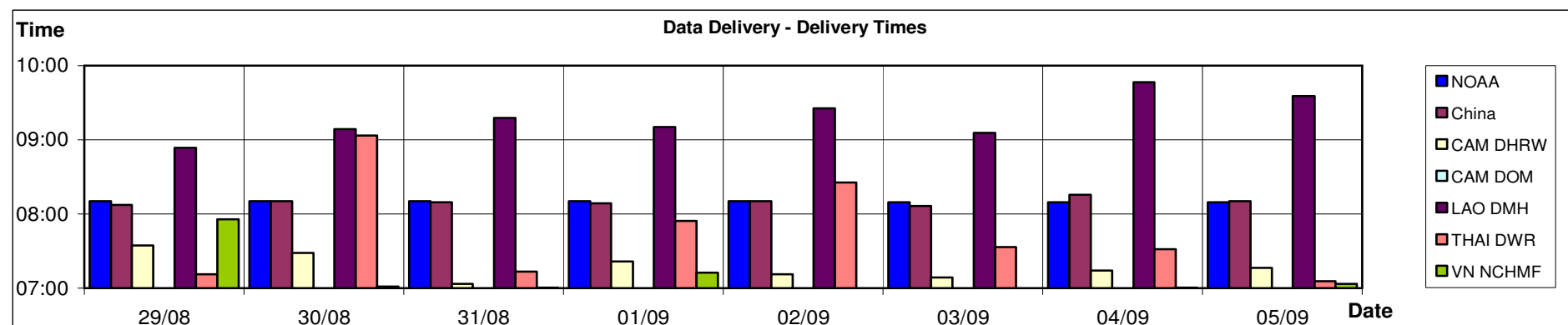


Figure B2: Data delivery times for the past 8 days including the current report date

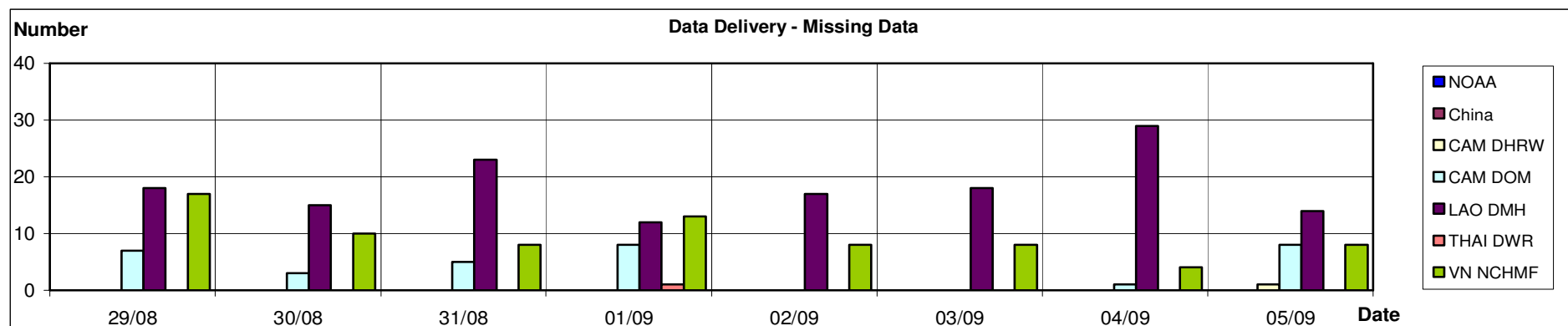


Figure B3: Missing data for the past 8 days including the current report date

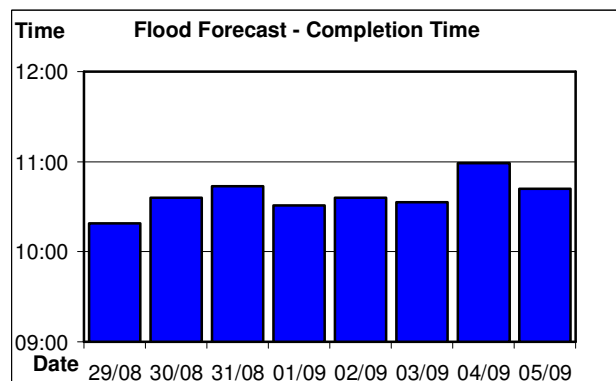


Figure B4: Flood forecast completion time

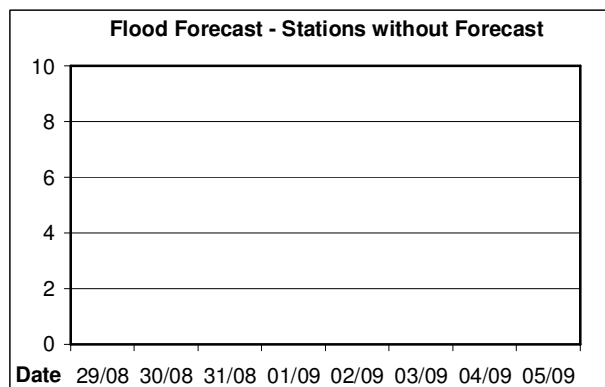


Figure B5: Flood forecast stations without forecast

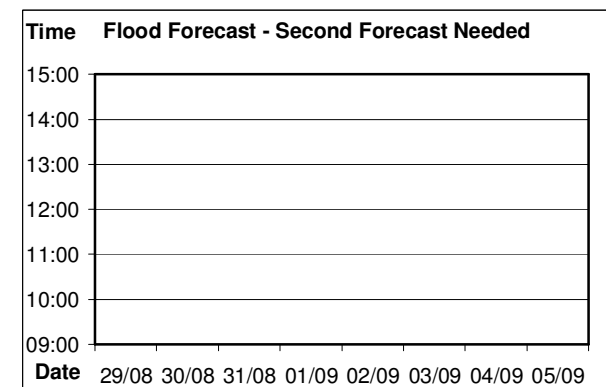


Figure B6: Second forecast needed

During last week, performance indicators of bulletin delivery (Table B3 and Figure B4) shows that the flood bulletins were disseminated timely to the registered national Line Agencies, MRC website, and other interested users a bit later than 10h30 AM which is a prescribed time in the Operational Manual. This was due to the late transfer and complete of data from LA's (Figure B2 shows data delivery time that is sometime about 10h AM) as a result less time was available for adjusting the forecast results..

## Annex C: Season Water Level Graphs

This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

### HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS IN FLOOD SEASON FROM 1 JUNE TO 31 OCTOBER

