Mekong River Commission

Regional Flood Management and Mitigation Centre

Weekly Flood Situation Report for the Mekong River Basin

Prepared on: 26/09/2011, covering the week from the 19th to the 25th September, 2011

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

General weather patterns

During the week of the 19th to the 25th September 2011, six weather bulletins were issued by the Department of Meteorology (DOM) of Cambodia. The weather charts of the 19th and the 24th August bulletins are presented in the figures below:

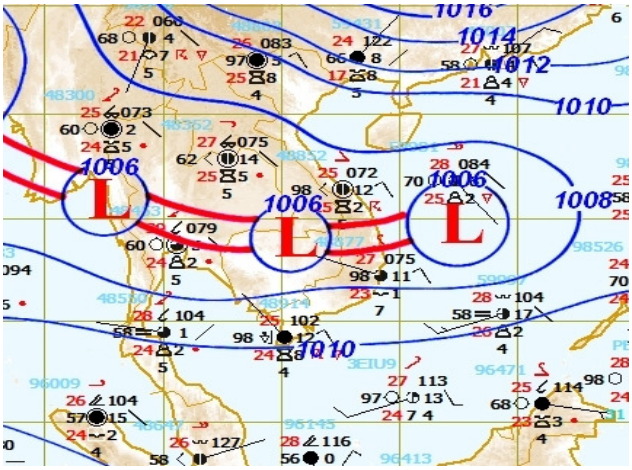


Figure 1: Weather map for 19th September 2011

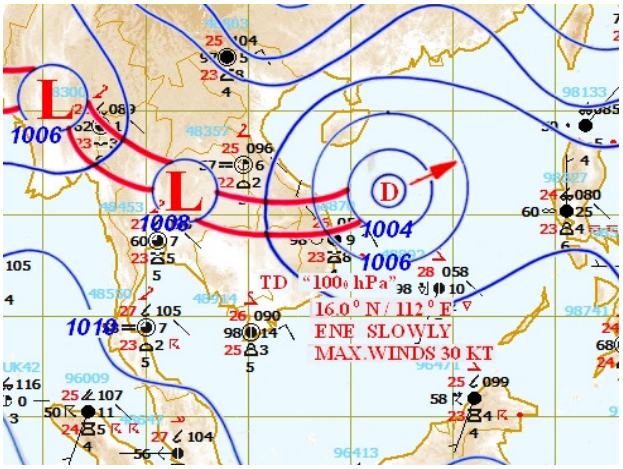


Figure 2: Weather map for 24th September 2011

Strong to week South-West (SW) Monsoon

Strong SW monsoon prevailed over Andaman Sea, the Gulf of Thailand, Thailand and Cambodia at the beginning of the week and became weakening nearly the end of the week (Figure 1 and 2).

Inter Tropical Convergence Zone (ITCZ)

ITCZ laid across the Myanmar, Thailand, Lao PDR and Viet Nam during 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.

Other weather phenomena that affect the discharge

No other weather phenomena affecting the discharge were observed.

Over weather situation

A severe weather situation was occurred during the second half of the week. As the result of strong SW monsoon activity, appearances of ITCZ in the whole week and low pressure trough laid across Thailand, Lao PDR, Cambodia and Viet Nam at the height 1.5 km (850 hPa), heavy rain occurred in the central of Myanmar, Thailand, the South of Lao PDR and Viet Nam during the mid of the week. 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 Kratie and the amounts of

rainfall covering last week, which is around 150 mm, were recorded at Pakse (141.7mm); at Stung Treng (145.5mm); at Kratie (153.4mm).

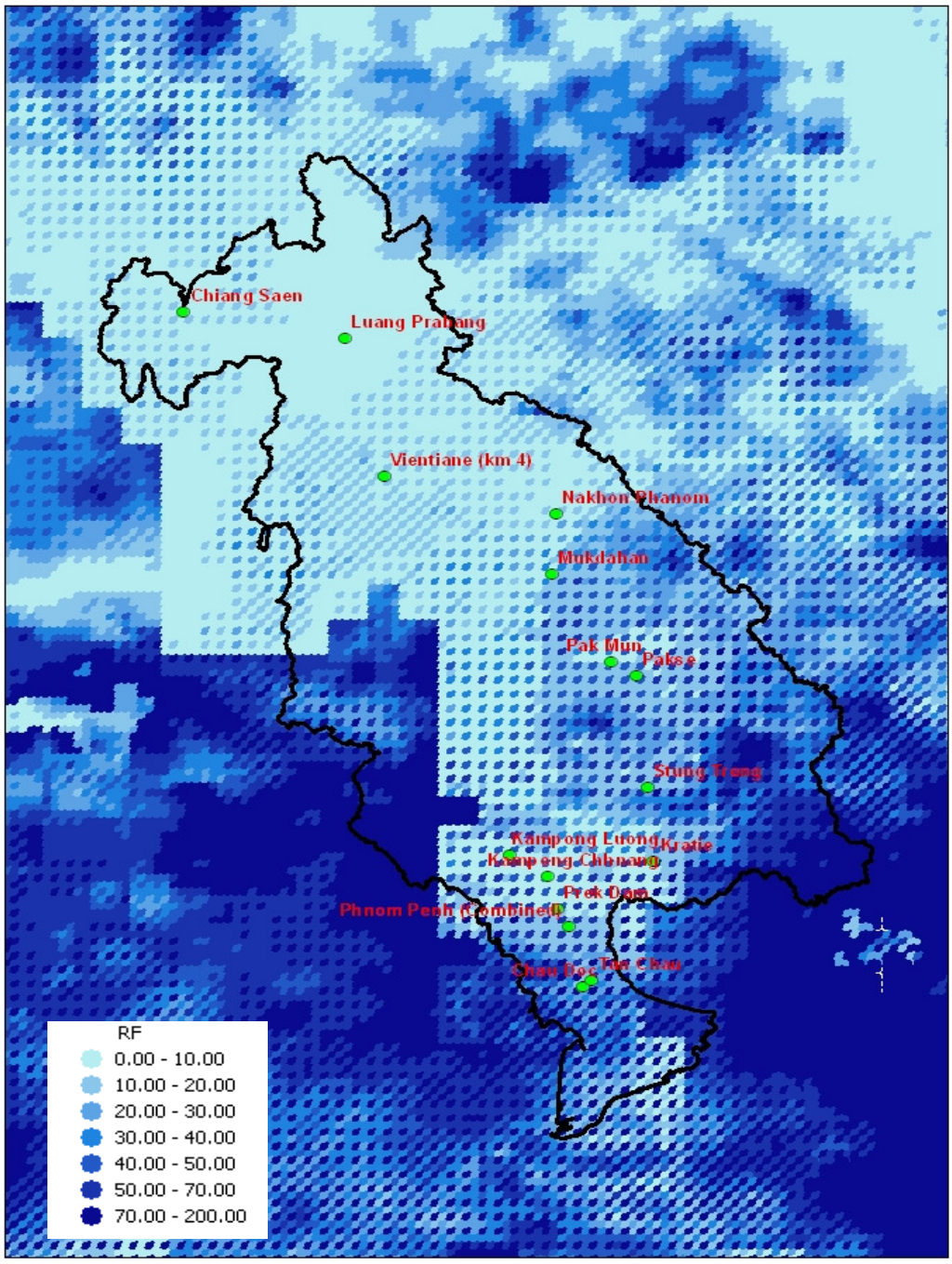


Figure 3: Rainfall distribution over the LMB, covering the week 19 – 25 September, 2011 (SRE)

General behaviour of the Mekong River

Water levels at all stations along the Mekong river were above the long-term average except. While water level at stations in the upper reach showed rising and falling trend, water levels at stations in the middle and lower reaches were rising 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 showed a rising trend in the first half of the week then recessed till the end of the week and were higher than the long-term average for this time of the year.

For stations Paksane to Pakse

Water level showed a rising trend in the first half of the week then recessed till the end of the week and were higher than the long-term average for this time of the year but below river bank except water level at Pakse station that higher than river bank resulting in flood during last week (Figure 4).

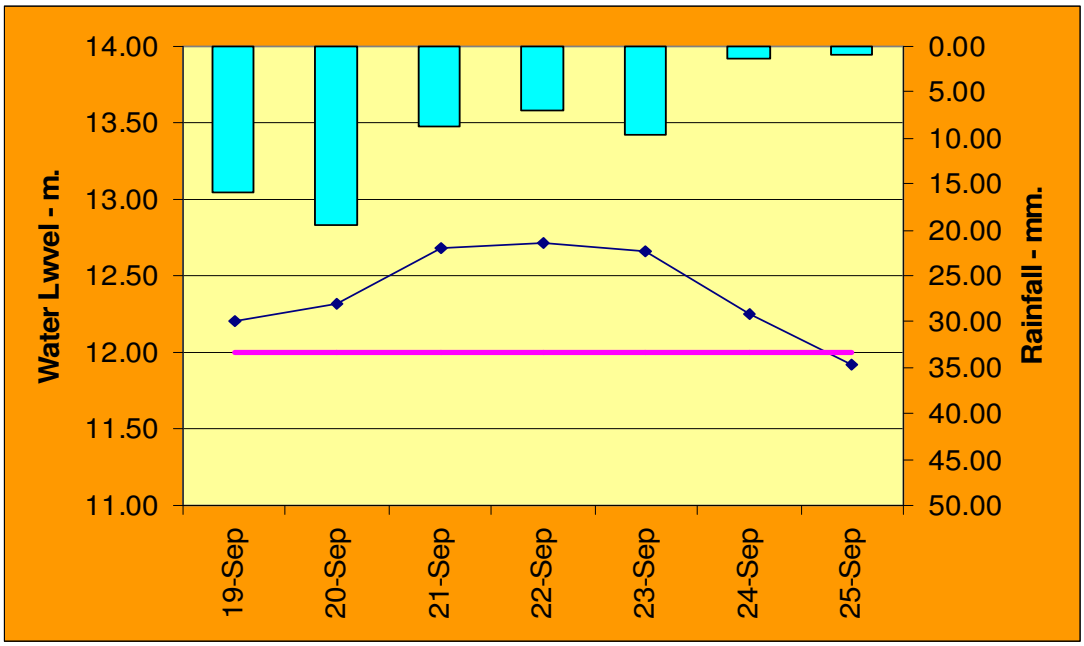


Figure 4: Water level on mainstream at stations Pakse

For stations Stung Treng to Kompong Cham

Water levels at Stung Treng and Kratie were rising in the first half of the week and then recessed till the end of the week, while at Kompong Cham were rising for last week. These stations were recording levels are above the long-term average for this time of the year.

For stations from Phnom Penh Port/ Phnom Penh Bassac to Prek Dam

Water levels at these stations showed a slightly rising trend during last week and were above the long-term average for this time of the year.

Tan Chau and Chau Doc

Water levels were rising till the end of the week. 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 remained flood stage at Pakse since 18th September, 2011.
  - The Mekong has reached flood stage at Tan Chau since 25th September, 2011.
  - The Mekong has reached alarm situation at Chau Doc monitoring stations.

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
19/09	537.05	5.26	13.00	12.21	9.40	10.72	13.23	11.85	12.92	12.04	10.87	14.74	12.20	10.45	21.61	15.19	10.11	9.20	7.60	7.40	9.22	4.12	3.51
20/09	536.67	5.09	13.54	12.35	9.89	11.25	13.30	11.95	13.00	12.15	10.98	15.05	12.32	10.50	21.76	15.28	10.15	9.26	7.61	7.42	9.26	4.16	3.53
21/09	536.35	5.56	13.62	12.70	10.12	11.42	13.40	11.94	13.00	12.20	11.05	15.34	12.68	10.53	21.88	15.38	10.25	9.34	7.65	7.50	9.36	4.22	3.58
22/09	536.75	5.44	14.06	12.95	10.38	11.67	13.42	11.92	12.99	12.17	11.02	15.21	12.72	11.07	22.16	15.51	10.34	9.45	7.68	7.56	9.46	4.28	3.62
23/09	536.86	5.86	13.90	13.14	10.62	11.88	13.40	11.78	12.84	12.00	10.82	15.15	12.66	11.25	22.60	15.67	10.43	9.51	7.72	7.66	9.56	4.34	3.68
24/09	537.18	5.96	13.56	12.93	10.59	11.87	13.40	11.64	12.70	11.77	10.61	14.66	12.25	11.17	22.88	15.92	10.57	9.64	7.77	7.74	9.69	4.42	3.75
25/09	537.97	5.75	13.28	12.65	10.38	11.68	13.32	11.50	12.58	11.57	10.48	14.30	11.92	10.85	22.80	16.02	10.66	9.71	7.80	7.79	9.76	4.53	3.85
26/09	537.23	5.90	12.84	12.37	10.06	11.40	13.14	11.30	12.38	11.34	10.15	14.07	11.65	10.66	22.59	15.99	10.76	9.80	7.83	7.92	9.83	4.62	3.94
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
19/09	13.0	7.1	28.4	16.0	40.5	137.1	0.6	15.7	28.1	0.2	nr	19.5	nr	1.5	29.2	nr	nr	-	nr	nr	nr	nr	5.0
20/09	25.0	29.0	nr	9.4	47.0	48.5	14.6	3.0	3.2	1.5	2.0	40.3	42.2	29.0	9.4	0.0	2.3	-	nr	nr	57.5	1.4	-
21/09	3.0	80.5	18.0	0.6	14.6	15.9	2.2	0.1	nr	4.5	20.8	15.0	52.2	18.5	33.0	42.0	20.7	-	15.5	52.2	27.3	3.4	2.0
22/09	29.0	13.7	11.4	2.0	4.5	5.3	nr	nr	0.8	0.9	nr	3.4	4.5	46.0	34.4	27.5	2.8	-	8.0	8.8	21.3	8.9	-
23/09	20.0	nr	1.4	2.4	7.0	12.9	nr	nr	0.2	nr	nr	43.2	41.2	24.0	17.6	4.0	1.2	-	17.8	22.2	nr	12.3	19.0
24/09	0.0	nr	1.1	1.4	nr	nr	nr	0.1	nr	nr	nr	1.6	1.6	26.5	29.0	22.9	6.7	-	0.5	3.2	3.1	0.4	-
25/09	0.0	nr	nr	7.4	nr	nr	nr	nr	nr	-	nr	nr	nr	nr	0.8	7.4	3.4	-	2.0	nr	nr	0.0	0.2
26/09	0.0	nr	nr	nr	nr	nr	nr	nr	nr	0.5	1.6	nr	1.0	nr	nr	nr	nr	-	nr	nr	nr	nr	-

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

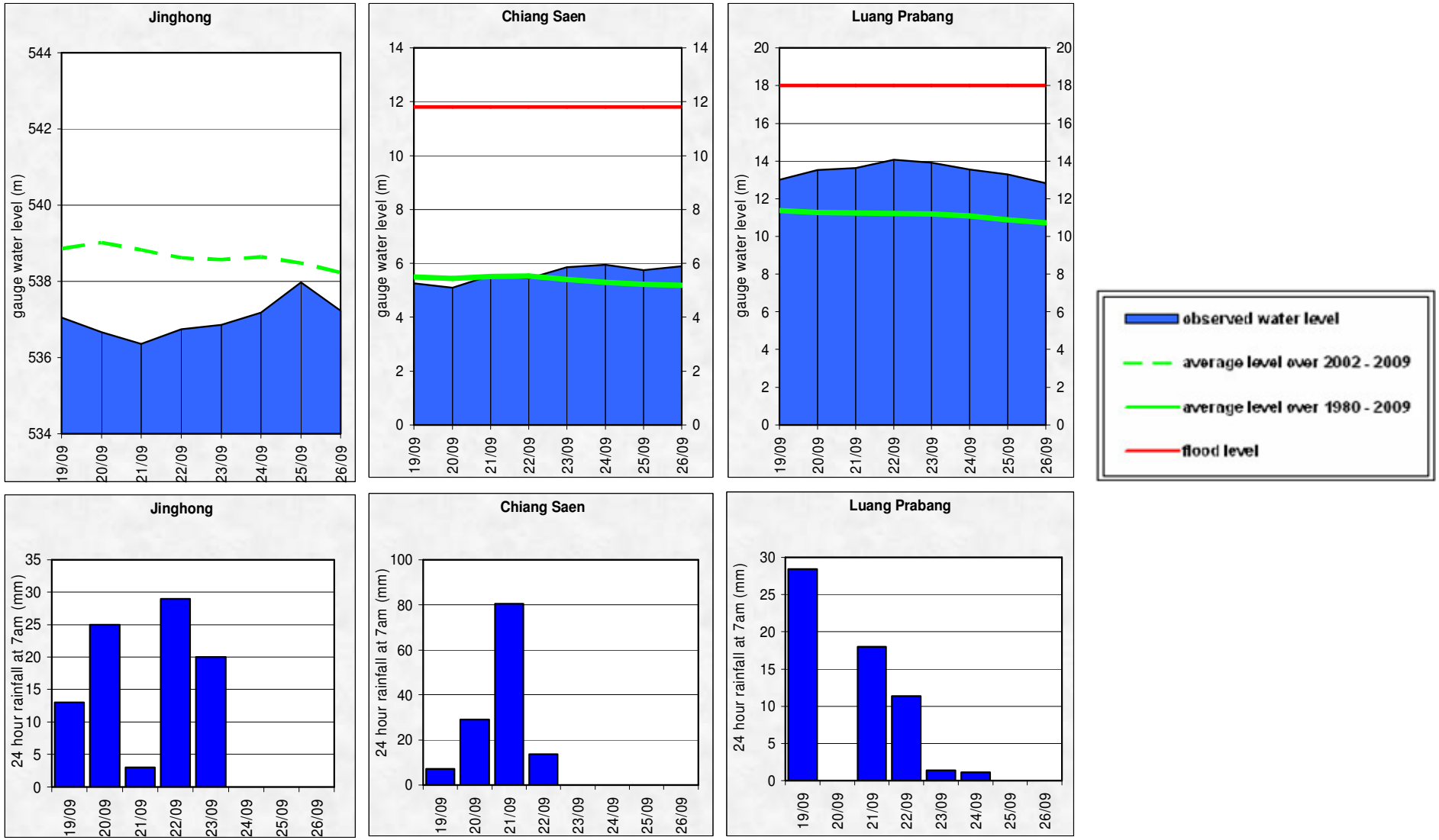


Figure A2: Water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

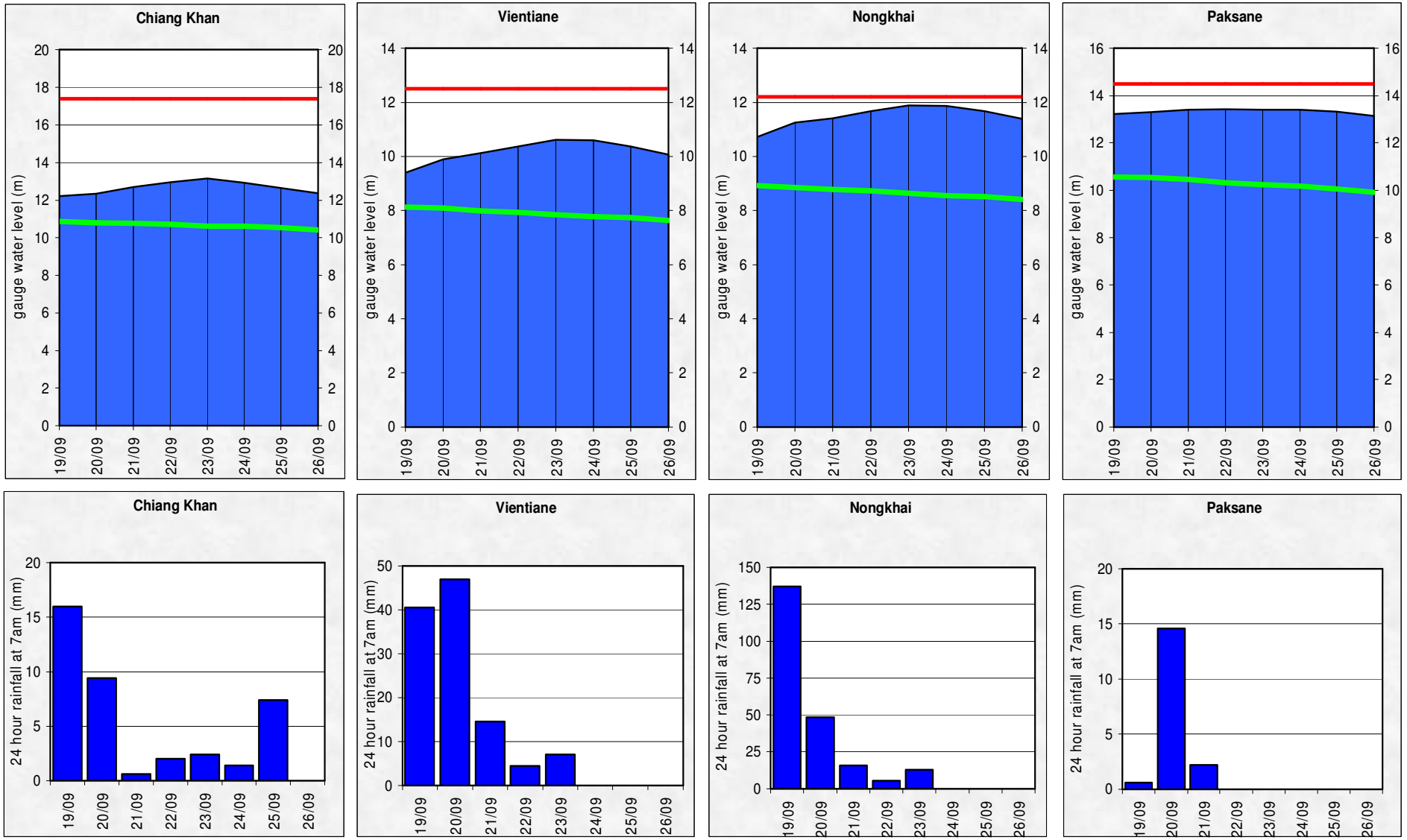


Figure A3: Water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

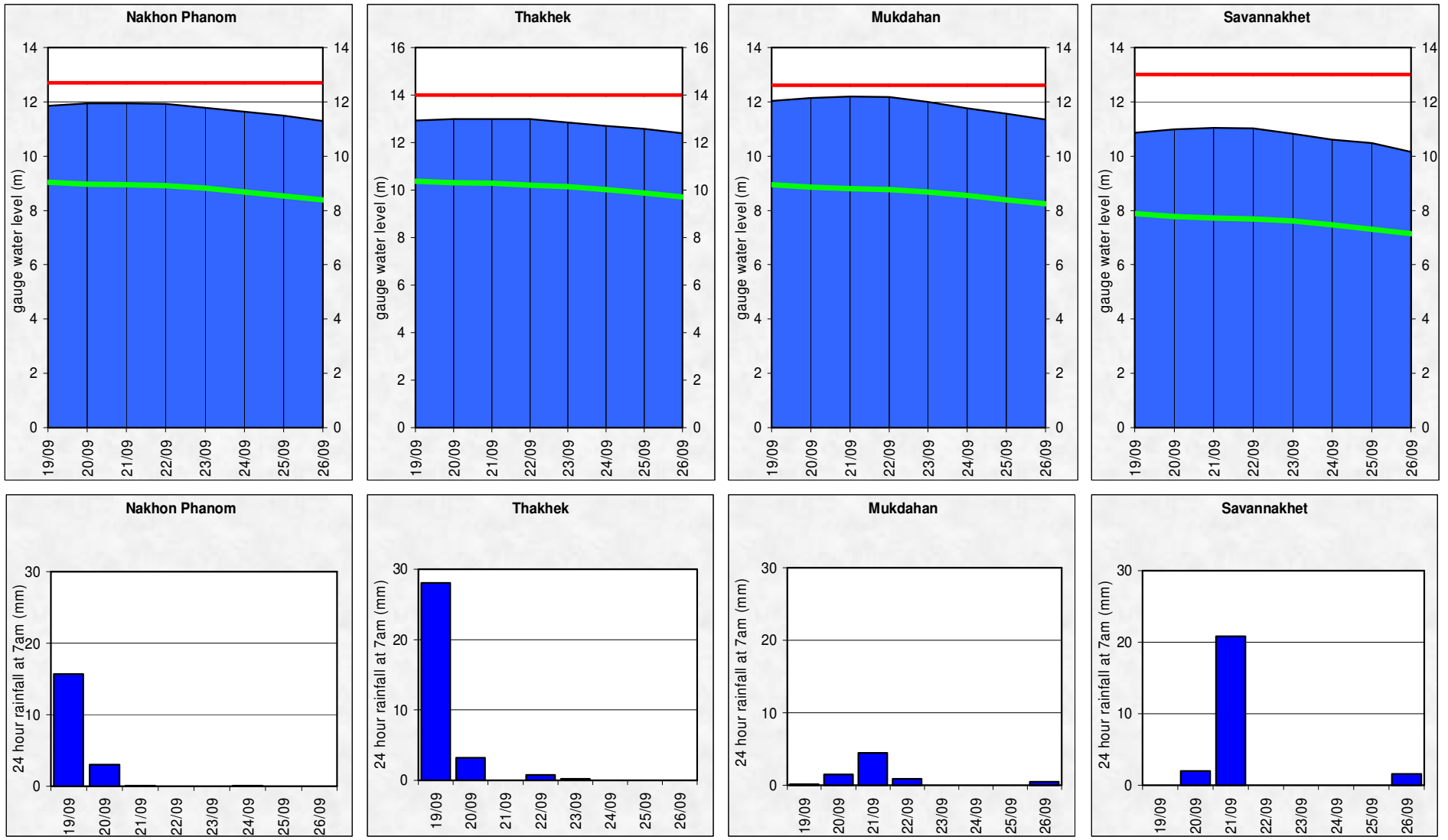


Figure A4: Water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

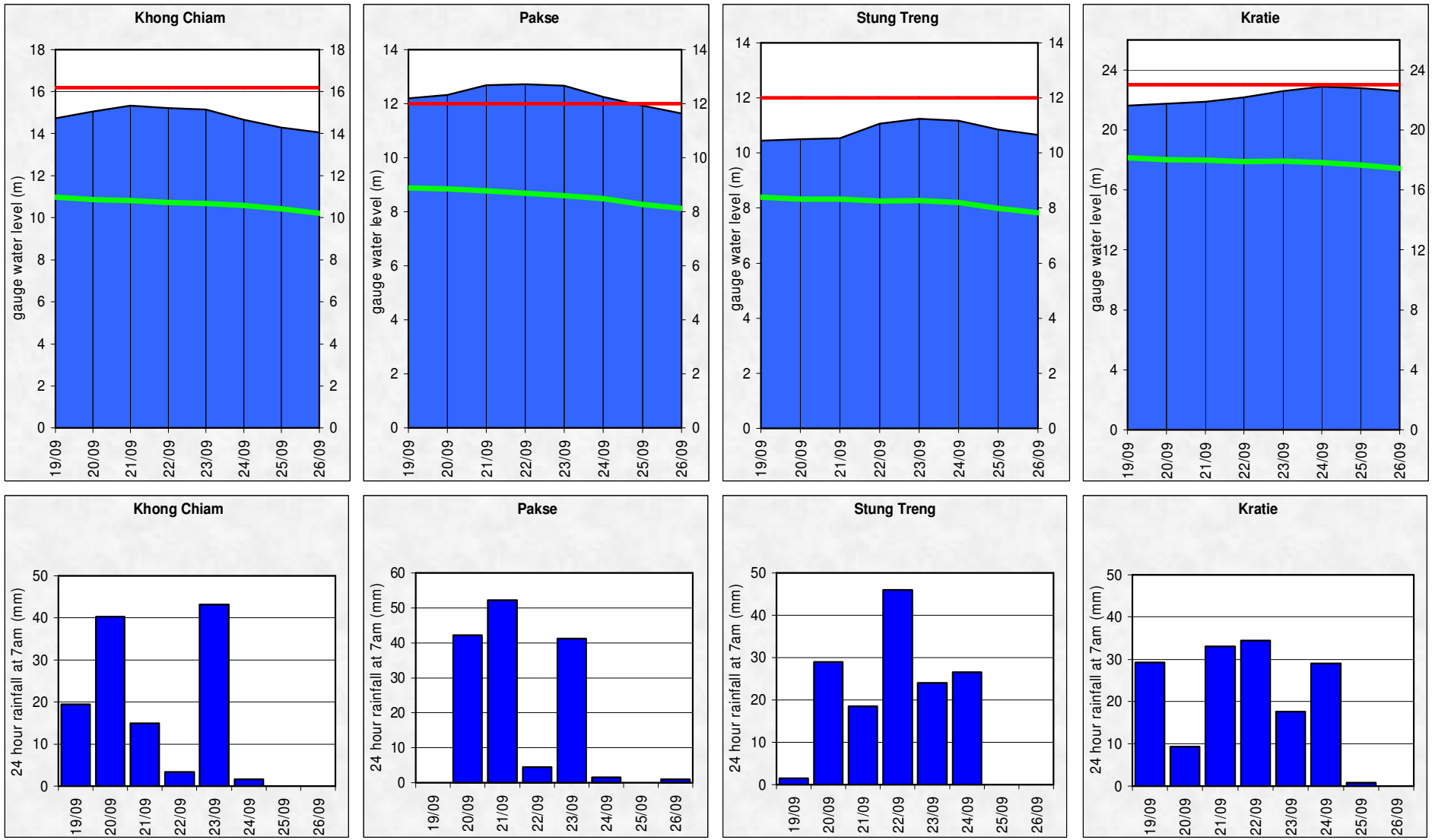


Figure A5: Water level and rainfall for Kompong Cham, Phnom Penh (Bassac and Port), and Koh Khel

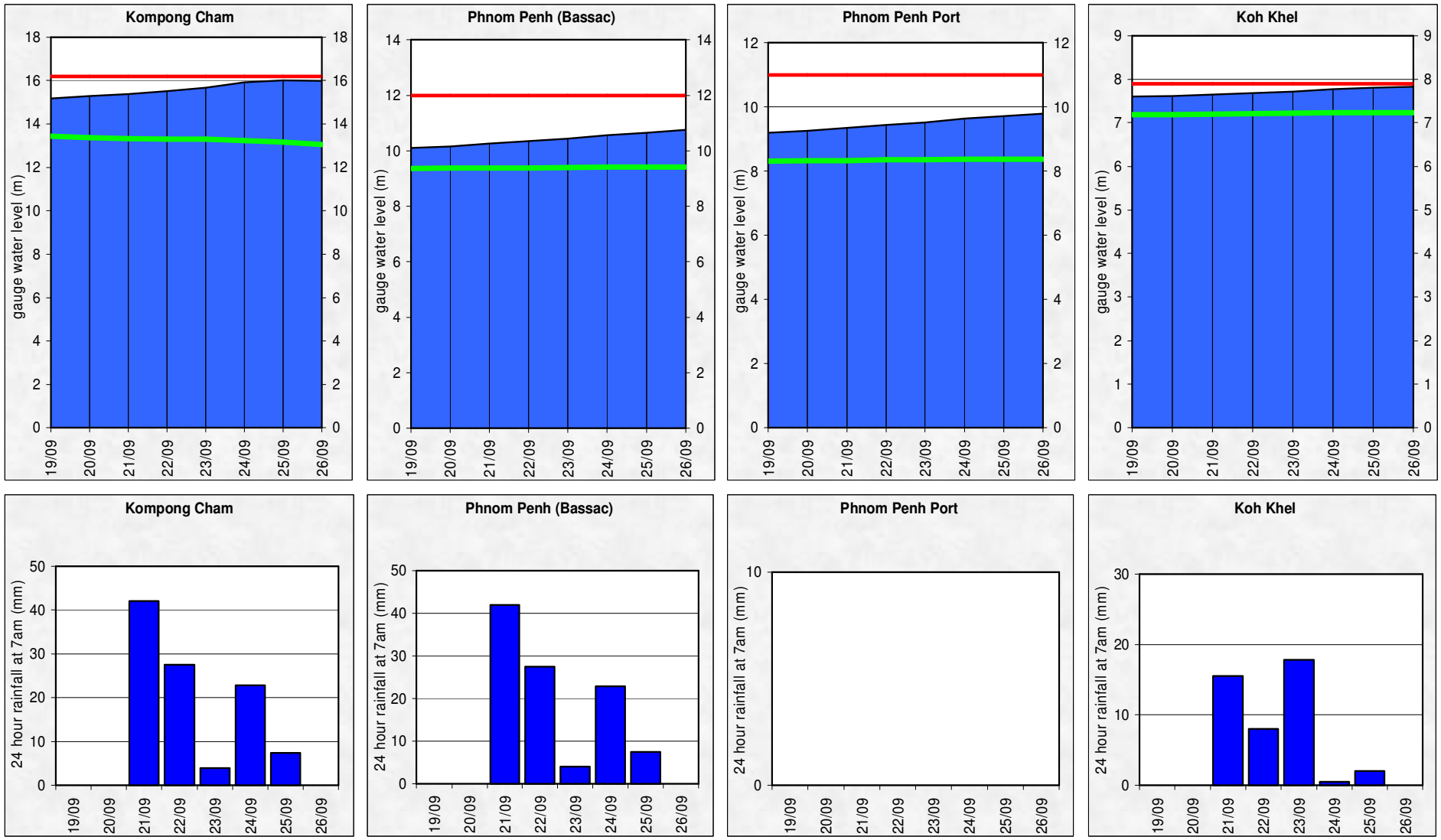
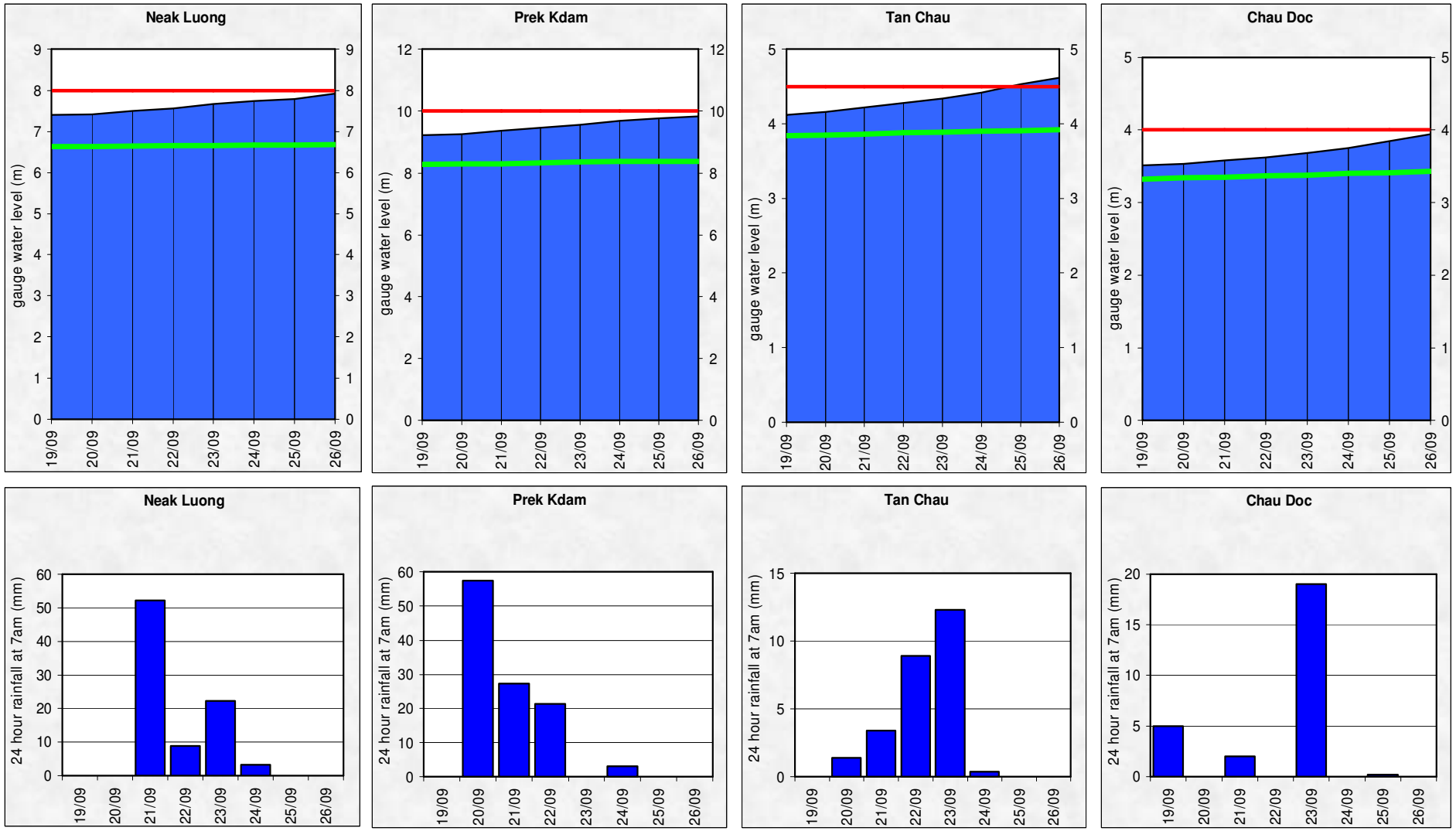


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



Annex B: Accuracy and performance

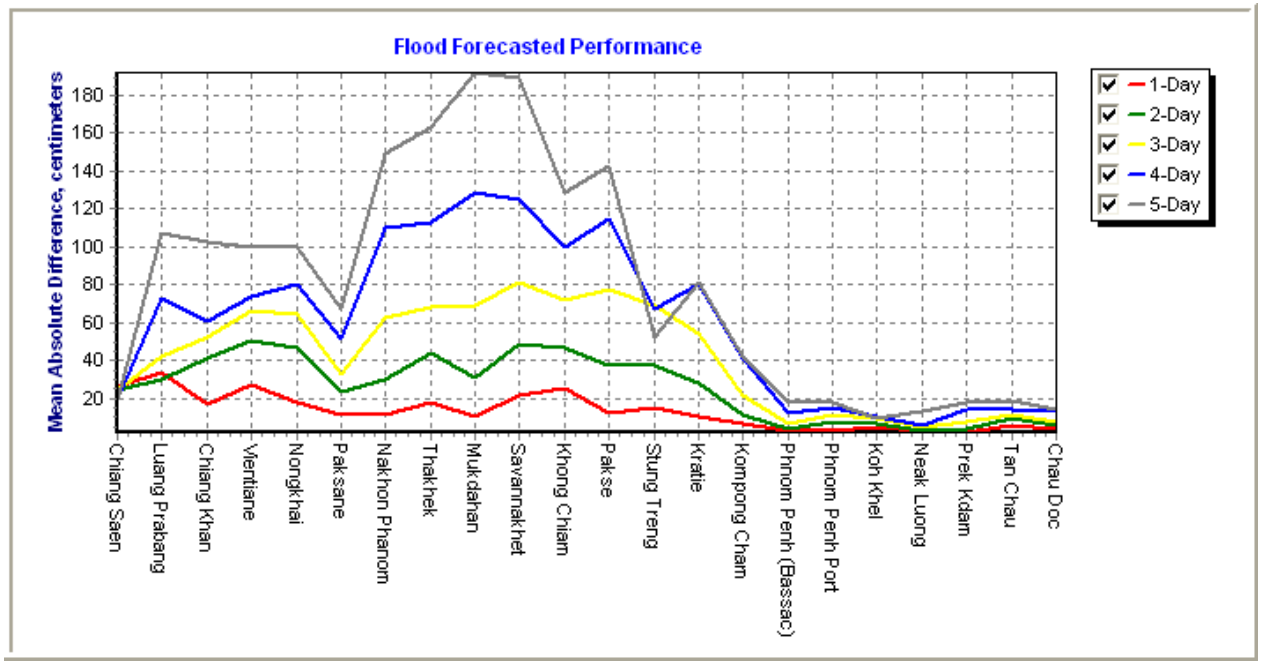
Accuracy

"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.

In general, the overall accuracy is good for 1-day and 2-day forecast lead time at most stations; however accuracies at stations Mukdahan and Savannakhet for 4-day to 5-day forecast were less than expected.

The above differences due to 3 main factors: (1) high variability of the SRE and NWP when appearance of critical weather pattern as ITCZ; (2) internal model functionality in forecasting for middle reach of the LMB in taking into account flow contribution from tributaries, for which the parameter adjustment in the model is not possible; (3) the adjustment by flood forecaster-in-charge at those stations.

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	57.1	57.1	71.4	0.0	57.1	57.1	71.4	42.9	42.9	42.9	28.6	57.1	57.1	57.1	71.4	100.0	100.0	100.0	100.0	100.0	85.7	100.0	***66.2***
2-day	100.0	100.0	83.3	0.0	0.0	66.7	33.3	50.0	50.0	33.3	16.7	33.3	33.3	16.7	100.0	100.0	83.3	83.3	100.0	100.0	66.7	83.3	***60.6***
3-day	100.0	60.0	40.0	0.0	0.0	60.0	20.0	40.0	0.0	0.0	20.0	0.0	0.0	0.0	80.0	80.0	60.0	60.0	80.0	60.0	60.0	60.0	***40.0***
4-day	100.0	75.0	25.0	0.0	0.0	50.0	0.0	25.0	0.0	25.0	25.0	0.0	50.0	25.0	75.0	25.0	100.0	50.0	100.0	100.0	25.0	50.0	***42.0***
5-day	100.0	33.3	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	33.3	0.0	66.7	33.3	33.3	66.7	100.0	100.0	100.0	66.7	100.0	100.0	***43.9***

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	10
2-day	50	50	50	25	25	25	25	25	25	25	25	25	25	25	25	10	10	10	10	10	10	10
3-day	50	50	50	25	25	25	25	25	25	25	25	25	25	25	25	10	10	10	10	10	10	10
4-day	75	75	50	50	50	50	50	50	50	50	50	50	50	50	50	10	25	10	25	25	10	10
5-day	75	75	50	50	50	50	50	50	50	50	50	50	50	50	50	25	25	25	25	25	25	25

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
week	*10:31*	*0*	*-*	*6*	*08:07*	*08:15*	*07:25*	*06:33*	*09:24*	*07:19*	*07:00*	*0*	*0*	*10*	*100*	*203*	*3*	*16*
month	*10:34*	*0*	*-*	*17*	*08:09*	*08:14*	*07:22*	*06:17*	*09:12*	*07:39*	*07:00*	*0*	*0*	*21*	*199*	*554*	*6*	*170*
season	*10:30*	*1*	*-*	*69*	*08:11*	*08:20*	*07:30*	*06:08*	*09:05*	*07:45*	*07:08*	*1*	*16*	*58*	*1010*	*2097*	*27*	*658*

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.

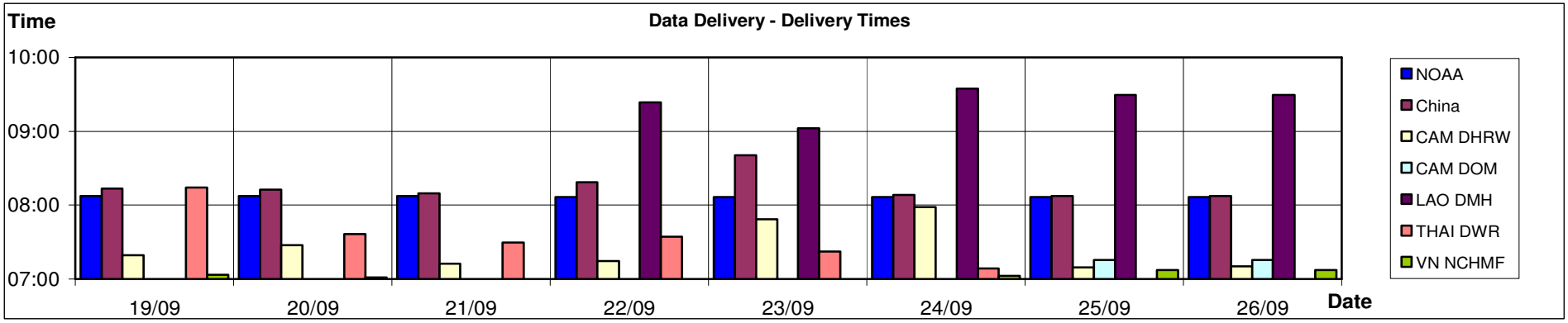


Figure B2: Data delivery times for the past 8 days including the current report date

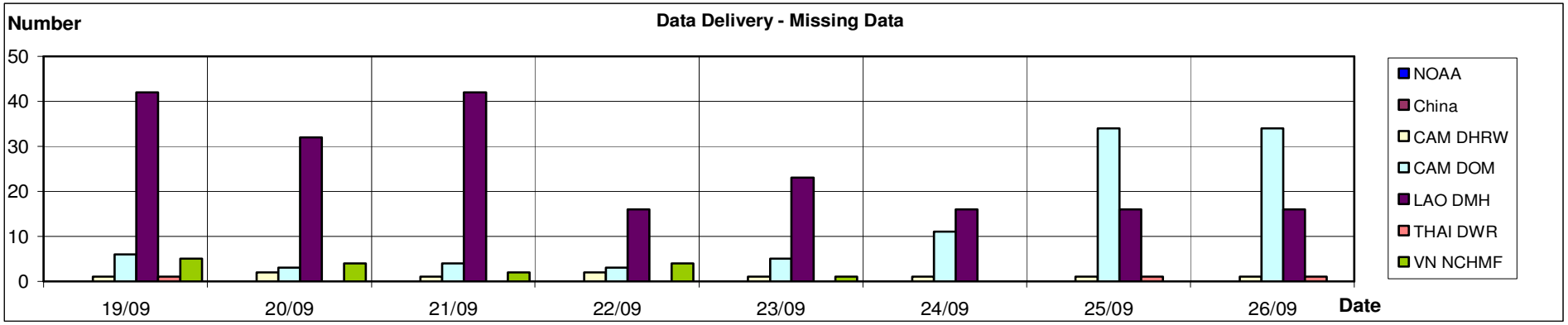


Figure B3: Missing data for the past 8 days including the current report date

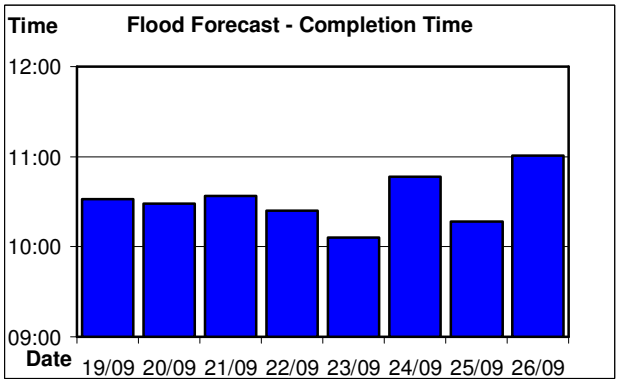


Figure B4: Flood forecast completion time

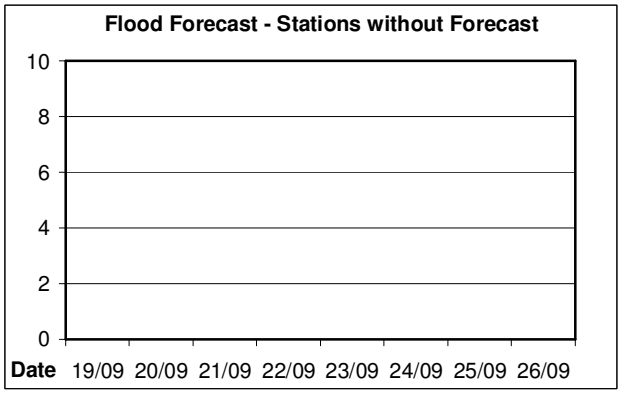


Figure B5: Flood forecast stations without forecast

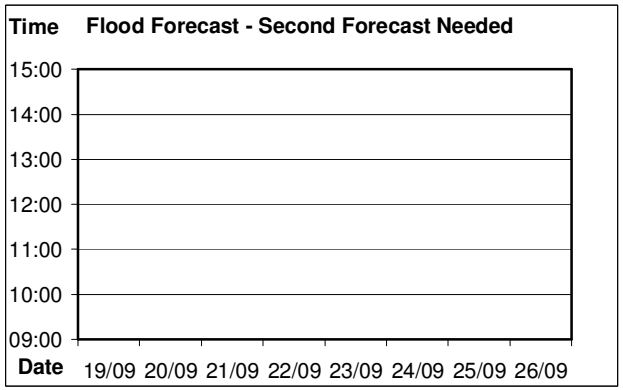


Figure B6: Second forecast needed

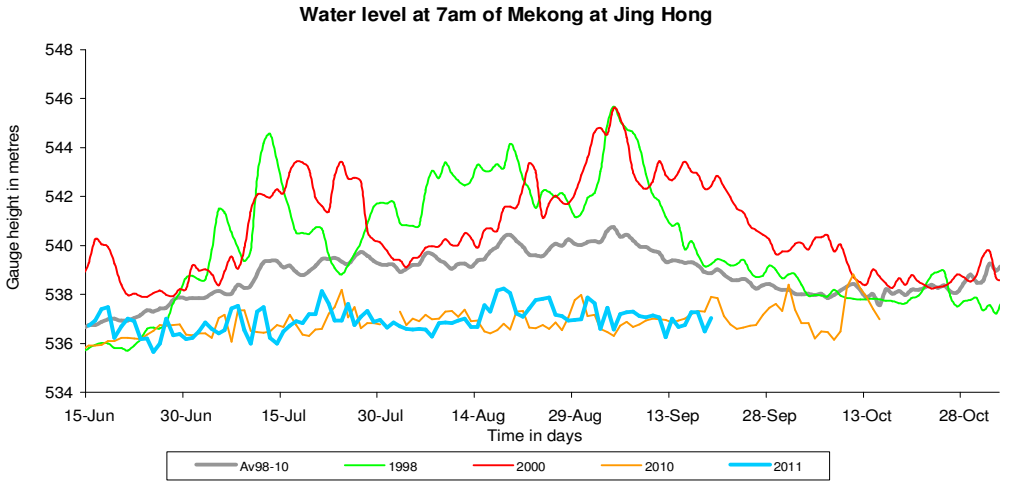
During last week, performance indicators of bulletin delivery (Table B3 and Figure B4) shows that the flood bulletins were disseminated timely to the registered national Line Agencies, MRC website, and other interested users about 10h30 AM which is a prescribed time in the Operational Manual. Some day was later than prescribed time 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..

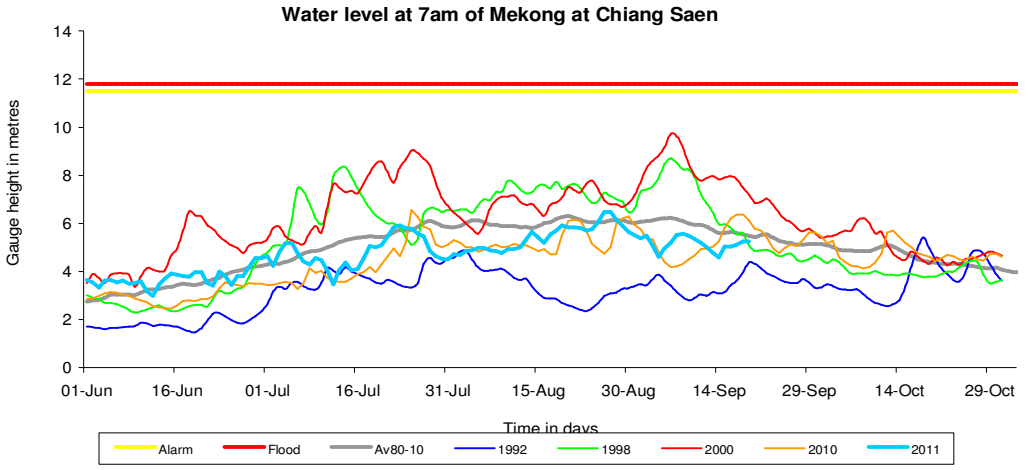
Annex C: Season Water Level Graphs

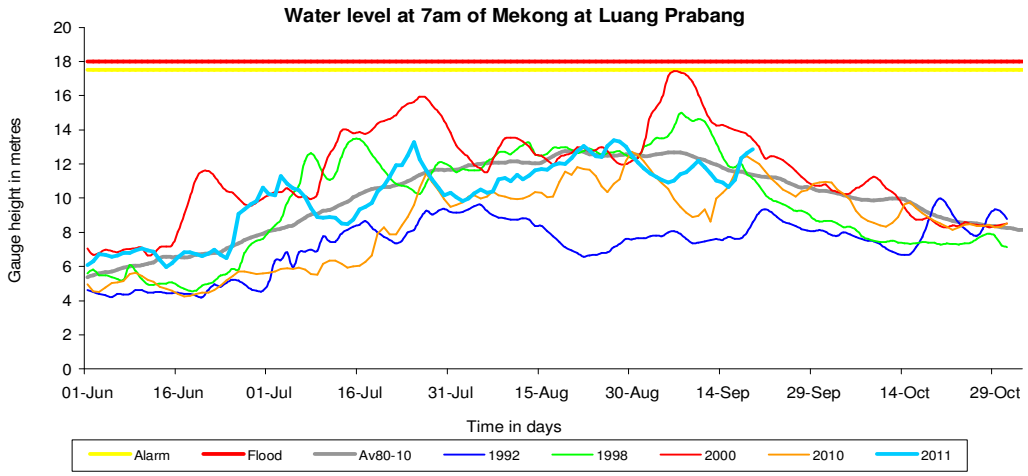
This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

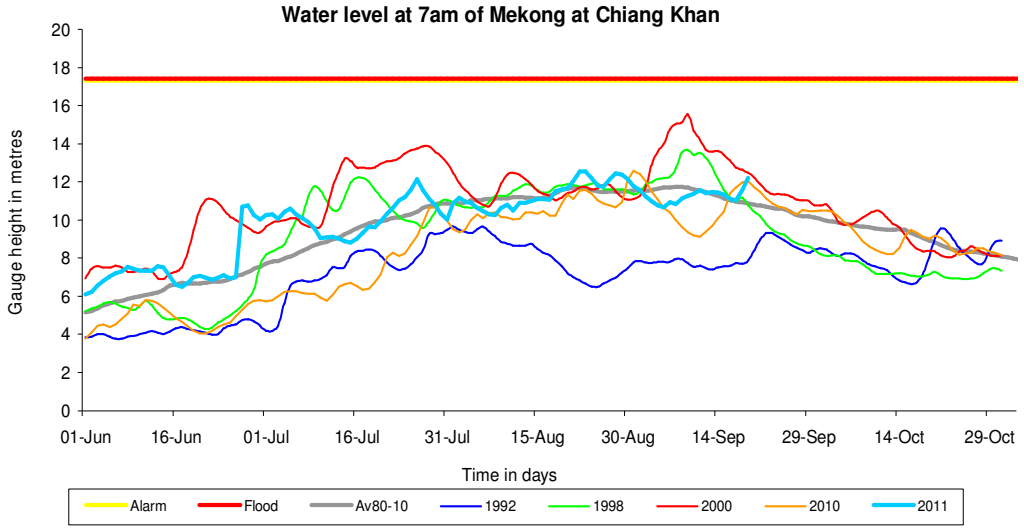
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS

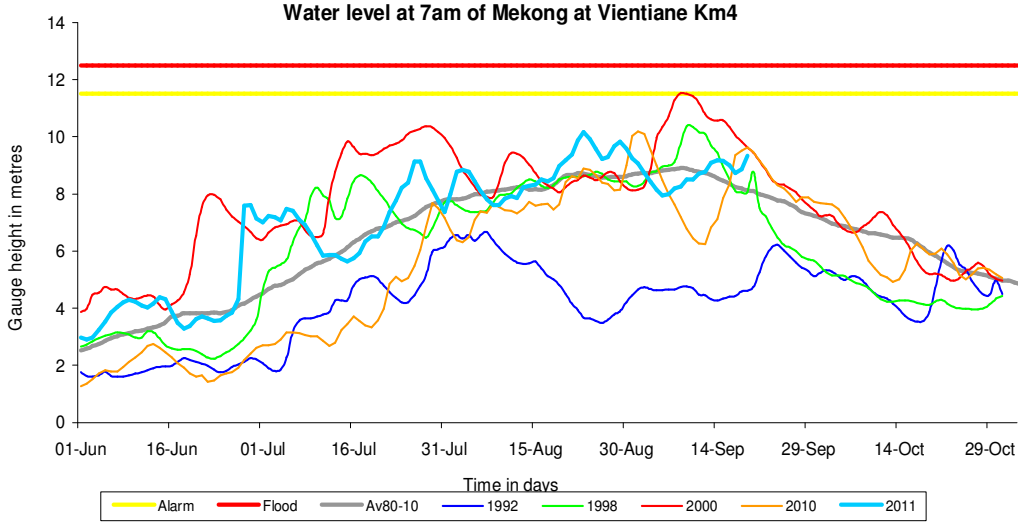
IN FLOOD SEASON FROM 1 JUNE TO 31 OCTOBER

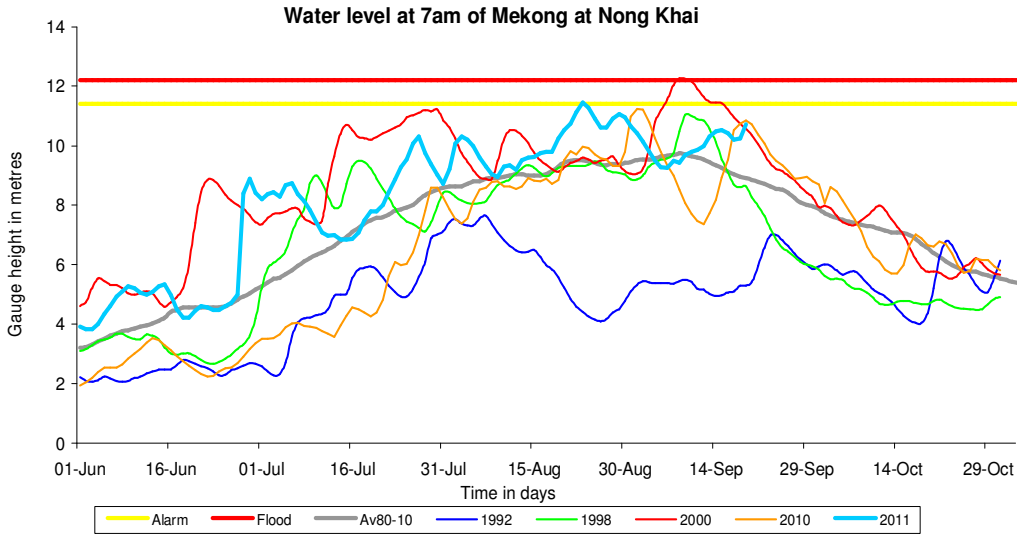


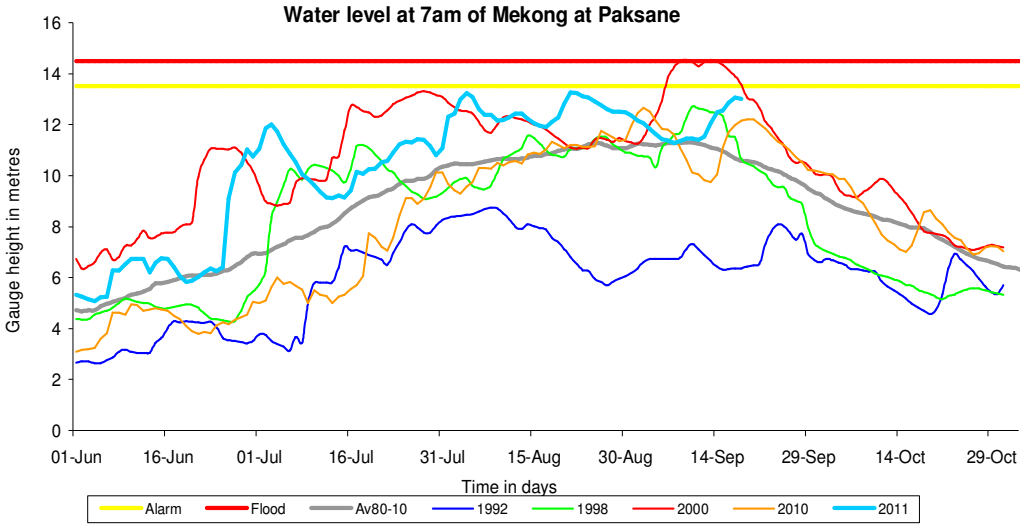


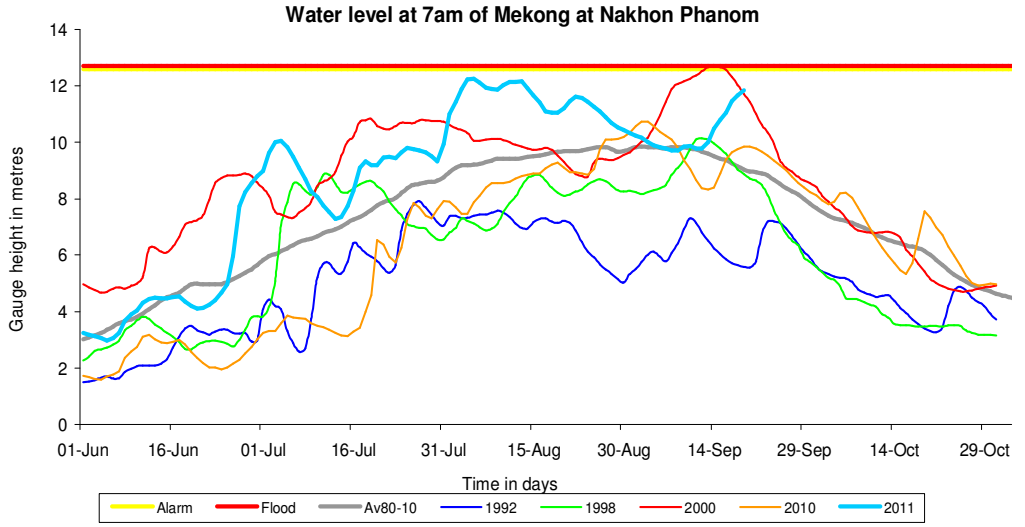


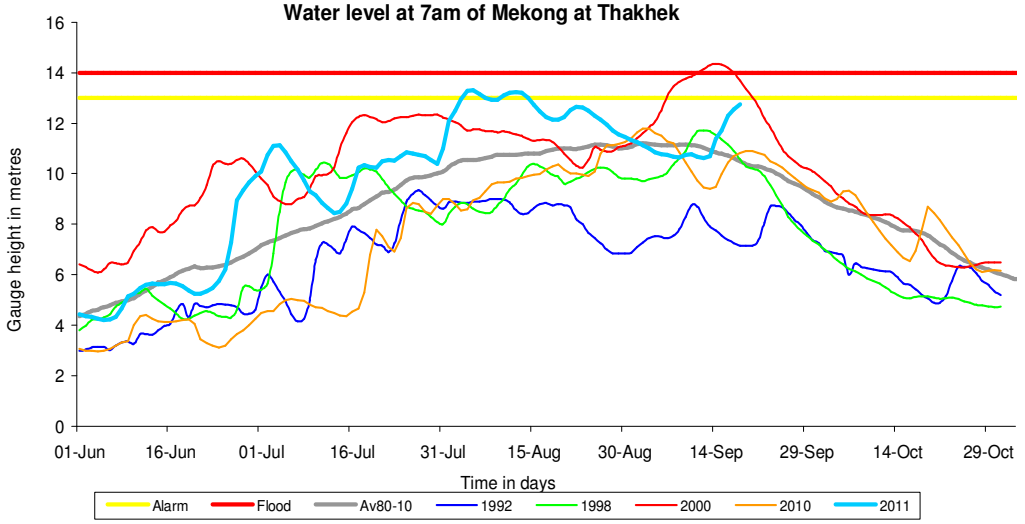

Water level at 7am of Mekong at Chiang Khan
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

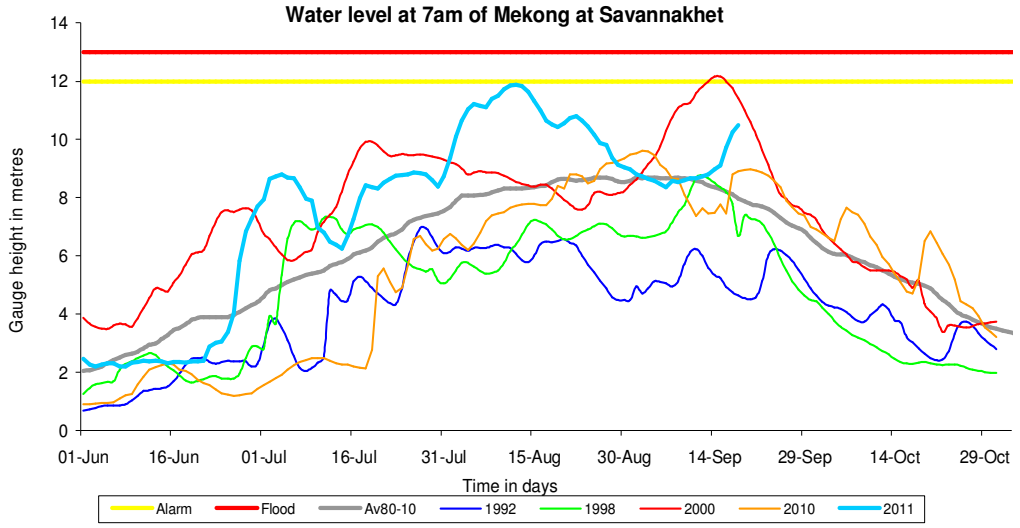

Water level at 7am of Mekong at Vientiane Km4
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

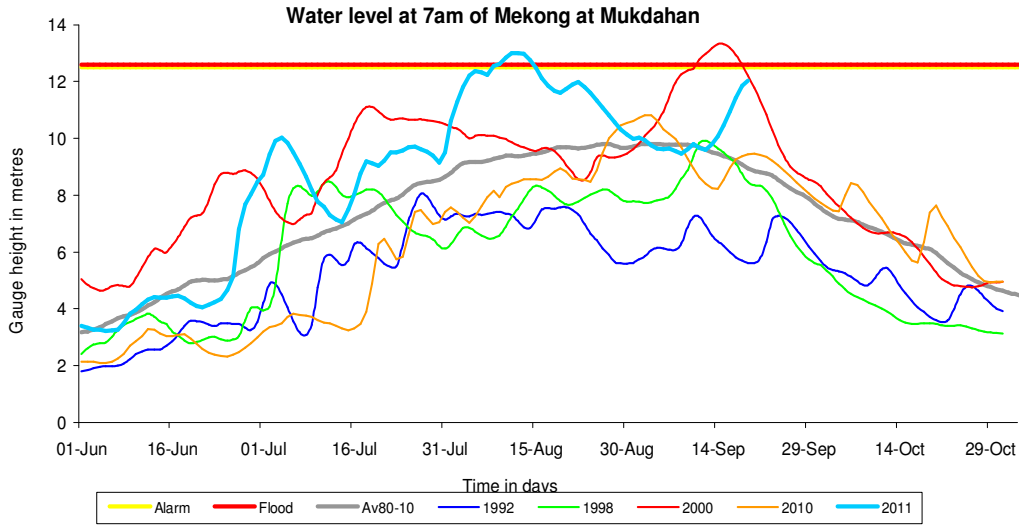

Water level at 7am of Mekong at Nong Khai
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

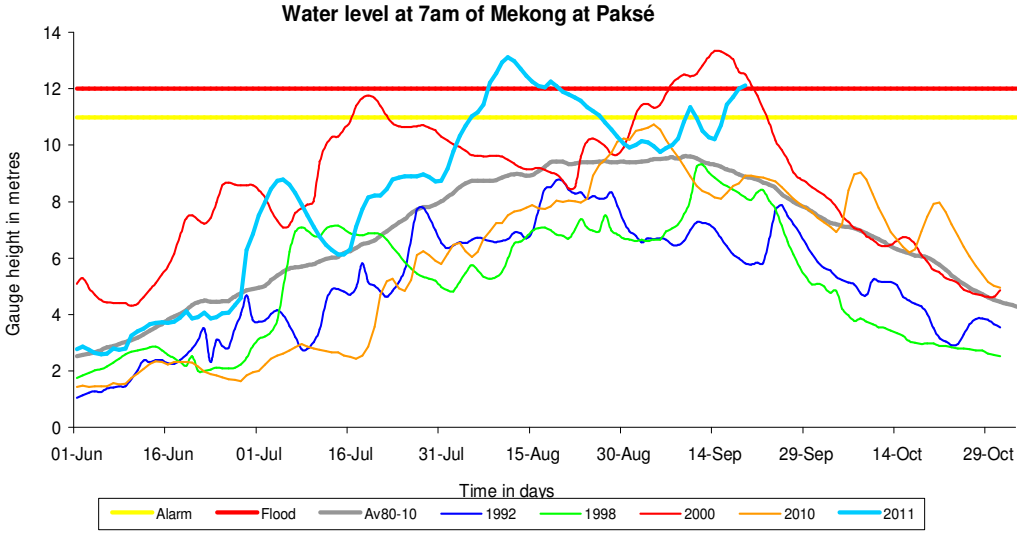

Water level at 7am of Mekong at Paksane
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

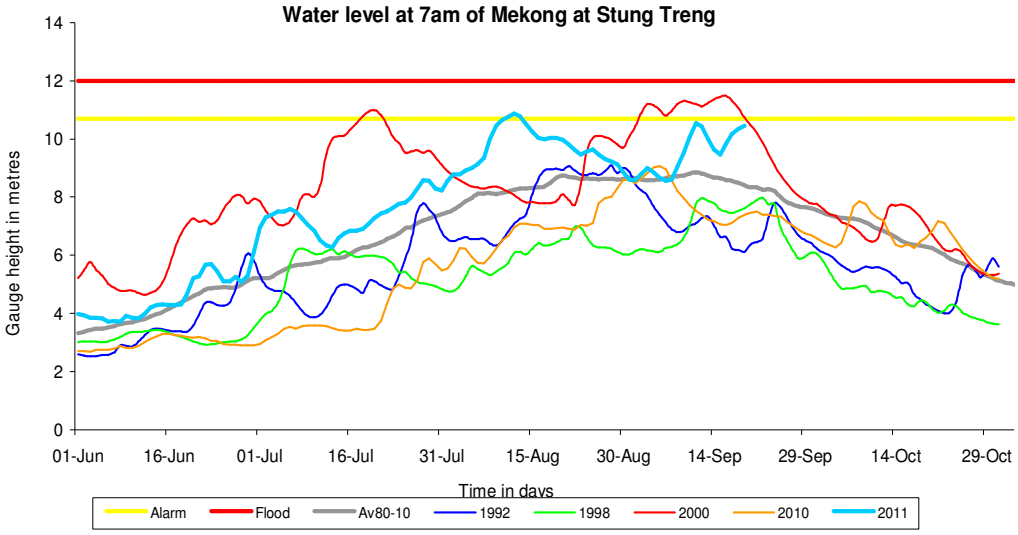

Water level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

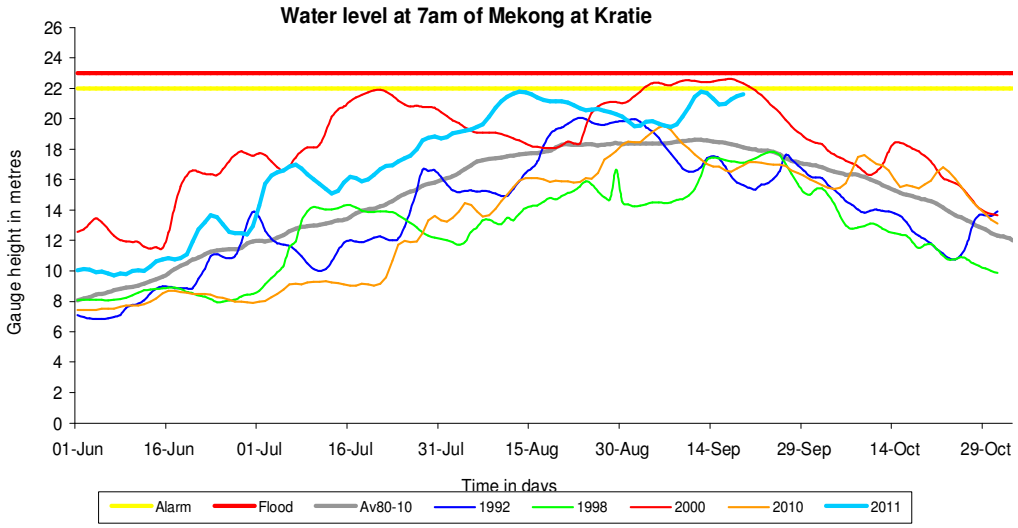

Water level at 7am of Mekong at Thakhek
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

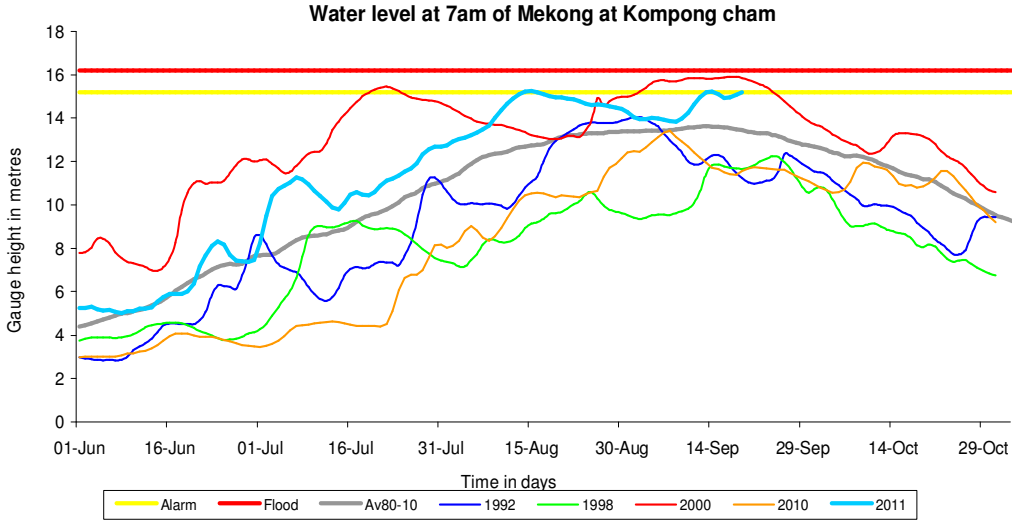

Water level at 7am of Mekong at Savannakhet
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

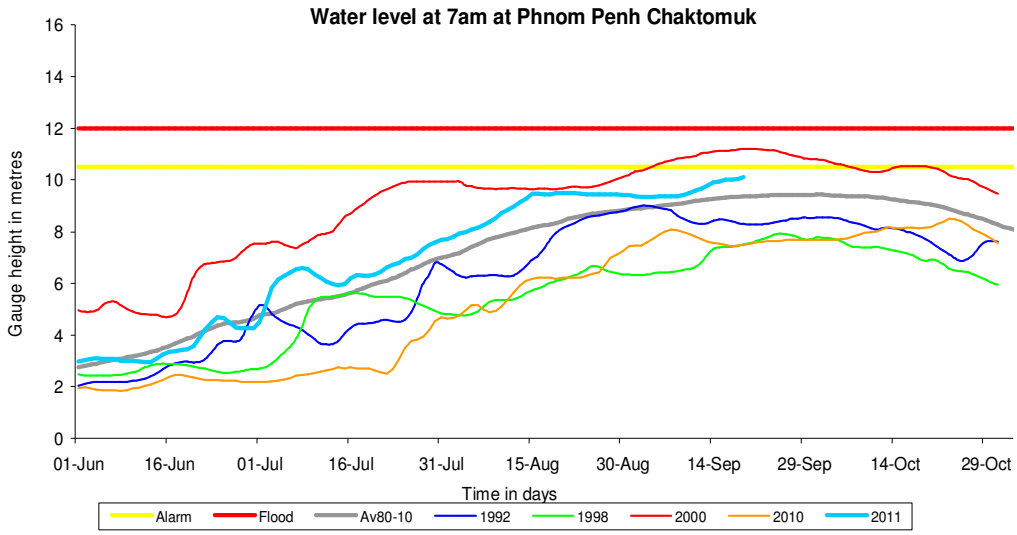

Water level at 7am of Mekong at Mukdahan
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

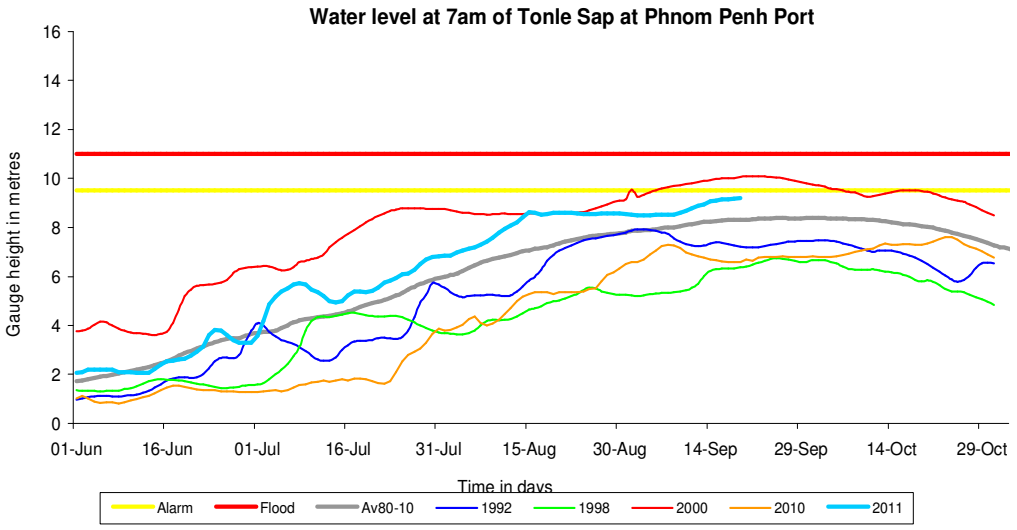

Water level at 7am of Mekong at Paksé
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

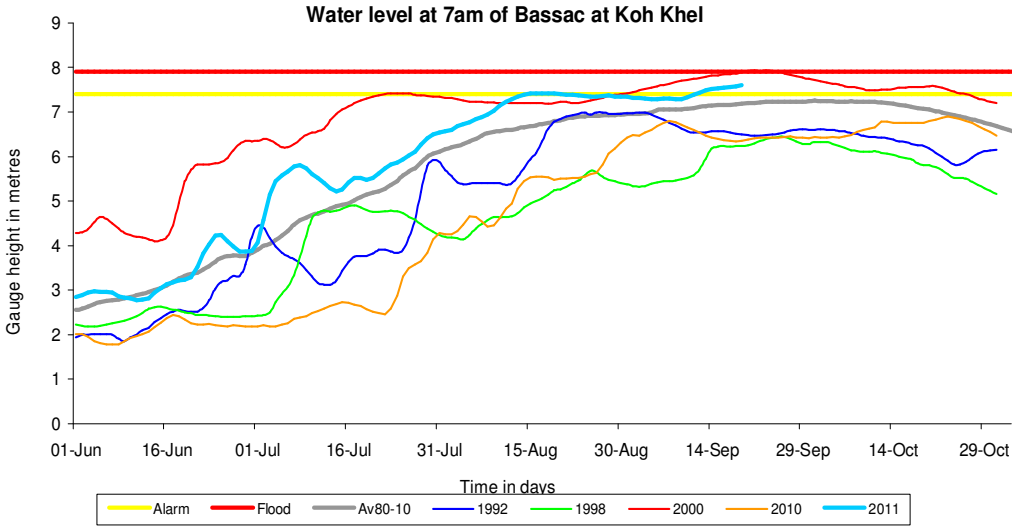

Water level at 7am of Mekong at Stung Treng
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

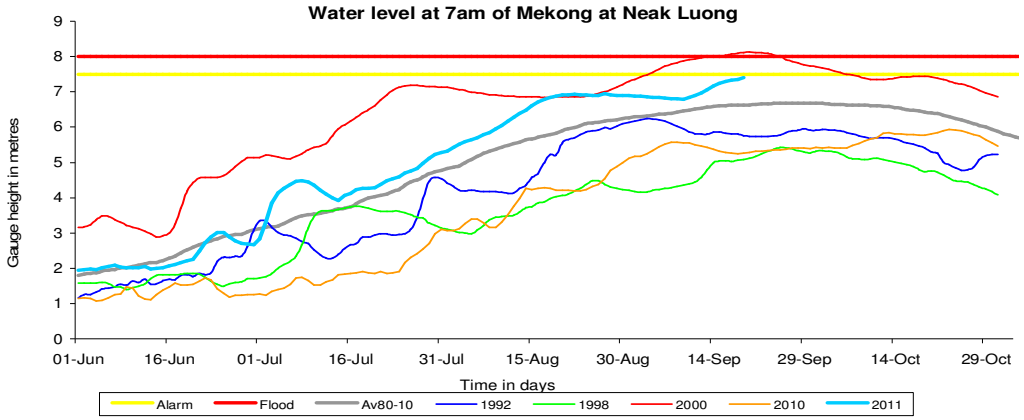

Water level at 7am of Mekong at Kratie
Gauge height in metres
0
2
4
6
8
10
12
14
16
18
20
22
24
26
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

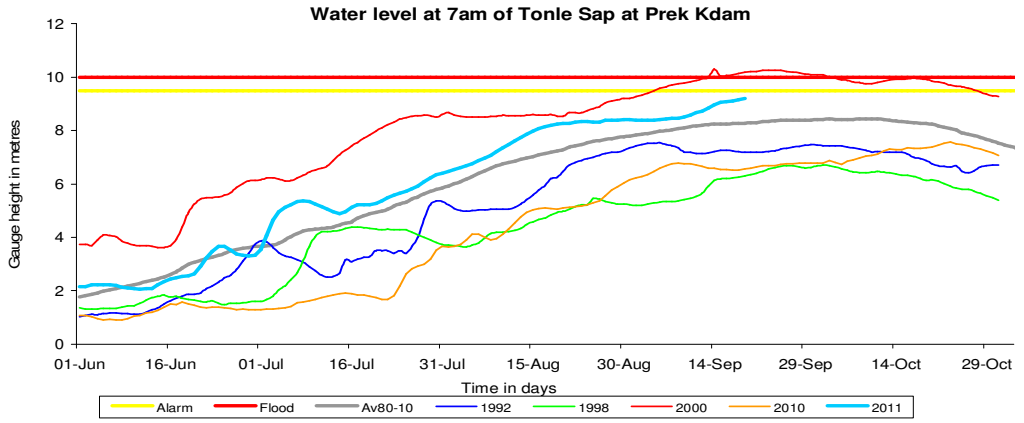

Water level at 7am of Mekong at Kompong cham
Gauge height in metres
0
2
4
6
8
10
12
14
16
18
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

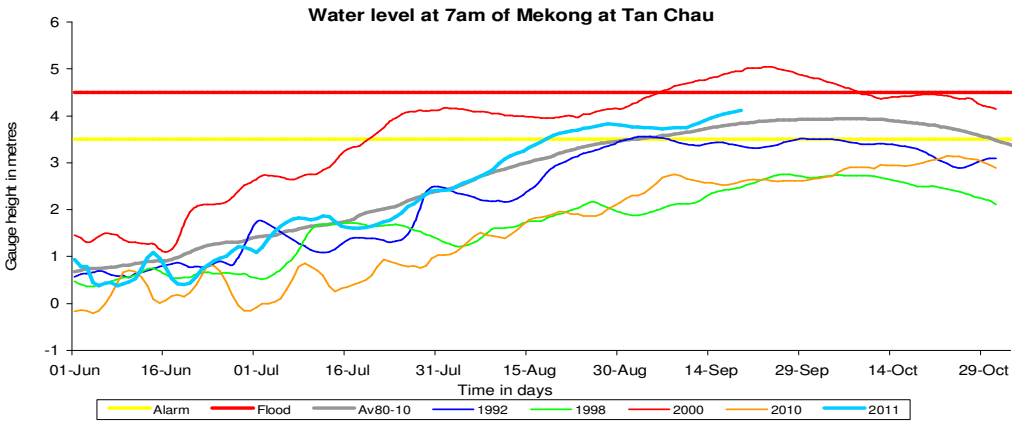

Water level at 7am at Phnom Penh Chaktomuk
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

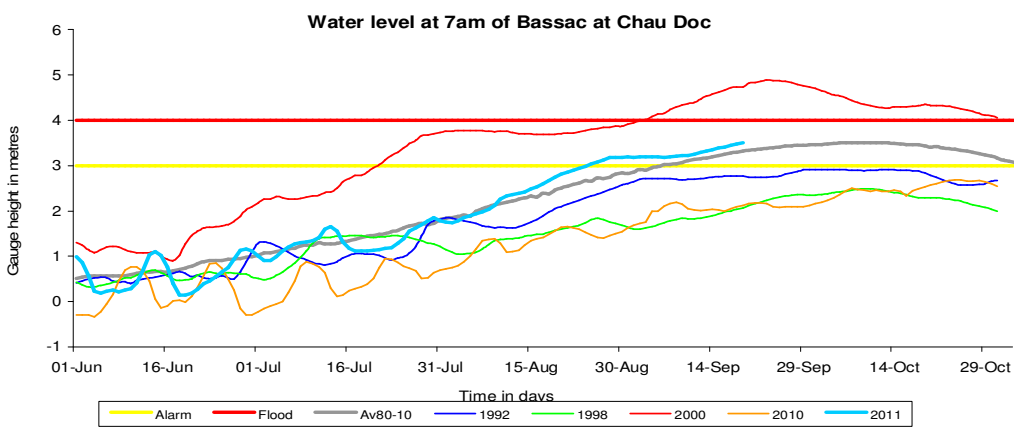

Water level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011


Water level at 7am of Bassac at Koh Khel
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011


Water level at 7am of Mekong at Neak Luong
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011


Water level at 7am of Tonle Sap at Prek Kdam
Gauge height in metres
0
2
4
6
8
10
12
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011


Water level at 7am of Mekong at Tan Chau
Gauge height in metres
-1
0
1
2
3
4
5
6
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011


Water level at 7am of Bassac at Chau Doc
Gauge height in metres
-1
0
1
2
3
4
5
6
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011