Mekong River Commission

Regional Flood Management and Mitigation Centre

Weekly Flood Situation Report for the Mekong River Basin

Prepared on: Monday, 13/07/2009, covering the week from 6th July to 13th July 2009

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

General weather patterns

During the week of Monday 6th to Monday 13th July, four weather bulletins (8th, 10th, 11th and 13th) were issued by the Department of Meteorology (DOM) of Cambodia. The weather chart of the July 11th bulletin is presented in the figure below.

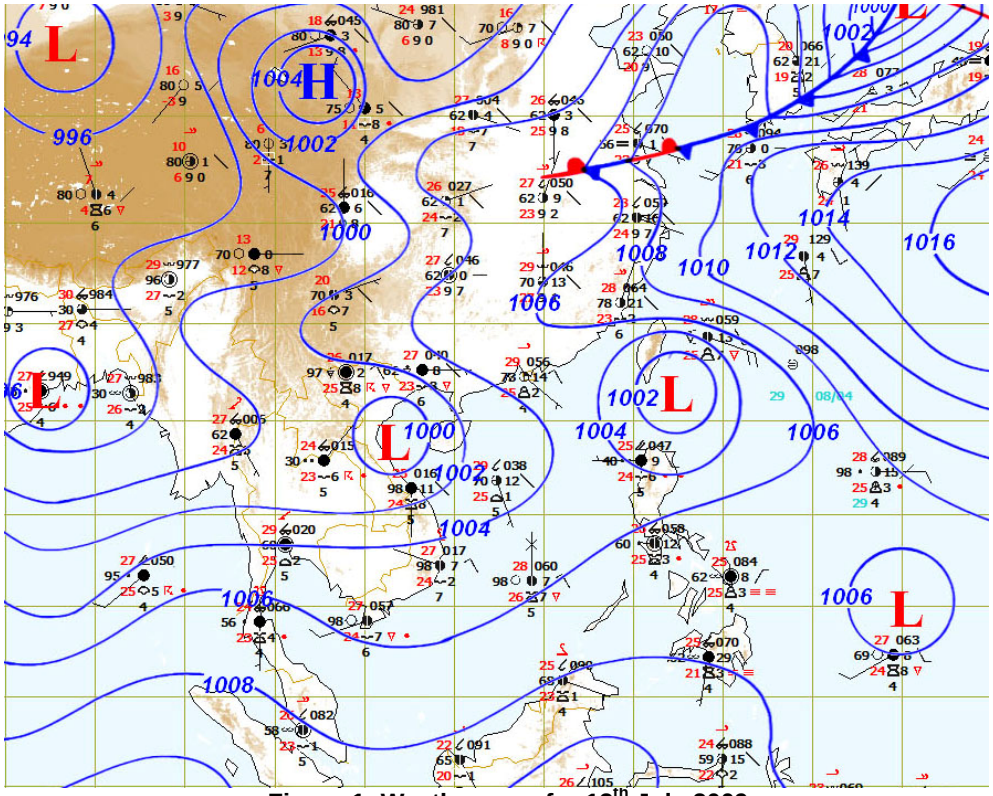


Figure 1: Weather map for 13th July 2009

Active monsoon

During July 11-13, 2009, the low pressure with central pressure 1000 hPa was almost stationary over China. The active SW monsoon was intensifying over the Indochina peninsula (Figure 1).

ITCZ (Inter Tropical Convergence Zone)

No ITCZ was observed in this week.

Tropical depression (TD)

Tropical Depression "**Soudelor** " (0905) with central pressure 1000 hPa was observed over Viet Nam and Laos PDR, dissipated over land. It has limited effect on the rainfall in the Mekong River Basin.

Other weather phenomena that affect the discharge

No other weather phenomena affecting the discharge were observed

Overall weather situation

Critical Southwest Monsoon. Mostly cloudy, big thunderstorms and very heavy rain in Tibet, Thailand, Northern Viet Nam and Lao PDR. The big thunderstorm occurred in Cambodia, especially in the coastal areas during July 11-13, 2009.

General behavior of the Mekong River

- The water levels in the Mekong River were rising over the entire Mekong River. The water levels are above the long-term average in the upper and middle reaches while they are still below the long-term average in the lower reach. However at this stage the water levels are still below flood levels everywhere in the Mekong River Basin

For stations from Chiang Saen to Paksane

Water levels were risen up at the beginning of the week and then fallen down after few days. As results of heavy rainfall in the left bank tributaries and increasing level in the upstream reach, water levels at Vientiane and Nong Khai rose up for almost 3.0 and 2.6 m in a day respectively (*see special note on the next page for more hydrological information regarding this peak event*). A falling trend is observed towards the end of the week. Most are somewhat above the long-term average for this time of the year.

For stations from Nakhon Phanom to Pakse

Water levels were rising till the end of the week. The trend is towards falling after this week. Most are somewhat above the long-term average for this time of the year.

For stations from Stung Treng to Kampong Cham

Water levels were rising, with a rising trend towards the end of the week. Most are somewhat close to the long-term average for this time of the year.

Downstream from Phnom Penh

Water levels were rising, with a rising trend towards the end of the week. Most are somewhat below the long-term average for this time of the year.

Note: For areas between forecast stations please refer to the nearest station.

Flood Situation

- Flood stage or alarm stage:

No alarm stage (where the forecast is expected to reach flood level within three days) was reported anywhere in the Mekong River Basin during the past week. Water levels are still significantly below flood levels (as defined by the national agencies) at all forecast stations.

- Damage or victims:

No damage and no loss of life due to river flooding was recorded anywhere in the Mekong River Basin 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

Special Note

Heavy rain was occurred at the Nam OU catchment on 5 July and 6 July 2009, where the rainfall recorded at Moung Ngoy station was 114.5 mm for July 5 and 137.5 mm for July 6. As shown in Figure 2 below, it was observed that the accumulative rainfall at the Moung Ngoy station from the beginning of this flood season was higher than that of the wet year 2002. Please note that on 6 July the heavy rainfall was recorded at a number of stations located in the North of Lao PDR (especially at Paksane station rainfall was recorded as 179 mm, Vang Vieng as 95.6 mm, Oudomxay as 94.6 mm, and Moung Namtha as 80.9 mm).

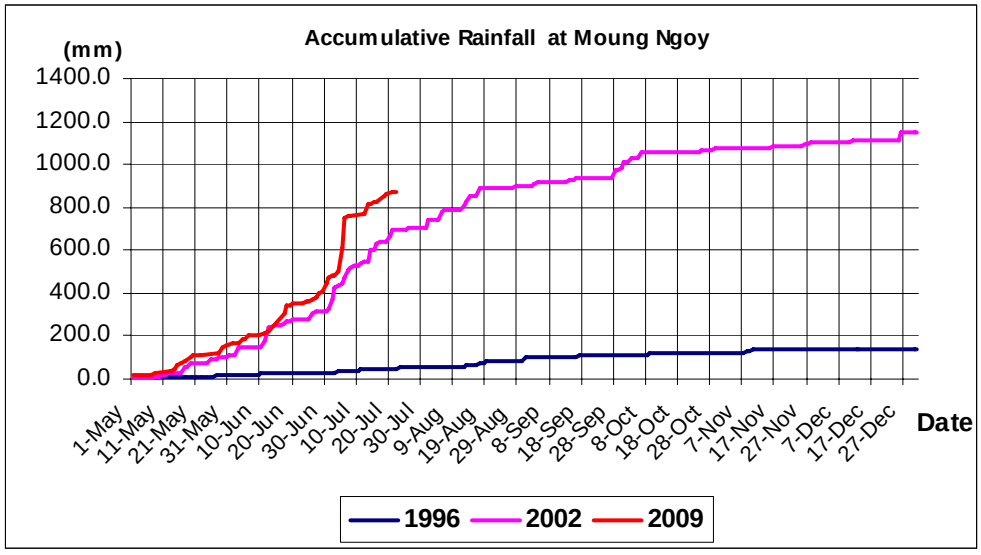


Figure 2: Accumulative rainfall at Moung Ngoy station from 1 May to 22 July 2009

The Flash Flood Guidance (FFG) System shows that the soil moisture at Nam OU and other catchments, which located in the North and Central parts of Lao PDR was saturated after having heavy rain on 5 July (see Figure 3).The additional heavy rain on the next day of 6 July generated a high water level at Moung Ngoy station (see Figure 4: water levels at Moung Ngoy and other tributaries of the Mekong in Lao PDR) as well as at other hydrological stations on the tributaries of Mekong River in the Northern and Central parts.

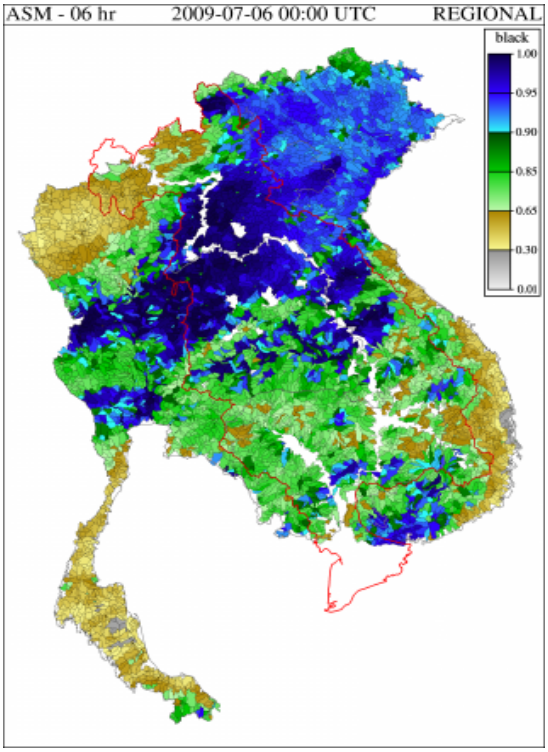


Figure 3: 6 hr Soil Moisture of Lower Mekong Basin at 06 July 2009 at 00 UTC (source: FFG)

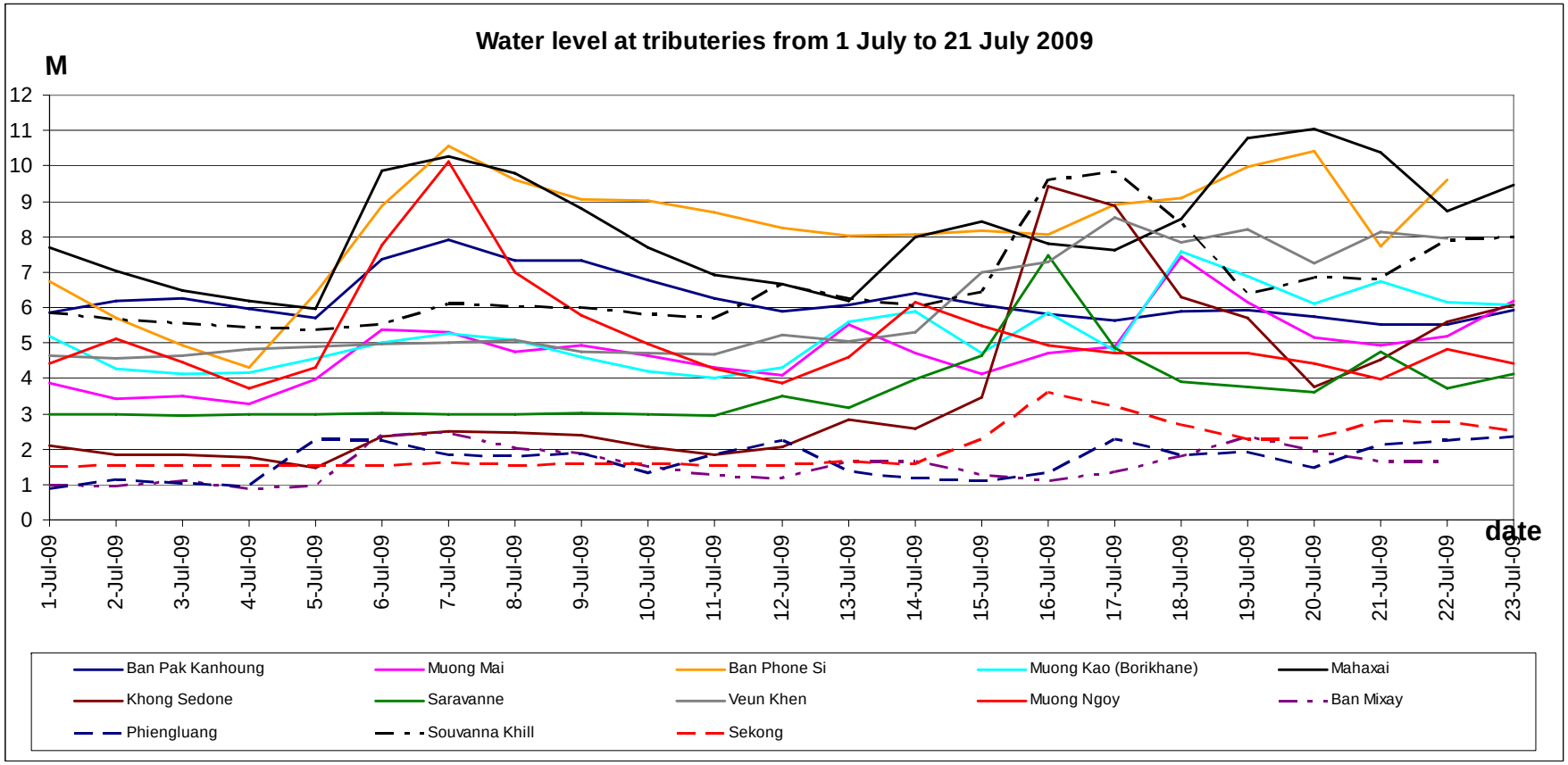


Figure 4: Hydrograph of hydrological stations on tributaries of Lao PDR from 1 July to 21 July 2009

Annex A: Graphs and Tables

Table A1: observed water levels

unit in m

2009	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
06/07	536.10	4.82	12.04	8.31	5.08	5.96	7.78	5.53	6.73	5.11	4.02	5.56	4.34	4.85	12.14	7.21	4.29	3.38	3.91	2.74	3.37	1.08	0.93
07/07	535.83	5.62	13.77	10.64	5.35	6.22	8.90	6.80	8.01	6.09	5.00	5.77	4.38	4.80	12.01	7.17	4.29	3.38	3.94	2.75	3.41	0.96	0.75
08/07	537.61	5.94	13.52	12.36	8.30	8.80	9.70	7.80	8.94	7.27	6.12	6.70	5.02	4.75	11.97	7.08	4.27	3.36	3.90	2.74	3.38	0.88	0.63
09/07	536.78	5.96	12.56	12.36	9.23	10.10	11.18	8.40	9.50	7.90	6.95	7.99	6.06	5.03	11.93	7.06	4.30	3.41	3.92	2.78	3.39	0.85	0.55
10/07	536.50	5.89	11.82	11.70	8.94	9.97	11.56	8.99	10.12	8.51	7.55	8.60	6.80	5.70	12.44	7.12	4.30	3.41	3.93	2.84	3.41	0.83	0.38
11/07	536.25	5.16	11.30	11.11	8.32	9.43	11.35	9.25	10.25	8.84	7.90	9.09	7.28	6.09	13.43	7.78	4.49	3.63	4.10	2.96	3.58	0.89	0.56
12/07	536.53	4.81	10.64	10.66	7.85	8.99	10.94	9.15	10.29	8.85	7.95	9.40	7.56	6.37	14.12	8.50	4.87	3.96	4.38	3.20	3.88	1.02	0.64
13/07	536.54	4.59	9.99	10.27	7.50	8.62	10.70	8.81	9.93	8.59	7.67	9.47	7.68	6.66	14.85	9.08	5.18	4.29	4.65	3.46	4.16	1.19	0.79
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

2009	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
06/07	25.4	69.0	87.8	12.0	8.5	5.7	179.0	18.4	24.0	34.6	38.8	26.7	43.0	0.0	48.6	0.2	2.9	0.0	0.0	5.5	0.0	19.0	27.0
07/07	15.1	25.3	4.0	0.6	8.0	7.2	51.4	11.3	33.2	23.0	25.4	22.0	13.0	0.0	19.6	57.5	2.7	0.0	0.0	1.7	0.0	0.0	0.2
08/07	12.1	0.0	0.0	0.0	4.5	8.3	3.6	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	34.0
09/07	0.0	0.0	0.0	0.0	4.3	0.0	13.7	0.0	20.2	0.0	0.0	0.0	0.0	0.0	0.0	4.3	16.7	0.0	34.8	7.4	6.3	0.0	0.3
10/07	0.0	0.0	7.4	0.0	0.0	0.0	49.0	0.0	0.0	1.2	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
11/07	0.0	0.0	0.0	0.0	11.2	10.2	25.2	10.6	5.4	0.5	0.0	2.8	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0
12/07	21.4	0.0	0.0	0.0	25.0	39.8	8.0	3.3	3.0	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13/07	69.4	5.8	24.0	7.2	31.6	24.2	75.6	19.4	41.9	0.0	0.0	3.2	6.6	0.0	14.4	9.5	10.6	0.0	0.0	0.0	0.0	38.0	9.0

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

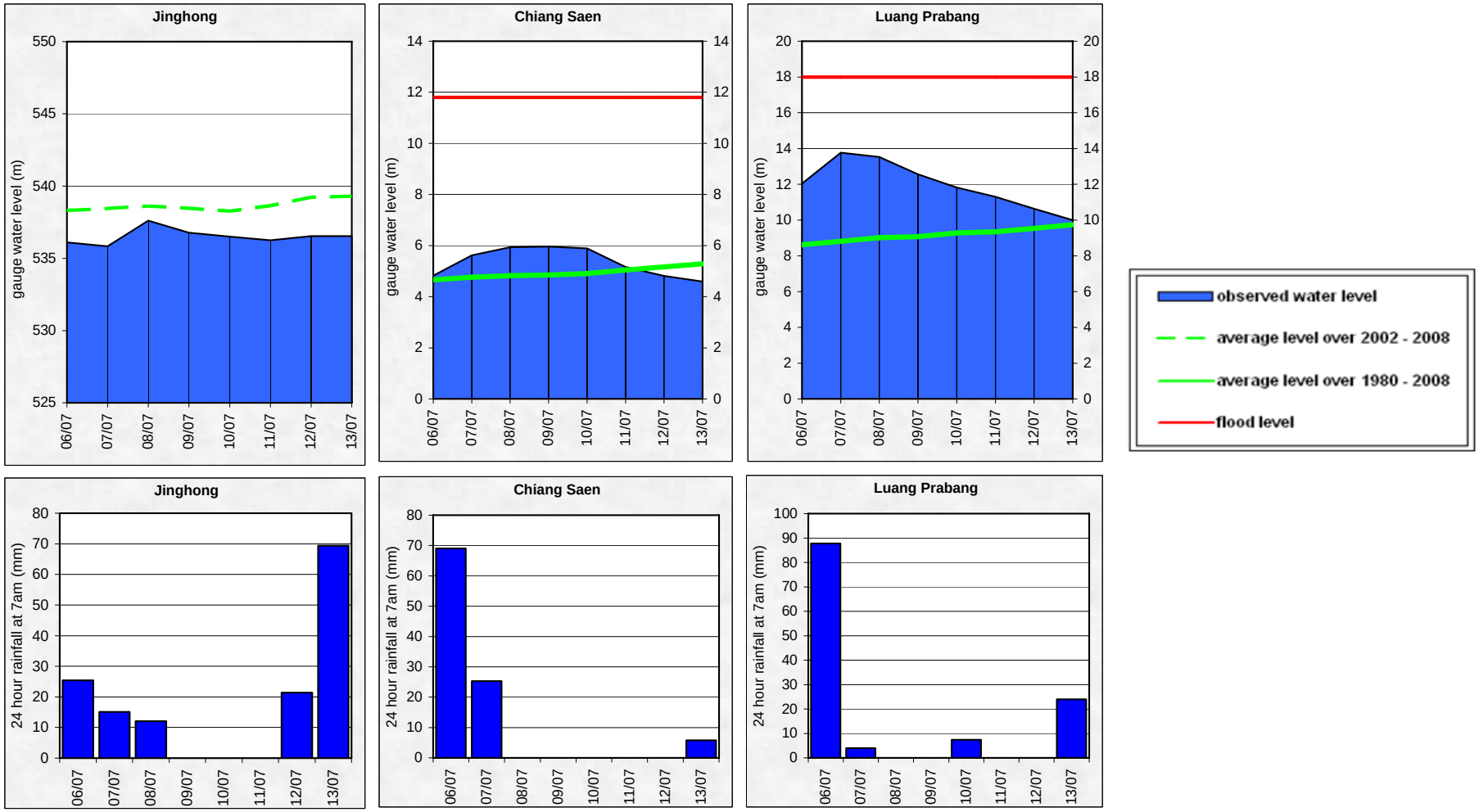


Figure A2: Water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

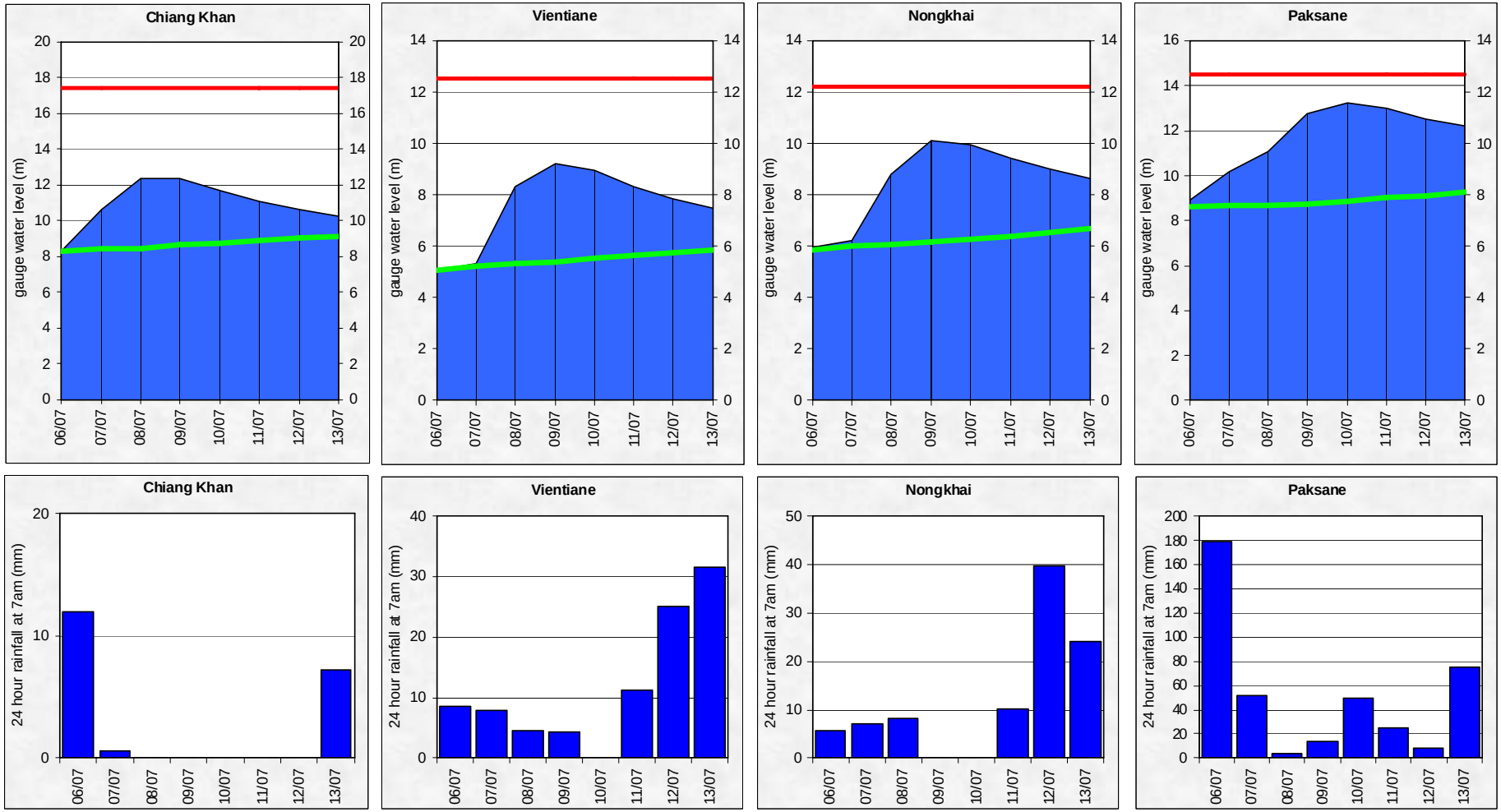


Figure A3: Water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

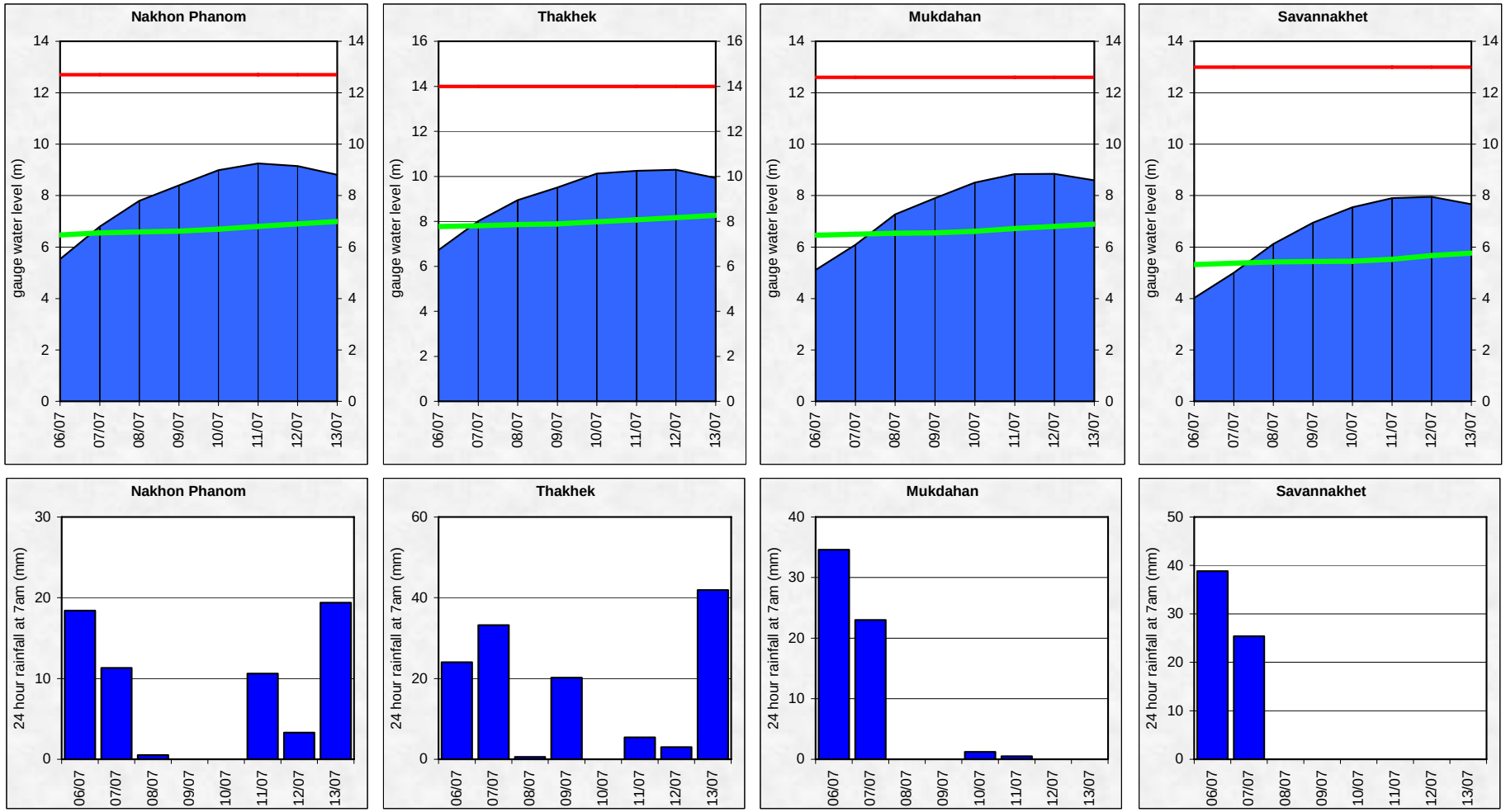


Figure A4: Water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

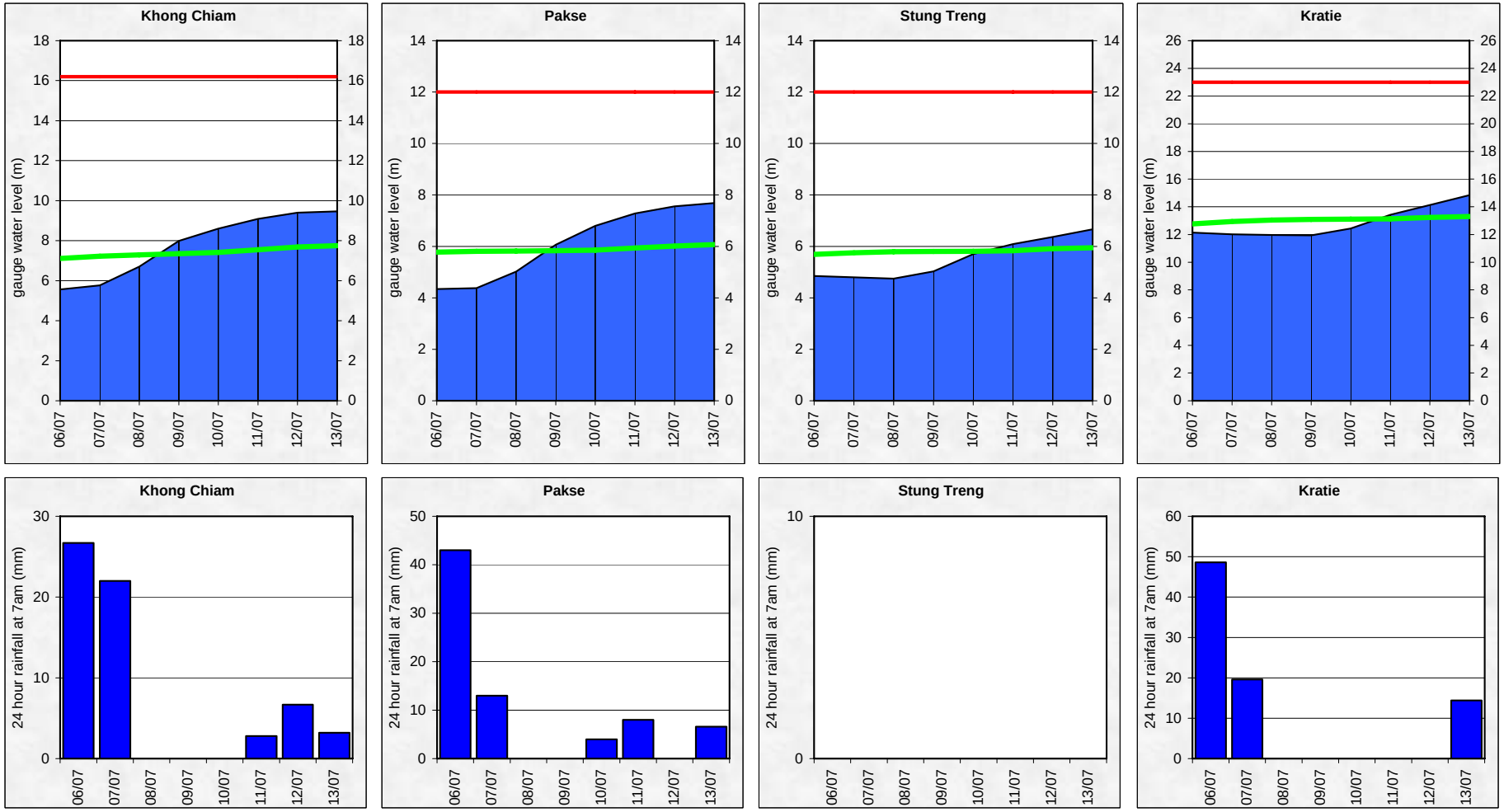


Figure A5: Water level and rainfall for Kampongs Cham, Phnom Penh (Bassac and Port), and Koh Khel

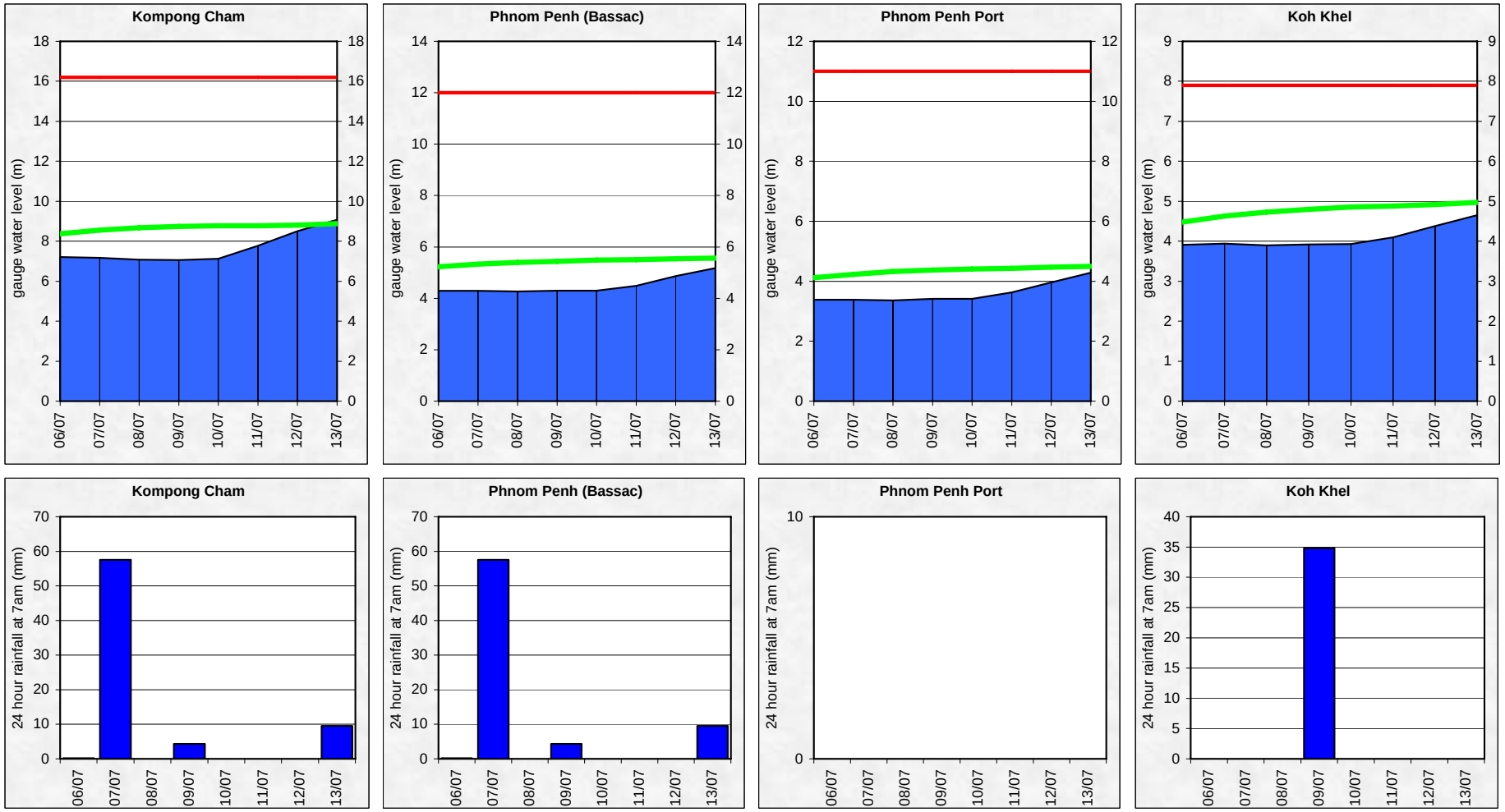
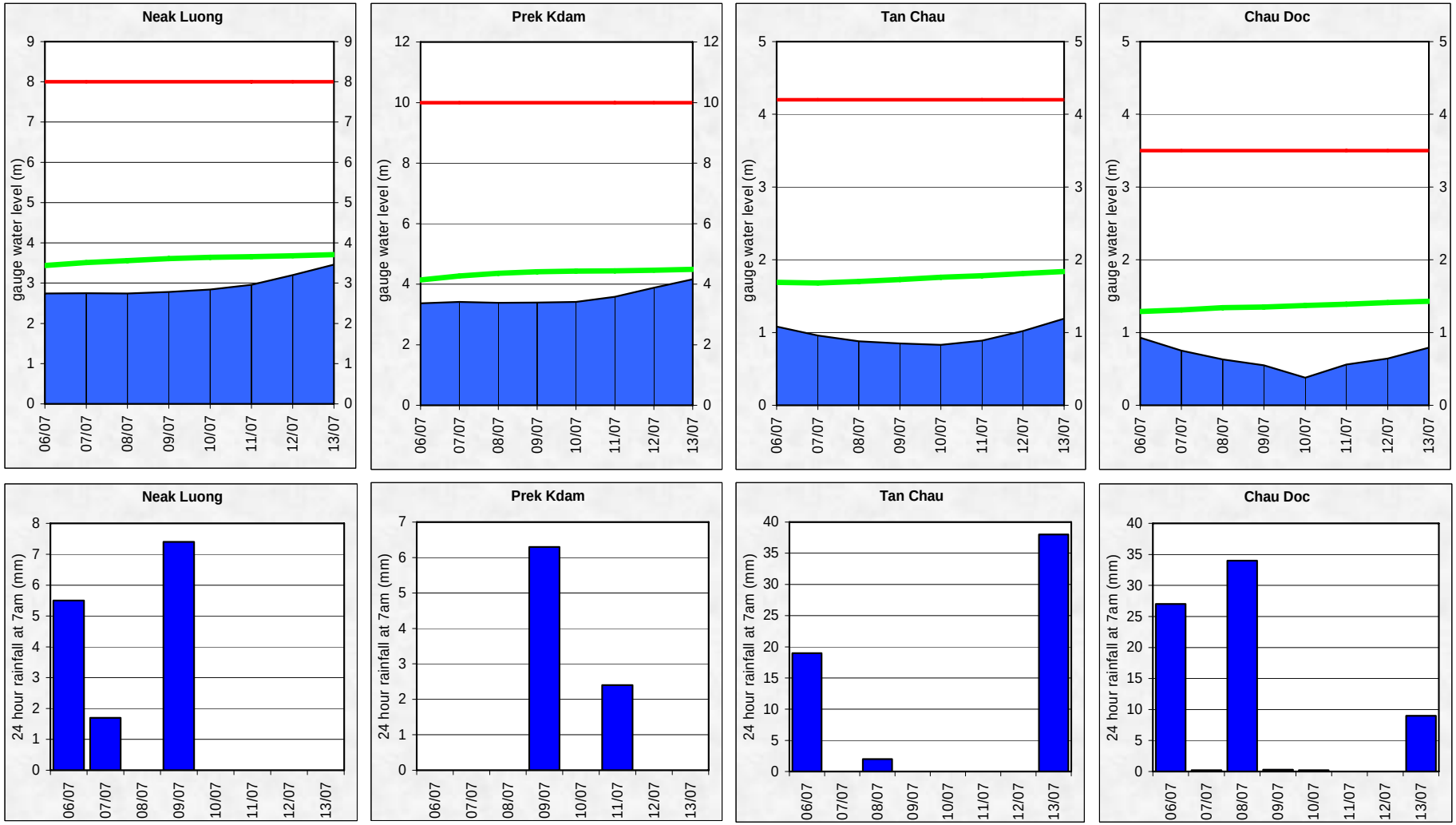


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



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 levels for the past week clearly shows the normal pattern, in which the accuracy is better if the forecast time is shorter; the forecast for 5 days ahead is always less accurate as the forecast 1 day ahead. It also shows that accuracy is higher in the downstream part.

In general the accuracy is less than expected, in particular at Vientiane and between Nakhon Phanom and Pakse. This was mainly due to poor satellite rainfall estimates.

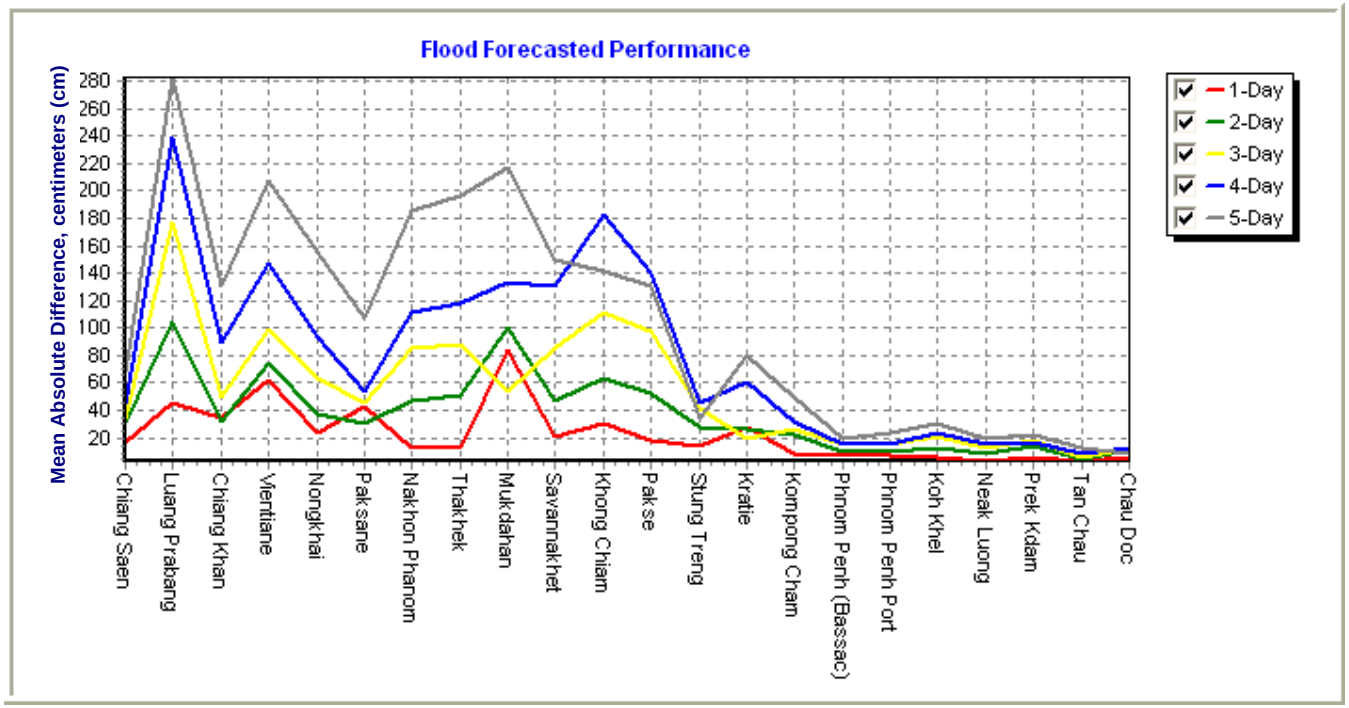


Figure B1: Average flood forecast accuracy along the Mekong mainstream.

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	100.0	71.4	71.4	28.6	71.4	42.9	85.7	85.7	57.1	71.4	42.9	71.4	42.9	28.6	71.4	71.4	71.4	85.7	100.0	71.4	100.0	85.7	*69.5*
2-day	100.0	50.0	50.0	33.3	50.0	50.0	66.7	66.7	33.3	50.0	66.7	50.0	66.7	66.7	66.7	83.3	83.3	50.0	66.7	66.7	66.7	66.7	*61.4*
3-day	100.0	40.0	60.0	20.0	60.0	60.0	60.0	60.0	60.0	40.0	60.0	40.0	60.0	100.0	60.0	40.0	60.0	40.0	20.0	40.0	60.0	40.0	*53.6*
4-day	100.0	25.0	25.0	0.0	50.0	50.0	50.0	50.0	0.0	0.0	25.0	25.0	75.0	50.0	75.0	100.0	100.0	50.0	25.0	75.0	50.0	75.0	*48.9*
5-day	100.0	0.0	0.0	0.0	0.0	66.7	33.3	33.3	0.0	0.0	33.3	0.0	66.7	33.3	33.3	66.7	33.3	33.3	0.0	33.3	66.7	66.7	*31.8*

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	50	50	25	25	25	25	25	25	25	25	25	25	10	10	10	10	10	10	10	10	10	10
2-day	75	75	25	25	25	25	50	50	50	50	50	50	25	25	25	10	10	10	10	10	10	10
3-day	75	100	50	50	50	50	50	50	50	50	75	75	50	50	25	10	10	10	10	10	10	10
4-day	100	*125*	75	50	50	50	50	50	75	75	75	75	50	50	50	25	25	25	10	25	10	10
5-day	100	*150*	75	75	75	75	75	75	75	75	75	75	50	50	50	25	25	25	10	25	10	10

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).*

In the future these indicators will be adjusted against a set of performance indicators that is established by combining international standards and the specific circumstances in the Mekong River Basin. An expert mission to establish these performance indicators is planned for the fourth quarter of 2009.

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 8 days including the current report date.

	Flood Forecast: time sent				Arrival time of input data (average)							Missing data (number)						
2009	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	*10:53*	*6*	*-*	*3*	*08:23*	*08:23*	*08:17*	*08:07*	*08:34*	*08:55*	*08:01*	*0*	*0*	*35*	*87*	*102*	*15*	*98*
month	*10:49*	*14*	*14:43*	*8*	*08:24*	*08:23*	*08:15*	*08:04*	*08:44*	*08:33*	*07:41*	*0*	*0*	*123*	*370*	*178*	*40*	*167*
season	*10:41*	*26*	*12:39*	*44*	*08:23*	*08:25*	*08:09*	*08:20*	*08:44*	*08:25*	*07:50*	*0*	*2*	*228*	*1049*	*667*	*83*	*464*

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.

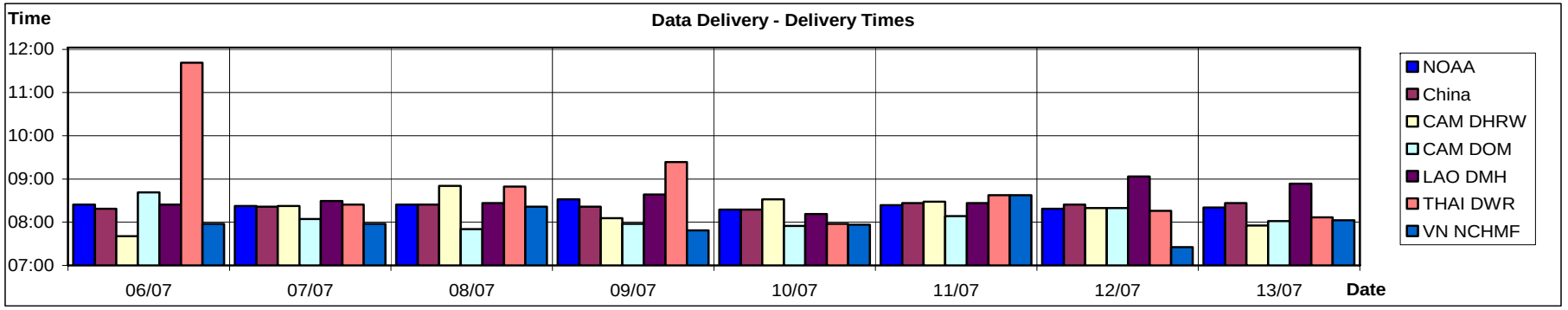


Figure B2: Data delivery times for the past 8 days including the current report date.

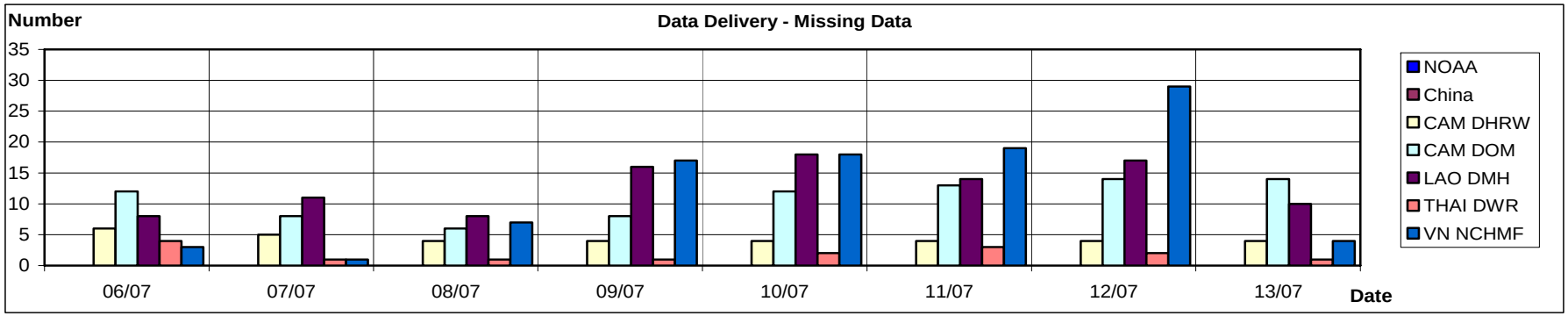


Figure B3: Missing data for the past 8 days including the current report date.

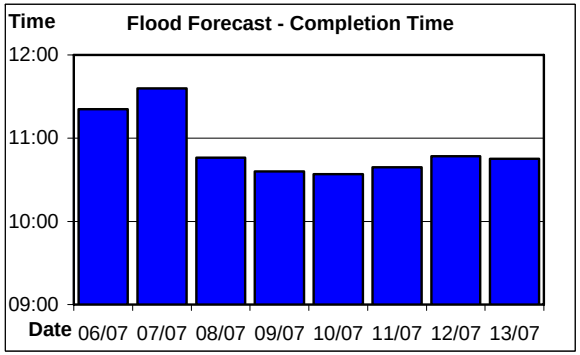


Figure B4: Flood forecast completion time

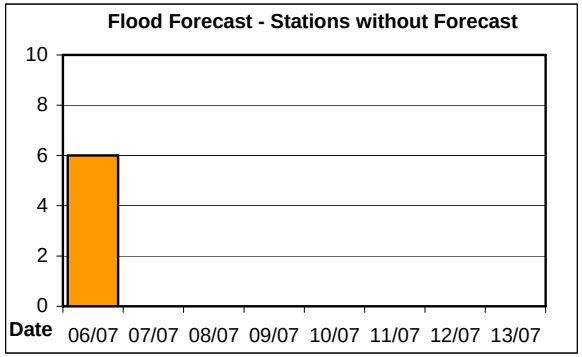


Figure B5: Flood forecast stations without forecast

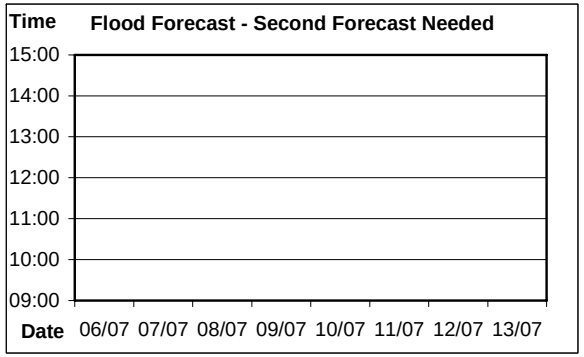


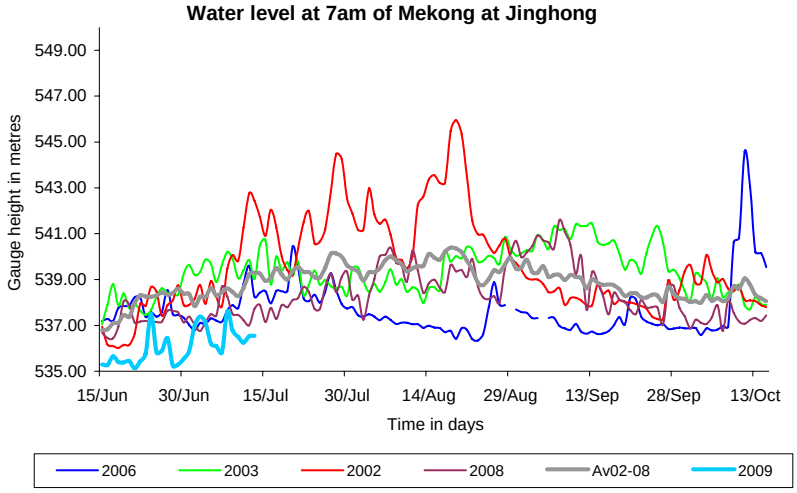
Figure B6: Second forecast needed

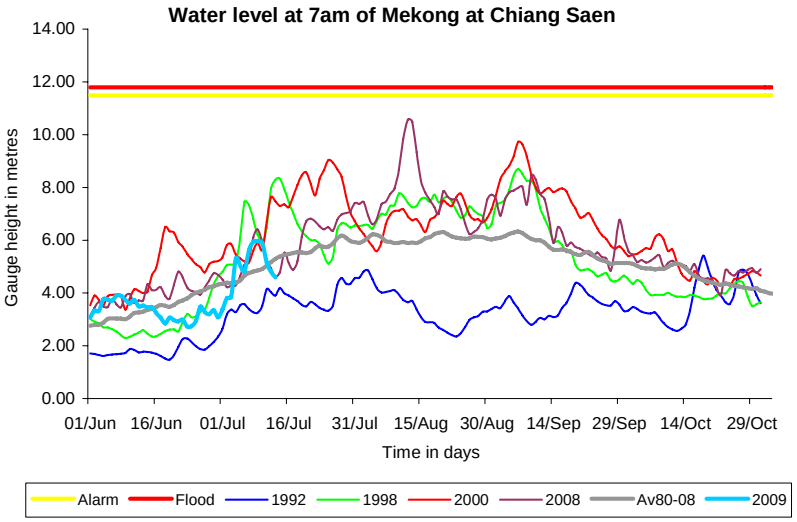
Annex C: Season Water Level Graphs

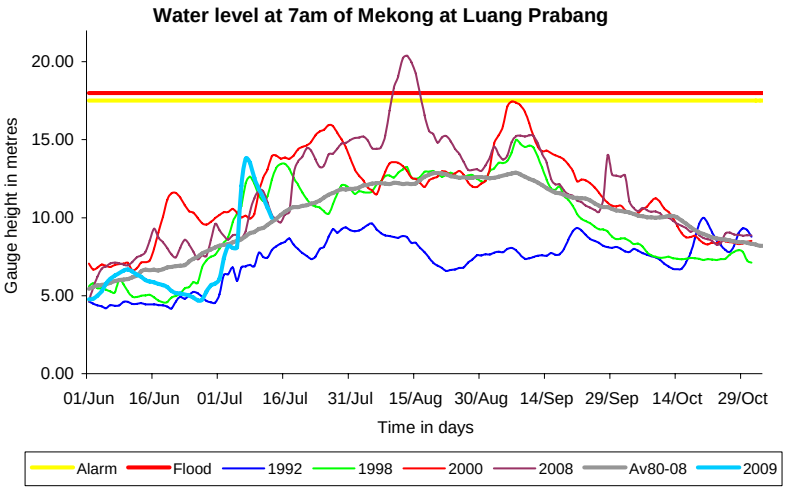
This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

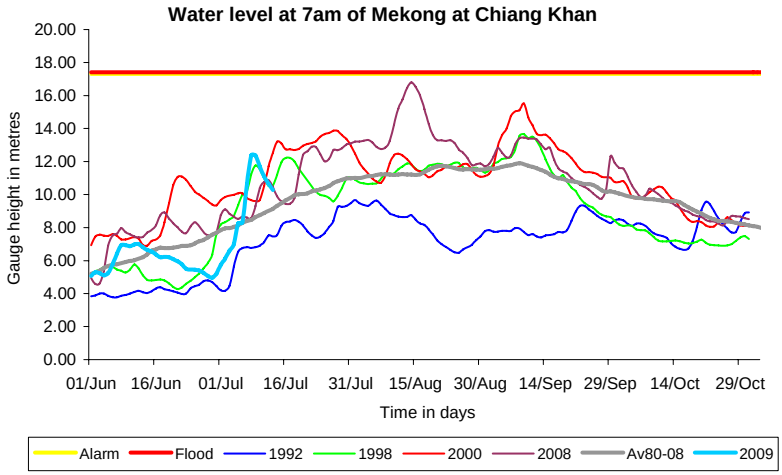
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS

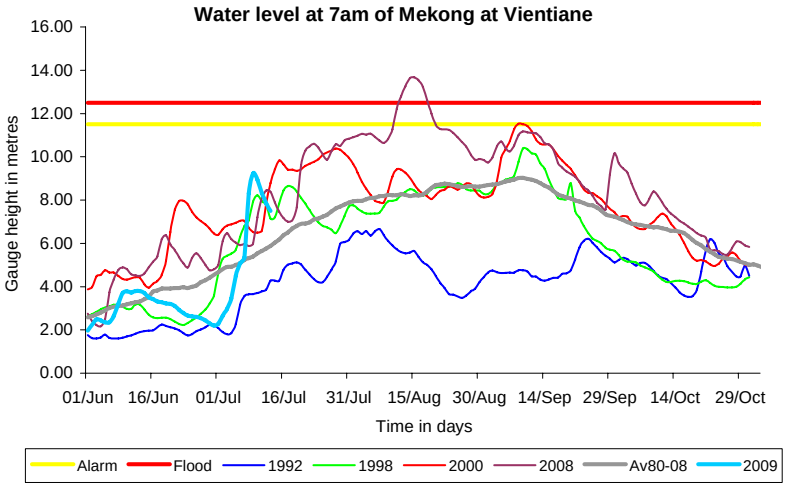
IN WET SEASON FROM 1 JUNE TO 31 OCTOBER

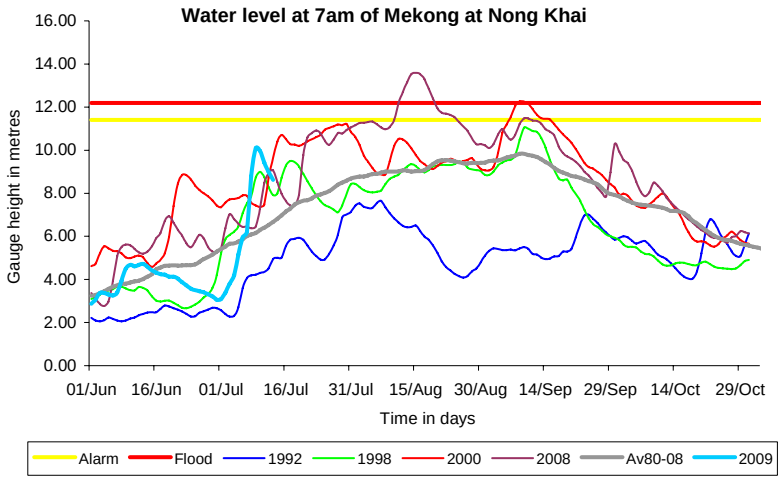


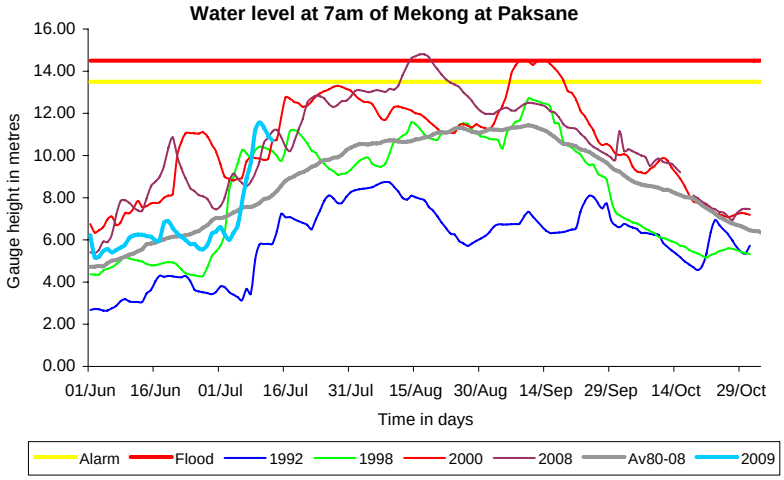


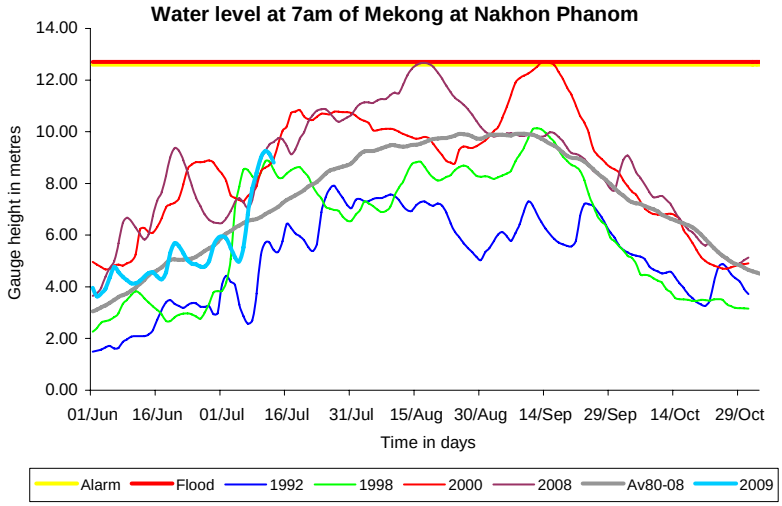

Water level at 7am of Mekong at Luang Prabang
Gauge height in metres
20.00
15.00
10.00
5.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

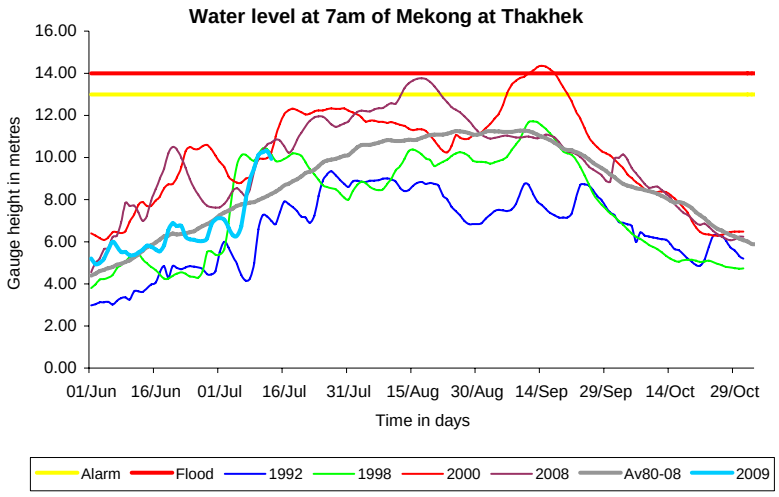

Water level at 7am of Mekong at Chiang Khan
Gauge height in metres
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

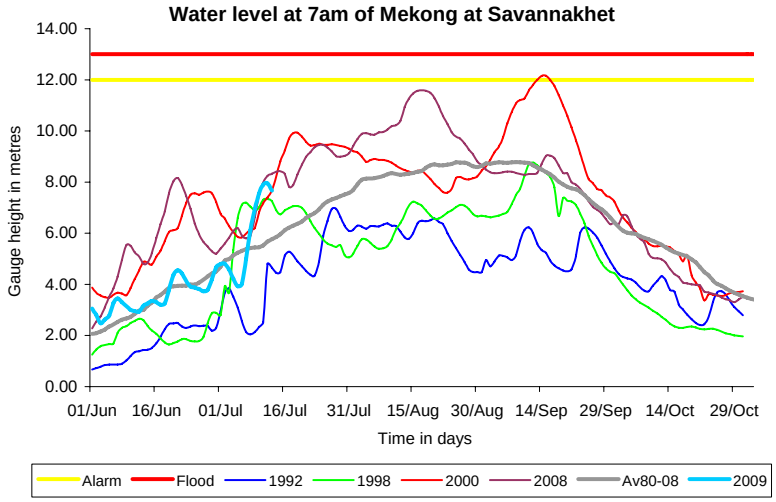

Water level at 7am of Mekong at Vientiane
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

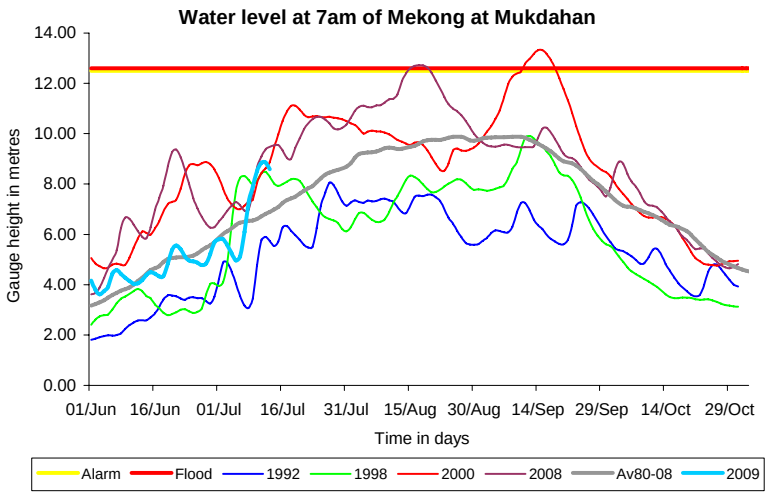

Water level at 7am of Mekong at Nong Khai
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

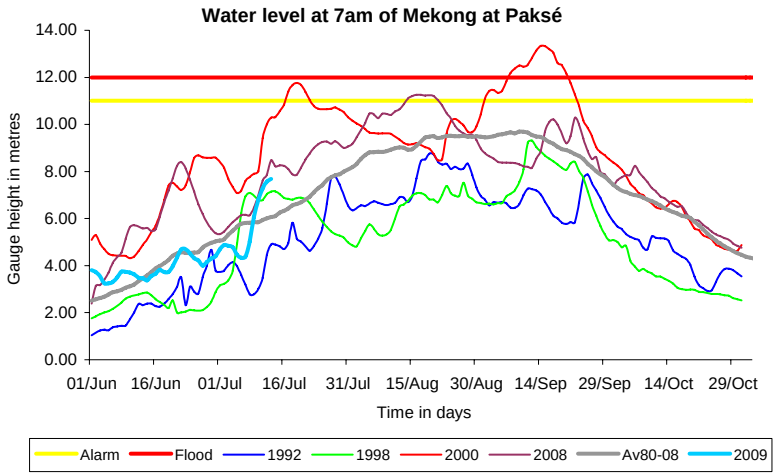

Water level at 7am of Mekong at Paksane
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

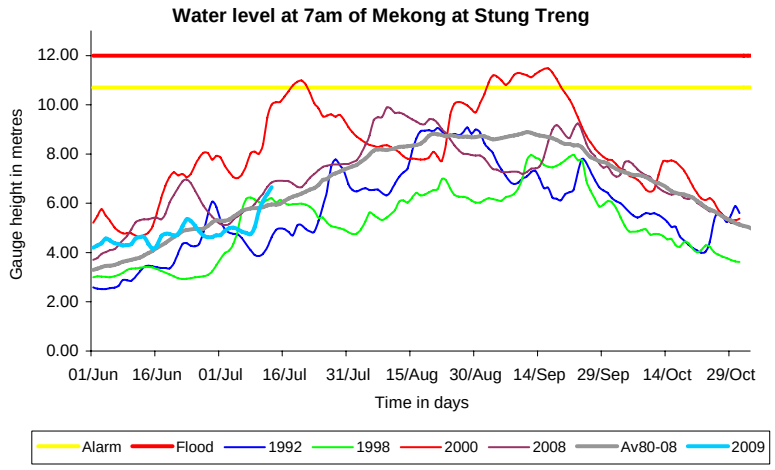

Water level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

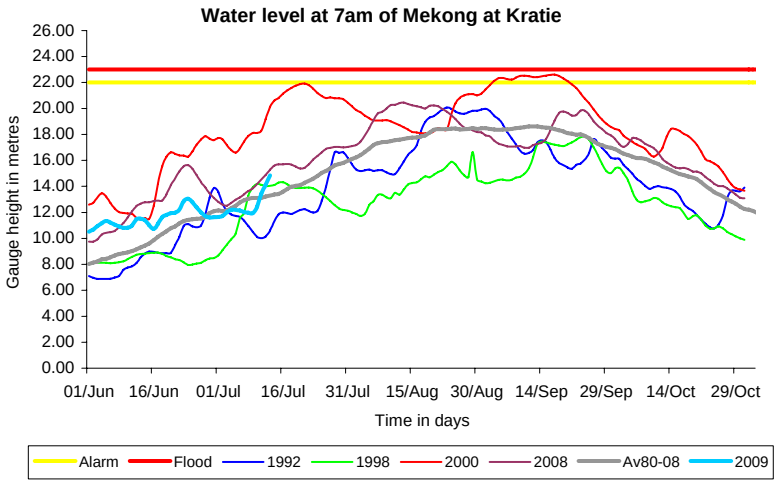

Water level at 7am of Mekong at Thakhek
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

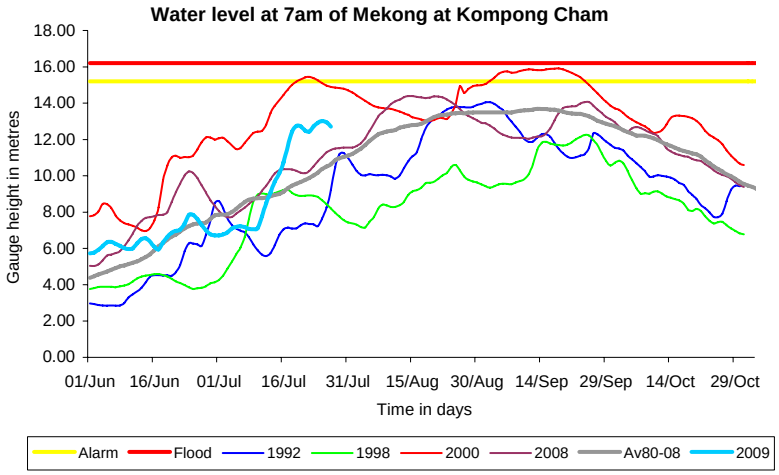

Water level at 7am of Mekong at Savannakhet
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

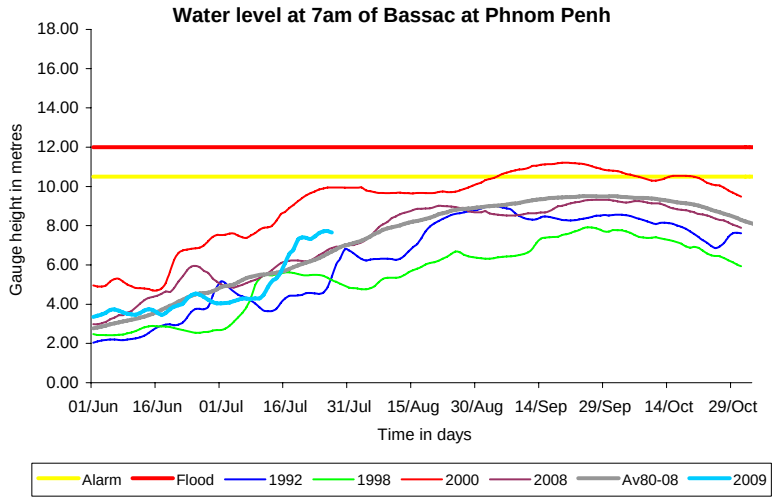

Water level at 7am of Mekong at Mukdahan
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

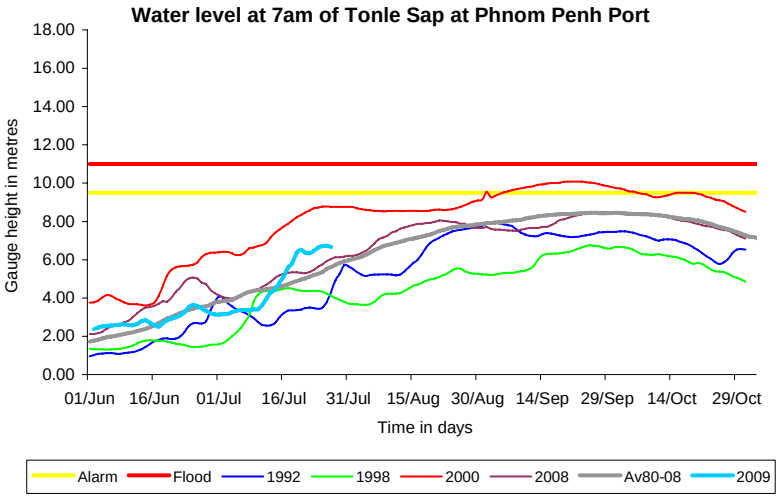

Water level at 7am of Mekong at Paksé
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

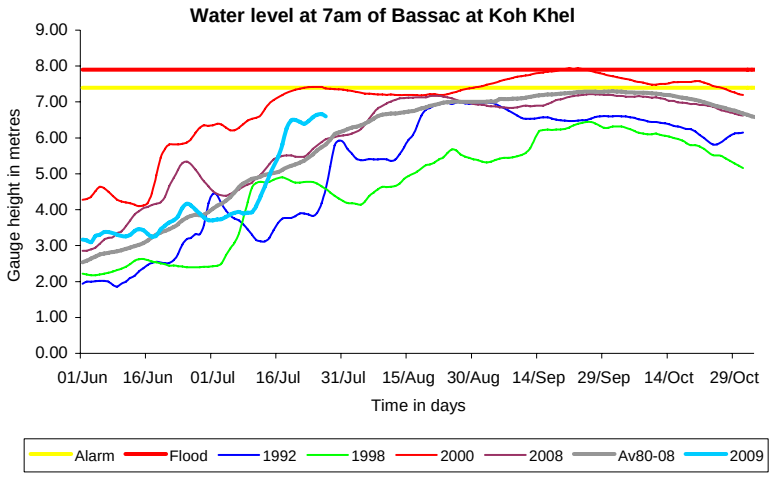

Water level at 7am of Mekong at Stung Treng
Gauge height in metres
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

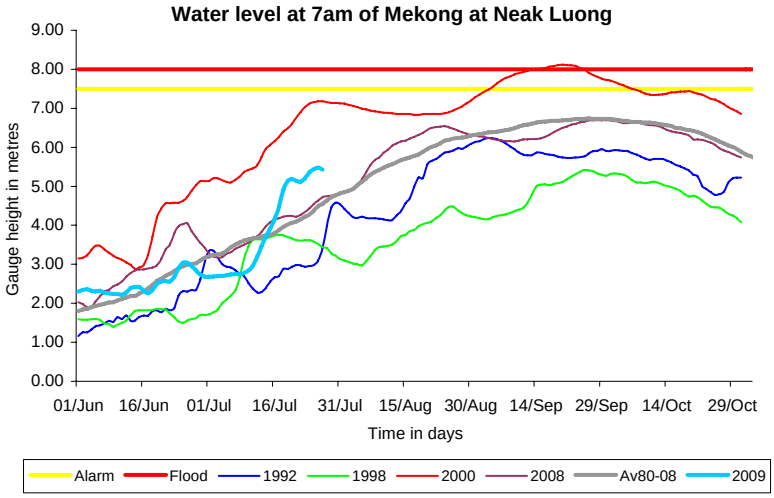

Water level at 7am of Mekong at Kratie
Gauge height in metres
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

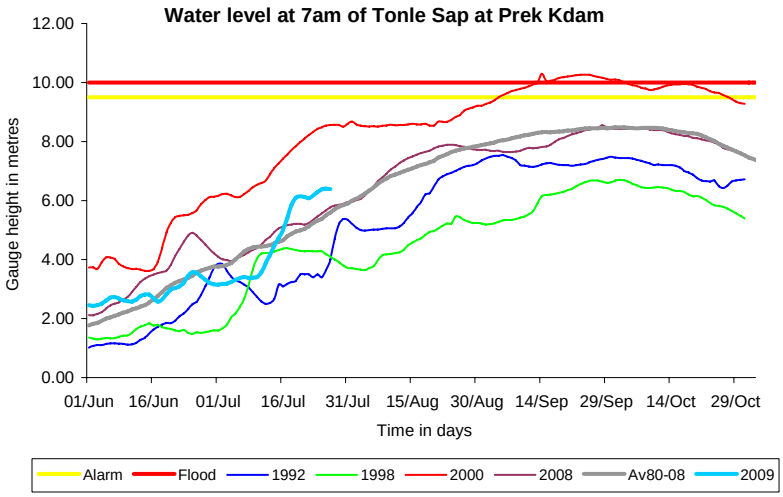

Water level at 7am of Mekong at Kompong Cham
Gauge height in metres
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

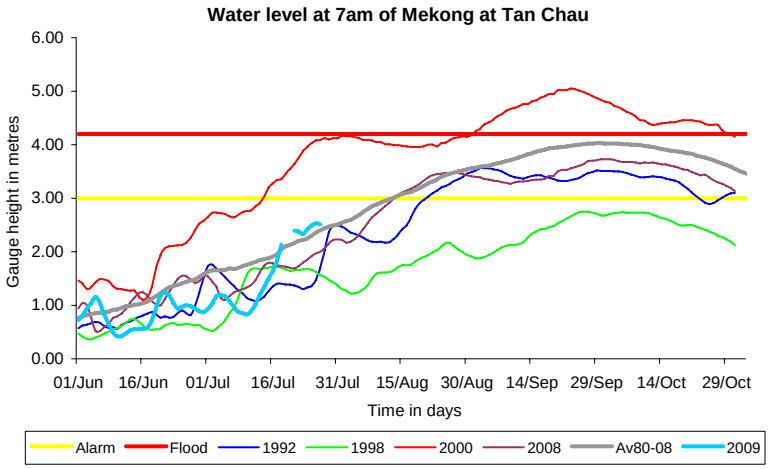

Water level at 7am of Bassac at Phnom Penh
Gauge height in metres
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

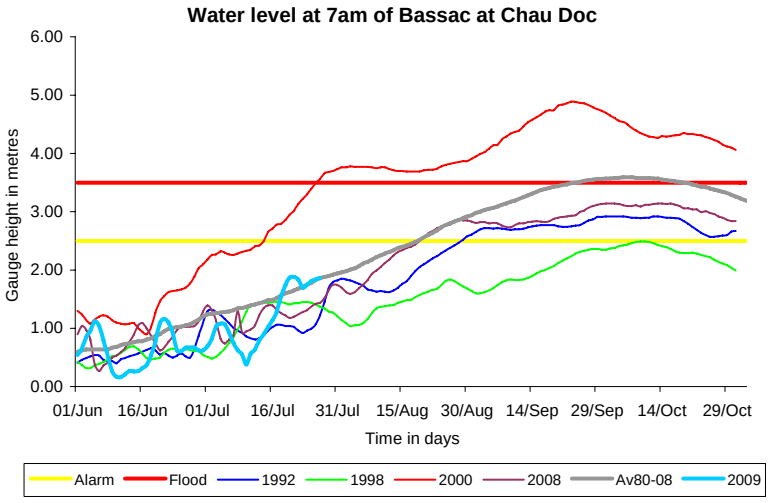

Water level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009


Water level at 7am of Bassac at Koh Khel
Gauge height in metres
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
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 1992 1998 2000 2008 Av80-08 2009


Water level at 7am of Mekong at Neak Luong
Gauge height in metres
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
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 1992 1998 2000 2008 Av80-08 2009


Water level at 7am of Tonle Sap at Prek Kdam
Gauge height in metres
12.00
10.00
8.00
6.00
4.00
2.00
0.00
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 1992 1998 2000 2008 Av80-08 2009


Water level at 7am of Mekong at Tan Chau
Gauge height in metres
6.00
5.00
4.00
3.00
2.00
1.00
0.00
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
1992
1998
2000
2008
Av80-08
2009


Water level at 7am of Bassac at Chau Doc
Gauge height in metres
6.00
5.00
4.00
3.00
2.00
1.00
0.00
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
1992
1998
2000
2008
Av80-08
2009