Mekong River Commission

Regional Flood Management and Mitigation Centre

Weekly Flood Situation Report for the Mekong River Basin

Prepared on: 05/10/2009, covering the week from the 28th of September to the 5th of October 2009

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

General weather patterns

During the week of the 28th September 2009 to the 5th October 2009, seven weather bulletins were issued by the Department of Meteorology (DOM) of Cambodia. The weather charts of the 28th of September to the 4th of October bulletins are presented in the figures below:

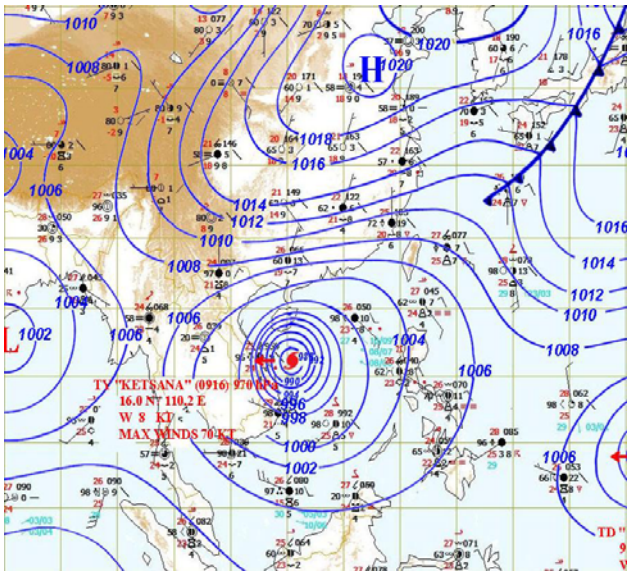


Figure 1: Weather map for 28th September 2009

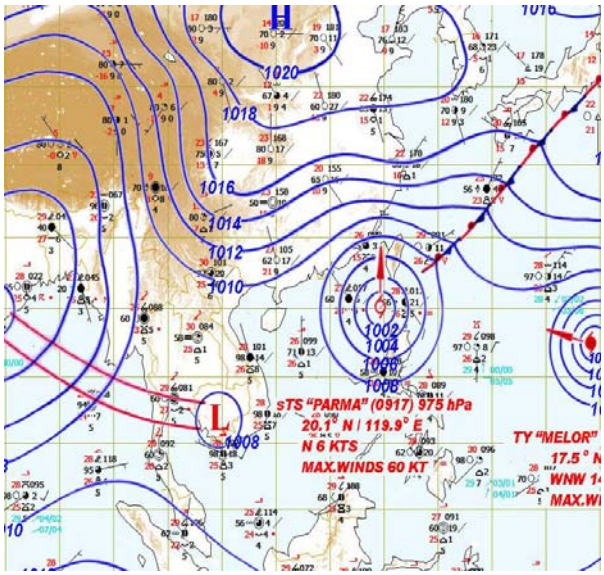


Figure 2: Weather map for 04th October 2009

Strong to moderate South-West (SW) Monsoon

Strong SW monsoon prevailed and was stationary over the Bay of Bengal, Gulf of Thailand and Indochina Peninsula from 28th September to 4th October and moderate monsoon occurred from 5th October 2009 (Figure 1 and Figure 2).

ITCZ (Inter Tropical Convergence Zone)

Inter Tropical Convergence Zone (ITCZ) laid across Bangladesh, Myanmar, Thailand, Lao PDR, Cambodia and Viet Nam on 1st October and starting from 2sd October ITCZ laid across India, Myanmar, Thailand and Cambodia.

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

The Typhoon (TY) ***KETSANA*** (0916) with a central pressure 970 hPa (figure 1) landed over Quang Ngai province, Central part of Vietnam, Southern part of Lao PDR, and North-eastern part of Cambodia on 29th September 2009. It had downgraded into a low pressure on 30th September 2009.

On 2nd October 2009, the typhoon ***PARMA*** (0917), with a central pressure 935 hPa located at latitude 16°6 N, longitude 123°8 E, which is over Philippine Sea. On 4th October, the Sever Tropical Storm ***PARMA*** (0917) with a central pressure 975 hPa, located at latitude 20° 1N, longitude 119°9 E, which is over South China Sea, between Philippine and Taiwan, moving to North with a speed 11 km/h (Figure 2).

Other weather phenomena that affect the discharge

No other weather phenomena affecting the discharge were observed.

Overall weather situation

The strong SW monsoon prevailed over the Bay of Bengal, Gulf of Thailand and Indochina Peninsula. From 29th September to 1st October 2009, there were many clouds of Ac, Cs, Cu, Cb and Cb caps were observed over Viet Nam, Lao PDR, Thailand and Cambodia. Big thunderstorms and very heavy rain occurred in Viet Nam, Lao PDR, Thailand and Cambodia as the result of these phenomena.

General behaviour of the Mekong River

Water levels were falling in the upper and middle reaches of the Lower Mekong River during the monitored period and most stations were recording levels that are somewhat about the long-term average. In the lower reaches of the Lower Mekong downstream of Khong Chiam, water levels were rising and most stations between Khong Chiam and Kampong Cham were recording levels that are somewhat above the long-term average for this time of the year while most stations downstream of Phnom Penh were recording levels that are somewhat about the long-term average for this time of the year. Water levels at Tan Chau and Chau Doc monitoring stations were above alarm levels during the past week. During the last week, Typhoon ***KETSANA*** caused rapid increase of water levels between Khong Chiam and Kampong Cham.

For stations from Chiang Saen to Vientiane/Nong Khai

Water levels were falling towards the end of the week. Most stations were recording levels that are somewhat slightly below the long-term average for this time of the year.

For stations from Paksane to Savannakhet/Mukdahan

Water levels were falling towards the end of the week. Most stations were recording levels that are somewhat around the long-term average for this time of the year.

For stations from Khong Chiam to Pakse

Water levels were rising until the mid of the week then slightly fell towards the end of the week. Most stations were recording levels that are somewhat above the long-term average for this time of the year.

For stations from Stung Treng to Kampong Cham

Water levels were rapidly rising until mid of the week then gradually rose towards the end of the week. Most stations were recording levels that are somewhat above the long-term average for this time of the year.

For stations from Phnom Penh to Koh Khel/Neak Luong

Water levels were rising steadily towards the end of the week. Most stations were recording levels that are somewhat around the long-term average for this time of the year.

Tan Chau and Chau Doc

Water levels were rising steadily towards the end of the week. Both stations were recording levels that are somewhat below the long-term average for this time of the year. The water levels at both stations were above the alarm levels as defined by the national agency.

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

Flood Situation

- Flood stage or alarm stage:

During the last week, the water levels at Tan Chau and Chau Doc were above alarm levels as defined by the national agency. No alarm stage (where the forecast is expected to reach flood level within three

days) was reported anywhere in the Mekong River during the past week. Water levels are still below flood levels (as defined by the national agencies) at all forecast stations.

- 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

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
28/09	536.92	4.90	9.96	10.27	7.36	8.11	9.70	8.34	9.44	8.05	7.15	9.34	7.56	7.27	17.00	11.95	8.81	8.02	6.97	6.28	8.02	3.29	2.79
29/09	536.34	4.73	9.67	10.13	7.28	8.14	9.70	8.13	9.22	8.03	7.14	9.81	7.96	7.68	17.66	12.20	8.87	8.09	7.00	6.29	8.07	3.29	2.77
30/09	536.12	4.85	9.22	9.82	7.09	7.92	9.54	7.85	8.96	7.72	6.78	10.39	8.78	8.52	18.57	12.70	9.02	8.25	7.09	6.36	8.18	3.35	2.81
01/10	535.92	4.68	8.96	9.32	6.68	7.58	9.26	7.56	8.66	7.47	6.57	11.24	9.74	9.58	19.80	13.37	9.24	8.48	7.19	6.48	8.36	3.44	2.88
02/10	535.52	4.40	8.93	9.06	6.16	7.07	9.14	7.55	8.68	7.40	6.49	11.31	9.86	10.14	20.68	13.95	9.45	8.67	7.22	6.56	8.37	3.51	2.95
03/10	535.25	4.00	8.71	9.21	5.99	6.77	9.02	7.90	8.99	7.71	6.78	11.19	9.45	10.37	21.11	14.39	9.50	8.73	7.29	6.64	8.46	3.58	3.00
04/10	535.79	3.68	8.46	9.22	5.90	6.86	8.64	7.71	8.84	7.80	6.88	11.26	9.40	10.46	21.20	14.68	9.55	8.78	7.35	6.72	8.57	3.67	3.06
05/10	-	3.57	7.94	8.96	5.98	6.85	8.45	7.18	8.29	7.39	6.52	11.10	9.29	10.56	21.36	14.89	9.60	8.92	7.39	6.84	8.68	3.74	3.12
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
28/09	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	4.5	5.2	12.1	5.0	0.0	28.4	4.9	2.1	0.0	1.4	1.8	0.0	0.0	0.0
29/09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	40.0	15.5	35.0	26.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30/09	0.0	0.0	0.0	1.2	0.0	0.5	0.0	1.9	1.4	12.8	12.8	106.3	171.5	100.5	32.0	53.8	4.6	0.0	0.9	2.1	13.5	0.0	0.6
01/10	0.0	0.0	0.0	4.7	4.2	4.4	1.1	3.2	3.6	47.0	47.6	0.0	13.0	16.2	11.4	3.8	0.0	0.0	13.1	98.8	0.0	16.5	12.0
02/10	0.0	0.2	0.0	19.6	4.5	5.8	0.0	0.3	0.7	29.0	22.5	0.0	0.0	15.0	11.0	10.6	5.6	5.6	2.7	0.0	5.3	0.0	0.0
03/10	0.0	1.1	0.0	5.7	4.0	4.5	0.0	17.7	10.9	0.5	0.0	6.8	0.6	0.0	0.0	0.0	33.5	0.0	6.5	0.0	0.0	0.0	0.0
04/10	0.0	0.0	0.0	1.0	0.0	0.4	0.0	0.0	0.0	4.6	6.7	1.2	0.0	0.6	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	4.0
05/10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	48.7	28.5	32.4	0.9	0.3	0.0	0.9	0.4	0.0	0.0	0.0

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

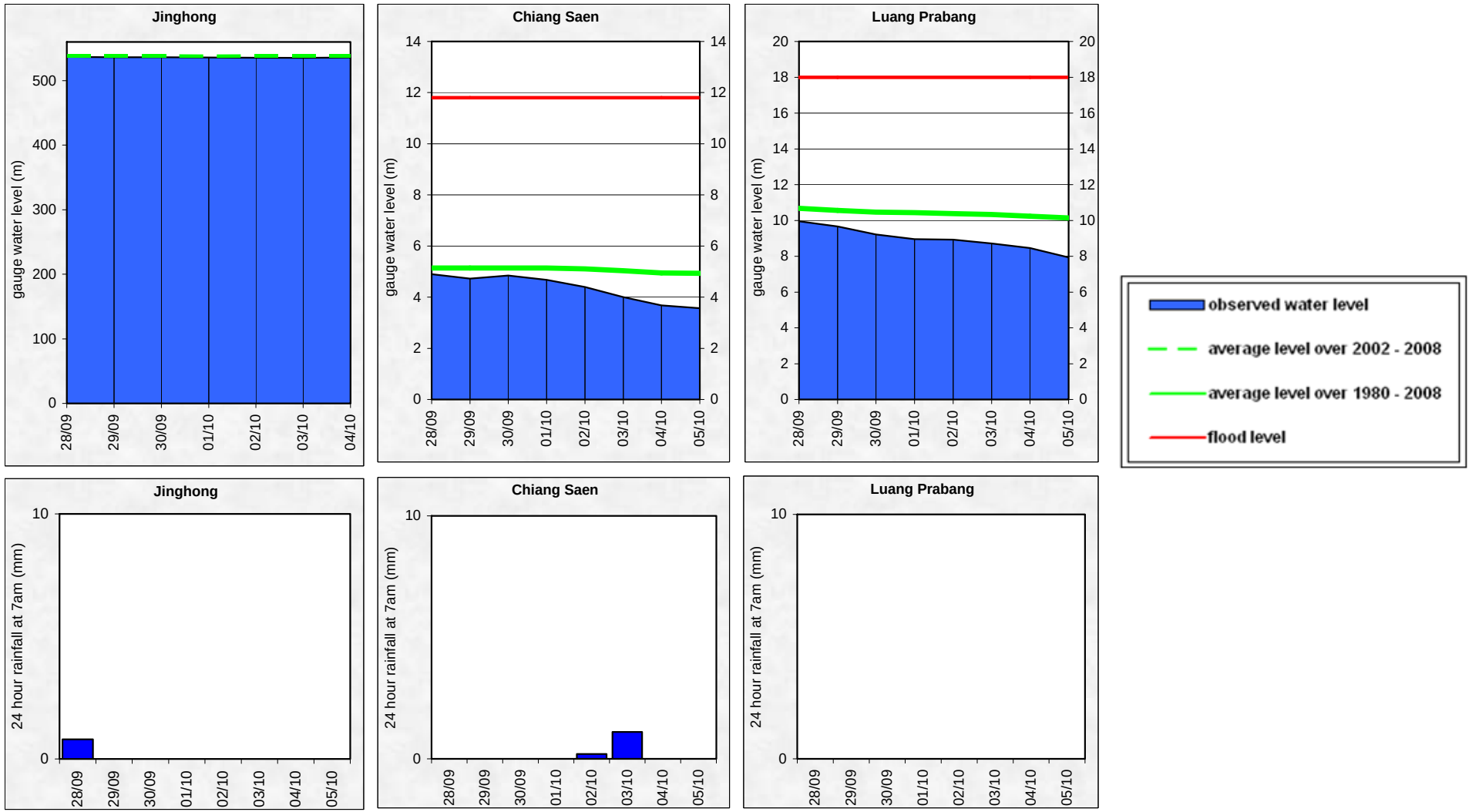


Figure A2: Water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

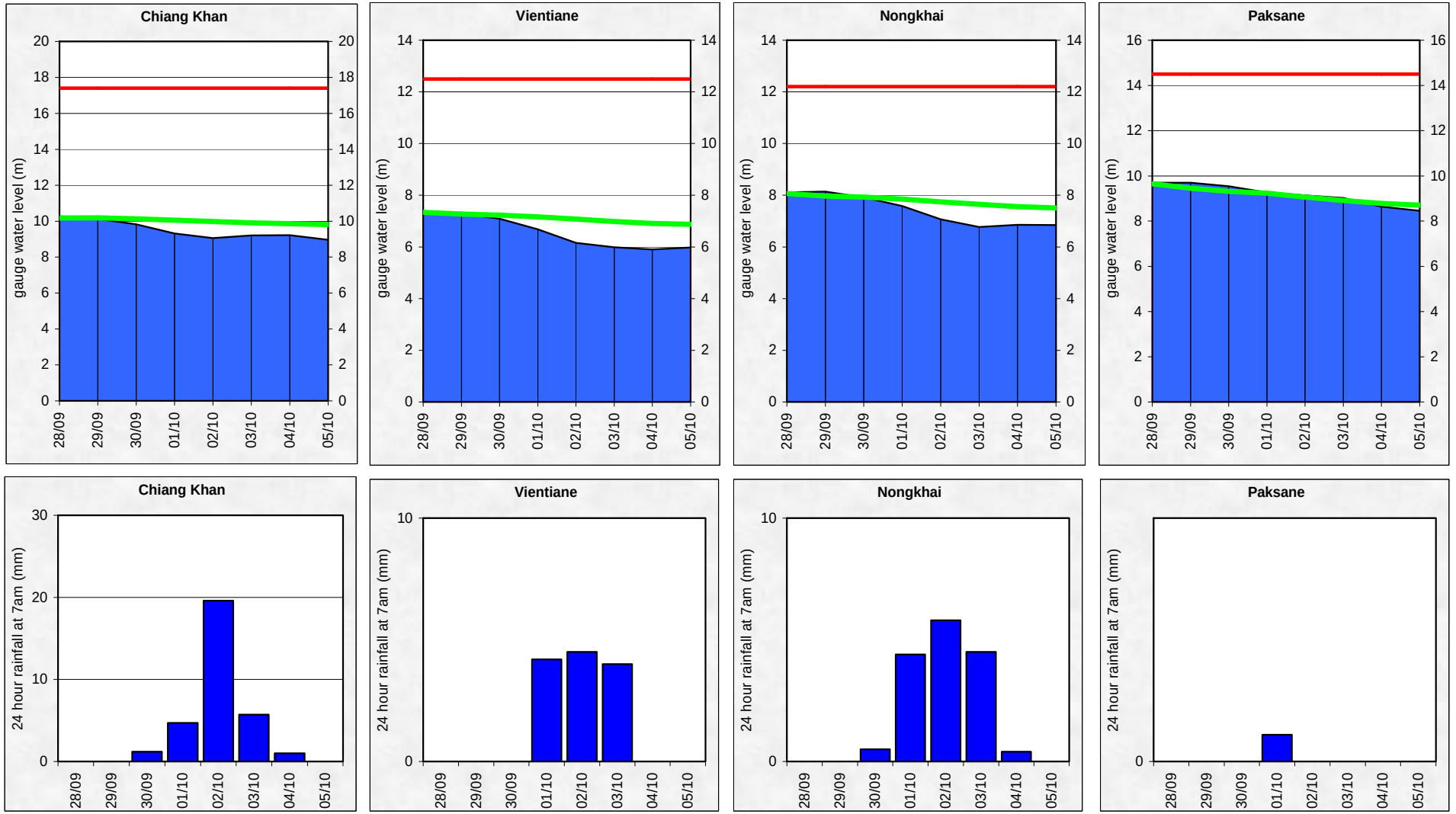


Figure A3: Water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

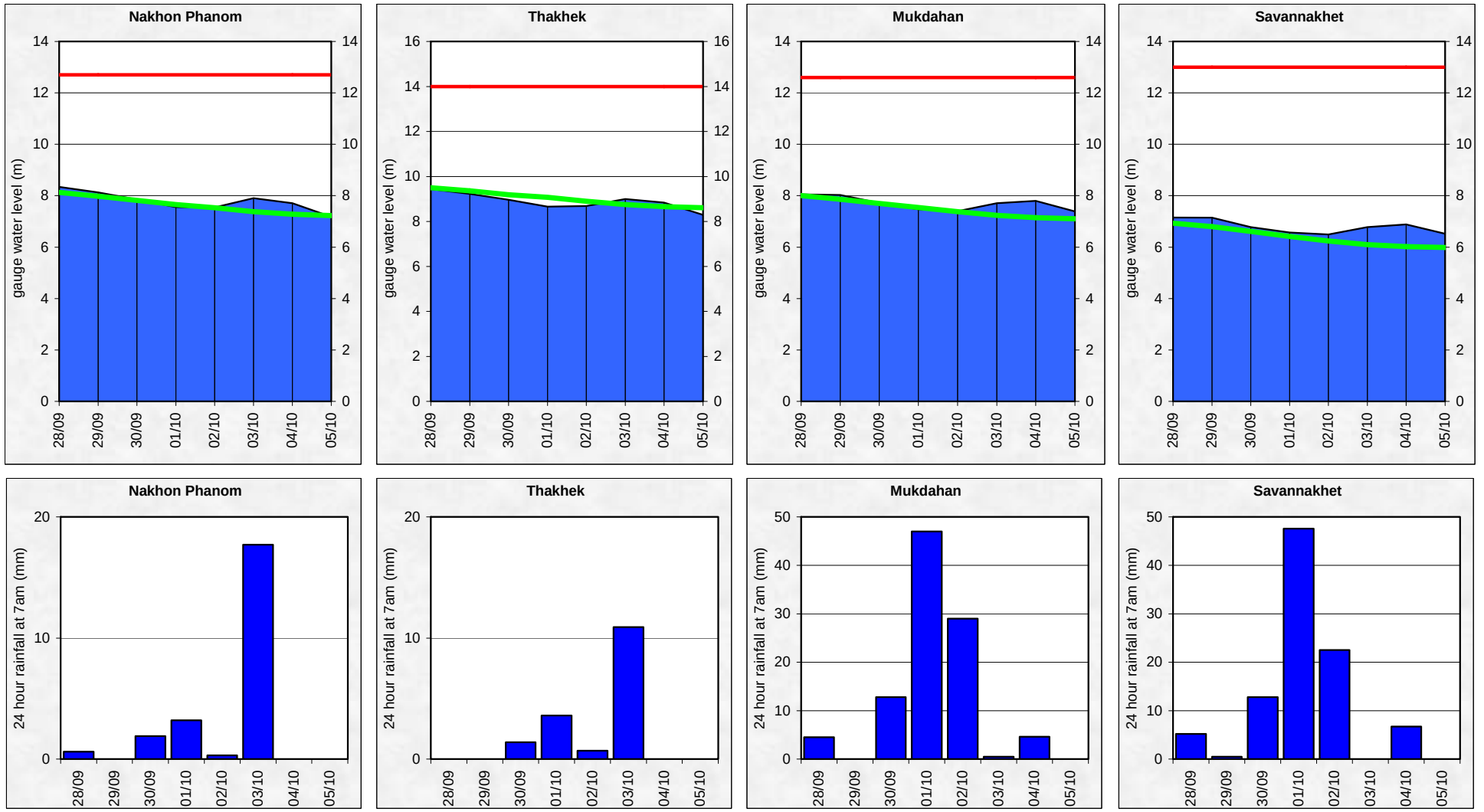


Figure A4: Water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

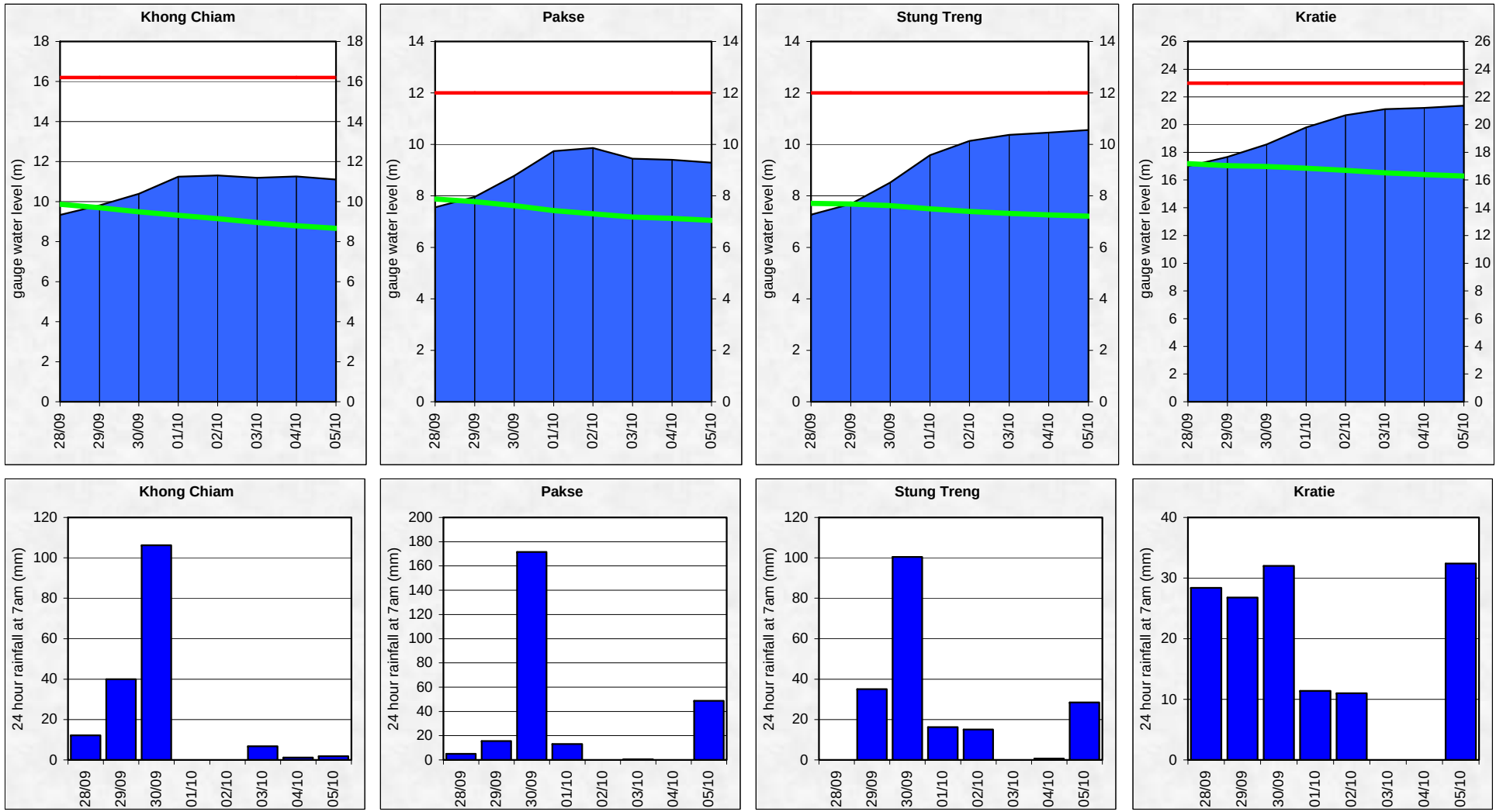


Figure A5: Water level and rainfall for Kampong Cham, Phnom Penh (Bassac and Port), and Koh Khel

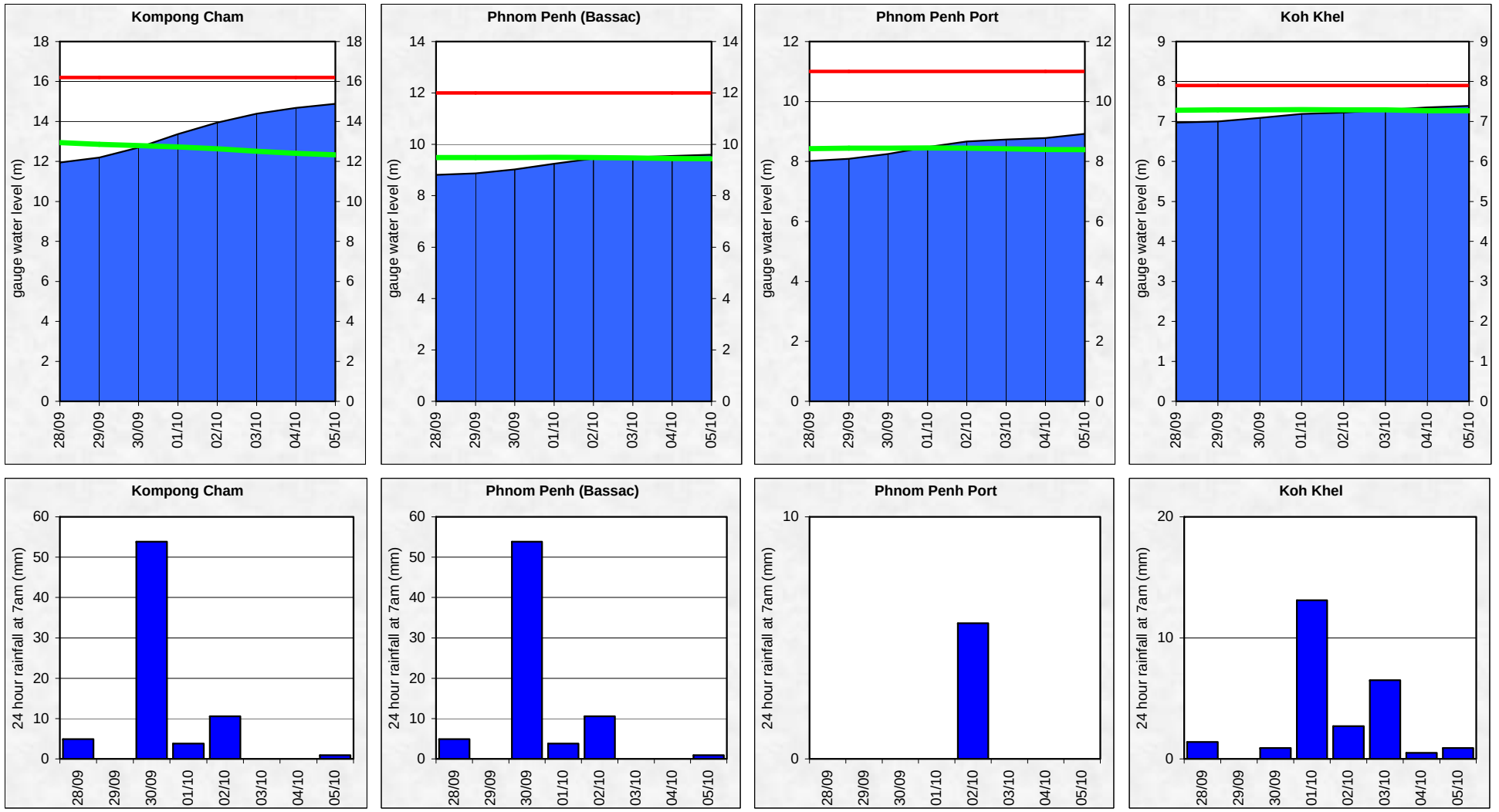
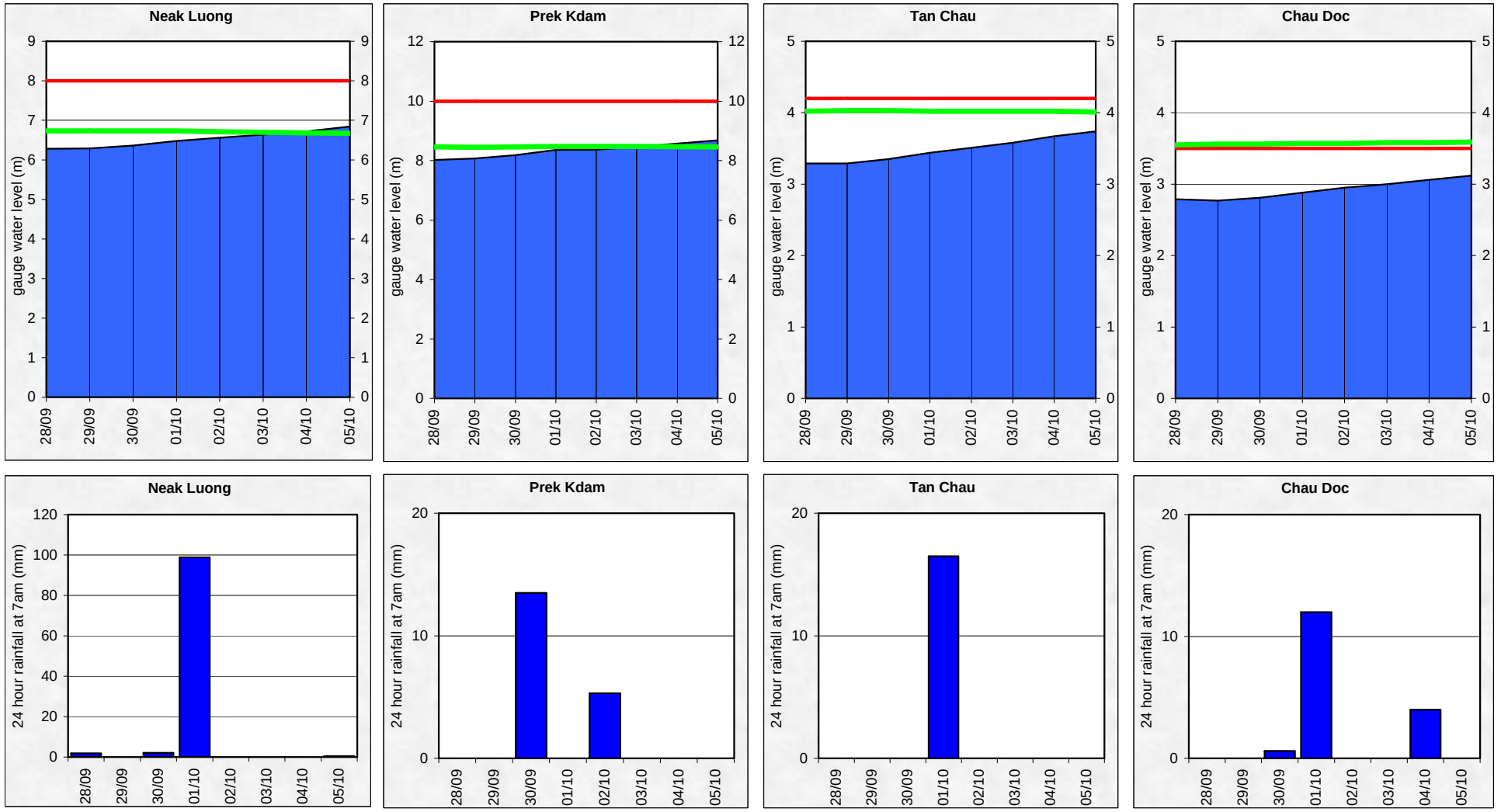


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



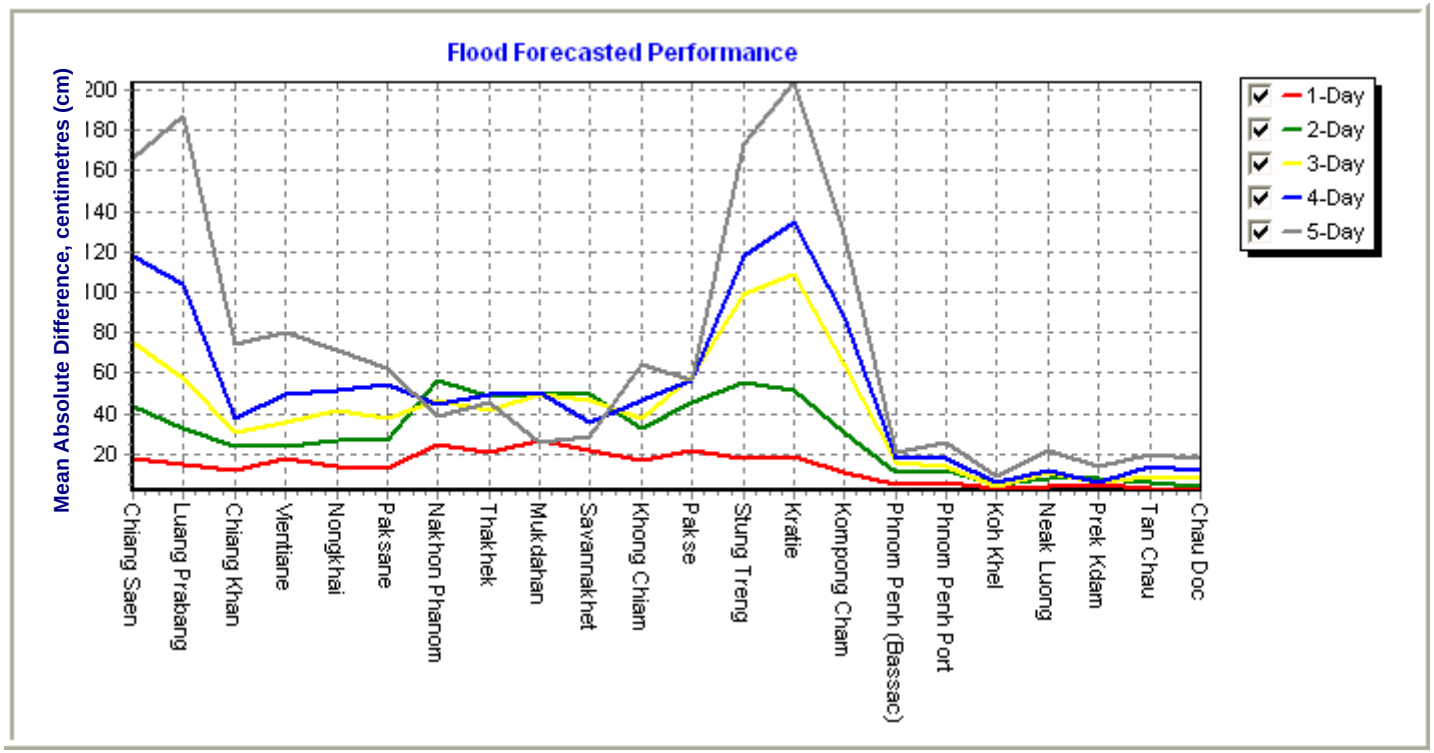
Annex B: Accuracy and performance

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 normal pattern except between Stung Treng and Kampong Cham where their accuracies are less than expected. In general the overall accuracy is fairly good for 1-day to 3-day forecasts. The peaks in Lao PDR and between Stung Treng and Kompong Cham were well recognized and this perhaps caused by internal model functionality due to limited parameters for model calibration as well as poor satellite rainfall estimates. The adjustment by utilising the practical knowledge and experience of forecaster-in-charge is desirably needed towards improved forecasts at these 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	100.0	100.0	85.7	85.7	85.7	85.7	42.9	57.1	42.9	57.1	57.1	57.1	57.1	28.6	42.9	85.7	85.7	100.0	100.0	85.7	100.0	100.0	*74.7*
2-day	83.3	83.3	66.7	50.0	66.7	50.0	50.0	50.0	33.3	50.0	83.3	50.0	16.7	33.3	33.3	50.0	33.3	100.0	83.3	50.0	100.0	100.0	*59.8*
3-day	80.0	80.0	80.0	80.0	80.0	60.0	60.0	60.0	40.0	60.0	80.0	60.0	20.0	20.0	0.0	20.0	40.0	100.0	40.0	80.0	80.0	80.0	*59.1*
4-day	50.0	75.0	75.0	50.0	75.0	50.0	75.0	25.0	100.0	100.0	75.0	75.0	25.0	25.0	25.0	75.0	75.0	100.0	50.0	100.0	25.0	25.0	*61.4*
5-day	0.0	66.7	66.7	66.7	66.7	66.7	100.0	66.7	100.0	100.0	66.7	66.7	0.0	0.0	0.0	66.7	33.3	100.0	33.3	100.0	0.0	0.0	*53.0*

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	*10:33*	*0*	*-*	*8*	*08:17*	*08:18*	*08:08*	*07:39*	*09:01*	*08:08*	*07:44*	*0*	*2*	*6*	*129*	*112*	*7*	*55*
month	*10:14*	*7*	*13:47*	*30*	*08:16*	*08:21*	*07:55*	*08:24*	*08:38*	*08:20*	*08:04*	*0*	*2*	*16*	*597*	*362*	*14*	*246*
season	*10:29*	*33*	*12:44*	*91*	*08:20*	*08:23*	*08:02*	*08:20*	*08:42*	*08:22*	*07:56*	*0*	*4*	*250*	*1989*	*1269*	*121*	*856*

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.

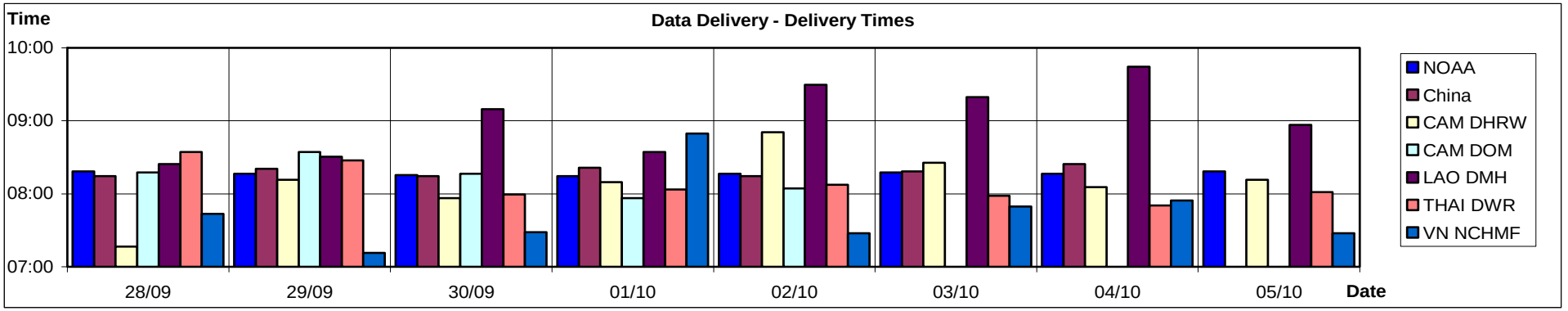


Figure B2: Data delivery times for the past 8 days including the current report date

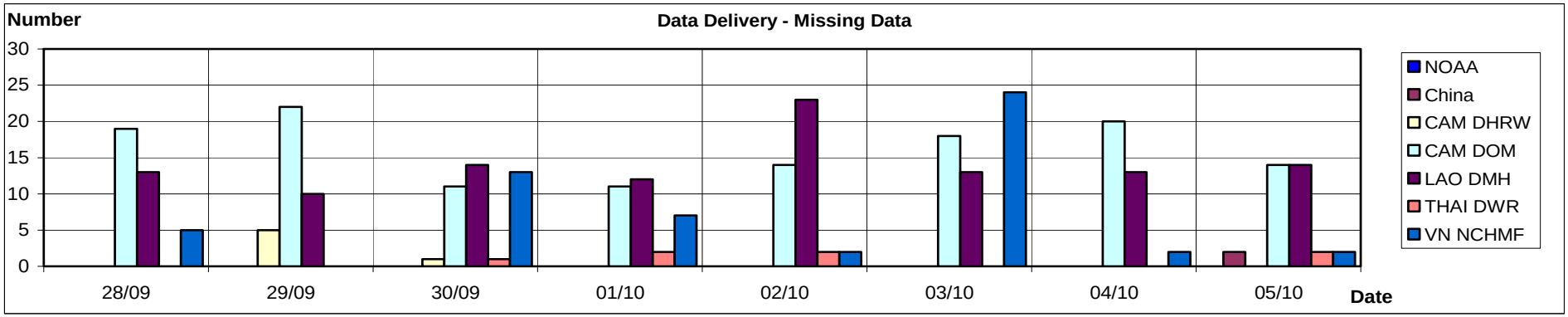


Figure B3: Missing data for the past 8 days including the current report date

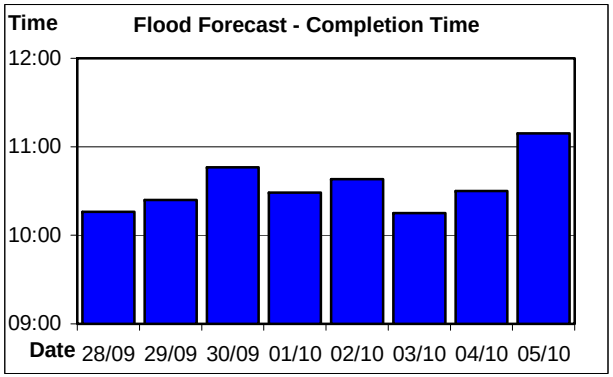


Figure B4: Flood forecast completion time

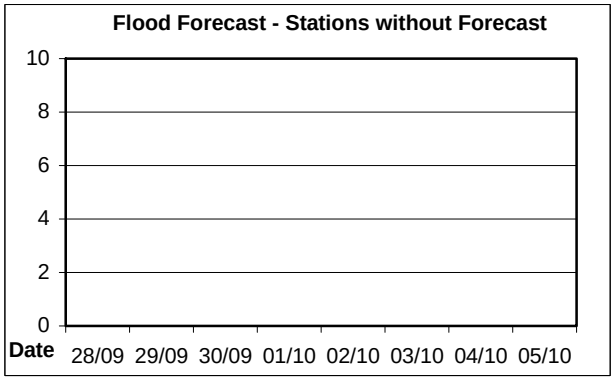


Figure B5: Flood forecast stations without forecast

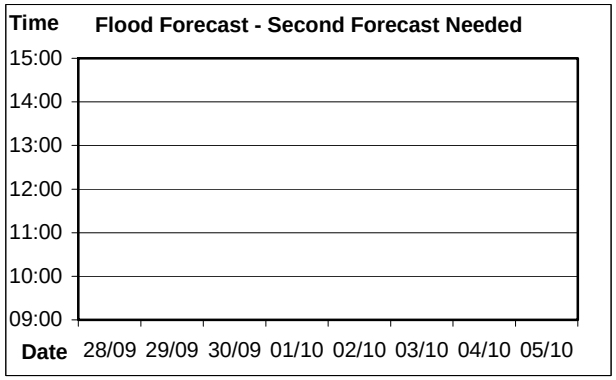


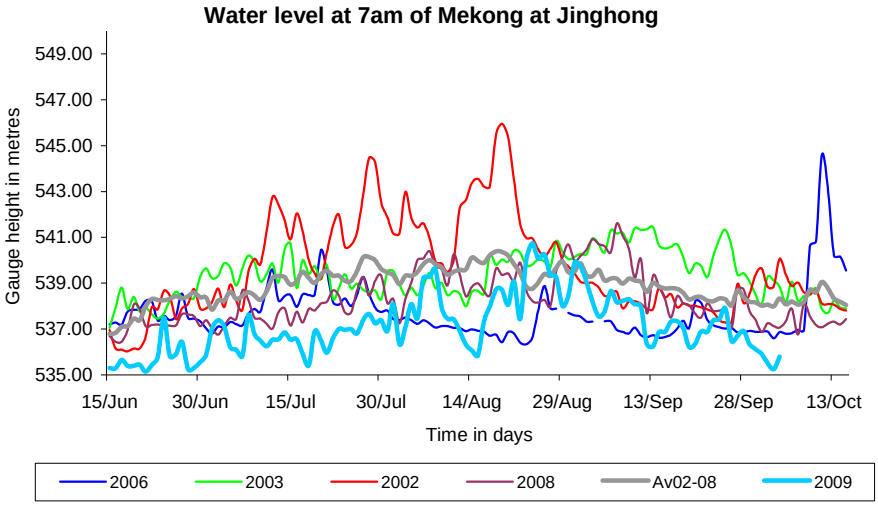
Figure B6: Second forecast needed

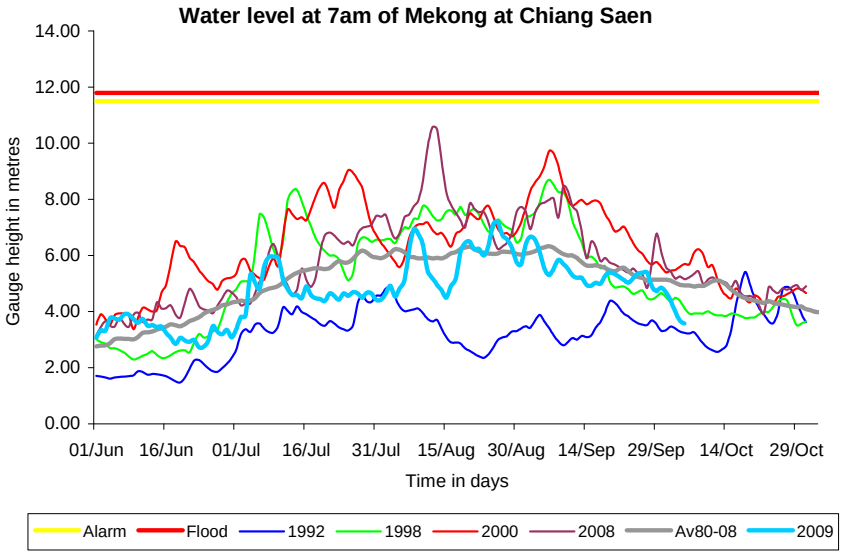
Annex C: Season Water Level Graphs

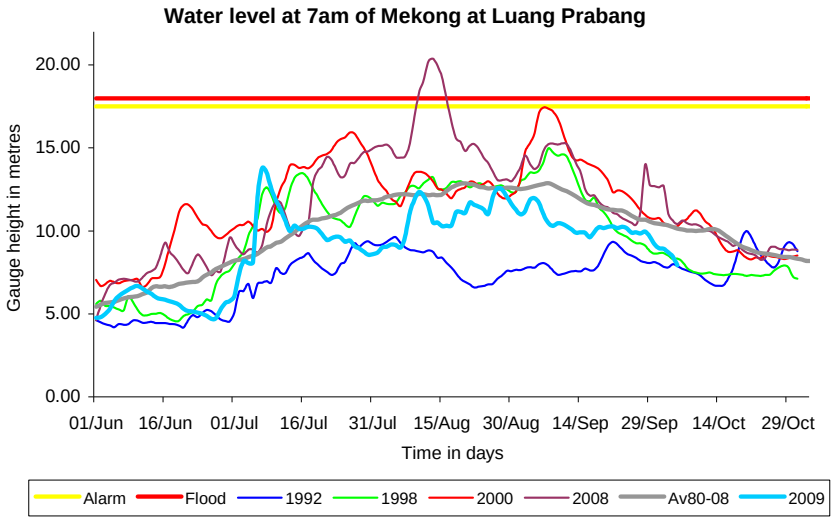
This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

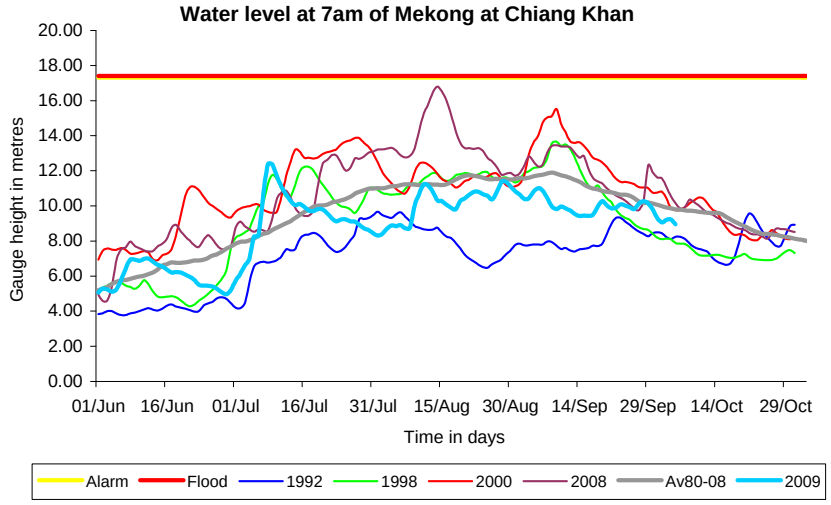
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS

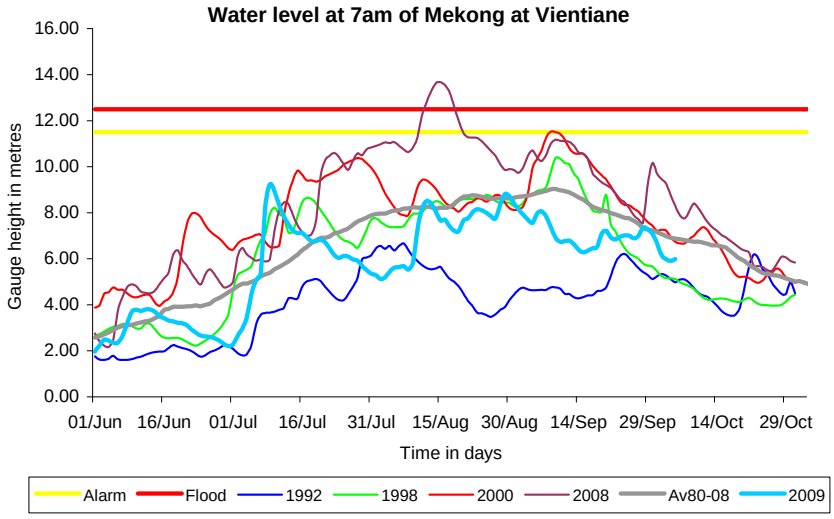
IN WET SEASON FROM 1 JUNE TO 31 OCTOBER

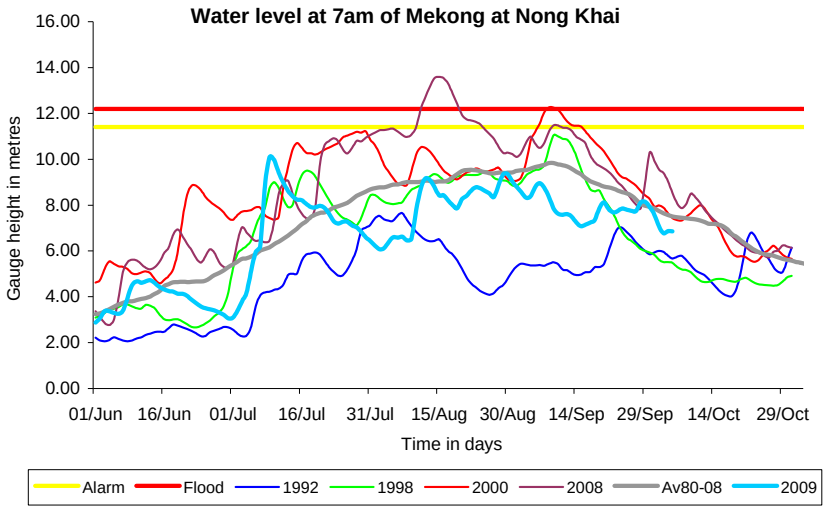


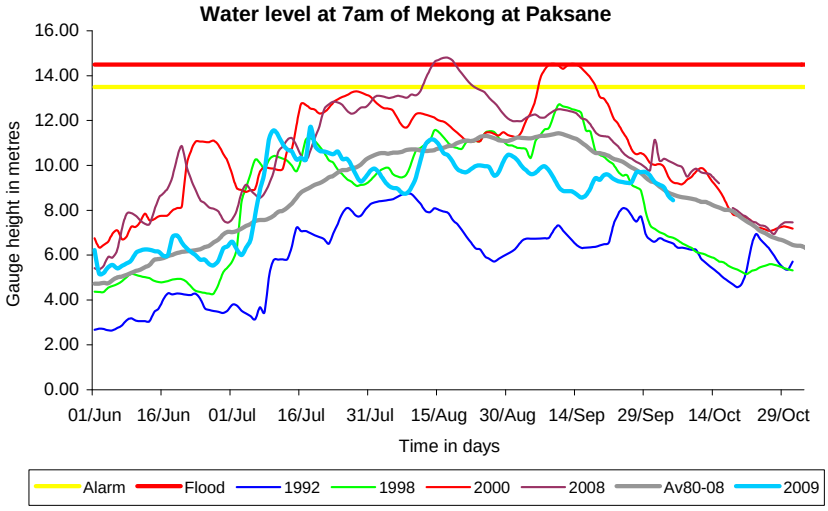


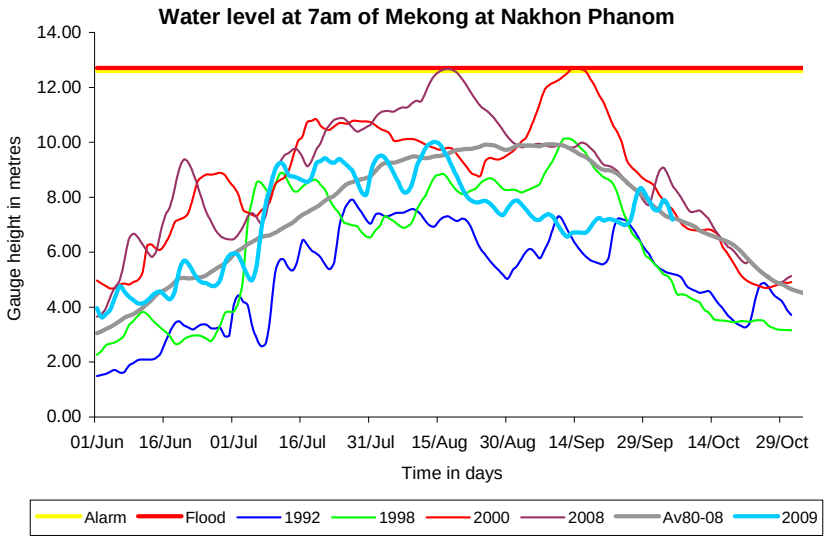

Water level at 7am of Mekong at Luang Prabang
Gauge height in metres
20.00
15.00
10.00
5.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

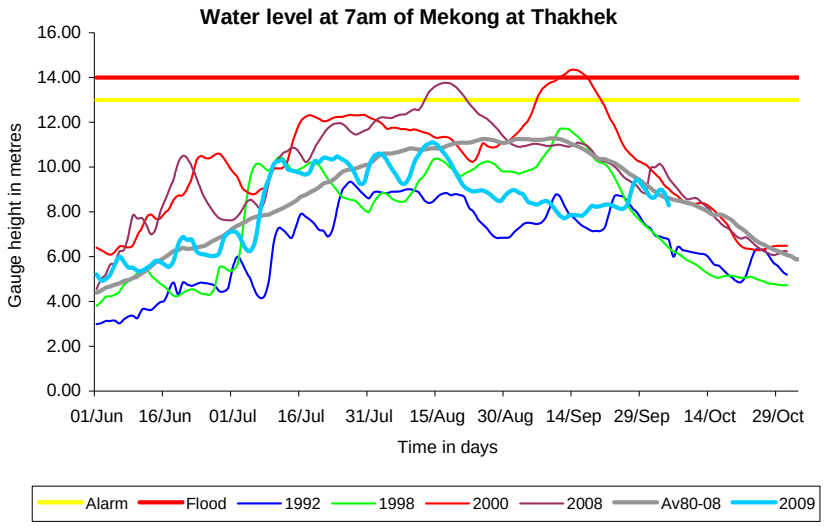

Water level at 7am of Mekong at Chiang Khan
Gauge height in metres
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

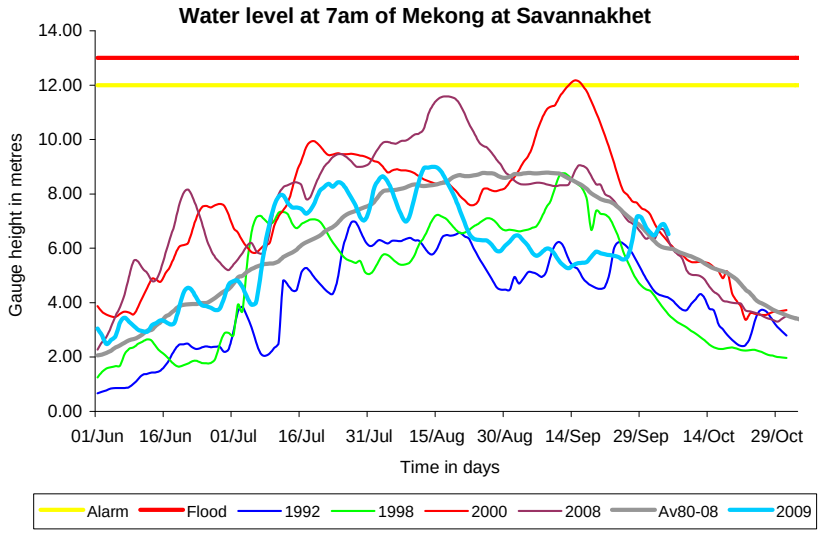

Water level at 7am of Mekong at Vientiane
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

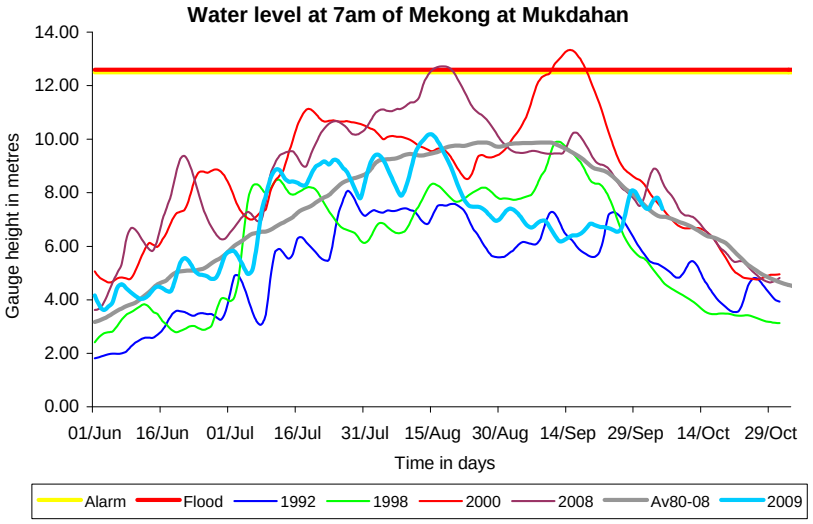

Water level at 7am of Mekong at Nong Khai
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

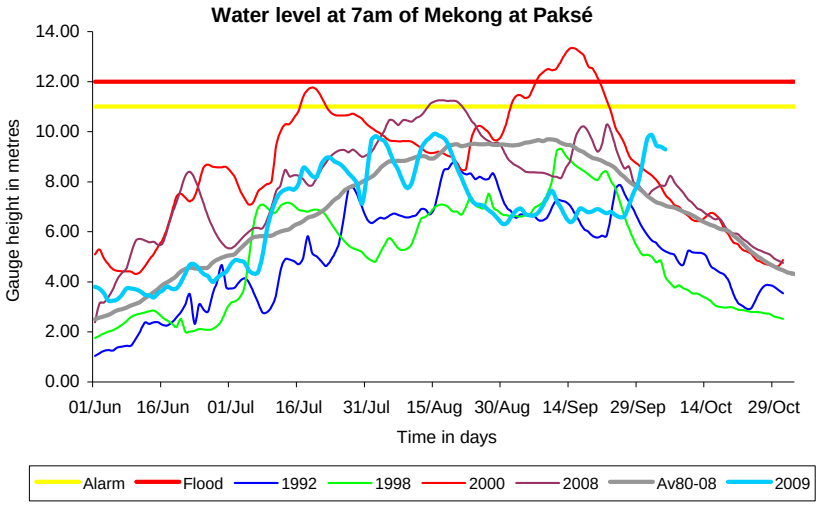

Water level at 7am of Mekong at Paksane
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

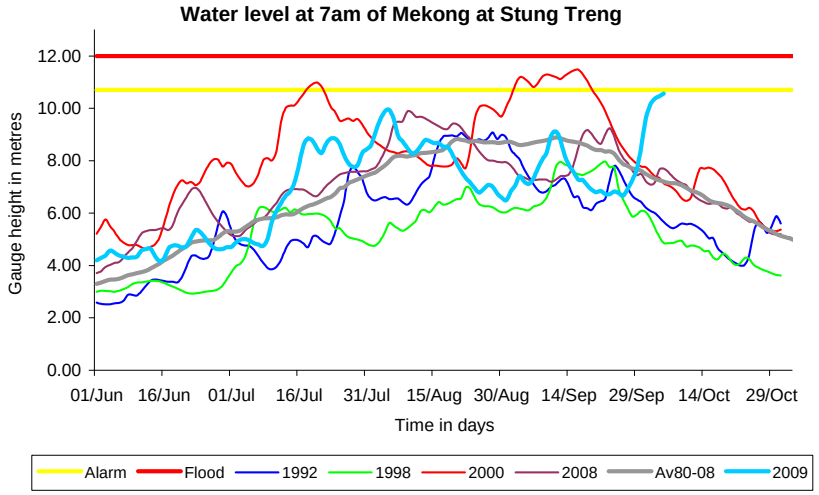

Water level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

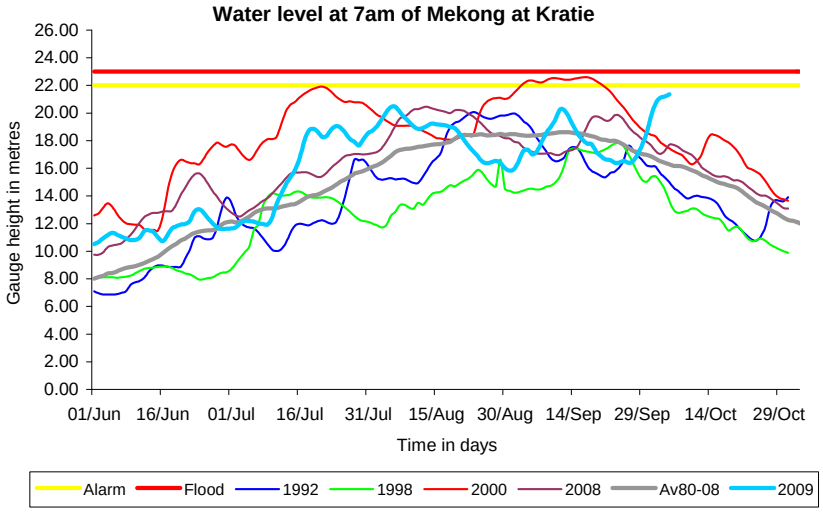

Water level at 7am of Mekong at Thakhek
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

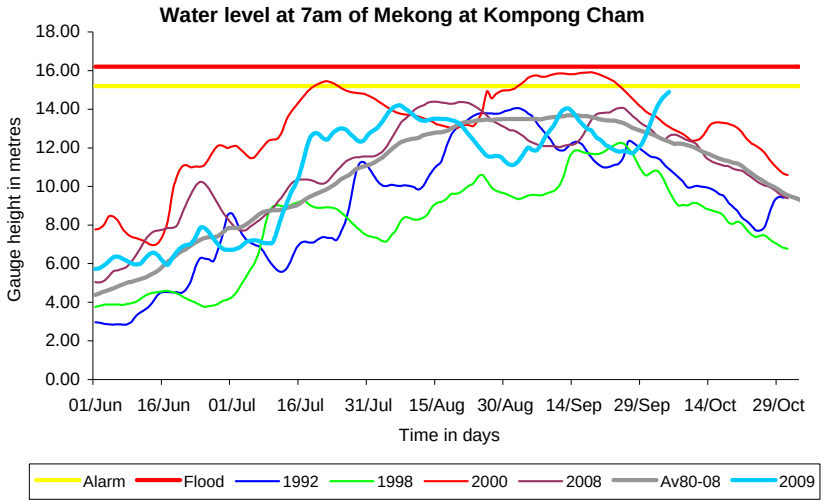

Water level at 7am of Mekong at Savannakhet
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

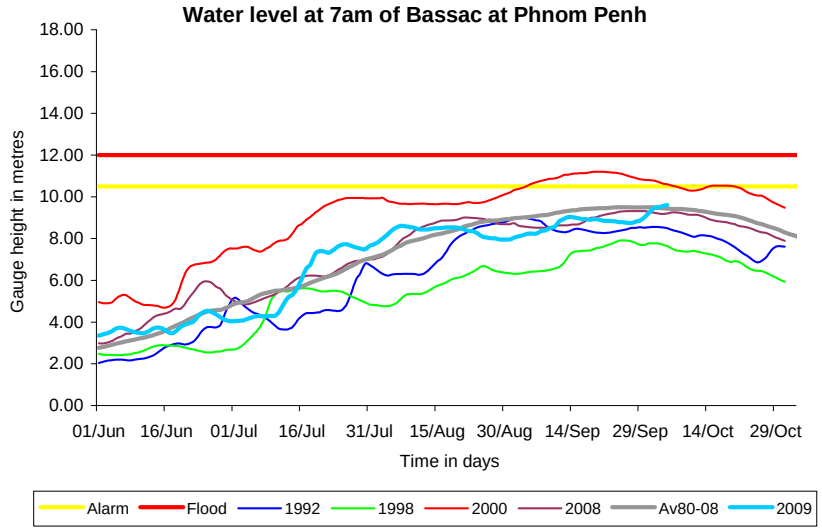

Water level at 7am of Mekong at Mukdahan
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

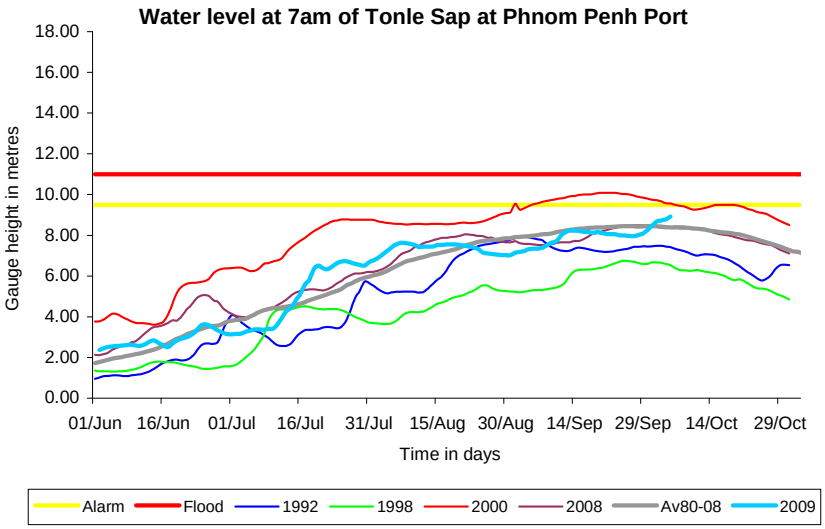

Water level at 7am of Mekong at Paksé
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

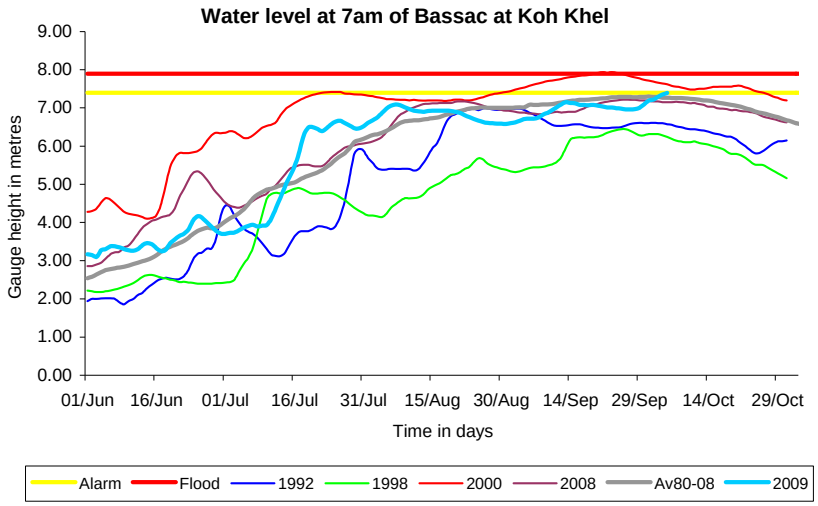

Water level at 7am of Mekong at Stung Treng
Gauge height in metres
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

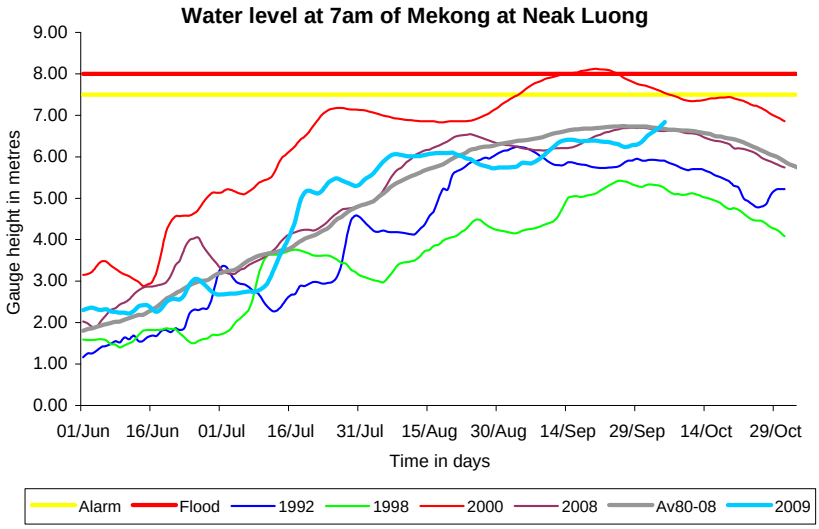

Water level at 7am of Mekong at Kratie
Gauge height in metres
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

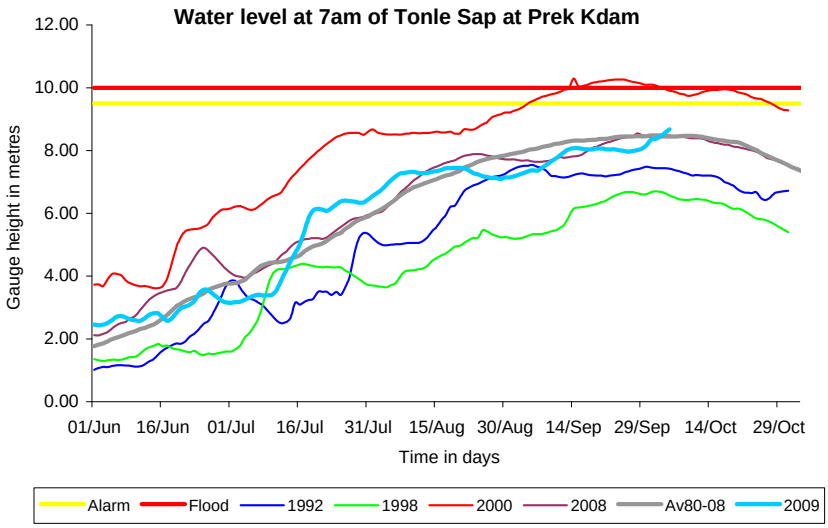

Water level at 7am of Mekong at Kompong Cham
Gauge height in metres
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

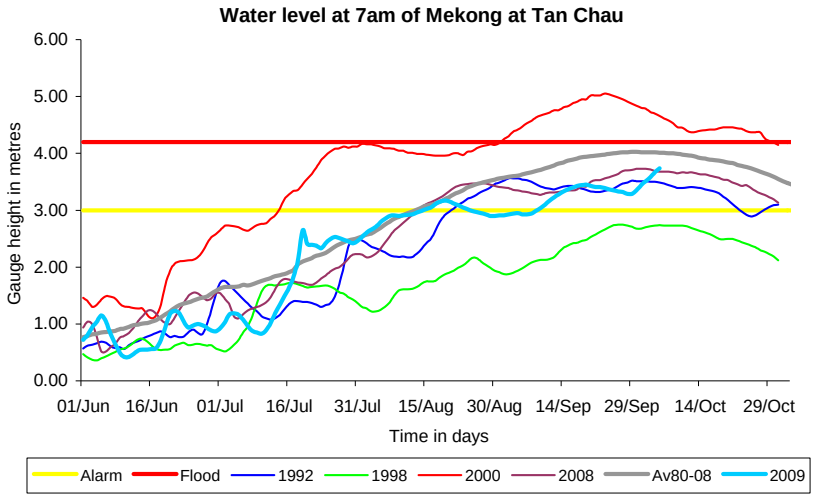

Water level at 7am of Bassac at Phnom Penh
Gauge height in metres
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

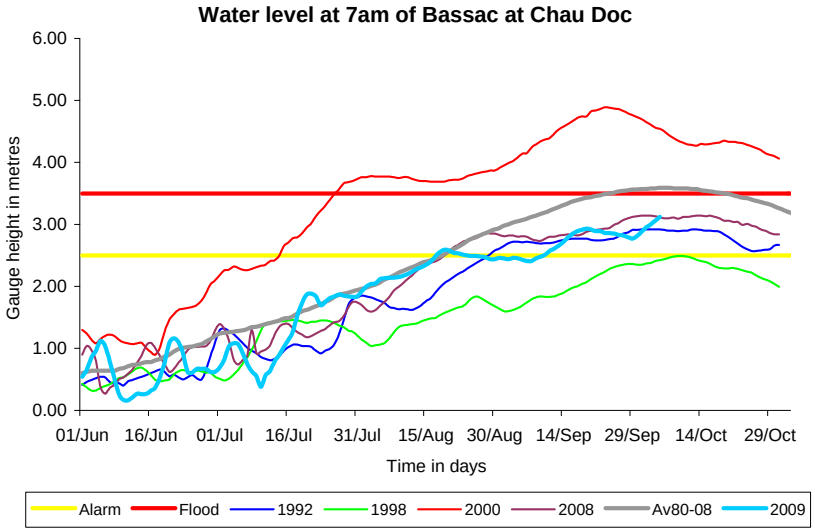

Water level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009


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