Mekong River Commission

Regional Flood Management and Mitigation Centre

Weekly Flood Situation Report for the Mekong River Basin

Prepared on: 28/09/2009, covering the week from the 21st to the 28th of September 2009

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

General weather patterns

During the week of 21 to 28 September 2009, seven weather bulletins were issued by the Department of Meteorology (DOM) of Cambodia. The weather charts of 21 and 27 September are presented in the figures below:

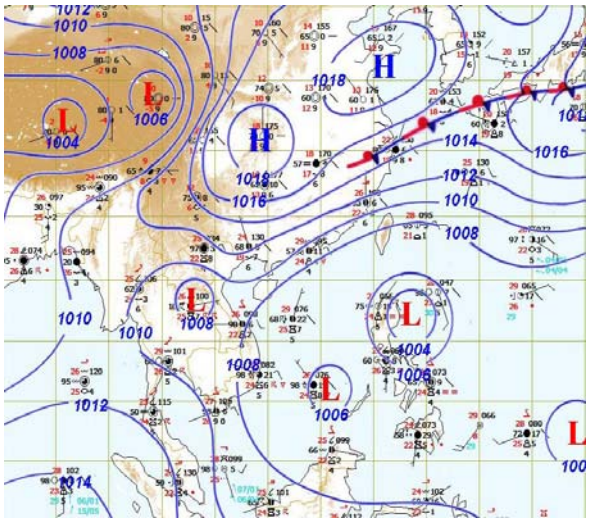


Figure 1: Weather map for 21st September 2009

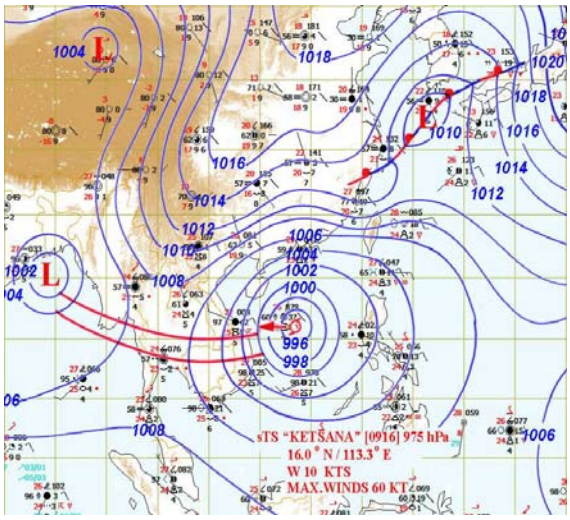


Figure 2: Weather map for 27th September 2009

Moderate South-West (SW) Monsoon

During 21 – 22 September 2009, normal SW monsoon conditions prevailed over the Bay of Bengal, Gulf of Thailand and Indochina Peninsula (Figure 1). Beginning 23 September this gradually developed into a strong SW monsoon (Figure 2).

ITCZ (Inter Tropical Convergence Zone)

Starting from 23 September 2009, a critical Inter Tropical Convergence Zone (ITCZ) remained stationary across Bangladesh, Myanmar, Thailand, Lao PDR, Cambodia and Viet Nam.

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

Starting from 27 September 2009, the Severe Tropical Storm (STS) ***KETSANA*** (0916) with a central pressure of 975 hPa began moving to the west at a speed of 19 km/h, maximum wind speed at the central of STS is 111 km/h (Figure 2).

Other weather phenomena that affect the Mekong discharge

No other weather phenomena affecting the discharge were observed.

Overall weather situation

A strong SW monsoon and ITCZ occurred from 23 September 2009. An intense monsoon trough lay across Bangladesh, Myanmar, Thailand, Lao PDR, Cambodia and Viet Nam. Heavy thunderstorms and rain occurred in Thailand, Lao PDR and Viet Nam and Cambodia in the afternoon and evening.

General behaviour of the Mekong River

Water levels along the Mekong River were more-or-less stable during the reporting period. Most stations were recording levels that are somewhat below 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. This is normal at this time of the year. for both stations.

For stations from Chiang Saen to Nongkhai/Vientiane

Water levels were more-or-less stable. Most stations were recording levels that are somewhat below the long-term average for this time of the year, except Chiang Saen station where the level was slightly over the long-term average from the middle of the week.

For stations from Paksane to Stung Treng

Water levels were more-or-less stable and fell from the beginning of the week, rising again by the end of the week. Most stations were recording levels that are somewhat below the long-term average for this time of the year.

For stations from Kratie to Koh Khel/Neak Luong

Water levels were more-or-less stable and fell slightly towards the end of the week. Most stations were recording levels that are somewhat below the long-term average for this time of the year.

For Tan Chau and Chau Doc

Water levels were more or less stable and fell slightly towards the end of the week. The 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.

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

- Damage or victims:

No damage or 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

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
21/09	536.89	5.24	10.27	9.86	6.93	7.84	9.57	7.20	8.32	6.73	5.78	8.41	6.83	6.85	16.65	12.14	8.85	8.06	7.04	6.37	8.04	3.41	2.89
22/09	536.88	5.13	10.18	9.90	6.84	7.68	9.40	7.17	8.32	6.72	5.75	8.39	6.74	6.73	16.59	12.04	8.85	8.06	7.01	6.36	8.03	3.41	2.89
23/09	537.37	5.03	10.26	10.09	6.95	7.74	9.30	7.12	8.25	6.68	5.72	8.34	6.79	6.73	16.41	11.88	8.84	8.05	7.01	6.35	8.04	3.39	2.86
24/09	537.44	5.18	10.18	10.02	7.02	7.86	9.26	7.02	8.15	6.61	5.67	8.21	6.67	6.83	16.41	11.80	8.80	8.00	6.99	6.32	8.01	3.37	2.86
25/09	537.90	5.35	9.90	9.93	7.00	7.80	9.22	7.00	8.14	6.54	5.59	8.12	6.58	6.77	16.54	11.83	8.79	7.99	6.98	6.30	7.99	3.35	2.85
26/09	536.48	5.39	9.92	9.82	6.89	7.75	9.26	7.22	8.35	6.70	5.70	8.17	6.64	6.67	16.40	11.79	8.76	7.97	6.96	6.24	7.97	3.33	2.83
27/09	536.69	5.39	9.85	10.12	6.99	7.74	9.68	7.99	9.10	7.36	6.30	8.67	7.08	6.95	16.50	11.72	8.75	7.96	6.96	6.24	7.98	3.32	2.82
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
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
21/09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22/09	5.8	22.1	10.8	94.0	18.0	40.7	0.0	0.0	0.0	0.0	0.0	7.3	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
23/09	0.0	11.3	0.0	9.4	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.6	0.0	3.2	0.0	32.2	3.0	3.0
24/09	0.0	11.8	34.2	0.0	0.0	0.0	14.3	0.9	0.3	0.0	0.0	1.6	1.0	0.0	25.4	0.0	10.1	0.0	4.0	1.2	0.0	16.0	4.0
25/09	0.0	0.3	0.0	17.2	18.4	0.0	1.5	59.8	49.1	3.7	3.0	10.6	12.0	0.0	10.8	4.4	0.5	0.0	0.0	0.0	0.0	0.0	11.0
26/09	5.0	0.9	0.0	25.0	44.3	38.8	31.9	13.2	13.7	7.0	5.9	10.5	0.0	5.5	22.0	0.0	0.0	0.0	1.8	6.8	0.0	0.0	1.0
27/09	0.0	1.1	0.0	53.5	1.6	2.1	1.9	0.6	0.5	7.3	11.9	73.8	22.0	7.2	46.0	6.9	0.0	0.0	0.9	0.8	0.0	0.4	0.9
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	1.2	0.0

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

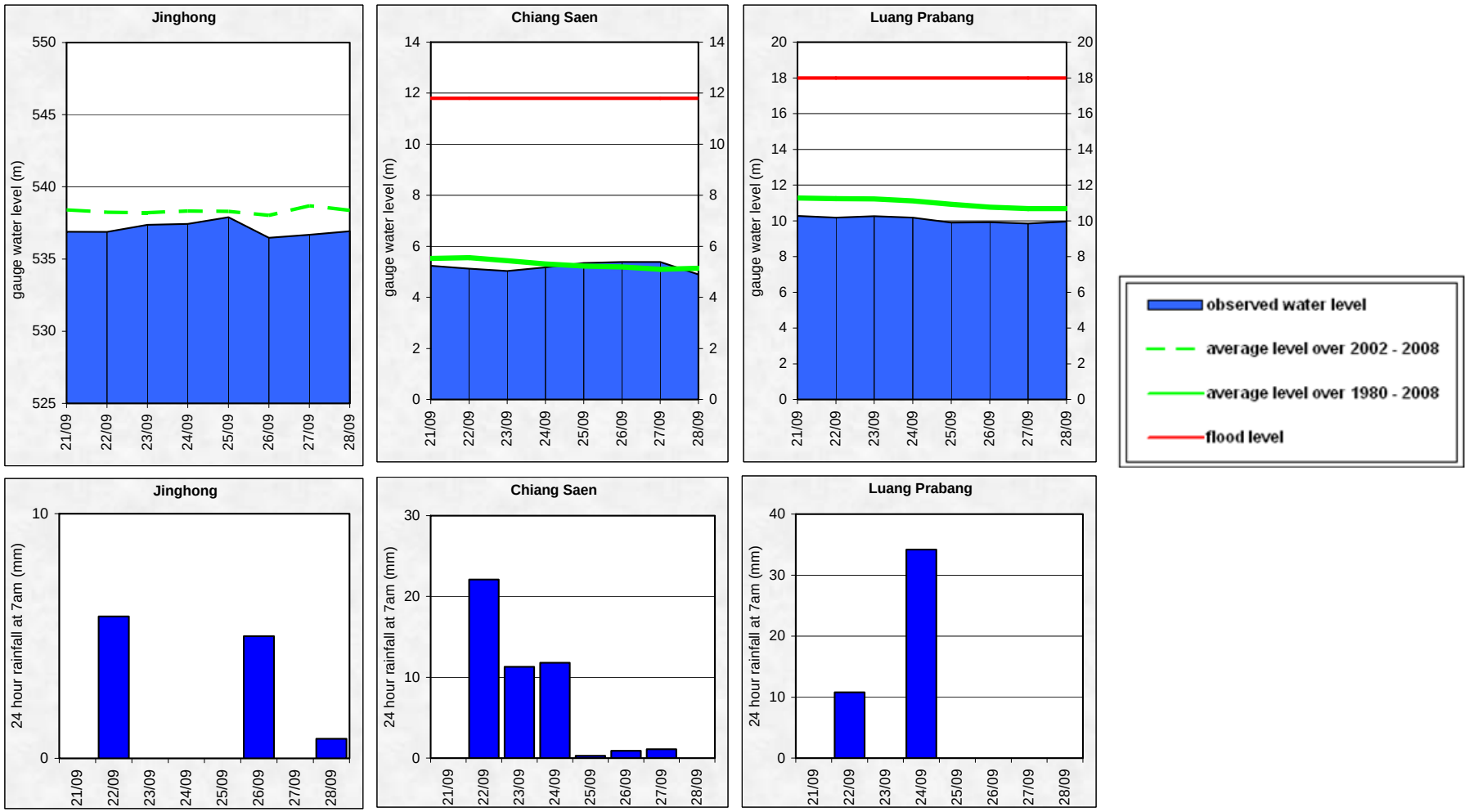


Figure A2: Water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

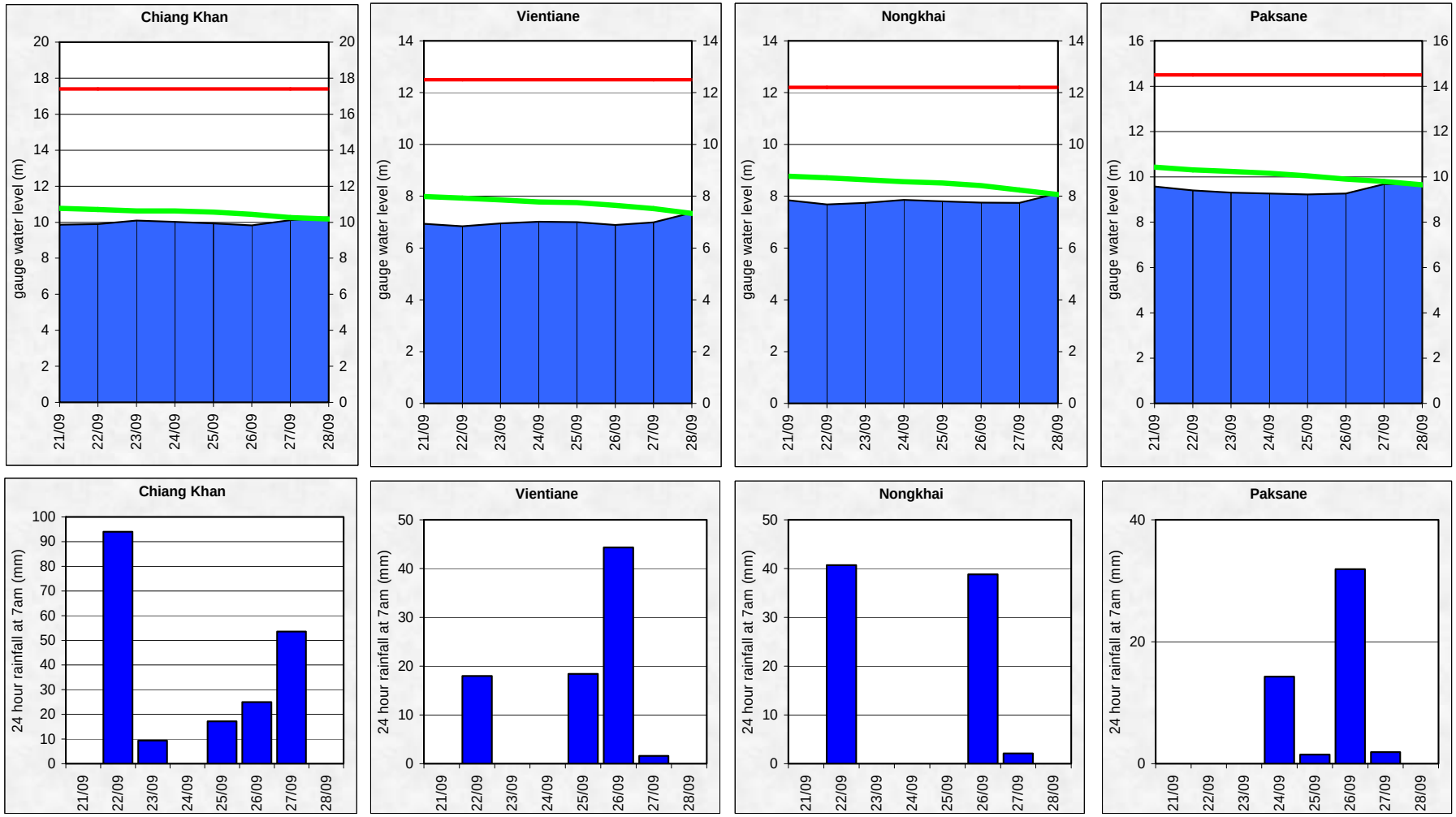


Figure A3: Water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

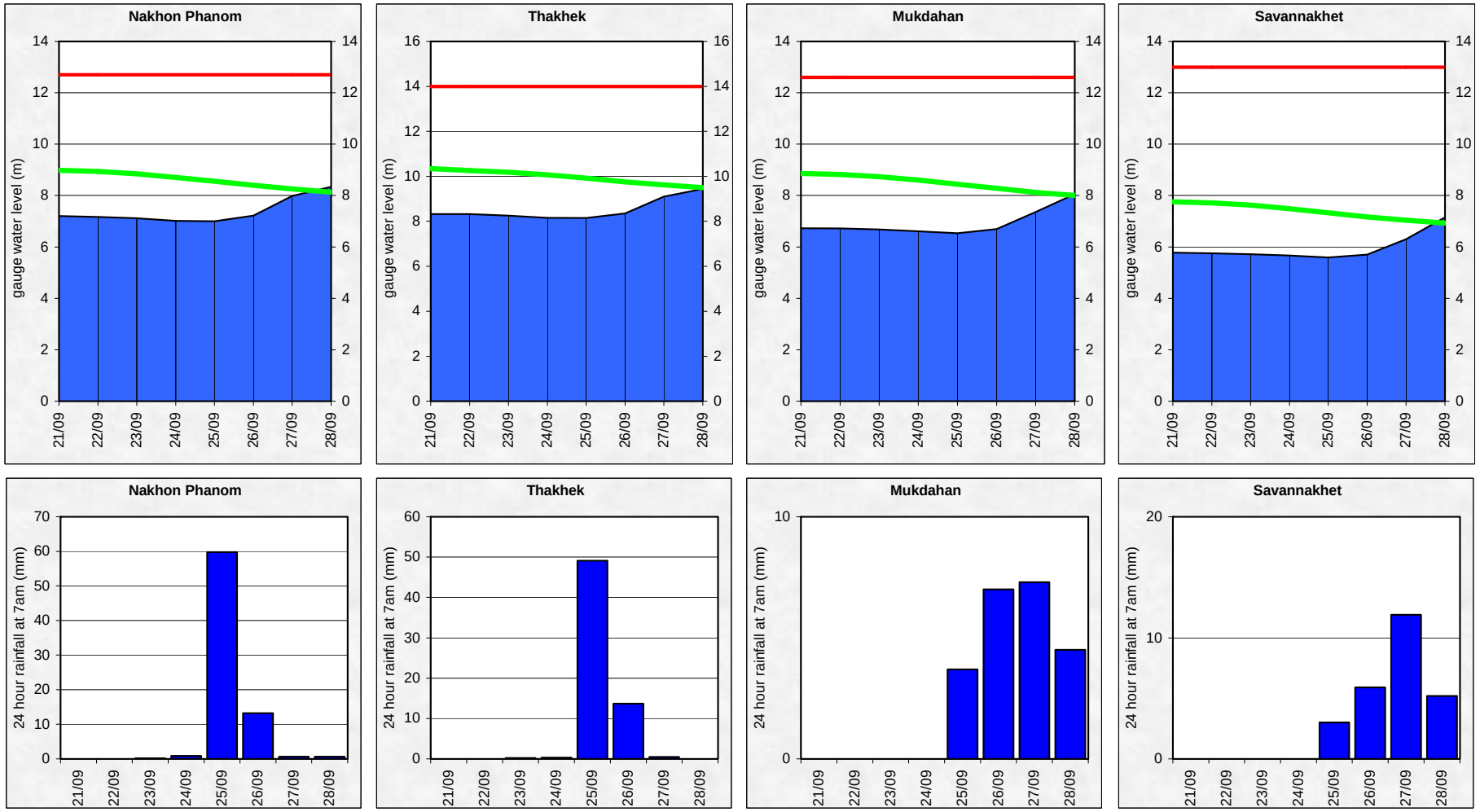


Figure A4: Water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

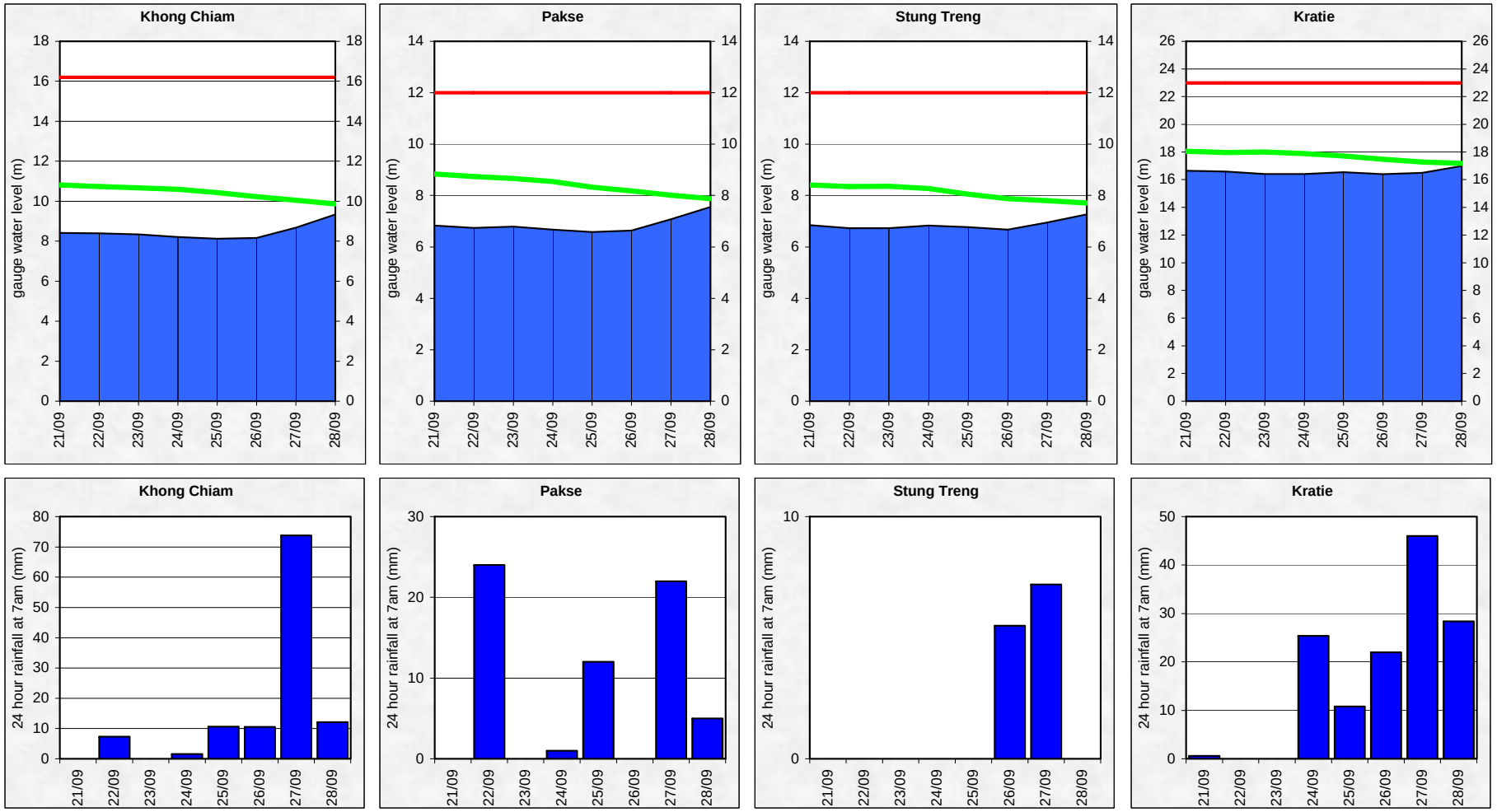


Figure A5: Water level and rainfall for Kampong Cham, Phnom Penh (Bassac and Port), and Koh Khel

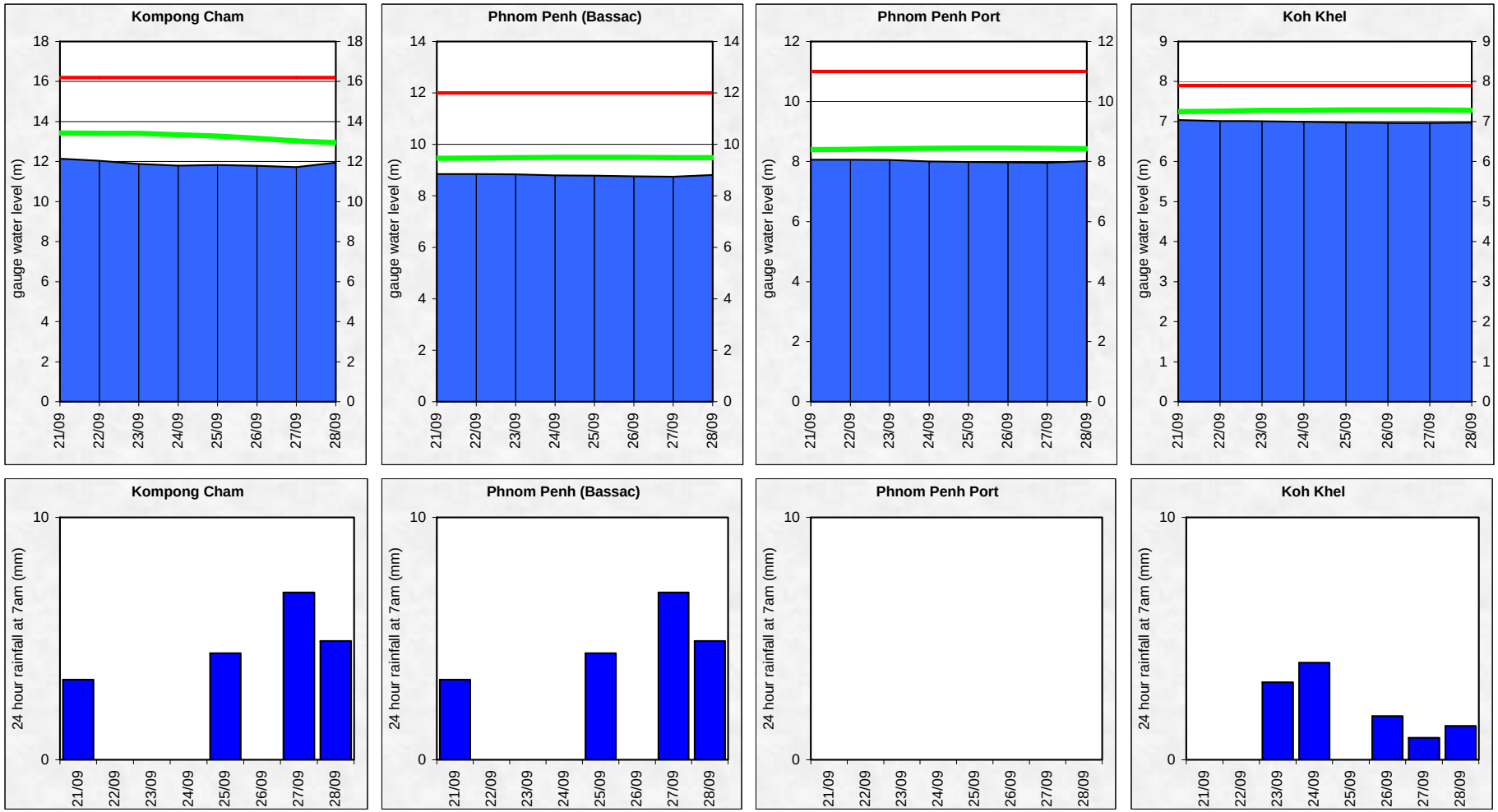
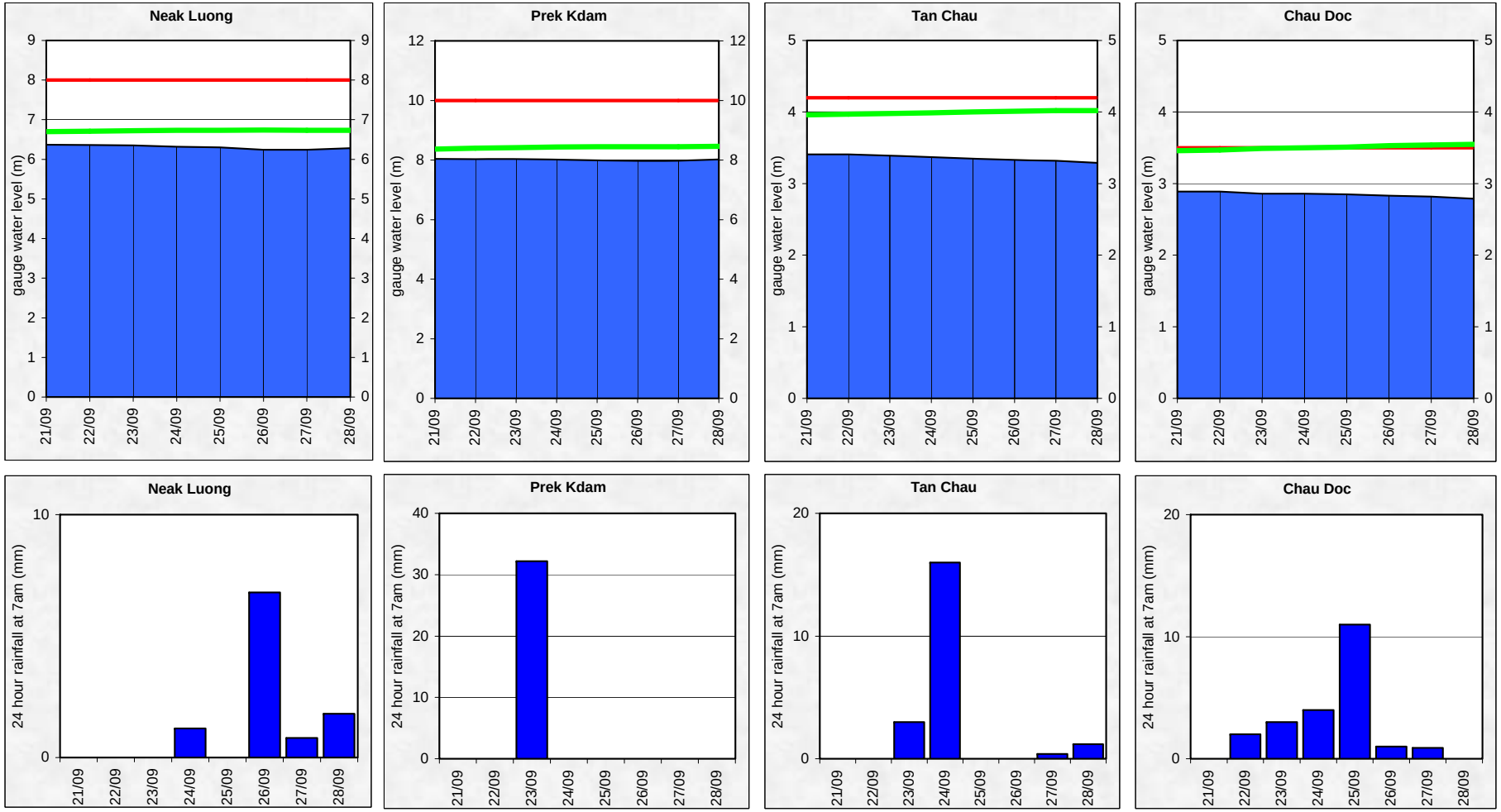


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



Annex B: Accuracy and performance

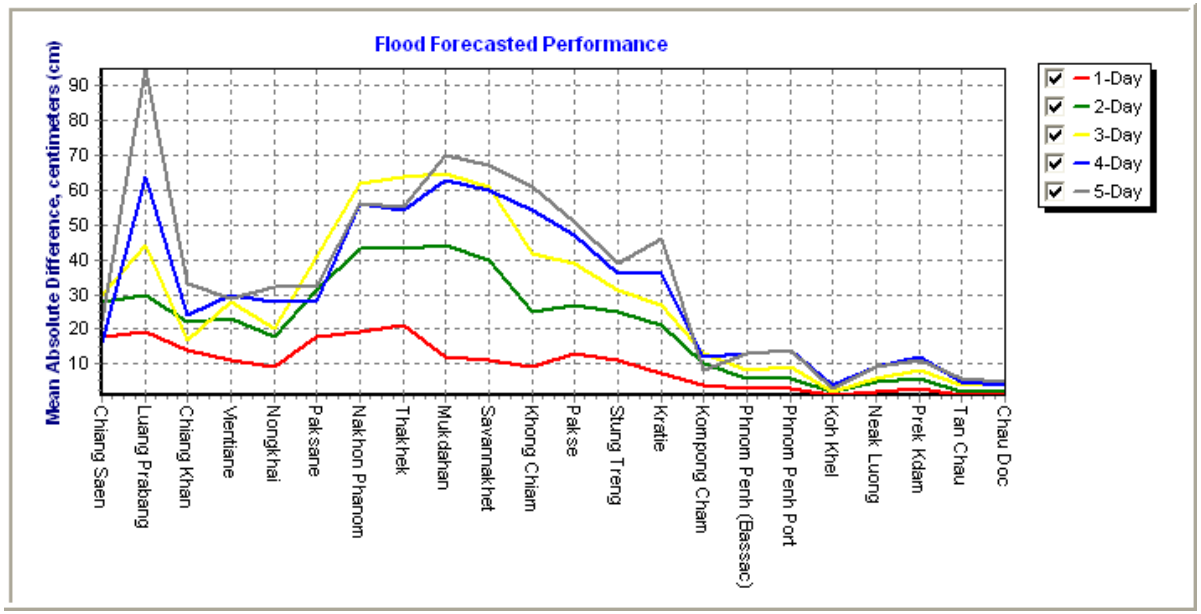
Accuracy

"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 was observed with 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 – 2 days ahead.

In general the overall accuracy was pretty good for all forecast lead times except at Luang Prabang where its accuracy was less than expected but it is quite common and well recognized as a result of sparse gauge network, which led to limited parameters for model calibration.

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	71.4	100.0	100.0	71.4	57.1	57.1	85.7	100.0	85.7	85.7	71.4	85.7	85.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	*89.0*
2-day	100.0	100.0	66.7	83.3	83.3	50.0	66.7	66.7	66.7	66.7	66.7	66.7	50.0	83.3	83.3	100.0	100.0	100.0	83.3	100.0	100.0	100.0	*81.1*
3-day	80.0	100.0	80.0	80.0	100.0	60.0	60.0	60.0	60.0	60.0	80.0	80.0	80.0	80.0	100.0	60.0	60.0	100.0	80.0	60.0	100.0	100.0	*78.2*
4-day	100.0	100.0	100.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	100.0	100.0	100.0	100.0	50.0	100.0	100.0	100.0	*85.2*
5-day	100.0	100.0	100.0	100.0	100.0	100.0	66.7	66.7	33.3	66.7	66.7	100.0	100.0	66.7	100.0	100.0	100.0	100.0	66.7	100.0	100.0	66.7	*86.4*

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	*10:06*	*0*	*-*	*8*	*08:16*	*08:18*	*07:45*	*08:17*	*08:30*	*08:23*	*08:06*	*0*	*0*	*6*	*177*	*119*	*2*	*56*
month	*10:07*	*8*	*12:52*	*28*	*08:16*	*08:21*	*07:46*	*08:34*	*08:31*	*08:21*	*08:11*	*0*	*0*	*8*	*592*	*334*	*24*	*253*
season	*10:29*	*33*	*12:44*	*84*	*08:21*	*08:23*	*08:01*	*08:23*	*08:40*	*08:23*	*07:57*	*0*	*2*	*244*	*1879*	*1170*	*114*	*806*

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.

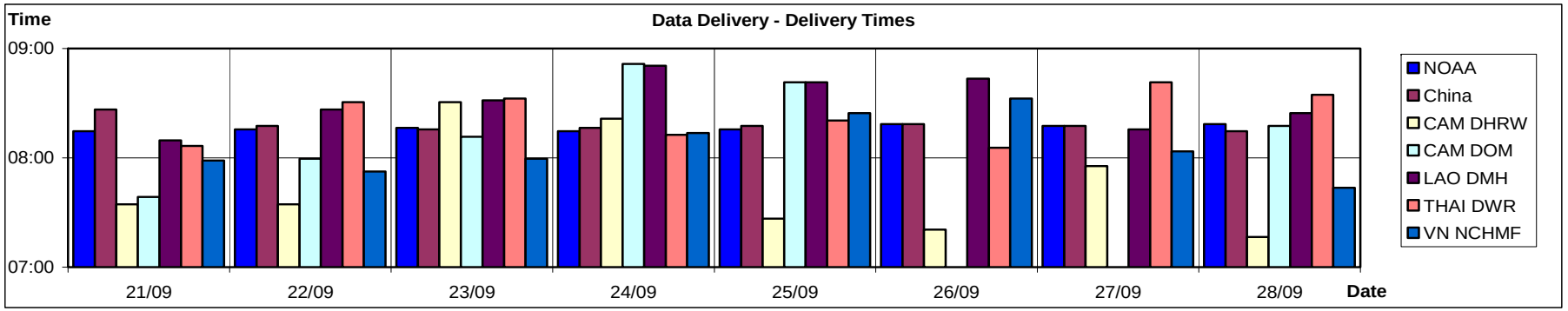


Figure B2: Data delivery times for the past 8 days including the current report date

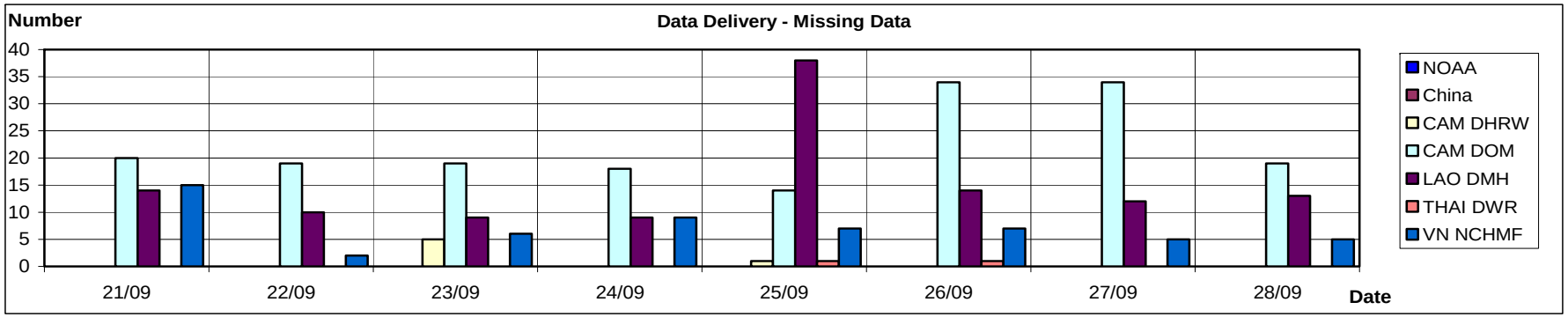


Figure B3: Missing data for the past 8 days including the current report date

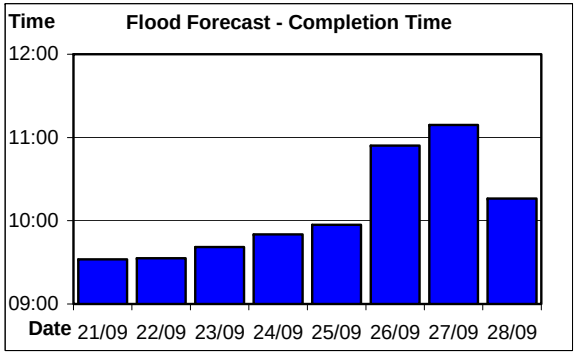


Figure B4: Flood forecast completion time

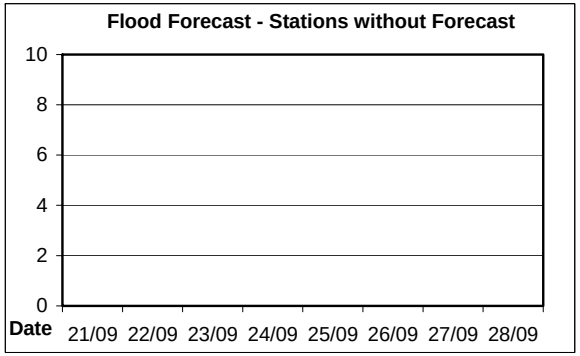


Figure B5: Flood forecast stations without forecast

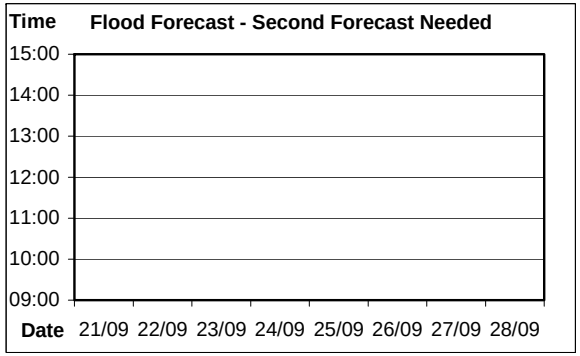


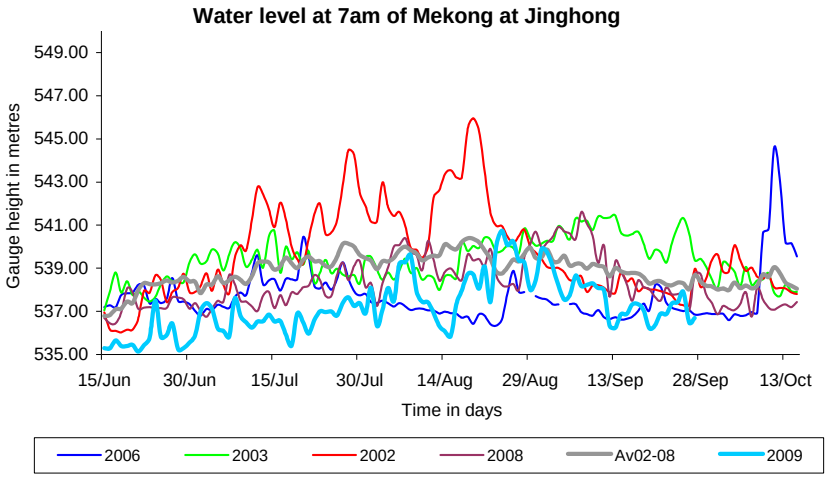
Figure B6: Second forecast needed

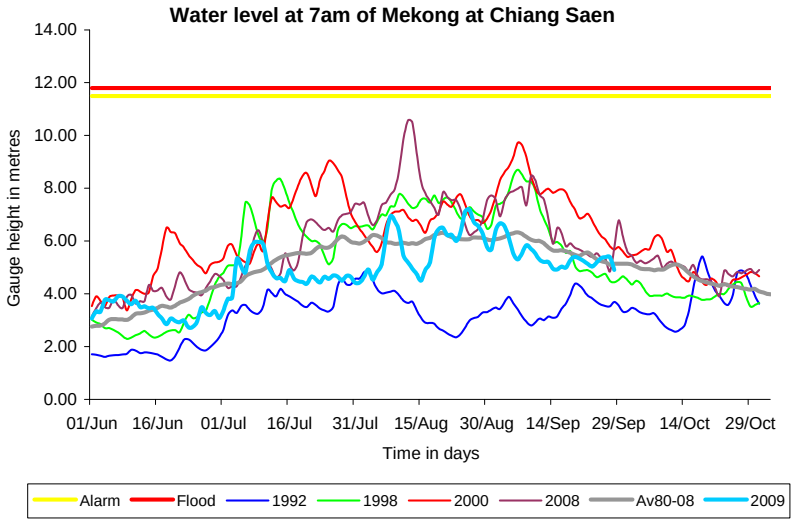
Annex C: Season Water Level Graphs

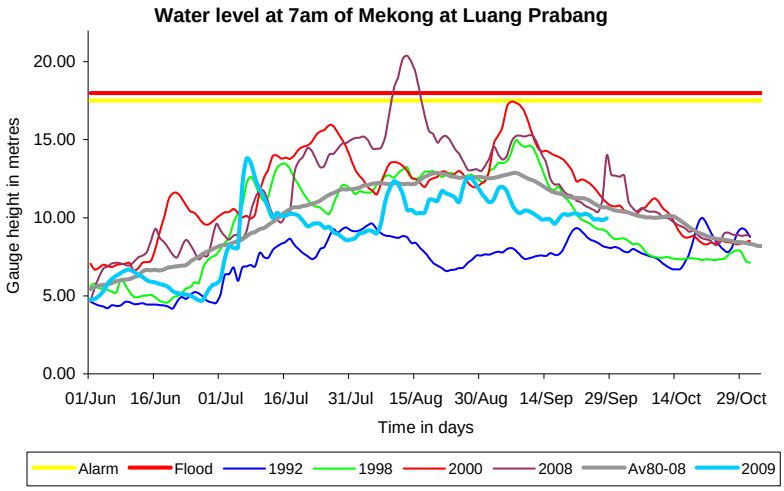
This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

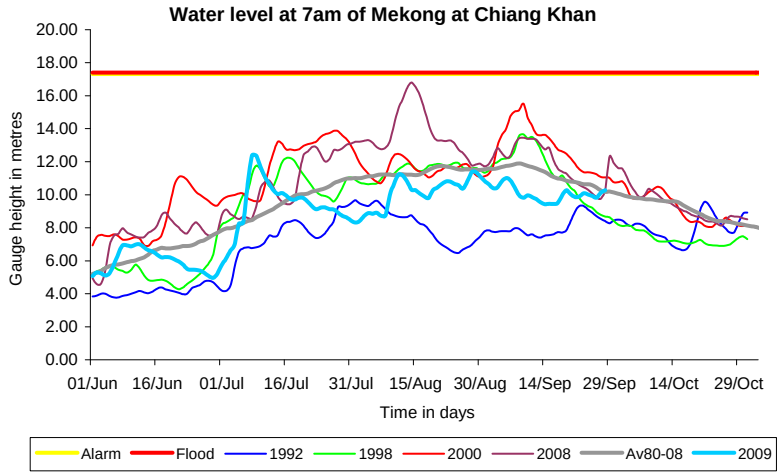
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS

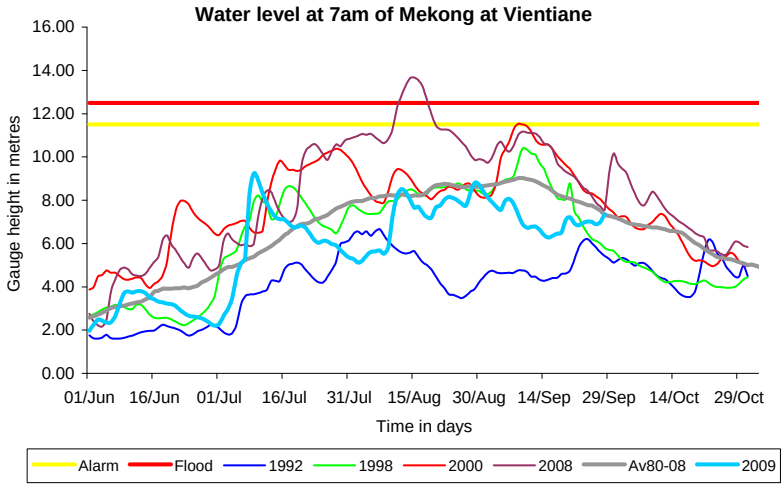
IN WET SEASON FROM 1 JUNE TO 31 OCTOBER

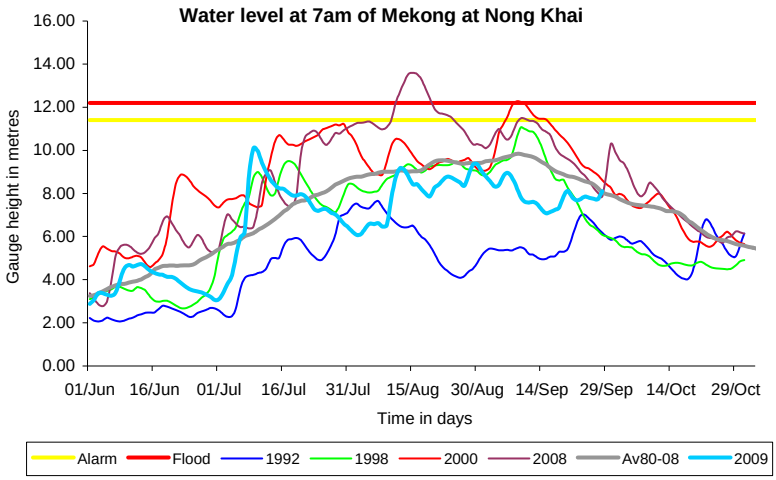


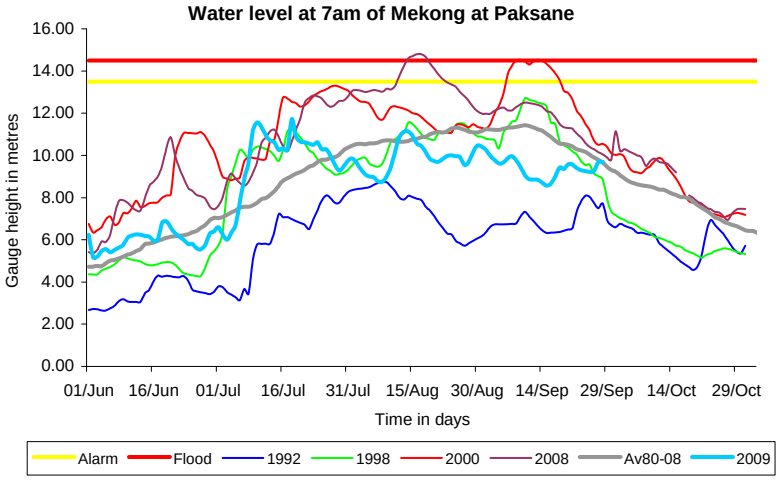


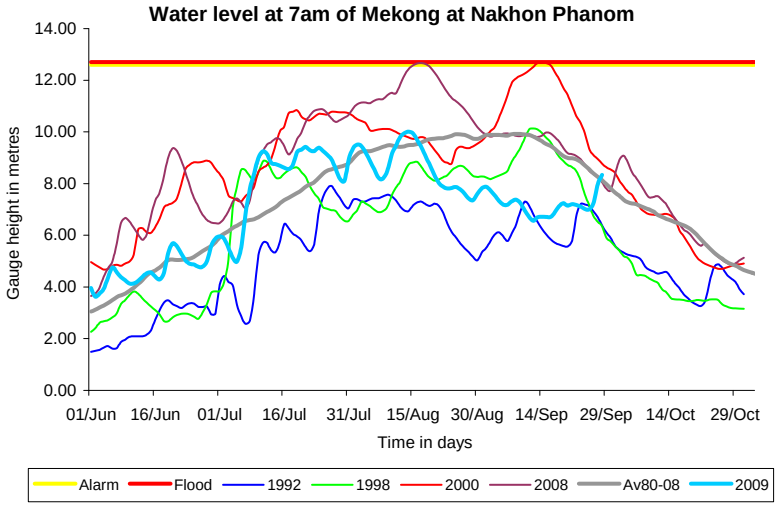

Water level at 7am of Mekong at Luang Prabang
Gauge height in metres
20.00
15.00
10.00
5.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

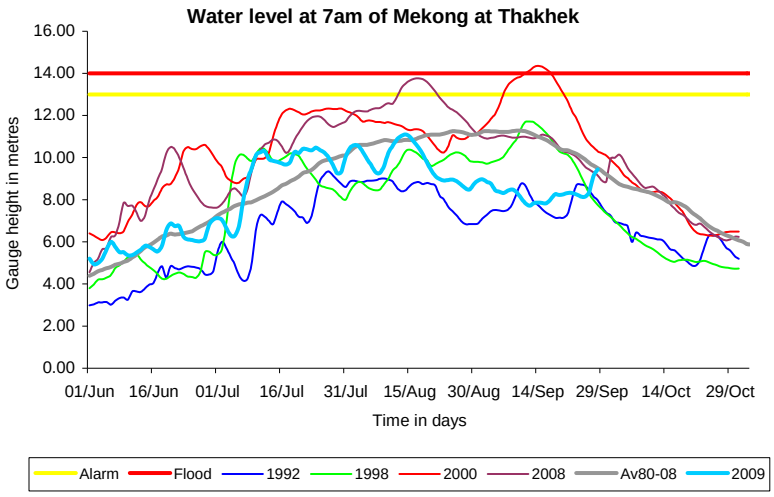

Water level at 7am of Mekong at Chiang Khan
Gauge height in metres
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

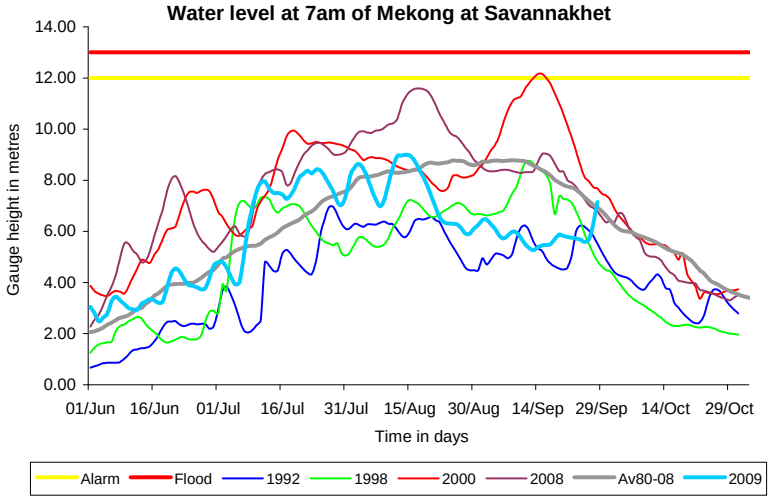

Water level at 7am of Mekong at Vientiane
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

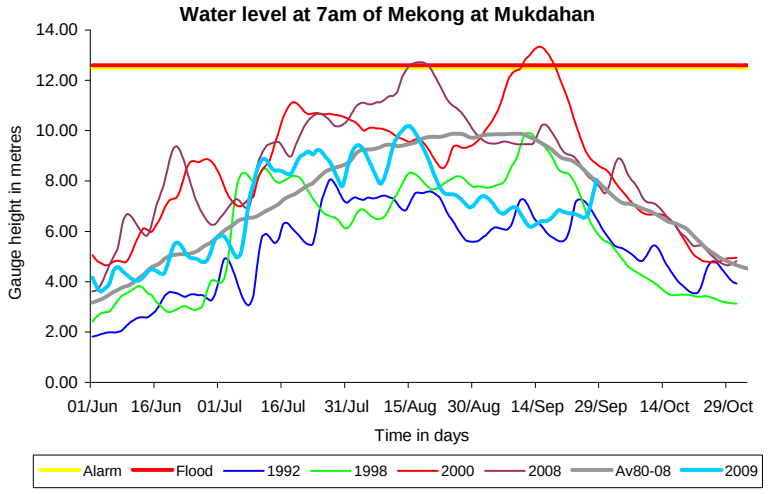

Water level at 7am of Mekong at Nong Khai
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

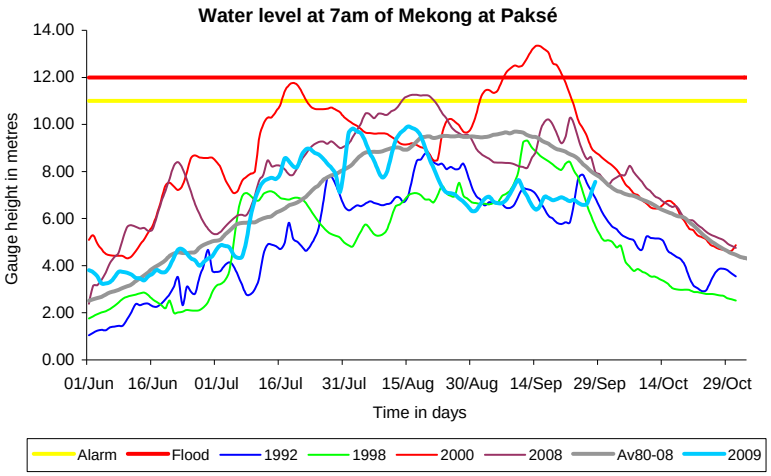

Water level at 7am of Mekong at Paksane
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

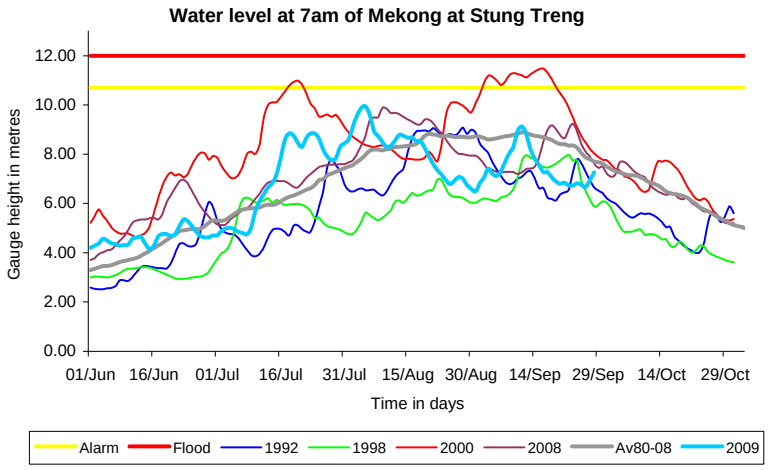

Water level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

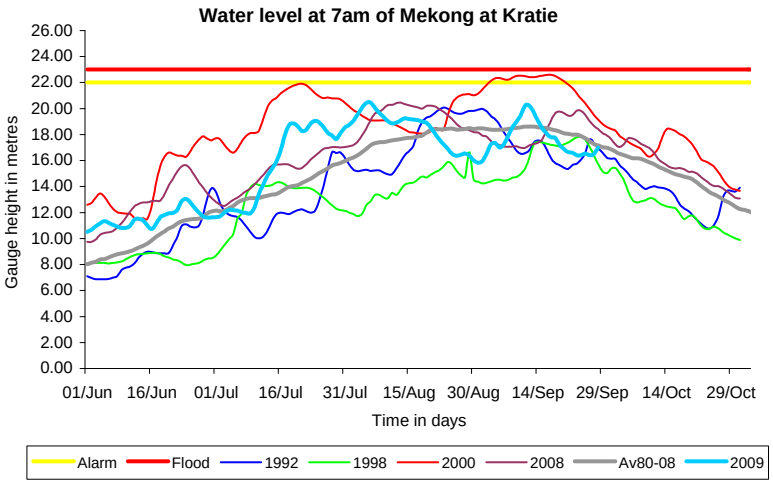

Water level at 7am of Mekong at Thakhek
Gauge height in metres
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

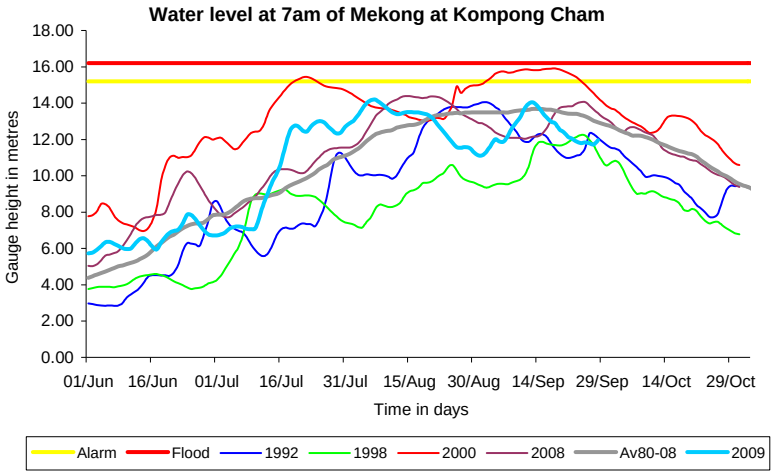

Water level at 7am of Mekong at Savannakhet
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

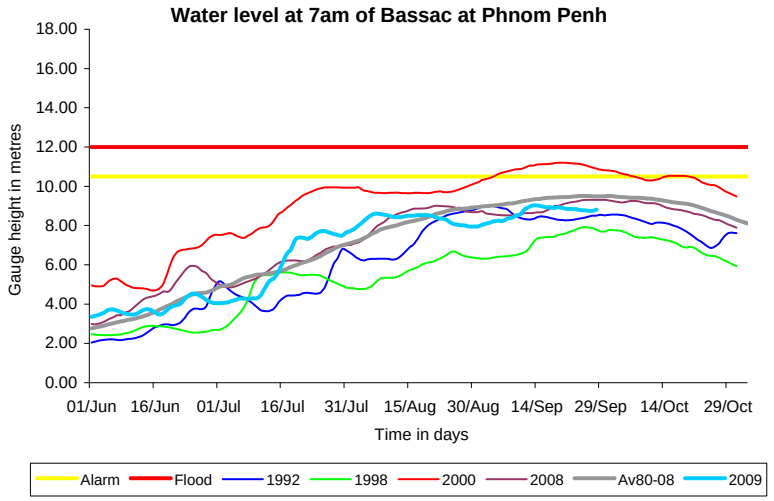

Water level at 7am of Mekong at Mukdahan
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

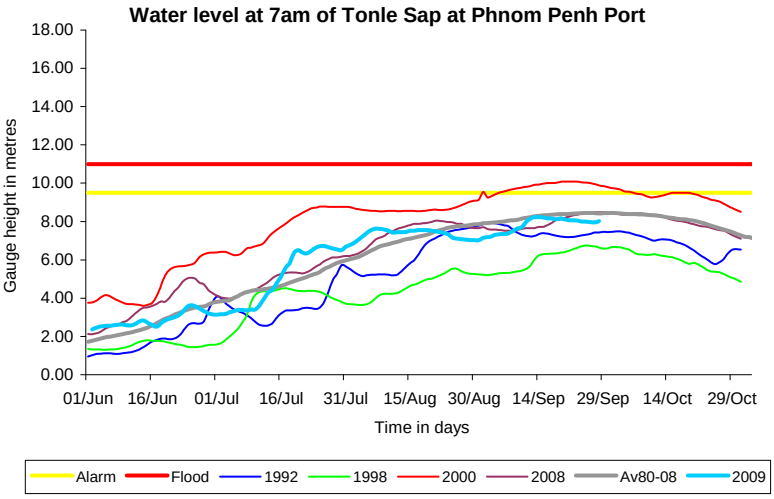

Water level at 7am of Mekong at Paksé
Gauge height in metres
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

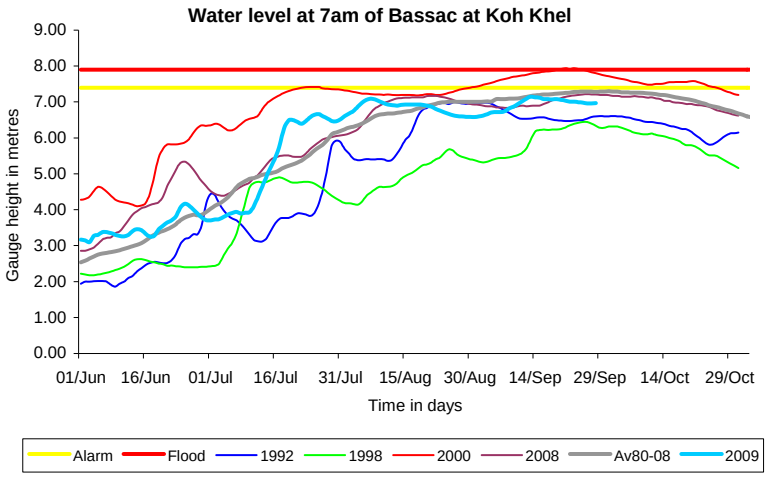

Water level at 7am of Mekong at Stung Treng
Gauge height in metres
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

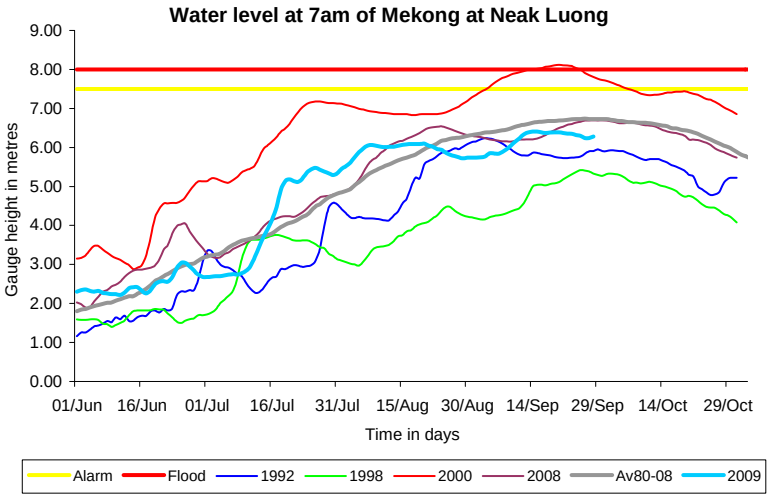

Water level at 7am of Mekong at Kratie
Gauge height in metres
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun
16/Jun
01/Jul
16/Jul
31/Jul
15/Aug
30/Aug
14/Sep
29/Sep
14/Oct
29/Oct
Time in days
Alarm
Flood
1992
1998
2000
2008
Av80-08
2009

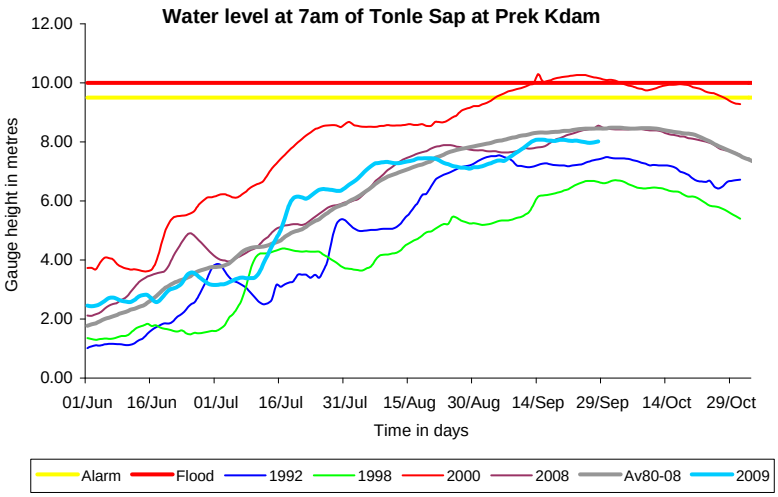

Water level at 7am of Mekong at Kompong Cham
Gauge height in metres
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

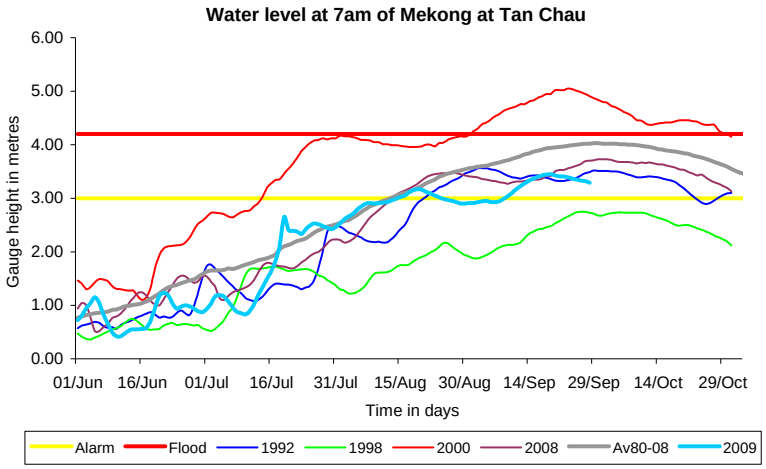

Water level at 7am of Bassac at Phnom Penh
Gauge height in metres
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009

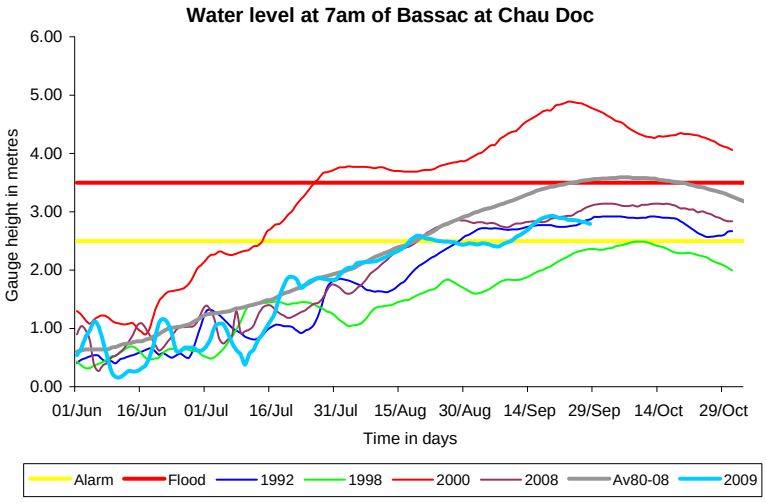

Water level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
01/Jun 16/Jun 01/Jul 16/Jul 31/Jul 15/Aug 30/Aug 14/Sep 29/Sep 14/Oct 29/Oct
Time in days
Alarm Flood 1992 1998 2000 2008 Av80-08 2009


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