Mekong River Commission

Regional Flood Management and Mitigation Centre

Weekly Flood Situation Report for the Mekong River Basin

Prepared on: 01/08/2011, covering the week from the 25th July to the 31st July, 2011

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

General weather patterns

During the week of the 25th July to the 31st July 2011, two weather bulletins were issued by the Department of Meteorology (DOM) of Cambodia. The weather charts of the 25th July and the 28th July bulletins are presented in the figures below:

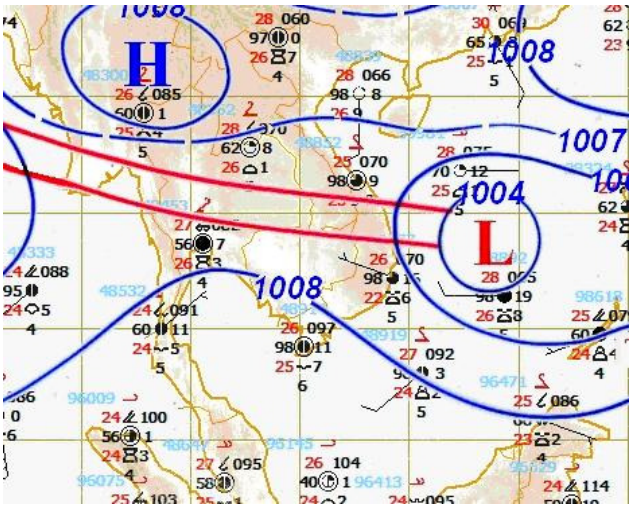


Figure 1: Weather map for 25th July 2011

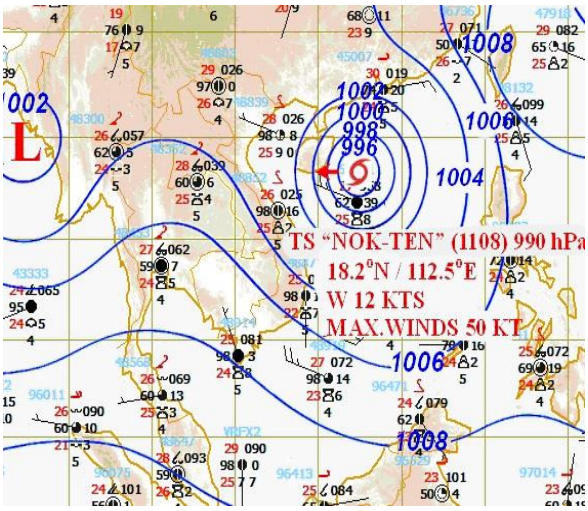


Figure 2: Weather map for 28th July 2011

Moderate to strong South-West (SW) Monsoon

Moderate SW monsoon in the mid of the week and strong SW monsoon in the end of the week prevailed over Andaman Sea, Thailand, the Gulf of Thailand and Cambodia (Figure 1 and 2).

Inter Tropical Convergence Zone (ITCZ)

ITCZ laid across the South of Myanmar, the middle of Thailand and Indochina and was almost stationary during the mid of the week (Figure 1).

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

A Tropical Storm (TS) named **NOK-TEN** (1108), which was formed in the East Philippines on the 26 July 2011, cased intensive damages in the Luzon Island of the Philippines and moved into South China Sea on 29 July 2011. After travelling though Hainan Island of China, the TS landed over Northern part of Central of Viet Nam on the 30th July and arrived at middle part of Lao PDR. It downgraded into low pressure on the 31st July when moving into Thailand territory. Figure 5 presents the recorded track of TS NOK-TEN.

The Figure 3 and 4 illustrate the weather map for **NOK-TEN** tropical storm before and after landing Viet Nam respectively.

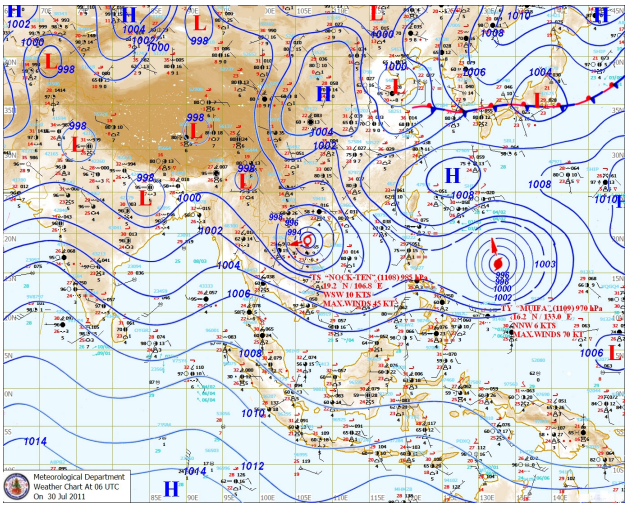


Figure 3: Weather map for NOK-TEN Tropical Storm at 13h on 30 July 2011, before landing

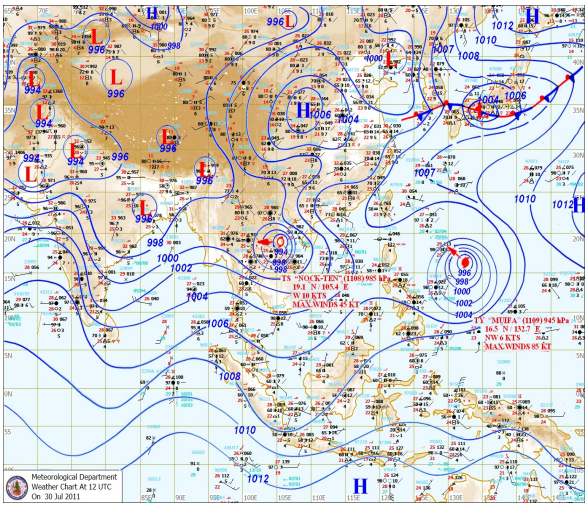


Figure 4: Weather map for NOK-TEN Tropical Storm at 19h on 30 July 2011, after landing

Source: *Thai Meteorological Department.*

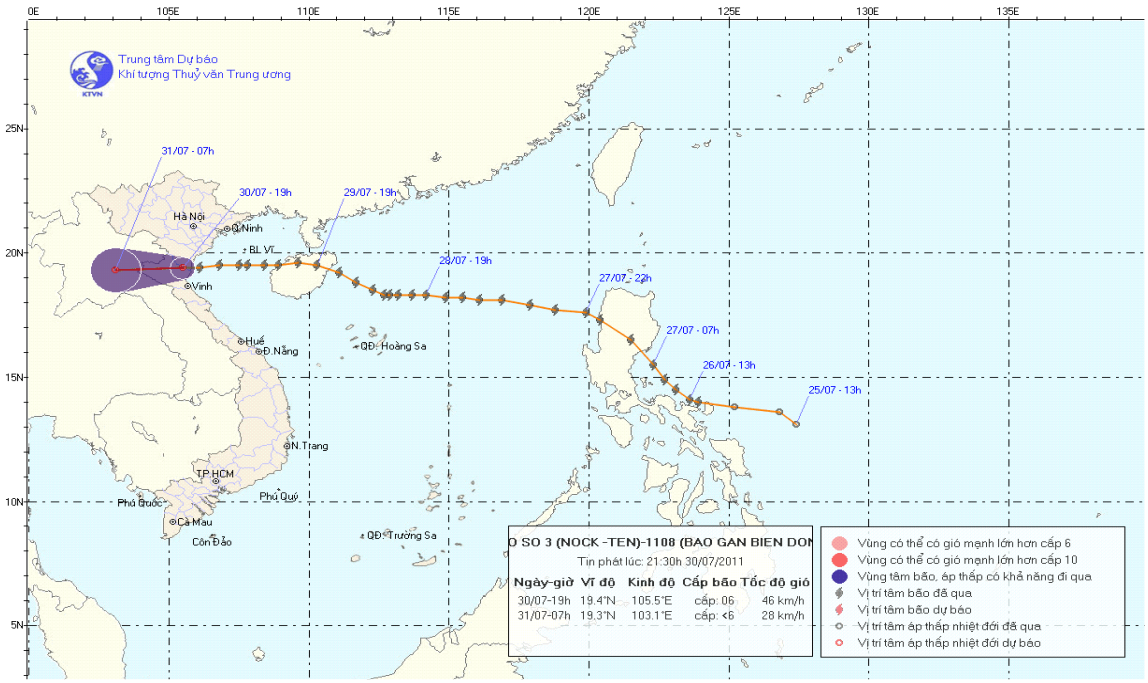


Figure 5: NOK-TEN Storm track

Source: *Viet Nam National Centre for Hydro-Meteorological Forecasting.*

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 end of the week because of strong SW and TS NOK-TEN influences. As the result of these phenomena, heavy rain and torrential rain occurred in the North, Northeast and the Central of Thailand, Lao PDR, Viet Nam, in the North-Northeast and Southwest of Cambodia particularly the area from Vientiane/Nong Khai to Thakhek/Nakon Phanom in the LMB. Figure 6 illustrates rainfall amount distribution over the LMB, covering last week.

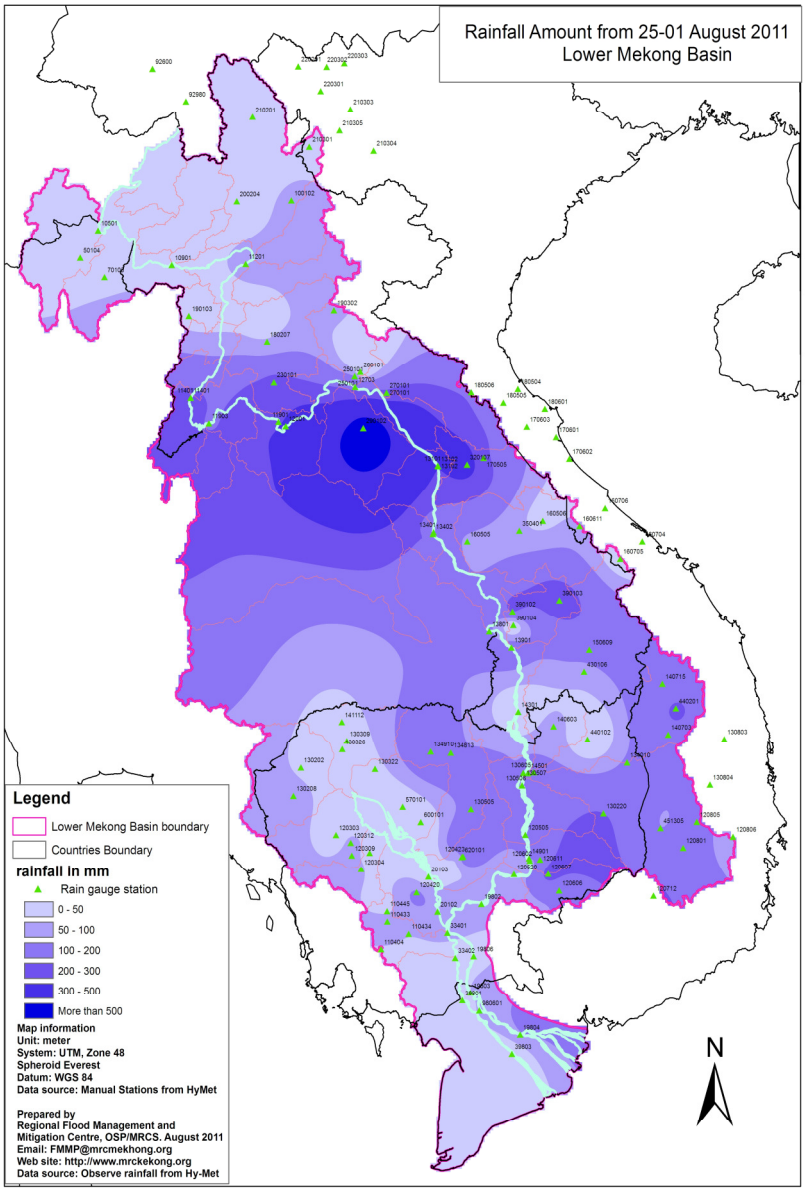


Figure 6: Rainfall distribution over the LMB, covering the week 25 – 31 July, 2011

General behaviour of the Mekong River

There is an inconsistency of water level along the Mekong River during the reporting period. While water levels at most stations in the middle reach was rising sharply at the end of the week by the influence of NOK-TEN storm, water levels at stations from Chiang Saen to Chiang Khan in the upper reach showed a falling trend and water levels at stations in the lower reach from Strung Treng to Phnom Penh Port/Pnom Penh Bassac show a slightly rising trend by strong SW affect during last week. Regarding to two stations in downstream at Tan Chau and Chau Doc, water levels at those two stations were fluctuated by tidal with slightly increasing trend in the monitoring period.

For stations from Chiang Saen to Vientiane/Nong Khai

Water level at Chiang Saen and Luang Prabang show a decreasing trend during last week and two stations were recording levels that are somewhat below the long-term average. Water levels at stations Chiang Khan, Vientiane/Nong Khai were falling during the mid of the week and rising rapidly at the end of the week. Water levers at these stations were somewhat above the long-term average for this time of the year.

For stations Paksane to Pakse

Water levels at Paksane, Nakon Phanon and Thakhet were falling in the first half of the week, then rising rapidly from 30th July to the end of the week with average intensity of 0.5-0.6 m/day (Figure 8) and its were recording levels that are above the long-term average for this time of the year.

Water levels at stations Savannakhet/Mukdahan to Pakse were more-or-less stable with a slightly falling trend from the beginning to the mid of the week and then rising at the end of the week. Water levers at these stations were above the long-term average for this time of the year.

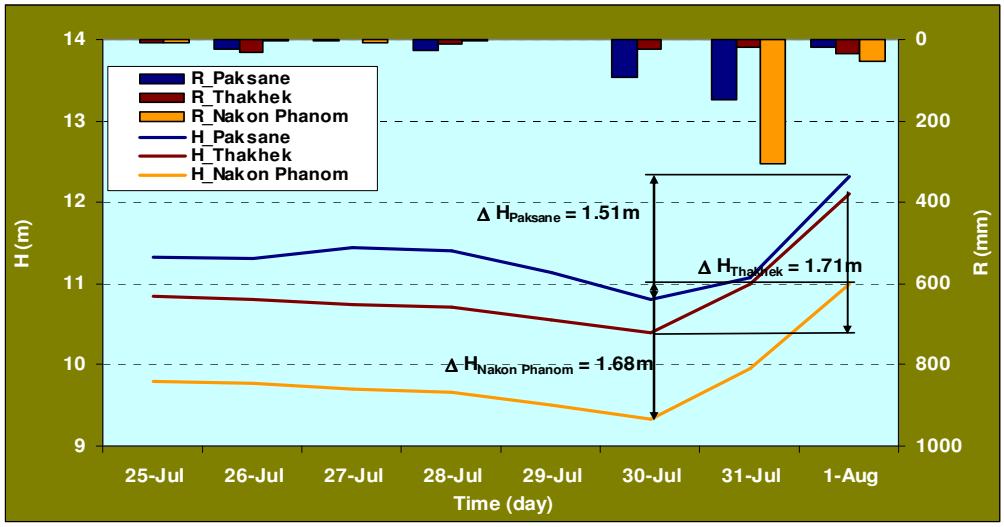


Figure 7: Quickly rising of water levels at stations: Paksane, Nakon Phanom and Thakhet

Water levels at stations on the left bank tributaries of Lao PDR such as at Muong Mai of Nam Nhiep River, at Ban Phone Si of Nam Ca Dinh, at Mahaxai of Se Bang Fai, Muong Ngoy of Nam Ou, Veun Khen and Sekong of Sekong river were increasing sharply with water increasing amplitudes of 3 – 4.5m from 30 July – 01 August (Figure 8 and 9).

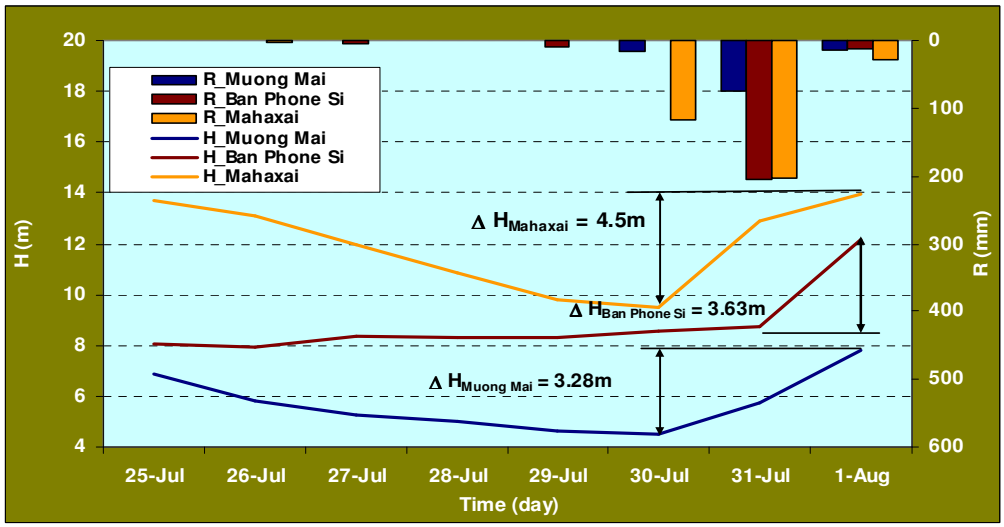


Figure 8: Rapidly increasing of water levels at stations on tributaries: Nam Nhiep at Muong Mai, Nam Ca Dinh at Ban Phone Si, Se Bang Fai at Mahaxai

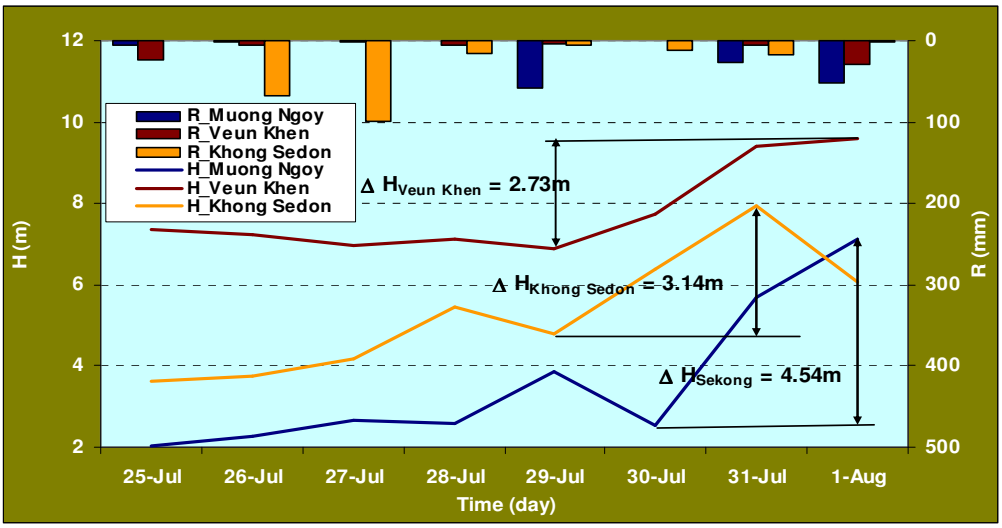


Figure 9: Rapidly increasing of water levels at stations on tributaries: Nam Ou at Muong Ngoy, Sekong at Sekong and Veukhen

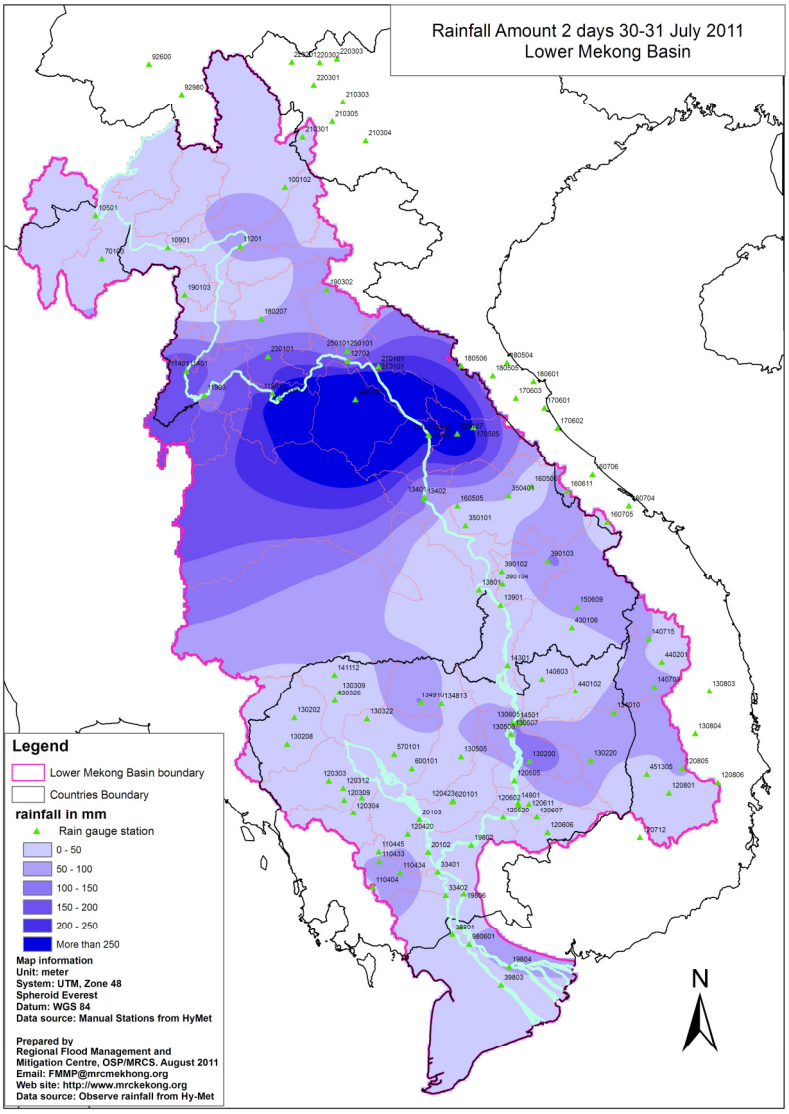


Figure 10: Rainfall distribution over the LMB when TS NOK-TEN affected (30 - 31 July)

Figure 10 shows amount rainfall distribution in the whole LMB during 30 and 31 July, when NOK-TEN Storm together with strong South west monsoon activity affected to the middle part of LMB. Recorded rainfall was 182.2 at Vientiane; 360.9mm at Nong Khai; 140.7mm at Paksane; 217.6mm at Ban Phon Si; 347.5mm at Mahaxai; 258.6mm at Thakhek; 254.9mm at Nakon Phanom.

For stations from Strung Treng to Kompong Cham

Water levels were rising in the first half of the week, then more-or-less stable till the end of the week. These stations were recording levels that are above the long-term average for this time of the year.

For stations from Phnom Penh Port/ Phnom Penh Bassac to Koh Khel/Neak Luong

Water levels were slightly rising till the end of the week. Water levels of these stations were above the long-term average for this time of the year.

Tan Chau and Chau Doc

Water levels were slightly rising from the beginning to the mid of the week and more-or-less stable in the end of the week. Both stations were recording levels that are around 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:

No alarm stage (where the forecast is expected to reach flood level within three days) was reported anywhere on the mainstream of the Mekong River during the past week. Water levels are still significantly below flood levels (as defined by the national agency) 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

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
25/07	537.62	5.77	13.26	11.57	8.40	9.53	11.33	9.80	10.84	9.70	8.79	10.80	8.90	7.81	17.39	11.53	6.95	6.08	5.94	4.70	5.74	1.93	1.38
26/07	536.74	5.58	12.28	12.14	9.14	10.07	11.30	9.77	10.81	9.72	8.85	10.80	8.90	7.99	17.58	11.68	6.98	6.12	6.02	4.76	5.83	2.07	1.56
27/07	537.08	5.48	11.64	11.58	9.14	10.30	11.44	9.70	10.75	9.61	8.83	10.81	8.91	8.30	18.01	11.91	7.10	6.26	6.10	4.83	5.93	2.13	1.63
28/07	537.33	4.84	11.10	11.09	8.55	9.75	11.40	9.66	10.70	9.53	8.80	10.77	8.97	8.58	18.56	12.33	7.33	6.50	6.27	4.98	6.09	2.23	1.70
29/07	536.89	4.64	10.60	10.79	8.16	9.38	11.14	9.51	10.55	9.39	8.60	10.60	8.87	8.55	18.76	12.56	7.50	6.69	6.41	5.12	6.24	2.33	1.78
30/07	536.95	4.53	10.16	10.34	7.76	9.02	10.81	9.32	10.39	9.15	8.60	10.60	8.87	8.29	18.85	12.68	7.58	6.78	6.49	5.22	6.34	2.40	1.85
31/07	536.64	4.52	10.30	10.02	7.37	8.73	11.08	9.95	10.99	9.52	8.58	10.41	8.71	8.22	18.72	12.69	7.69	6.91	6.53	5.28	6.41	2.41	1.76
01/08	536.85	4.72	10.04	10.86	8.00	9.22	12.32	11.00	12.10	10.60	9.36	11.01	9.17	8.35	18.79	12.73	7.84	7.08	6.56	5.32	6.46	2.41	1.76
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
25/07	1.0	1.10	nr	0.8	14.0	8.7	3.4	nr	nr	5.0	7.2	11.8	9.5	8.5	nr	14.7	8.6		0.9	2.8	52.40	5.8	0.60
26/07	nr	nr	nr	38.7	40.4	2.0	16.5	12.8	22.4	1.5	32.7	12.3	29.0	19.2	6.0	7.7	1.4		1.3	4.3	nr	0.0	1.4
27/07	nr	nr	nr	nr	nr	6.6	nr	1.8	3.7	40.1	0.6	42.4	27.0	24.5	6.4	0.7	6.4		1.3	2.4	22.5	0.5	
28/07	nr	nr	nr	19.8	2.0	2.8	11.4	13.9	27.3	26.9	10.8	35.4	46.3	5.5	24.6	37.0	25.4		18.2	7.8	4.2	0.5	
29/07	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	13.0	85.4	5.8	11.3		nr	9.0	nr	16.0	0.5
30/07	nr	nr	nr	nr	nr	nr	18.7	93.3	93.6	39.1	24.8	nr	nr	10.0	25.4	1.8	0.2		0.6	5.8	nr	0.0	2.8
31/07	38.0	9.7	62.0	71.2	178.5	307.5	98.2	143.5	146.6	22.6	20.4	3.1	4.5	16.8	7.6	1.3	3.5		3.6	nr	7.5	17.2	29.0
01/08	6.0	9.00	nr	66.0	3.7	54.3	23.8	18.1	18.4	55.5	36.8	3.4	16.7	113.5	nr	0.2	9.6		2.7	nr	nr	14.9	21.00

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

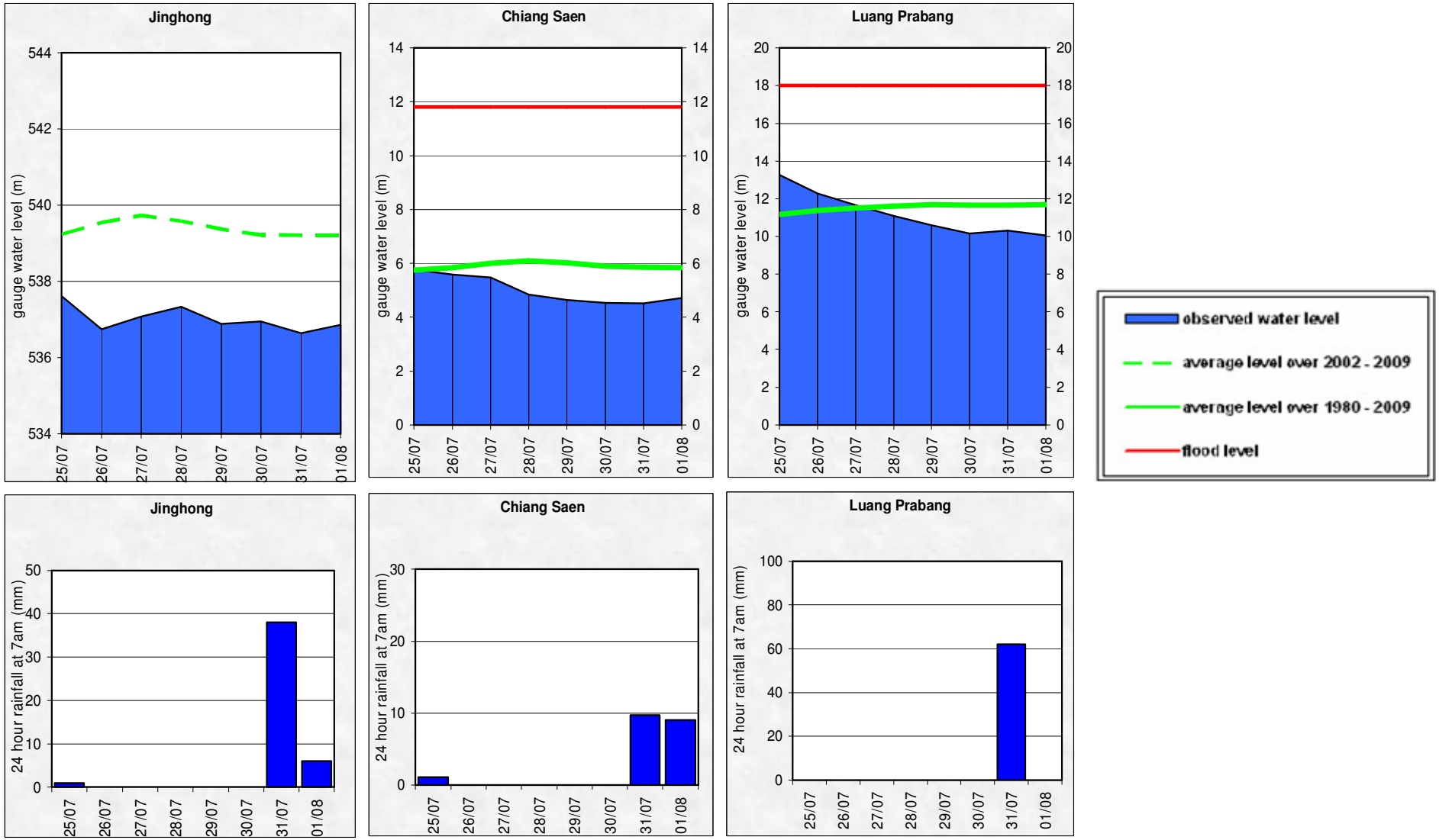


Figure A2: Water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

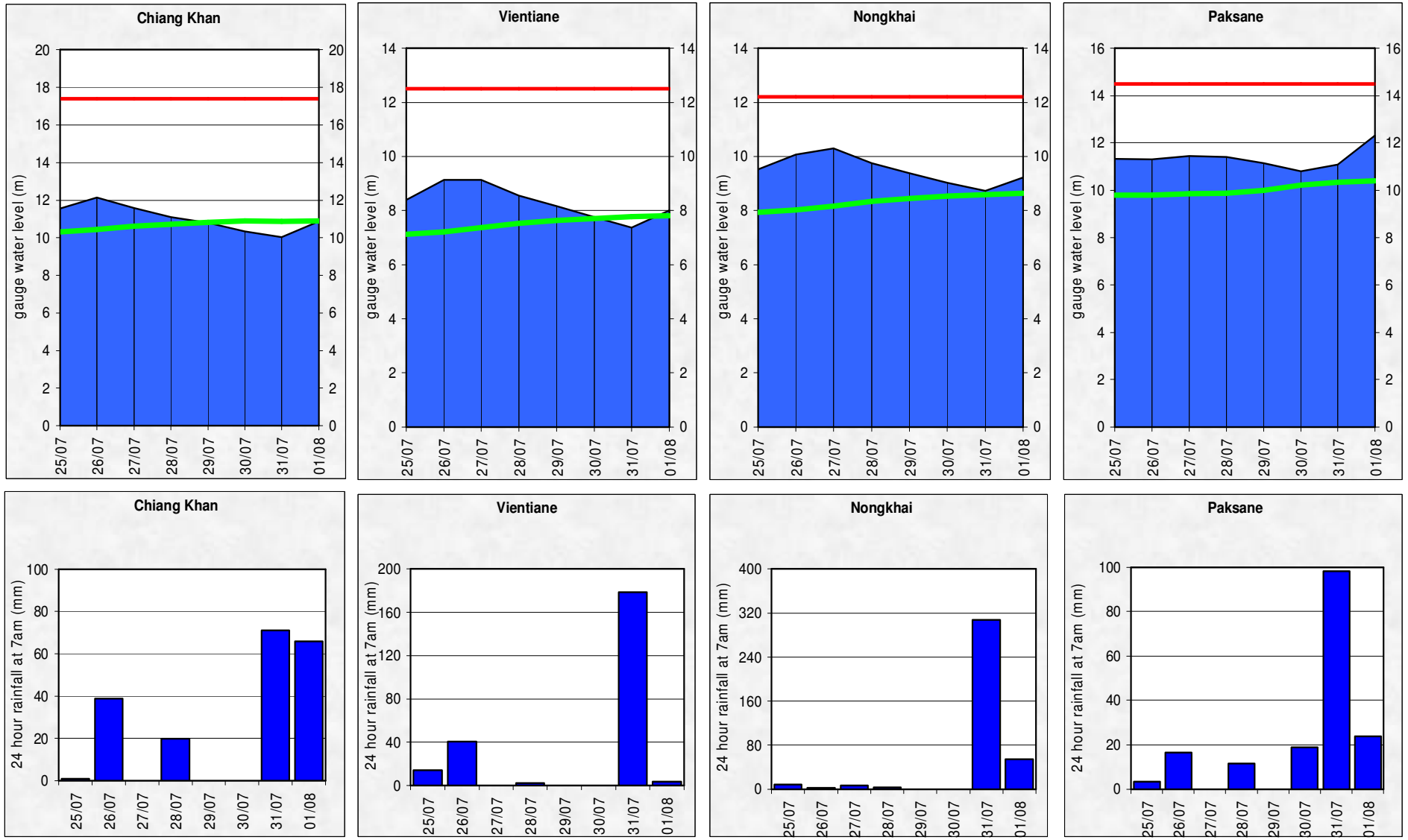


Figure A3: Water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

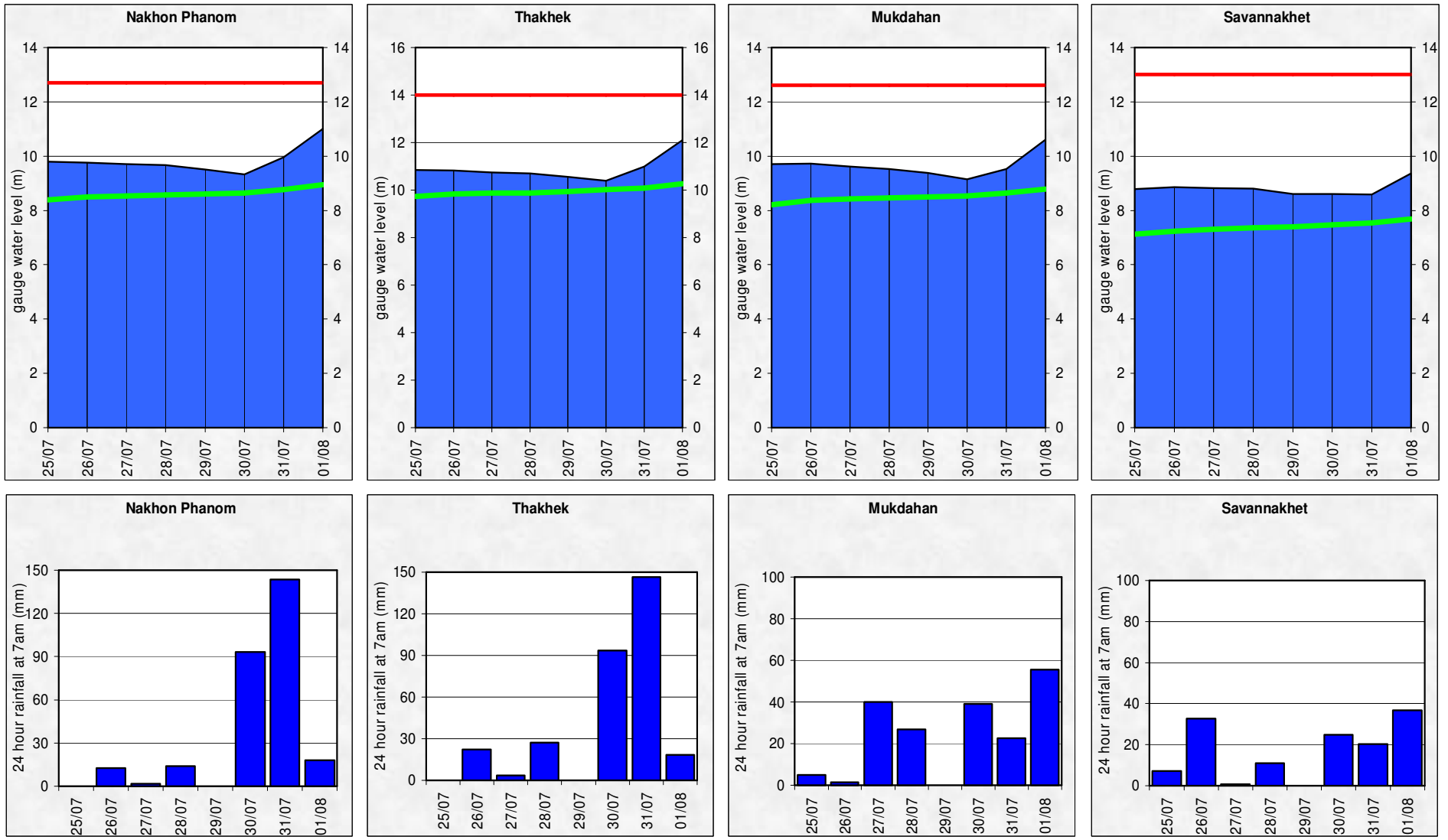


Figure A4: Water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

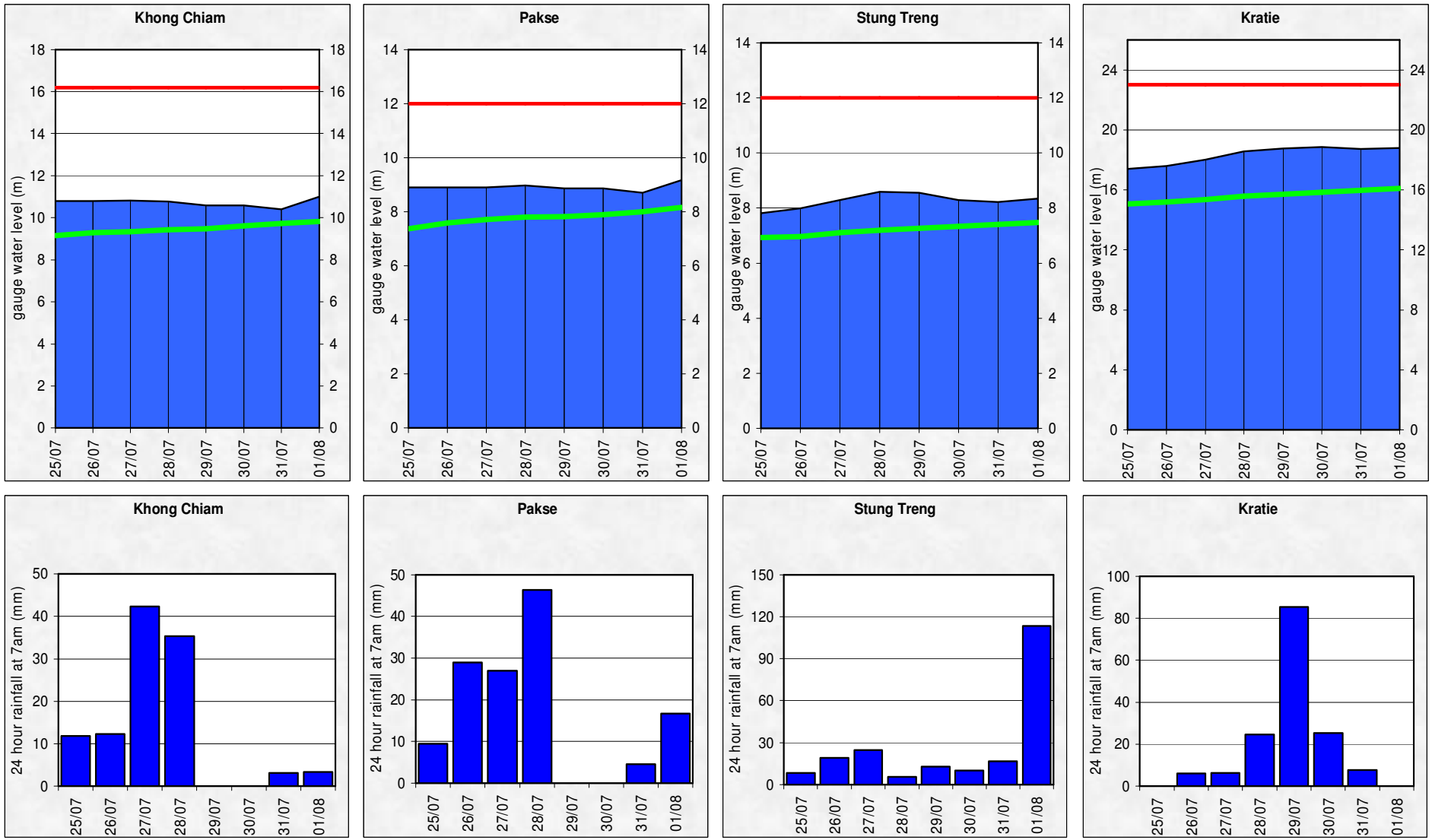


Figure A5: Water level and rainfall for Kompong Cham, Phnom Penh (Bassac and Port), and Koh Khel

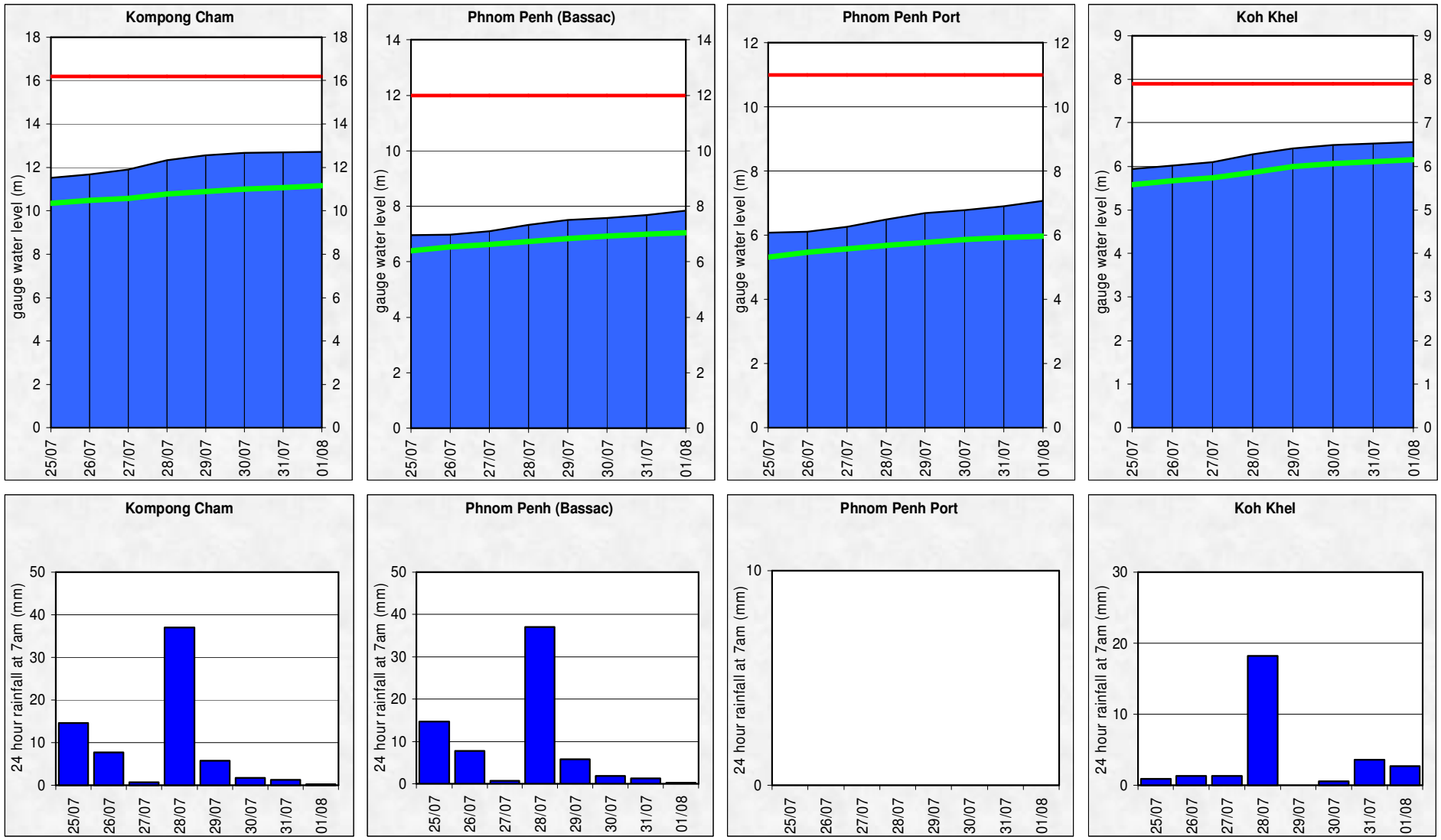
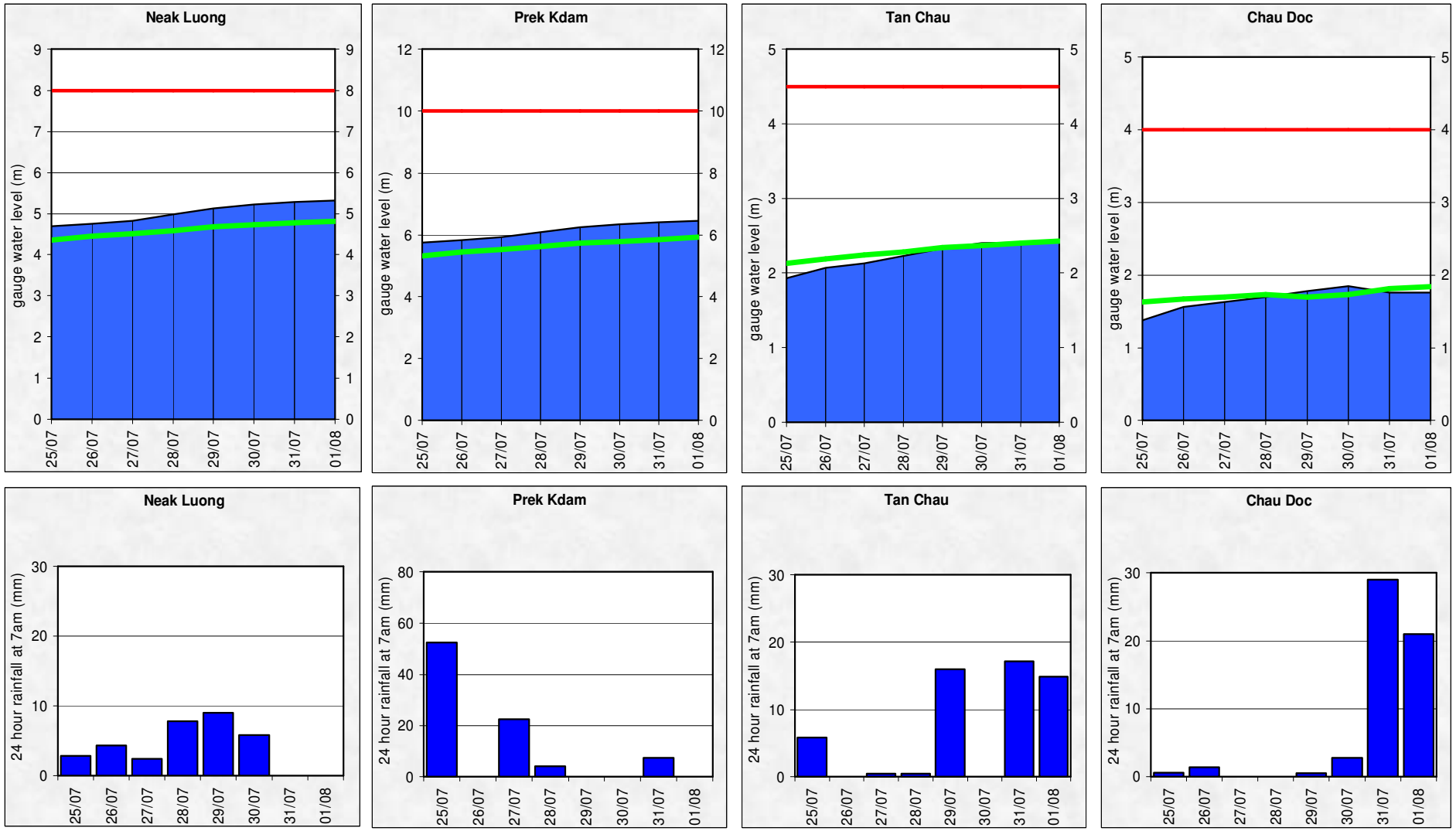


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



Annex B: Accuracy and performance

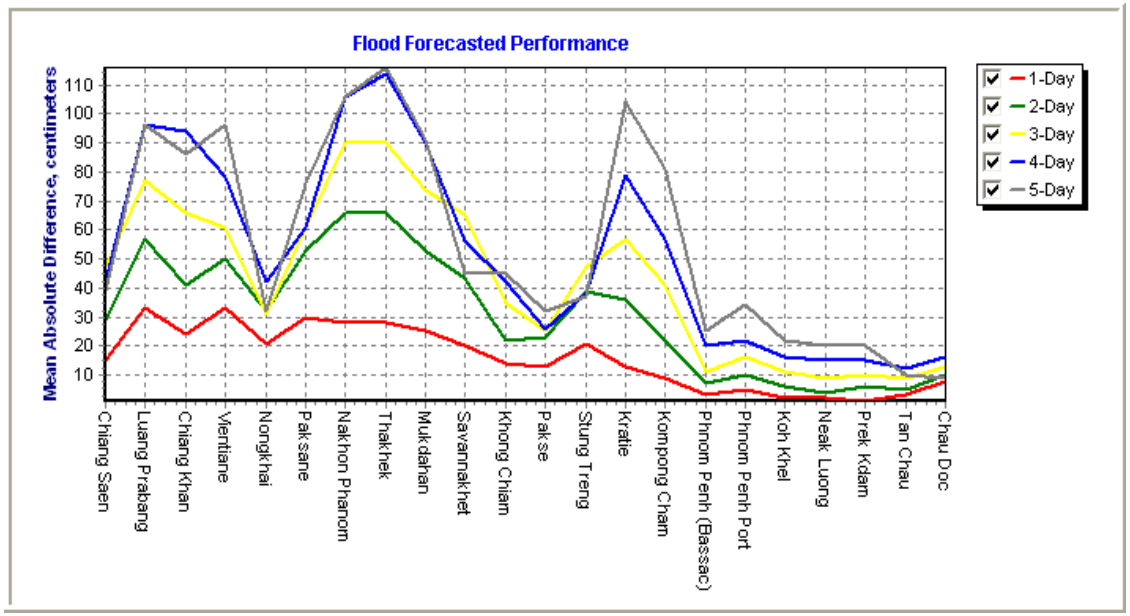
Accuracy

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

The graph of average difference between forecast and actual water levels for the past week shows the abnormal pattern, in which the accuracies at stations in the upper reach of LMB were better than in middle reach. In general, the overall accuracy is quite good for 1-day and 2-day forecast lead time; however accuracies at stations Nakon Phanom/Thakhet and Kratie for 3-day and 5-day forecast were less than expected.

The above differences are due to two main factors: (1) by internal model functionality in forecasting for middle reach of the LMB, for which the parameter adjustment in the model is not possible especially when severe weather condition appeared; (2) the adjustment by flood forecaster-in-charge.

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	85.7	42.9	71.4	0.0	57.1	42.9	28.6	28.6	42.9	14.3	71.4	42.9	0.0	57.1	71.4	100.0	100.0	100.0	100.0	100.0	100.0	57.1	***59.7***
2-day	66.7	50.0	66.7	16.7	33.3	66.7	16.7	33.3	33.3	50.0	83.3	66.7	33.3	33.3	50.0	66.7	50.0	83.3	100.0	83.3	83.3	66.7	***56.1***
3-day	40.0	40.0	20.0	0.0	40.0	20.0	20.0	20.0	0.0	20.0	40.0	60.0	40.0	20.0	40.0	40.0	20.0	60.0	40.0	60.0	80.0	20.0	***33.6***
4-day	100.0	25.0	0.0	25.0	75.0	75.0	0.0	0.0	25.0	50.0	75.0	75.0	75.0	50.0	50.0	0.0	50.0	50.0	100.0	75.0	50.0	25.0	***47.7***
5-day	100.0	33.3	33.3	33.3	66.7	66.7	33.3	33.3	33.3	66.7	33.3	100.0	66.7	33.3	0.0	33.3	33.3	66.7	66.7	66.7	66.7	100.0	***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	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	*10:43*	*0*	*-*	*3*	*08:12*	*08:15*	*07:33*	*05:47*	*09:06*	*07:29*	*07:13*	*0*	*0*	*0*	*30*	*124*	*1*	*44*
month	*10:36*	*0*	*-*	*13*	*08:12*	*07:41*	*07:33*	*06:25*	*09:02*	*07:39*	*07:10*	*1*	*12*	*3*	*247*	*496*	*5*	*154*
season	*10:25*	*1*	*-*	*41*	*08:12*	*08:27*	*07:32*	*06:08*	*09:04*	*07:49*	*07:13*	*1*	*16*	*35*	*682*	*1151*	*17*	*352*

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.

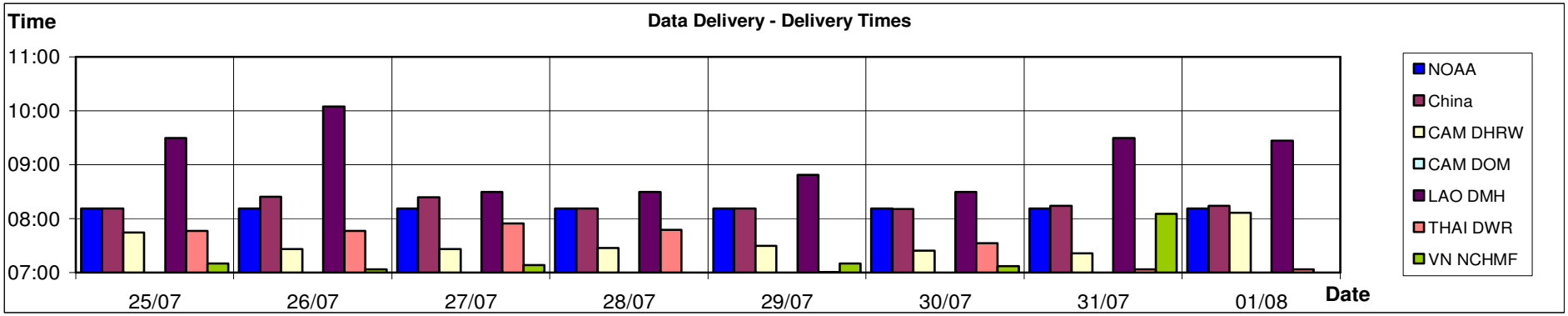


Figure B2: Data delivery times for the past 8 days including the current report date

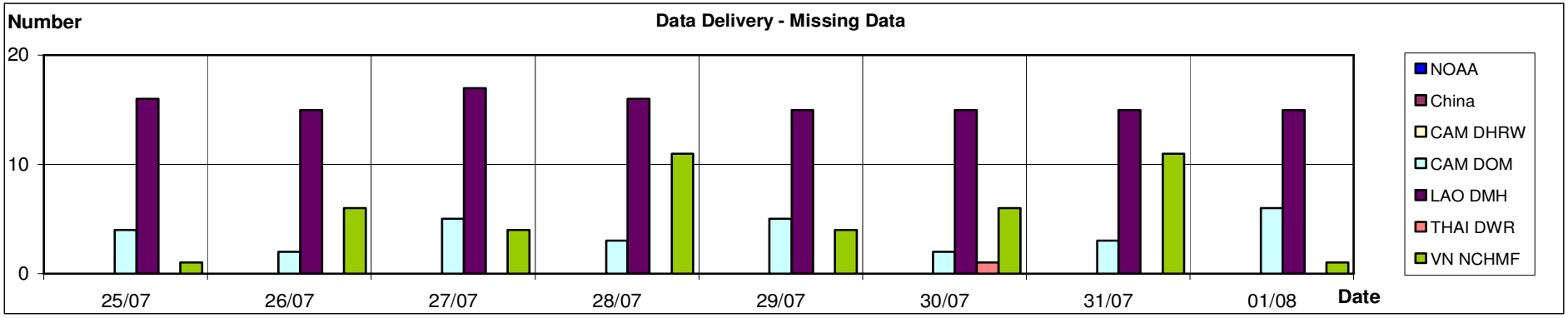


Figure B3: Missing data for the past 8 days including the current report date

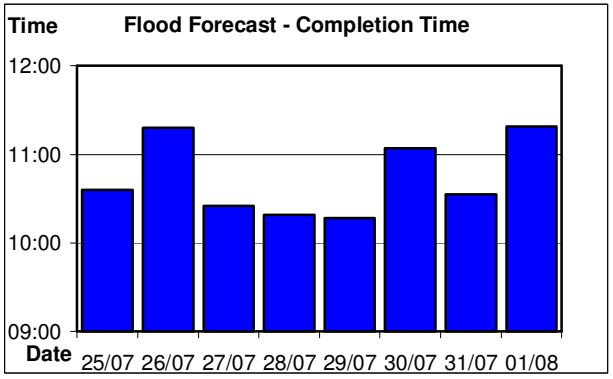


Figure B4: Flood forecast completion time

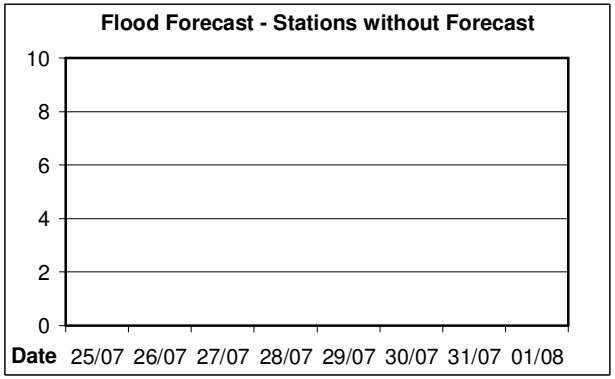


Figure B5: Flood forecast stations without forecast

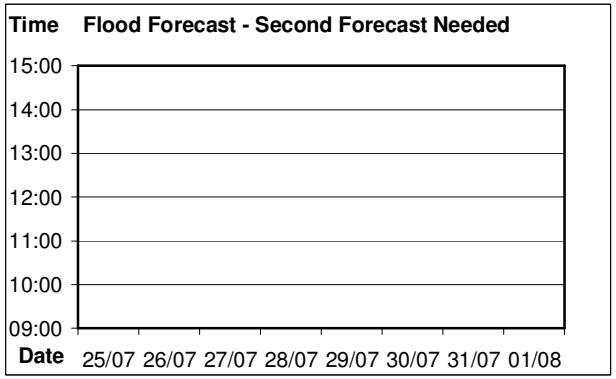


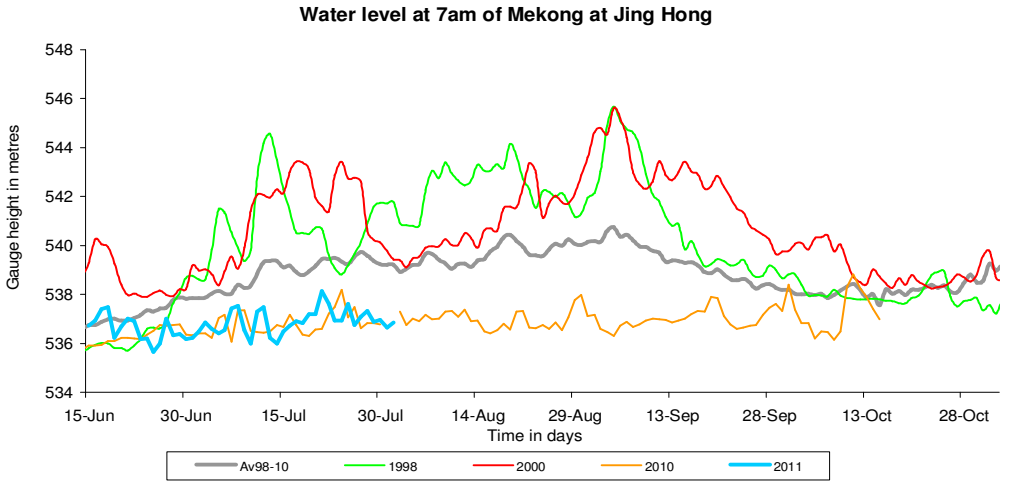
Figure B6: Second forecast needed

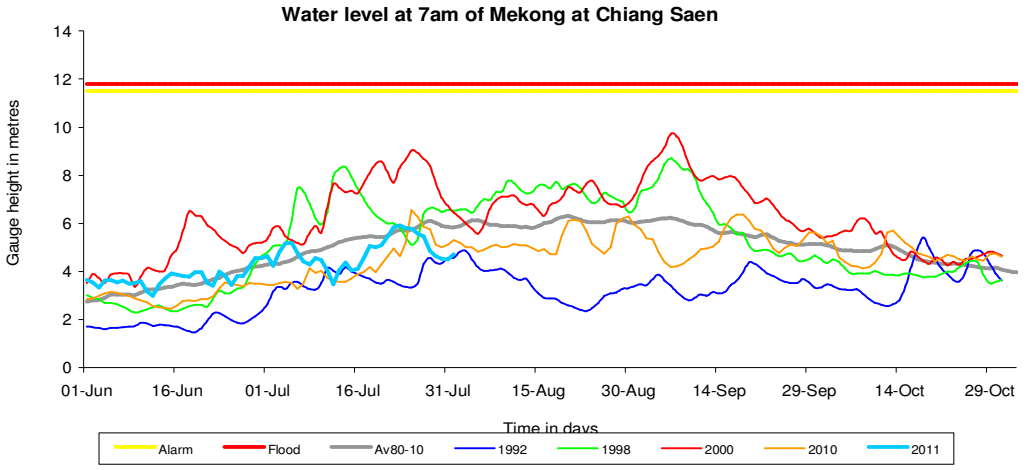
Annex C: Season Water Level Graphs

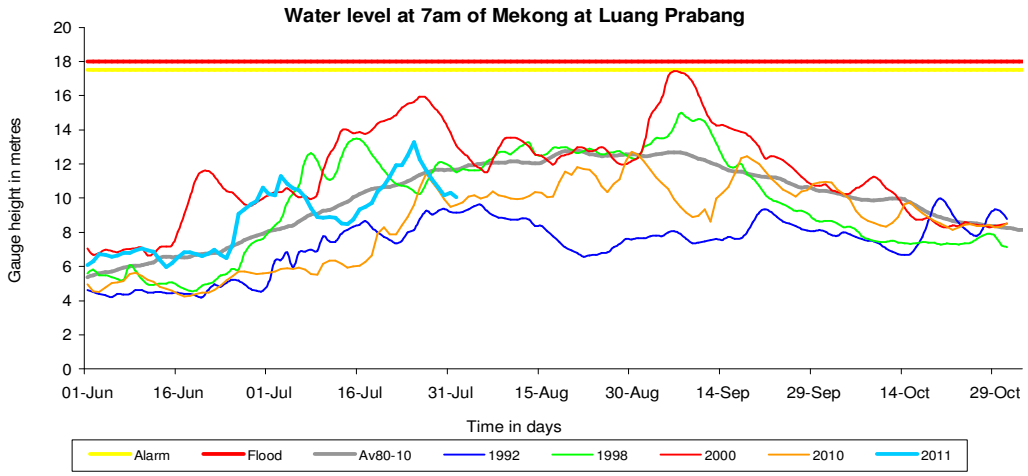
This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

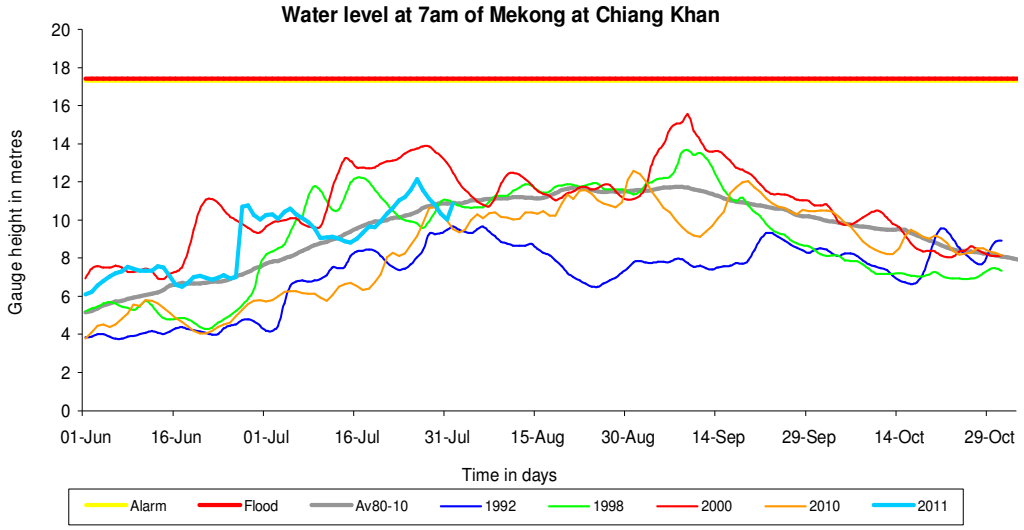
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS

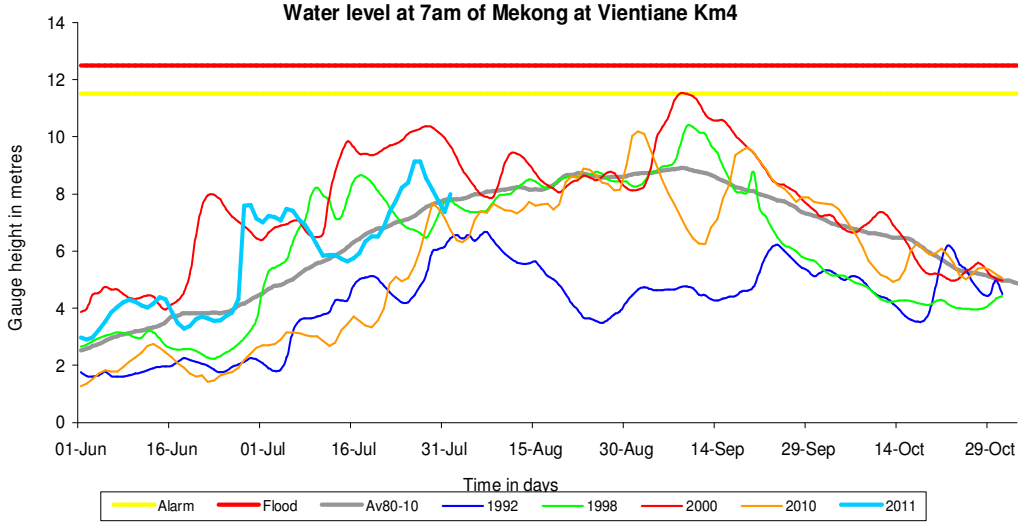
IN FLOOD SEASON FROM 1 JUNE TO 31 OCTOBER

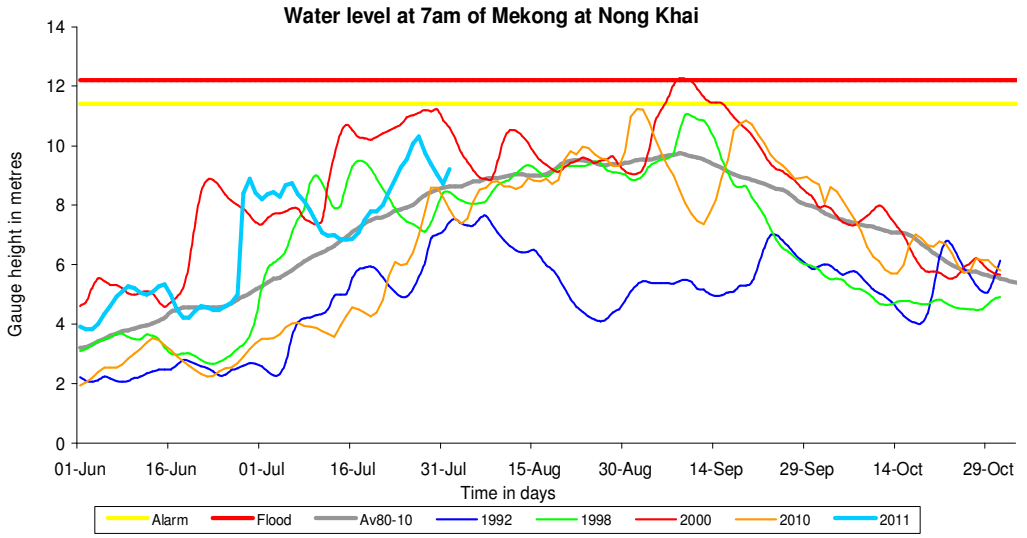


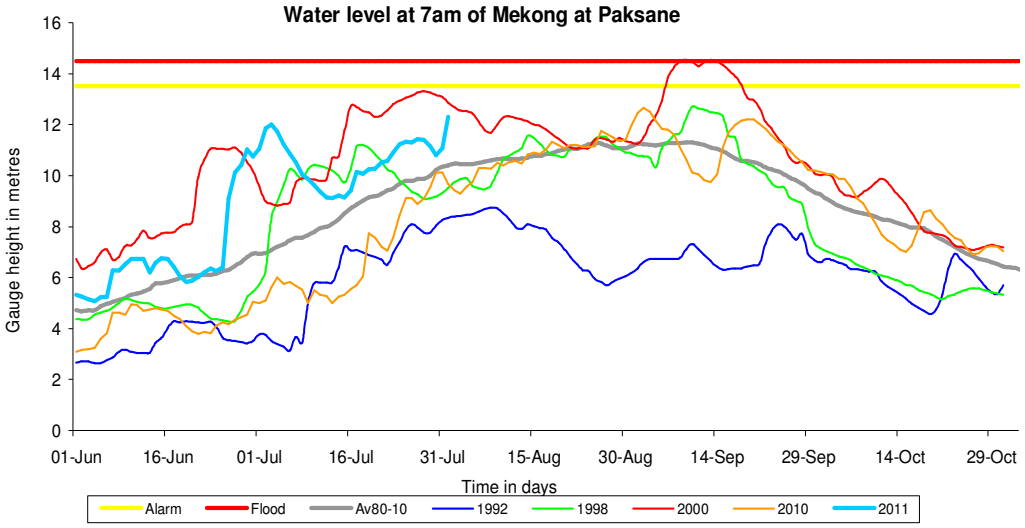


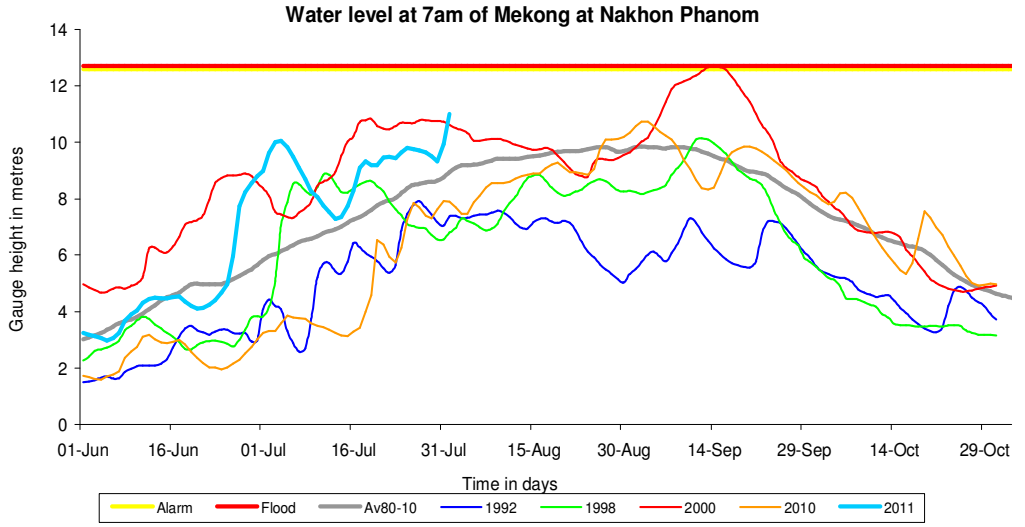


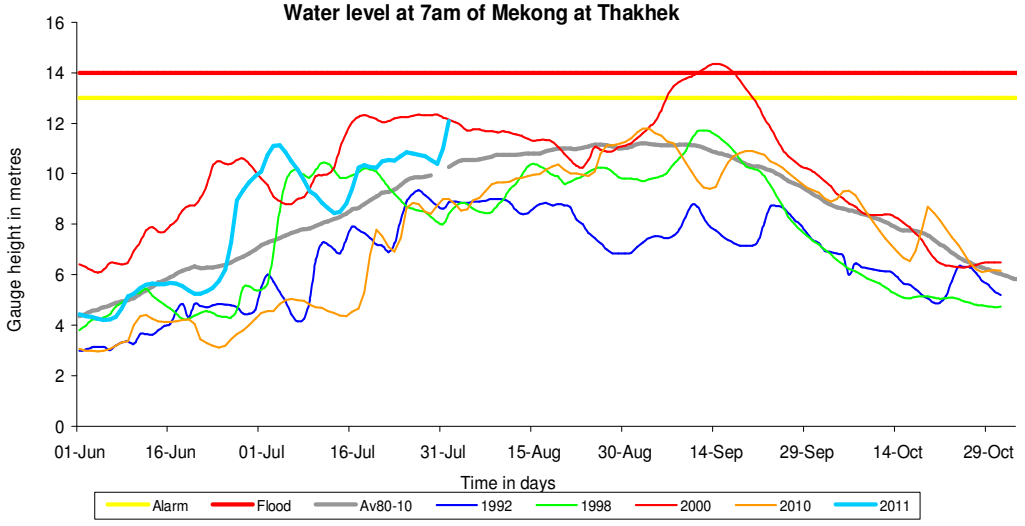

Water level at 7am of Mekong at Chiang Khan
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

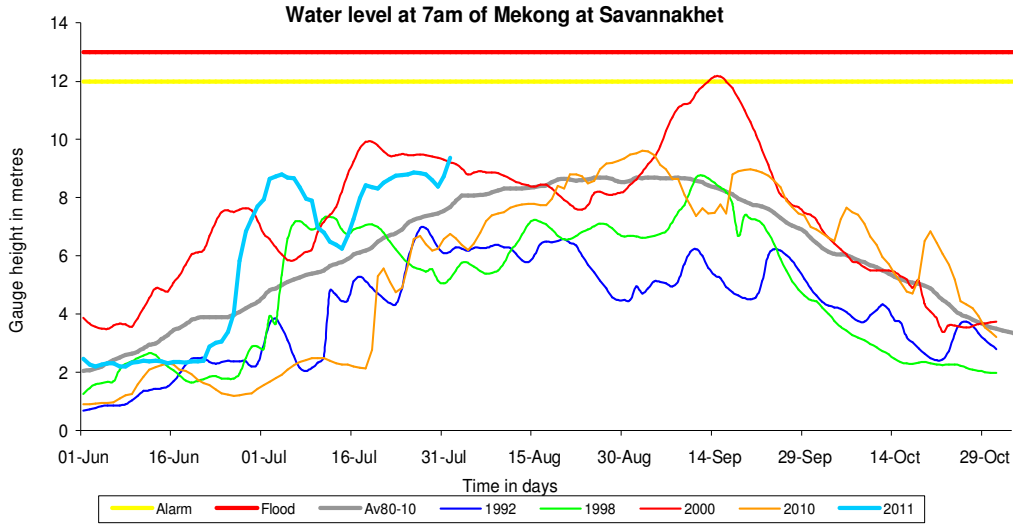

Water level at 7am of Mekong at Vientiane Km4
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

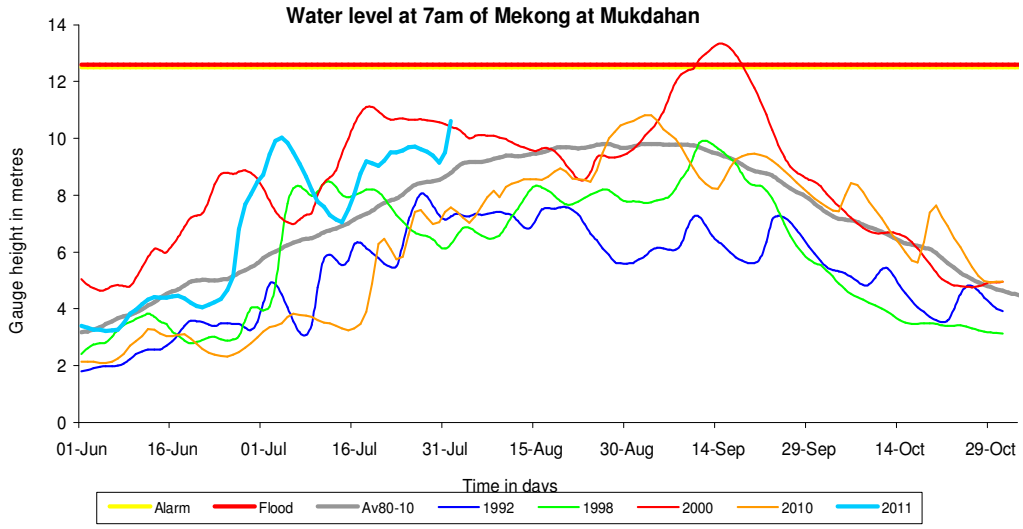

Water level at 7am of Mekong at Nong Khai
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

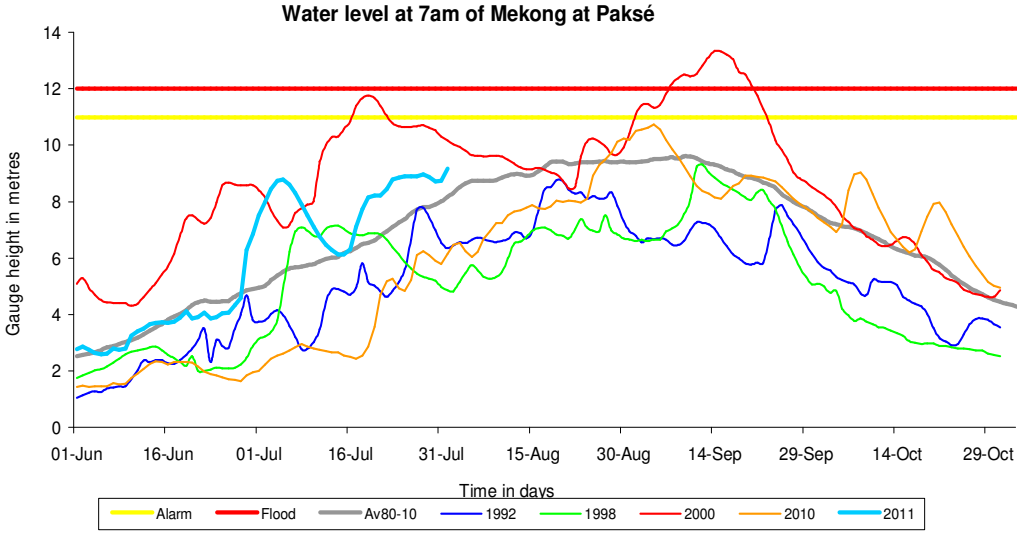

Water level at 7am of Mekong at Paksane
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

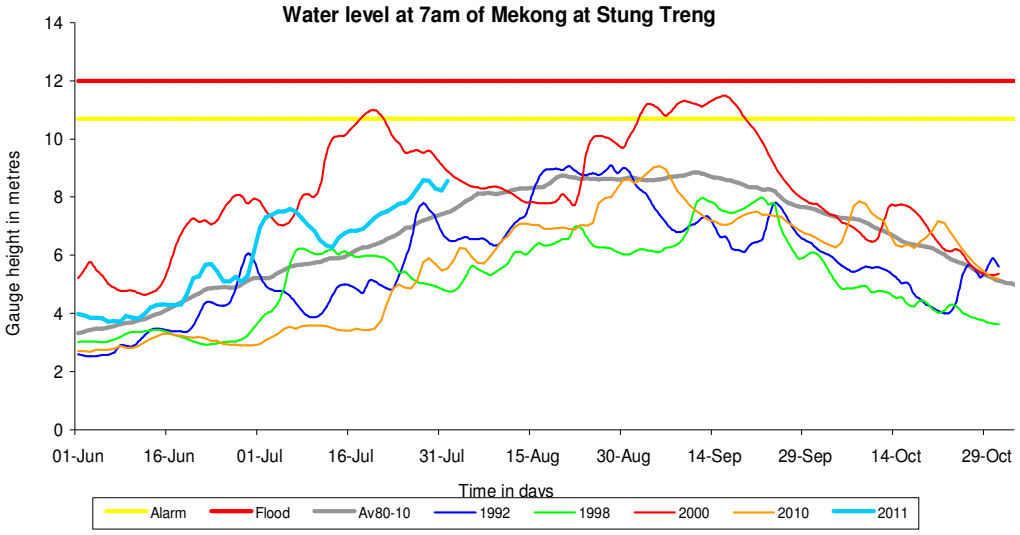

Water level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

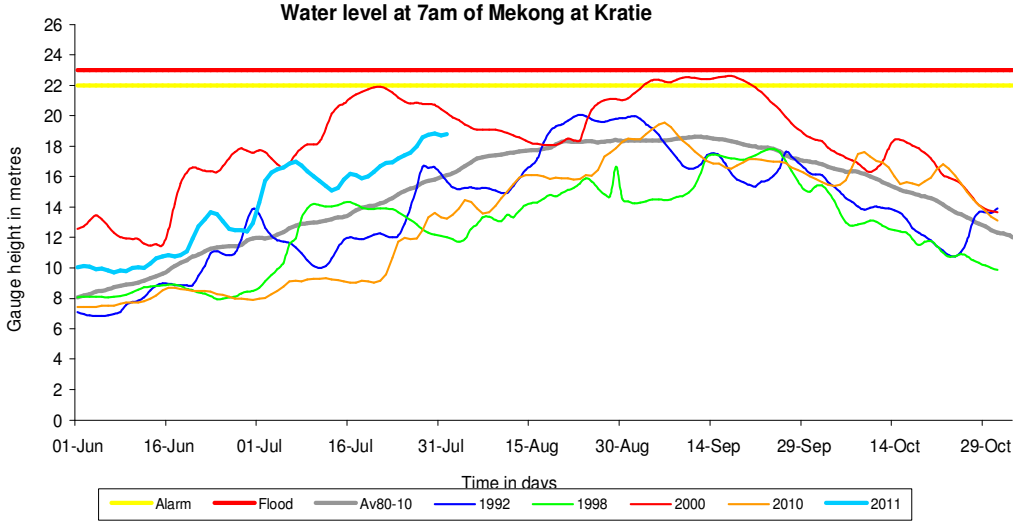

Water level at 7am of Mekong at Thakhek
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

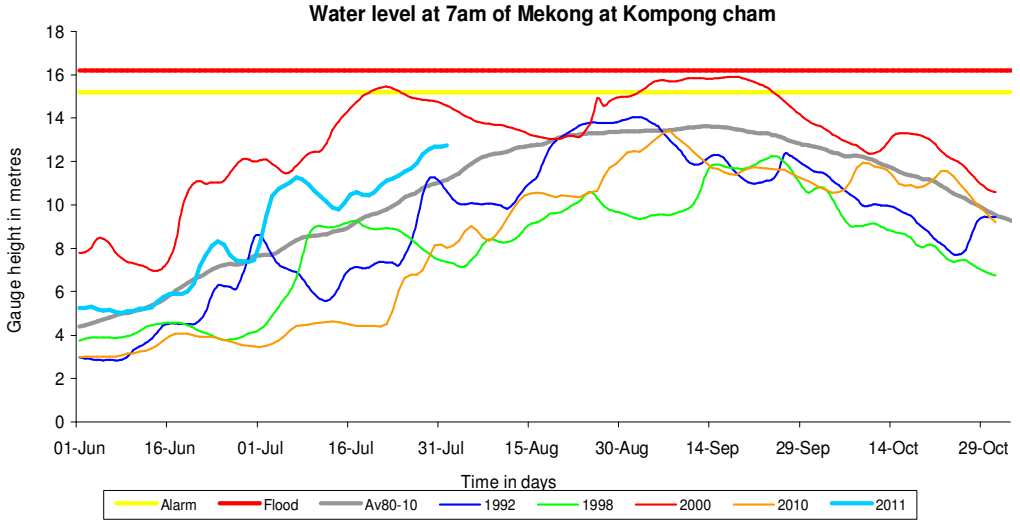

Water level at 7am of Mekong at Savannakhet
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

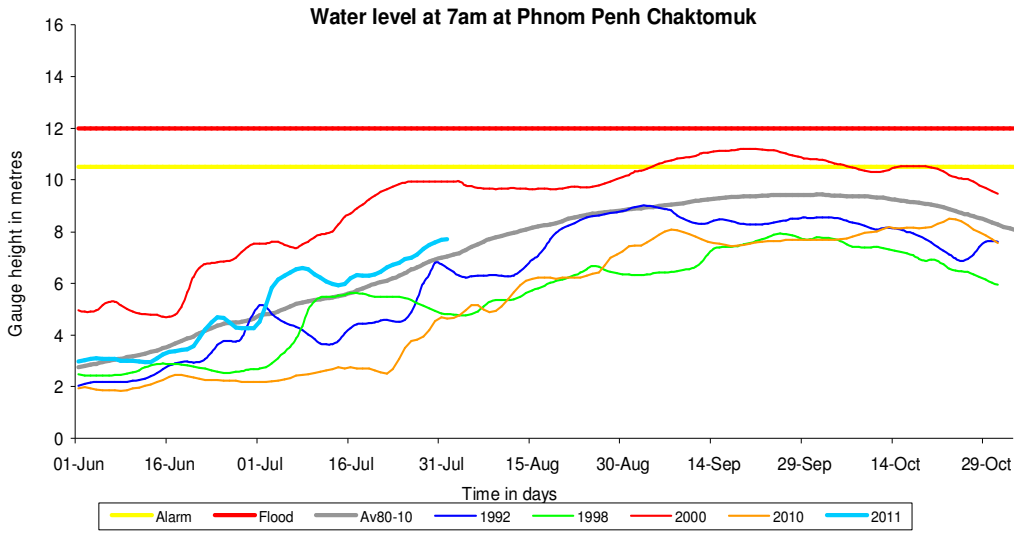

Water level at 7am of Mekong at Mukdahan
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

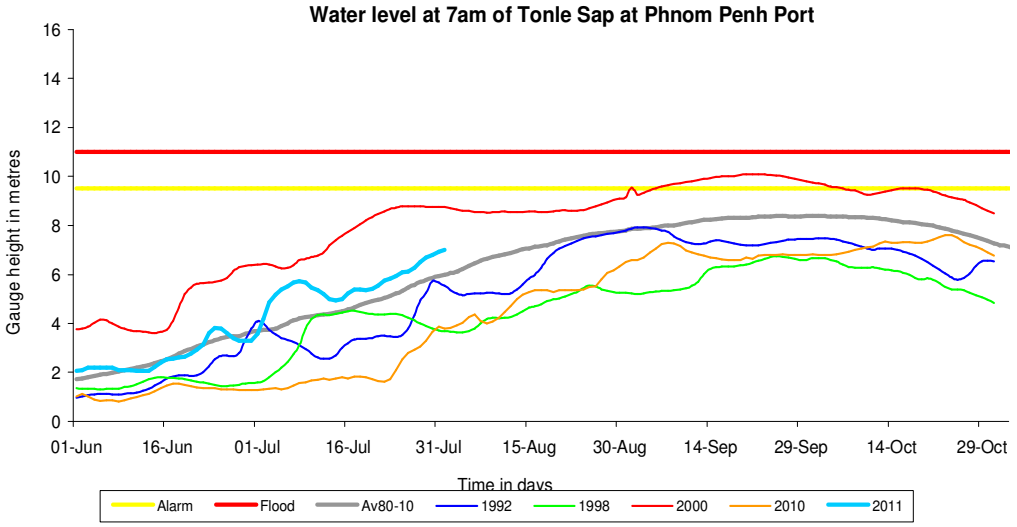

Water level at 7am of Mekong at Paksé
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

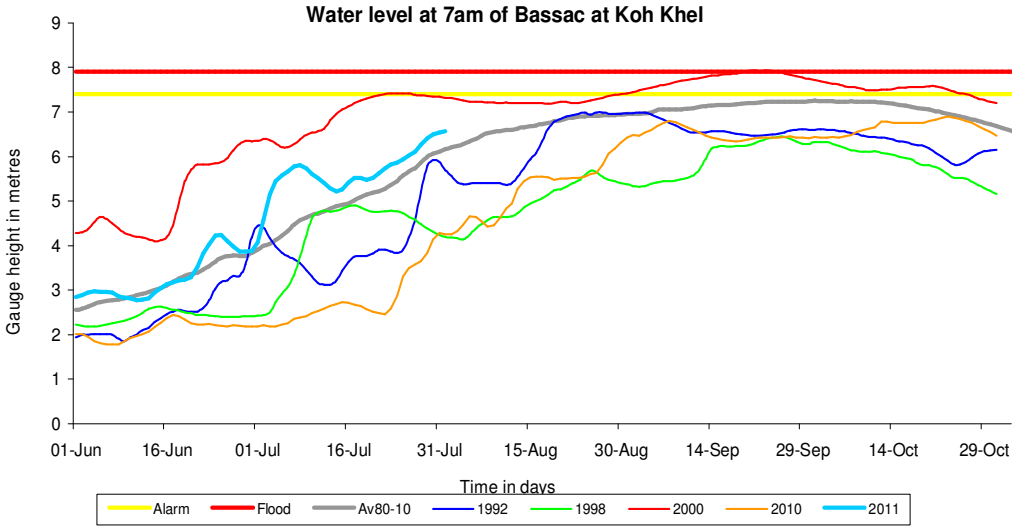

Water level at 7am of Mekong at Stung Treng
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

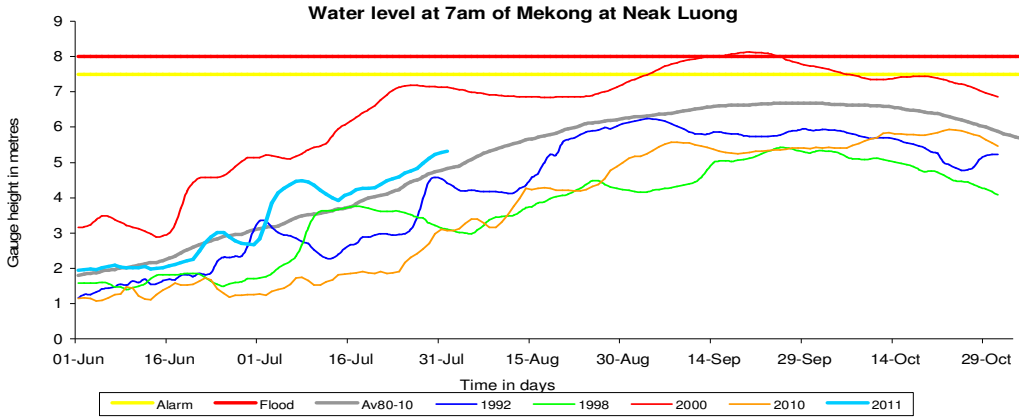

Water level at 7am of Mekong at Kratie
Gauge height in metres
0
2
4
6
8
10
12
14
16
18
20
22
24
26
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

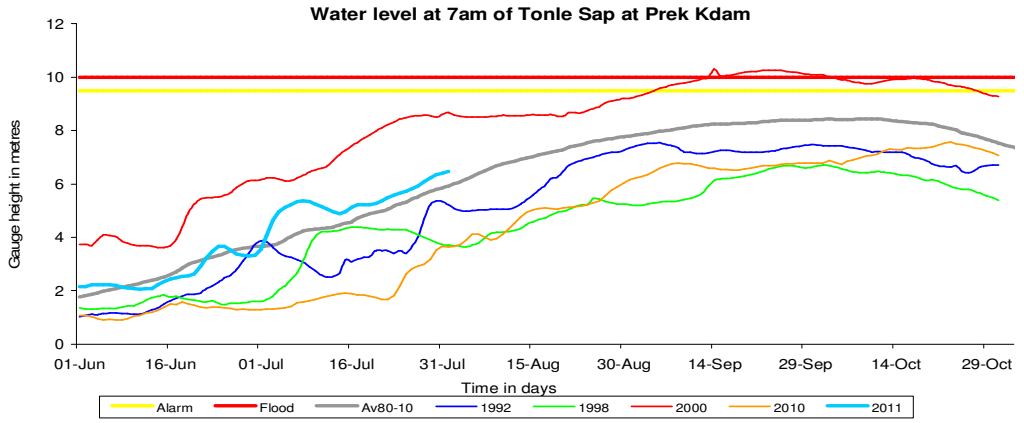

Water level at 7am of Mekong at Kompong cham
Gauge height in metres
0
2
4
6
8
10
12
14
16
18
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

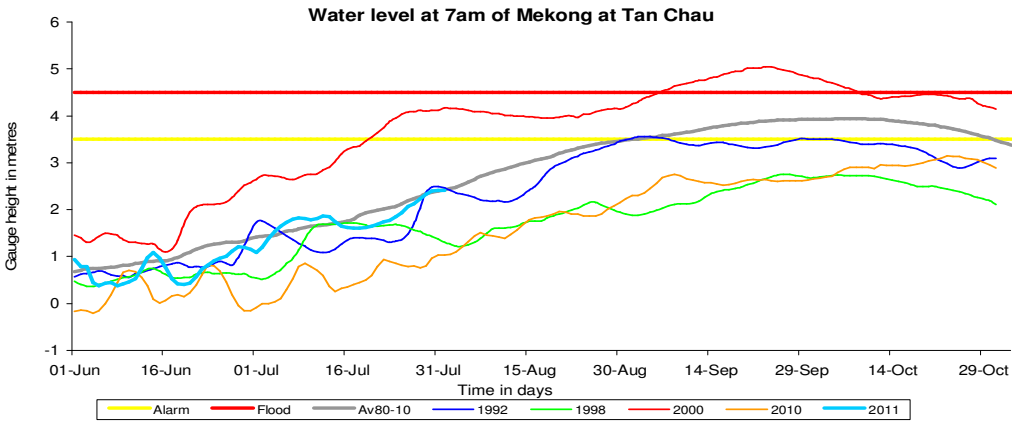

Water level at 7am at Phnom Penh Chaktomuk
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011

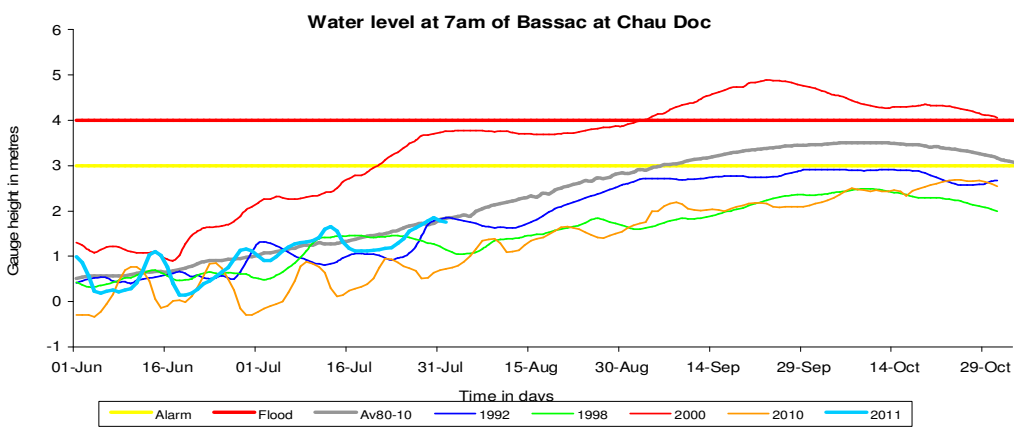

Water level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011


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
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
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
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
Time in days
Alarm
Flood
Av80-10
1992
1998
2000
2010
2011