Mekong River Commission

Regional Flood Management and Mitigation Centre

Weekly Flood Situation Report for the Mekong River Basin

Prepared on: 12/07/2010, covering the week from the 5th to the 11th July 2010

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

General weather patterns

During the week of the 5th to the 11th July 2010, seven weather bulletins were issued by the Department of Meteorology (DOM) of Cambodia and made available to the MRC-RFMMC. The weather patterns of the 5 July and the 11 July bulletins are shown below:

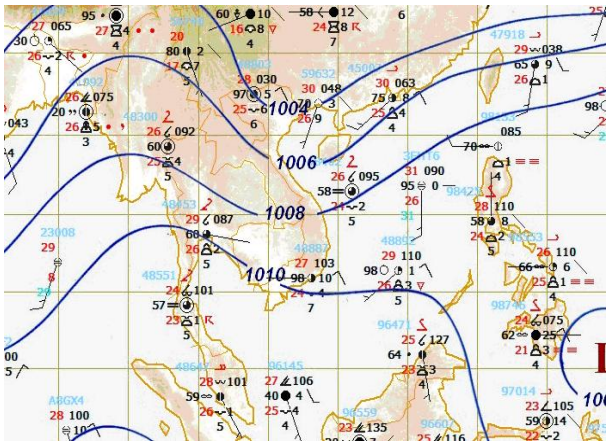


Figure 1: Weather map for 5 July 2010

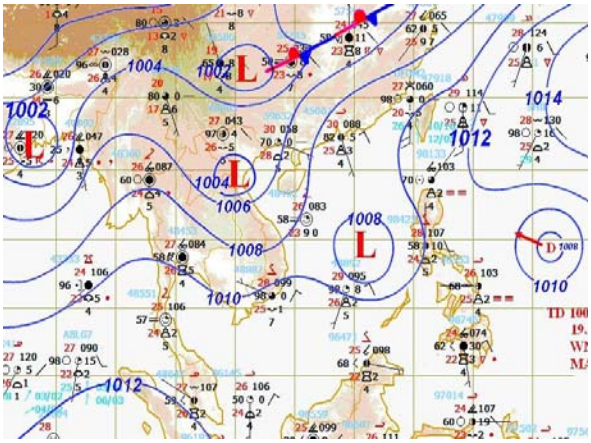


Figure 2: Weather map for 11 July 2010

South-West (SW) Monsoon

SW monsoon prevailed over Andaman Sea, the Gulf of Thailand and was stationary during this week.

Inter Tropical Convergence Zone (ITCZ)

No ITCZ was observed during this week.

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

No Tropical Storm was observed in this week.

Other weather phenomena that affect the discharge

No other weather phenomena affecting the discharge were observed.

Over weather situation

A normal weather situation lasted during last week. Southwest monsoon prevailed over the Andaman Sea, Gulf of Thailand and was almost stationary. The trough of low pressure laid across Myanmar, Thailand, Lao PDR, Cambodia and Viet Nam at the surface. As the result of these phenomena, scattered to moderate thundershowers occurred in Myanmar, Thailand, Cambodia, Viet Nam and in the LMB.

General behaviour of the Mekong River

Water levels along the Lower Mekong River were generally low and all of forecats stations were recording levels that are somewhat below long-term average and show a falling and rising trends in upper and middle reaches, respectively, of the LMB during this week. Meanwhile, water levels at stations in lower reach of the LMB from Phnom Penh to Koh Khel are more or less stable with a slightly rising trend toward of the end of the week in which water levels in downstream at Tan Chau and Chau Doc monitoring stations were fluctuated by tidal effect.

Water levels at all forecast stations in the mainstream were below long-term average from 2m to 3m during this time of the year.

For stations from Chiang Saen to Chiang Khan

Water levels were falling from the beginning to the middle of the week and then rising toward the end of the week. The stations were recording levels that were below long-term average for this time of the year.

For stations from Vientiane/Nongkhai to Savanakhet/Mukdahan

Water levels were falling from the beginning toward the end of the week. The stations were recording levels that were below long-term average for this time of the year.

For stations from Khong Chiam to Pakse

Water levels were rising from the beginning to the middle of the week and then falling toward the end of the week. The stations were recording levels that were below long-term average for this time of the year.

For stations from Stung Treng to Koh Khel

Water levels were more-or-less stable, slightly rising at the end of the week. All of the stations were recording levels that are below the long-term average level for this time of the year.

Stations Neak Luong, Tan Chau and Chau Doc

Water levels at these stations have been significantly affected by tidal regime and ther were rising from the middle to the end of the week. The stations were recording levels that are below the long-term average for this time of the year.

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

The situation of low water level could be explained by the following analysis of hydro-meteorological condition covered the end of 2009-2010 dry season and the beginning of 2010 flood season:

A. Meteorological condition (rainfall) of Mekong Basin at the beginning of 2010 flood season

At the end of 2009-2010 dry season the meteorological condition of some sub-catchments of the Mekong basin was very dry. The volume of rainfall on the sub-catchments of the northern and central parts of Lao PDR was lower than long-term average. The figures 1 to 4 indicate the accumulative rainfall at Luang Prabang, Vientiane, Pakse and Mahaxai stations where the quantity of rainfall was lower than average so it resulted a significant effect on the low flow condition in the Mekong mainstream and its tributaries.

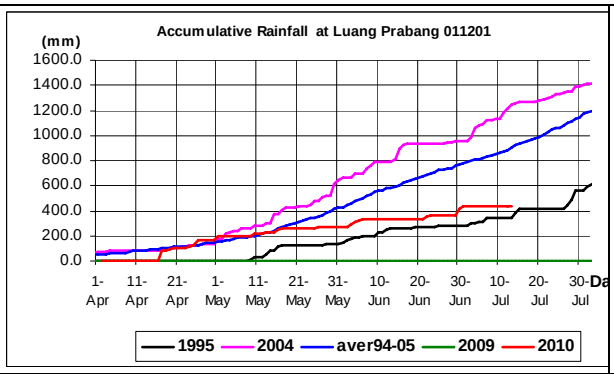


Figure 1: Rainfall accumulative at Luang Prabang

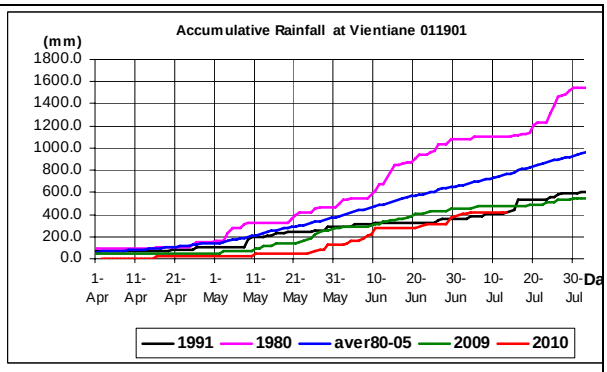


Figure 2: Rainfall accumulative at Vientiane

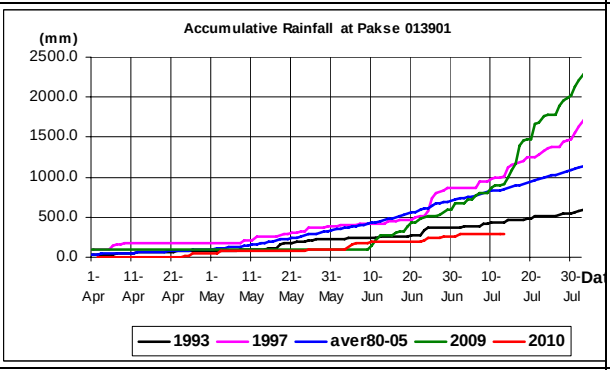


Figure 3: Rainfall accumulative at Pakse

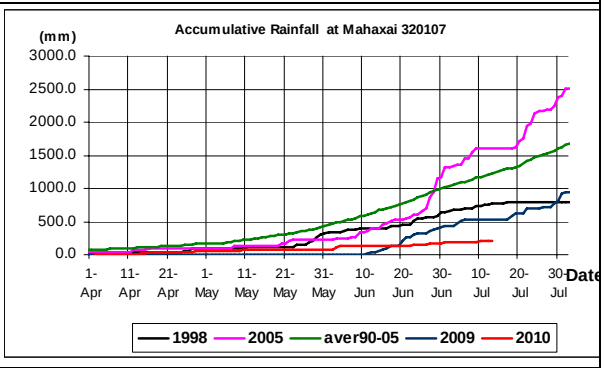


Figure 4: Rainfall accumulative at Mahaxai

B. Hydrological condition of the Mekong mainstream at the beginning of 2010 flood season

At the end of the 2009-2010 dry season the water levels for most of the main stations in the upper part of the Lower Mekong Basin were lower than long-term average. Through figures 5 to 10 showing the trend of water level for some stations such as Luang Prabang, Vientiane, Pakse that continue facing low level during the beginning of 2010 flood season.

Through figures 7 to 10 presenting the water level condition of stations on the mainstream from Luang Prabang to Neak Luong where the water level condition of some stations on the mainstream in the lower part of the Lower Mekong Basin was lower than long-term daily minimum level especially at several stations in the downstream such as in Stung Treng.

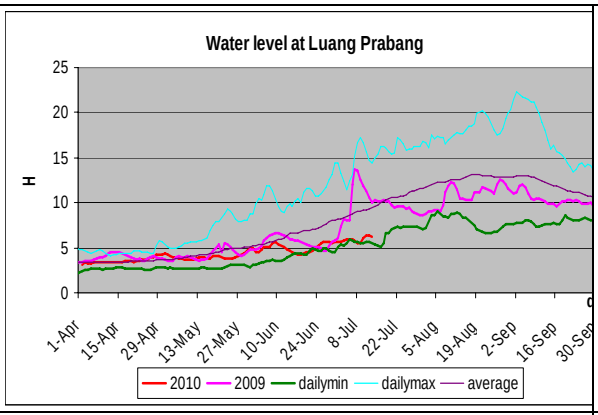


Figure 5: Water level at Luang Prabang

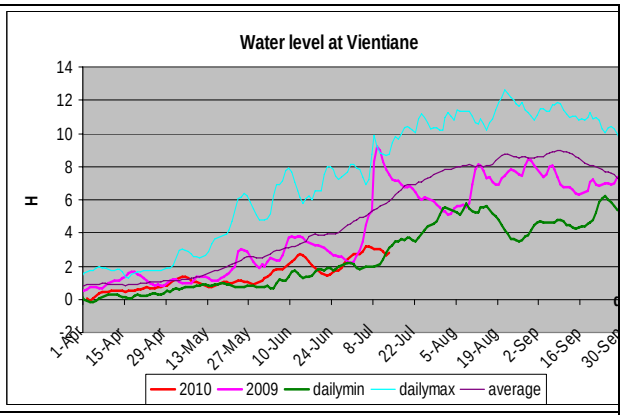


Figure 6: Water level at Vientiane

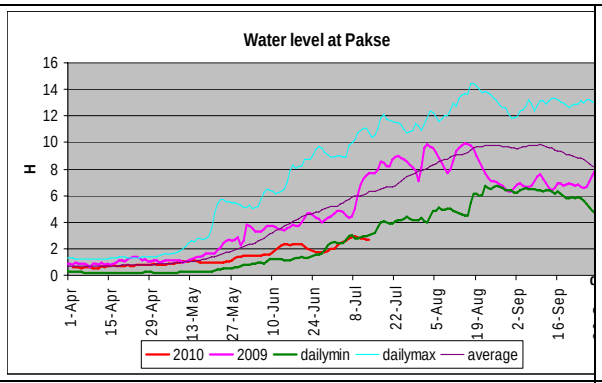


Figure 7: Water level at Pakse

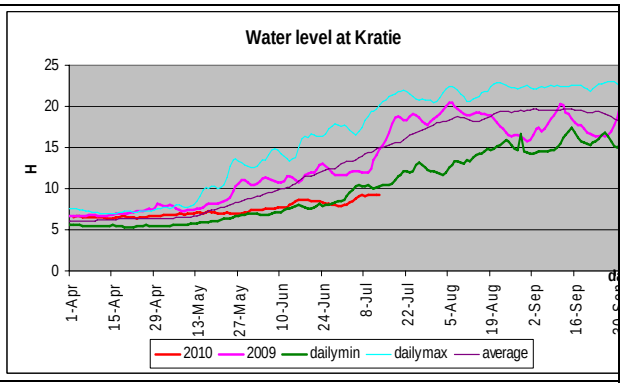


Figure 8: Water level at Kratie

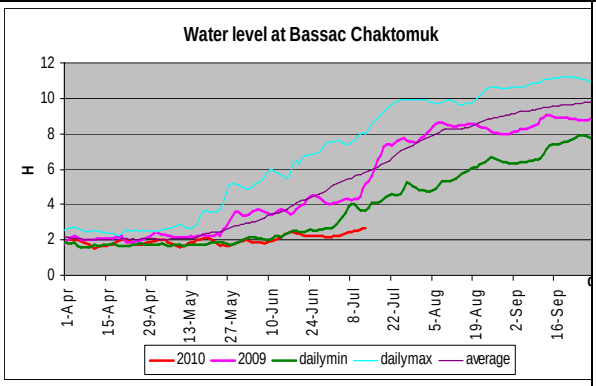


Figure 9: Water level at Chaktomuk (at 7:00 am)

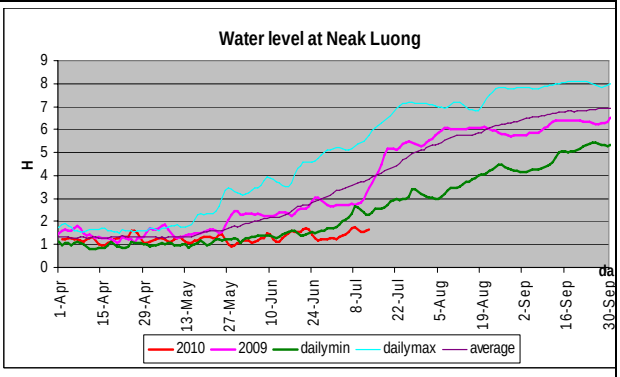


Figure 10: Water level at Neak Luong (at 7:00 am)

C. Hydrological condition of the Mekong tributaries at the beginning of 2010 flood season

Through hydrographs of hydrological stations at some tributaries of Lao PDR presented by figures 11 to 14 demostrated that due to the fact that low rainfall during the 2009-2010 dry season as well as the beginning of 2010 flood season, the hydrological condition of some key stations located at some main tributaries of the Mekong river in the northern, central and southern parts of Lao PDR was lower than long-term average and some stations even lower than long-term minimum daily water level especially for the stations located at tributaries of southern part of Lao PDR.

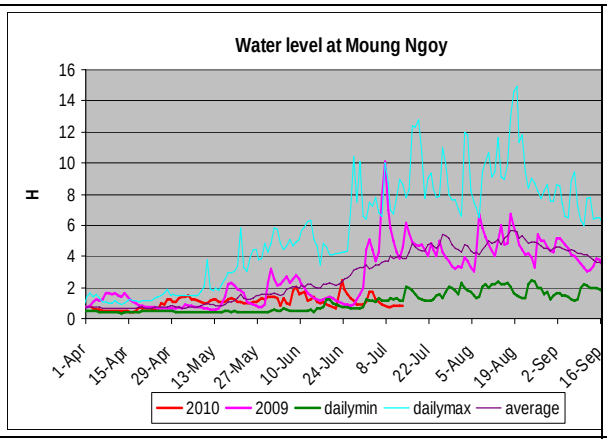


Figure 11 : Water level at Moung Ngoy (Nam OU)

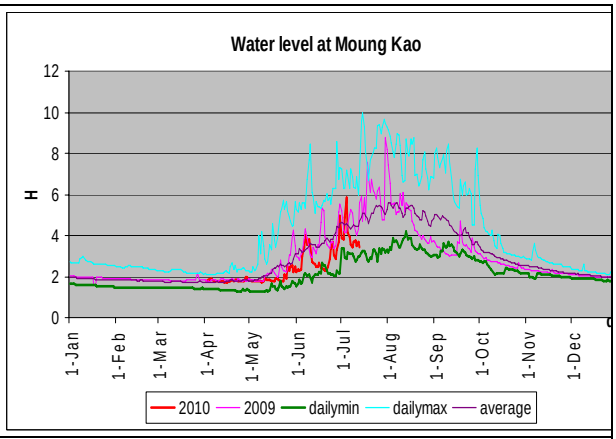


Figure 12: Water level at Moung Kao (Nam Sane)

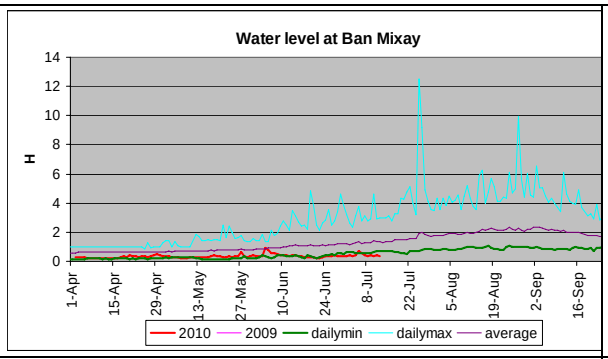


Figure 13: Water level at Ban Mixay (Nam Khan)

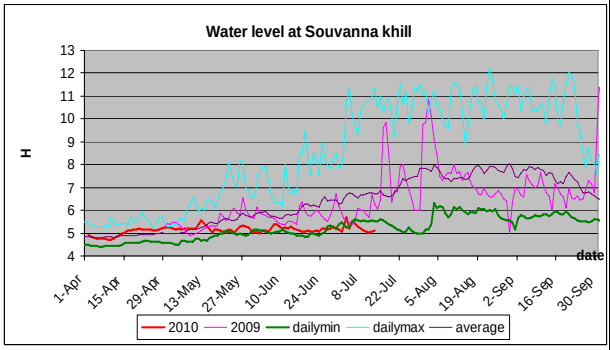


Figure 14 : Water level at Souvanna Khill (Sedone)

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 significanlyt 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

2010	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
05/07	537.05	3.51	5.88	6.28	3.36	3.90	5.75	3.85	5.00	3.72	2.09	3.64	2.62	3.48	8.78	3.96	2.29	1.30	2.22	1.44	1.37	0.10	0.00
06/07	537.16	3.28	5.92	6.27	3.16	4.02	5.82	3.79	5.03	3.83	2.24	3.80	2.74	3.53	9.10	4.21	2.34	1.36	2.25	1.55	1.41	0.30	0.20
07/07	536.08	3.49	5.80	6.18	3.13	4.04	5.68	3.77	5.00	3.78	2.35	3.94	2.83	3.48	9.18	4.42	2.43	1.47	2.36	1.72	1.54	0.53	0.46
08/07	537.35	4.13	5.54	6.14	3.05	3.94	5.52	3.74	4.96	3.77	2.42	3.95	2.97	3.55	9.13	4.46	2.45	1.57	2.39	1.74	1.58	0.78	0.78
09/07	537.05	3.94	5.52	6.13	3.02	3.91	5.00	3.59	4.81	3.72	2.49	3.94	2.86	3.58	9.24	4.47	2.48	1.60	2.42	1.66	1.61	0.86	0.88
10/07	536.51	4.01	6.14	5.93	3.02	3.88	5.51	3.49	4.70	3.60	2.49	3.90	2.71	3.57	9.30	4.55	2.53	1.66	2.48	1.53	1.67	0.78	0.83
11/07	536.47	3.74	6.36	5.75	2.86	3.76	5.32	3.45	4.67	3.52	2.48	3.80	2.56	3.59	9.30	4.59	2.57	1.70	2.53	1.52	1.75	0.71	0.76
12/07	536.44	3.59	6.34	6.07	2.68	3.67	5.28	3.35	4.56	3.49	2.39	3.75	2.44	3.55	9.31	4.61	2.64	1.75	2.58	1.62	1.79	0.60	0.64
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

2010	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
05/07	0.0	0.0	0.0	3.0	0.0	4.8	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	3.6	5.0		0.0	0.0	4.2	14.0	0.0
06/07	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	0.0	0.0	0.0		3.6	22.4	0.0	1.0	5.0
07/07	0.0	4.7	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0		0.0	23.8	0.0	10.0	0.0
08/07	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	0.0	0.0	0.0		0.0	0.0	0.0	0.0	16.0
09/07	0.0	20.0	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	0.0		0.0	0.0	0.0	0.0	0.0
10/07	0.0	0.0	0.0	0.7	5.8	0.0	0.0	48.7	27.6	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0		0.0	12.2	0.0	0.0	14.0
11/07	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	0.0	3.0	2.2		0.0	0.0	0.0	0.0	0.0
12/07	6.0	2.2	0.0	0.0	0.0	0.0	0.2	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.4	0.4		0.0	0.0	0.0	0.0	1.0

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

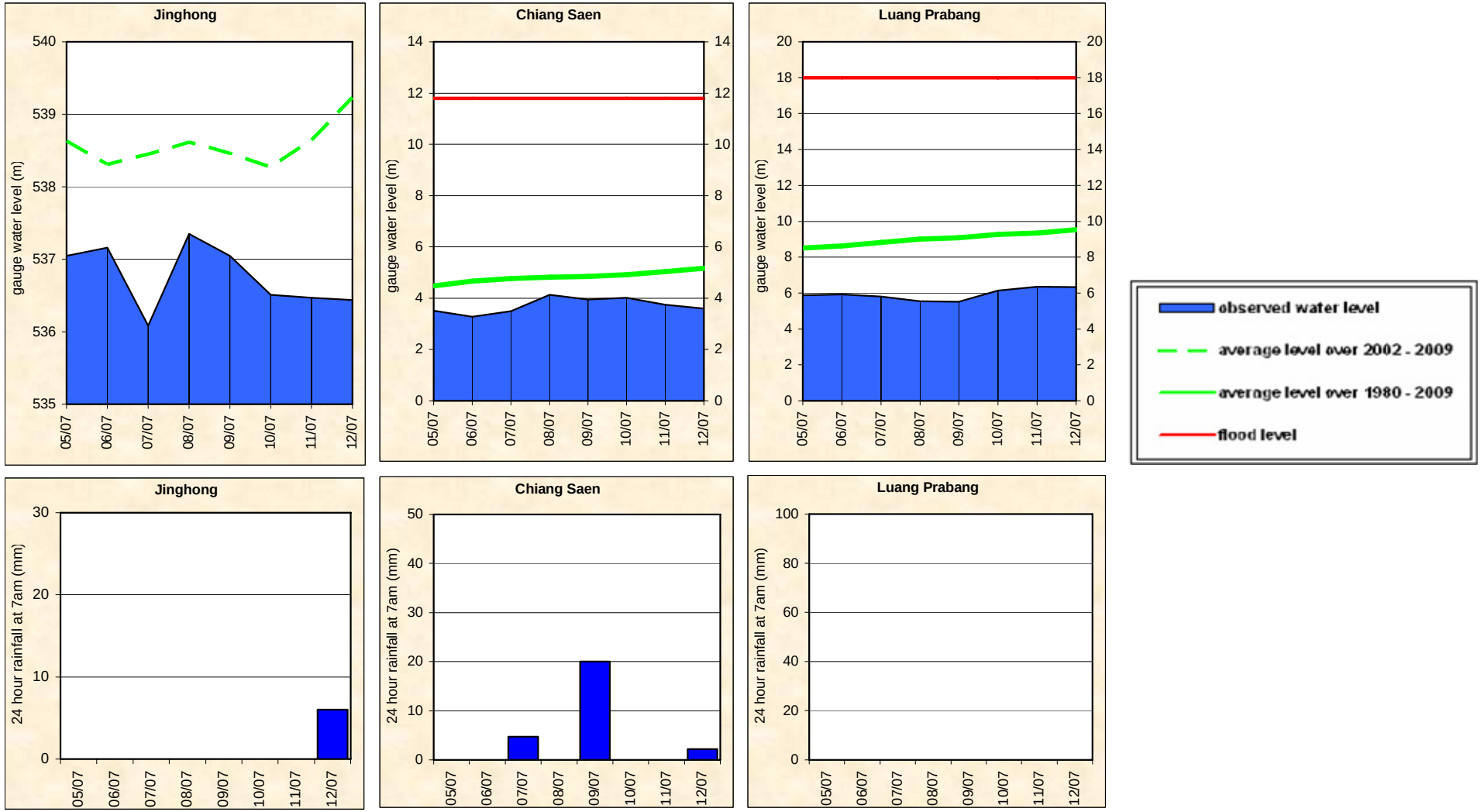


Figure A2: Water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

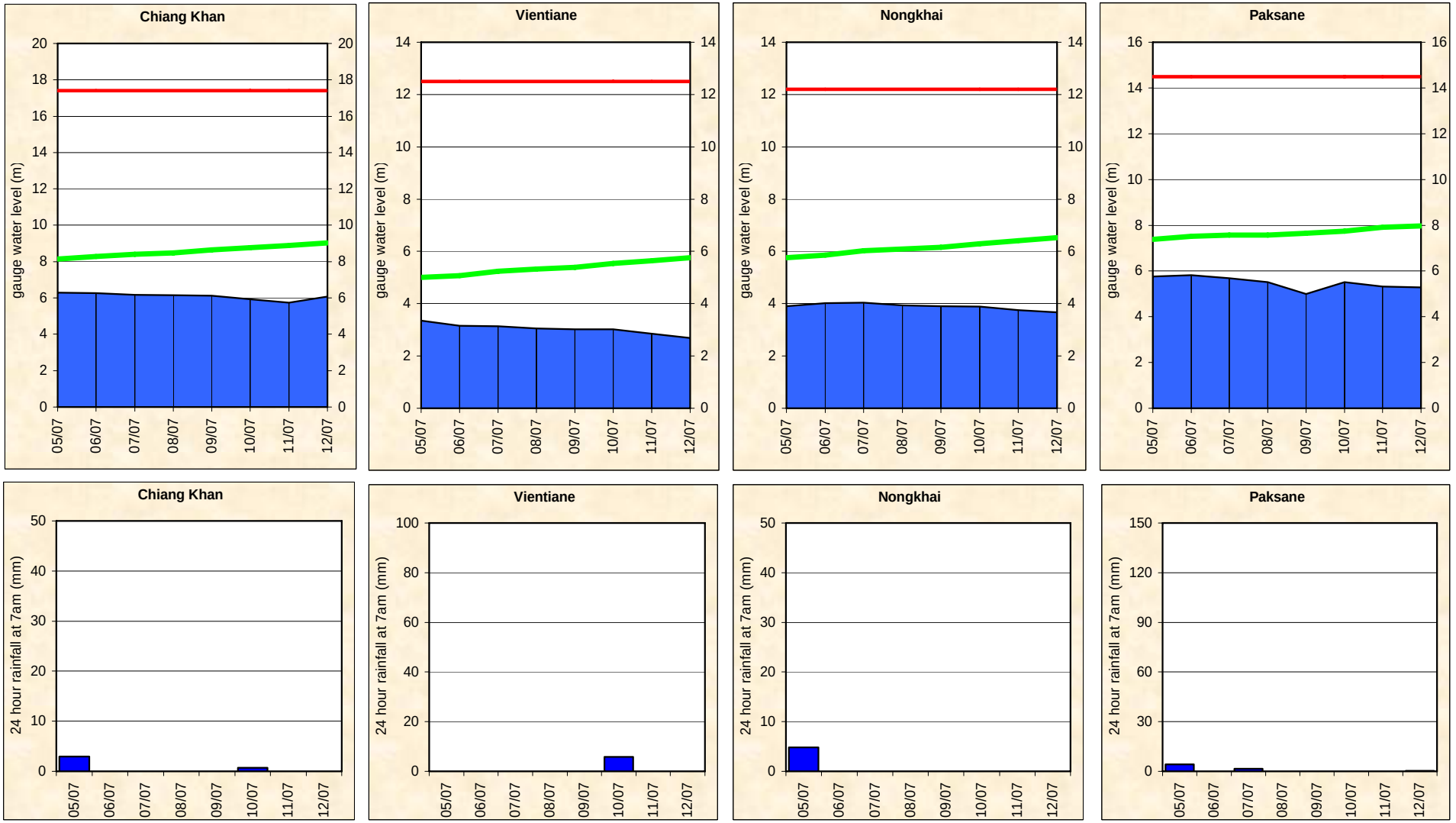


Figure A3: Water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

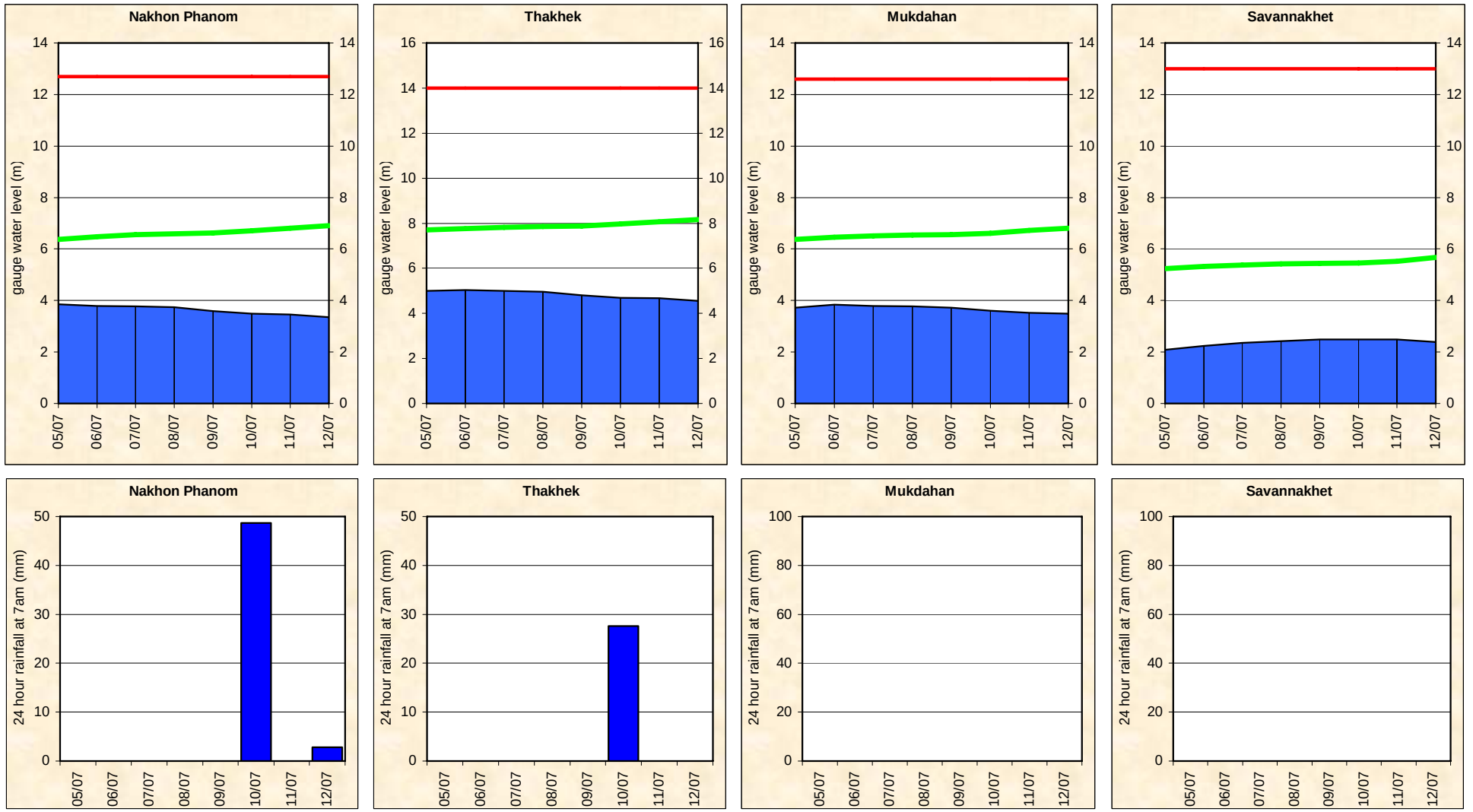


Figure A4: Water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

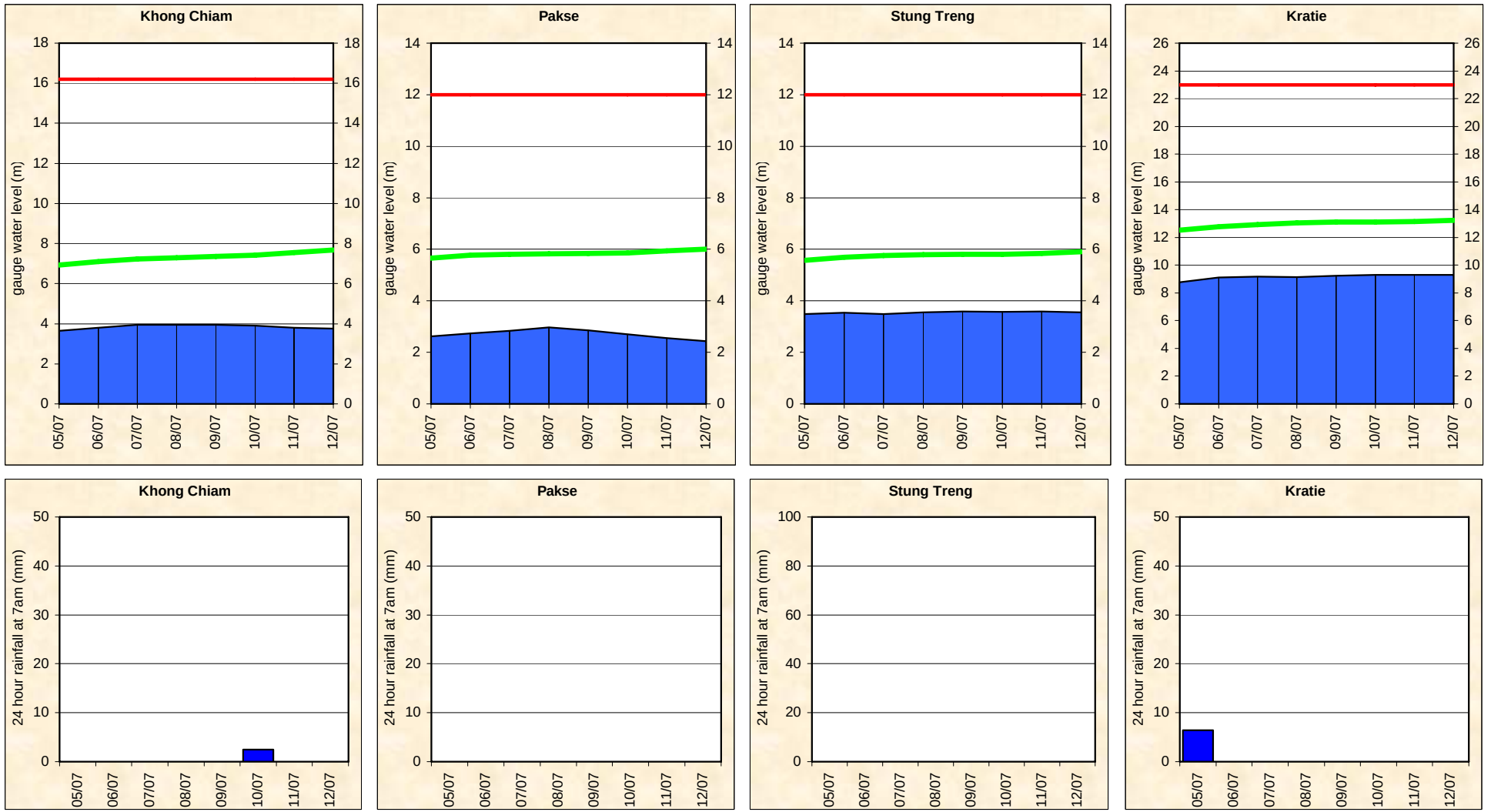


Figure A5: Water level and rainfall for Kampong Cham, Phnom Penh (Bassac and Port), and Koh Khel

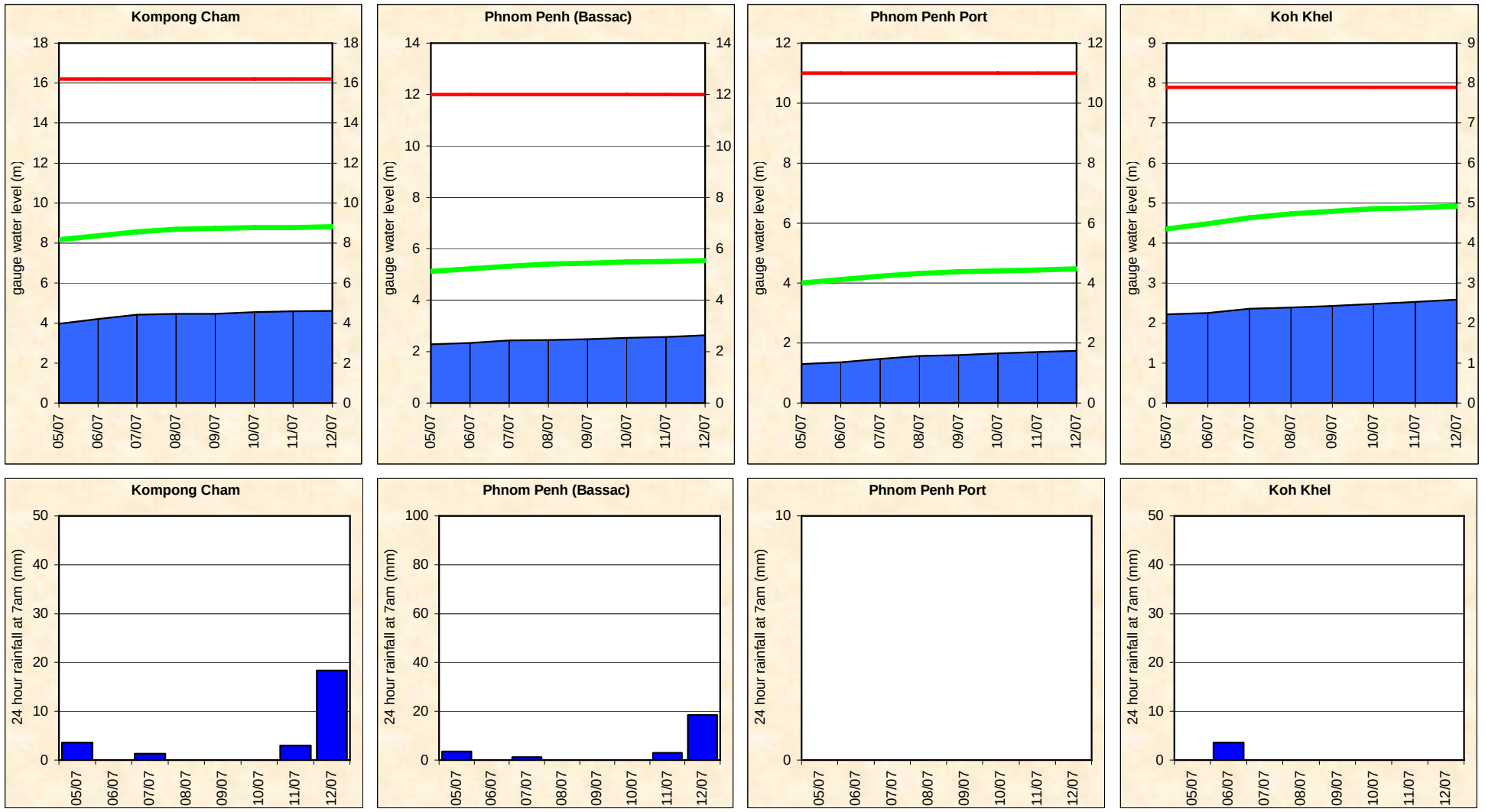
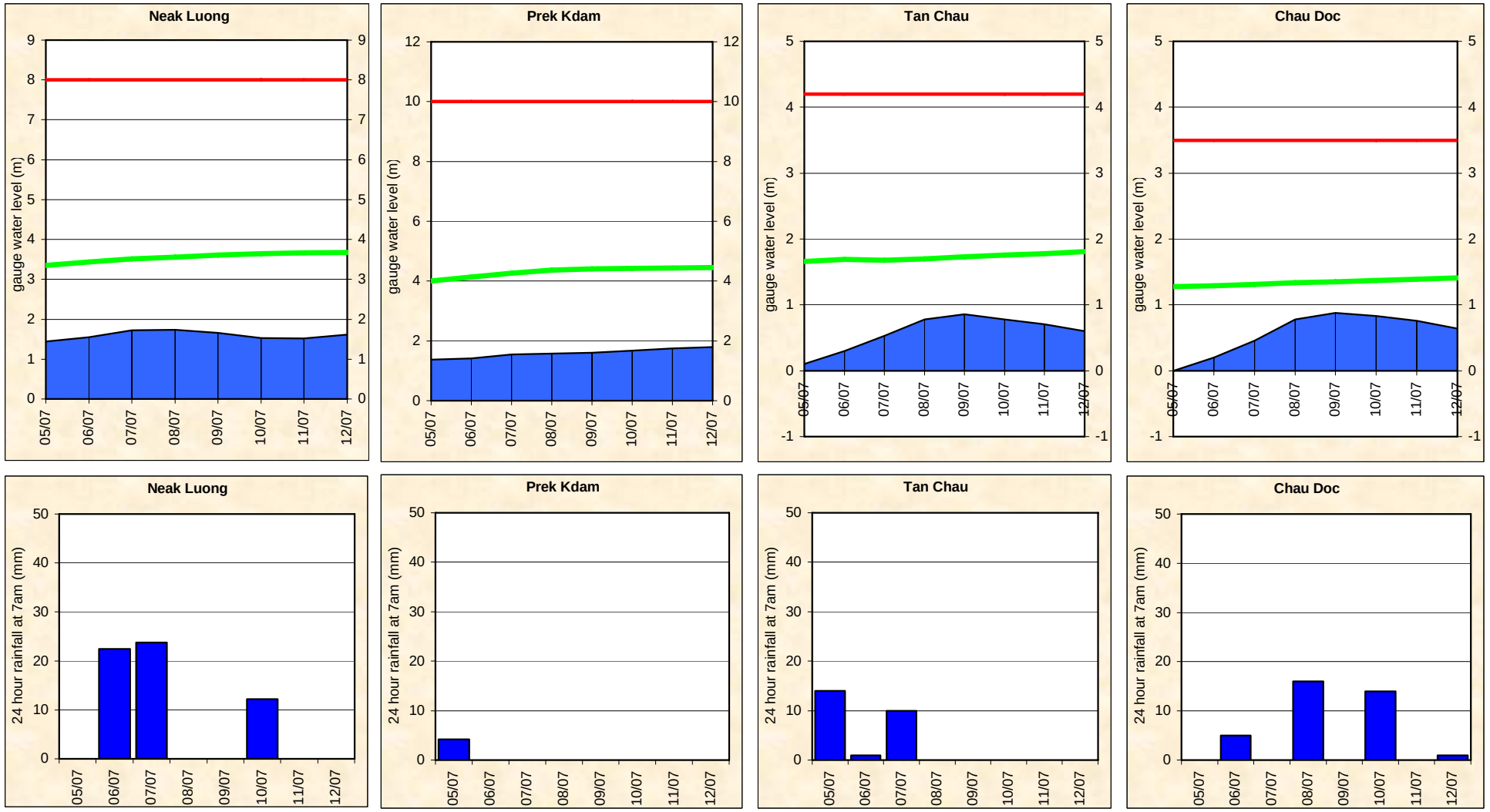


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



Annex B: Accuracy and performance

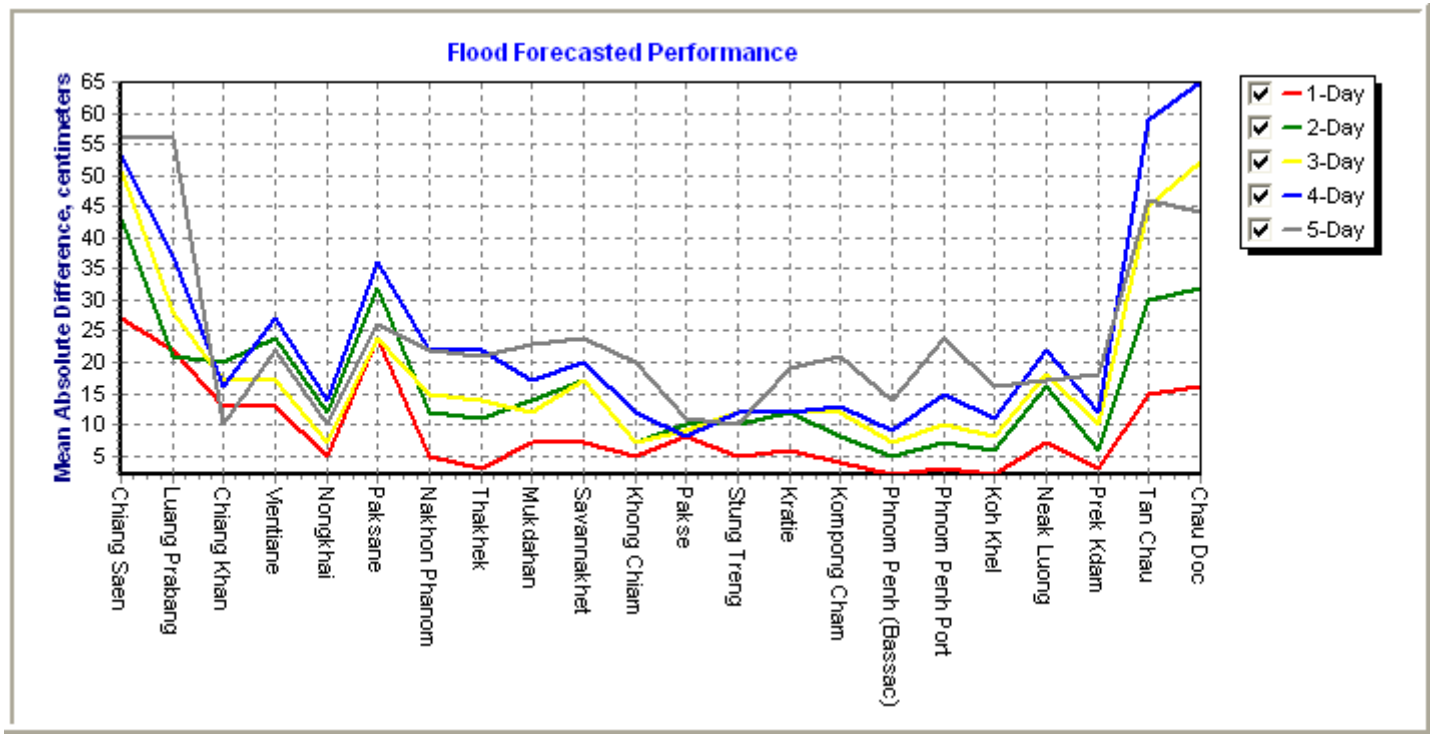
Accuracy

"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 the known biases in input data, the knowledge of model response and the experience with hydrometeorological conditions of the Mekong River Basin. The information presented as a graph below shows 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 accuracy for 1-day to 5-day forecasts at Tan Chau and Chau Doc were worse than normal. In general, the overall accuracy is pretty good for all forecast lead time at stations from Chiang Sean to Prekdam.

The above differences are due to 2 main factors: (1) internal model functionality in forecasting for tidal influence stations; for which the parameter adjustment in the model is not possible; (2) the knowledge and experience of forecaster-in-charge in adjusting the forecast results taking into account the tidal affects for the most downstream 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	100.0	100.0	50.0	33.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	66.7	100.0	100.0	100.0	100.0	83.3	100.0	83.3	83.3	*90.9*
2-day	100.0	100.0	60.0	60.0	60.0	20.0	80.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	80.0	80.0	100.0	60.0	60.0	*84.5*
3-day	75.0	100.0	100.0	100.0	75.0	50.0	75.0	100.0	75.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0	*84.1*
4-day	66.7	100.0	100.0	66.7	33.3	66.7	33.3	66.7	66.7	66.7	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0	*75.8*
5-day	100.0	100.0	100.0	100.0	100.0	100.0	50.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0	*88.6*

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

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)						
2010	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	*10:34*	*0*	*-*	*6*	*08:12*	*-*	*07:53*	*08:07*	*08:29*	*08:20*	*07:34*	*0*	*0*	*1*	*221*	*146*	*5*	*61*
month	*10:28*	*0*	*-*	*1*	*08:12*	*-*	*07:54*	*08:07*	*08:26*	*08:15*	*07:25*	*0*	*0*	*1*	*119*	*88*	*5*	*31*
season	*10:43*	*0*	*-*	*28*	*08:13*	*-*	*08:14*	*08:20*	*08:42*	*08:25*	*07:32*	*0*	*0*	*23*	*834*	*578*	*16*	*237*

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.

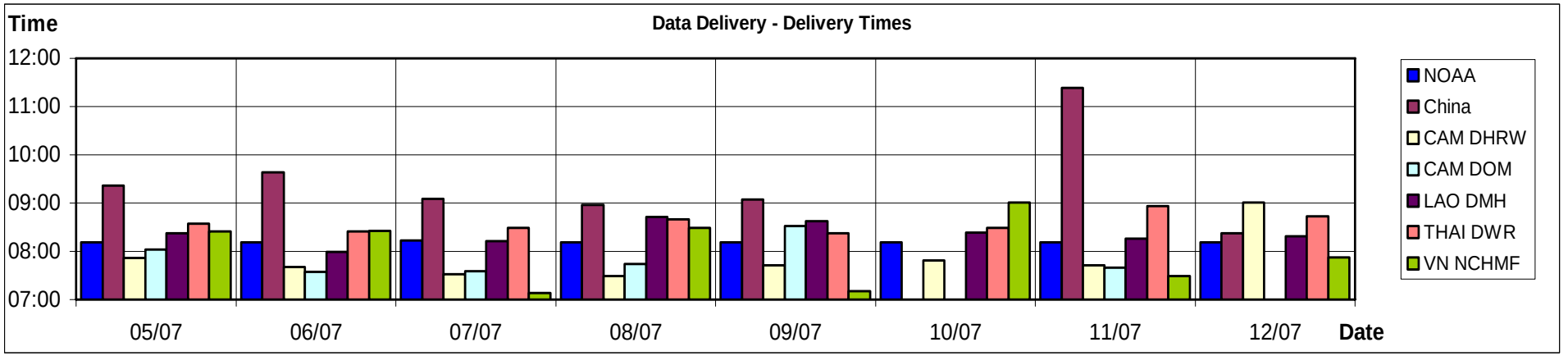


Figure B2: Data delivery times for the past 8 days including the current report date

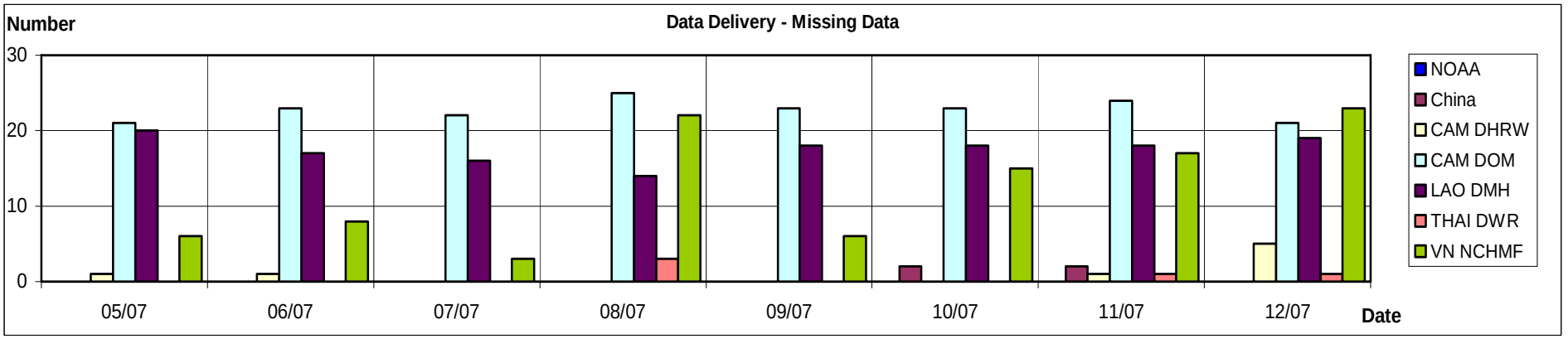


Figure B3: Missing data for the past 8 days including the current report date

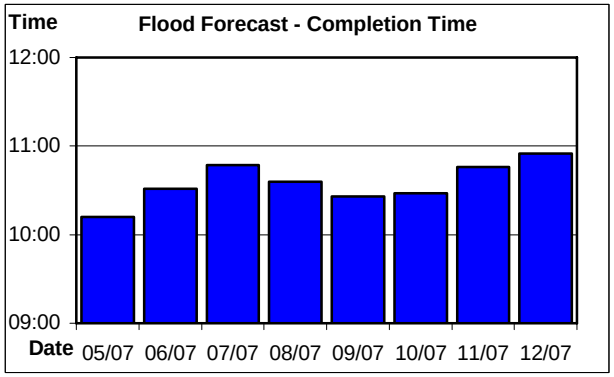


Figure B4: Flood forecast completion time

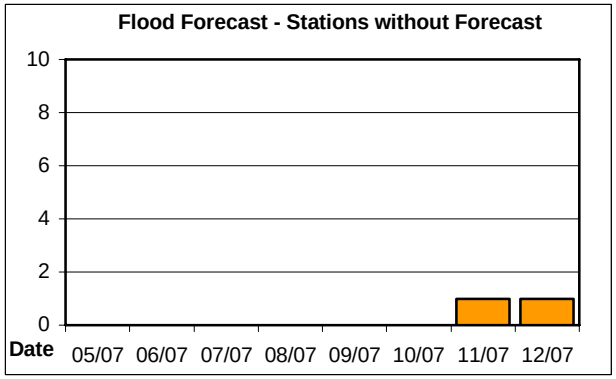


Figure B5: Flood forecast stations without forecast

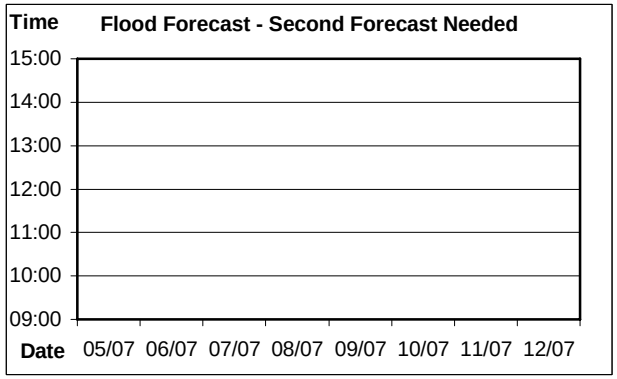


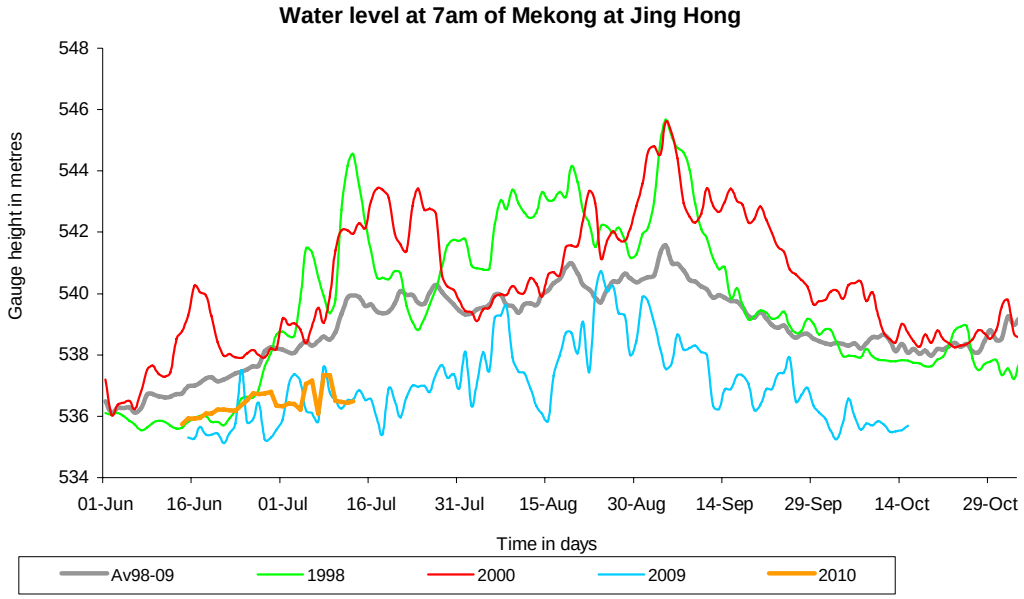
Figure B6: Second forecast needed

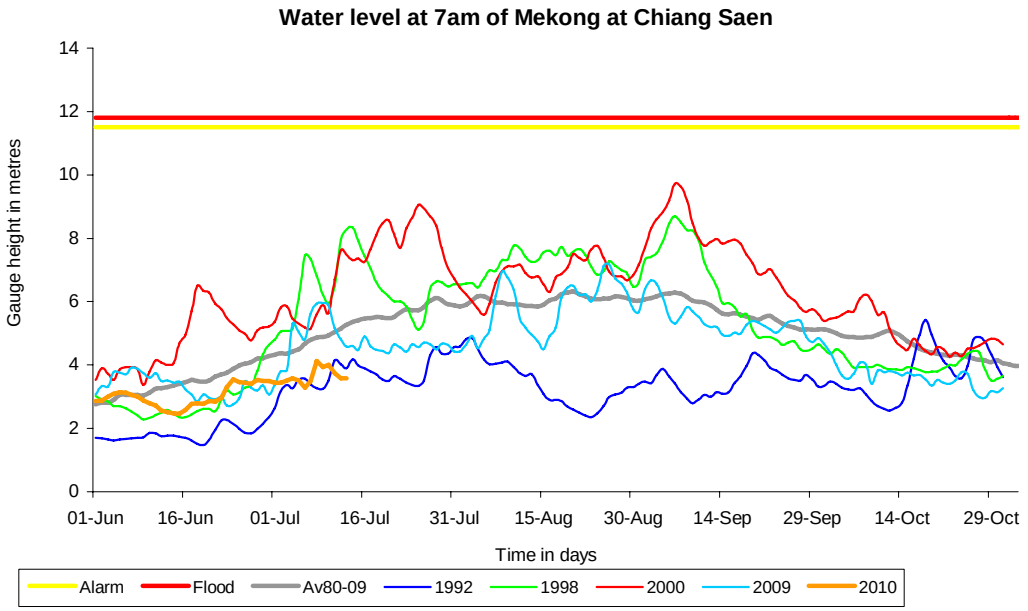
Annex C: Season Water Level Graphs

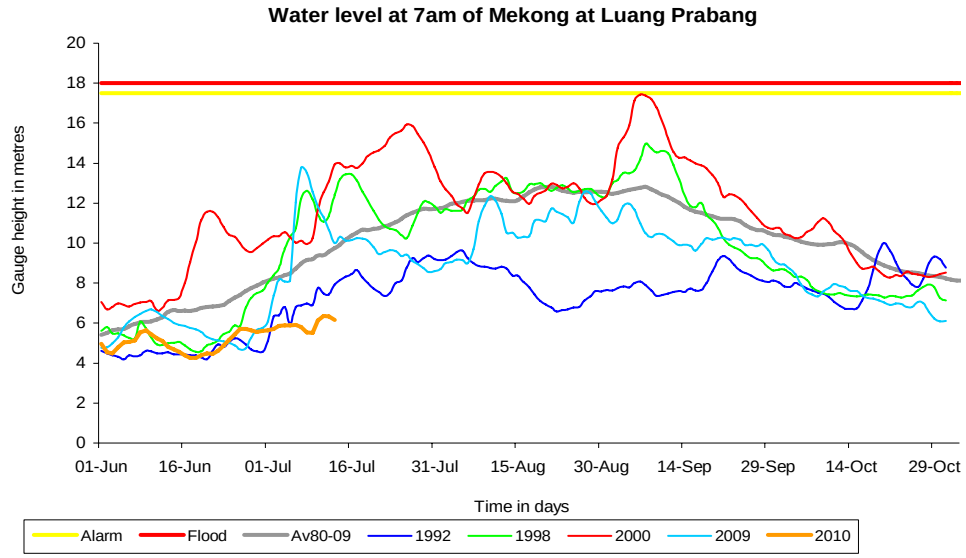
This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

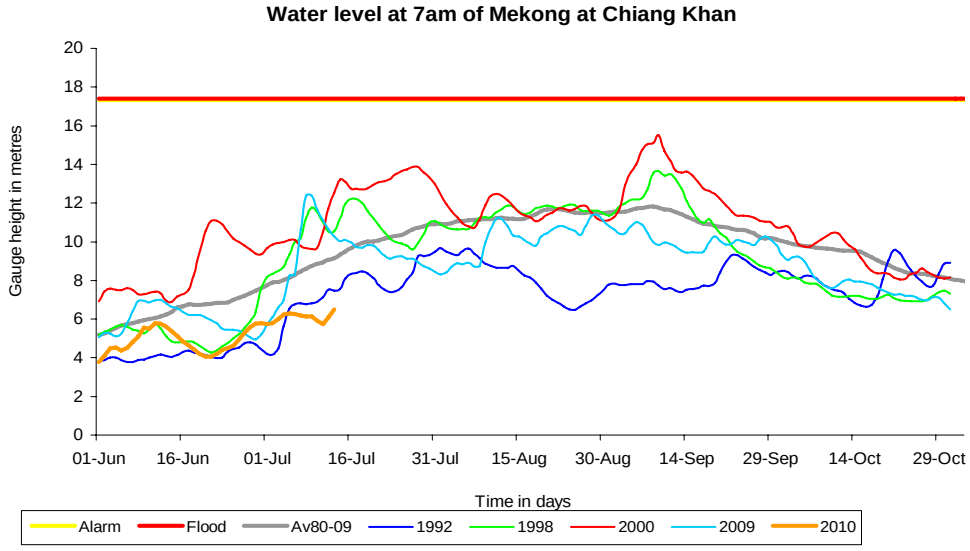
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS

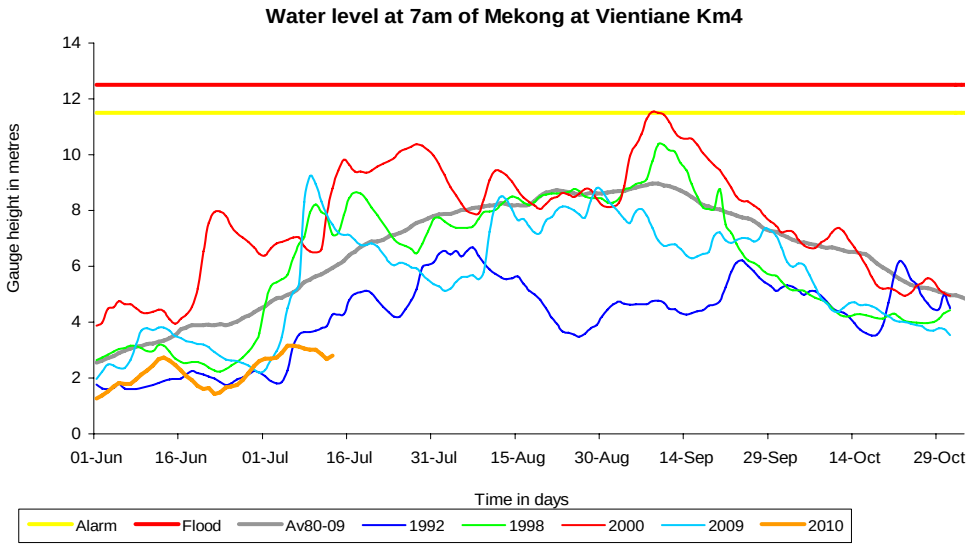
IN WET SEASON FROM 1 JUNE TO 31 OCTOBER

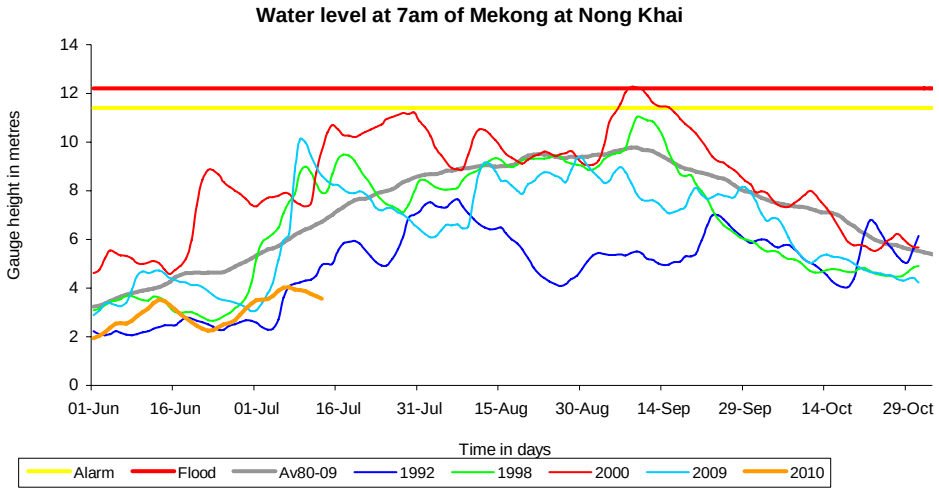


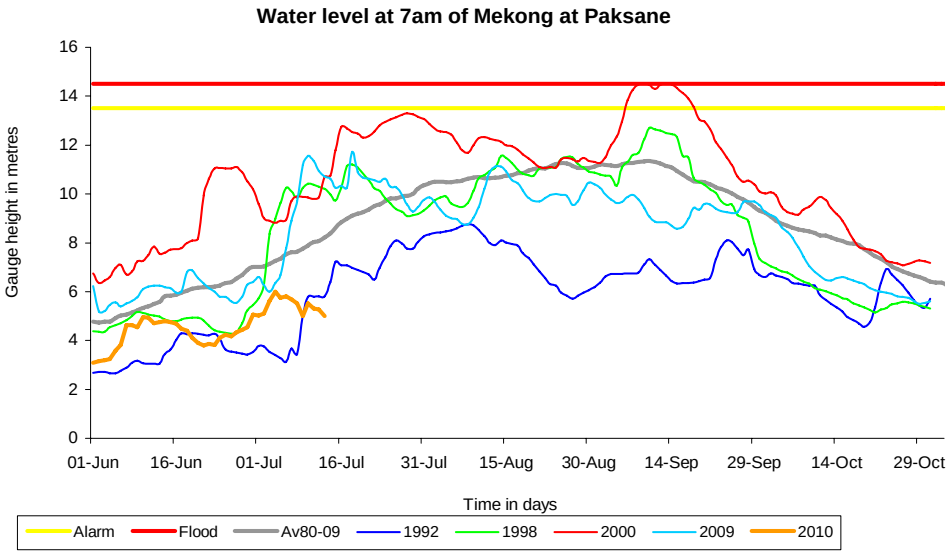


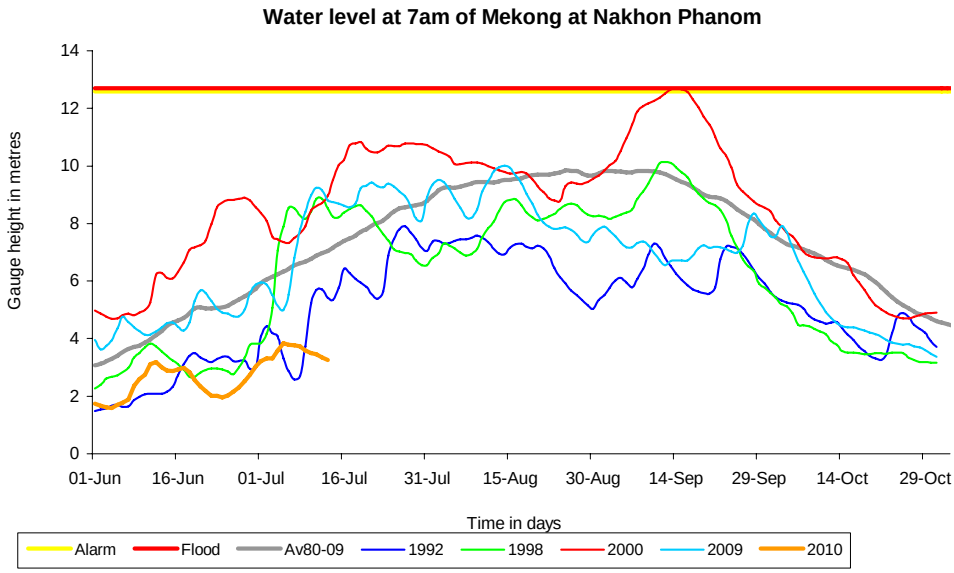

Water level at 7am of Mekong at Luang Prabang
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010

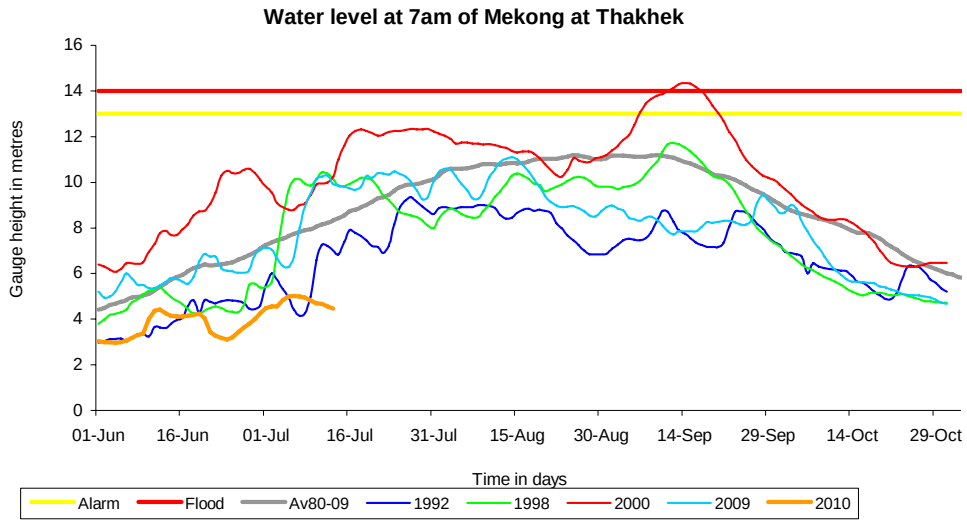

Water level at 7am of Mekong at Chiang Khan
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010

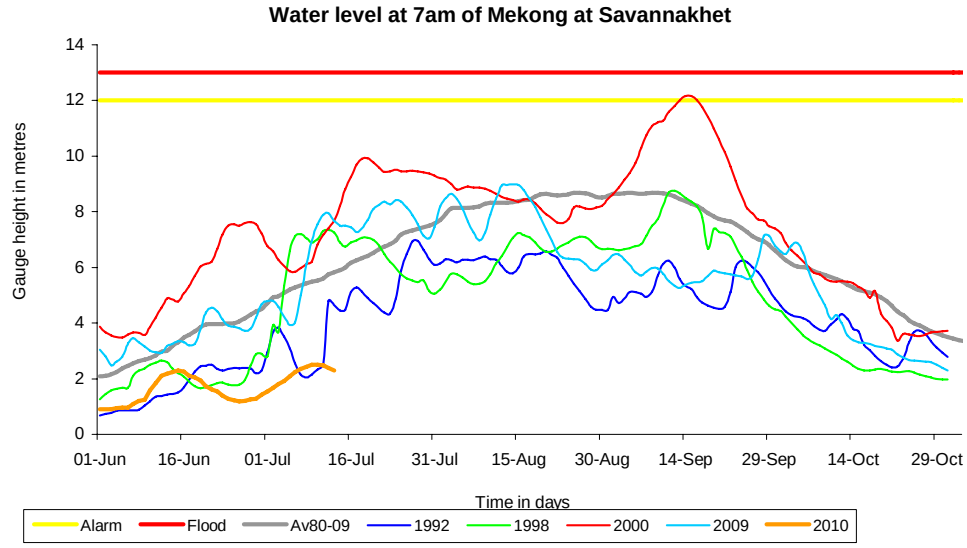

Water level at 7am of Mekong at Vientiane Km4
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010

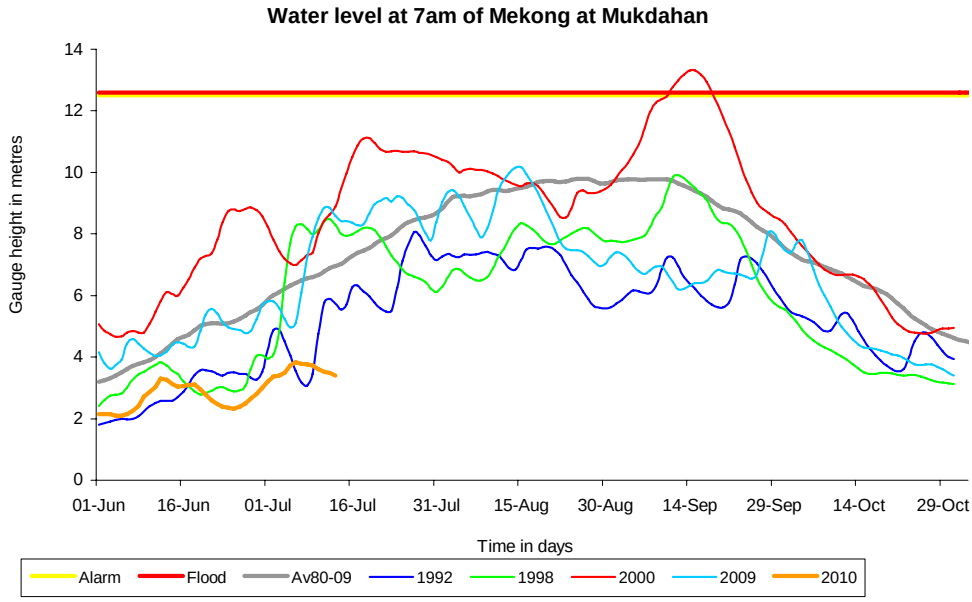

Water level at 7am of Mekong at Nong Khai
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


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
Av80-09
1992
1998
2000
2009
2010

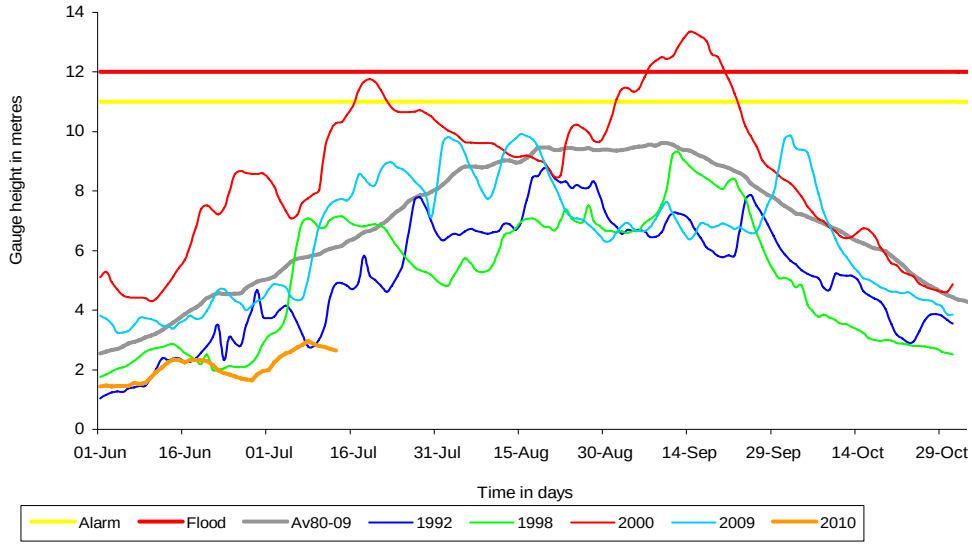

Water level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


Water level at 7am of Mekong at Thakhek
Gauge height in metres
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
Av80-09
1992
1998
2000
2009
2010

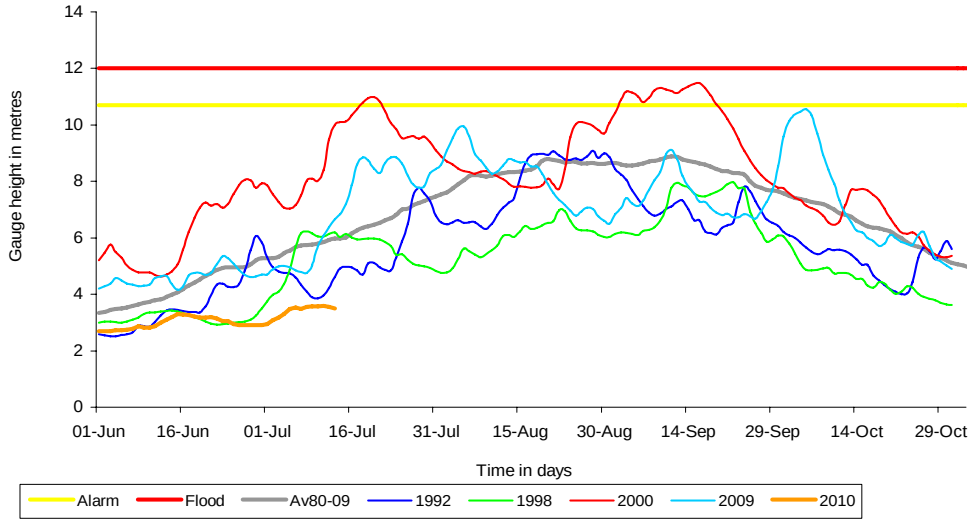

Water level at 7am of Mekong at Savannakhet
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


Water level at 7am of Mekong at Mukdahan
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
Av80-09
1992
1998
2000
2009
2010

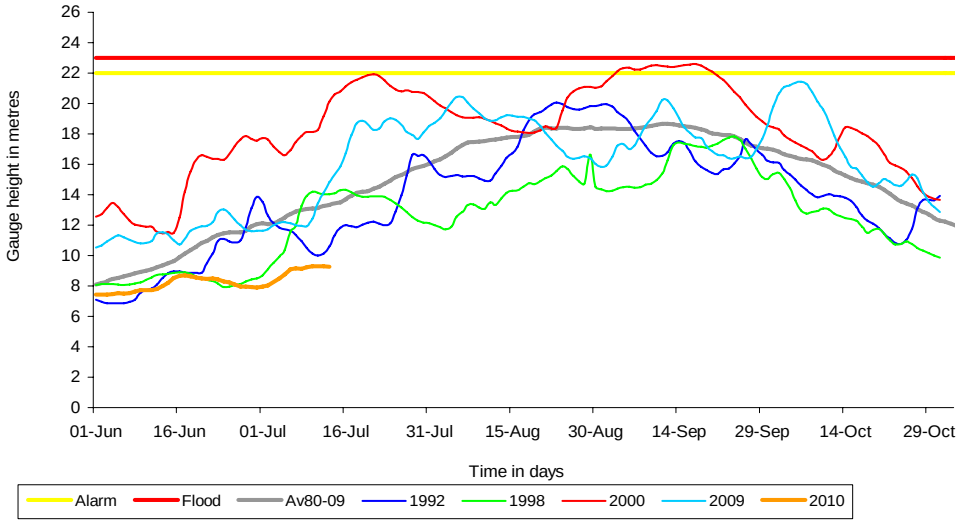
Water level at 7am of Mekong at Paksé



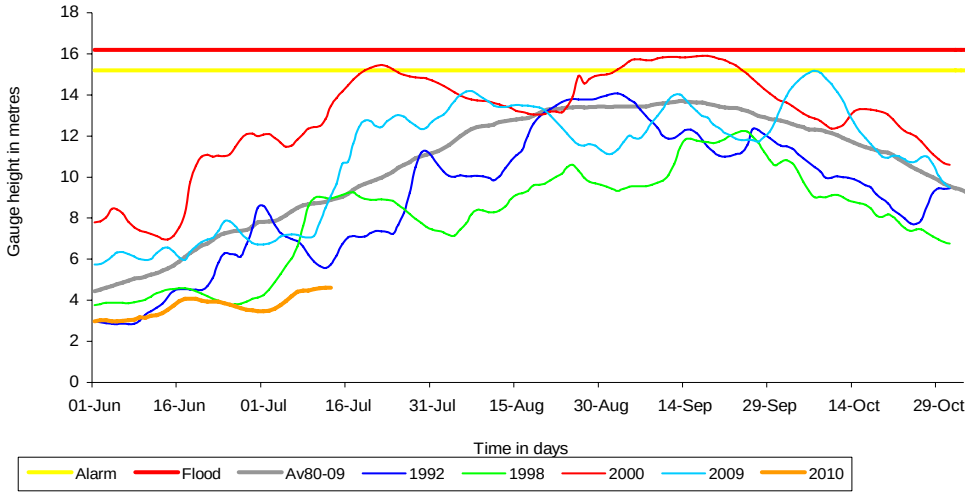
Water level at 7am of Mekong at Stung Treng



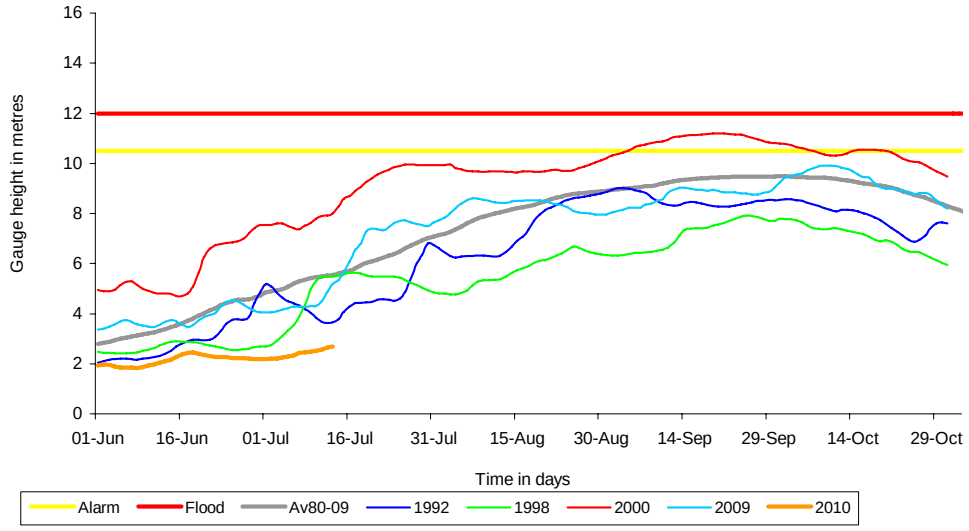
Water level at 7am of Mekong at Kratie



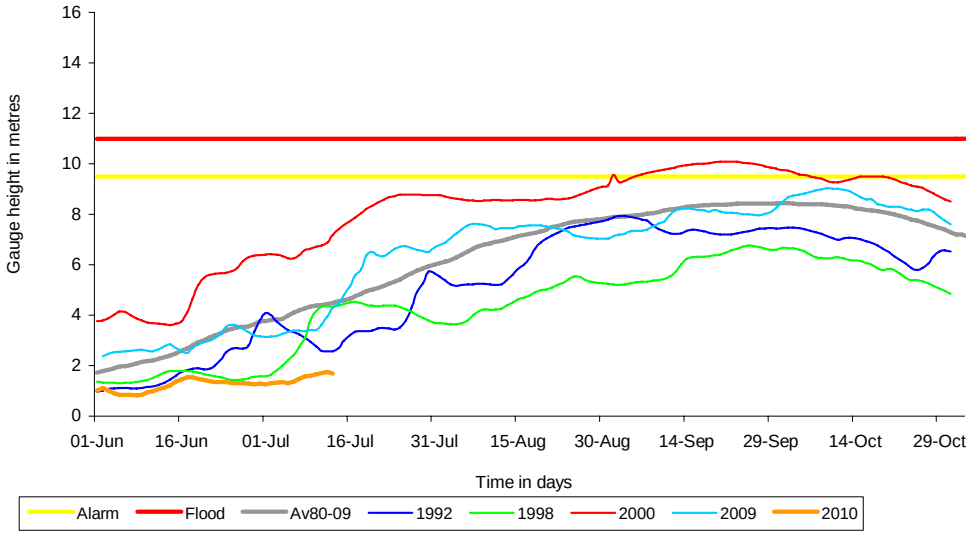
Water level at 7am of Mekong at Kompong Cham

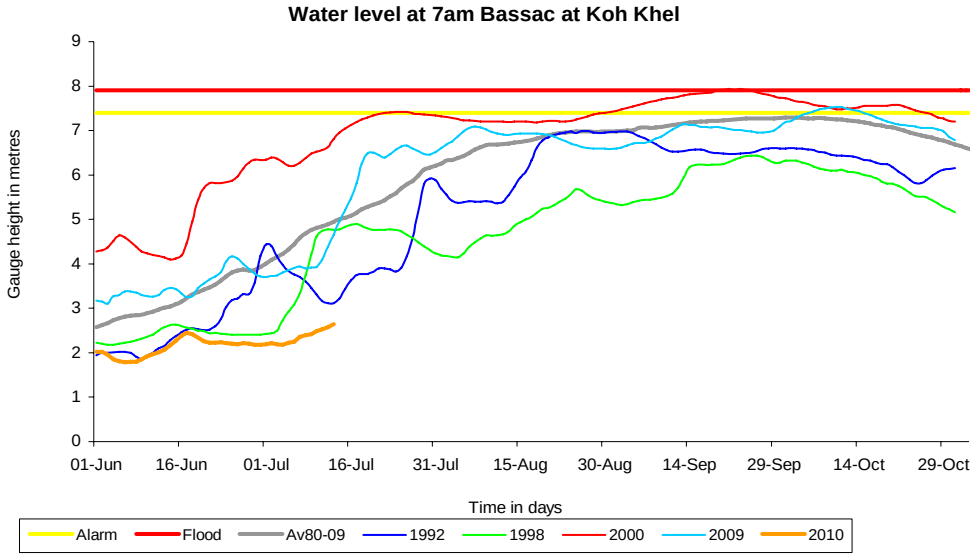


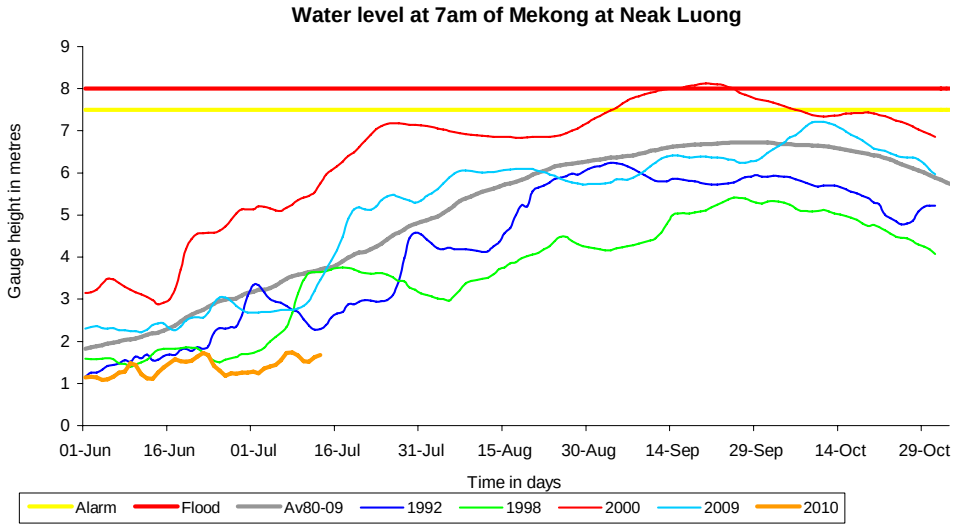
Water level at 7am of Bassac at Phnom Penh

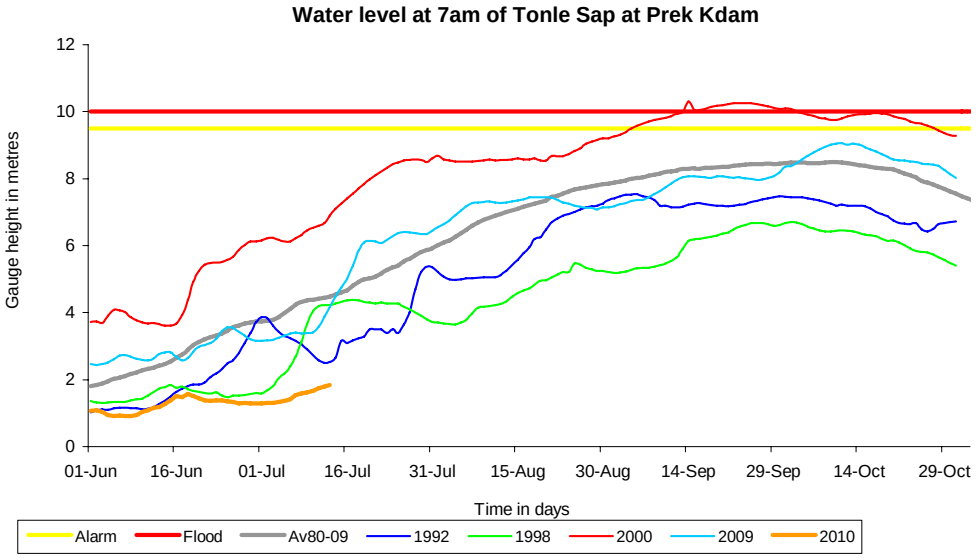


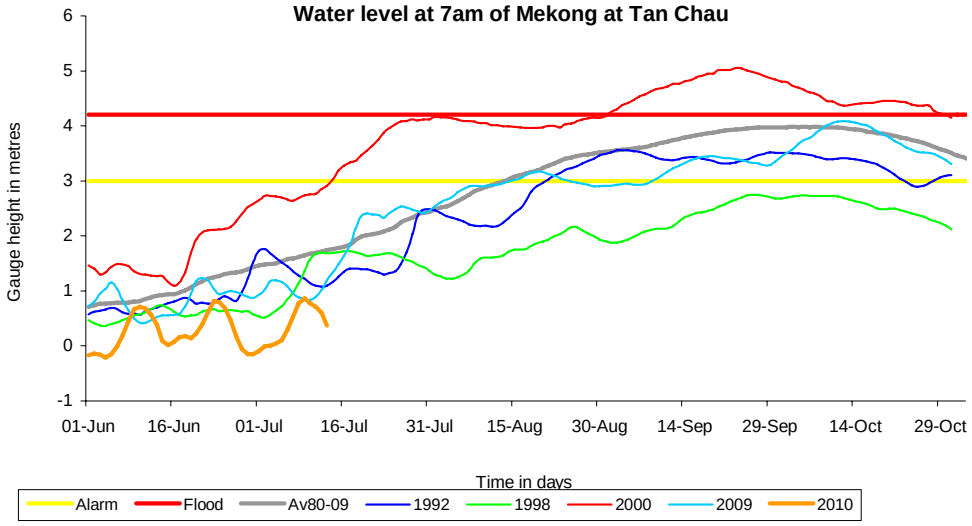
Water level of Tonle Sap at Phnom Penh Port

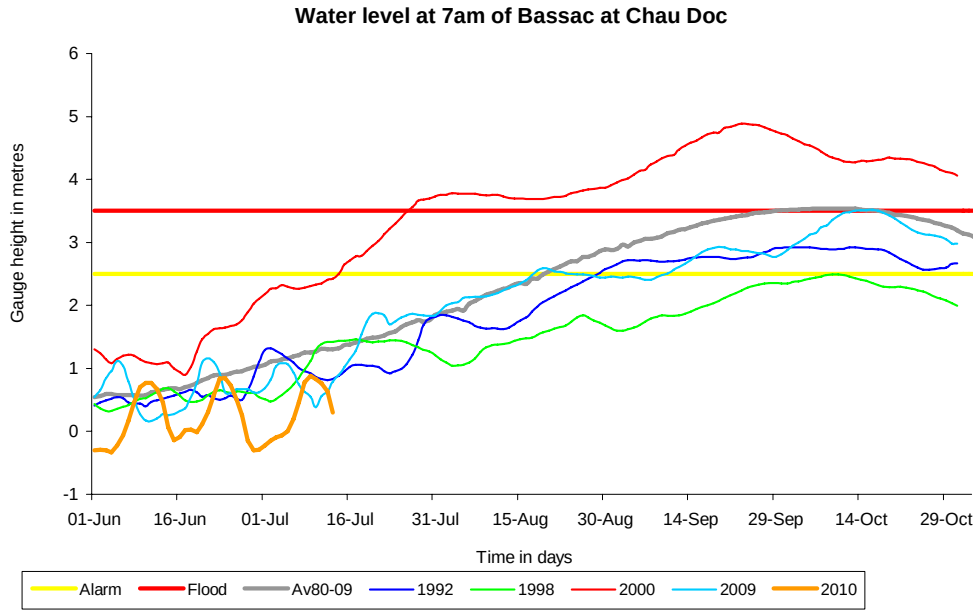



Water level at 7am Bassac at Koh Khel
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


Water level at 7am of Mekong at Neak Luong
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


Water level at 7am of Tonle Sap at Prek Kdam
Gauge height in metres
0
2
4
6
8
10
12
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


Water level at 7am of Mekong at Tan Chau
Gauge height in metres
6
5
4
3
2
1
0
-1
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
Av80-09
1992
1998
2000
2009
2010


Water level at 7am of Bassac at Chau Doc
Gauge height in metres
6
5
4
3
2
1
0
-1
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
Av80-09
1992
1998
2000
2009
2010