Mekong River Commission

Regional Flood Management and Mitigation Centre

Weekly Flood Situation Report for the Mekong River Basin

Prepared on: 20/09/2010, covering the week from the 13th to the 19th September 2010

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

General weather patterns

During the week of the 13th to the 19th September 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 13th to the 19th September bulletins are shown below:

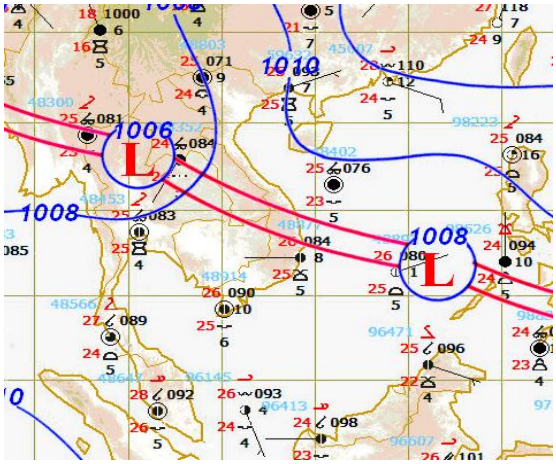


Figure 1: Weather map of 13 September 2010

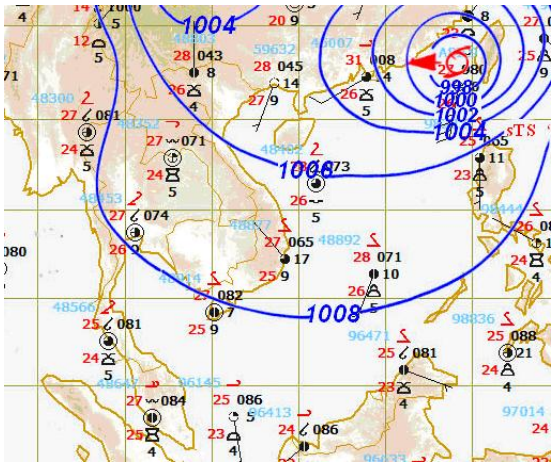


Figure 2: Weather map of 19 September 2010

From Strong to weak South-West (SW) Monsoon

From the 14th to the 17th September, intensive SW monsoon trough laid across Myanmar, Thailand, Lao PDR, Cambodia, Viet Nam and expanded to the middle and lower parts of LMB at the surface. It was weakening from 18th September toward the end of the week.

Inter Tropical Convergence Zone (ITCZ)

ITCZ occurred from the 13th to the 18th September and laid across lower part of LMB, Myanmar, Thailand, southern part of Lao PDR, and Viet Nam in most of the mornitoring period.

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

During last week, a super Tropical Storm (sTS) named ***"FANAPI"*** (1011), which was formed in the south of Okinawa, Japan on 15th September, was moving closely to mainland of China with its speed of 14.8 km/h after passing through the Taiwain island on 19th September (figure 2). It had no influence at all to the LMB.

Other weather phenomena that affect the discharge

No other weather phenomena affecting the discharge were observed.

Overall weather situation

ITCZ and the intensive monsoon trough were observed during last week. Moreover, the active streamline trough of low pressure laid across the lower part of LMB, Myanmar, Thailand, Lao PDR, Cambodia and Viet Nam at the height of 1.5km (850 hPa). As the result of these phenomena, moderate thundershower to heavy rain occurred in Myanmar, Thailand, Lao PDR, Cambodia, Viet Nam and Lower Mekong Basin (LMB) particularly in the middle and lower parts of LMB, upper and middle parts of Thailand, lower part of Viet Nam and Cambodia.

General behaviour of the Mekong River

Water levels at stations in the upper and middle reaches of LMB were somewhat around or slightly over the long-term average while water levels at stations in lower reach were below the long-term average for this time of the year. Water level at stations in the upper and middle reaches of the LMB were rising during the beginning and the mid of the week and then more-or-less stable toward the end of the week while water levels at stations in the lower reach were more-or-less stable during the reporting period. Regarding to downstream stations at Tan Chau and Chau Doc, water levels at those stations were affected by tide with a little rising trend at the end of the week.

For stations from Chiang Saen to Chiang Khan

Water levels at those stations were rising from the beginning to the mid of the week and then slightly falling to the end of the week. The stations were recording levels that were somewhat over the long-term average for this time of the year.

For stations from Vientiane/ Nong Khai to Savanakhet/Mukdahan

Water levels were rising from the beginning to the mid of the week and then more-or-less stable at the end of the week. The stations were recording levels that were somewhat slightly over the long-term average for this time of the year.

For stations from Khong Chiam to Kratie

Water levels were more-or-less stable during the beginning and the mid of the week and then slightly rising toward the end of the week. The stations were recording levels that were somewhat below the long-term average for this time of the year.

For stations from Kampong Cham to Neak Luong, Koh Khel

Water levels were more-or-less stable during last week. All stations were recording levels that are below the long-term average level for this time of the year.

Stations Tan Chau and Chau Doc

Water levels at these stations, which have been significantly affected by sea tide. Water level at these 2 stations were more-or-less stable with a little rising at the end of the week. These 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.

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
13/09	536.85	5.04	10.00	9.70	6.83	7.73	9.75	8.32	9.41	8.26	7.46	10.10	8.29	7.21	17.04	11.93	7.62	6.76	6.47	5.42	6.59	2.58	2.02
14/09	536.94	5.25	10.32	10.08	7.13	8.18	10.05	8.39	9.47	8.23	7.47	9.92	8.14	7.16	16.84	11.73	7.55	6.69	6.43	5.38	6.58	2.58	2.04
15/09	537.01	5.80	10.65	10.42	7.86	8.94	11.10	8.90	9.98	8.55	7.76	9.93	8.10	7.07	16.85	11.66	7.53	6.66	6.40	5.32	6.55	2.55	2.02
16/09	537.19	6.20	11.45	11.39	8.35	9.54	11.70	9.39	10.45	8.97	8.18	10.22	8.30	7.03	16.60	11.52	7.49	6.62	6.37	5.29	6.54	2.52	2.00
17/09	537.32	6.38	12.34	11.70	9.35	10.52	11.97	9.65	10.70	9.26	8.79	10.54	8.55	7.10	16.55	11.40	7.45	6.59	6.35	5.26	6.52	2.54	2.05
18/09	537.30	6.36	12.46	11.94	9.52	10.73	12.17	9.77	10.82	9.38	8.90	10.78	8.65	7.27	16.71	11.38	7.46	6.59	6.34	5.24	6.52	2.56	2.10
19/09	537.90	6.14	12.24	12.03	9.62	10.85	12.20	9.85	10.90	9.44	8.95	10.97	8.93	7.38	16.95	11.55	7.49	6.60	6.36	5.26	6.56	2.60	2.13
20/09	537.85	5.79	12.00	11.71	9.46	10.72	12.20	9.85	10.90	9.45	8.97	10.90	8.93	7.46	17.14	11.67	7.54	6.69	6.38	5.28	6.59	2.63	2.17
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
13/09	1.0	70.0	7.0	4.1	11.5	21.5	8.8	30.5	17.1	7.5	5.5	45.7	2.5	0.0	3.2	5.8	0.0		0.0	0.0	0.0	0.0	0.0
14/09	0.0	4.2	0.0	51.2	40.0	64.7	102.8	11.6	10.6	31.2	30.0	2.2	3.8	4.2	16.4	0.0	0.0		0.0	67.2	0.0	0.0	1.0
15/09	12.0	43.1	47.8	25.7	38.5	17.4	41.6	1.2	2.1	9.6	0.0	0.0	0.0	8.5	0.0	0.0	16.4		13.0	0.0	0.0	6.0	0.0
16/09	5.0	20.5	1.6	40.1	0.3	4.4	45.8	0.0	0.3	0.0	0.0	1.1	0.0	0.2	0.0	0.2	6.8		0.9	4.7	7.4	0.0	0.0
17/09	22.0	4.2	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.9	3.1	0.0	0.0	2.0	0.0	3.0	16.2		44.9	0.0	0.0	35.9	0.0
18/09	0.0	12.8	0.0	7.5	0.8	0.0	4.3	0.0	0.0	3.0	8.0	2.4	16.5	13.2	9.4	4.0	12.2		0.5	0.0	9.4	4.0	0.0
19/09	0.0	0.0	8.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.7		9.5	0.0	0.0	38.0	0.0
20/09	0.0	0.0	0.0	0.0	0.0	0.0	32.0	0.0	0.0	2.8	0.0	1.0	0.0	0.0	0.0	0.0	0.0		0.0	5.4	0.0	0.0	0.0

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

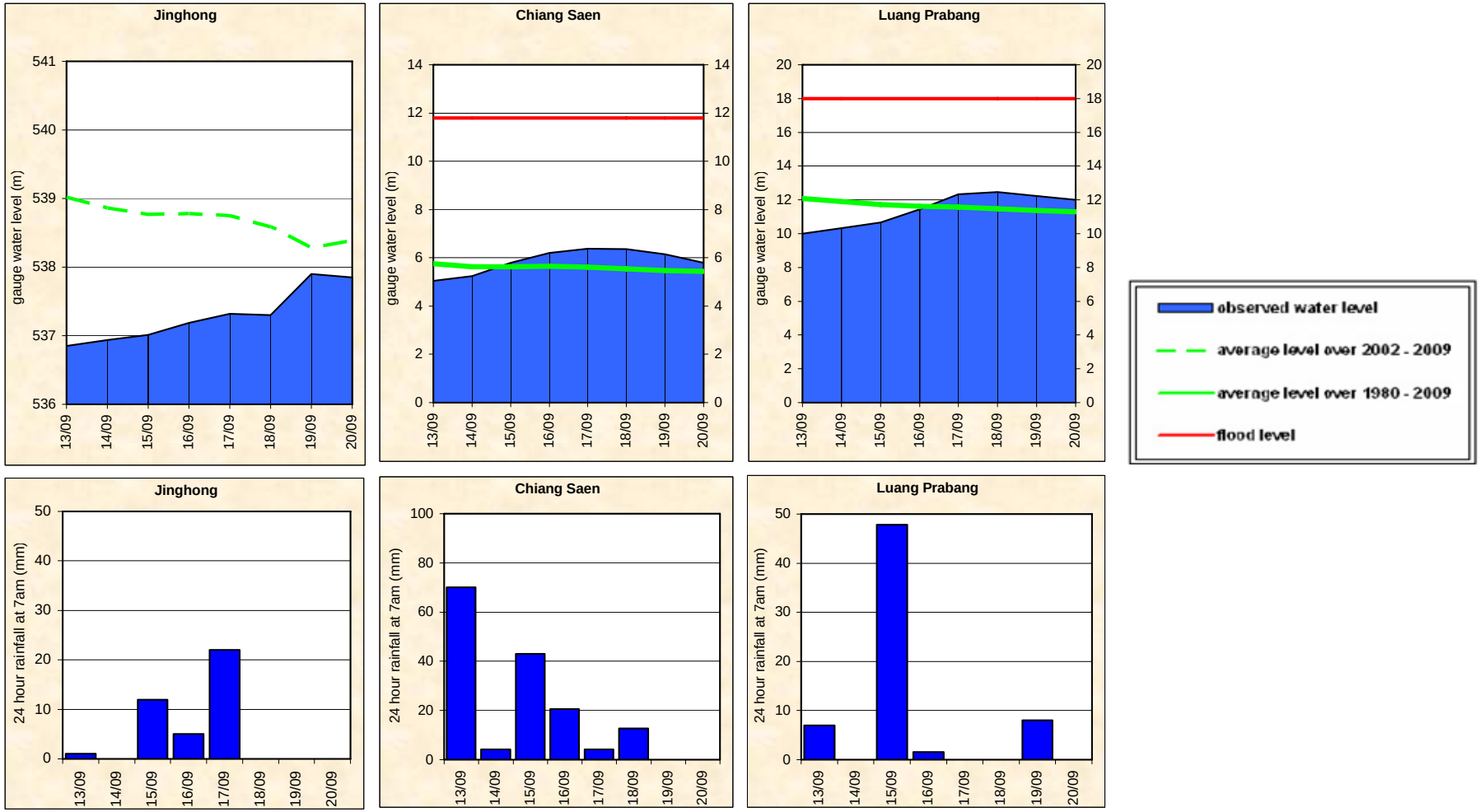


Figure A2: Water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

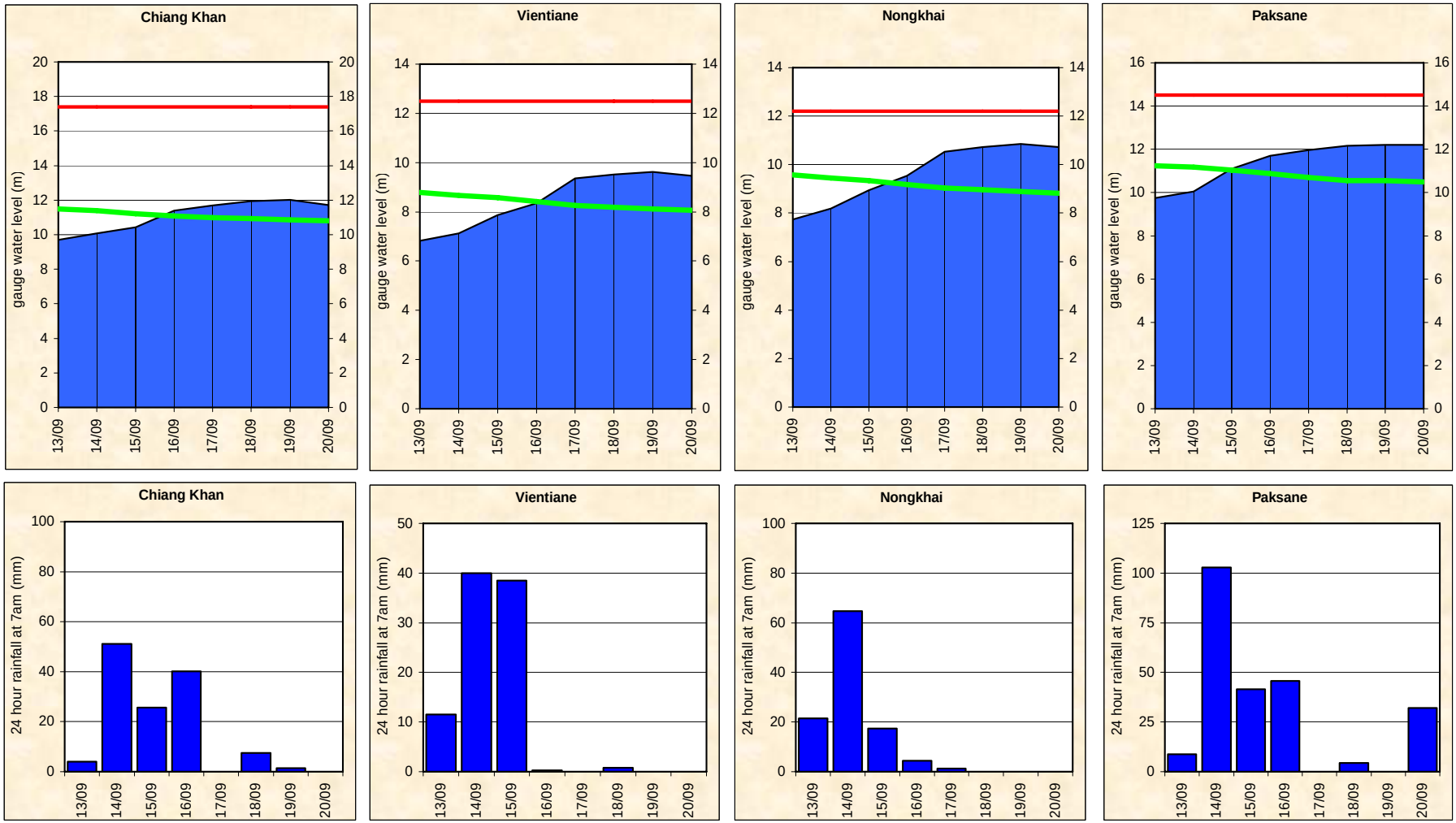


Figure A3: Water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

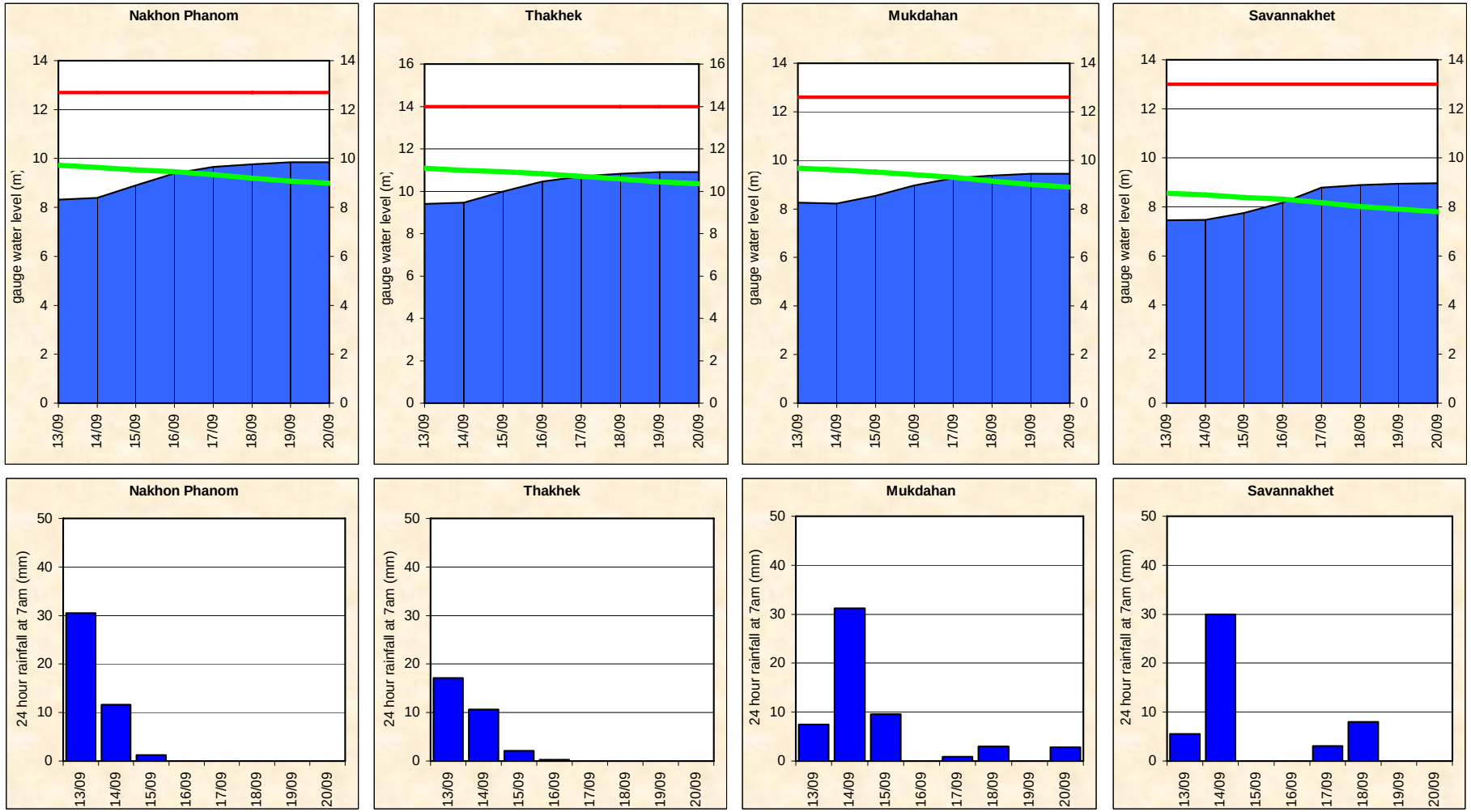


Figure A4: Water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

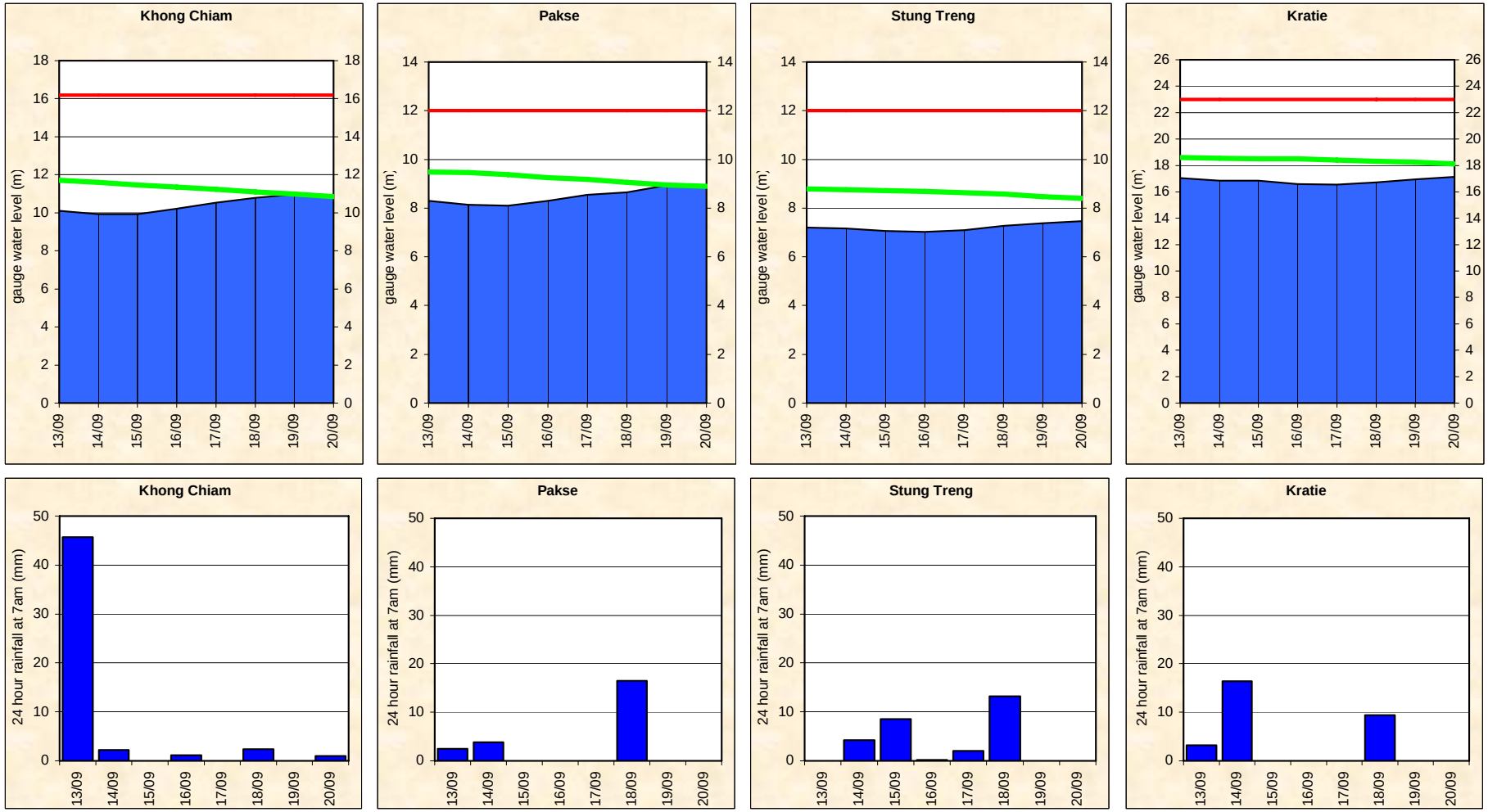


Figure A5: Water level and rainfall for Kampong Cham, Phnom Penh (Bassac and Port), and Koh Khel

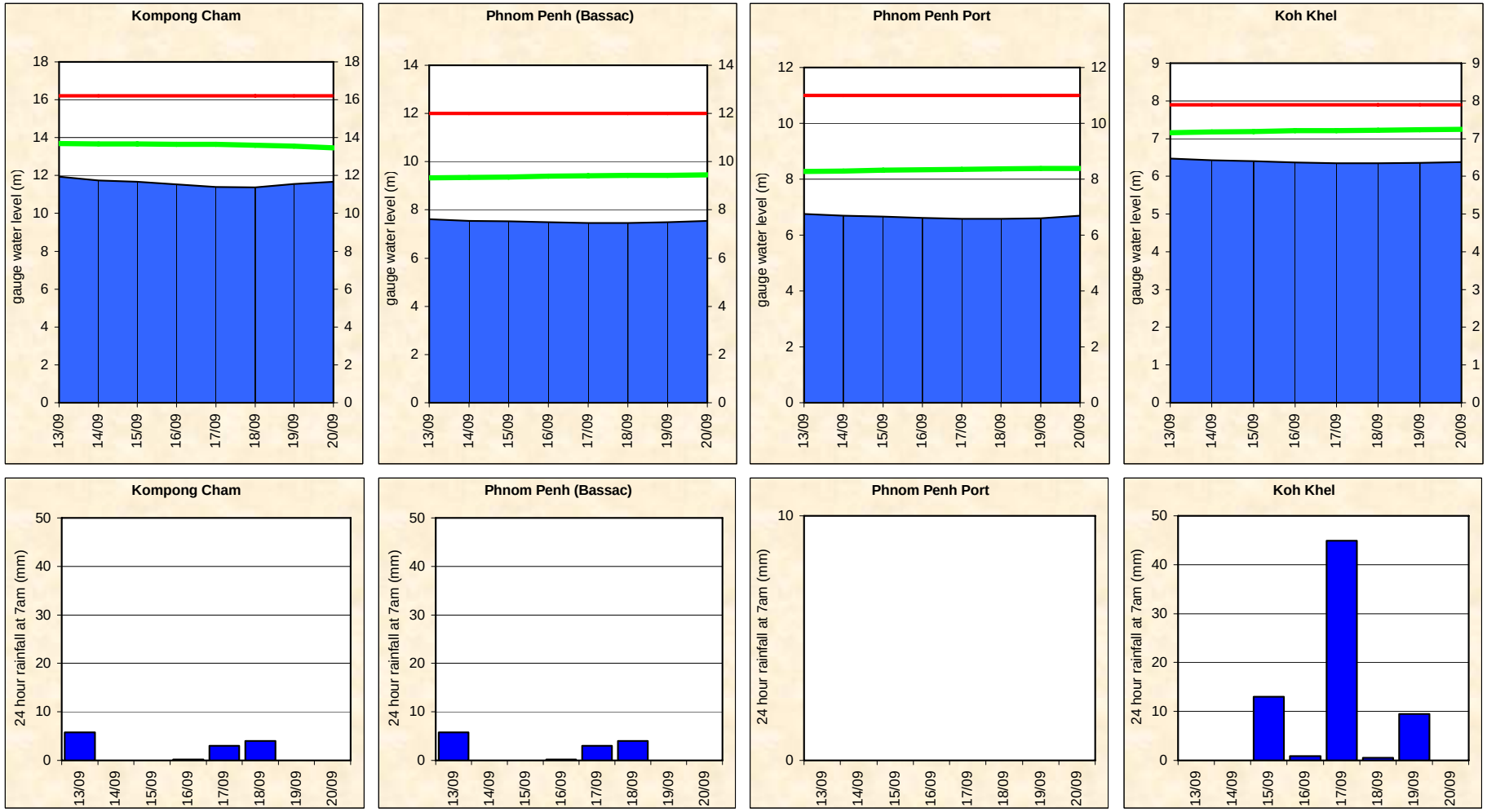
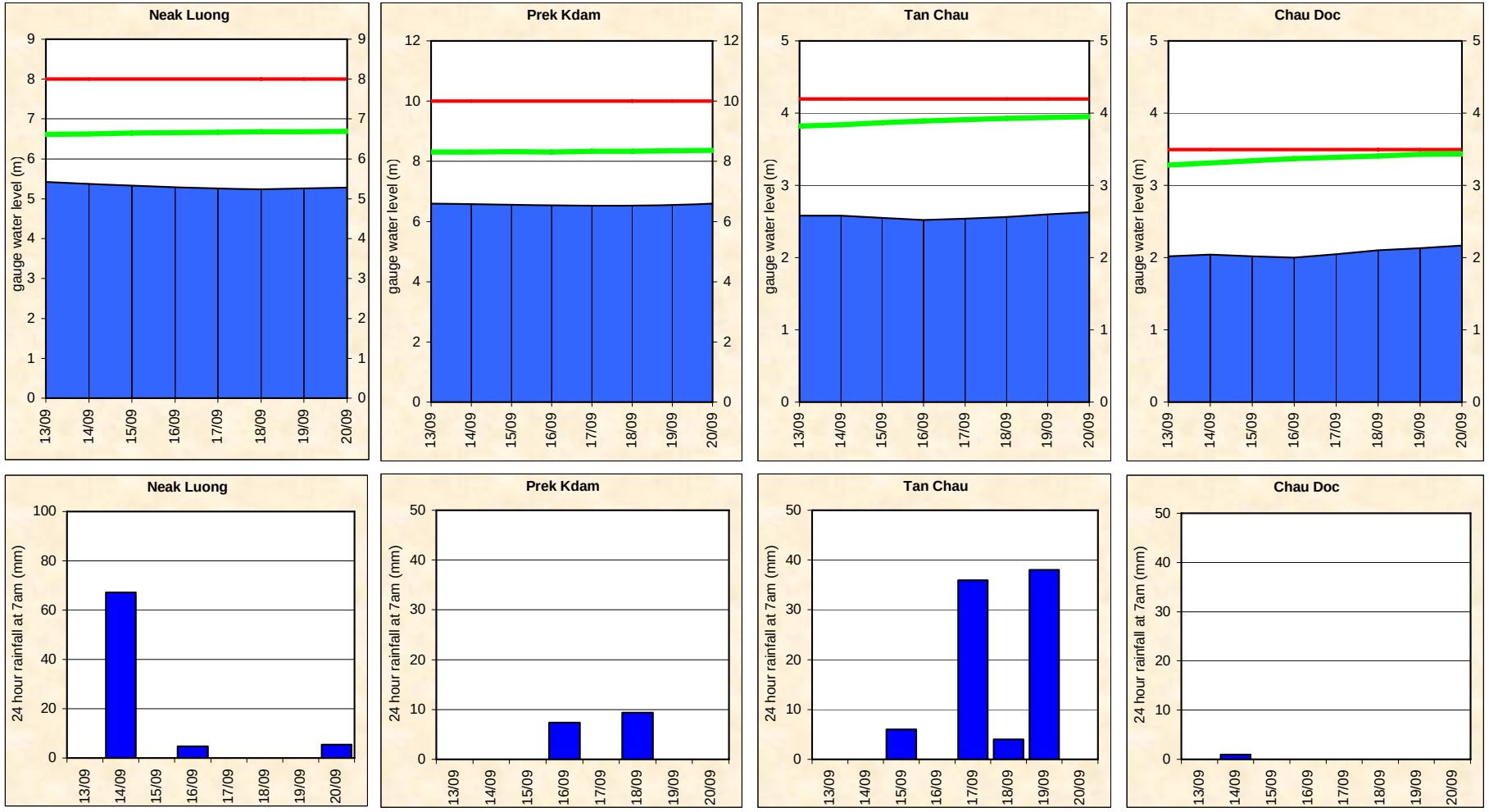


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



Annex B: Accuracy and performance

Accuracy

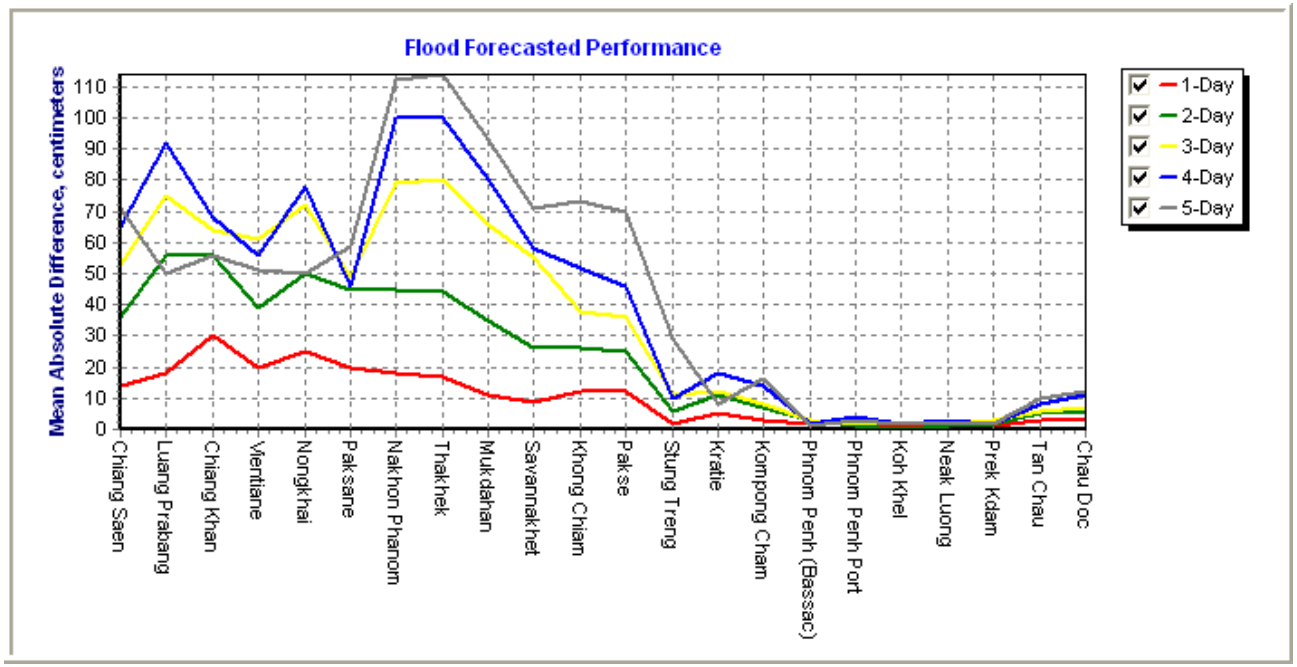
"Accuracy" describes the accuracy of the adjusted and published forecast, based on the results of the MRC Mekong Flood Forecasting System, which are then adjusted by the Flood Forecaster-In-Charge taking into consideration the known biases in input data, the knowledge of model response and the experience 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 accuracies at stations in the upper reach of LMB were better than that in the middle reach.

In overall, the accuracy is good for all forecasts lead-time at stations in upper and lower reaches; however, the accuracies for 3-day to 5-day forecasts at stations in the middle reach between Nakon Phanon and Mukdahan were less than expected.

The above differences perharp caused by internal model functionality in forecasting for stations in middle reach of LMB for which the parameter adjustment is not possible and the high variability of the SRE and NWP when the critical weather phenomenon as ITCZ occur.

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	50.0	66.7	33.3	83.3	83.3	66.7	100.0	100.0	100.0	100.0	100.0	83.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	*89.4*
2-day	100.0	80.0	0.0	40.0	20.0	0.0	40.0	40.0	60.0	80.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	80.0	*74.5*
3-day	75.0	75.0	50.0	50.0	50.0	75.0	25.0	25.0	50.0	75.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	75.0	75.0	*77.3*
4-day	66.7	100.0	100.0	66.7	33.3	66.7	33.3	33.3	33.3	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	66.7	66.7	*80.3*
5-day	100.0	100.0	100.0	100.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	*81.8*

Table B2: Benchmarks of success (Indicator of accuracy in mean absolute error) Unit in cm

	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
1-day	50	50	25	25	25	25	25	25	25	25	25	25	10	10	10	10	10	10	10	10	10	10
2-day	75	75	25	25	25	25	50	50	50	50	50	50	25	25	25	10	10	10	10	10	10	10
3-day	75	100	50	50	50	50	50	50	50	50	75	75	50	50	25	10	10	10	10	10	10	10
4-day	100	*125*	75	50	50	50	50	50	75	75	75	75	50	50	50	25	25	25	10	25	10	10
5-day	100	*150*	75	75	75	75	75	75	75	75	75	75	50	50	50	25	25	25	10	25	10	10

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	*10:16*	*0*	*-*	*8*	*08:13*	*08:11*	*08:05*	*06:04*	*08:31*	*08:12*	*07:19*	*0*	*0*	*0*	*64*	*157*	*3*	*39*
month	*10:30*	*0*	*-*	*31*	*08:13*	*08:20*	*08:01*	*05:46*	*08:39*	*08:08*	*07:33*	*0*	*0*	*7*	*242*	*604*	*8*	*195*
season	*10:39*	*2*	*-*	*109*	*14:09*	*09:02*	*08:02*	*06:40*	*08:37*	*08:19*	*07:27*	*0*	*22*	*57*	*2026*	*2100*	*60*	*767*

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.

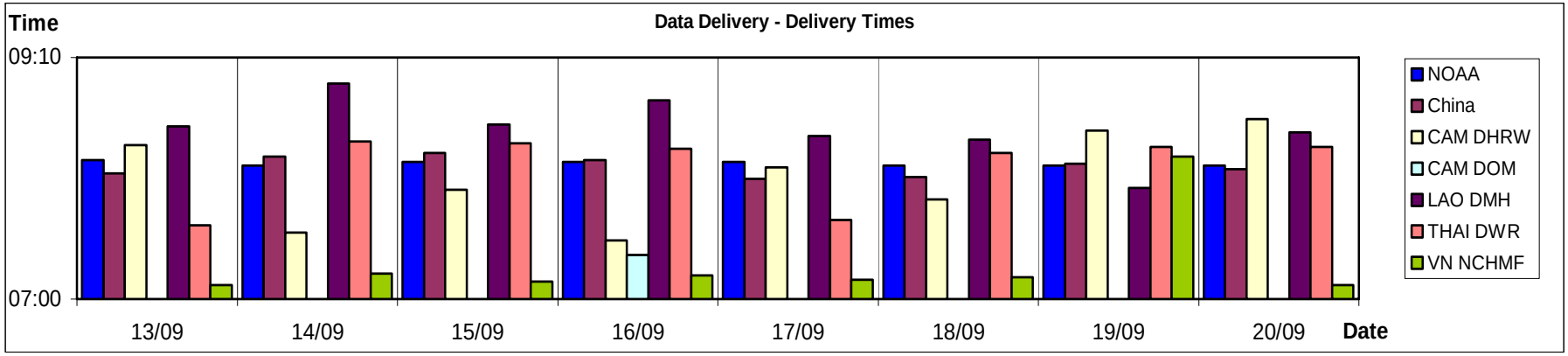


Figure B2: Data delivery times for the past 8 days including the current report date

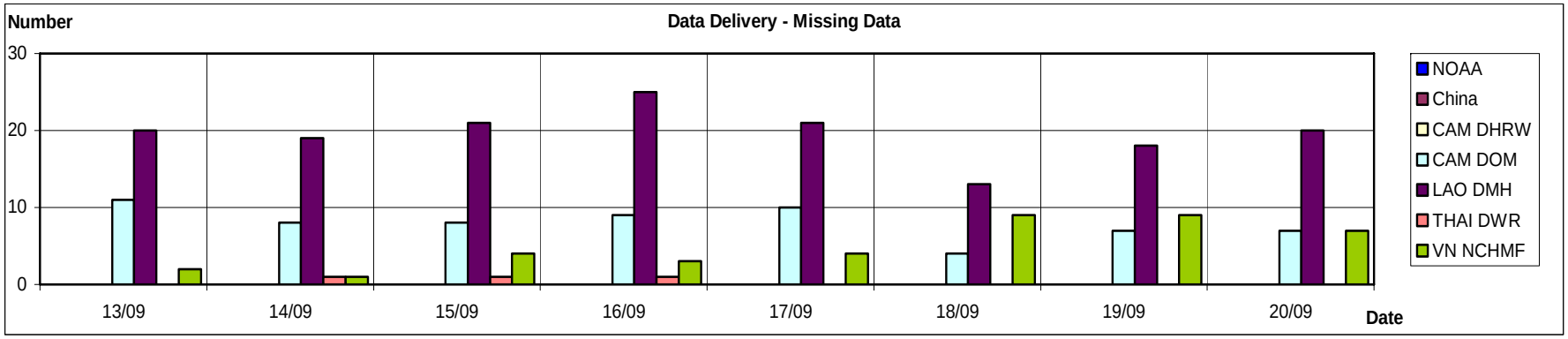


Figure B3: Missing data for the past 8 days including the current report date

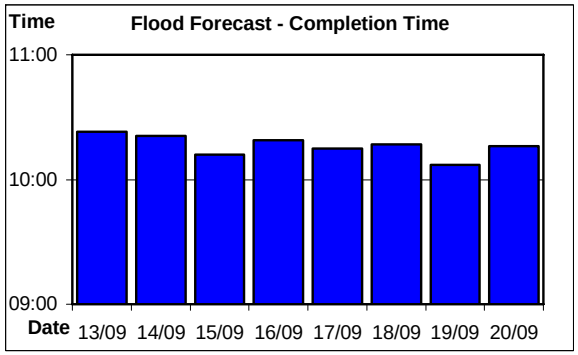


Figure B4: Flood forecast completion time

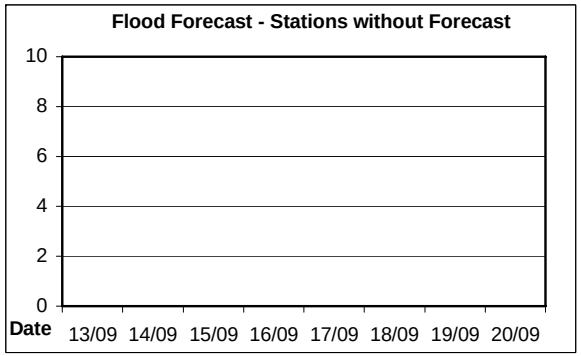


Figure B5: Flood forecast stations without forecast

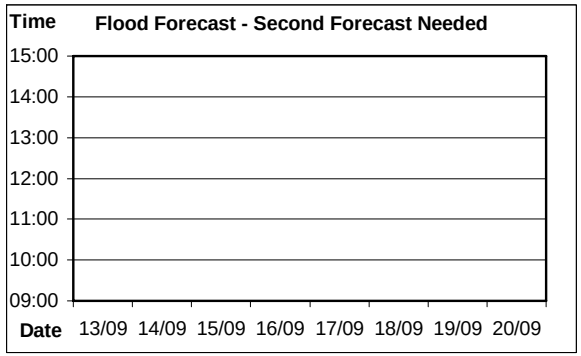


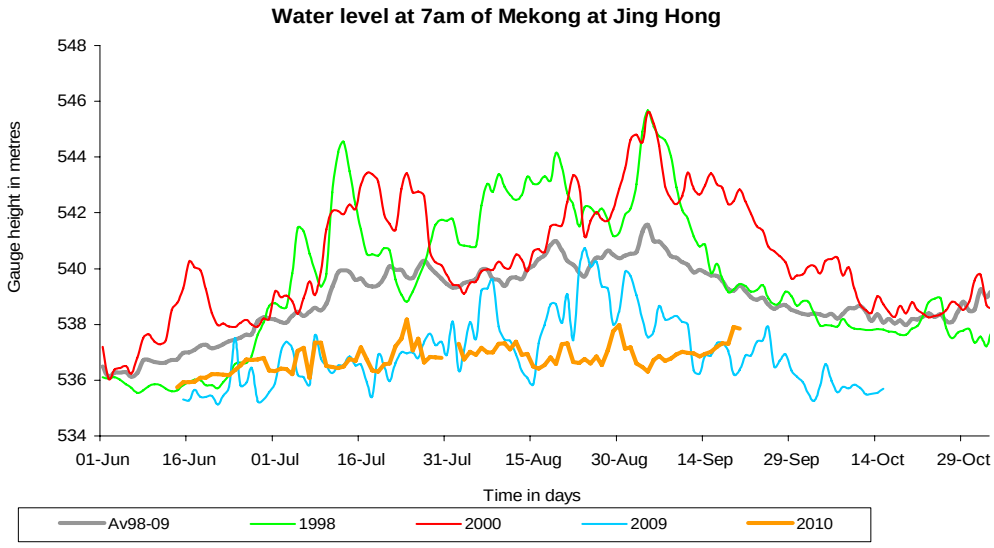
Figure B6: Second forecast needed

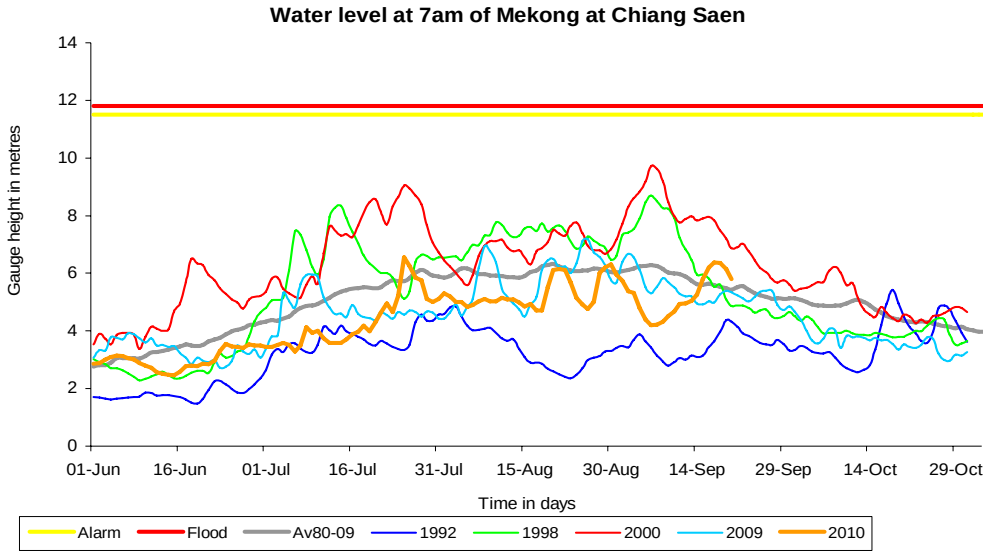
Annex C: Season Water Level Graphs

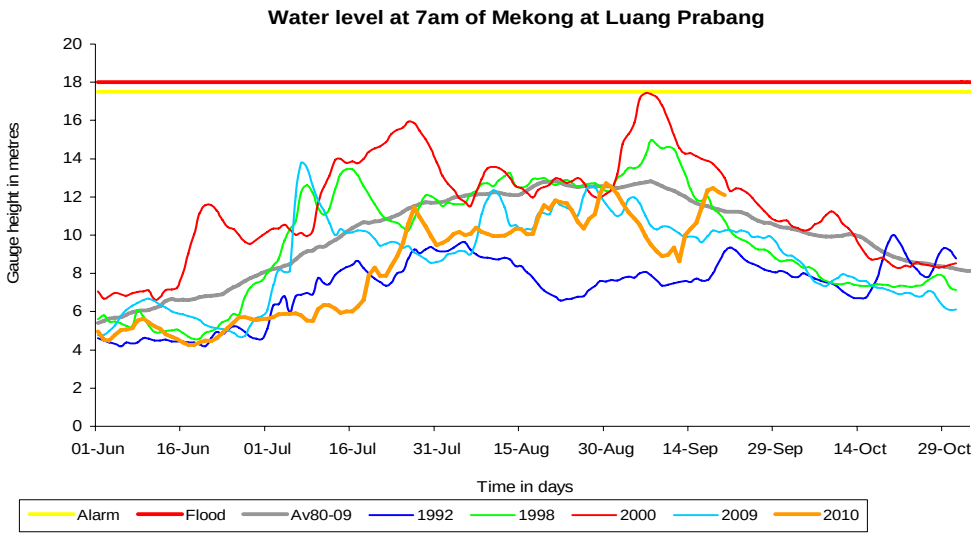
This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

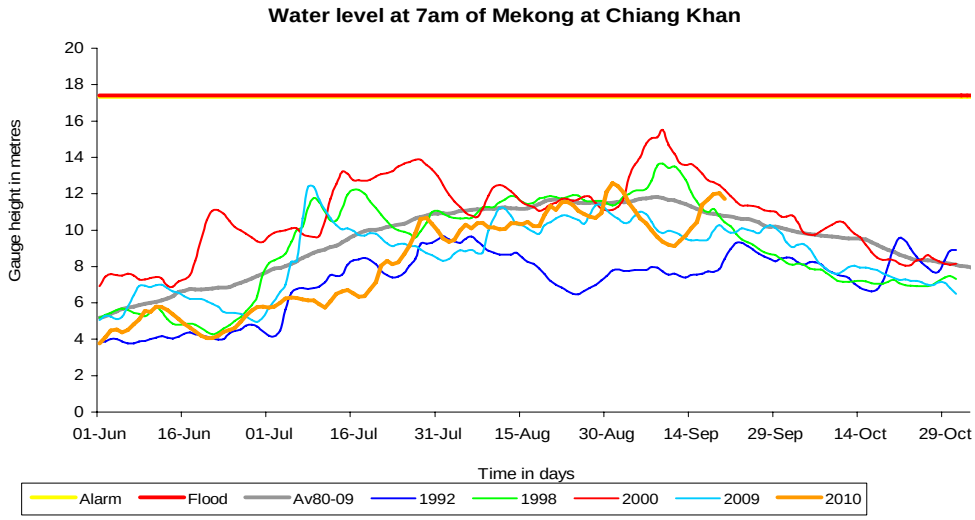
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS

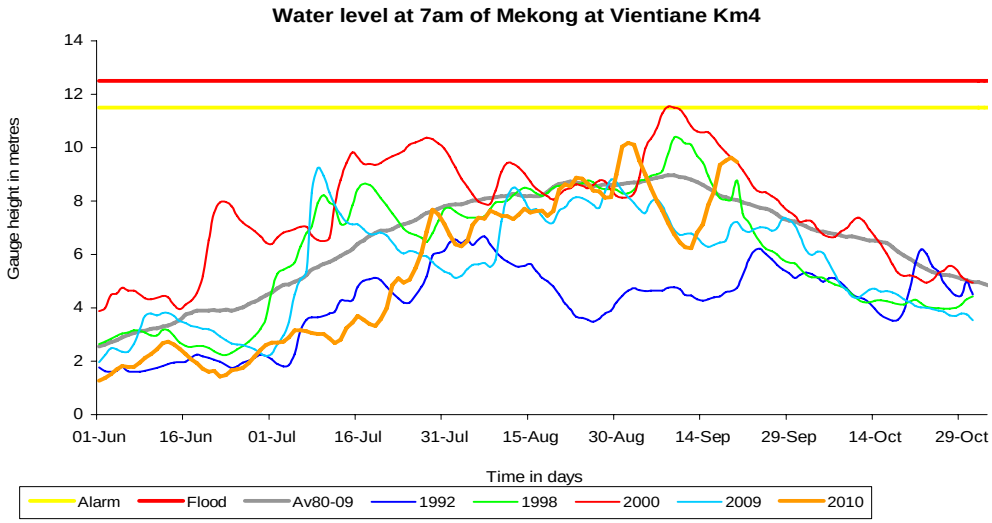
IN WET SEASON FROM 1 JUNE TO 31 OCTOBER

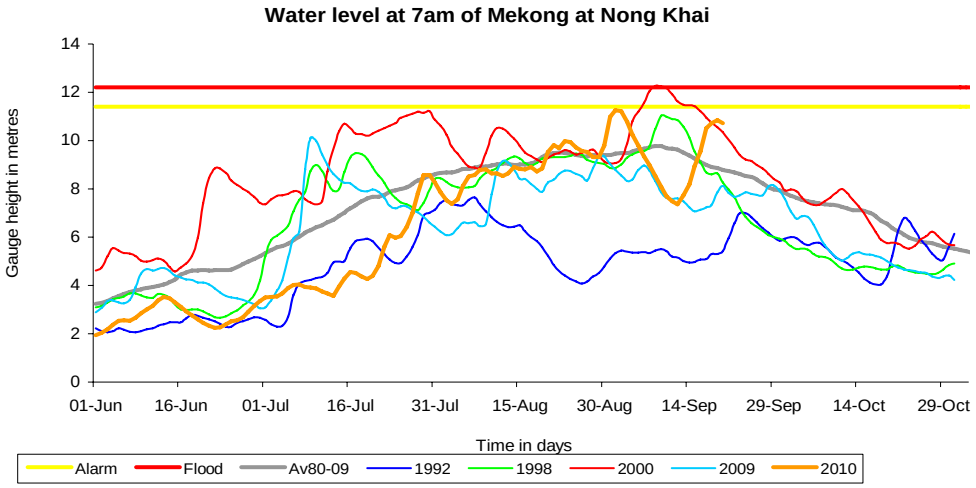


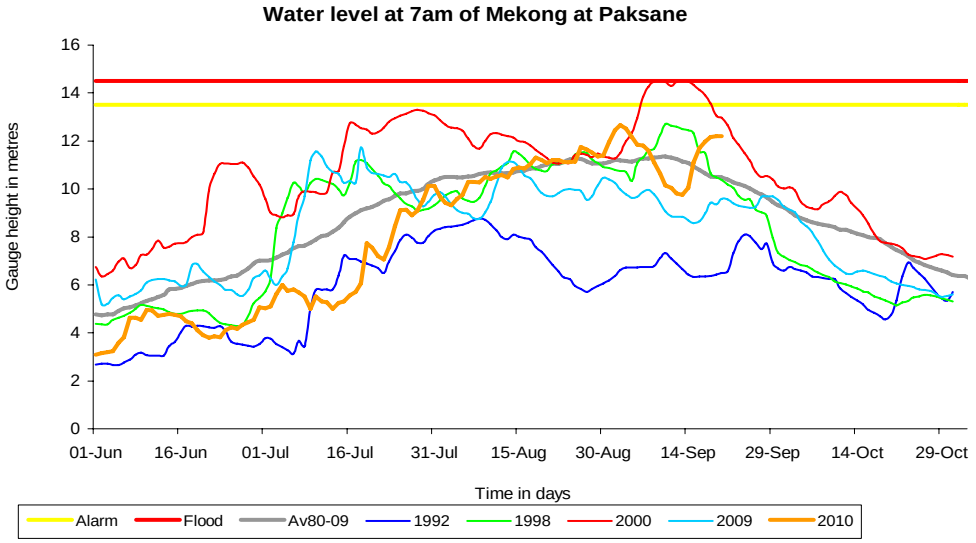


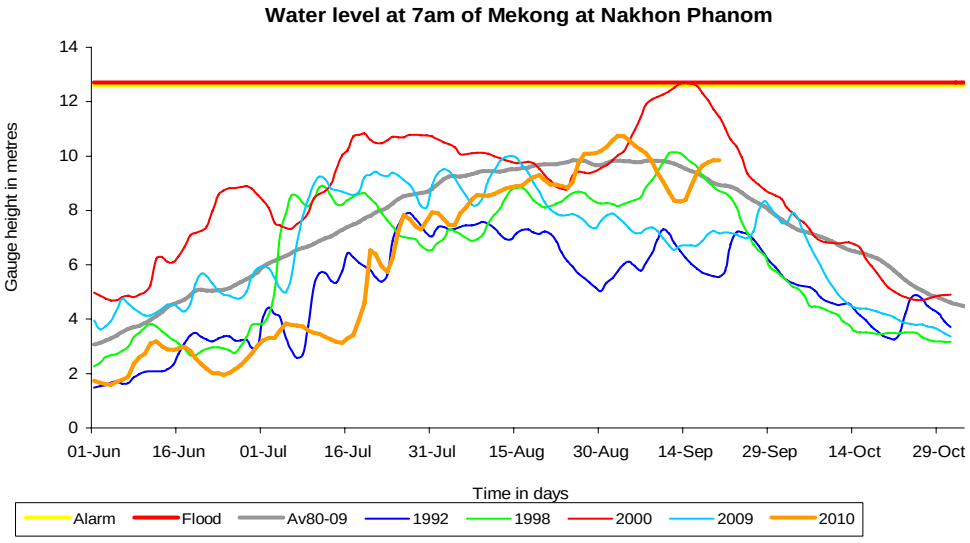

Water level at 7am of Mekong at Luang Prabang
Gauge height in metres
0
2
4
6
8
10
12
14
16
18
20
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010

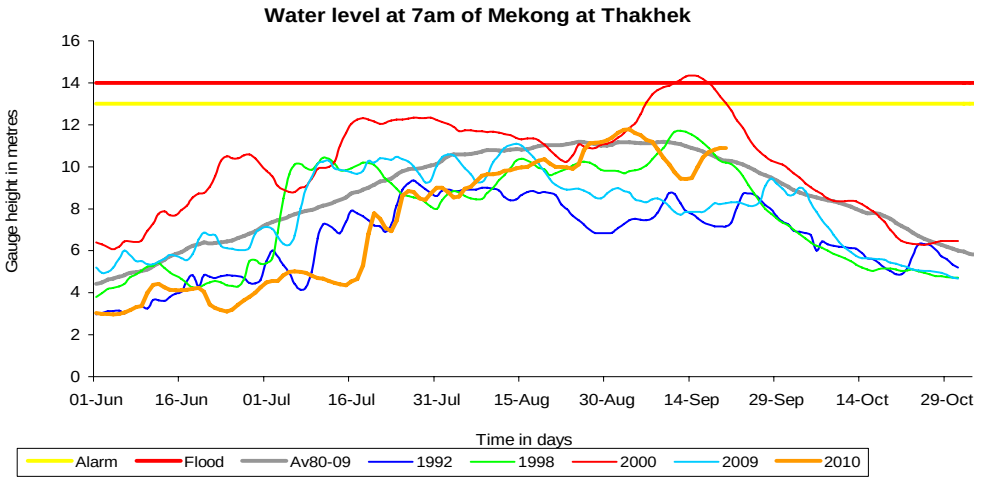

Water level at 7am of Mekong at Chiang Khan
Gauge height in metres
0
2
4
6
8
10
12
14
16
18
20
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010

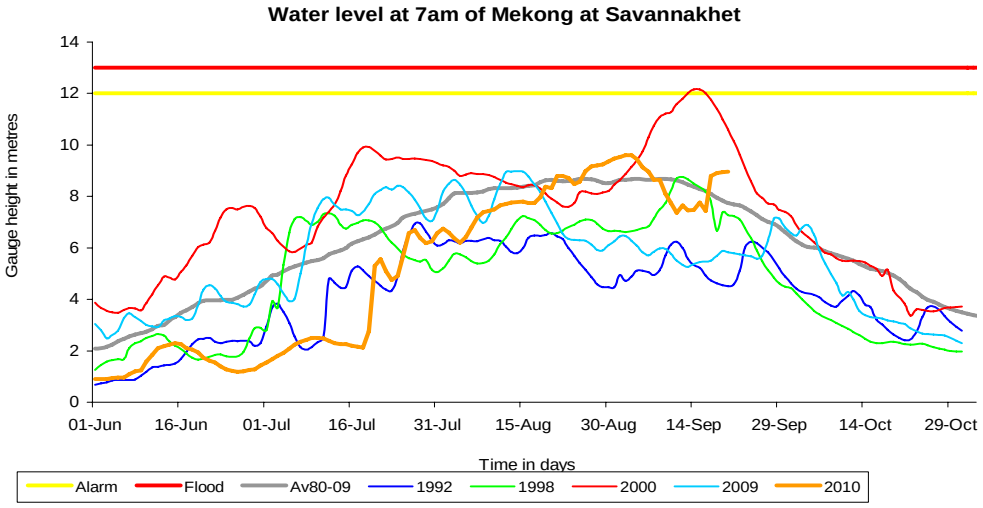

Water level at 7am of Mekong at Vientiane Km4
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010

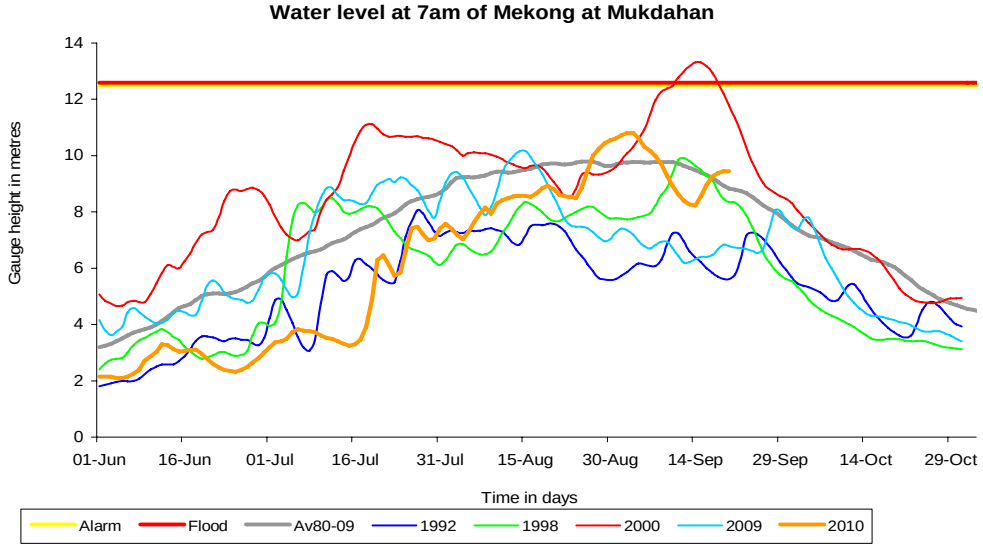

Water level at 7am of Mekong at Nong Khai
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010

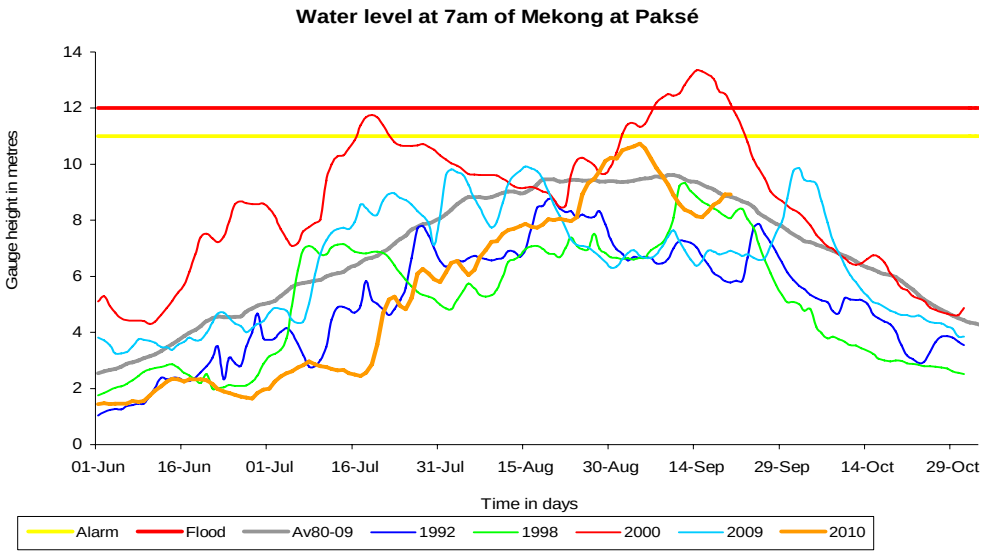

Water level at 7am of Mekong at Paksane
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010

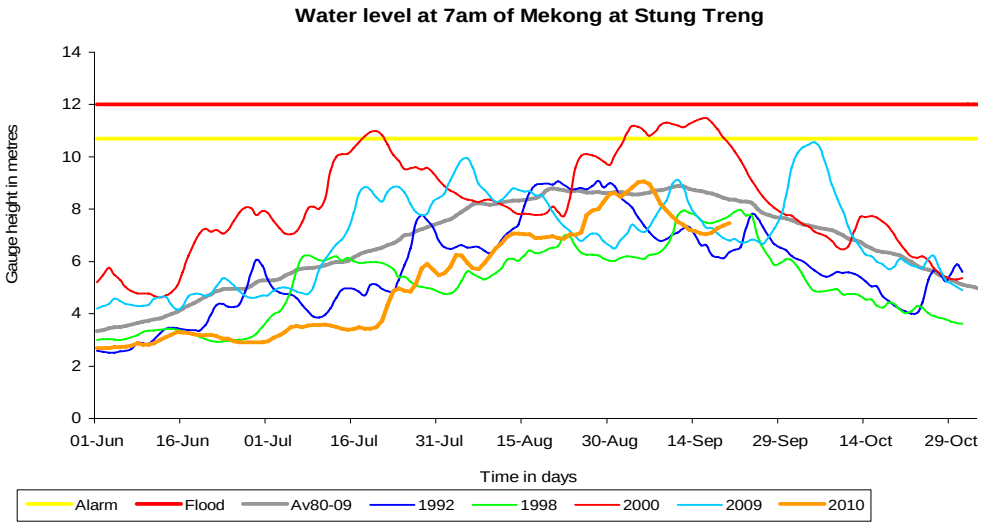

Water level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010

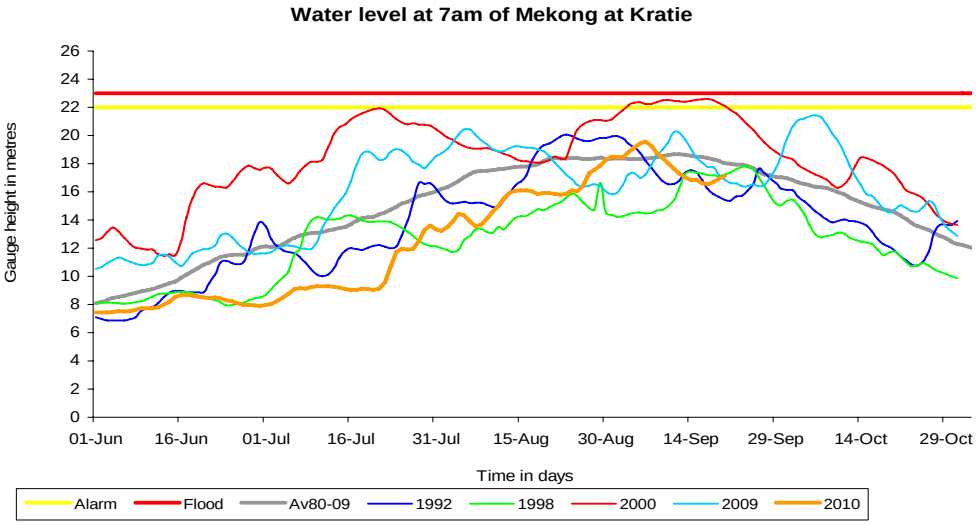

Water level at 7am of Mekong at Thakhek
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


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

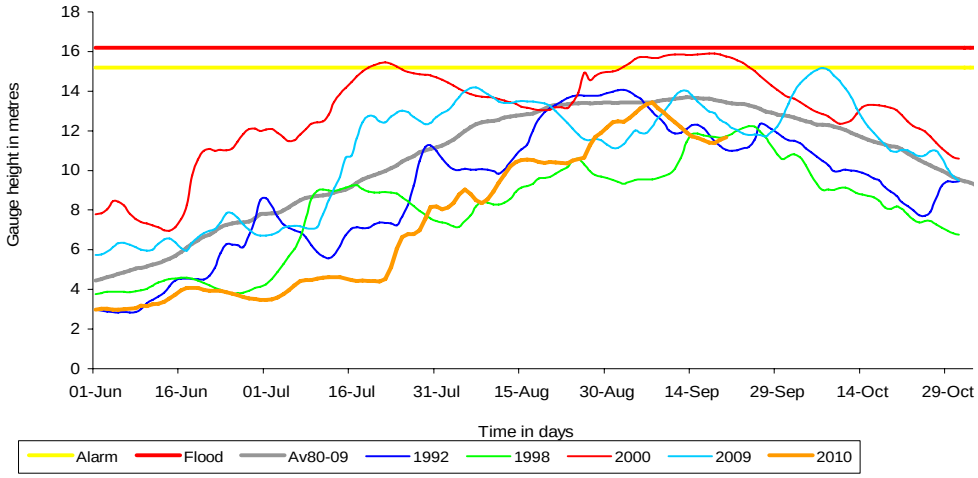

Water level at 7am of Mekong at Mukdahan
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


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
Av80-09
1992
1998
2000
2009
2010

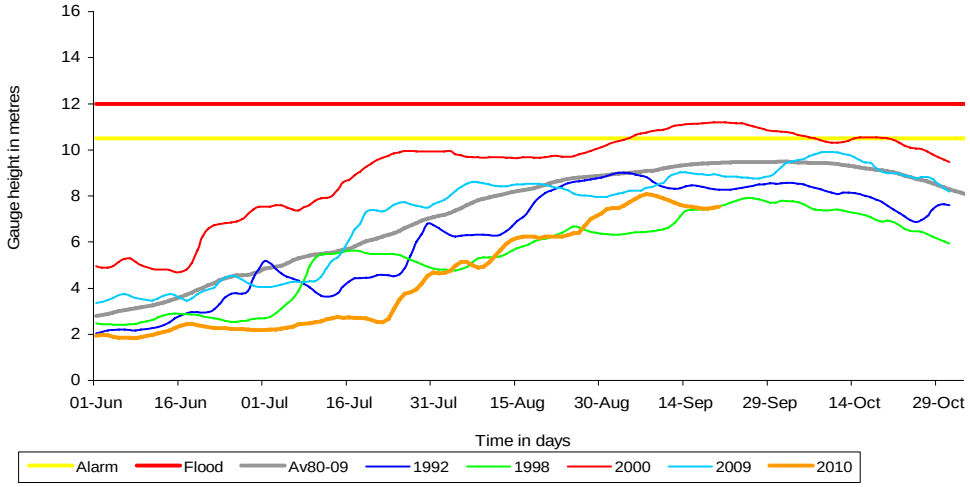

Water level at 7am of Mekong at Stung Treng
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


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
Av80-09
1992
1998
2000
2009
2010

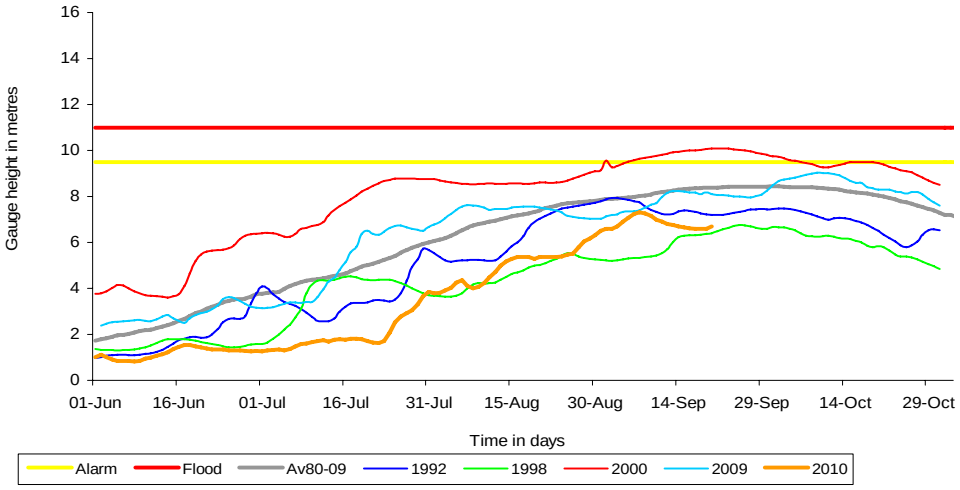
Water level at 7am of Mekong at Kompong Cham

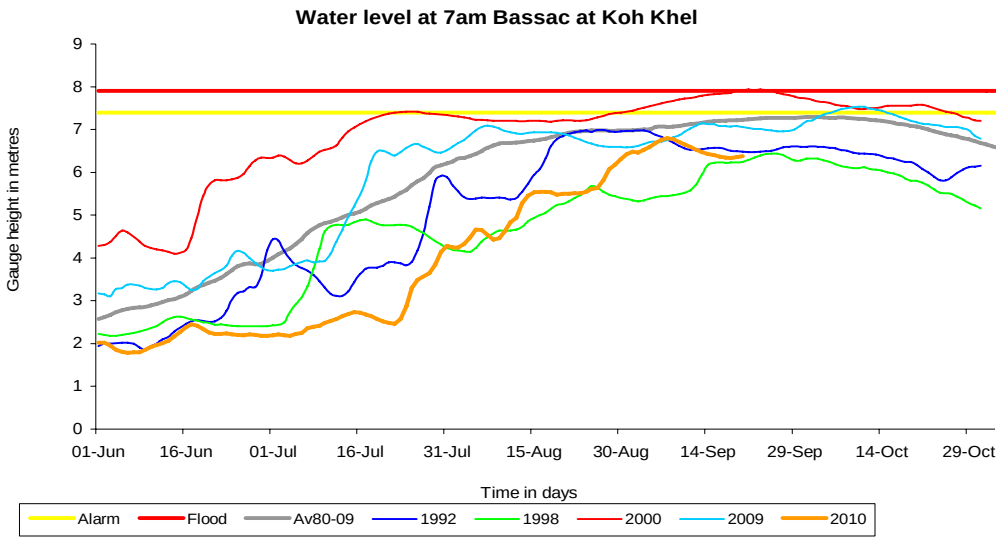


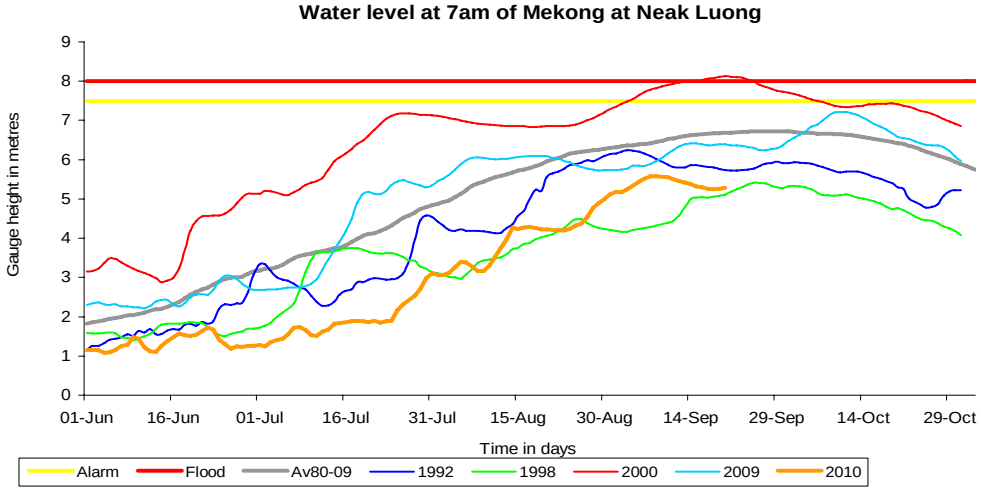
Water level at 7am of Bassac at Phnom Penh

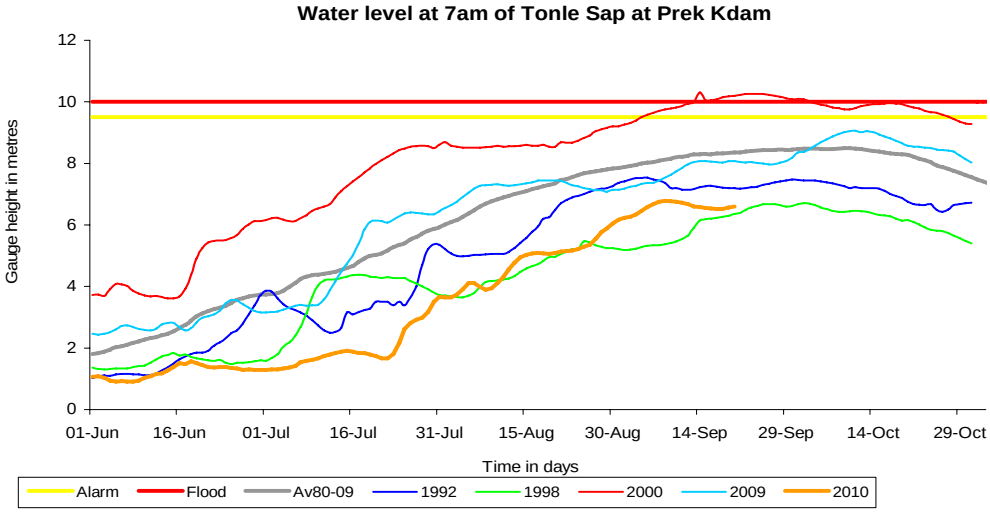


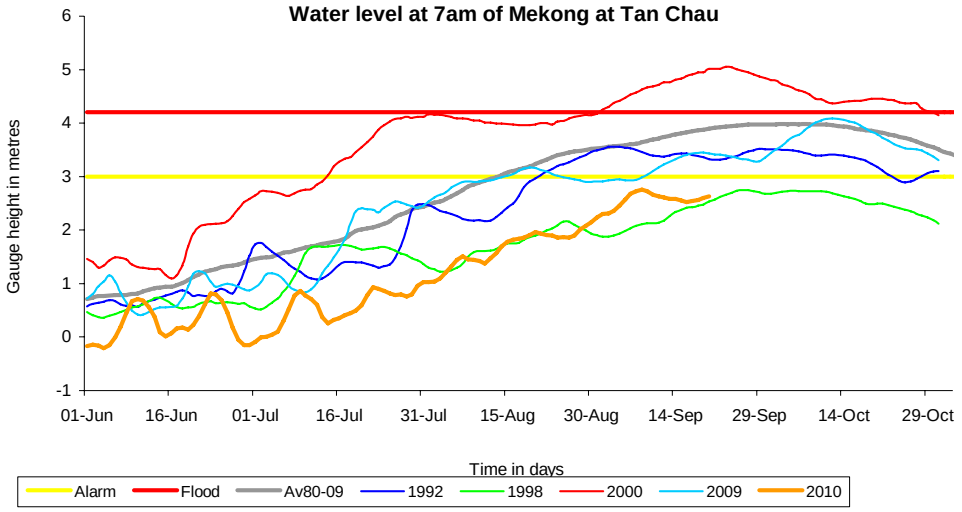
Water level of Tonle Sap at Phnom Penh Port

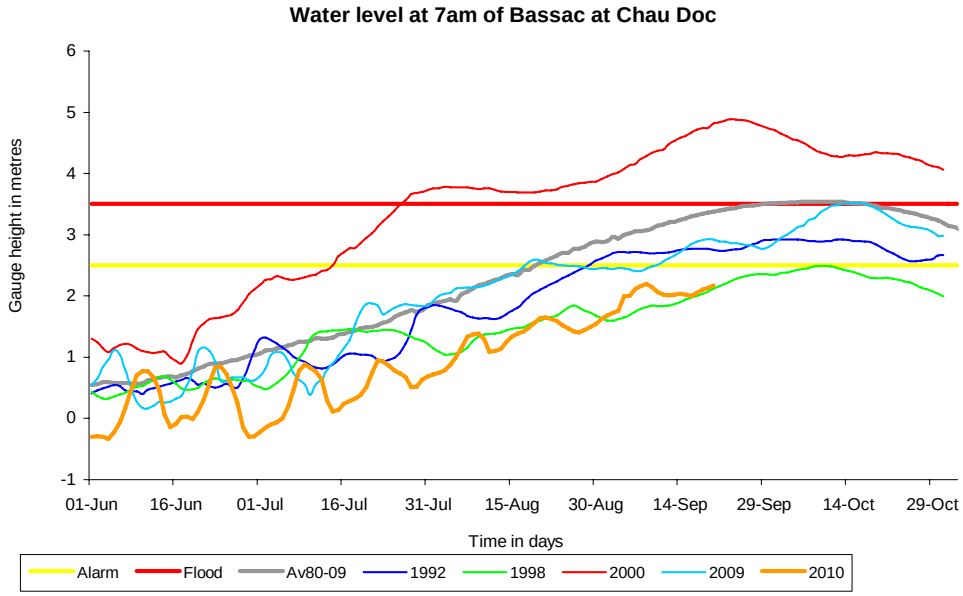



Water level at 7am Bassac at Koh Khel
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
Time in days
Alarm
Flood
Av80-09
1992
1998
2000
2009
2010


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