Mekong River Commission

Regional Flood Management and Mitigation Centre

Weekly Flood Situation Report for the Mekong River Basin

Prepared at: 25/07/2016, covering the week from the 18th - 25th July 2016

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

General weather patterns

During the week of 18th - 25th July 2016, four weather bulletins were issued by the Department of Meteorology (DOM) of Cambodia. The weather charts of the 19th July and 23rd July are presented in the figures 1 & 2 below:

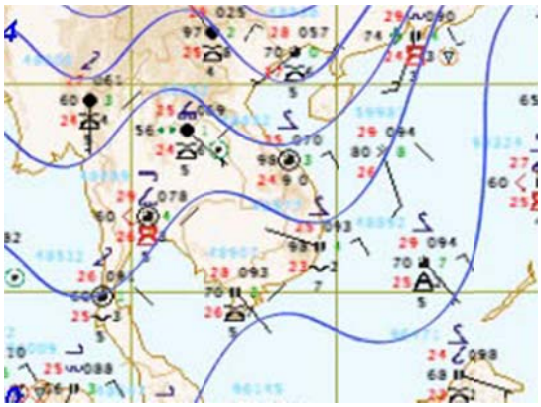


Figure 1: Weather map for 19th July 2016

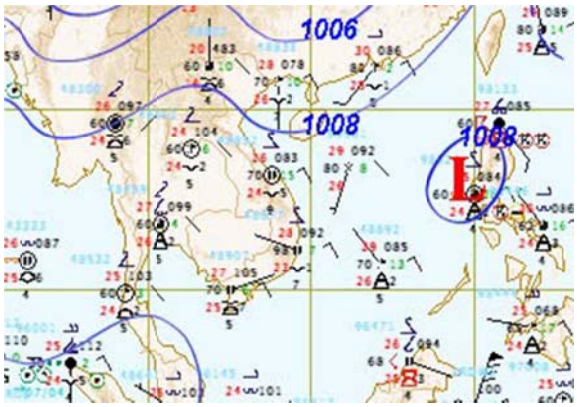


Figure 2: Weather map for 23rd July 2016

South-West (SW) Monsoon

During the last week, the weak Southwest monsoon prevails over Andaman Sea Gulf of Thailand, Thailand and Indochina Peninsular. (Figure 1 and Figure 2).

Inter Tropical Convergence Zone (ITCZ)

No Inter Tropical Convergence Zone (ITCZ) was observed during last week.

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

No TD, TS or TY have significantly influenced the LMB during the last week.

Other weather phenomena that affect the discharge

The weak trough lies across Thailand, Lao PDR, Cambodia and Viet Nam.

Over weather situation

During the last week, the weather was influenced by weak Southwest monsoon and weak trough. As a result, moderate rain occurred in many areas of Lower Mekong Basin. The first three maximum accumulated rainfalls were at Chiang Saen (150.9 mm.), Paksane (111.8 mm.) and Tan Chau (95.4 mm.), see Figure 3 and Table A2 for more detail.

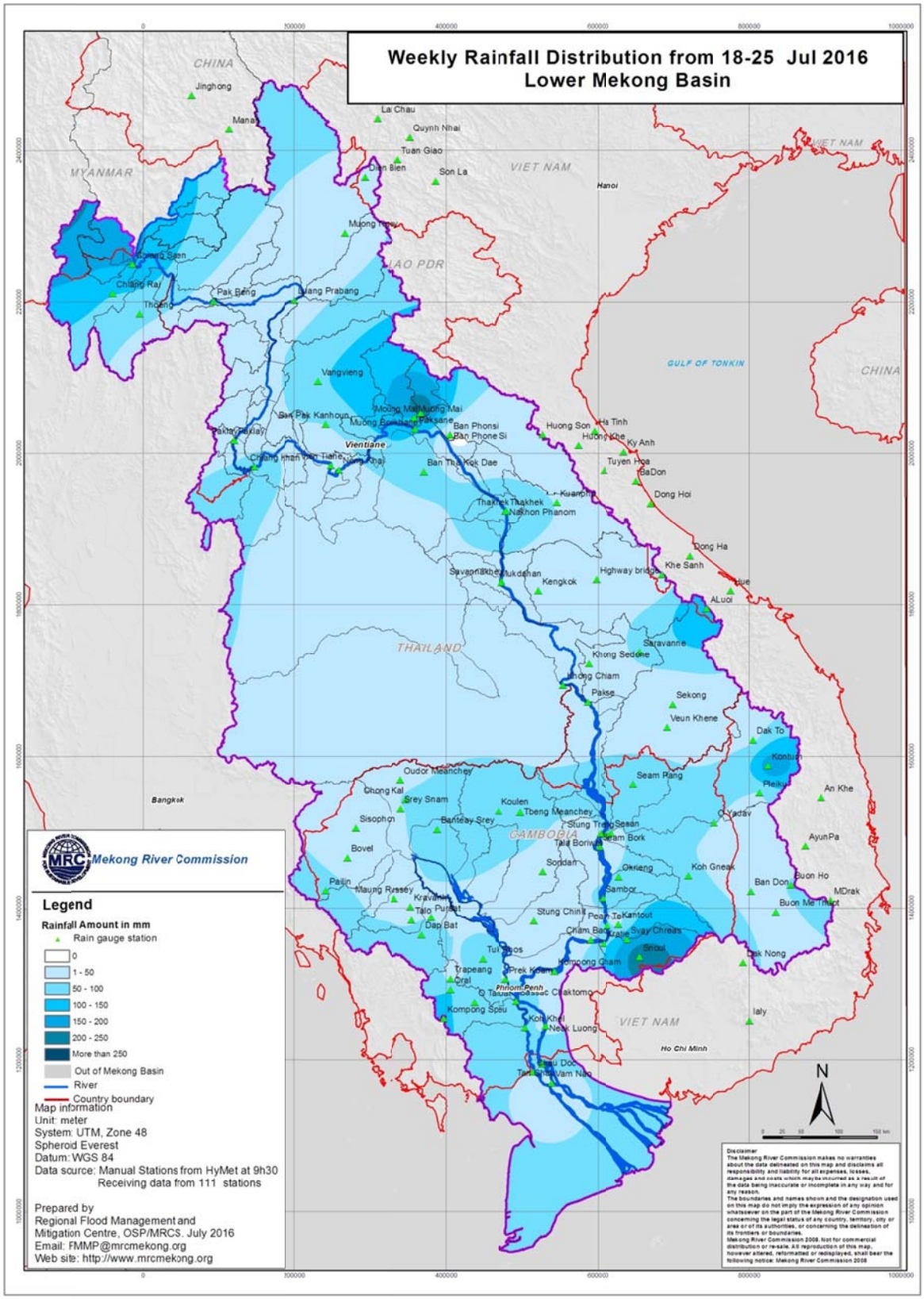


Figure 3: Weekly Rainfall Distribution over the LMB from 18th – 25th July, 2016

General behaviour of the Mekong River

Compared the Long Term Average (LTA), during the last week, the water levels at all stations of LMB were fluctuated below the LTA.

For stations from Chiang Saen and Luang Prabang

During the last week, the water levels at these stations were fluctuated bellow the LTA.

For stations from Chiang Khan, Vientiane and Nong Khai and Paksane

During the last week the water levels at these stations were fluctuated bellow the LTA.

For stations from Thakhet/Nakhon Phanom to Pakse

During the last week, the water levels at these stations were fluctuated bellow the LTA.

For stations from Stung Treng to Kampong Cham

During the last week, the water levels at these stations were fluctuated bellow the LTA.

For stations from Phnom Penh to Koh Khel/Neak Luong

During the last week, the water levels at these stations were fluctuated bellow the LTA.

Tan Chau and Chau Doc

During the last week, the water levels at these stations were fluctuated bellow the LTA.

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 last week. Water levels were 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 last week.

For more details see the following annexes:

- 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**

2016	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
18/07	535.79	3.23	7.47	7.08	3.28	4.02	5.00	6.57	7.65	6.59	6.32	7.91	6.35	5.95	13.95	8.53	4.88	3.90	4.35	3.32	3.91	1.49	1.45
19/07	536.04	3.44	7.34	7.30	3.48	4.12	5.53	5.97	7.11	6.02	5.71	7.42	5.98	5.94	14.00	8.48	4.85	3.87	4.34	3.32	3.87	1.39	1.38
20/07	535.91	3.21	7.06	7.57	3.75	4.36	5.58	5.52	6.99	5.53	5.27	6.83	5.50	5.71	14.10	8.55	4.87	3.89	4.37	3.32	3.89	1.33	1.26
21/07	536.26	3.21	6.94	7.57	4.00	4.72	5.90	5.39	6.55	5.26	4.97	6.34	5.03	5.47	13.70	8.48	4.90	3.92	4.38	3.38	3.92	1.21	0.97
22/07	536.11	3.48	6.82	7.46	4.05	4.79	6.33	5.47	6.64	5.22	4.95	5.97	4.70	5.20	13.25	8.14	4.78	3.80	4.30	3.32	3.84	1.02	0.72
23/07	536.23	3.93	7.06	7.33	3.92	4.71	6.20	5.62	6.77	5.38	5.09	5.87	4.60	4.92	12.86	7.80	4.50	3.52	4.18	3.24	3.68	0.95	0.66
24/07	536.23	4.19	7.48	7.28	3.83	4.58	6.04	5.44	6.61	5.37	5.07	5.91	4.59	4.86	12.36	7.44	4.46	3.48	4.06	3.15	3.54	0.92	0.67
25/07	536.25	3.94	8.02	7.42	3.75	4.48	5.70	5.21	6.32	5.18	4.91	5.92	4.55	4.85	12.15	7.14	4.30	3.32	3.92	3.04	3.38	0.88	0.68

Table A2: observed rainfall **Unit in mm**

2016	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
18/07	0.0	2.7	0.3	0.0	nr	0.0	nr	0.0	nr	0.0	nr	0.0	nr	11.0	nr	nr	nr	-	nr	0.0	nr	nr	-
19/07	0.0	0.0	nr	0.0	nr	0.0	2.4	56.1	31.4	18.7	31.1	0.0	3.9	12.0	1.5	11.7	0.6	-	6.5	23.6	23.2	4.2	0.2
20/07	0.0	31.0	nr	15.8	4.6	6.4	0.3	1.9	5.6	0.0	nr	0.0	nr	nr	nr	nr	nr	-	0.5	nr	4.2	nr	8.8
21/07	5.5	69.4	2.8	2.0	nr	3.6	33.2	28.3	31.4	0.0	nr	3.5	3.2	-	nr	nr	1.5	-	nr	5.8	-	19.5	9.1
22/07	33.5	0.0	4.8	0.0	nr	11.4	1.3	3.6	2.4	0.0	nr	17.9	nr	1.0	39.2	0.0	1.3	-	6.0	nr	4.2	32.3	1.9
23/07	1.0	34.3	nr	0.0	nr	0.0	2.7	0.0	nr	0.8	1.6	15.9	nr	0.5	14.0	5.3	nr	-	nr	nr	nr	14.0	23.0
24/07	0.5	1.1	19.8	49.0	nr	1.2	3.2	0.0	nr	0.0	nr	0.0	nr	nr	nr	5.3	4.0	-	nr	nr	7.3	18.9	4.0
25/07	0.0	12.4	nr	0.0	nr	0.0	68.7	0.0	nr	0.0	nr	0.0	nr	63.5	25.3	4.5	78.0	-	49.0	9.2	9.4	6.5	0.3
Sum R	40.5	**150.9**	27.7	66.8	4.6	22.6	**111.8**	89.9	70.8	19.5	32.7	37.3	7.1	88.0	80.0	26.8	85.4	0.0	62.0	38.6	48.3	95.4	47.3

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

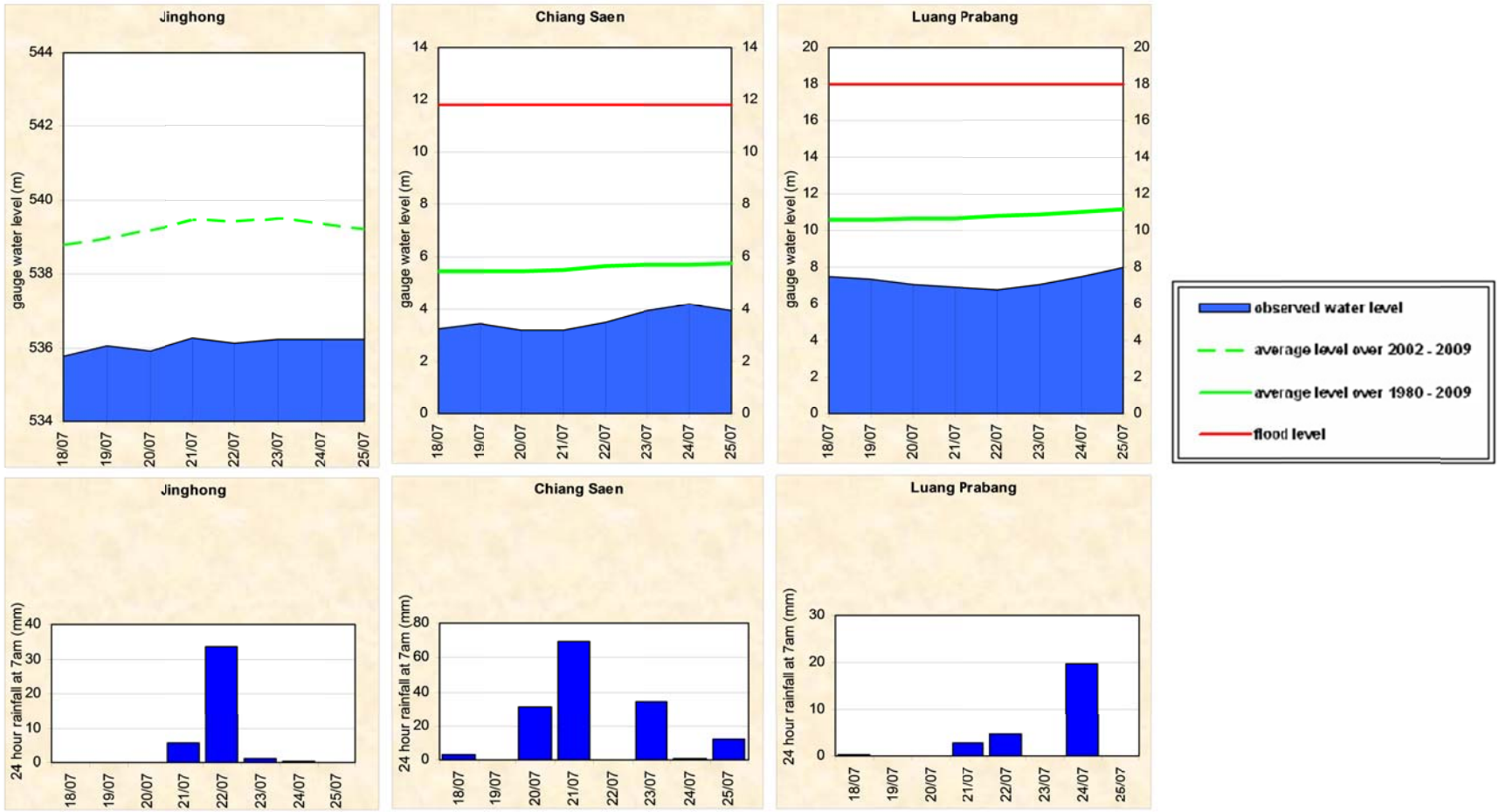


Figure A2: Observed water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

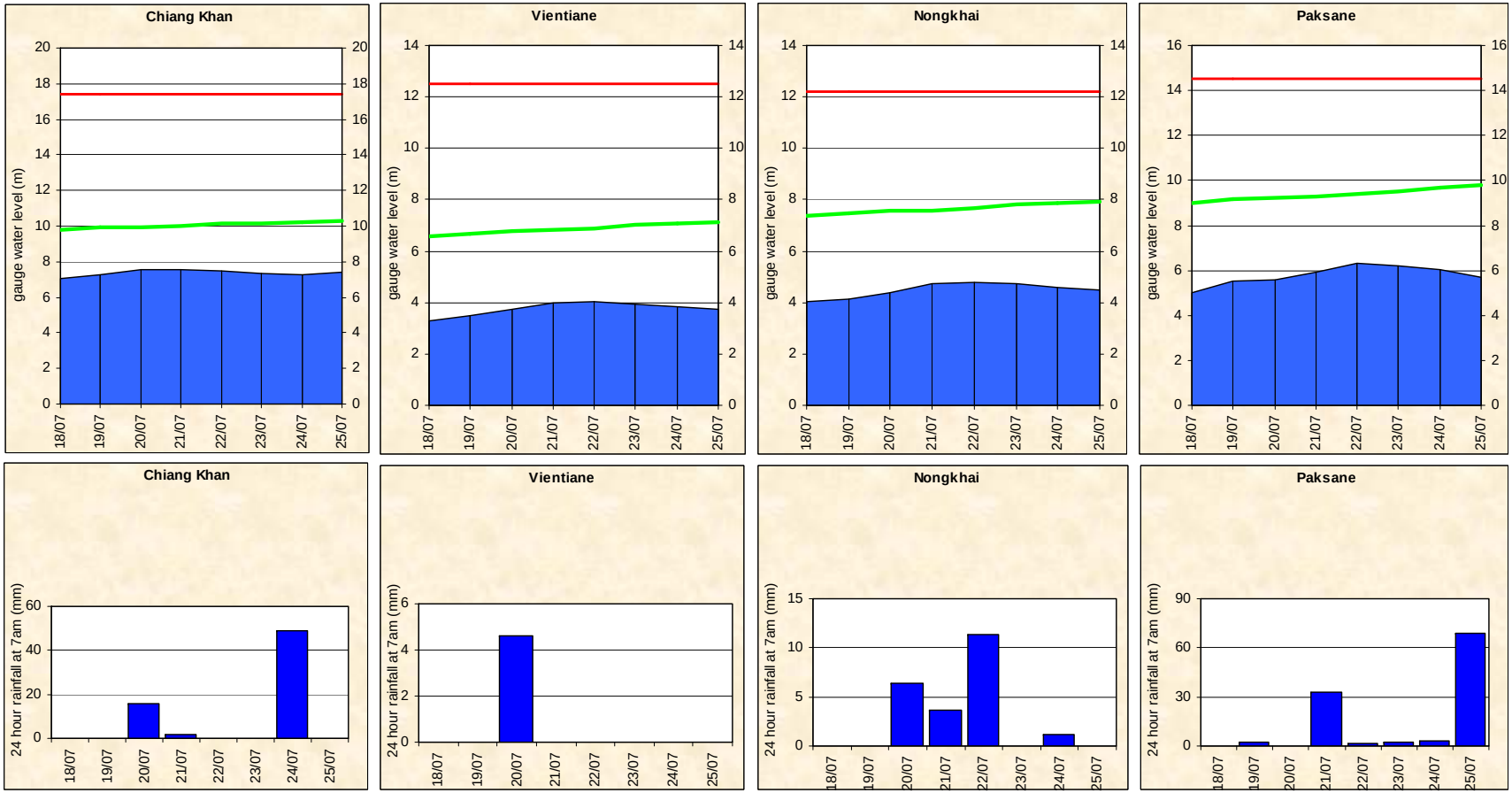


Figure A3: Observed water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

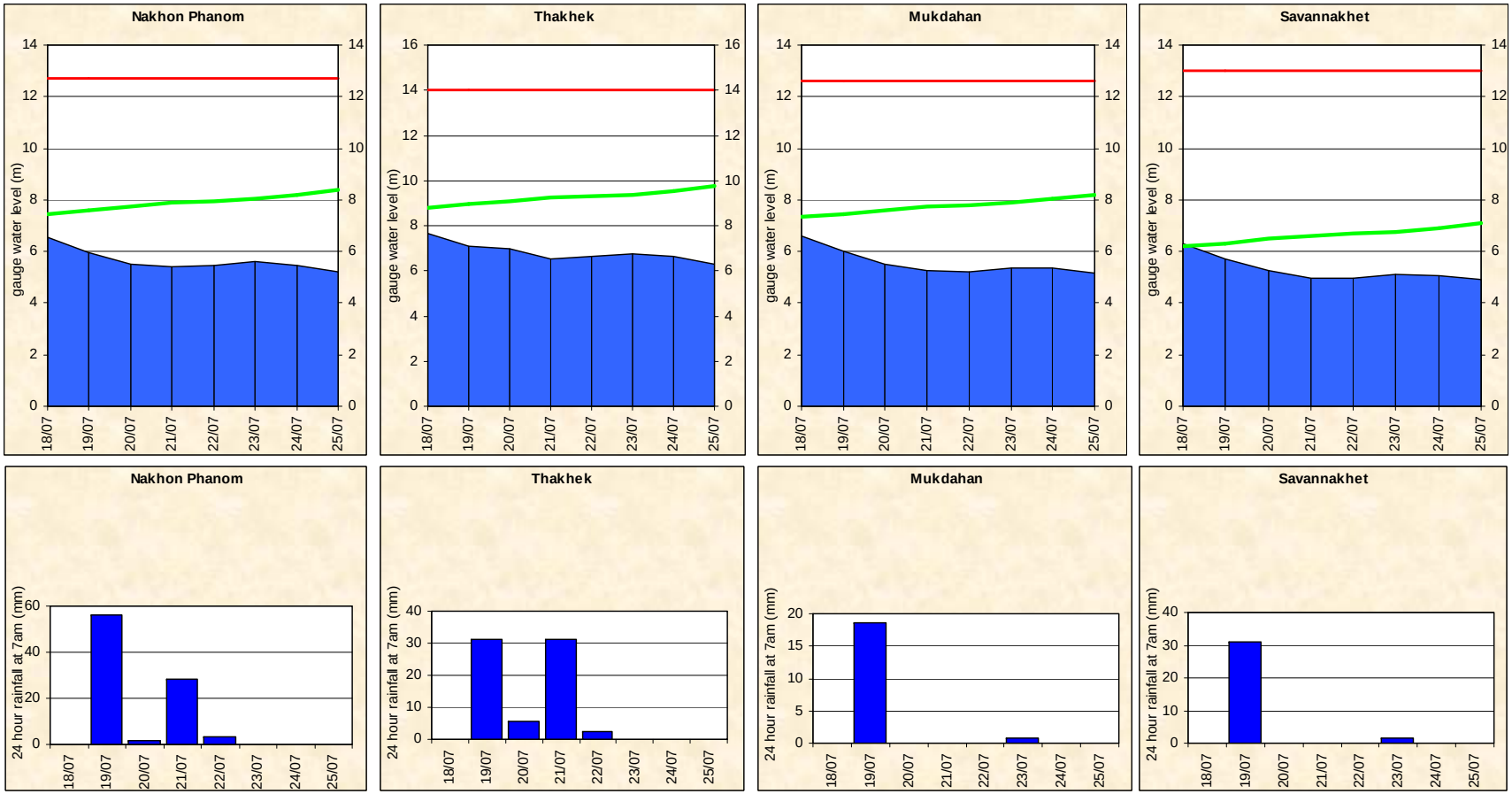


Figure A4: Observed water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

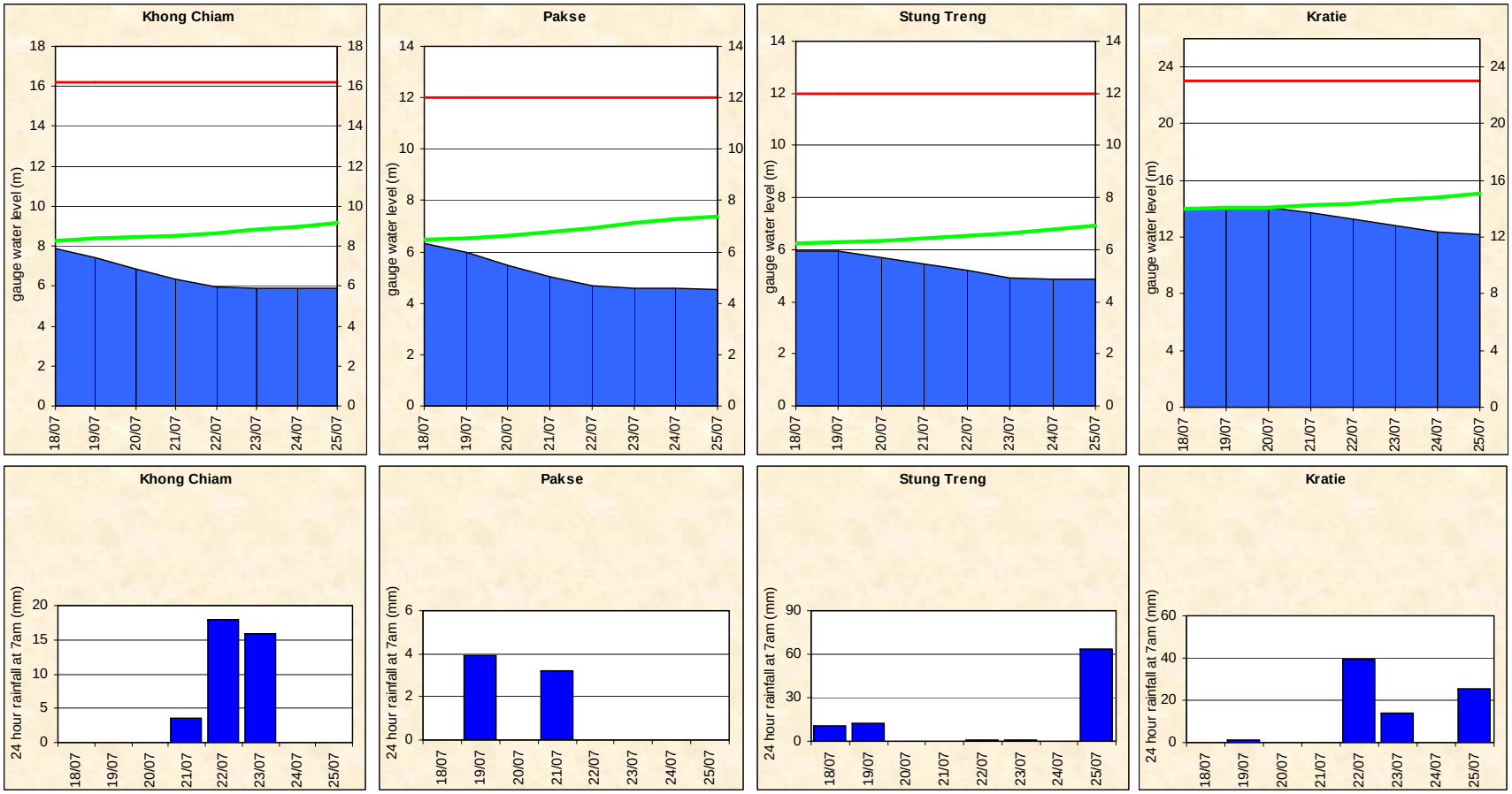


Figure A5: Water level and rainfall for Kampong Cham, Phnom Penh (Bassac and Port), and Koh Khel

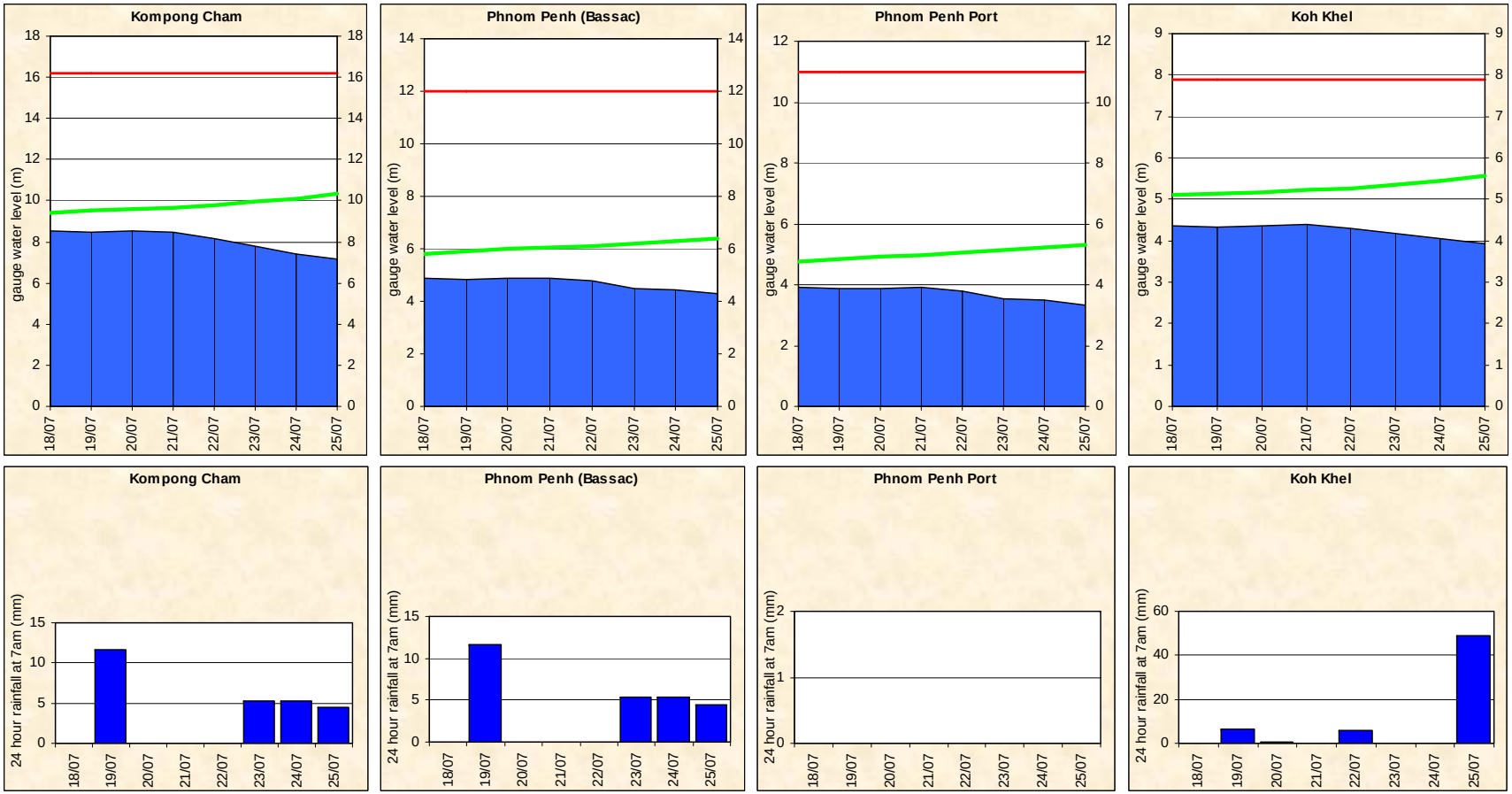
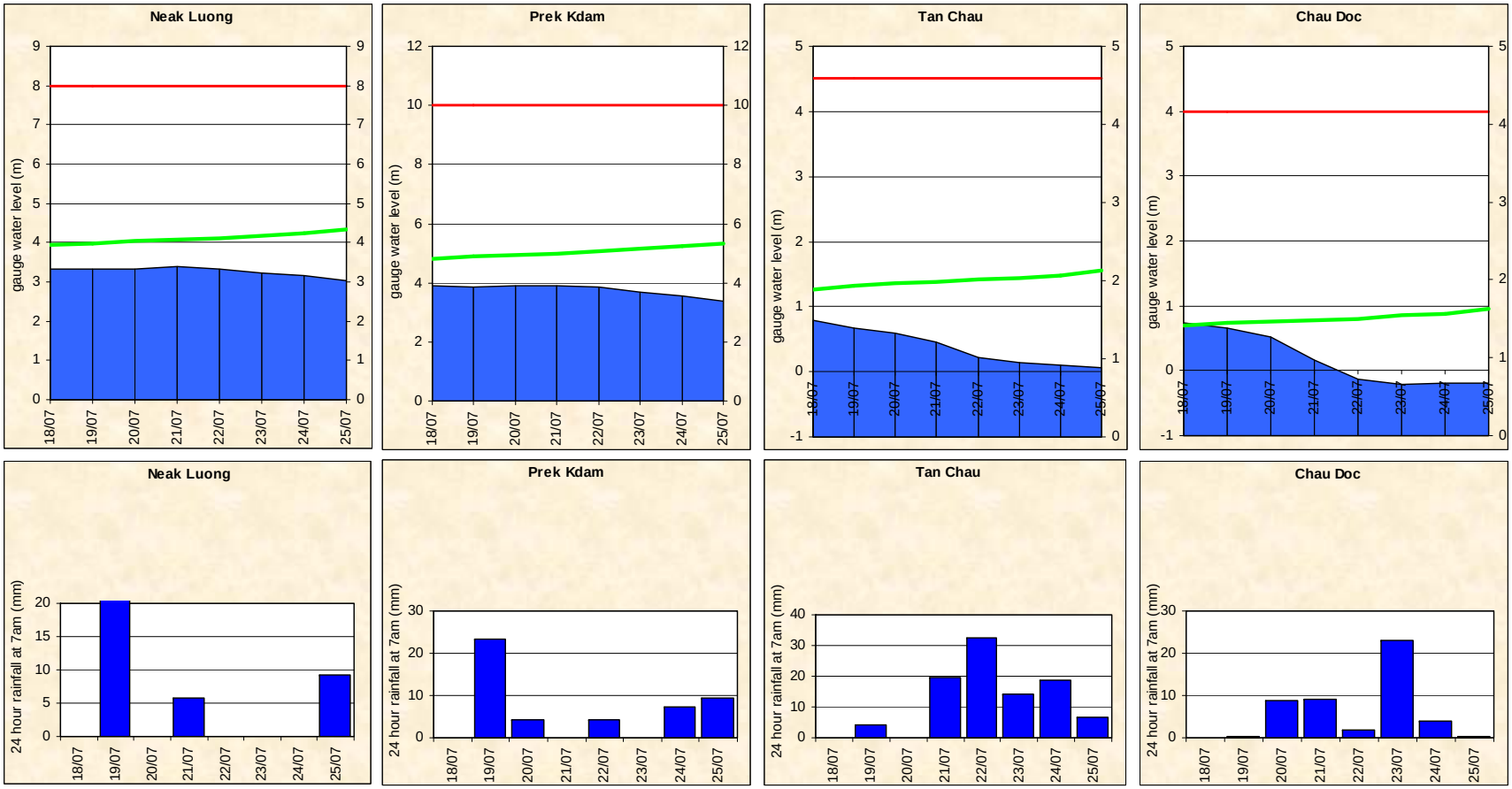


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



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.

In general, the overall accuracy is good for 1-day to 5-day forecast lead time at stations in the upper parts of the LMB. However, the accuracies at middle and lower reaches at Paksane to Thakhek, Tan Chau and Chau Doc for 2-day to 3-day forecast were less than expected.

The above differences due to two main factors: (1) internal model functionality in forecasting; for which the parameter adjustment in the model is not possible especially at stations in the upper part and in the Mekong delta where are affected by tidal; (2) the adjustment by utilizing the practical knowledge and experience of flood forecaster-in-charge; (3) the heavy rainfall happened in many tributaries inside the LMB. See the Figure B1 and table B1 for more detail.

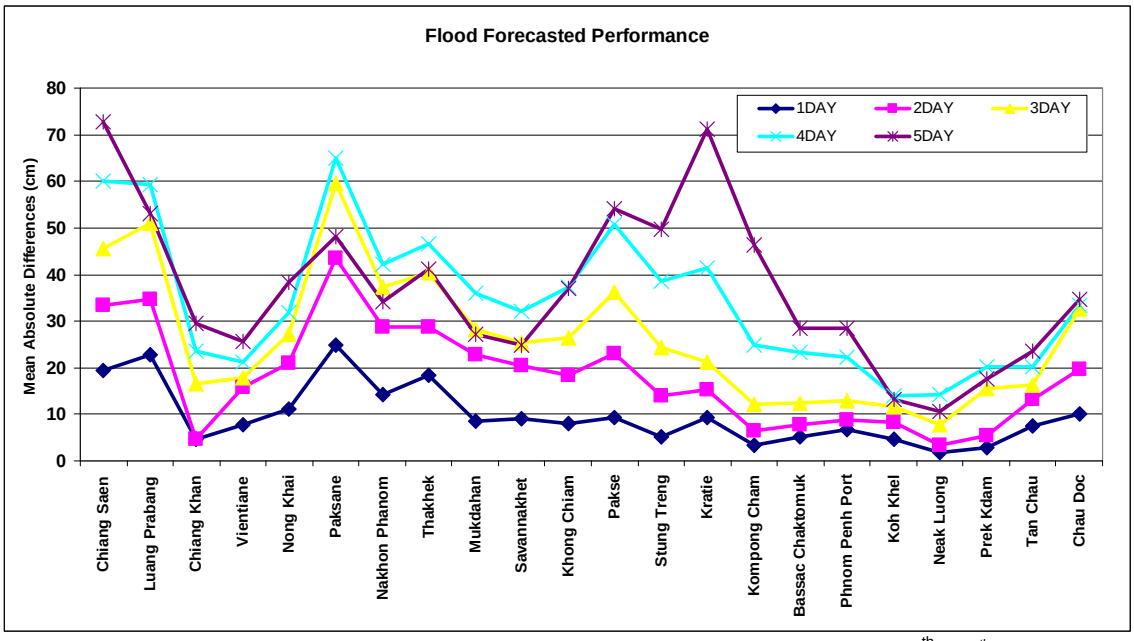


Figure B1: Average flood forecast accuracy along the Mekong mainstream (from 18th – 25th July 2016)

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	57.1	100.0	57.1	57.1	14.3	28.6	28.6	71.4	71.4	71.4	71.4	85.7	71.4	100.0	71.4	71.4	100.0	100.0	100.0	71.4	71.4	70.8
2-day	66.7	83.3	100.0	83.3	66.7	33.3	50.0	50.0	66.7	66.7	66.7	50.0	83.3	83.3	100.0	66.7	66.7	66.7	100.0	66.7	33.3	33.3	67.4
3-day	40.0	40.0	100.0	80.0	60.0	20.0	40.0	20.0	40.0	60.0	80.0	20.0	60.0	60.0	100.0	60.0	40.0	20.0	60.0	40.0	40.0	0.0	49.1
4-day	75.0	75.0	100.0	100.0	100.0	50.0	75.0	50.0	75.0	75.0	75.0	75.0	75.0	75.0	100.0	50.0	50.0	50.0	75.0	75.0	25.0	0.0	68.2
5-day	66.7	66.7	66.7	100.0	100.0	33.3	66.7	66.7	100.0	100.0	66.7	33.3	66.7	0.0	66.7	66.7	66.7	66.7	100.0	66.7	66.7	0.0	65.2

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

2016	FF completed and sent (time)	stations without forecast	FF2 completed and sent (time)	Weather informaition 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	*09:44*	*0*	*-*	*0*	*08:15*	*07:10*	*07:30*	*08:18*	*08:29*	*07:41*	*07:52*	*0*	*0*	*5*	*28*	*397*	*0*	*0*
month	*10:05*	*0*	*-*	*-*	*08:14*	*07:10*	*07:28*	*07:47*	*08:39*	*07:47*	*07:53*	*0*	*0*	*13*	*56*	*1066*	*5*	*0*
season	*10:09*	*0*	*-*	*0*	*08:14*	*07:11*	*07:45*	*07:40*	*08:55*	*07:50*	*07:42*	*0*	*0*	*36*	*85*	*1970*	*21*	*0*

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.

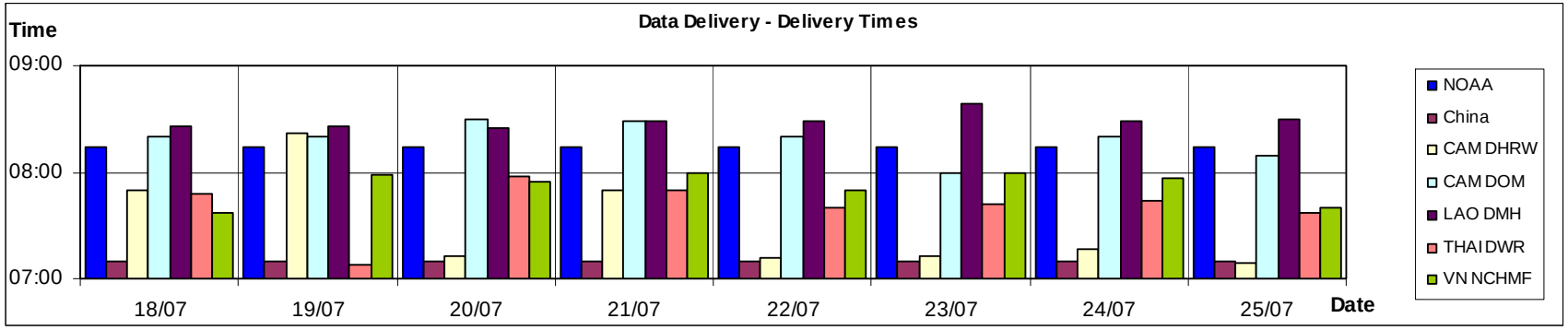


Figure B2: Data delivery times for the past 8 days including the current report date

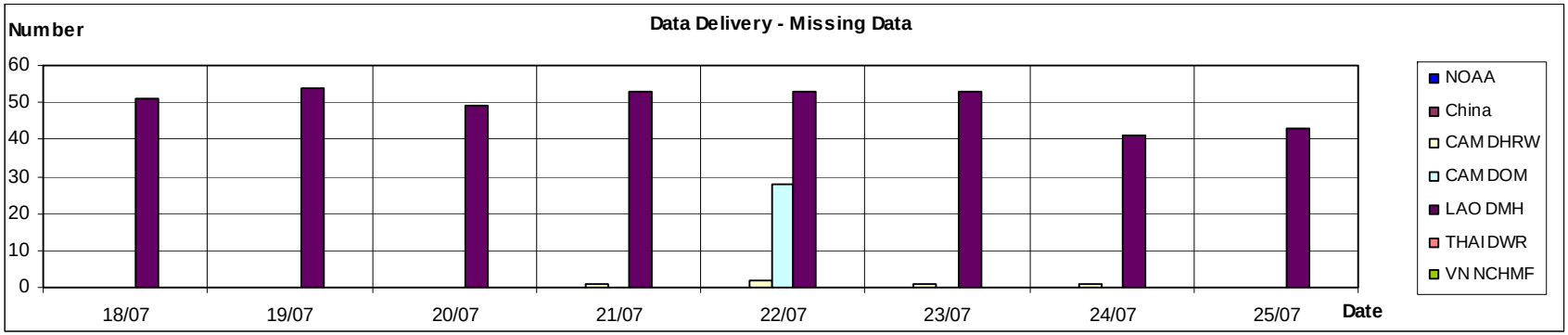


Figure B3: Missing data for the past 8 days including the current report date

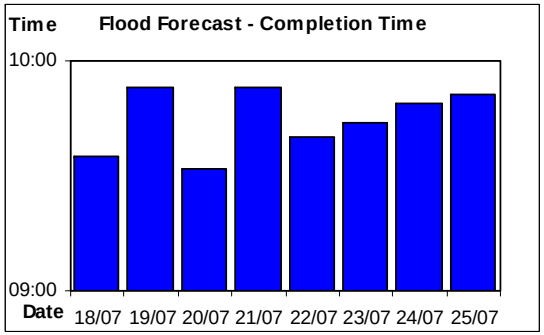


Figure B4: Flood forecast completion time

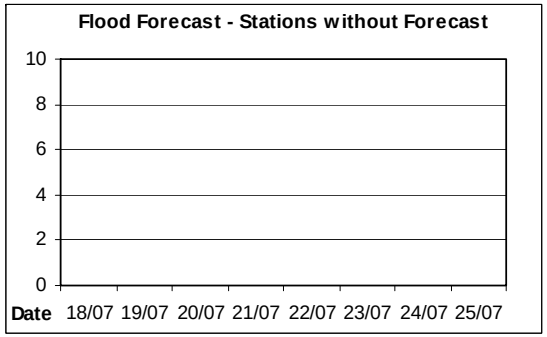


Figure B5: Flood forecast stations without forecast

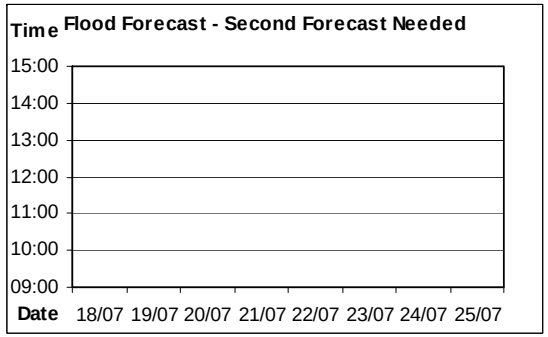


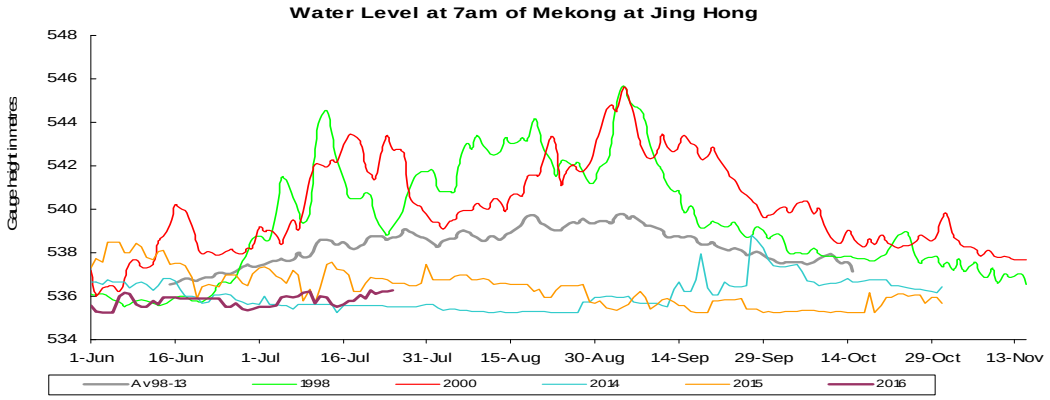
Figure B6: Second forecast needed

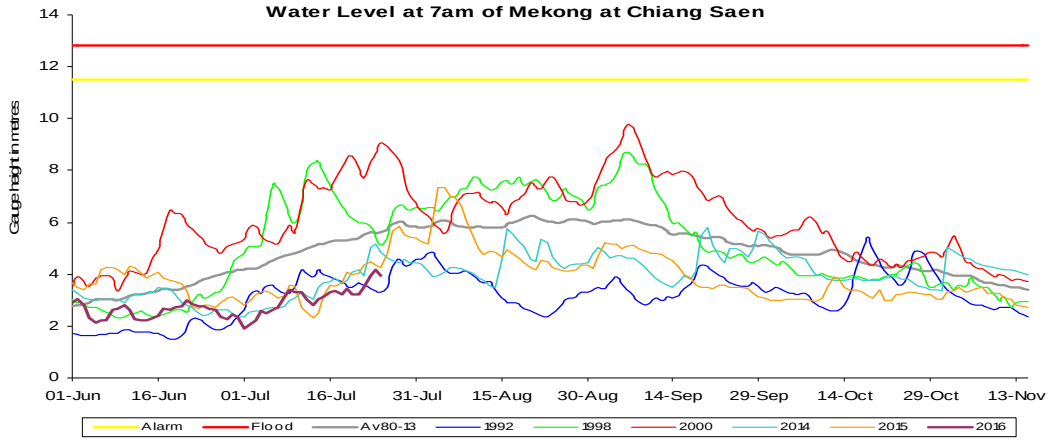
Annex C: Season Water Level Graphs

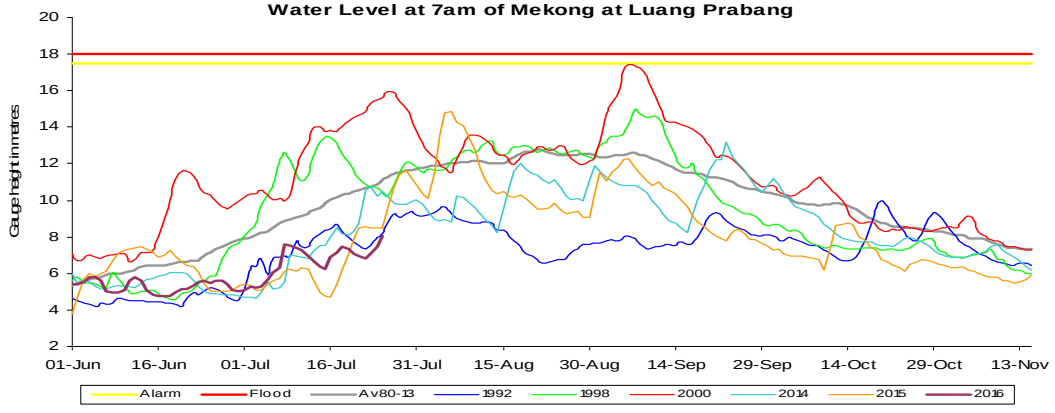
This Annex has the water level graphs of the report date. These graphs are distributed daily by email together with the Flood Bulletins.

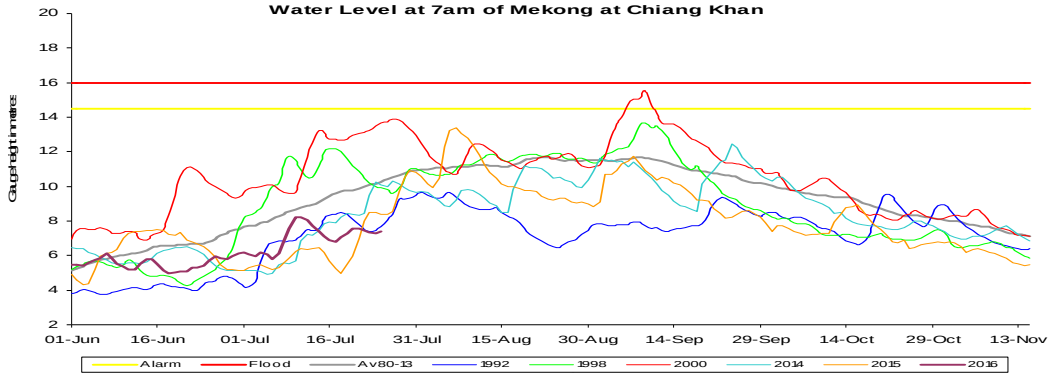
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS

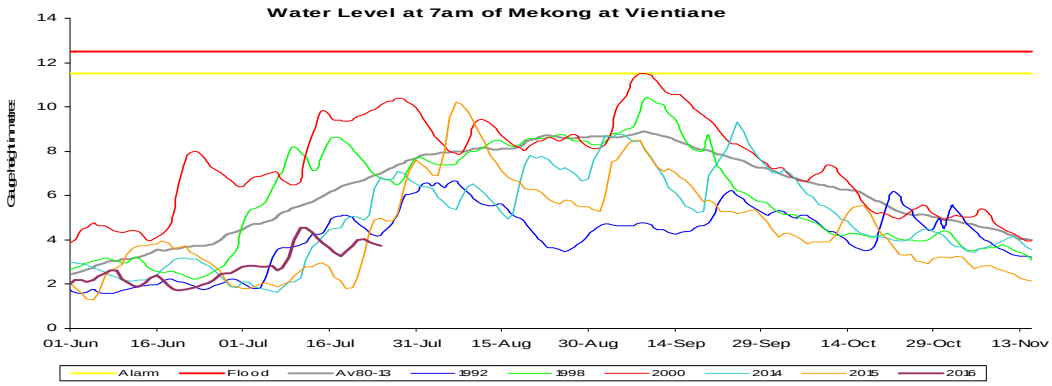
IN FLOOD SEASON FROM 1 JUNE TO 31 OCTOBER

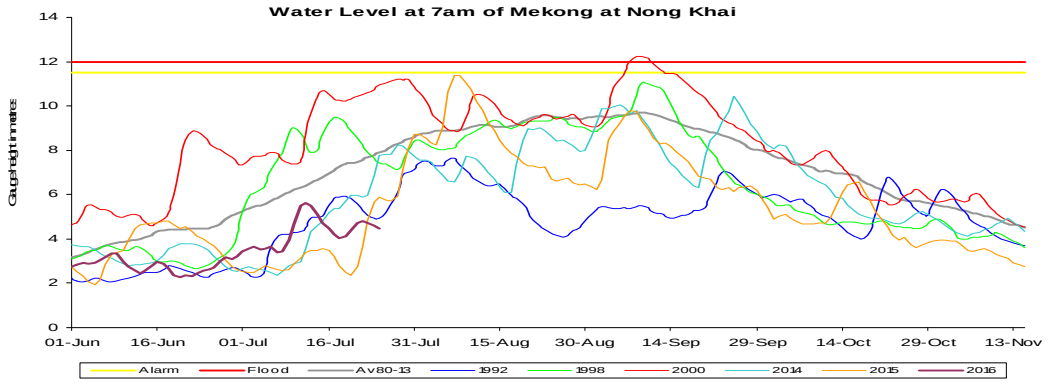


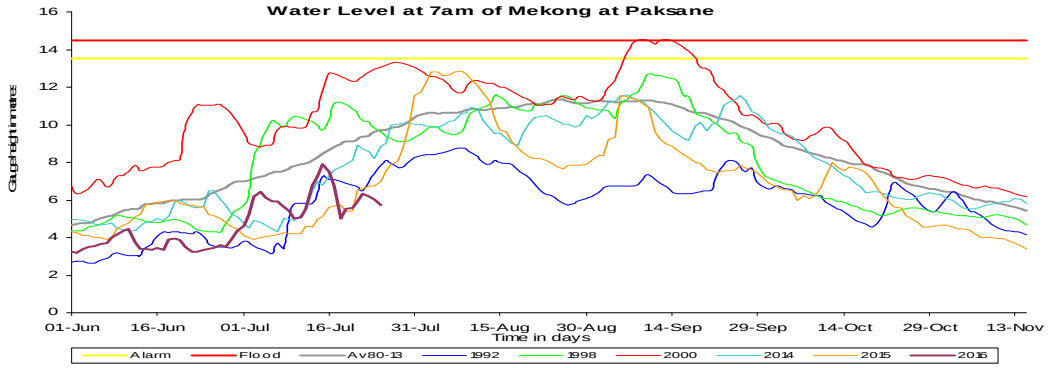


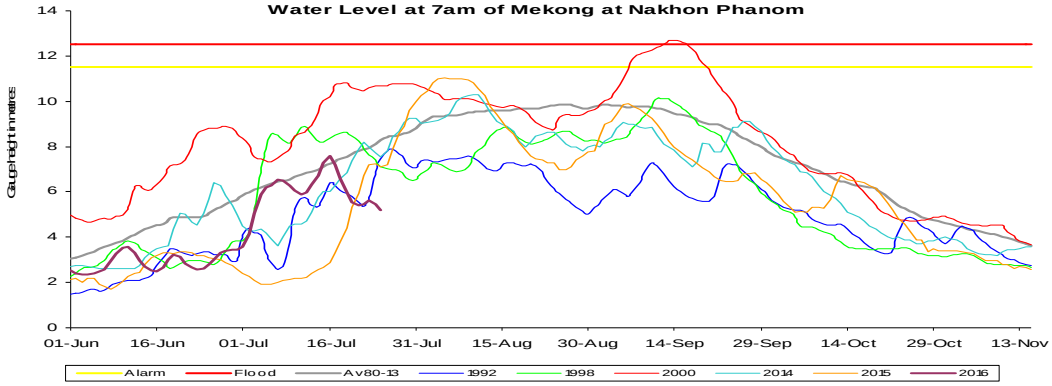


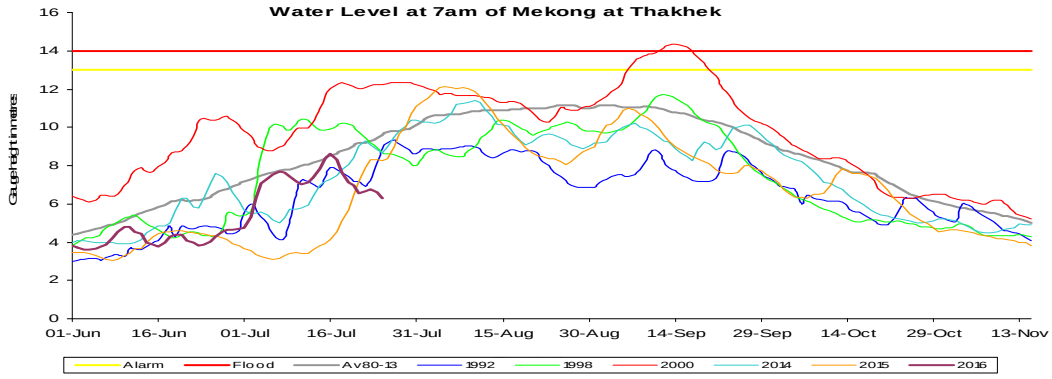

Water Level at 7am of Mekong at Chiang Khan
Gaugheightinmetres
20
18
16
14
12
10
8
6
4
2
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

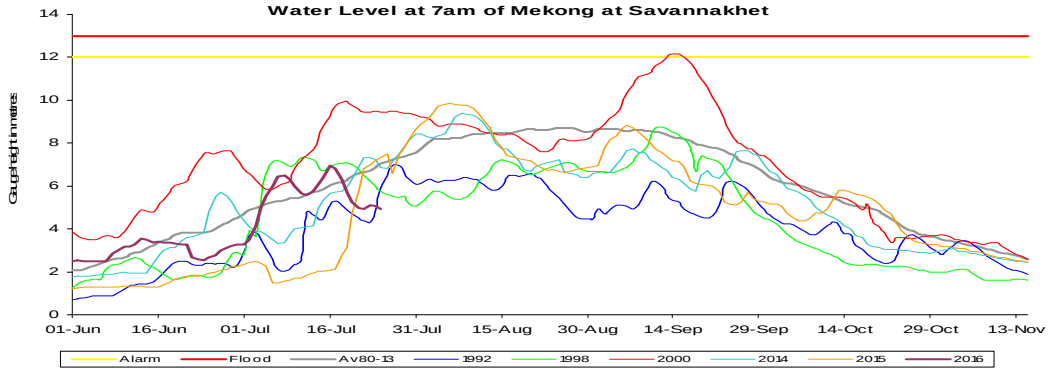

Water Level at 7am of Mekong at Vientiane
Gaugheightinmetres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

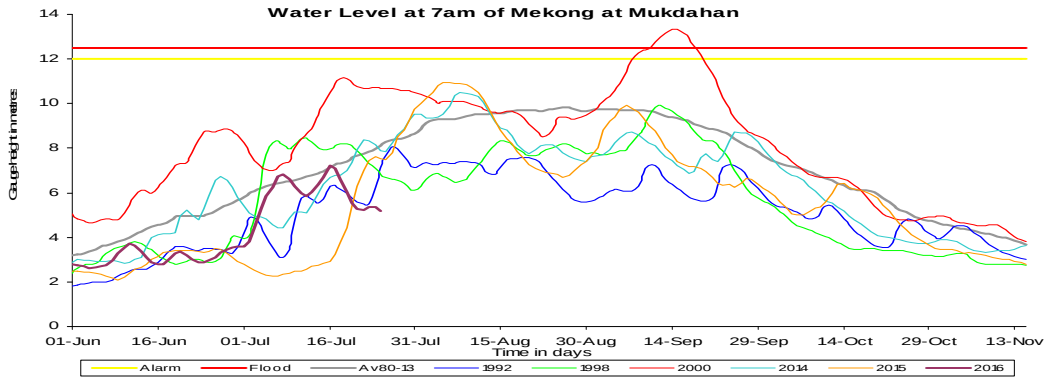

Water Level at 7am of Mekong at Nong Khai
Gaugheightinmetres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

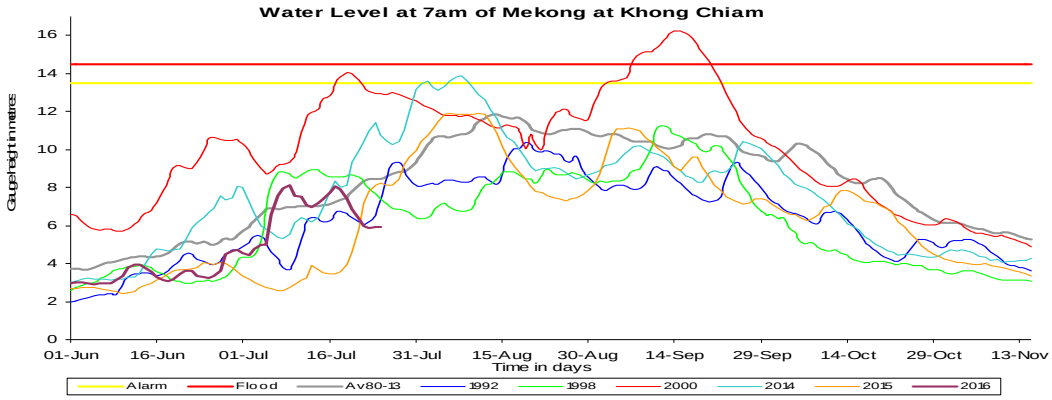

Water Level at 7am of Mekong at Paksane
Gaugheightinmetres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

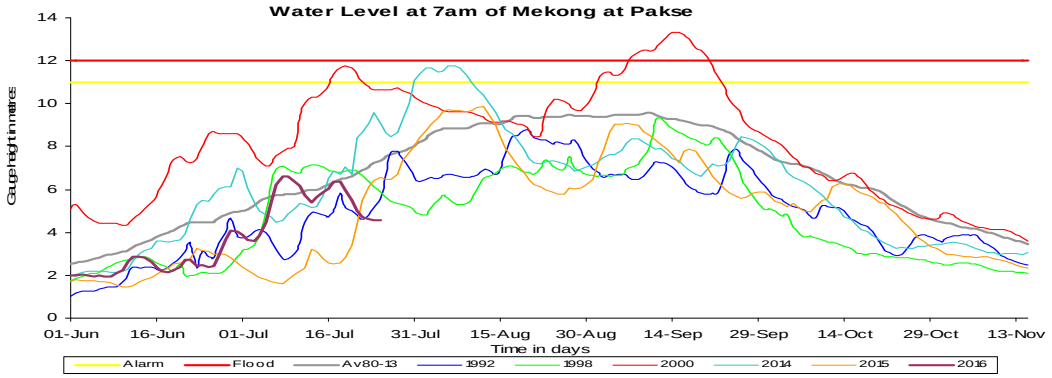

Water Level at 7am of Mekong at Nakhon Phanom
Gaugeheightinmetres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

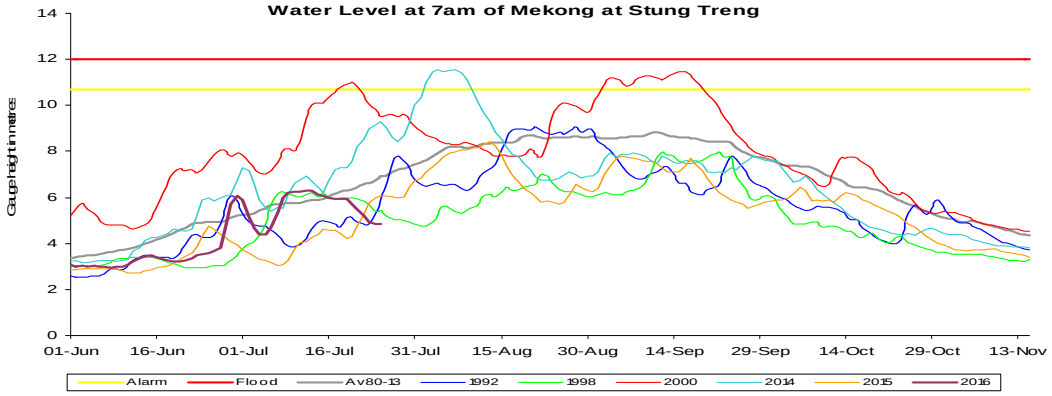

Water Level at 7am of Mekong at Thakhek
Gaugeheightinmetres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

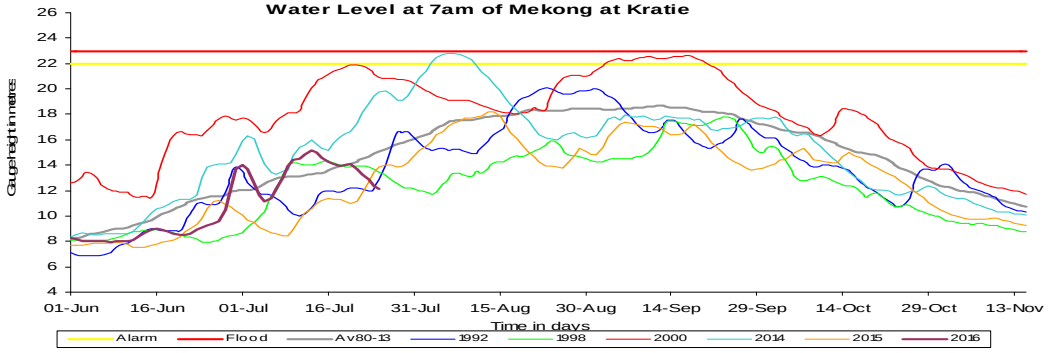

Water Level at 7am of Mekong at Savannakhet
Gaugeheightinmetres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

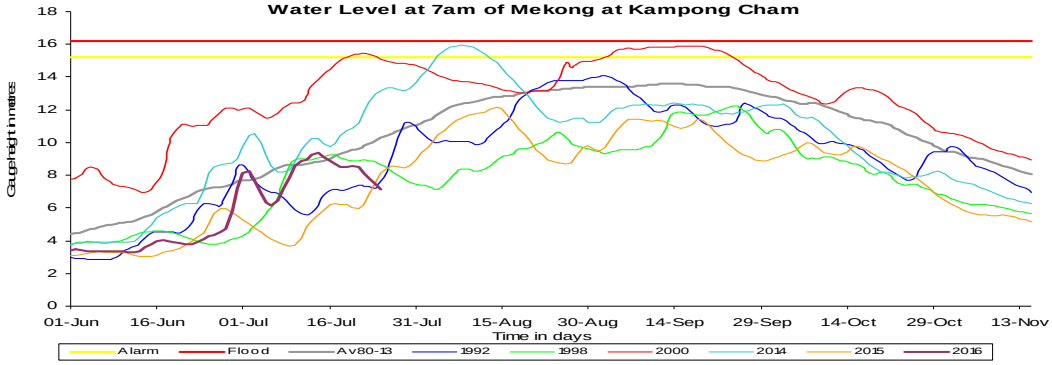

Water Level at 7am of Mekong at Mukdahan
Gaugeheightinmetres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

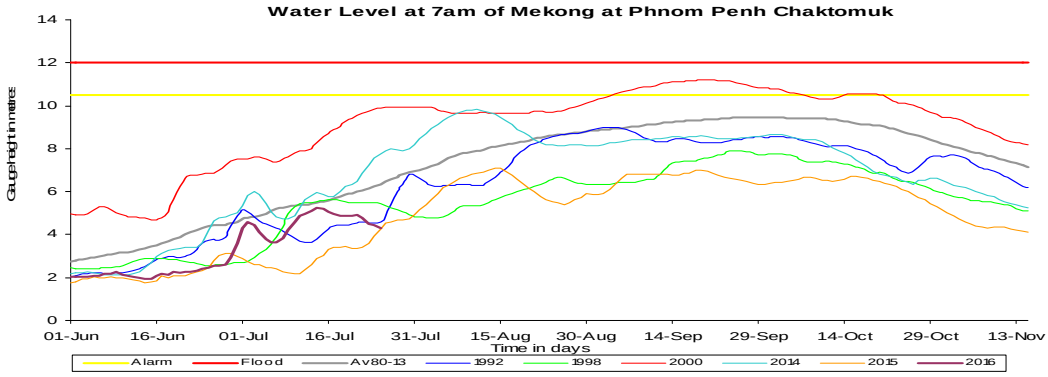

Water Level at 7am of Mekong at Khong Chiam
Gaugeheightinmetres
Time in days
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

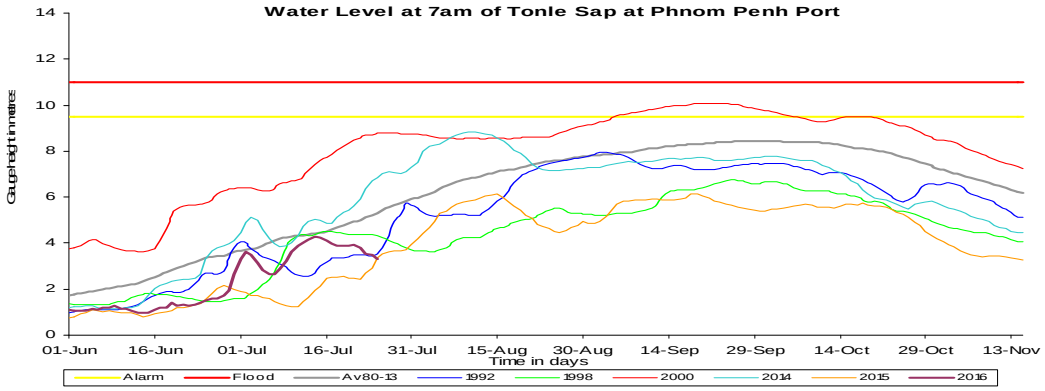

Water Level at 7am of Mekong at Pakse
Gaugeheightinmetres
Time in days
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

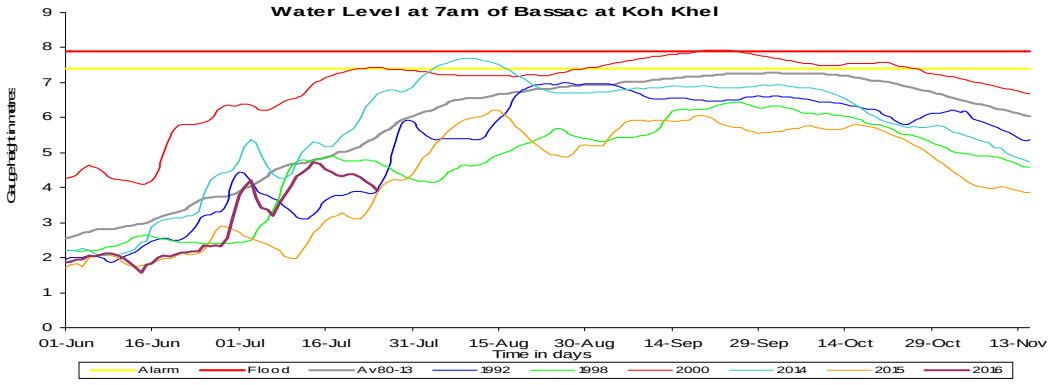

Water Level at 7am of Mekong at Stung Treng
Gaugeheightinmetres
Time in days
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

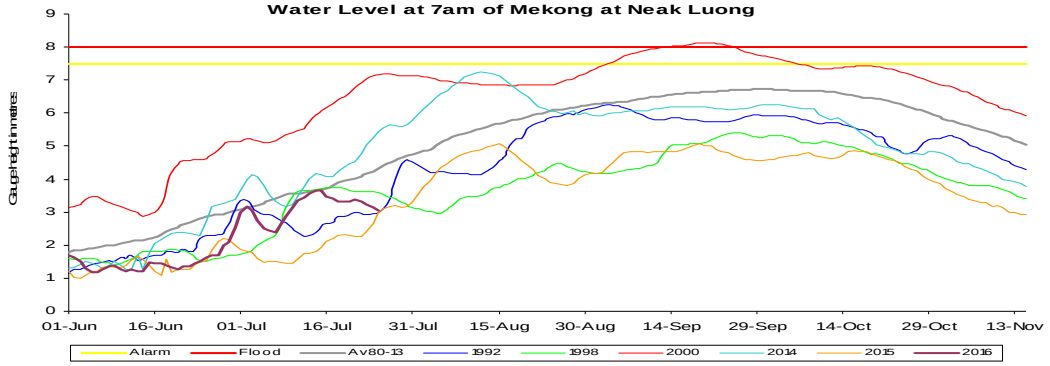

Water Level at 7am of Mekong at Kratie
Gaugeheightinmetres
Time in days
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

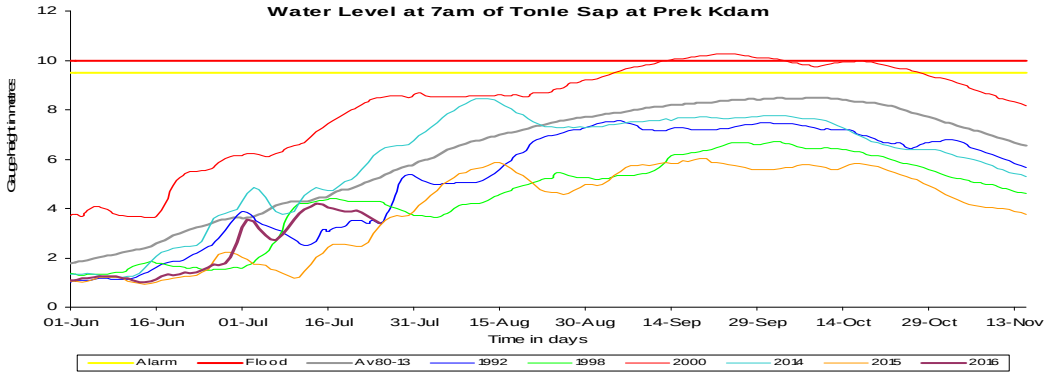

Water Level at 7am of Mekong at Kampong Cham
Gaugeheightinmetres
Time in days
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

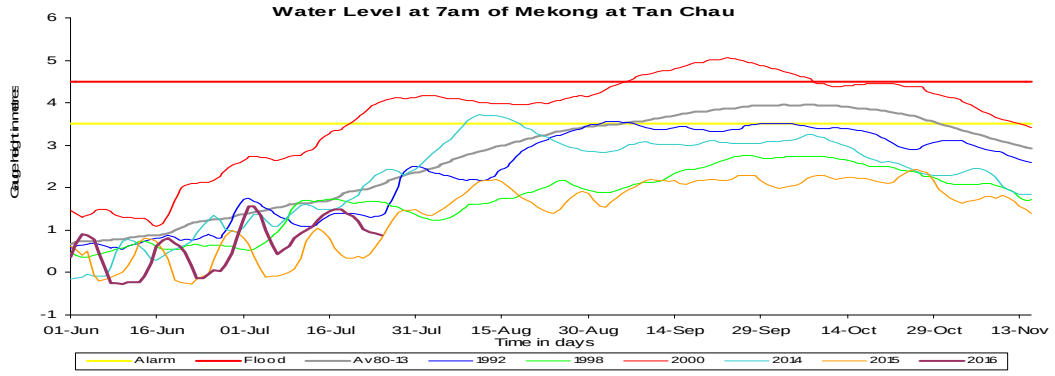

Water Level at 7am of Mekong at Phnom Penh Chaktomuk
Gaugeheightinmetres
Time in days
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016

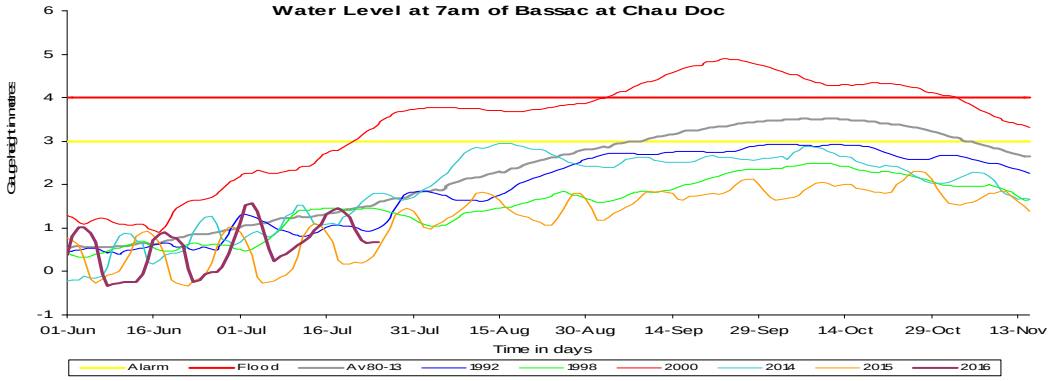

Water Level at 7am of Tonle Sap at Phnom Penh Port
Gaugeheightinmetres
Time in days
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016


Water Level at 7am of Bassac at Koh Khel
Gaugeheightinmetres
Time in days
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016


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
13-Nov
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016


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
13-Nov
Time in days
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016


Water Level at 7am of Mekong at Tan Chau
Gauge height in metres
-1
0
1
2
3
4
5
6
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016


Water Level at 7am of Bassac at Chau Doc
Gauge height in metres
-1
0
1
2
3
4
5
6
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Time in days
Alarm
Flood
Av80-13
1992
1998
2000
2014
2015
2016