Weekly Flood Situation Report for the Mekong River Basin

Prepared at: 25/09/2018, covering the week from the 17th to 24th September 2018

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

General weather patterns

This weekly report is prepared from 17th to 24th September 2018, the weather bulletins were issued by the Department of Meteorology (DOM) of Cambodia. The weather maps were referenced from Thailand Meteorology Department (TMD) on 20th and 23th September 2018 as presented in the **Figures 1 & 2** as follows:

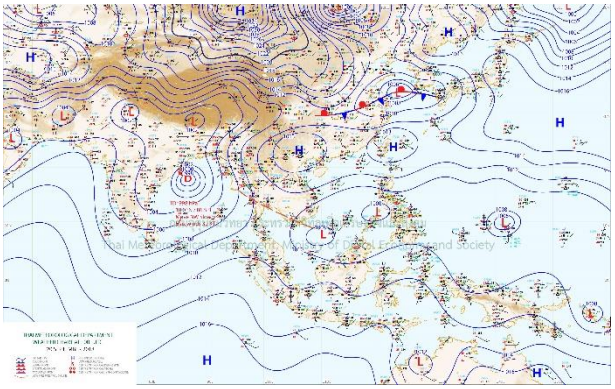


Figure 1: Weather map for 20th Sept 2018

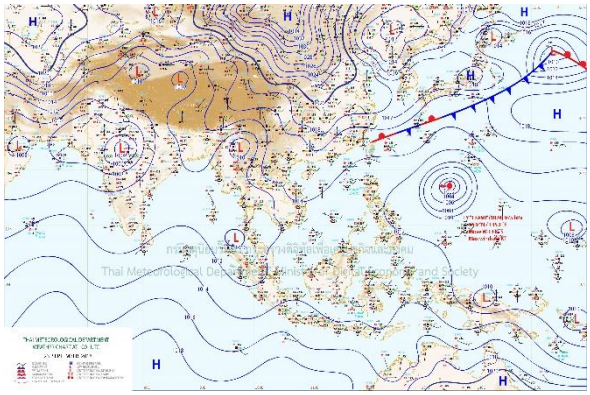


Figure 2: Weather map for 23th Sept 2018

Moderate South-West (SW) Monsoon

During the last week, the low pressure was nominated in the upper part of the Lower Mekong Basin (LMB) which resulted in moderate rainfall occurring. **Figure 1** and **2** shown the effected weather in the LMB.

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

The major influences on the climate of the Mekong Basin are its position in the subtropical latitudes of mainland Southeast Asia and certain topographic features that affect the distribution of precipitation. In May, the warm, humid air masses of the southwest monsoon begin to flow north-eastward over the region from the Indian Ocean, depositing great quantities of rain. Rainfall reaches a maximum in Auguest-September. Last week, there was no effect of storm or Typhoon but still influent by the South-Monsoon. Last week from 17th to 24th September 2018, there was no notified storm or Typhoon effected the Mekong Region but still have moderate over the region.

Other weather phenomena that affect the discharge

According to the Thai Meteorological Department (TMD), there will influence the prevailing southwest monsoon over Mekong region, including the Gulf of Thailand to become more rainfall. The low pressure was hit the upper part of the Mekong region, during that time (see **Fig.1**).

Over weather situation

During last week, the weather was scattered thundershowers with moderate rain of the Southwest monsoon. Consequently, in this week there was moderate rainfall covered from upper part of Naphon Phanom and to Khong Chaim and Pakse. The observed rainfall at Paksane to Pakse and the 3S area showed high rainfall between 100 mm to 250mm, which slightly effected by the Typhoon Mangkhut from Vietnam. The weekly rainfall distribution is shown in **Figure 3** and daily rainfall at key stations in the Lower Mekong Basin are shown **Table A2**.

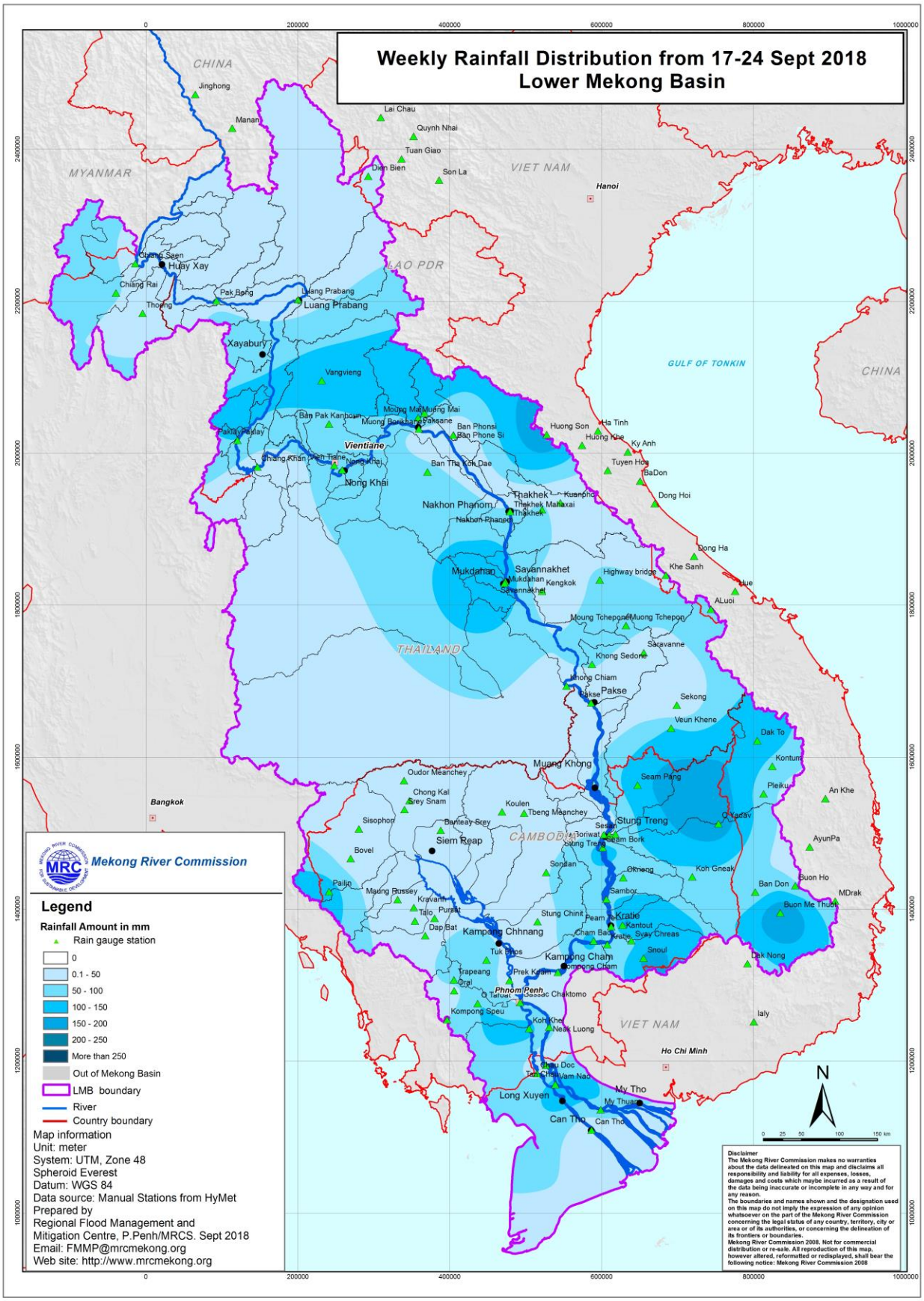


Figure 3: Weekly Rainfall Distribution over the LMB from 17th to 24th September 2018

General behaviour of the Mekong River

During the last week, the water levels at stations from upper to middle part of LMB has been decreasing due to inflow operation upstream part, while at downstream part has been slightly rising.

For stations from Chiang Saen and Luang Prabang

Water levels from 17h to 24th September 2018 at Chiang Sean station were fluctuated over its long-term average (LTA), but decreased significantly from 5.85 m on 22th to 4.87m on 24th September 2018. This was considered nominated by upstream hydropower dam operation in China. For Luang Prabang station, water levels were nominated by upstream inflow from Chiang Sean and tributaries. This week water levels were decreased from 12.49 m to 11.00 m from 17th to 24th September 2018. However, still they stay over its LTA.

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

From Chiang Khan, Vientiane, Nong Khai to Paksane, water levels this week were decreased significantly from upstream to downstream. As observed, water levels at Vientiane and Nong Khai stations were dropped below their LTAs.

For stations from Nakon Phanom/Thakhet to Mukdaha/Sovannakhet

Water levels from Nakhon Phanom/Thakhet to Mukdahan/Sovannakhet stations were continued to decrease since las week. Based on river monitoring network, water levels from these stations were dropped close to their LTAs from 17th to 24th September 2018.

For stations from Khong Chiam to Pakse

The same trend as upstream station, water levels from Khong Chiam to Pakse stations were continued to decrease, referred to their inflows from upstream and their tributaries. However, water levels at these stations were decreased close to their Long-Term Averages (LTAs) at the end of this week.

For stations from Stung Treng to Kompong Cham/ Phnom Penh to Koh Khel/Neak Luong

Water levels at Stung Treng, Kratie, Kompong Cham and Phnom Penh stations were also continued to decrease from 17th to 23th September 2018. However, water levels at Koh Khel were remained over its alarm levels. Water levels at the rest of stations were still stayed over their Long-Term Averages (LTAs).

Tan Chau and Chau Doc

Water level at these 2 tidal stations were also maintained over the alarm levels since last week and are expecting to stay over their alarm levels in next week.

Note: For more detail the flood situation during the last week, please see the hydrographic in Annex C.

Flood Situation

This week the water levels decreased significantly from upstream to downstream of the Mekong River, but some stations like Koh Khel, Tan Chau and Chau Doc were remained over the alarm levels.

- Alarm stage: This week, the alarm levels were still found at Koh Khel, Tan Chau and Chau Doc from 17th to 24th September 2018.

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

2018	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
17/09/2018	536.91	5.89	12.49	11.64	8.10	9.52	12.12	10.16	11.26	9.93	8.82	11.66	9.66	9.14	20.59	14.64	9.85	8.89	7.72	7.34	8.98	3.89	3.52
18/09/2018	536.91	5.55	12.36	11.32	8.20	9.79	11.95	10.05	11.12	9.93	8.70	11.69	9.65	8.77	20.30	14.52	9.84	8.88	7.72	7.32	8.97	3.89	3.50
19/09/2018	536.23	5.63	12.46	11.33	8.05	9.43	11.84	9.89	11.01	9.81	8.70	11.59	9.60	8.77	19.98	14.36	9.85	8.89	7.71	7.32	8.99	3.89	3.50
20/09/2018	538.02	5.61	11.96	11.83	8.15	9.46	11.62	9.73	10.84	9.59	8.50	11.39	9.40	8.82	19.93	14.25	9.85	8.88	7.71	7.31	9.02	3.93	3.54
21/09/2018	537.52	5.55	11.59	11.37	8.46	9.79	11.54	9.51	10.69	9.34	8.26	11.12	9.13	8.60	19.81	14.19	9.84	8.87	7.70	7.29	9.05	3.96	3.57
22/09/2018	536.72	5.85	11.32	11.10	7.92	9.29	11.49	9.36	10.49	9.13	8.04	10.77	8.70	8.36	19.55	14.08	9.81	8.85	7.69	7.26	9.01	3.96	3.58
23/09/2018	536.36	5.40	11.12	10.56	7.54	8.89	11.17	9.19	10.32	8.94	7.85	10.48	8.57	8.23	19.32	13.91	9.78	8.81	7.68	7.26	8.98	3.95	3.57
24/09/2018	536.86	4.87	11.67	10.32	7.36	8.46	10.92	8.93	10.06	8.72	7.80	10.43	8.50	8.14	19.12	13.78	9.75	8.79	7.66	7.24	8.98	3.94	3.57

Table A2: observed rainfall Unit in mm

2018	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
17/09/2018	0.00	0.00	nr	0.00	nr	0.00	4.60	17.50	19.00	75.50	84.40	0.00	nr	1.00	nr	nr	nr	-	24.00	11.20	nr	0.30	2.70
18/09/2018	9.50	30.00	16.20	0.00	11.20	9.80	13.10	22.60	18.80	18.30	nr	2.80	nr	2.50	nr	1.20	0.70	-	12.00	1.80	nr	4.90	6.00
19/09/2018	46.00	0.00	0.40	14.70	21.80	3.40	9.20	0.30	0.60	5.50	nr	1.00	3.00	6.00	nr	nr	nr	-	0.50	nr	nr	nr	1.00
20/09/2018	0.50	15.00	nr	2.20	38.50	69.50	0.80	0.00	nr	0.00	nr	0.00	nr	nr	18.60	nr	nr	-	nr	nr	nr	nr	0.00
21/09/2018	0.00	0.00	nr	0.00	nr	0.00	nr	0.00	nr	0.00	nr	0.00	0.00	0.00	nr	nr	0.20	-	4.30	8.20	nr	nr	1.00
22/09/2018	0.00	0.00	14.60	0.00	nr	0.00	nr	0.00	nr	0.00	nr	4.20	nr	5.50	24.40	10.80	2.00	-	4.60	1.80	nr	2.60	1.00
23/09/2018	0.00	0.00	nr	0.00	nr	5.50	7.60	12.70	12.30	34.30	nr	5.80	nr	1.50	5.80	1.60	36.10	-	68.90	nr	17.60	5.30	22.50
24/09/2018	0.00	0.00	nr	0.80	nr	13.00	nr	0.00	22.70	0.00	nr	13.70	nr	nr	nr	nr	nr	-	5.70	29.70	nr	0.00	0.50

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

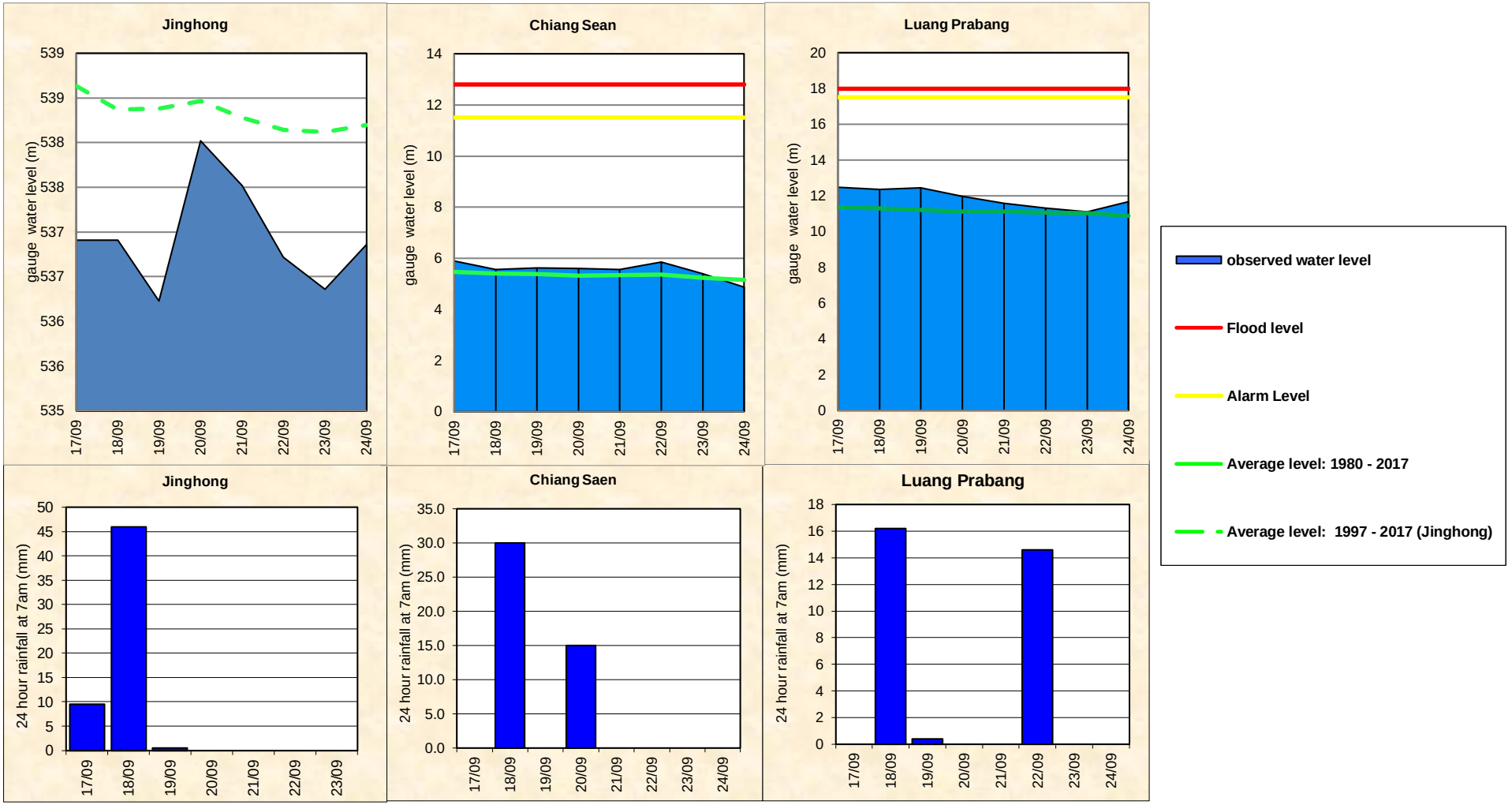


Figure A2: Observed water level and rainfall for Chiang Khan, Vientiane, Nongkhai, and Paksane

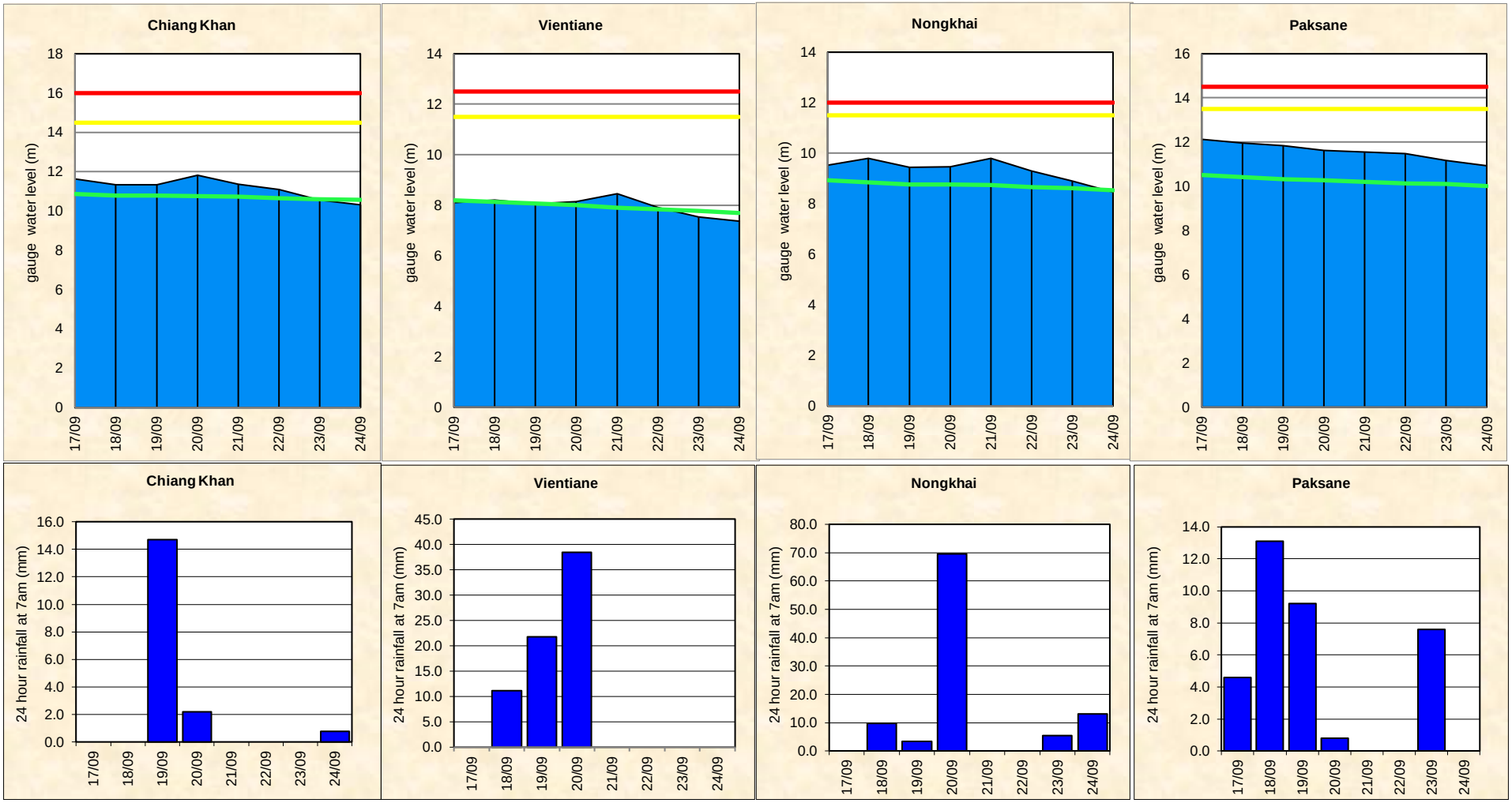


Figure A3: Observed water level and rainfall for Nakhon Phanom, Thakhek, Mukdahan and Savannakhet

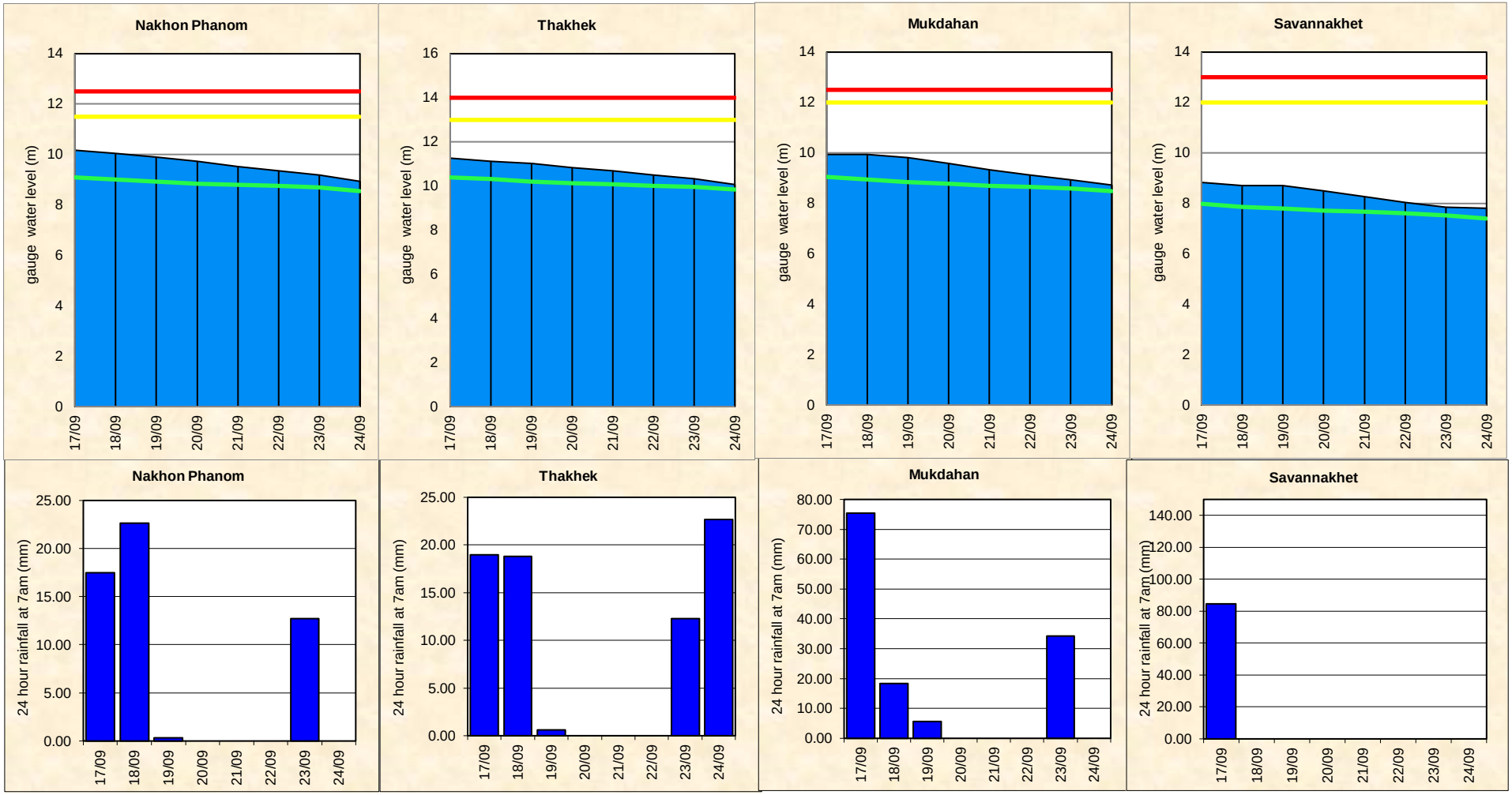


Figure A4: Observed water level and rainfall for Khong Chiam, Pakse, Stung Treng, and Kratie

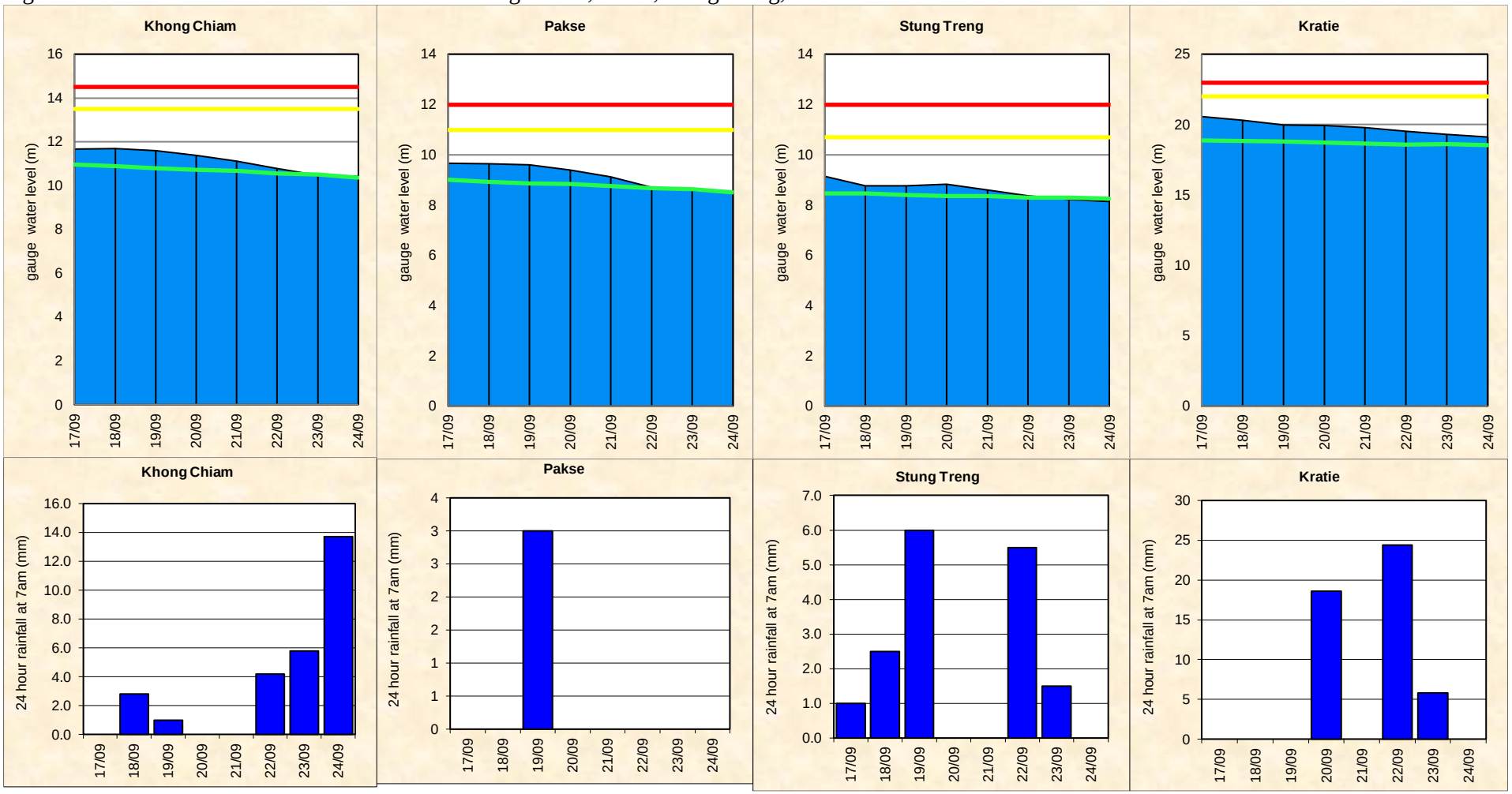


Figure A5: Water level and rainfall for Kompong Cham, Phnom Penh (Bassac and Port), and Koh Khel

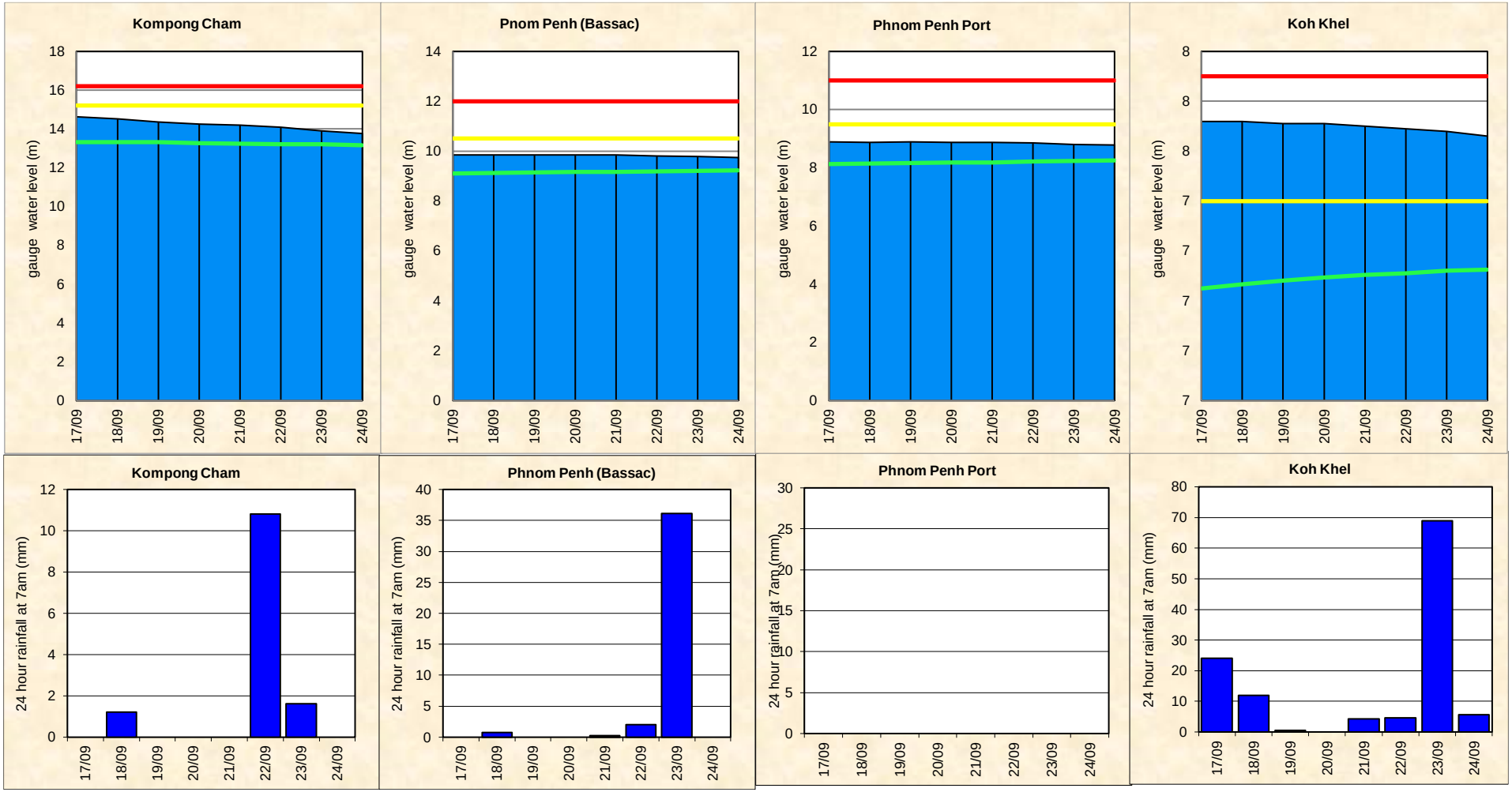
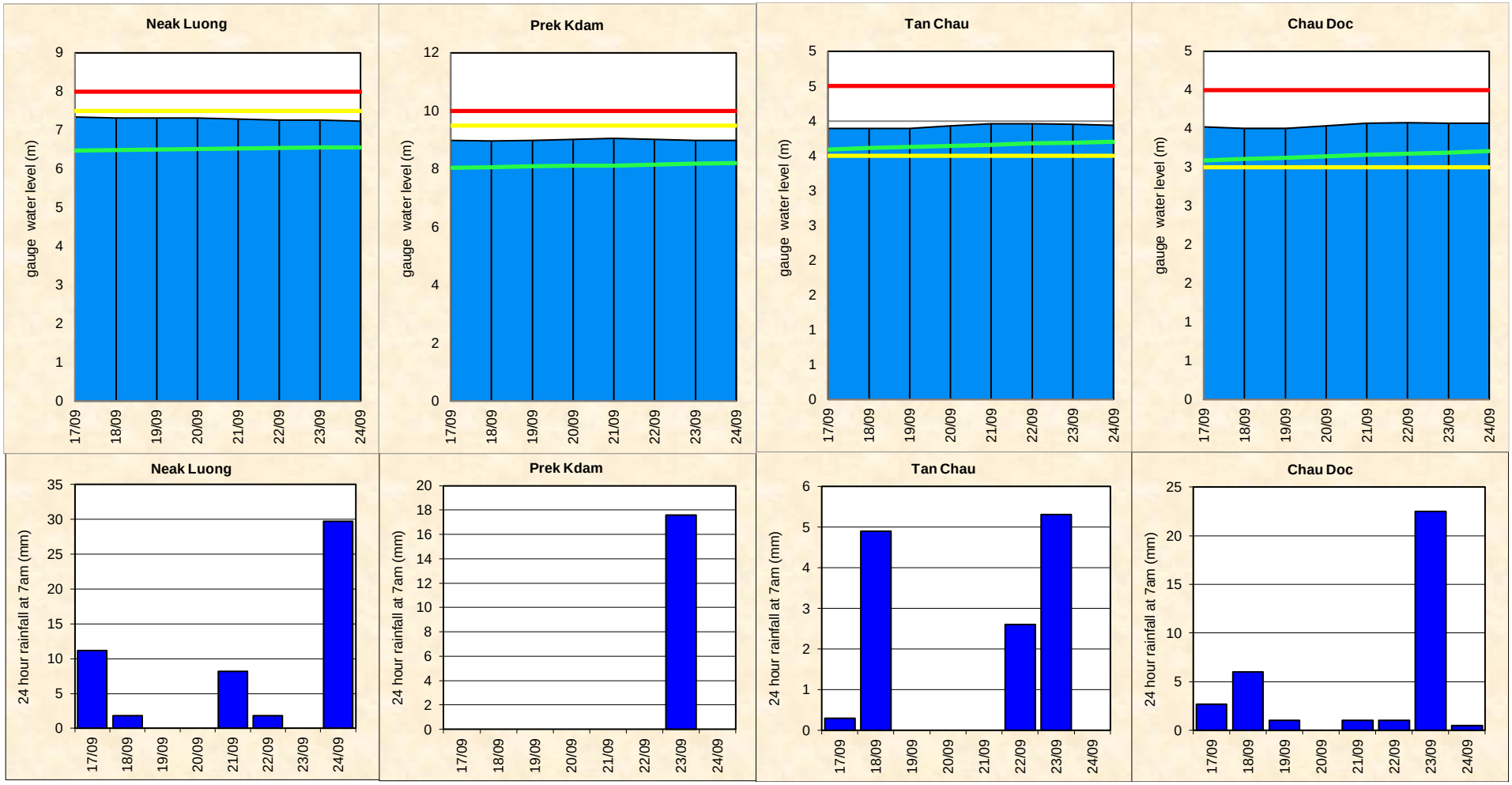


Figure A6: Water level and rainfall for Neak Luong, Prek Kdam, Tan Chau and Chau Doc



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.

In general, the overall accuracy is fair for 1-day to 5-day forecast lead time at stations in the upper and lower parts of the LMB. However, the accuracies at upper and middle reaches of the LMB stations from Chaing Sean to Pakse stations for 4-day to 5-day forecast were considered large.

The above differences due to three main factors: (1) the effect by manmade (hydro-power operation: without provided information)

(2) 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; (3) the adjustment by utilizing the practical knowledge and experience of flood forecaster-in-charge; and (4) the forecasted accumulated rainfall was not well represented.

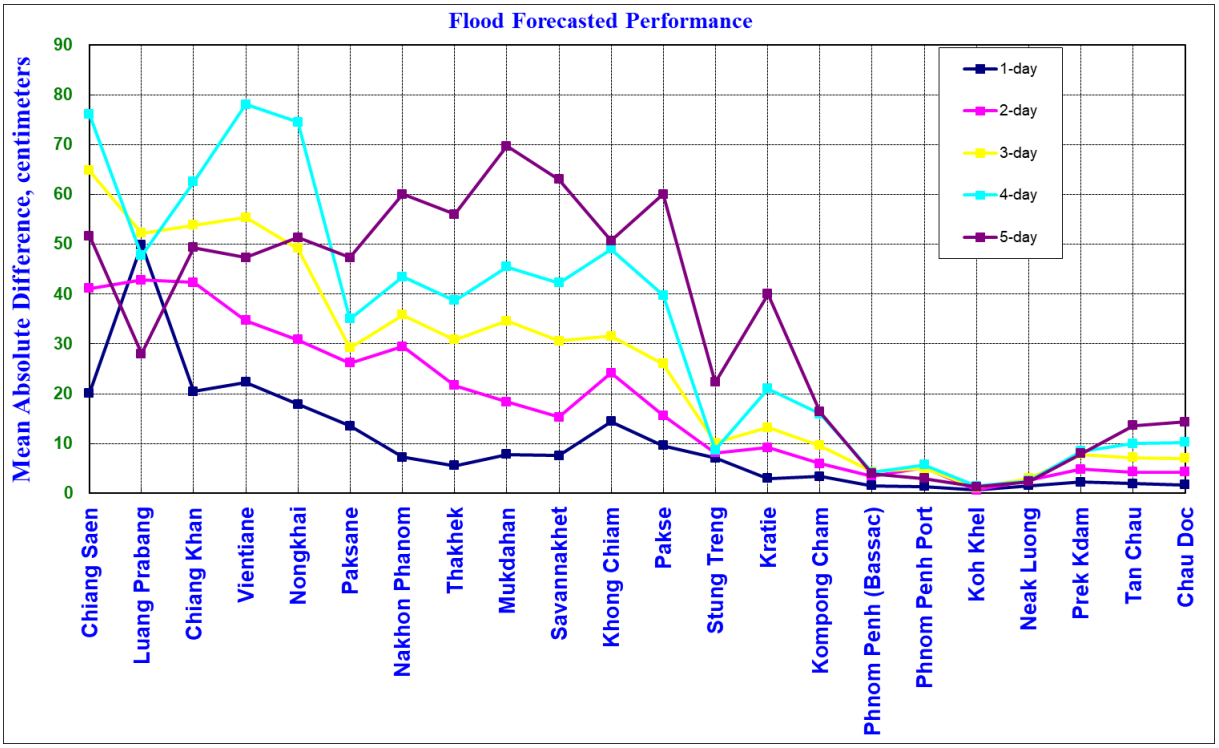


Figure B1: Average flood forecast accuracy along the Mekong mainstream

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: Evaluation performance forecasting (from 17th to 24th September 2018) base on New Benchmark (%).

Unit in %

Lead time Forecast	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	42.86	14.29	57.14	71.43	85.71	57.14	100.00	100.00	100.00	100.00	85.71	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	85.71	100.00	***86.36***
2-day	33.33	50.00	66.67	66.67	66.67	100.00	66.67	83.33	100.00	100.00	83.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	***87.12***
3-day	20.00	80.00	60.00	60.00	60.00	100.00	100.00	100.00	80.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	***89.09***
4-day	50.00	100.00	75.00	50.00	50.00	100.00	100.00	100.00	100.00	75.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	***90.91***
5-day	66.67	100.00	66.67	100.00	66.67	100.00	66.67	66.67	33.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	***89.39***

Unit in cm

Lead time Forecast	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	22	31	22	23	23	23	20	20	20	20	24	22	18	28	20	9	9	6	7	9	6	6
2-day	39	55	41	42	43	42	38	39	39	38	46	41	33	52	38	18	18	12	14	17	11	11
3-day	51	76	57	59	59	58	54	54	55	54	65	58	46	73	54	26	26	18	20	24	16	16
4-day	60	93	70	72	74	72	68	68	70	68	82	73	57	92	69	34	34	22	26	31	20	21
5-day	66	107	81	84	86	85	81	81	83	80	98	87	67	109	82	41	41	27	31	38	24	24

Table B2: Evaluation performance forecasting (from 17th to 24th September 2018) base on Old Benchmark (%).

Unit in %

Lead time Forecast	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	71.43	14.29	57.14	28.57	71.43	57.14	85.71	71.43	57.14	71.43	57.14	57.14	71.43	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	***75.97***
2-day	83.33	50.00	66.67	16.67	50.00	50.00	50.00	66.67	66.67	83.33	83.33	83.33	83.33	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	83.33	***78.03***
3-day	20.00	60.00	60.00	0.00	0.00	40.00	20.00	20.00	40.00	40.00	40.00	40.00	100.00	100.00	60.00	100.00	100.00	100.00	100.00	80.00	60.00	60.00	***56.36***
4-day	50.00	75.00	50.00	25.00	25.00	75.00	25.00	75.00	50.00	50.00	25.00	50.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	25.00	50.00	***65.91***
5-day	100.00	100.00	66.67	33.33	33.33	33.33	33.33	33.33	33.33	33.33	66.67	33.33	100.00	66.67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	***71.21***

Unit in cm

Lead time Forecast	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 7 days including the current report date

	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)							
2018	FF completed and sent (time)	Stations without forecast	FF2 completed and sent (time)	Weather data available (time)	NOAA data	China	Cambodia - DHRW	Cambodia - DOM	Lao PDR - DMH	Thailand - DWR	Viet Nam - SRHMC	Viet Nam - HMS	NOAA data/2dataset	China/2	Cambodia - DHRW/15	Cambodia - DOM/34	Lao PDR - DMH/32	Thailand - DWR/13	Viet Nam - SRHMC/6	Viet Nam - HMS/39
week	*10:15*	*00:00*	-	-	*08:15*	*07:10*	*06:59*	*07:54*	*08:38*	*08:08*	*07:01*	*08:06*	*0*	*0*	*1*	*0*	*84*	*0*	*2*	*0*
month	*10:16*	*00:00*	-	-	*08:14*	*07:10*	*07:24*	*07:55*	*08:24*	*08:08*	*07:01*	*08:12*	*0*	*0*	*1*	*0*	*337*	*0*	*6*	*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.

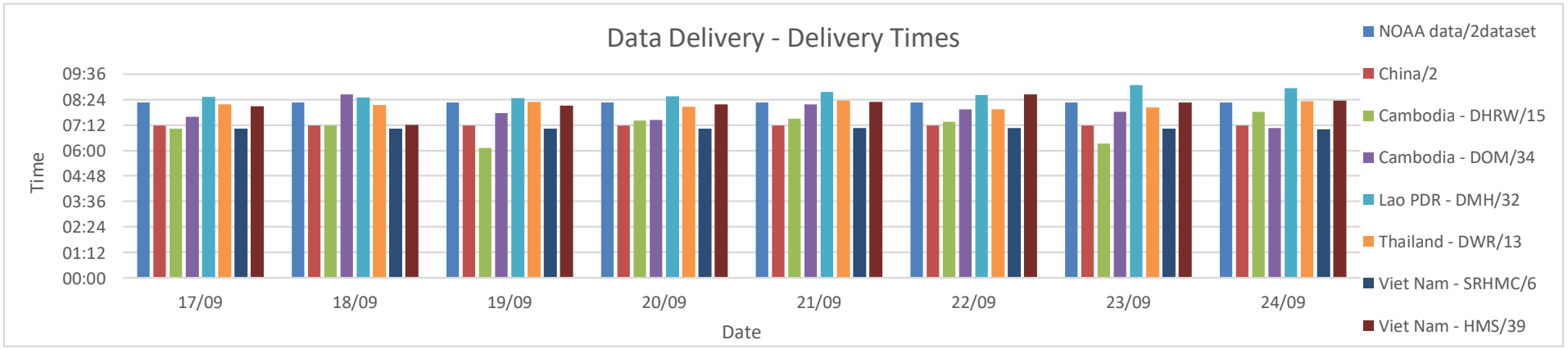


Figure B2: Data delivery times for the past 8 days including the current report date

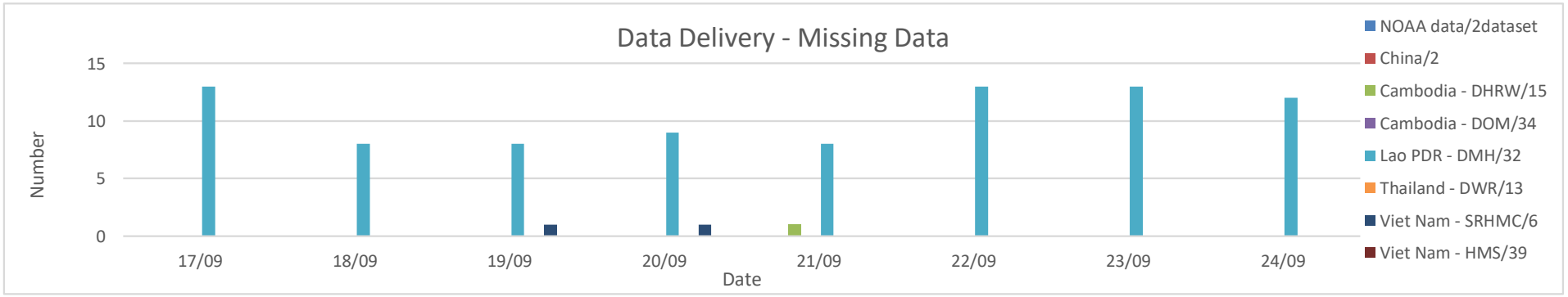


Figure B3: Missing data for the past 8 days including the current report date

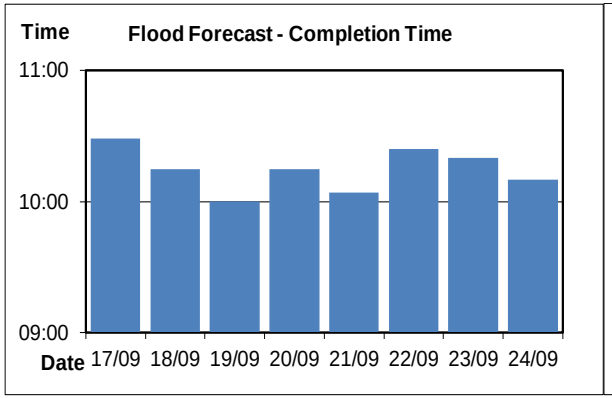


Figure B4: Flood forecast completion time

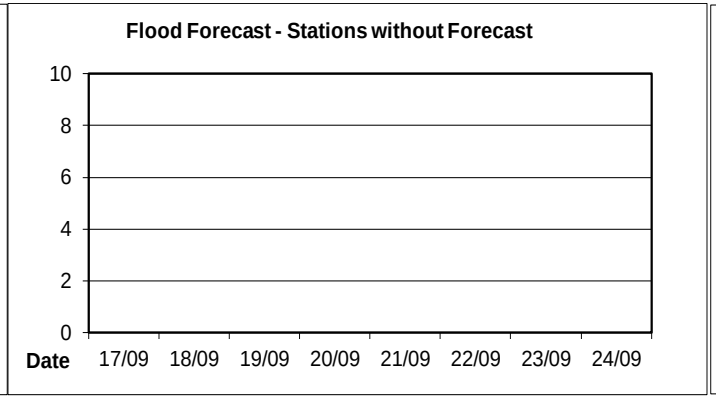


Figure B5: Flood forecast stations without forecast

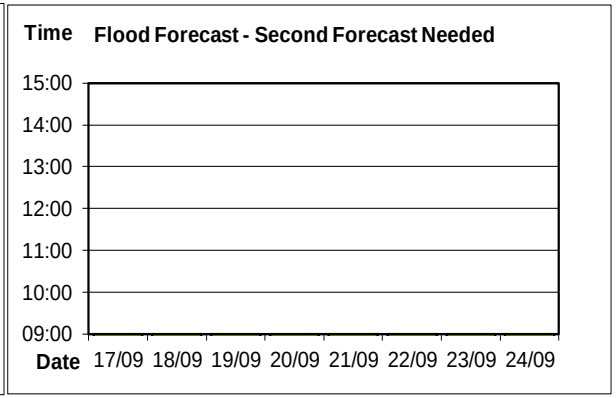
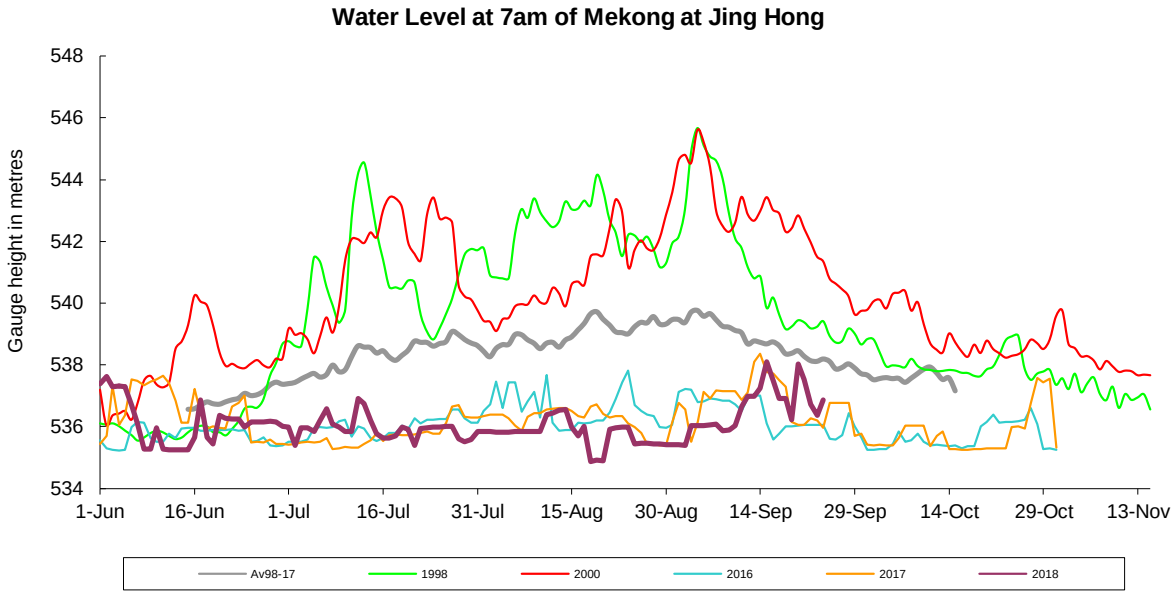


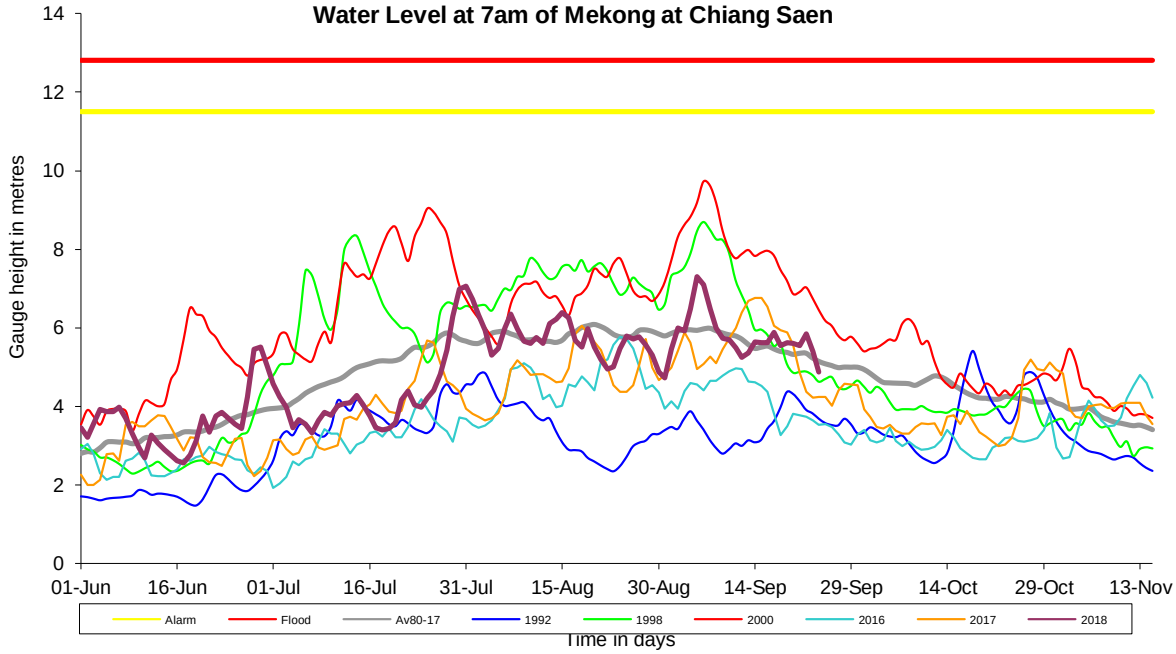
Figure B6: Second forecast needed

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





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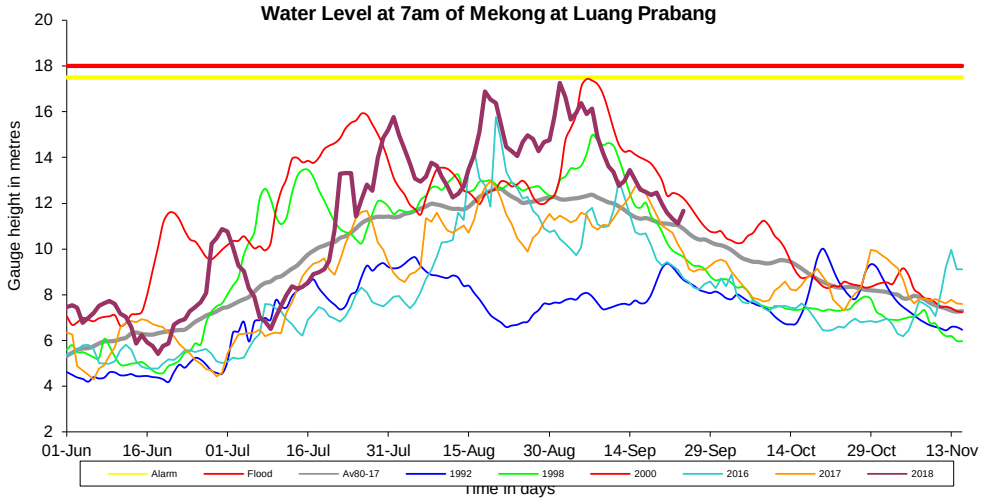

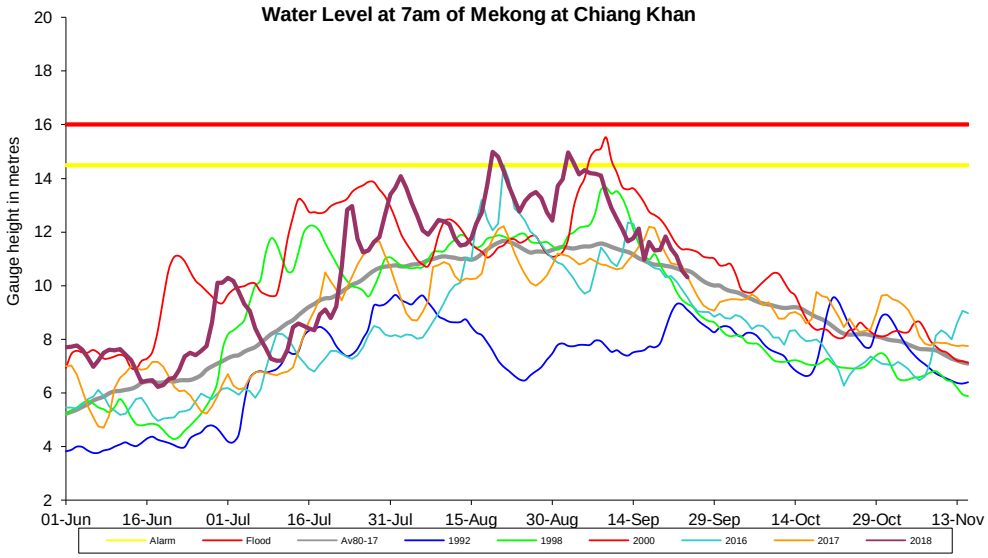

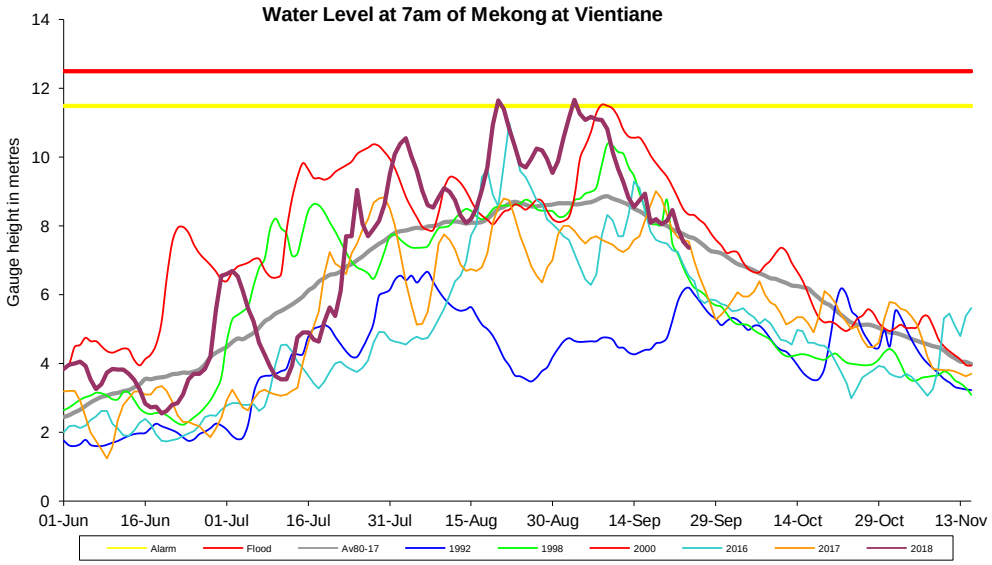

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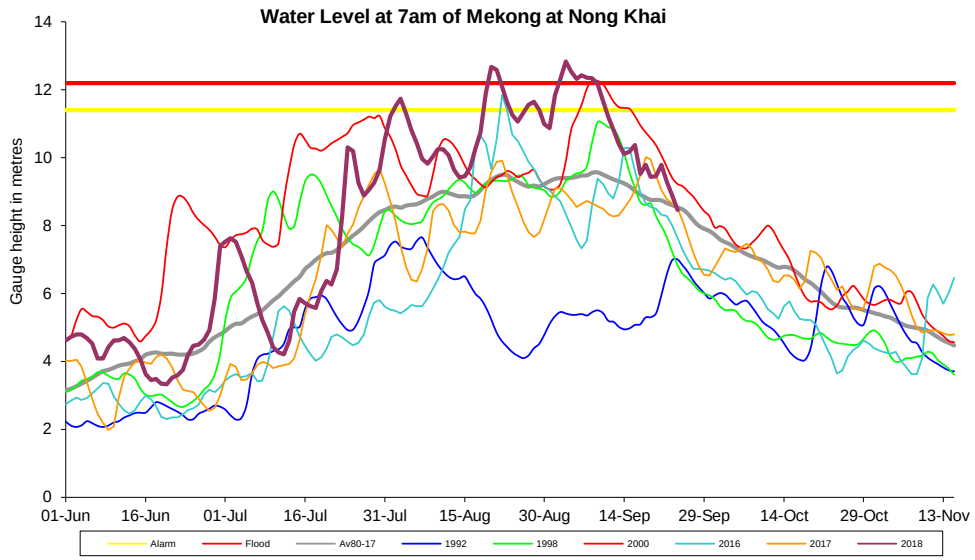

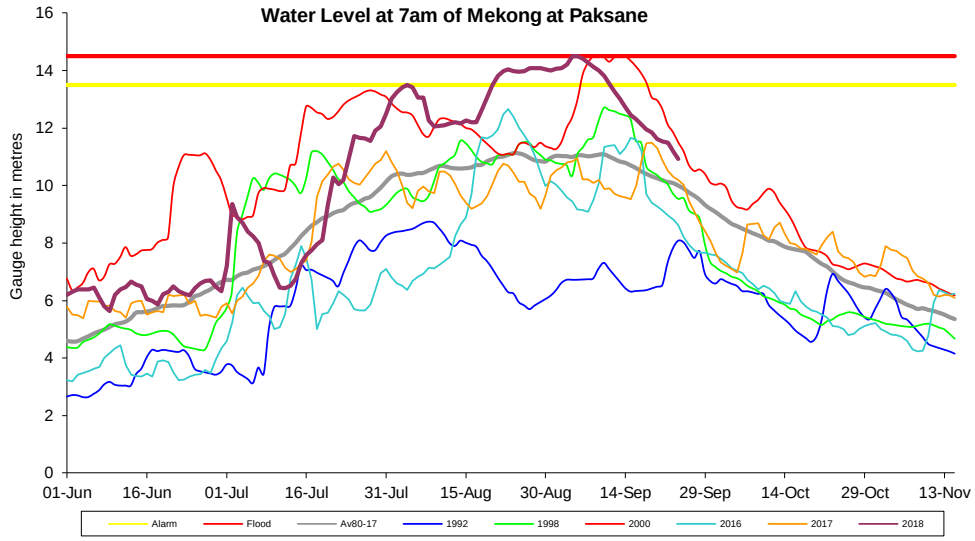

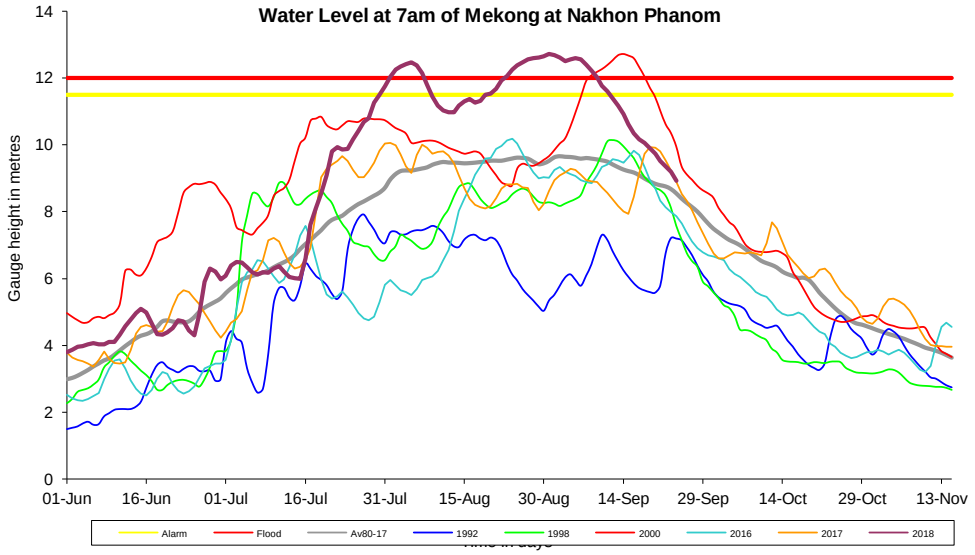

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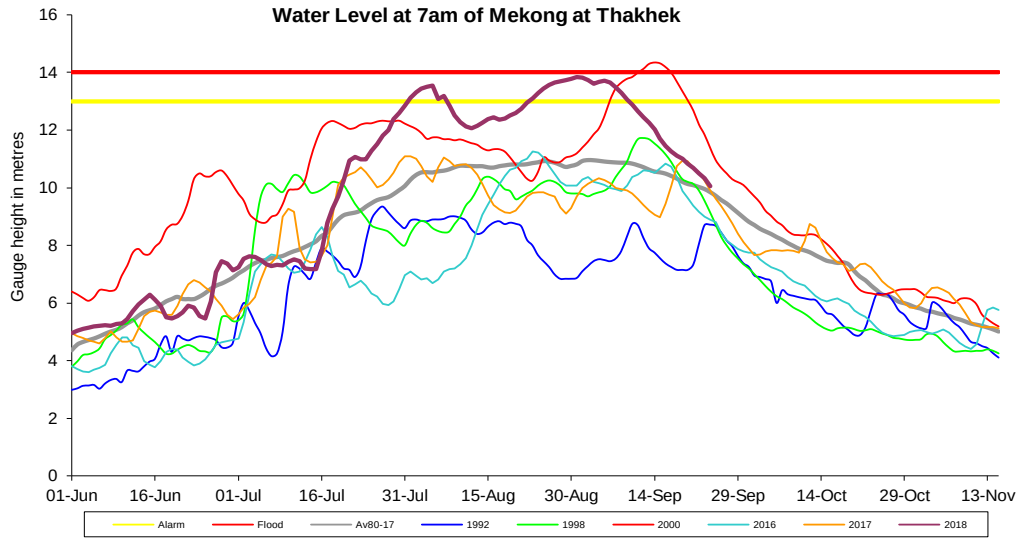

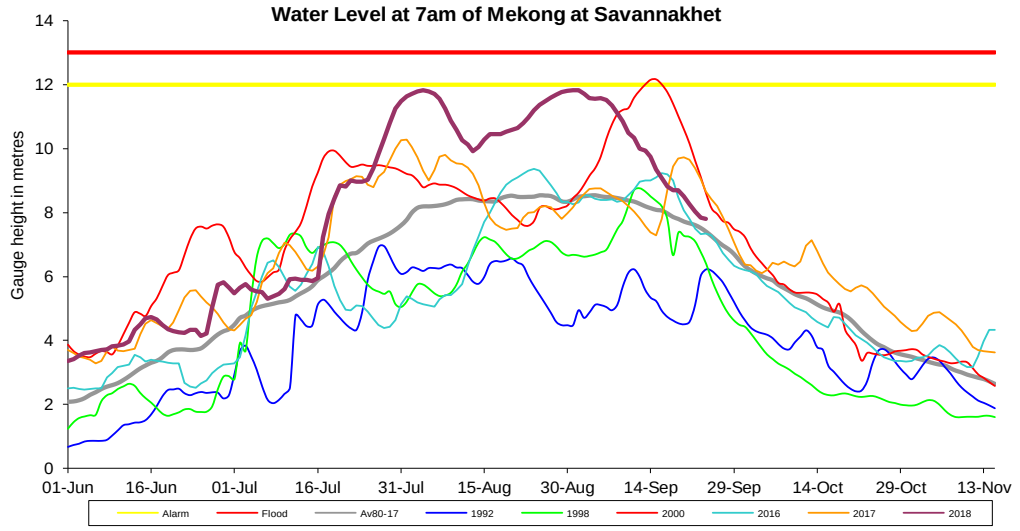

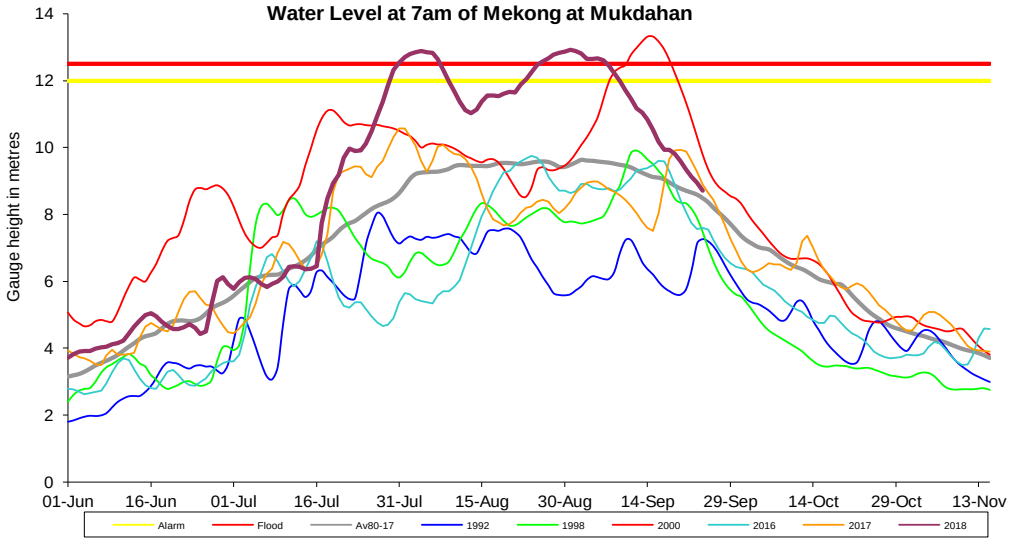

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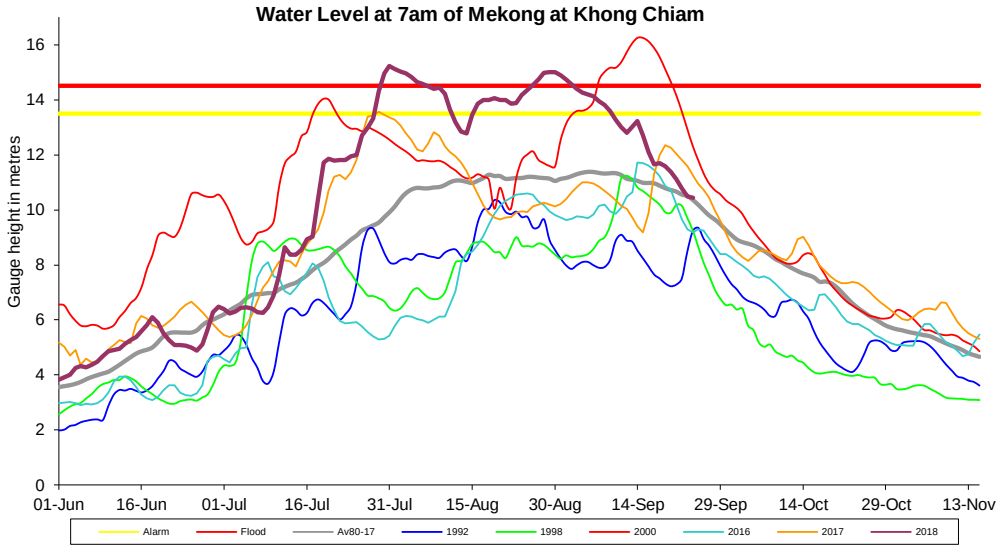

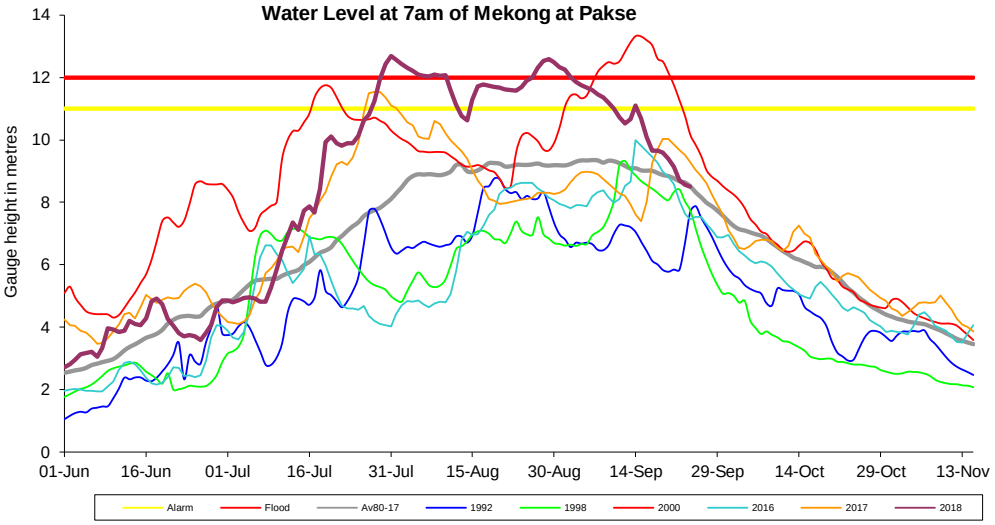

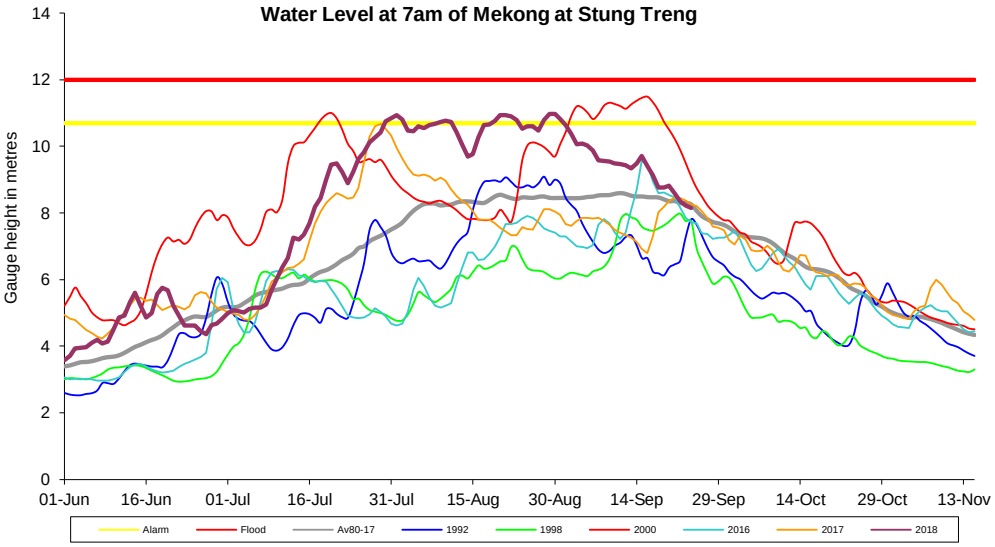

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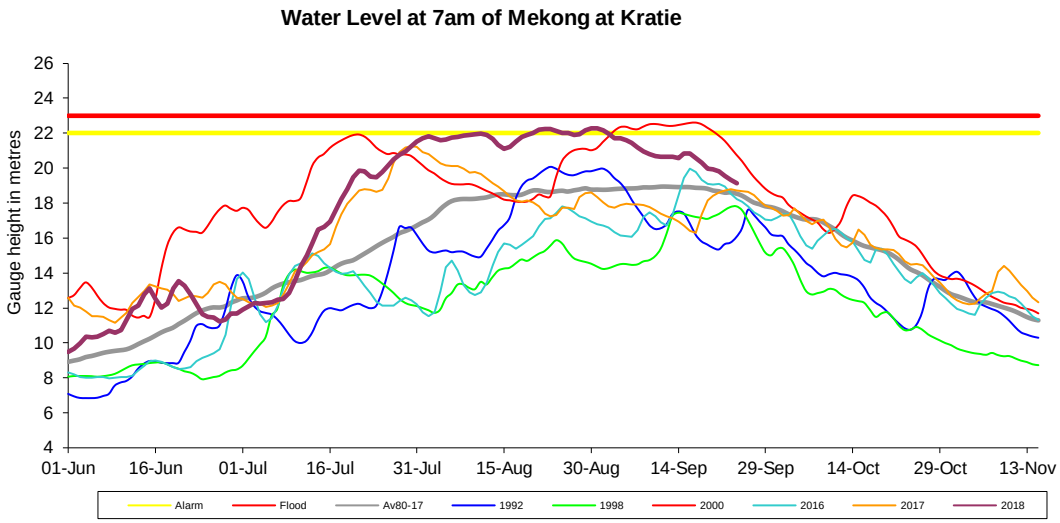

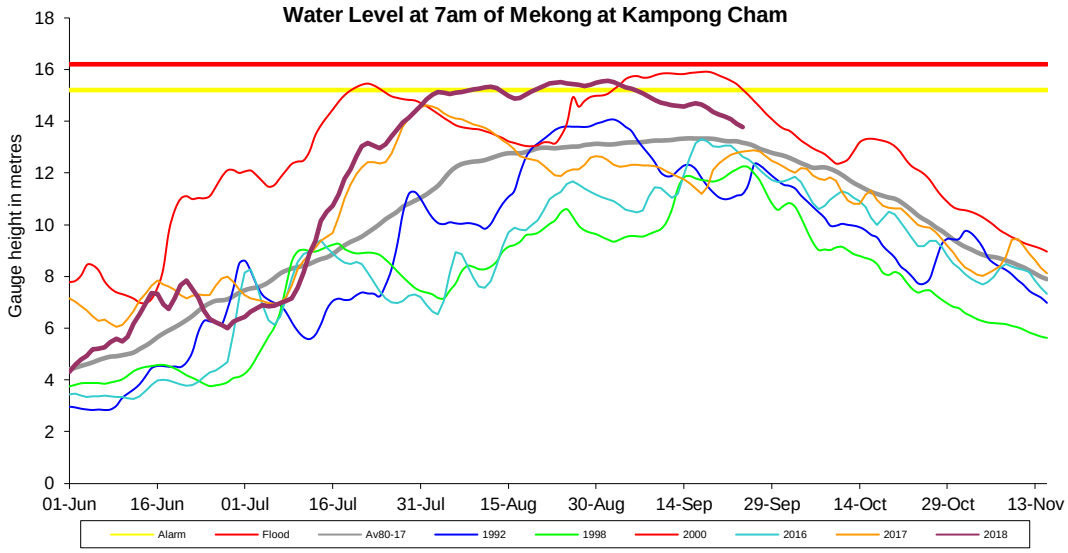

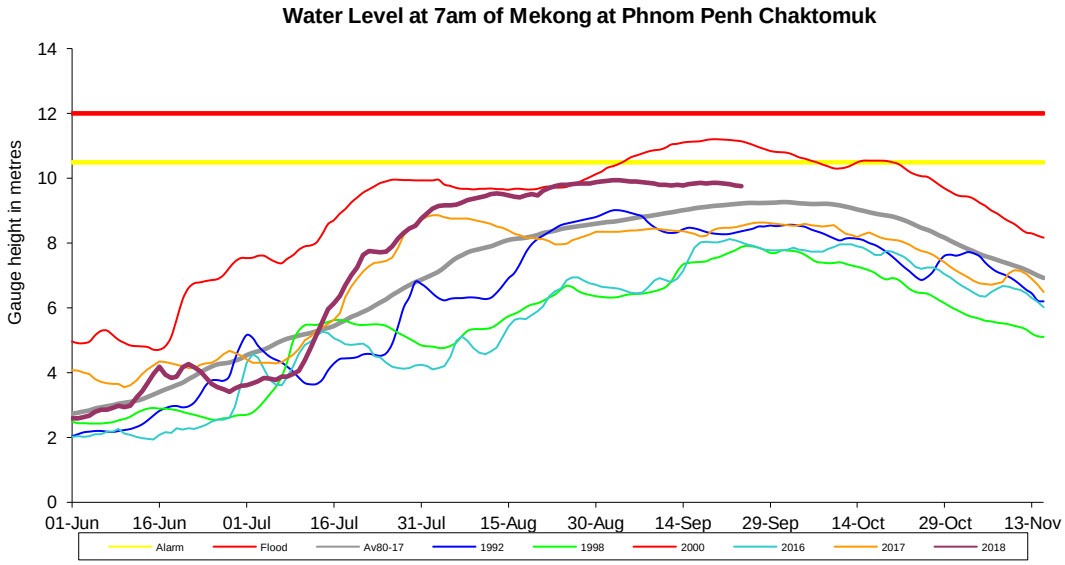

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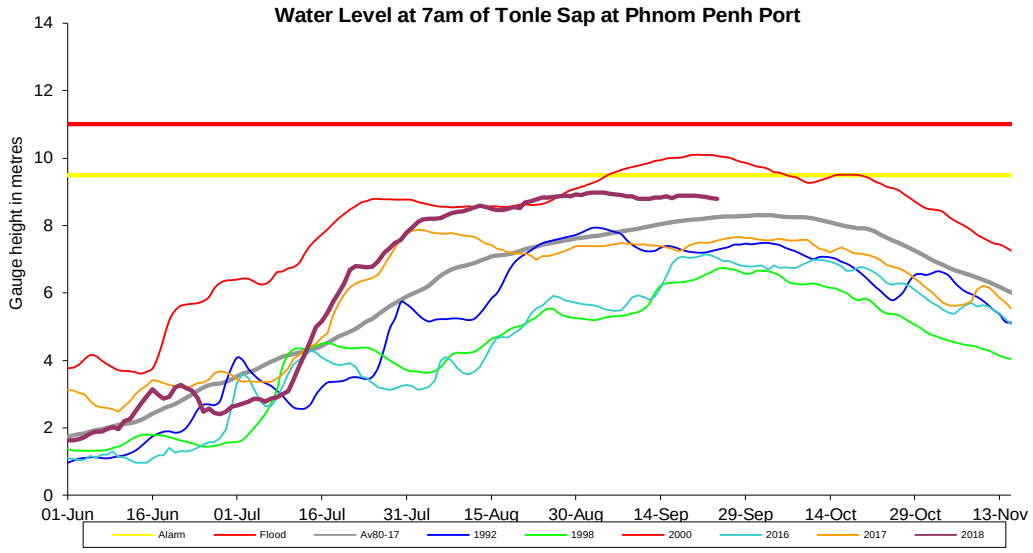

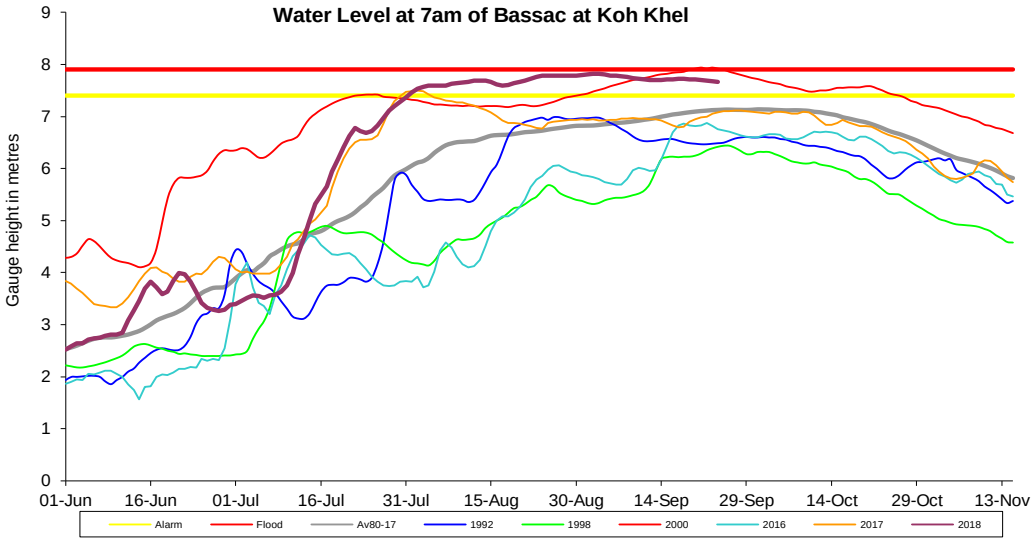

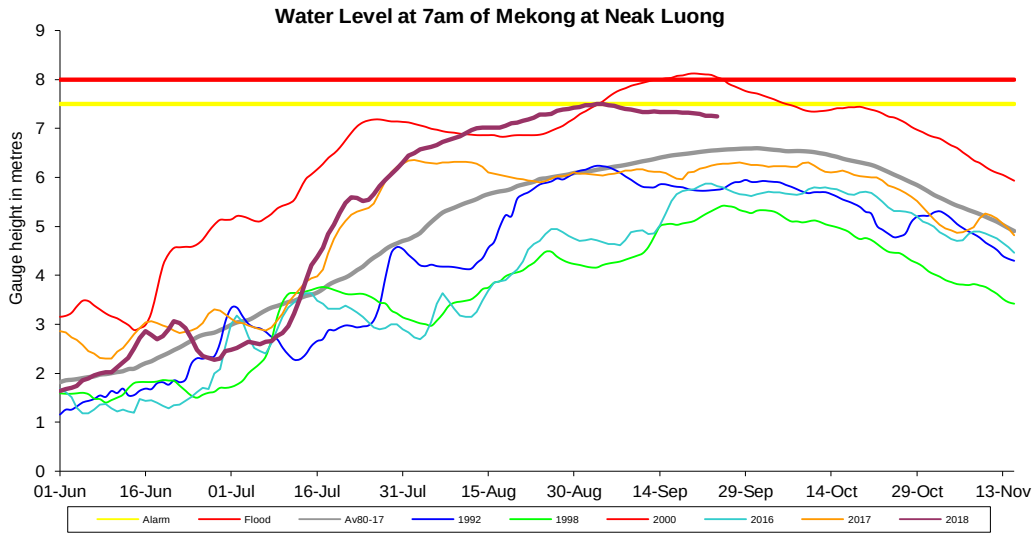

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