



**Mekong River Commission**

**Weekly Wet Season Situation Report  
in the Lower Mekong River Basin  
04 - 10 August 2020**

Prepared by  
The Regional Flood and Drought Management Centre  
11 August 2020

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# 1 Introduction

This Weekly Wet Season Situation Report presents a preliminary analysis of the weekly hydro-meteorological situation in the Lower Mekong River Basin (LMB), including the Tonle Sap flows, and the trend and outlook for water levels, from **04 to 10 August 2020**.

This analysis is based on the daily hydro-meteorological data provided by the Mekong River Commission Member Countries – Cambodia, Lao PDR, Thailand and Viet Nam – and on satellite data.

The report covers the following topics that are updated weekly:

- General weather patterns, including rainfall patterns over the LMB
- Water levels in the Lower Mekong River Basin, including in the Tonle Sap
- Forecast water levels and outlook, and
- Discussion and conclusion.

Mekong River water levels are updated daily and can be accessed from:

[http://ffw.mrcmekong.org/bulletin\\_wet.php](http://ffw.mrcmekong.org/bulletin_wet.php)

## 2 General Weather Patterns

The weather outlook bulletins for three months (August, September and October) and the weather maps issued by the Thailand Meteorology Department (TMD) were used to verify weather conditions in the LMB.

Since early August 2020, moderate and above-normal rainfall was observed in the LMB. The data from the TMD predicted that instances of low pressure and tropical cyclones may move closer to the Mekong region in August and continue to September, when heavy rainfall often occurs in the Mekong region. The TMD also predicted that scattered thundershowers throughout August will continue in the north-eastern part of Thailand (within the Mekong region).

Figure 1 presents the weather map created on 09 August 2020, which shows two lines of low pressure of the Monsoon Trough crossing the northern part of the Mekong region.

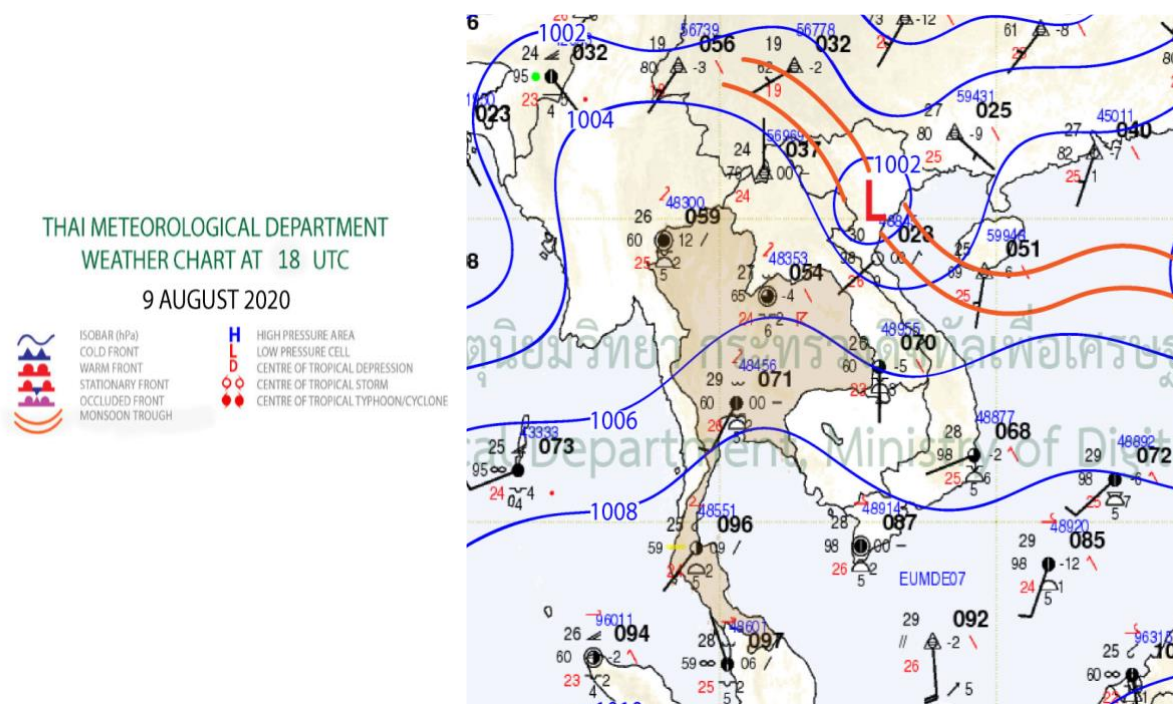
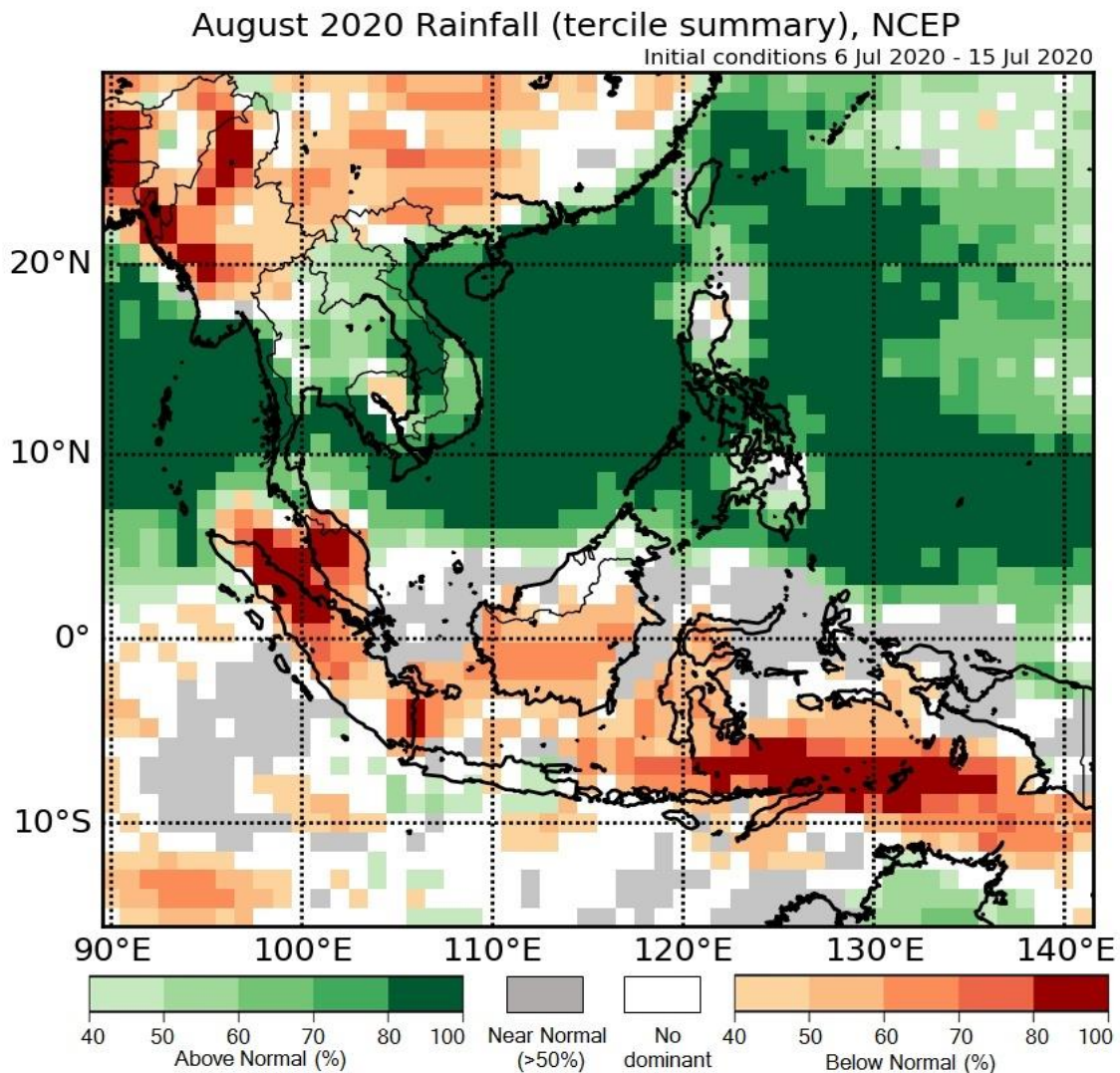


Figure 1. Summary of weather conditions over the LMB

According to the Asian Specialised Meteorological Centre (ASMC), increased shower rainfall over the Mekong sub-region, above-normal rainfall, and hotspot activities will occur from August to September. In the southern ASEAN region, rainfall over most parts of the equatorial region is predicted to be above normal in August and September.

Consequently, from August to September, there is an increasing chance of moderate to above average rainfall for most Asian countries, especially in the Mekong region. Figure 2 shows the

predicted rainfall in August in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).



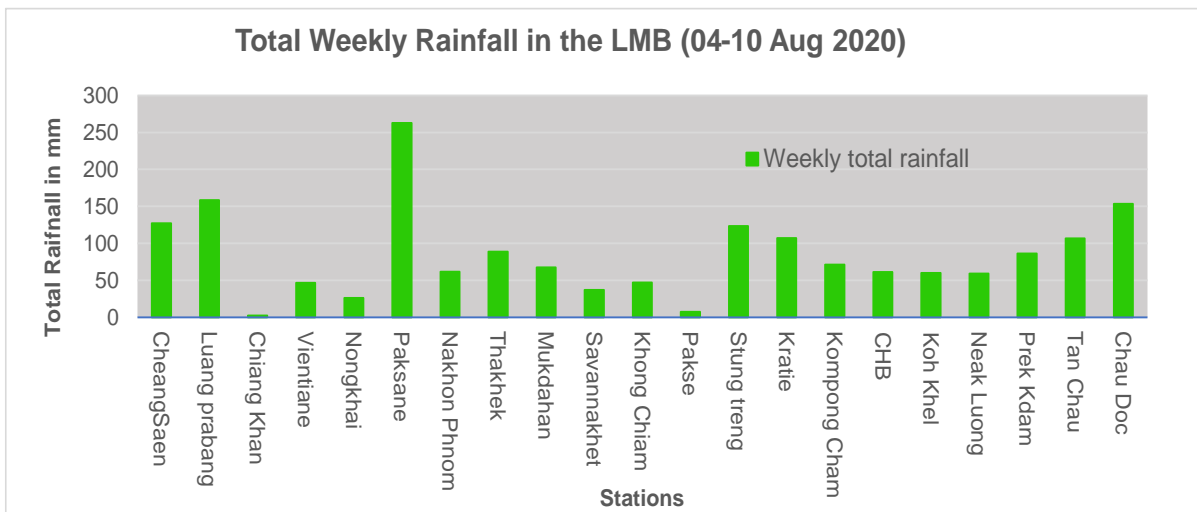
**Figure 2. Predicted rainfall over Asian Countries by ASMC**

### **Tropical depressions (TD), tropical storms (TS) and typhoons (TY)**

There were no tropical depressions or tropical storms in the LMB this week.

### **Rainfall patterns over the LMB**

This week's rainfall is considered above average, varying from 20 mm to 260 mm at different stations along the LMB from Chiang Saen in Thailand to Tan Chau and Chau Doc in Viet Nam. The weekly total observed rainfall at these selected stations is shown in Figure 3.



**Figure 3. The weekly total rainfall over the LMB**

To verify area rainfall distribution, Figure 4 shows a map of the accumulated weekly rainfall based on observed data provided by the MRC Member Countries from 03 to 10 August. The map indicates that the highest rainfall this week was focused mostly in the middle part of the LMB at Paksane, the 3S area and the Mekong Delta at Tan Chau and Chau Doc.



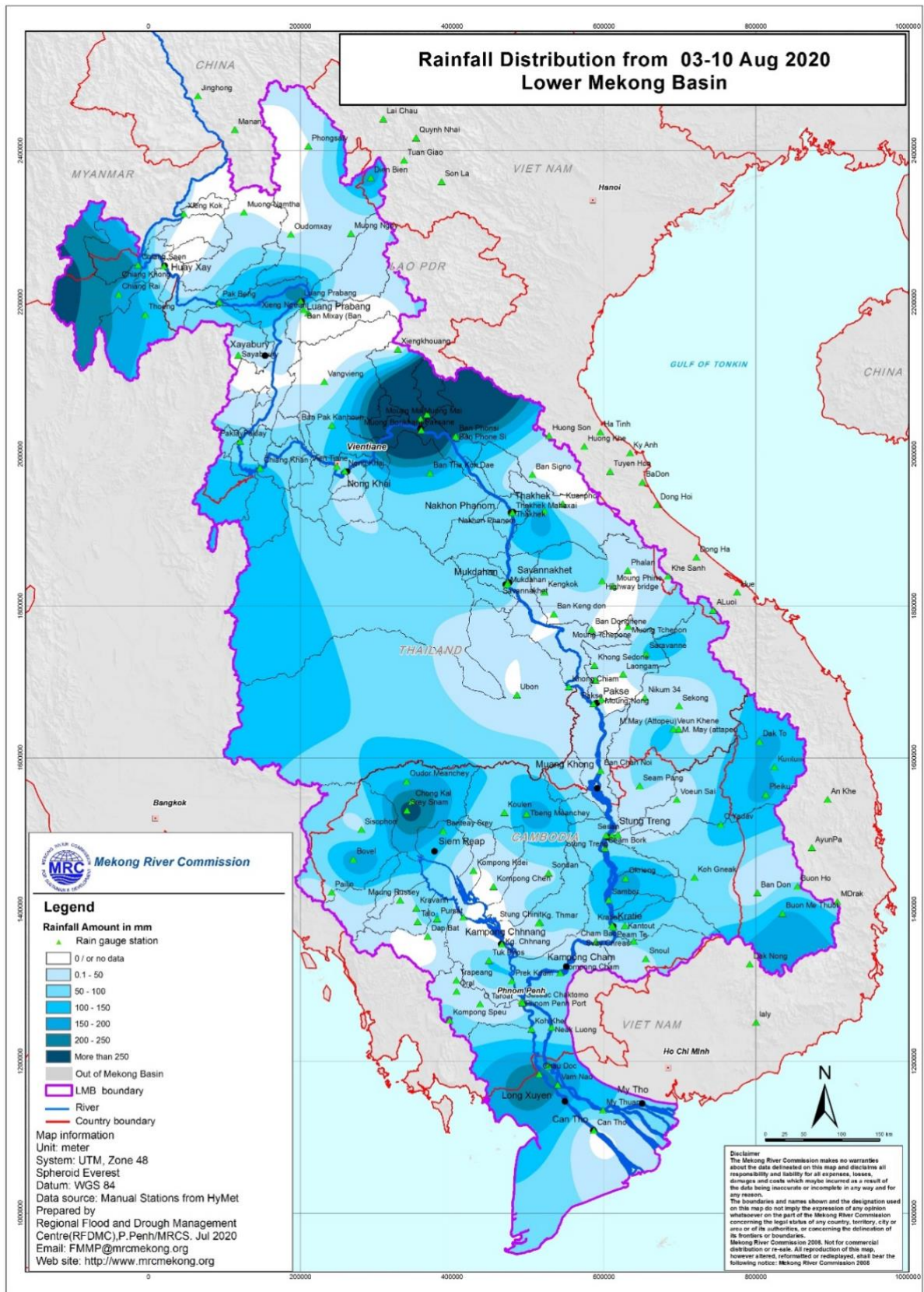


Figure 4. The weekly rainfall distribution over the LMB

### 3 Water Levels in the Lower Mekong River Basin

The key stations along the Lower Mekong River Basin and their respective model application for River Flood Forecasting during the wet season from June to October and River Monitoring during the dry season from November to May are presented in Figure 5. The hydrograph for each key station is attached in Annex 1.

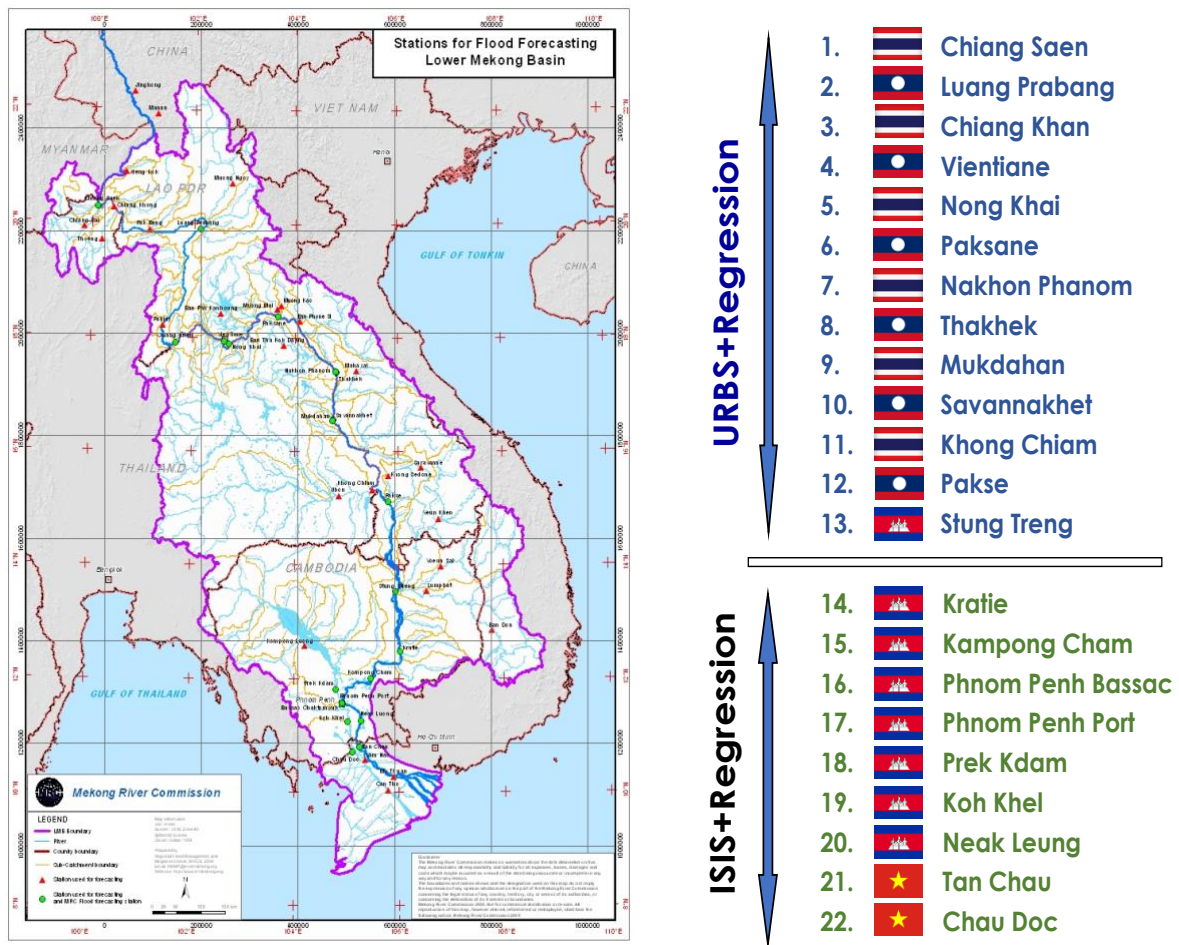


Figure 5. Key stations and model application for River Monitoring and Flood Forecasting

#### Chiang Saen and Luang Prabang

Water levels from 04 to 10 August at Chiang Saen station increased, varying from 0.18 m to 0.56 m. The increased water levels at this station revealed more rainfall from catchment inflow and the flows upstream from Lao PDR, Myanmar and Lancang (Mekong) in China.

Water levels at Luang Prabang in Lao PDR are likely impacted by the downstream hydropower dam at Xayaburi and upstream dams from tributaries on Nam Beng, Nam Ou, Nam Suong and Nam Khan, which follows the same trends as they did this week last year (2019). Water levels at these stations are below their Long-Term Averages (LTAs).

### **Chiang Khan, Vientiane-Nong Khai and Paksane**

Water levels from 04 to 10 August at Chiang Khan station may have been dominated by the upstream hydropower dam at Xayaburi, which fluctuated daily from -0.36 m to 0.70 m. At the downstream from Vientiane to Paksane in Loa PDR, water levels were influenced by upstream inflows and rainfall from sub-catchments. This week's water levels at these stations fluctuated greatly, varying from -1.45 m to 1.7 m. However, these water levels were lower than their LTAs, although higher than they were last year (2019).

### **Nakhon Phanom to Pakse**

Water levels from 04 to 10 August at Thailand's Nakhon Phanom to Laos PDR's Pakse stations fluctuated significantly, varying from -0.50 m to 1.60 m and following the trend from upstream, which may have been affected by above-average rainfall from upper sub-catchments. This week's water levels at these stations are lower than their LTAs.

### **Stung Treng to Kampong Cham/Phnom Penh to Koh Khel/Neak Luong**

Water levels during the same period at Cambodia's Stung Treng, Kratie, Kampong Cham, Chaktomuk, Koh Khel, Phnom Penh Port and Prek Kdam stations increased significantly, varying from 0.17 m to 1.36 m. This week's water levels at these stations stayed close to their minimum levels.

### **Tidal stations at Tan Chau and Chau Doc**

During this period, water levels at these two tidal stations at Tan Chau and Chau Doc fluctuated below their LTAs due to daily tidal effects from the sea.

### **The Tonle Sap Flow**

At the end of the dry season, when water levels of the Mekong increase, flows of the Mekong River reverse into the Tonle Sap Lake (TSL). This normally happens from mid-May to mid-October.

Figure 6 shows the seasonal change of the inflow/reverse flow and the outflow of the TSL at Prek Kdam in comparison with the flows of 2018 and 2019 and their LTA level (1997-2019). Up to 10 August, it was observed that the reverse flow into the TSL was recorded on 4 August. This reveals the same pattern of reverse flow into the TSL by the PMFM's (Procedures for the Maintenance of Flows on the Mainstream) tool on Article 6B (monitoring area). The delay of the reverse flow was due to the low water levels on the Mekong mainstream. The low inflows from the Mekong River are most likely affected by less rainfall in the upper sub-catchment areas.

Although the reverse flows have started, the volume of the Lake up to this point is considered to be in a critical situation. Figure 7 shows the seasonal change in the monthly volume flow up to 10 August for the TSL compared with the volumes in 2018 and 2019 and their LTA and fluctuating levels (1997-2019). It shows that in early August the volume of the Lake was at a

critical level, compared with last year (2019) and historical minimum levels. Table 1 shows the monthly change in flow volume of the TSL and the critical flow volume of the TSL in July and early August 2020 compared to its historical minimum value and volumes of 2018 and 2019. This reveals the TSL is still affected by the low inflow from the Mekong and the reduced rainfall in the surrounding sub-catchments.

The low inflows (inflows from the Mekong River and inflows from tributaries) in the early wet season of 2020 resulted in the very critical situation of the TSL. This demonstrates the influence of the relationships between the reverse flows, water levels of the Mekong River, and the flow direction in the complex hydraulic environment of the TSL during this wet season. The data show that more than half of the annual inflow into the lake originates from the Mekong mainstream. Thus, flow alterations in the mainstream could have direct impacts on the Tonle Sap water levels and on hydrology.

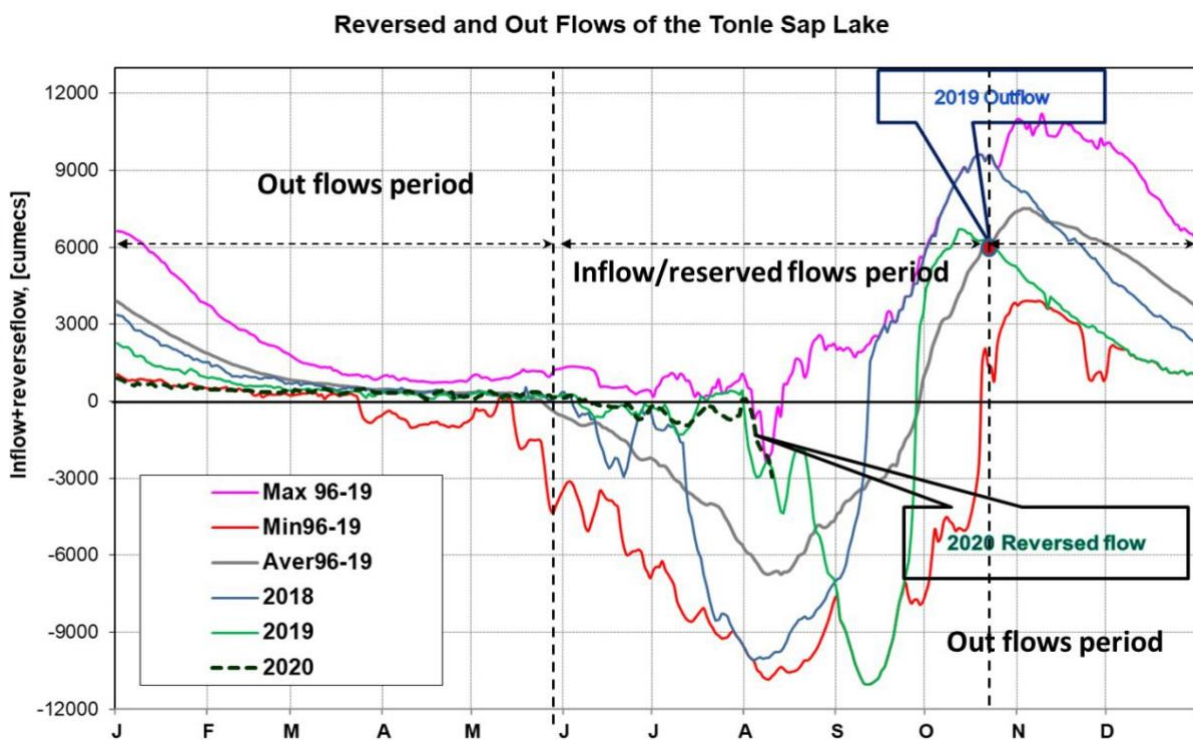


Figure 6. The seasonal change of inflows and outflows of Tonle Sap Lake

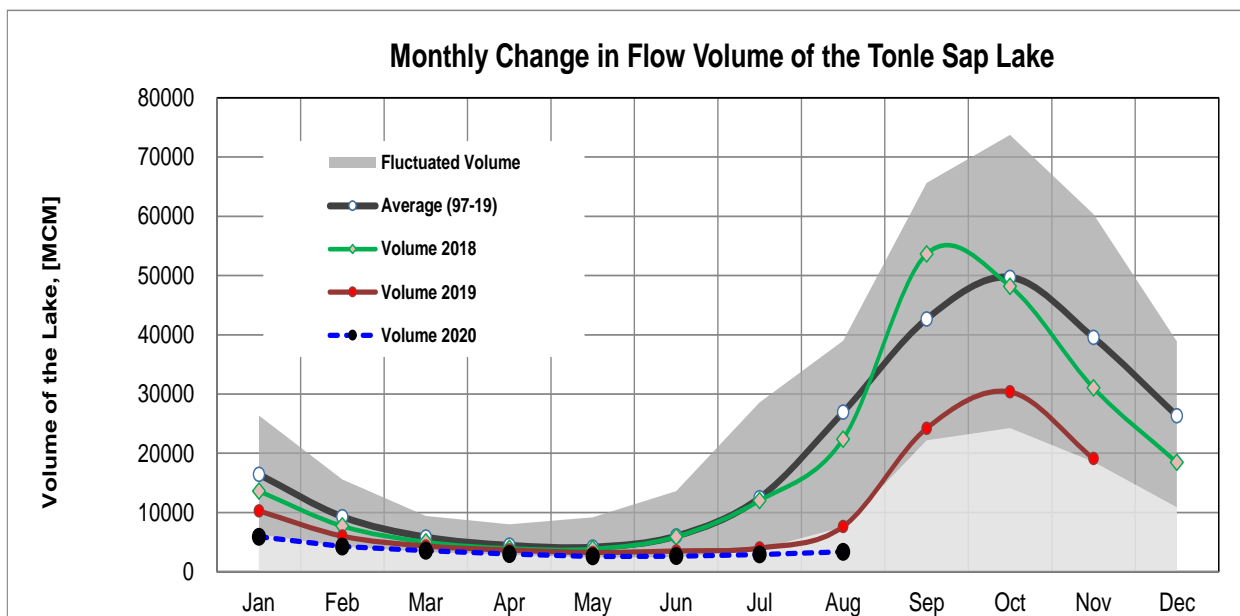


Figure 7. The seasonal change in monthly flow volume of Tonle Sap Lake

Table 1. The monthly change in the flow volume of Tonle Sap Lake

Month	Average Volume (97-19) [MCM]	Max Volume [MCM]	Min Volume [MCM]	Volume 2018 [MCM]	Volume 2019 [MCM]	Volume 2020 [MCM]	Percentage of Volume in 2020 [%]
Jan	16452.95	26357.53	6272.01	13633.41	10285.31	5906.80	35.90
Feb	9312.36	15596.22	4281.41	7729.72	6019.30	4264.19	45.79
Mar	5868.92	9438.24	3350.92	5037.06	4354.62	3553.99	60.56
Apr	4474.98	8009.14	2875.42	3956.47	3667.47	2992.61	66.87
May	4166.07	9176.93	2417.81	3864.00	3266.43	2594.92	62.29
Jun	6034.10	13635.01	2470.54	5919.18	3517.06	2641.88	43.78
Jul	12502.58	28599.56	3832.51	12024.96	4001.99	2925.86	23.40
Aug	26934.35	39015.12	7554.93	22399.65	7622.71	3358.22	
Sep	42644.05	65632.35	22180.73	53639.54	24194.19		
Oct	49698.19	73757.23	24276.79	48193.08	30358.38		
Nov	39542.58	60367.33	18576.01	31036.07	19112.65		
Dec	26325.13	38888.95	10869.43	18469.21	10577.29		
	Critical situation, compared with historical Min values						
	Normal condition, compared with LTA (Long term average)						
	Low volume situation, compared with LTA values						

## 4 Forecast Water Levels and Outlook

### Chiang Saen and Luang Prabang

Based on the daily flood bulletin on 10 August, the daily forecast water levels along the lower Mekong River at Chiang Saen are expected to increase from 4.45 m to 5.05 m in the next four days. For Luang Prabang, water levels will also increase from 10.30 m to 10.70 m during the same period.

### Chiang Khan, Vientiane-Nong Khai and Paksane

From Chiang Khan to Vientiane/Nong Khai, water levels are expected to increase up to 0.45 m due to the forecast above-average rainfall in their catchment inflows. The water levels at Vientiane station are forecast to increase from 4.82 m to 5.72 m in the next five days, while at Paksane the water level will decrease by about 0.28 m on 11 August and then increase from 7.00 m to 7.40 m.

### Nakhon Phanom to Pakse

Water levels at this station will decrease by about 0.35 m in the next three days, following the same trends as upstream.

### Stung Treng to Kampong Cham/Phnom Penh to Koh Khel/Neak Luong

From Stung Treng to Neak Luong on the Mekong River, water levels will increase by about 0.06 to 0.95 m in the next three days.
























Water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port will increase by about 0.05 m to 0.45 m over the next two days. Water levels at Phnom Penh at Chaktomuk and Koh Khel on the Bassac River will increase by 0.55 m during the same period.

### Tidal stations at Tan Chau and Chau Doc

For Viet Nam's Tan Chau on the Mekong River and Chau Doc on the Bassac River, the water levels will be fluctuating below their LTAs, following daily tidal effects from the sea.

Table 2 shows the River Flood Forecasting Bulletin issued on 10 August. Results of the daily flood forecasting bulletin are also available at [http://ffw.mrcmekong.org/bulletin\\_wet.php](http://ffw.mrcmekong.org/bulletin_wet.php).

**Table 2. River Flood Forecasting Bulletin**

Location	Country	24-hr Observed Rainfall (mm)	Zero gauge above M.S.L (m)	Flood level (m)	Alarm level (m)	Observed W. level against zero gauge (m)		Forecasted Water Levels (m)					There is currently no flood warning in place at monitoring sites on the Mekong							
						1-Aug	2-Aug	3-Aug	4-Aug	5-Aug	6-Aug	7-Aug	02	03	04	05	06	07		
Jinghong		5.0				535.59	535.73								↑	×	×	×	×	×
Chiang Saen		0.3	357.110	12.80	11.50	3.49	2.99	2.77	2.91	3.38	3.79	4.10			↓	↓	↑	↑	↑	↑
Luang Prabang		24.2	267.195	18.00	17.50	8.85	8.93	9.15	9.73	10.52	11.34	12.19			↑	↑	↑	↑	↑	↑
Chiang Khan		9.2	194.118	16.00	14.50	6.16	6.40	7.46	9.41	9.42	9.13	9.43			↑	↑	↑	↓	↑	↓
Vientiane		142.5	158.040	12.50	11.50	2.56	2.78	3.69	5.85	6.98	6.47	6.09			↑	↑	↑	↓	↓	↓
Nongkhai		98.0	153.648	12.20	11.40	3.03	3.15	4.16	6.53	8.03	7.64	7.09			↑	↑	↑	↓	↓	↓
Paksane		35.5	142.125	14.50	13.50	4.37	4.38	6.69	9.58	10.15	10.13	9.71			↑	↑	↑	↓	↓	↓
Nakhon Phanom		105.7	130.961	12.00	11.50	3.37	3.33	4.55	8.31	10.44	10.92	10.45			↑	↑	↑	↓	↓	↓
Thakhek		104.5	129.629	14.00	13.00	4.59	4.58	5.81	9.57	11.70	12.19	11.73			↑	↑	↑	↓	↓	↓
Mukdahan		60.7	124.219	12.50	12.00	3.40	3.45	4.28	7.19	10.14	11.29	11.17			↑	↑	↑	↓	↓	↓
Savannakhet		59.0	125.410	13.00	12.00	1.96	1.98	3.18	6.04	9.01	10.28	10.19			↑	↑	↑	↓	↓	↓
Khong Chiam		75.1	89.030	14.50	13.50	3.89	4.03	4.45	6.06	9.08	12.06	13.36			↑	↑	↑	↓	↓	↓
Pakse		nr	86.490	12.00	11.00	2.20	1.77	1.85	3.20	5.76	8.55	9.97			↓	↑	↑	↓	↓	↓
Stung Treng		0.0	36.790	12.00	10.70	3.86	4.16	4.23	4.46	5.63	7.37	9.26			↑	↑	↑	↓	↓	↓
Kratie		0.0	-0.101	23.00	22.00	9.41	9.85	10.28	10.52	11.18	12.81	15.03			↑	↑	↑	↓	↓	↓
Kompong Cham		1.6	-0.930	16.20	15.20	4.34	4.54	4.87	5.08	5.34	6.08	7.31			↑	↑	↑	↓	↓	↓
Phnom Penh (Bassac)		2.6	-1.020	12.00	10.50	2.25	2.26	2.40	2.55	2.67	2.90	3.39			↑	↑	↑	↓	↓	↓
Phnom Penh Port		nr	0.070	11.00	9.50	1.25	1.26	1.40	1.55	1.67	1.90	2.39			↑	↑	↑	↓	↓	↓
Koh Khel		1.6	-1.000	7.90	7.40	2.16	2.21	2.28	2.39	2.47	2.55	2.71			↑	↑	↑	↓	↓	↓
Neak Luong		13.2	-0.330	8.00	7.50	1.66	1.48	1.50	1.59	1.67	1.75	1.91			↓	↑	↑	↓	↓	↓
Prek Kdam		0.0	0.080	10.00	9.50	1.25	1.32	1.42	1.54	1.66	1.85	2.23			↑	↑	↑	↓	↓	↓
Tan Chau		nr	0.000	4.50	3.50	0.93	0.87	0.82	0.84	0.87	0.92	1.05			↓	↓	↑	↓	↓	↓
Chau Doc		25.0	0.000	4.00	3.00	1.01	0.99	0.93	0.90	0.90	0.93	1.00			↓	↓	↑	↓	↓	↓

**REMARKS:**

nr: not available.  
nr: no rain.

LEGEND	
rising water level	↑
stable water level	↔
falling water level	↓
alarm stage	Yellow
alarm situation	Orange
flood stage	Red
no data available	×
as suggested by Thailand, forecasted values are not displayed pending further improvement of the system	★

**Note:** Stable water level is defined as a daily change of less than 10cm from Chiang Saen to Savannakhet; less than 5cm at Pakse and Stung Treng; and no more than 3cm from Kratie downstream.  
**Flood stage** is when the flood level exceeds. A flood level is determined by each Member Country.  
**Alarm stage** is when the water level ranges between alarm and flood levels.  
**Alarm situation** is when the water level is forecasted to reach the flood stage within the next three days.

River Flood Forecaster  
  
**KHEM Sothea**

**NOTE:** Discharge at Luang Prabang may be influenced by hydropower operations (at both upstream and downstream).  
 For more info, please refer to this link:  
<http://www.mrcmekong.org/>; [http://ffw.mrcmekong.org/bulletin\\_wet.php](http://ffw.mrcmekong.org/bulletin_wet.php); <http://ffw.mrcmekong.org/reportflood.php>

The performance of the weekly flood forecast, with an accuracy and data input evaluation from to 04 to 10 August is presented in Annex 2.

## 5 Discussion and Conclusion

Since the beginning of this year (2020), water levels in the Lower Mekong River have been lower than their LTAs for all monitoring stations (from upper to lower stretches within the LMB). Like many parts of the world, the Mekong region has been affected by the prolonged El Nino phenomenon, the phenomenon that usually causes extreme heat and insufficient rainfall. This climate change impact has been observed since 2019. Therefore, a cause of low water levels in the Mekong mainstream in June-July 2020 could have been due to unusually low rainfall and the impact of climate change over the Mekong region.

Further preliminary analysis of the MRC data revealed that the low water levels along the Mekong mainstream have resulted from less inflows from tributaries and low inflows from upstream part since June 2020. This could have been partly due to reservoir operations in the mainstream of the Upper Mekong Basin and from tributaries in the LMB.

The contribution to the Mekong River's flow from the Upper Mekong Basin in China (Yunnan component) is about 16 % by the time the river discharges through the Mekong Delta into the Sea. By far the major contribution comes from the two major 'left-bank' (eastern) tributaries between Vientiane – Nakhon Phanom and Pakse – Stung Treng, which together contribute more than 40% of the flows.

Another potential reason for the low flows in the mainstream (January through July) could have been the contributions from major tributary dams. However, the MRC Secretariat does not have any official data and information to quantify or verify their contributions or extent of impacts.

The reverse flows of the TSL have begun, although the volume of the lake up to this point is still considered as being in a critical situation.

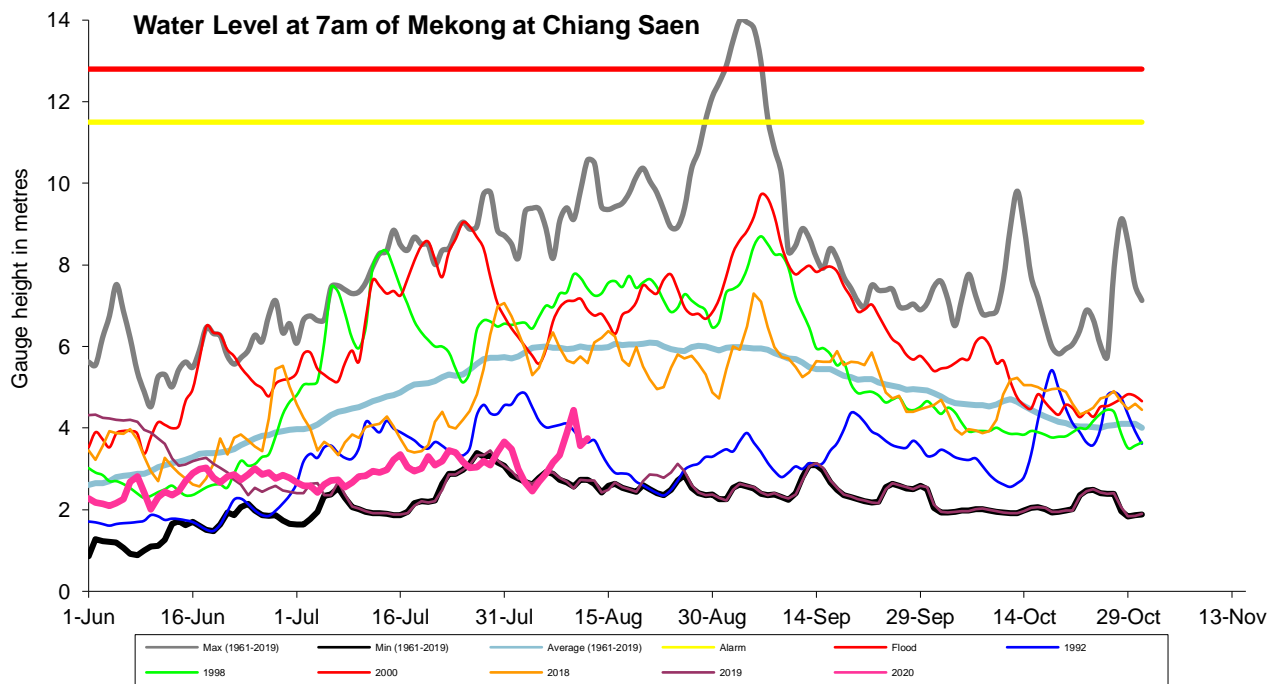
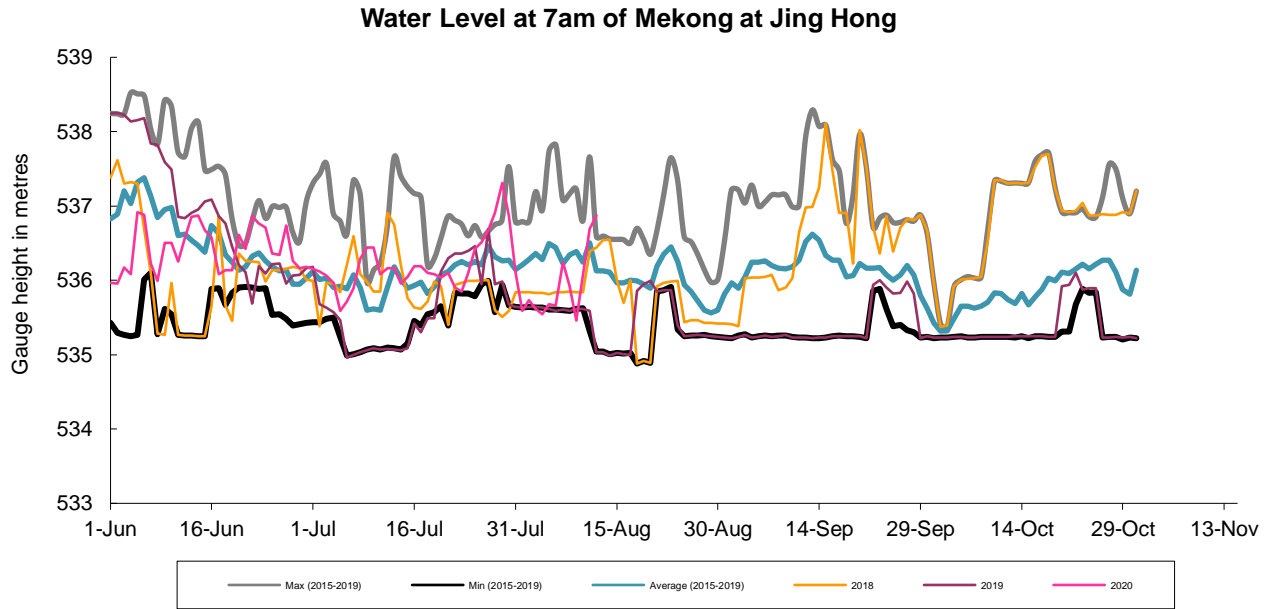
Above-normal rainfall is expected to occur from August to September 2020, which may contribute to increased flows in the Mekong River.

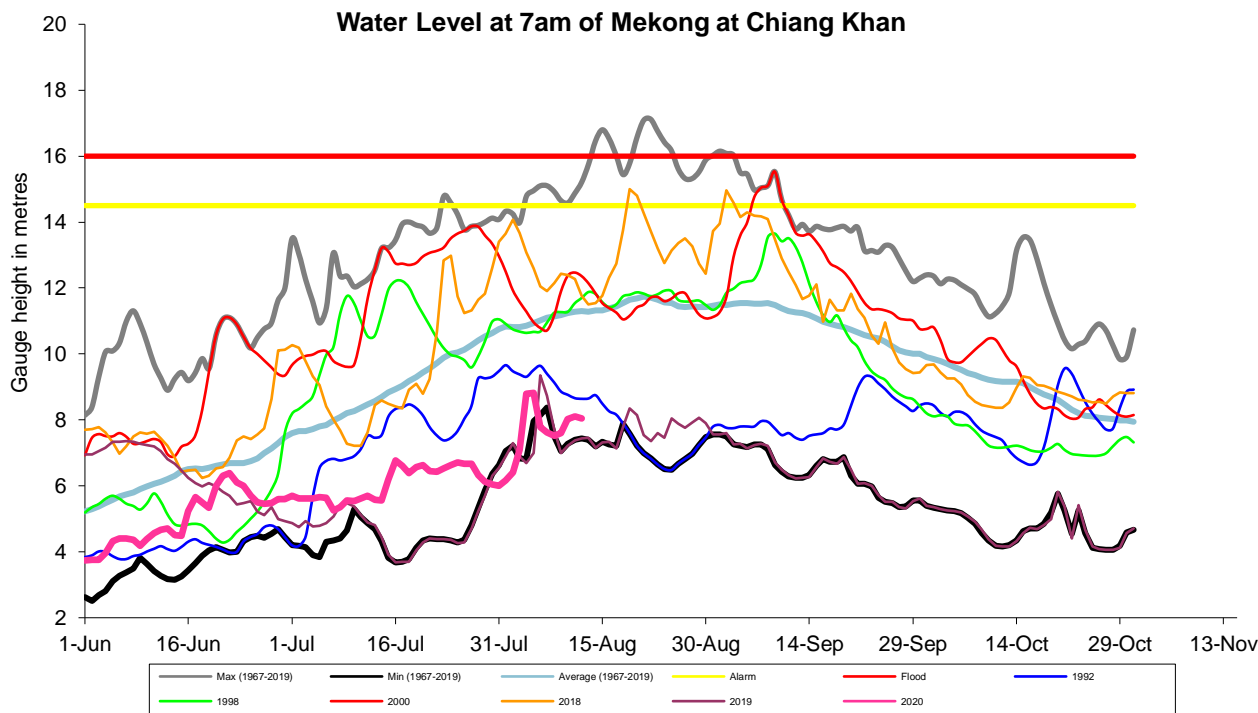
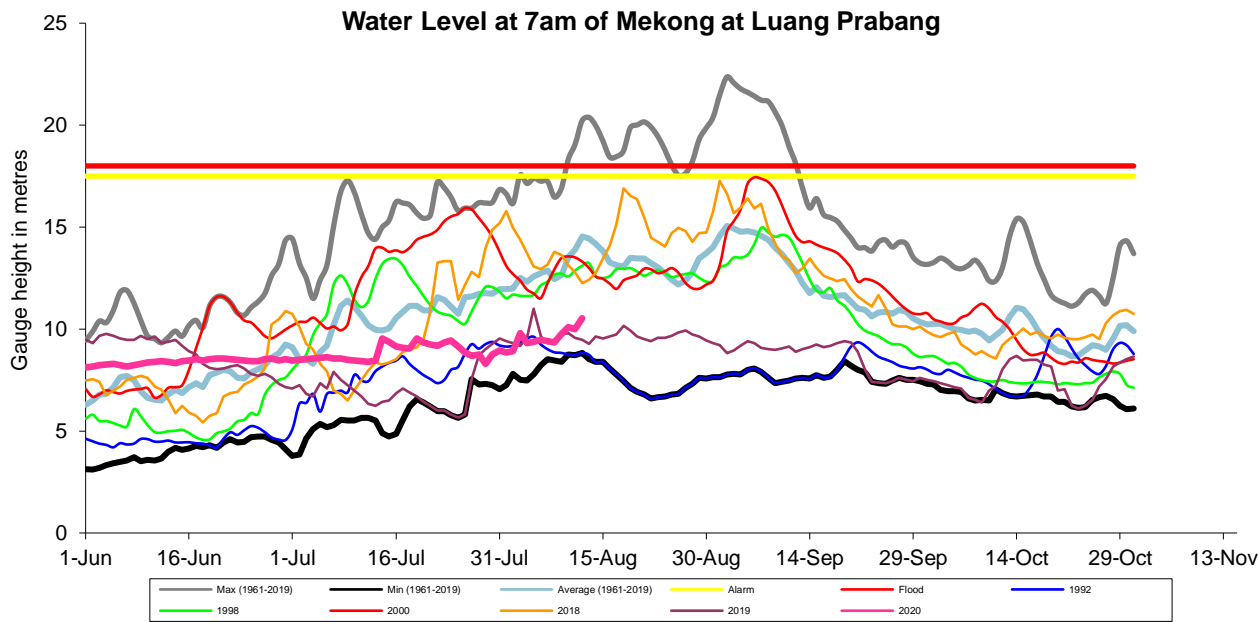
According to ASMC and TMD, low pressure and tropical cyclones may move closer to the Mekong region in August and continue to September, which could bring above-normal rainfall in the Mekong region.

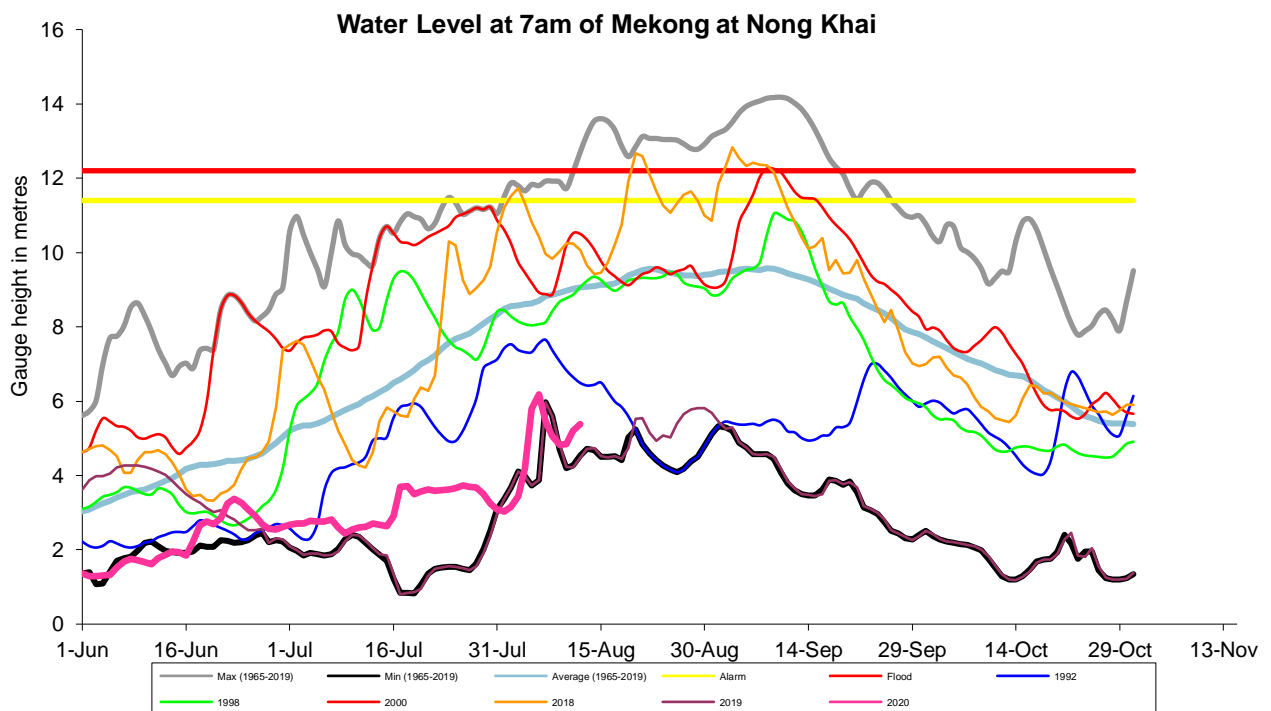
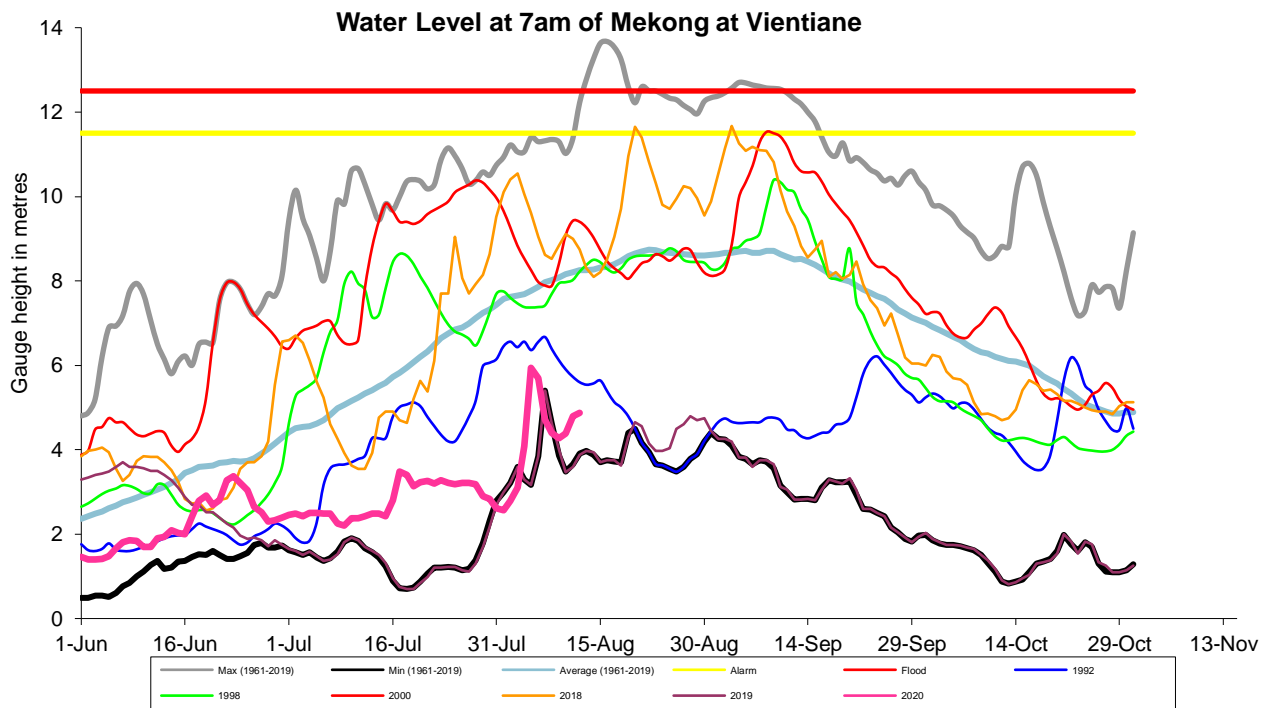
Detailed information on water levels and rainfall hydrographs at each key station are presented in Annex 1 and Annex 2, showing the accuracy and performance of the weekly flood forecasting activities.

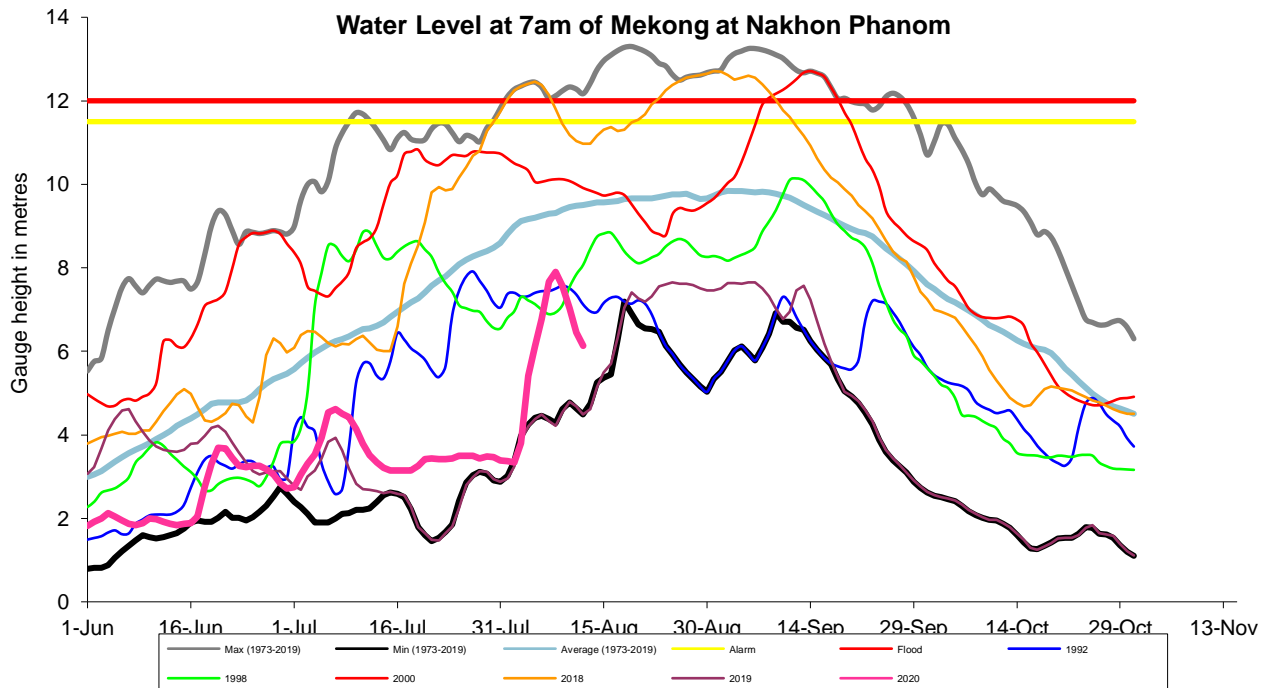
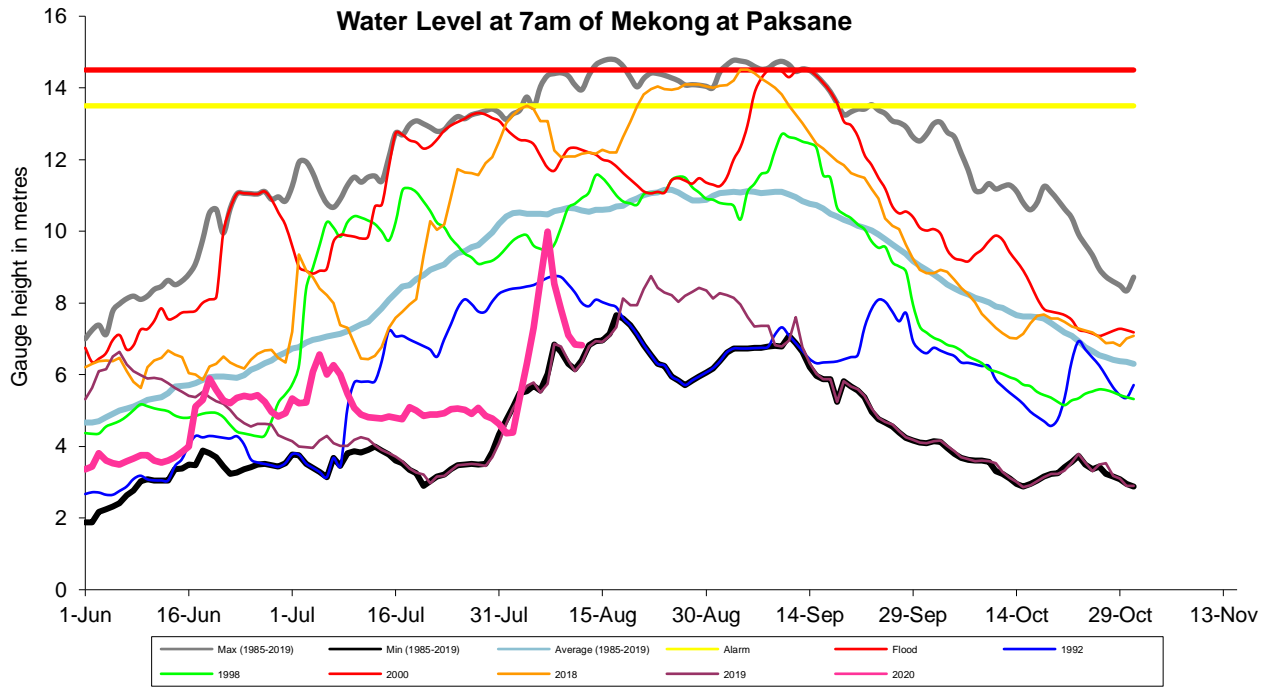


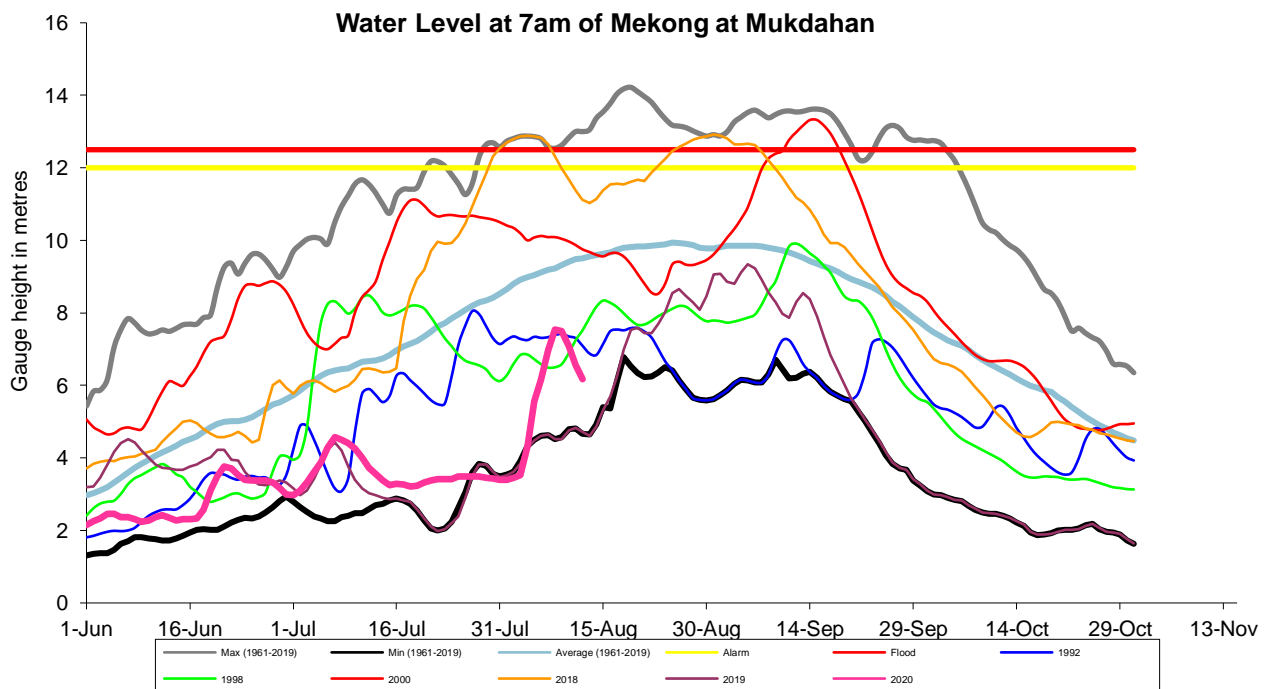
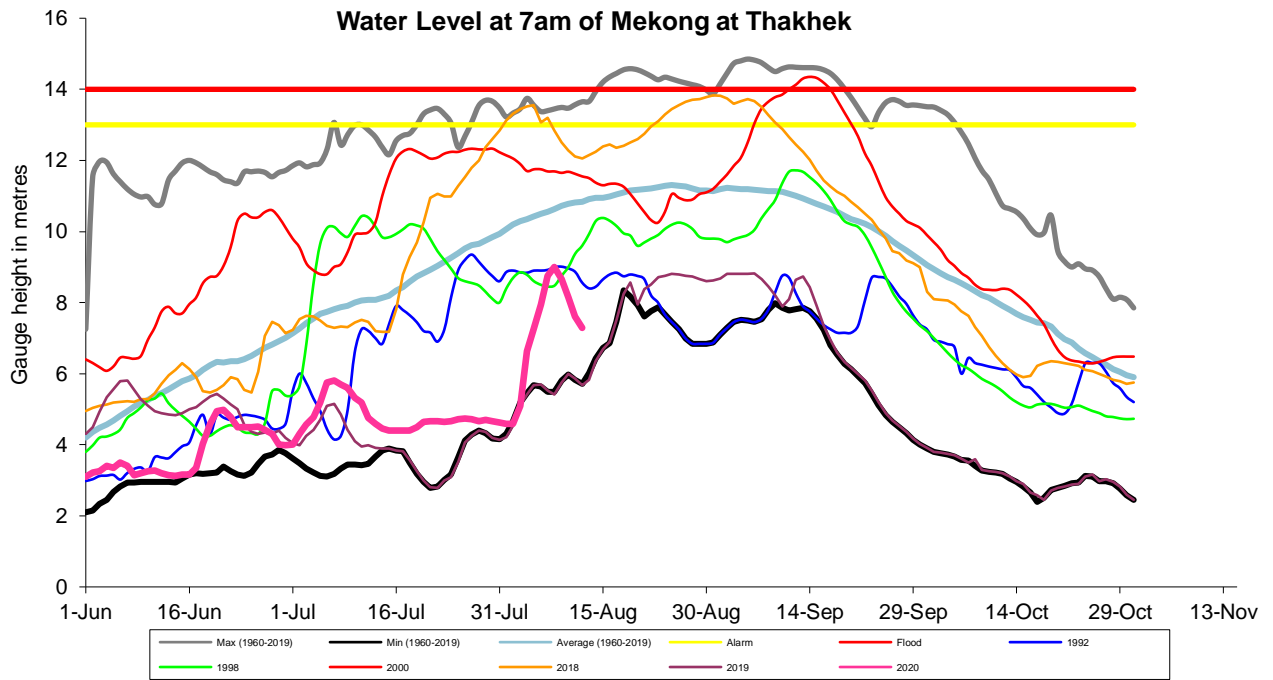
## Annex 1: Hydrographs at mainstream stations in the wet season

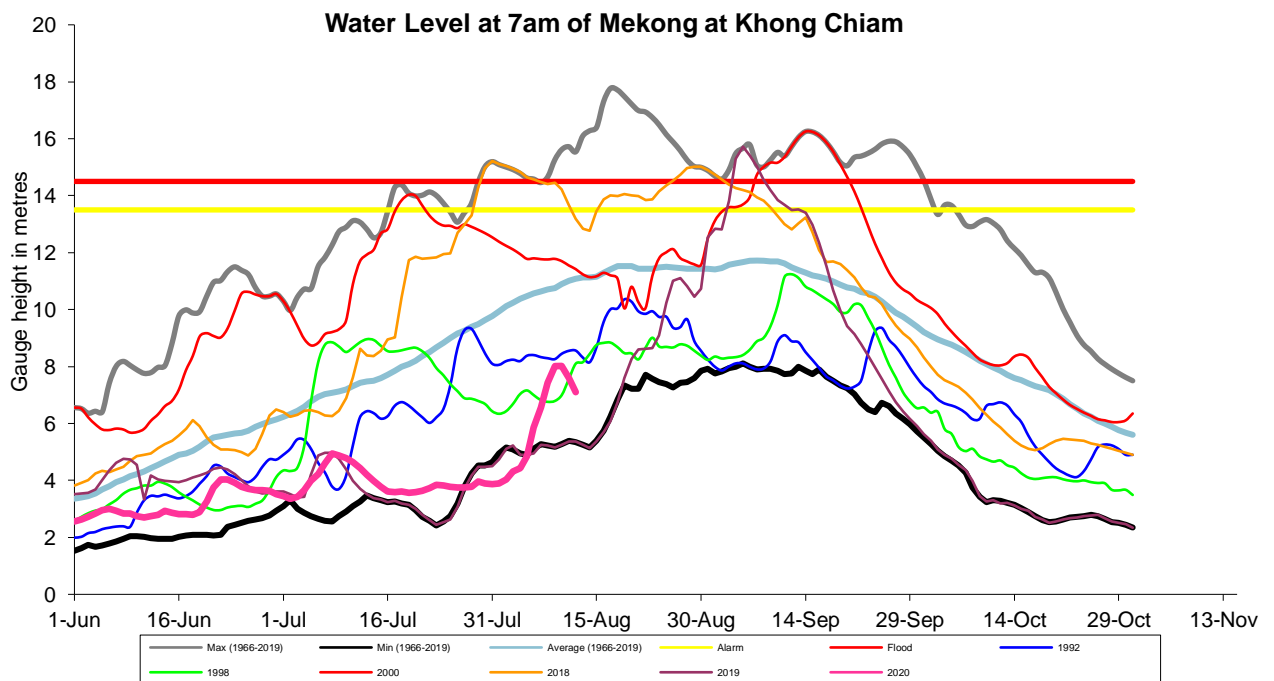
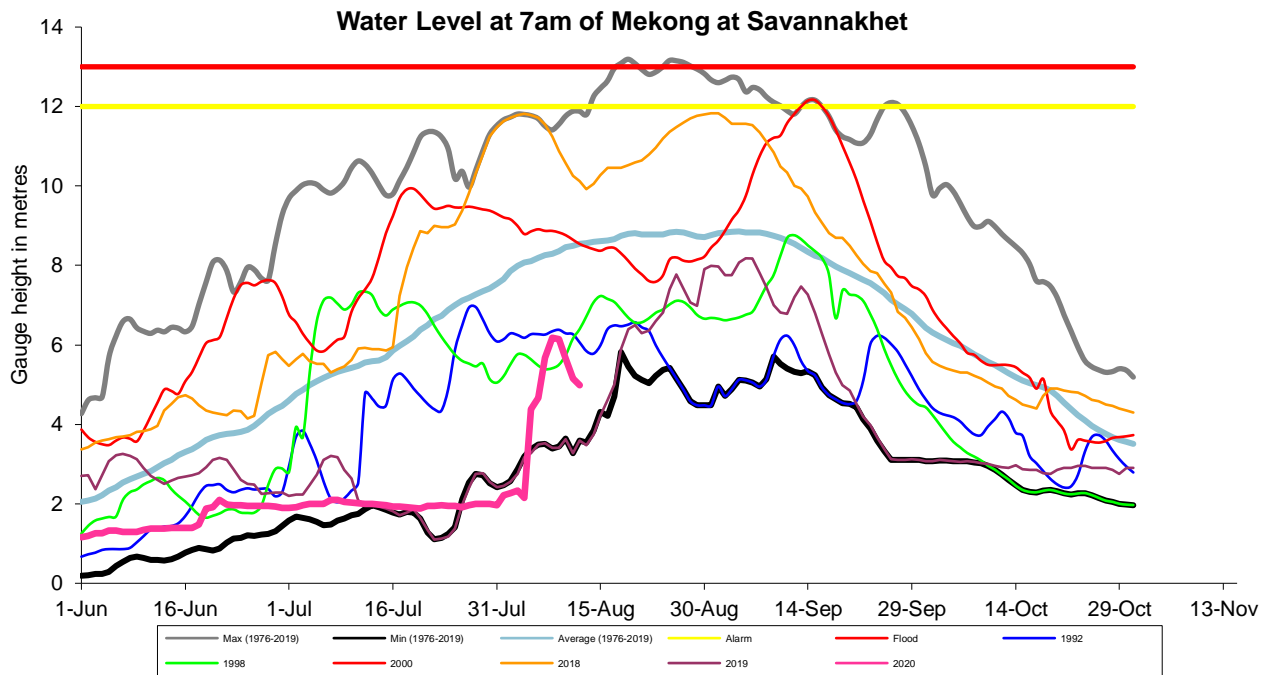


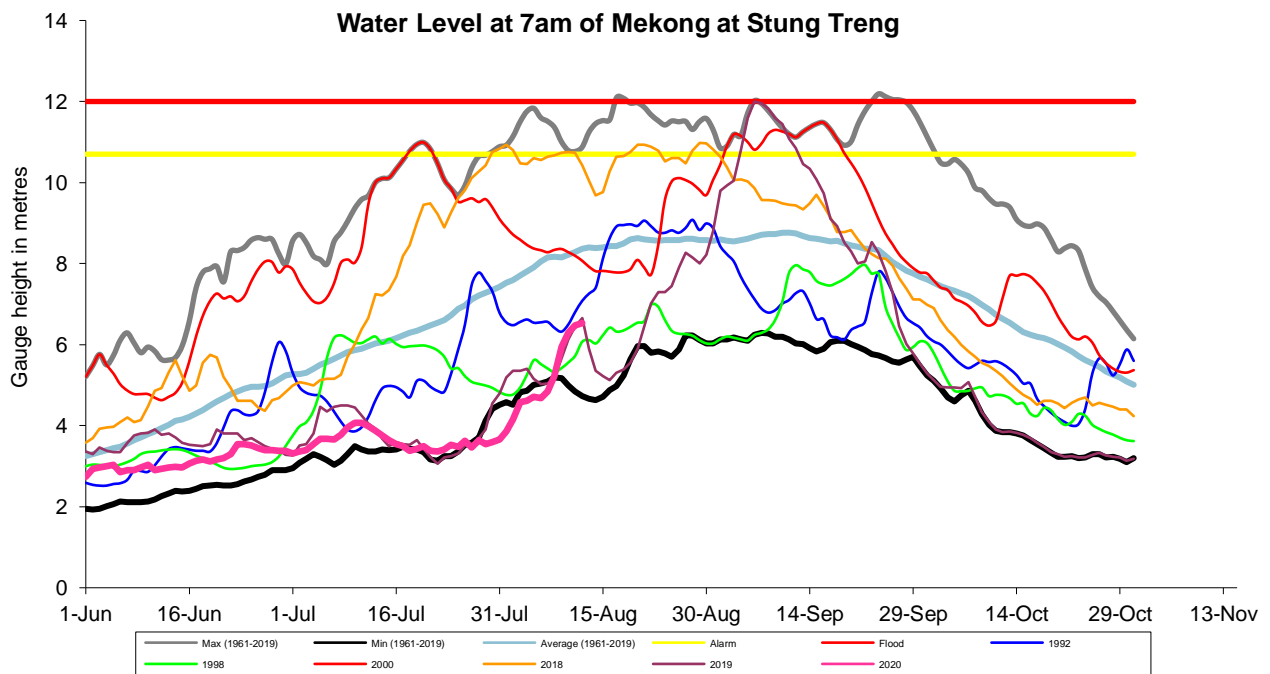
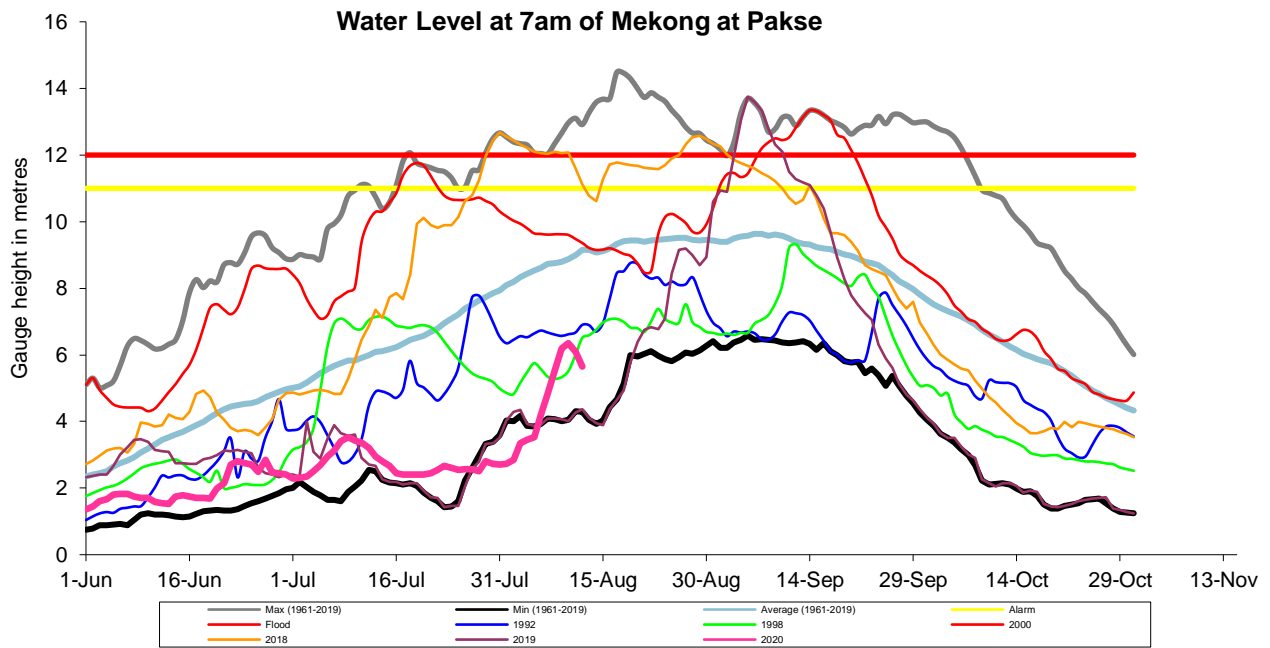




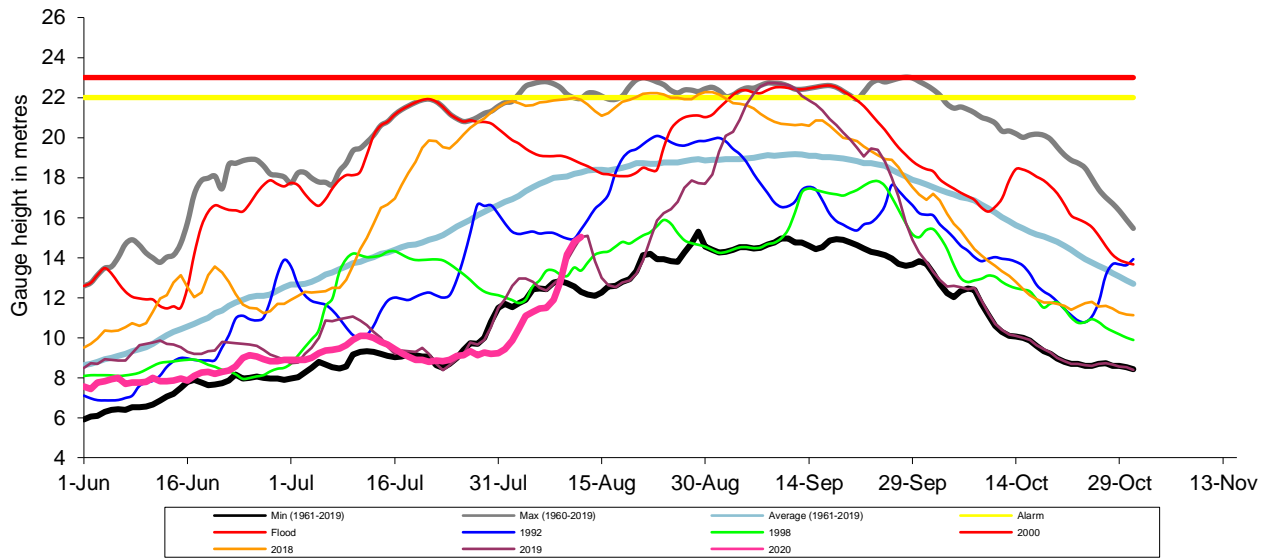




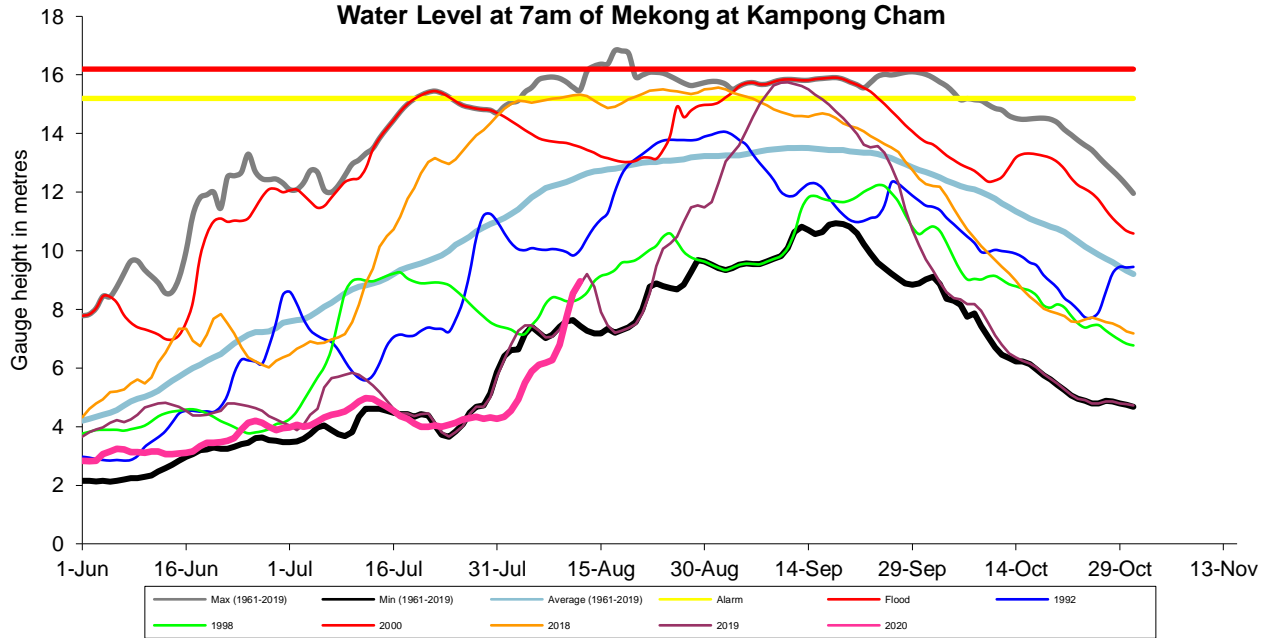




**Water Level at 7am of Mekong at Kratie**

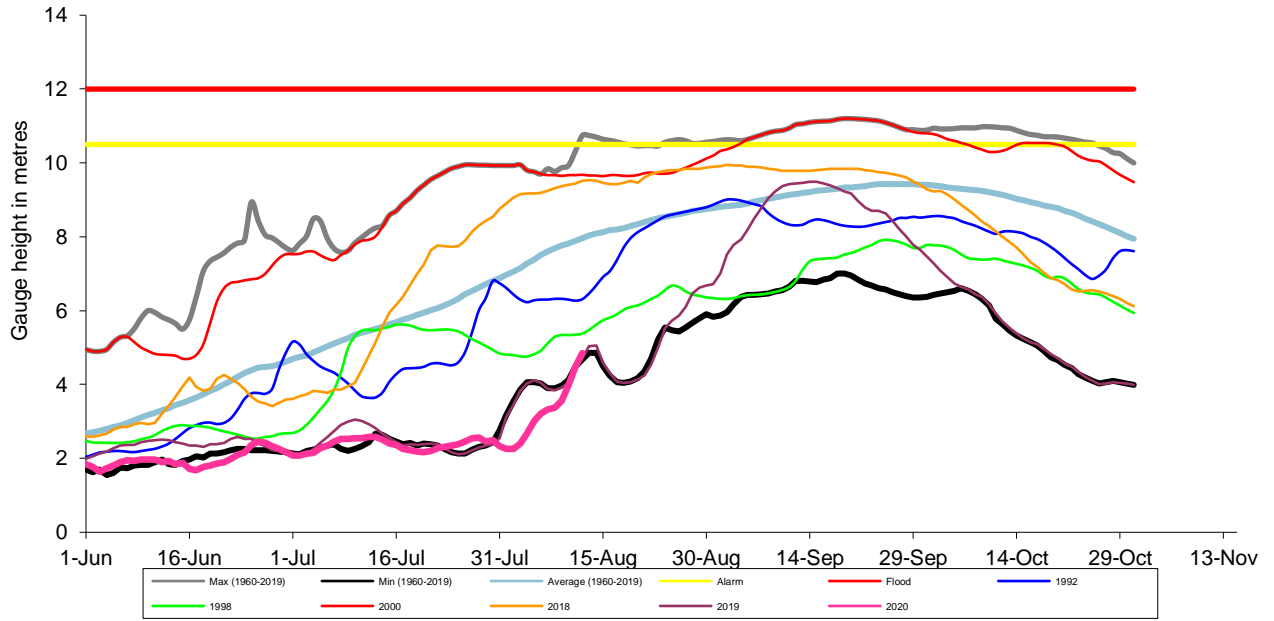


**Water Level at 7am of Mekong at Kampong Cham**

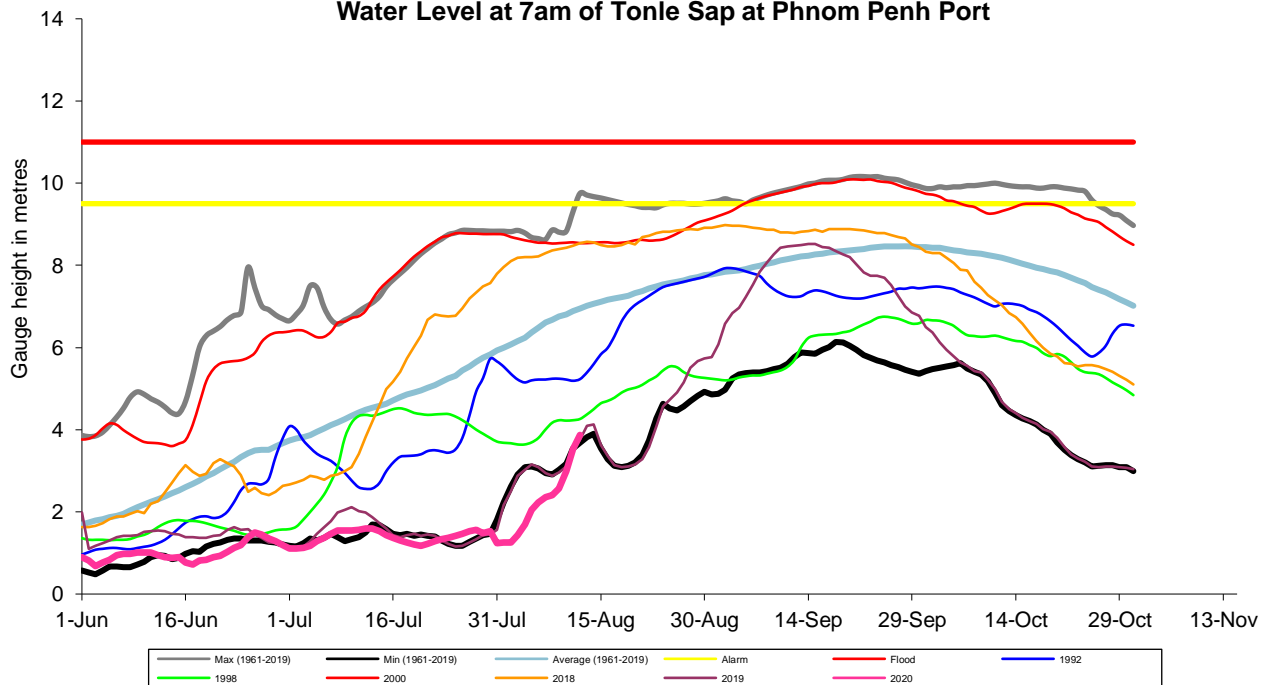


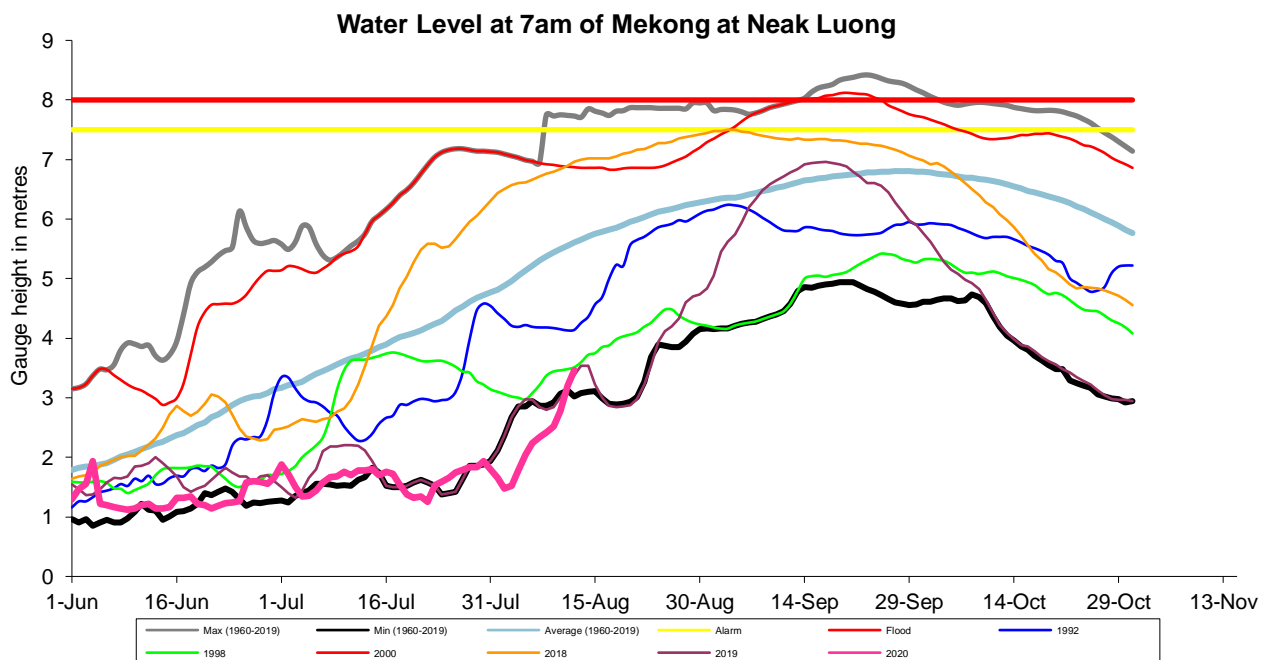
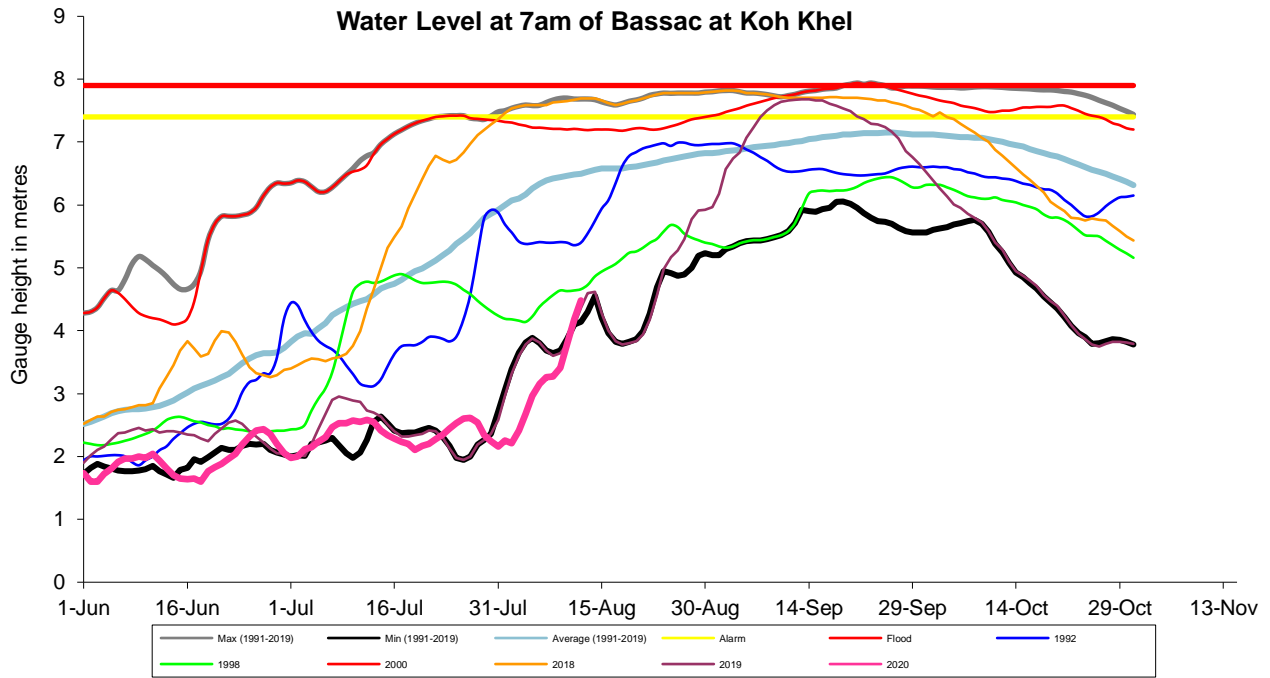


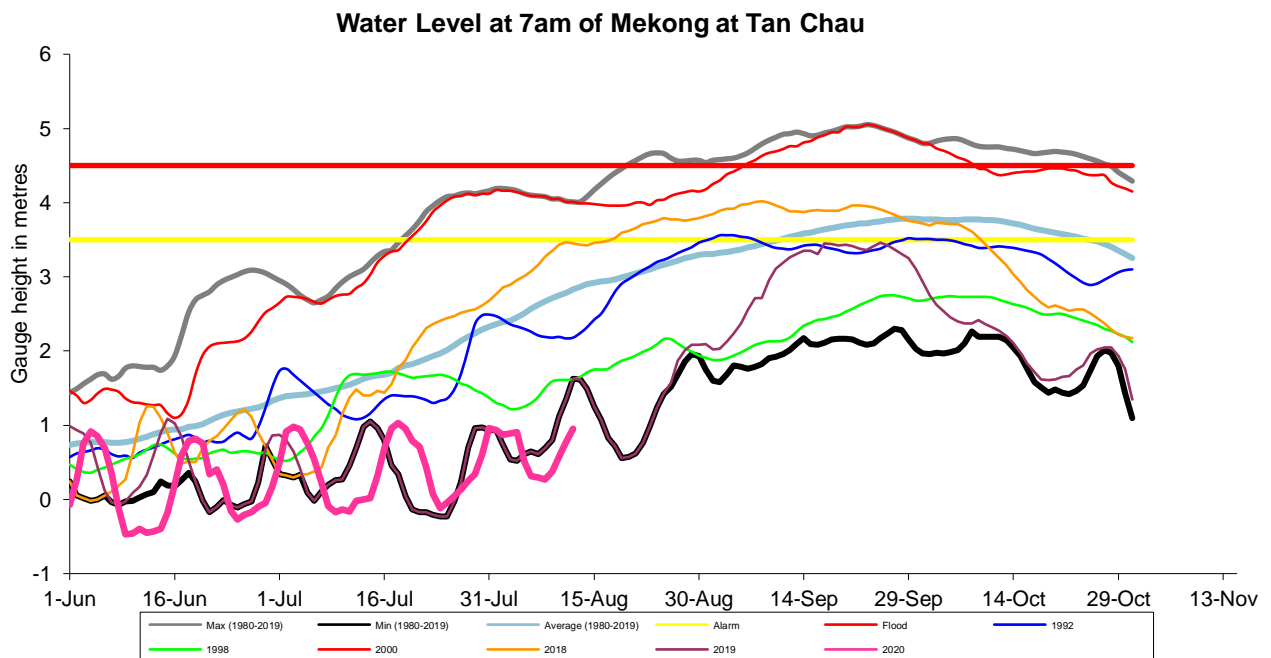
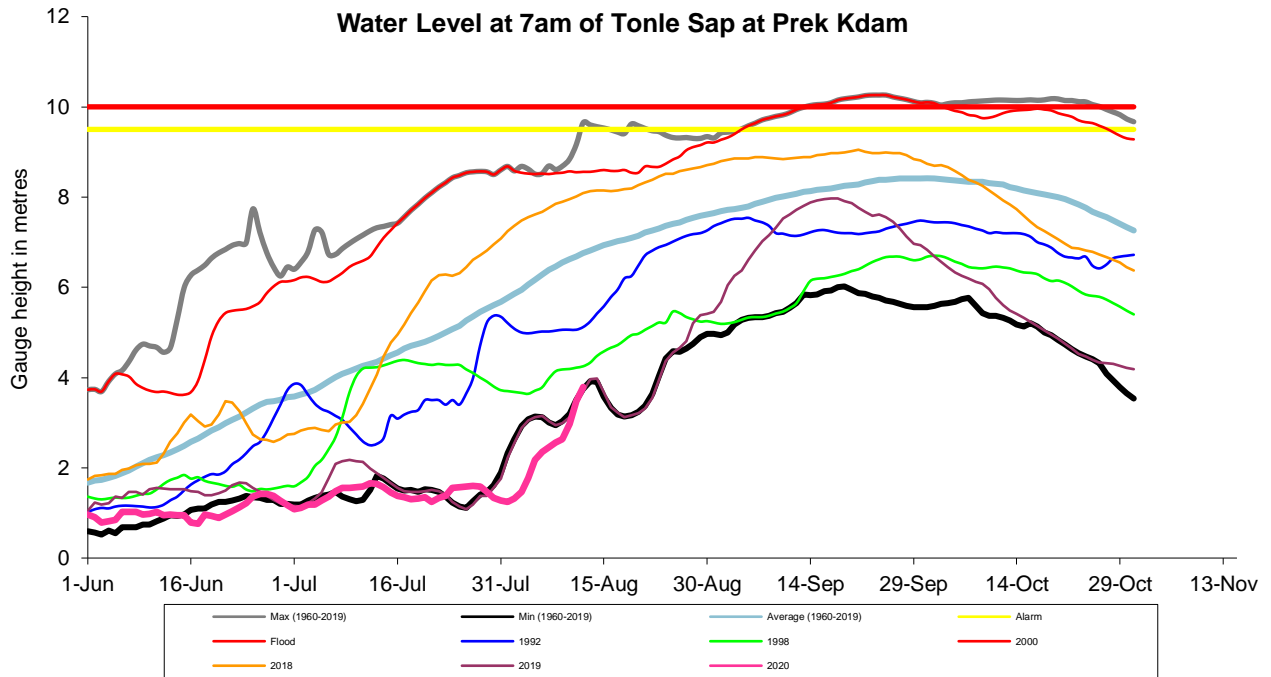
**Water Level at 7am of Mekong at Phnom Penh Chaktomuk**

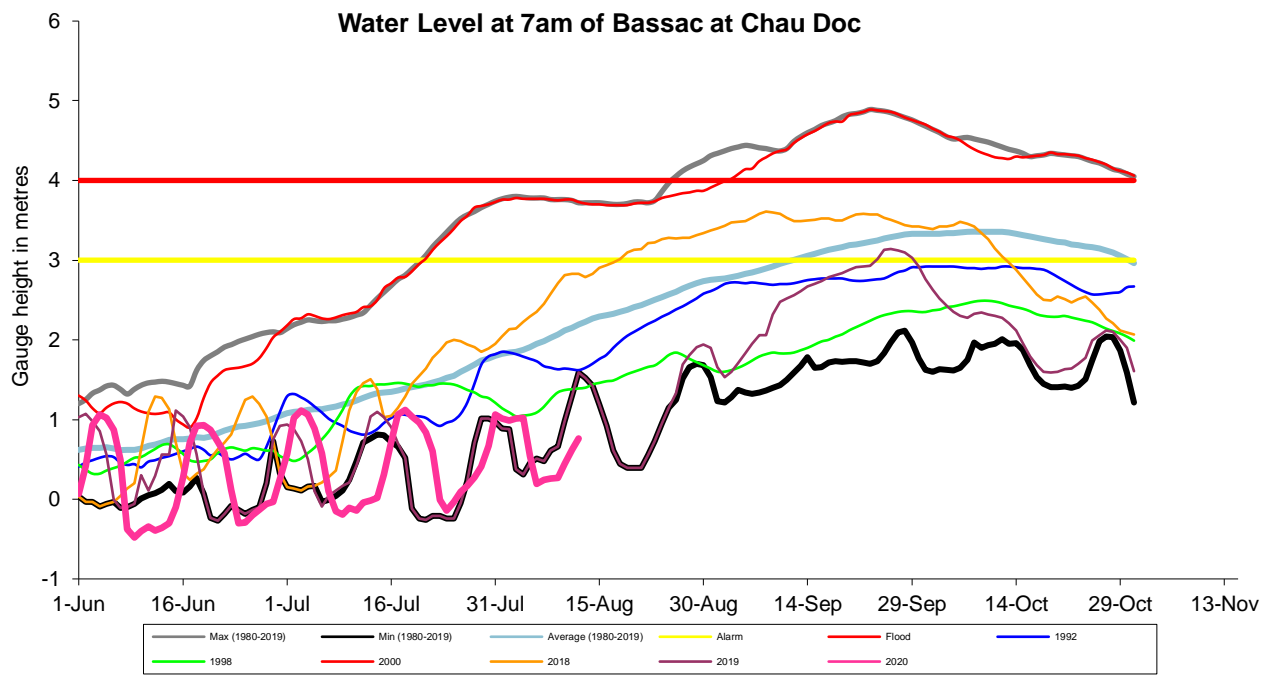


**Water Level at 7am of Tonle Sap at Phnom Penh Port**









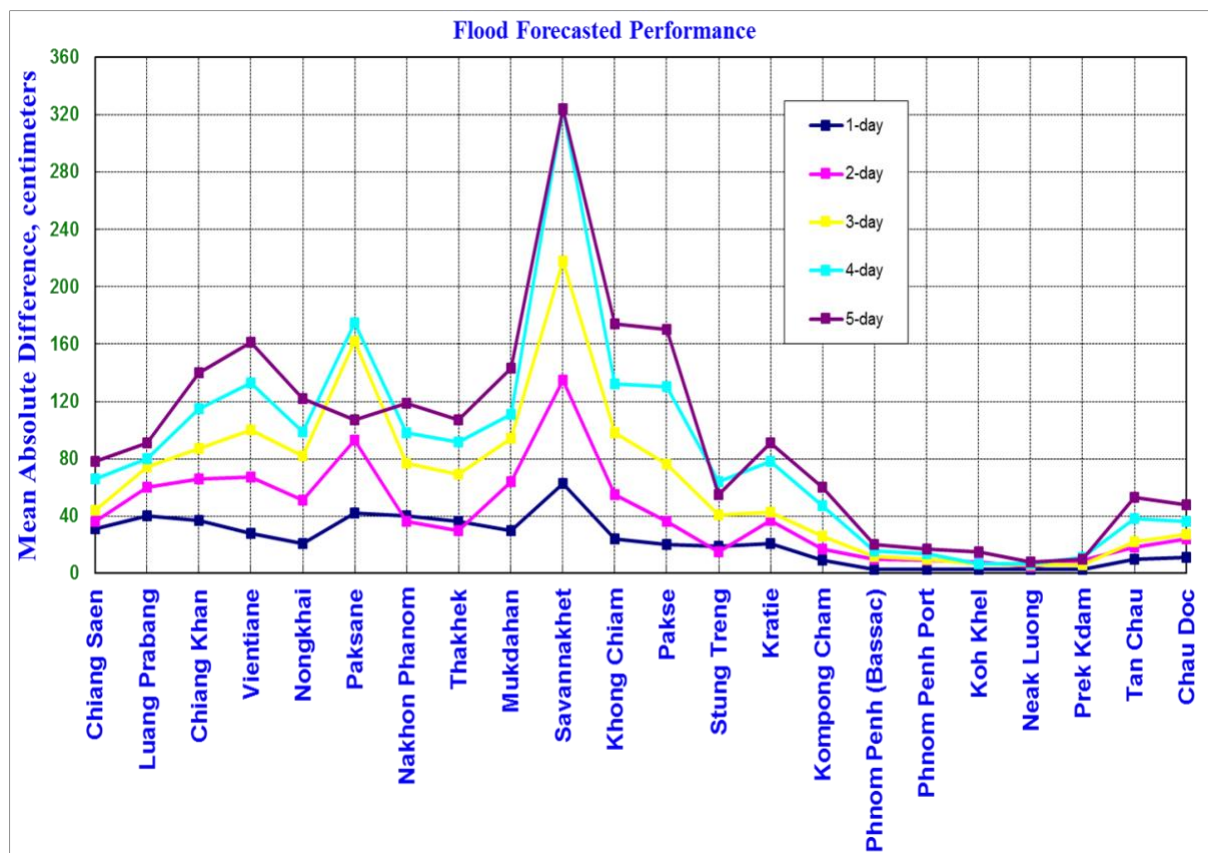
## Annex 2: Performance of the weekly flood forecasting

### Accuracy

“Accuracy” here refers to the state where data recorded in the MRC’s Mekong River Flood Forecasting System are cleaned and verified to ensure they are correct before releasing.

The adjustment of flood forecasting outcomes from the flood forecasting system, required flood forecasters to have extensive knowledge in hydrology and statistical modelling for estimating the relationships between stations upstream and downstream in the Mekong River Basin. Flood forecasting performance presented in the graph below shows the average flood forecasting accuracy at each key station along the Mekong mainstream from 04 to 10 August 2020.

The forecasting values from 04 to 10 August 2020 show overall accuracy is fair for 1-day to 3-day forecast lead time at stations in the middle part of the Mekong River from Luang Prabang to Pakse, due to the heavy rainfall affecting this area and the inaccurately recorded values of water levels at Sovannakhet from 01 to 06 August 2020.



**Note:** The higher percentage of flood forecasting accuracy is due to several key factors as follows:

- Missing data and data input are not sufficient to be used for inputting into the flood

forecasting model system.

- The influence of heavy rainfall and hydropower operations from upstream (Xayaburi) and tributaries inflows.
- Luang Prabang, Chiang Khan and Paksane stations have been affected by hydropower operations of Xayaburi and Nam Nguem (water retention and release). Rainfall always accumulates at this spot, which could be causing rapid high-water levels.
- Inaccurate recording of values at Sovannakhet, which DMH had corrected from 01 to 06 August 2020.
- Rapid fluctuations of water levels at Tan Chau and Chau Doc stations due to daily tidal effects of the sea in the Mekong Delta.

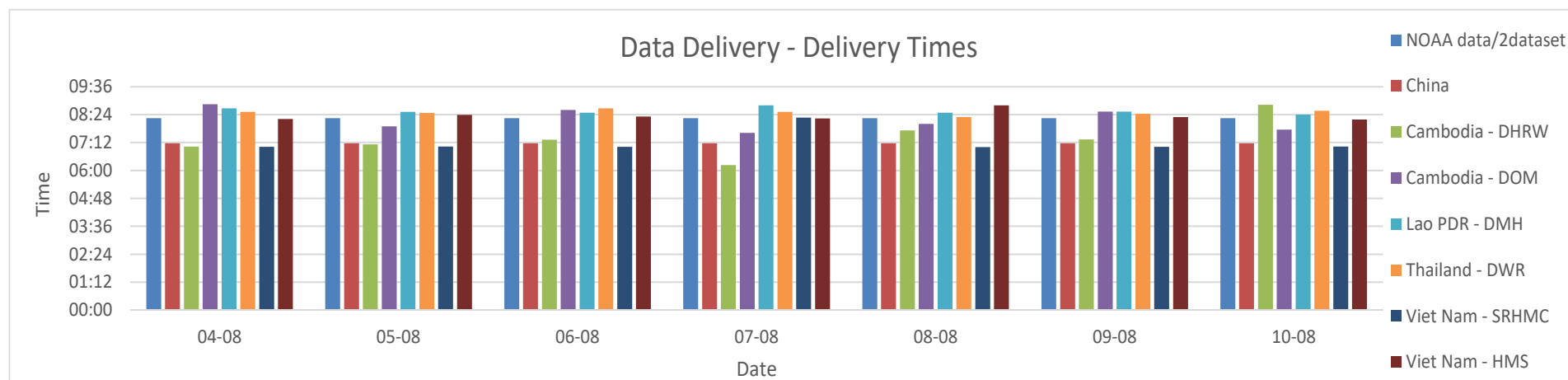
Satellite rainfall data was not representative of the actual rainfall at ground stations in some areas of the Mekong region.

### **Performance based on data from the Member Countries**

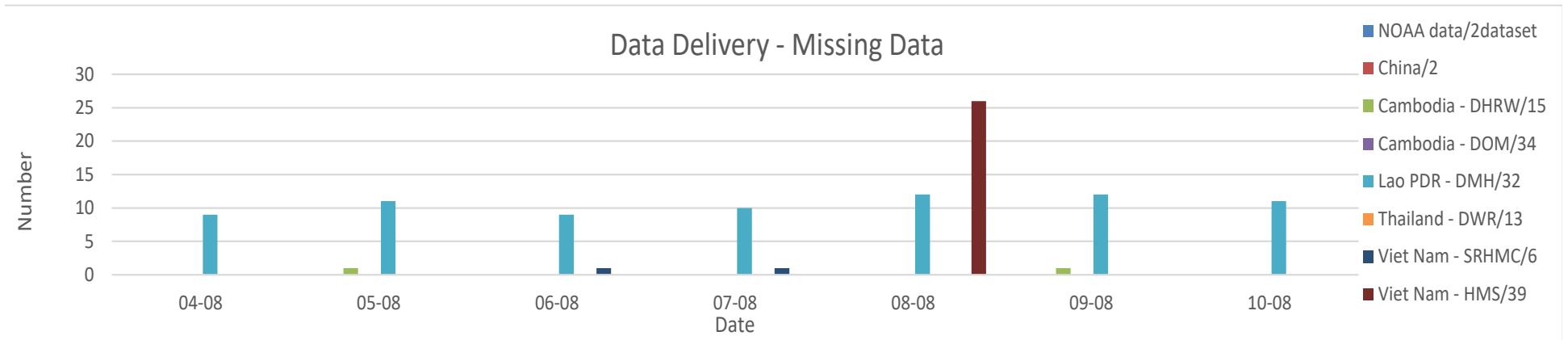
Flood forecasting performance is based on the hydro-met data received from the Member Countries. The evaluation of performance indicators, missing data and completion time for flood forecasting are presented in Table B4 and Figures B1, B2 and B3, respectively from 04 to 10 August 2020.

**Table B4: Overview of performance indicators for the past 8 days from 04 to 10 August 2020**

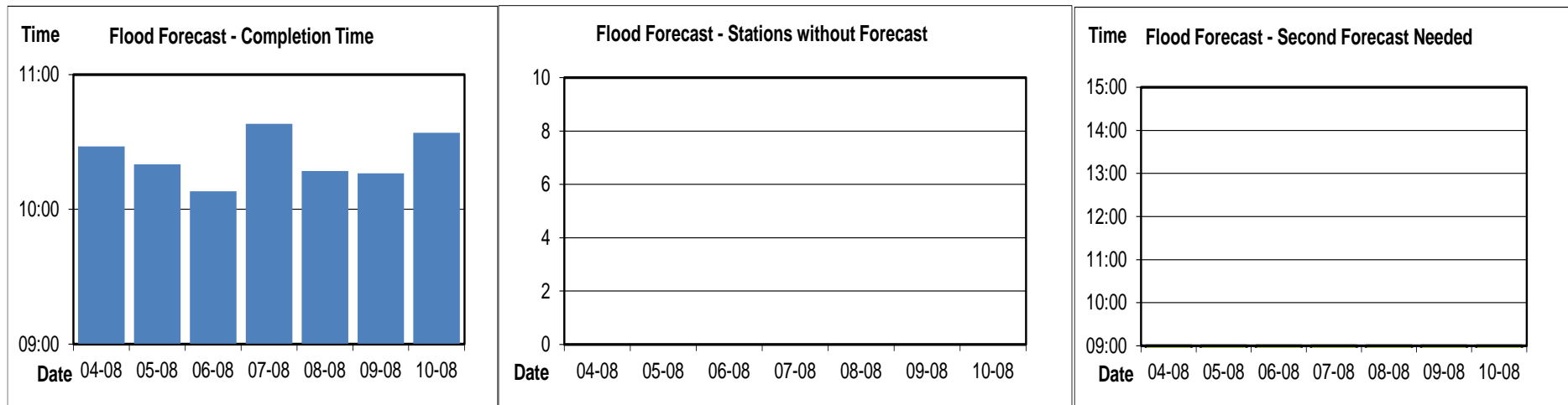
2020	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)							
	FF completed and sent (time)	Stations without forecast	FF2 completed and sent (time)	Weather data available (time)	NOAA data	China	Cambodia - DHRW	Cambodia - DOM	Lao PDR - DMH	Thailand - DWR	Viet 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	10:23	00:00	-	-	08:15	07:10	07:22	08:10	08:33	08:29	07:11	08:20	0	0	2	0	74	0	2	26
month	10:24	00:00	-	-	08:15	07:10	07:38	08:11	08:39	08:26	07:14	08:22	0	0	37	0	464	0	2	38



**Fig. B1: Data delivery times for the past 8 days from 04 to 10 August 2020**



**Fig. B2: Missing data for the past 7 days from 04 to 10 August 2020**



**Fig. B3: Flood forecast completion time, stations without forecasts, and second forecasts need from 04 to 10 August 2020**





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