Mekong River Commission

Weekly Wet Season Situation Report in the Lower Mekong River Basin

11 – 17 August 2020

Prepared by
The Regional Flood and Drought Management Centre
18 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, from **11 to 17 August 2020**. The trend and outlook for water levels are also presented.

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
- Conclusion.

Mekong River water levels are updated daily and can be accessed from:
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 has been 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 of 16 August 2020, which shows two lines of low pressure of the Monsoon Trough crossing the northern and eastern parts of the Mekong region, which can bring some rainfall over the next few days.

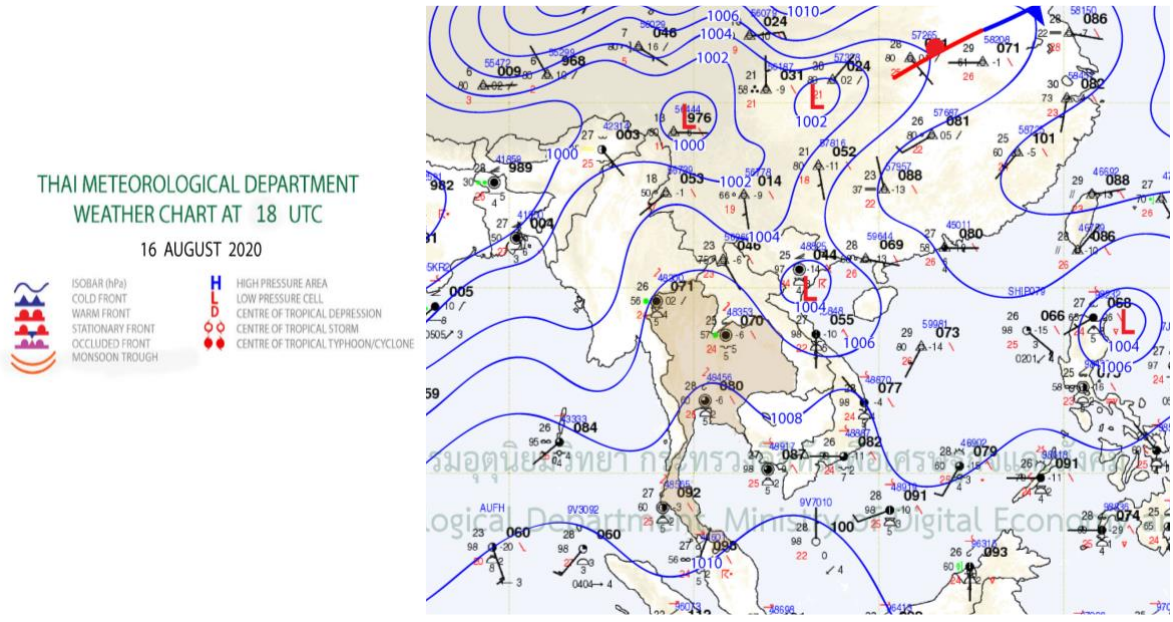


Figure 1. Summary of weather conditions over the LMB

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).

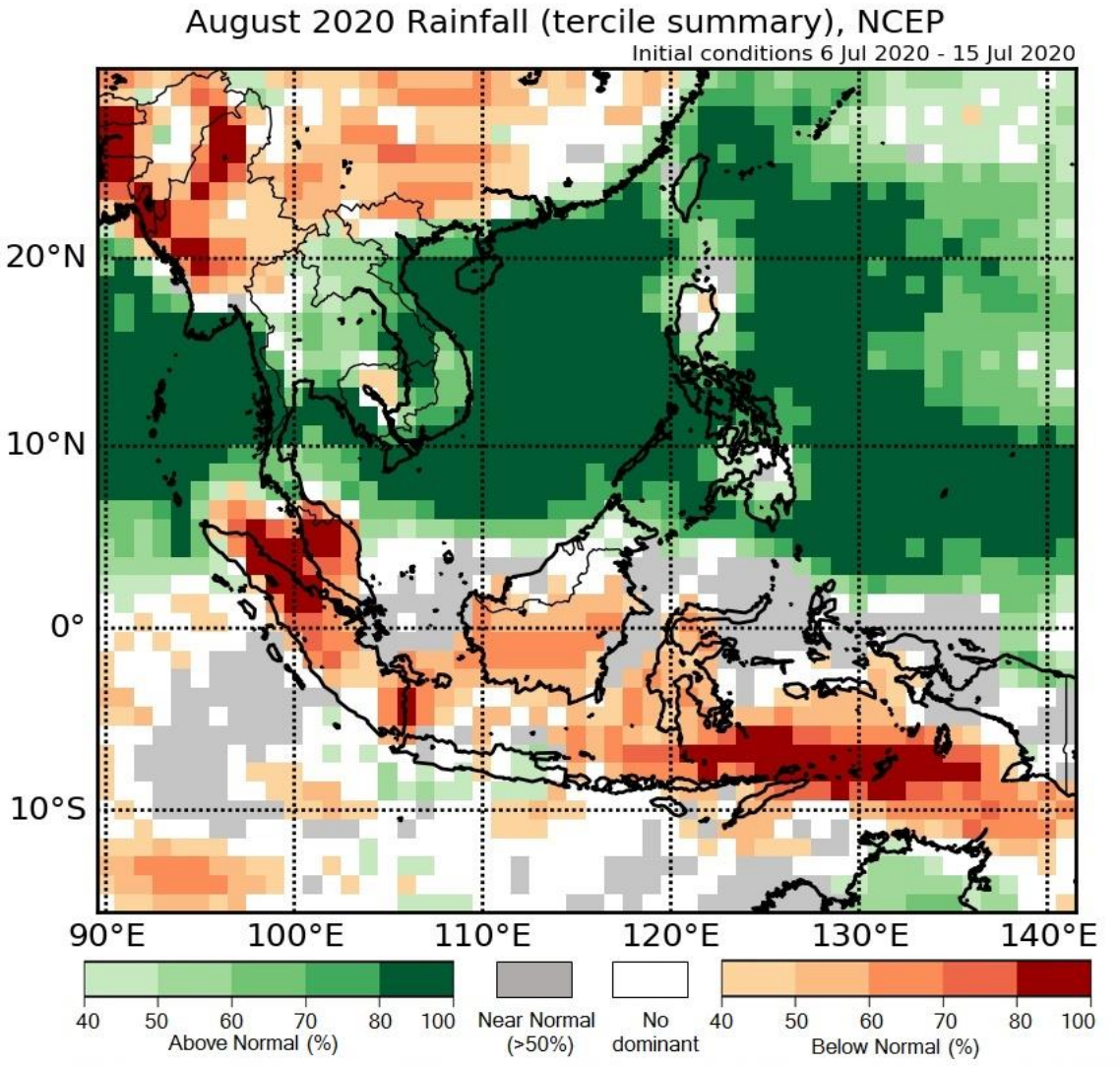


Figure 2. Predicted rainfall over Asian Countries by ASMC

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 50 mm to 450 mm at different stations along the LMB from Chiang Saen in Thailand to Tan Chau and Chau Doc in Viet Nam. The highest rainfall during this week was accumulated in the middle part of the LMB at Pasksane area (rainfall up to 450 mm) and the 3S area, much like last week. The weekly total observed rainfall at these selected stations is shown in Figure 3.

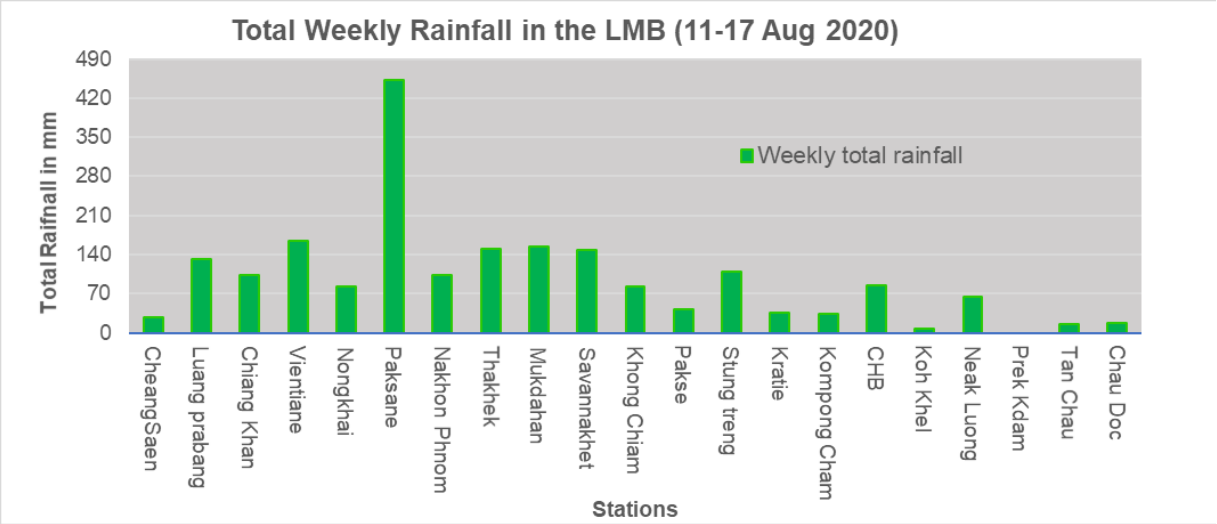


Figure 3. The weekly total rainfall over the LMB

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 – Cambodia, Lao PDR, Thailand and Viet Nam – from 10 to 17 August.

The situation this week is comparable to that of last week. During the last reporting period, the amount of rainfall (20 – 260 mm) was also above average, but was slightly below this week's quantity.

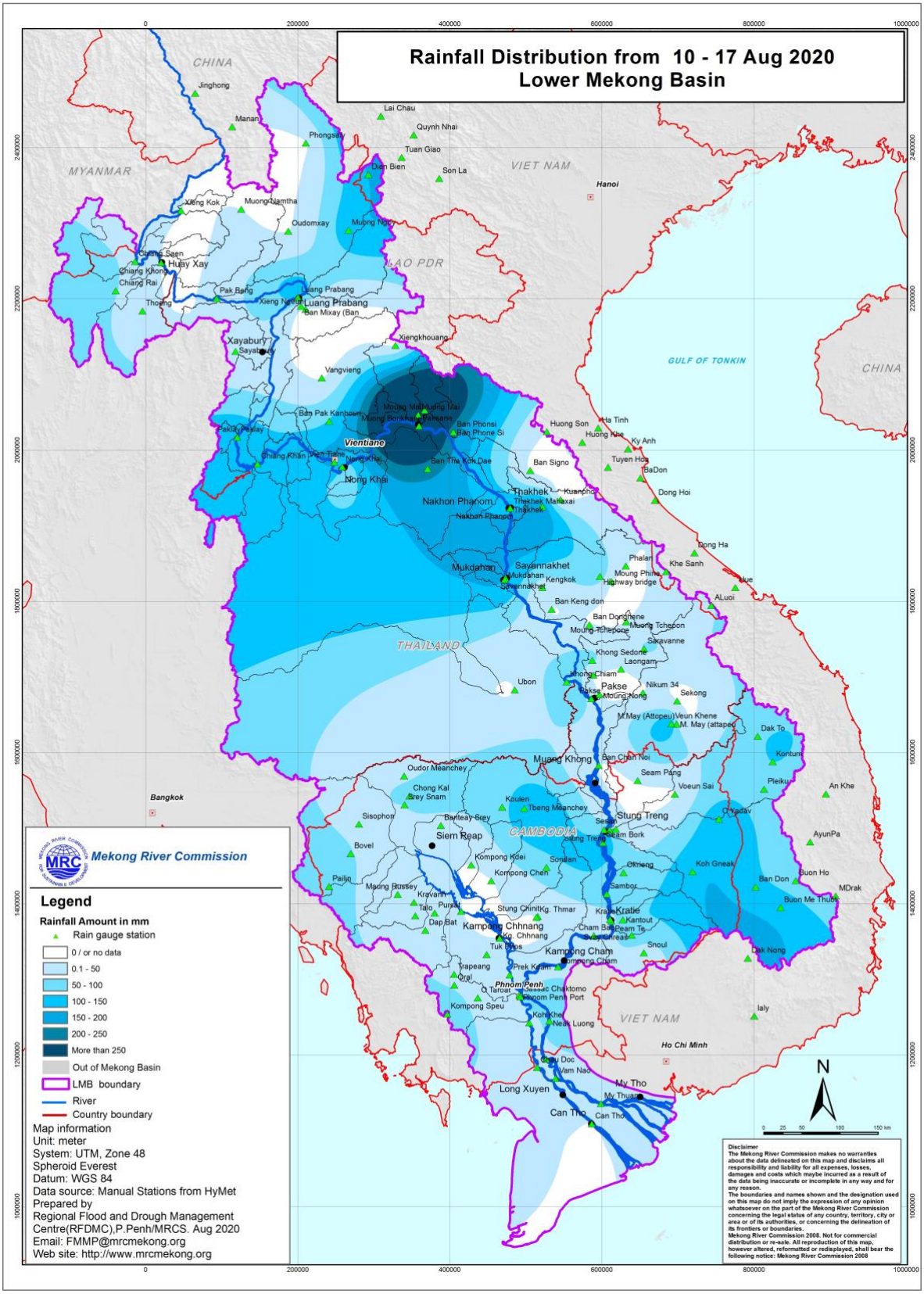


Figure 4. The weekly rainfall distribution over the LMB

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.

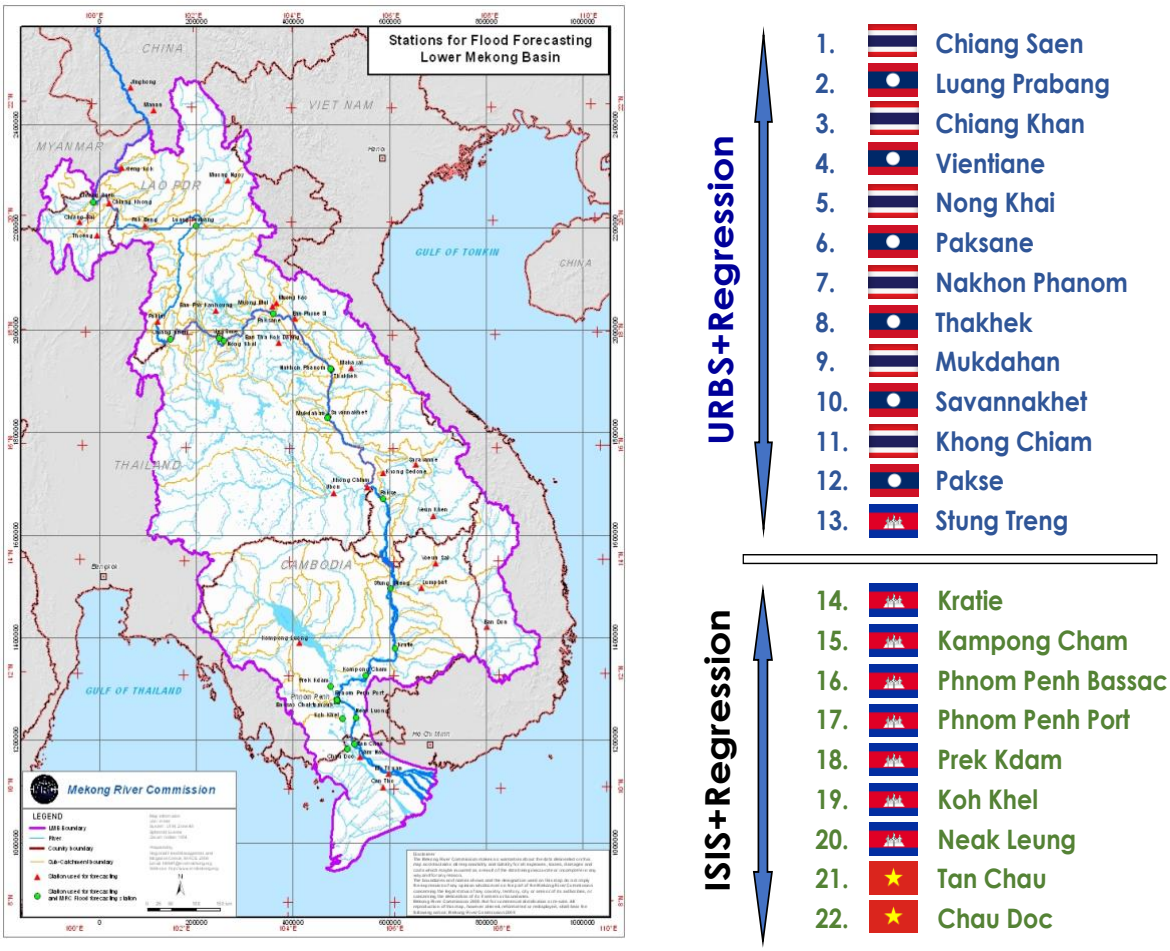


Figure 5. Key stations and model application for River Monitoring and Flood Forecasting

Chiang Saen and Luang Prabang

Water levels from 11 to 17 August at Chiang Saen station were not stable. They fluctuated, varying from -0.87 m to 0.42 m. The fluctuating water levels at this station followed the fluctuating patterns upstream from Lao PDR, Myanmar and Lancang (Mekong) in China and less rainfall from catchment inflows. When compared to last week's water levels, this week's levels were slightly lower.

Also, 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 notably followed the same trend from last week with rapidly fluctuating water levels varying from -0.95 m to 0.72 mm. Water levels at these stations were below their Long-Term Averages (LTAs). But they were higher than their levels in 2019, a situation that has happened since last year.

Chiang Khan, Vientiane-Nong Khai and Paksane

Water levels from 11 to 17 August at Chiang Khan station may have been dominated by the upstream hydropower dam at Xayaburi, which fluctuated daily from -0.06 m to 0.46 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, varying from -0.25 m to 0.74 m, while last week they fluctuated greatly varying from -1.45m to 1.7m. However, these water levels were lower than their LTAs, although higher than they were this time last year by between 1 m and 2 m.

Nakhon Phanom to Pakse

Water levels from 11 to 17 August at Thailand's Nakhon Phanom to Laos PDR's Pakse stations fluctuated, varying from -0.58 m to 0.70 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 were higher than they were last week. But they were still lower than their LTAs although they were about 0.5 m higher than they were this time last year.

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 fluctuated and followed the same trend from upstream, varying from - 0.29 m to 0.84 m. This week's water levels at these stations were between their minimum and LTA levels. But they slightly decreased, compared to last week's water levels, although still slightly higher than they were this time last year.

Tidal stations at Tan Chau and Chau Doc

During this period, just like they were last week and in their historical record, 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 17 August (this reporting period), **it was observed that the reverse flow into the TSL was**

recorded on August 4 although two extremely small instances happened in July. 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 (since August 4), the volume of the Lake up to this point has been considered critical as it is still lower than its minimum level. Figure 7 shows the seasonal change in the monthly volume flow up to 17 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 at the same period. Table 1 shows the monthly change in flow volume of the TSL and the critical flow volume of the TLS 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 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 Lake water levels and on hydrology.

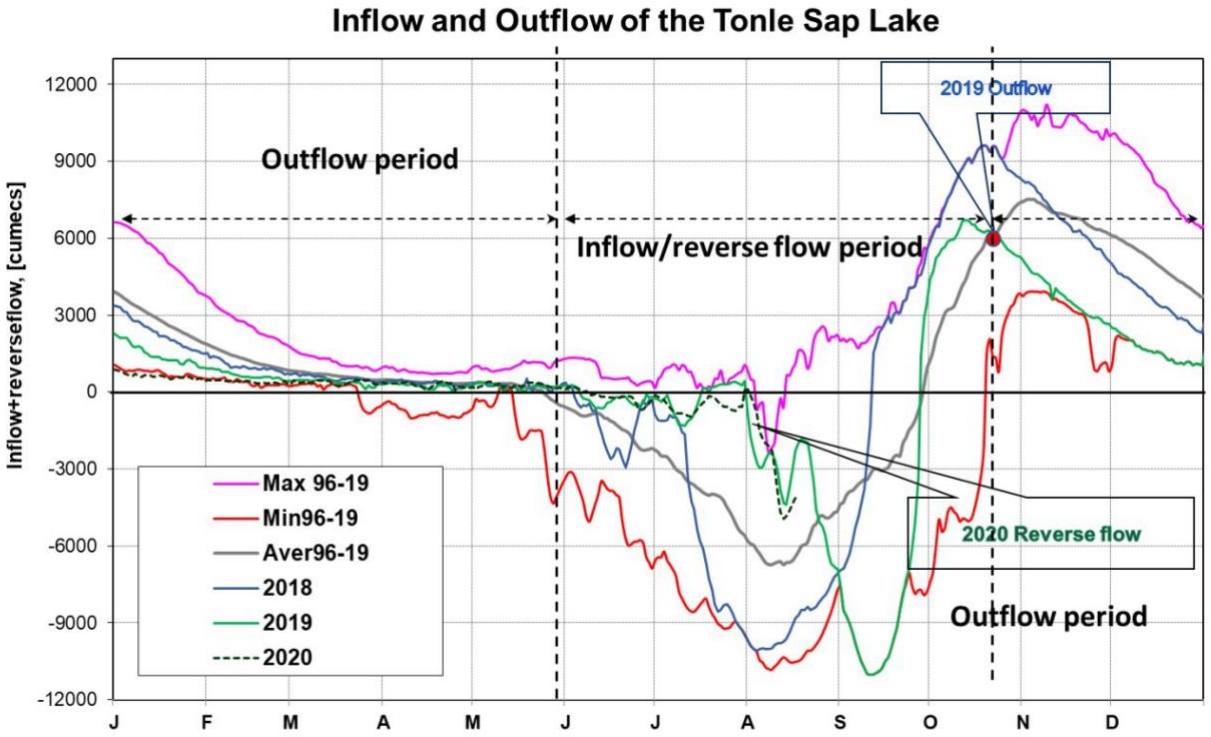


Figure 6. The seasonal change of inflows and outflows of Tonle Sap Lake

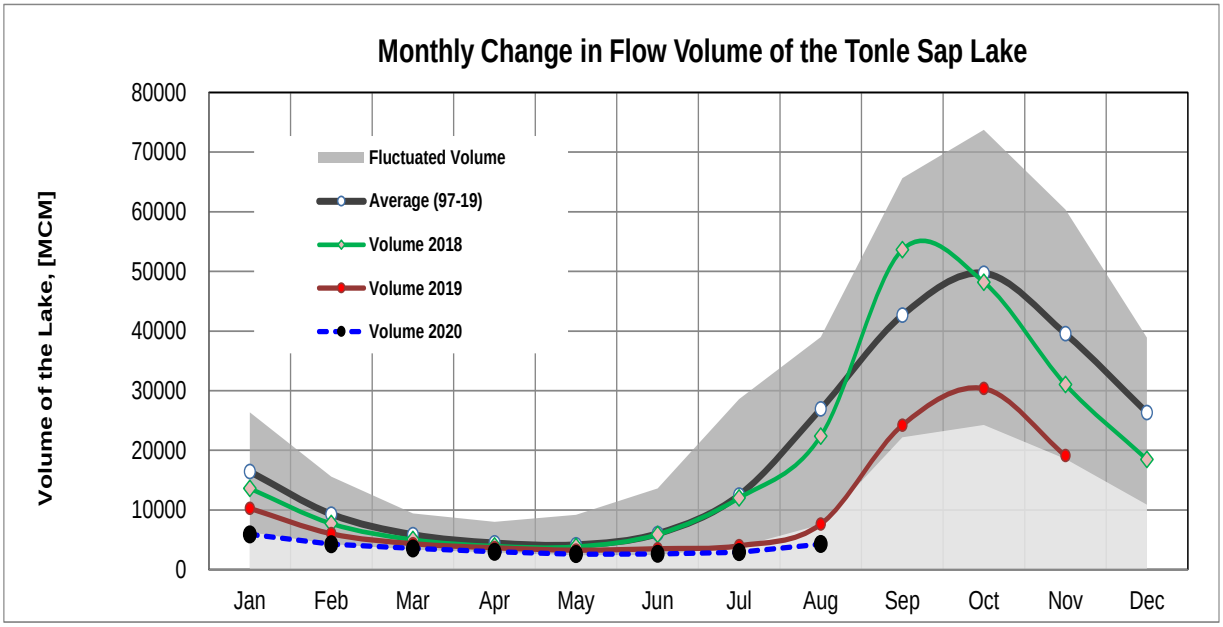


Figure 7. The seasonal change in monthly flow volume of Tonle Sap Lake

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	4276.48	
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, comapred with historical Min values						
	Normal condition, compared with LTA (Long term average)						
	Low volume situation, comapred with LTA values						

4 Forecast Water Levels and Outlook

Chiang Saen and Luang Prabang

Based on the daily flood bulletin on 17 August, daily forecast water levels along the lower Mekong River at Chiang Saen are expected to increase from 3.90 m to 4.10 m in the next two days. After that, they will decrease due to less inflow from upstream and rainfall.

For Luang Prabang, the water levels will also increase from 10.59 m to 11.54 m during the same period.

Despite this rise and fall, water levels in these stations will still be lower than their LTAs.

Chiang Khan, Vientiane-Nong Khai and Paksane

From Chiang Khan to Vientiane/Nong Khai, water levels are expected to increase up to 0.40 m due to the forecast above-average rainfall in their catchment inflows. The water levels at Vientiane station are forecast to increase from 5.92 m to 7.18 m, while at Pasksane the water level will also increase from 8.98 m to 9.86 m in the next five days.

However, the water levels here still stay approximately 2 m lower than their LTAs.

Nakhon Phanom to Pakse

Water levels at this station will increase by about 0.75 m in the next three days, following the same trends as those in the upstream. The water levels at Pakse station are forecast to increase from 5.58 m to 6.36 m in the next five days. Still, the levels will be about 1 m lower than their LTAs.

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 fluctuate, varying between -0.27 m and 0.33 m in the next three days.

Water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port will fluctuate between -0.07 m and 0.14 m over the next five days. Water levels at Phnom Penh at Chaktomuk and Koh Khel on the Bassac River will also fluctuate, varying from -0.07m to 0.13 m during the same period.

Although these trends, the water levels at these stations will continue to be under their LTAs.

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 18 August. Results of the daily flood forecasting bulletin are also available at http://ffw.mrcmekong.org/bulletin_wet.php.

The performance of the weekly flood forecast, with an accuracy and data input evaluation from to 11 to 17 August is presented in Annex 2.

Table 2. River Flood Forecasting Bulletin

Mekong Bulletin

Mekong River Commission Secretariat (MRCS)

Regional Flood and Drought Management Centre (RFDMC)

P.O. Box 623 #576, National Road #2, Chak Angre Krom, Meanchey, Phnom Penh, Cambodia

Tel: (855-23) 425353, Fax: (855-23) 425363, Email: floodforecast@mrcmekong.org

River Flood Forecast: 18 - 20 August 2020

Date: 17 August 2020

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					
		16-Aug				16-Aug	17-Aug	18-Aug	19-Aug	20-Aug	21-Aug	22-Aug	17	18	19	20	21	22
Jinghong		5.5				535.90	535.92							×	×	×	×	×
Chiang Saen		3.5	357.110	12.80	11.50	3.77	3.90	4.05	4.10	4.03			↑	↑			★	★
Luang Prabang		23.4	267.195	18.00	17.50	9.87	10.59	11.15	11.54	11.35	11.14	11.00	↑	↑	↑	↓	↓	↓
Chiang Khan		10.5	194.118	16.00	14.50	8.68	9.06	9.41	9.65	9.80			↑	↑	↑	↑	★	★
Vientiane		21.5	158.040	12.50	11.50	5.84	5.92	6.32	6.70	6.96	7.13	7.18		↑	↑	↑	↑	
Nongkhai		0.0	153.648	12.20	11.40	6.26	6.38	6.79	7.18	7.45			↑	↑	↑	↑	★	★
Paksane		24.5	142.125	14.50	13.50	8.76	8.98	9.15	9.38	9.62	9.76	9.87	↑	↑	↑	↑	↑	↑
Nakhon Phanom		4.3	130.961	12.00	11.50	7.22	7.90	8.03	8.12	8.25			↑	↑		↑	★	★
Thakhek		6.2	129.629	14.00	13.00	8.33	9.03	9.18	9.29	9.43	9.60	9.70	↑	↑	↑	↑	↑	
Mukdahan		2.9	124.219	12.50	12.00	6.69	7.34	7.71	7.80	7.86			↑	↑			★	★
Savannakhet		1.2	125.410	13.00	12.00	5.40	6.00	6.33	6.39	6.43	6.48	6.53	↑	↑				
Khong Chiam		5.3	89.030	14.50	13.50	6.94	7.31	8.06	8.48	8.58			↑	↑	↑		★	★
Pakse		0.0	86.490	12.00	11.00	5.34	5.58	6.00	6.21	6.28	6.32	6.36	↑	↑	↑	↑		
Stung Treng		14.0	36.790	12.00	10.70	6.06	5.82	5.90	6.23	6.37	6.41	6.44	↓	↑	↑	↑		
Kratie		19.2	-0.101	23.00	22.00	14.38	14.11	13.95	14.05	14.36	14.51	14.56	↓	↓	↑	↑	↑	↑
Kompong Cham		0.0	-0.930	16.20	15.20	8.66	8.50	8.31	8.18	8.30	8.63	8.78	↓	↓	↓	↑	↑	↑
Phnom Penh (Bassac)		59.2	-1.020	12.00	10.50	4.86	4.76	4.70	4.65	4.71	4.84	4.91	↓	↓	↓	↑	↑	↑
Phnom Penh Port		nr	0.070	11.00	9.50	3.88	3.78	3.71	3.65	3.72	3.86	3.93	↓	↓	↓	↑	↑	↑
Koh Khel		0.8	-1.000	7.90	7.40	4.48	4.40	4.33	4.28	4.36	4.48	4.55	↓	↓	↓	↑	↑	↑
Neak Luong		64.2	-0.330	8.00	7.50	3.40	3.32	3.24	3.15	3.08	3.13	3.25	↓	↓	↓	↓	↑	↑
Prek Kdam		0.0	0.080	10.00	9.50	3.85	3.79	3.73	3.67	3.74	3.87	3.95	↓	↓	↓	↑	↑	↑
Tan Chau		0.0	0.000	4.50	3.50	1.61	1.55	1.51	1.43	1.33	1.14	1.00	↓	↓	↓	↓	↓	↓
Chau Doc		nr	0.000	4.00	3.00	1.60	1.57	1.51	1.51	1.40	1.18	1.00	↓	↓		↓	↓	↓

REMARKS:

-: not available.

nr: no rain.

LEGEND	
rising water level	↑
stable water level	
falling water level	↓
alarm stage	
alarm situation	
flood stage	
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 cm 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/reportflood.php

5 Conclusion

Rainfall

Rainfall during this reporting week was considered above average, varying from 50 mm to 450 mm at different stations along the LMB from Chiang Saen in Thailand to Tan Chau and Chau Doc in Viet Nam. The highest concentration was in the middle part of the LMB at Pasksane area (up to 450 mm) and the 3S area, much like last week. The rainfall amount this week was also higher than that of last week (20 – 260 mm).

No tropical depressions or tropical storms in the LMB were detected during this reporting week in the LMB. On 16 August, there were two lines of low pressure of the Monsoon Trough, crossing the northern and eastern parts of the Mekong region. This situation may bring some rainfall to these areas over the next few days.

Water levels

Water levels across the LMB during this reporting week were fluctuating, varying from -0.06 m to 0.74 m. The levels at most of these monitoring stations were still lying below their long-term averages (LTA). The only exception was from Stung Treng up to Kampong Cham/Phnom Penh and Koh Khel/Neak Luong in Cambodia where the water levels were between their minimum and LTA levels.

Compared with last week, this week's water levels at the majority of the stations were slightly lower. However, the only exception was from Nakhon Phanom in Thailand to Pakse in Lao PDR where the levels this week were higher than they were last week.

Until August 17 (this reporting period), the reverse flow into the Tonle Sap Lake was recorded on August 4 although two extremely small and brief instances already happened in July. Even though the reverse flows have started, the volume of the lake, up to this point, has been considered as critical since it is still lower than its minimum level, compared with last year (2019) and historical minimum levels at the same period.

Water level outlook

Over the next few days, water levels at upper stations in the LMB are expected to increase, varying from 0.20 m to 0.95 m. In the middle part of the LMB at Vientiane station, water levels are forecast to increase from 5.92 m to 7.18 m – the highest increase among all the stations.

In the lower reaches – from Stung Treng to Koh Khel on the Bassac, including the Tonle Sap Lake at Prek Kdam and Phnom Penh Port – water levels will fluctuate, varying between -0.07 m and 0.33 m in the next three days.

The situation in Tan Chau on the Mekong River and Chau Doc on the Bassac River is expected to remain unchanged.

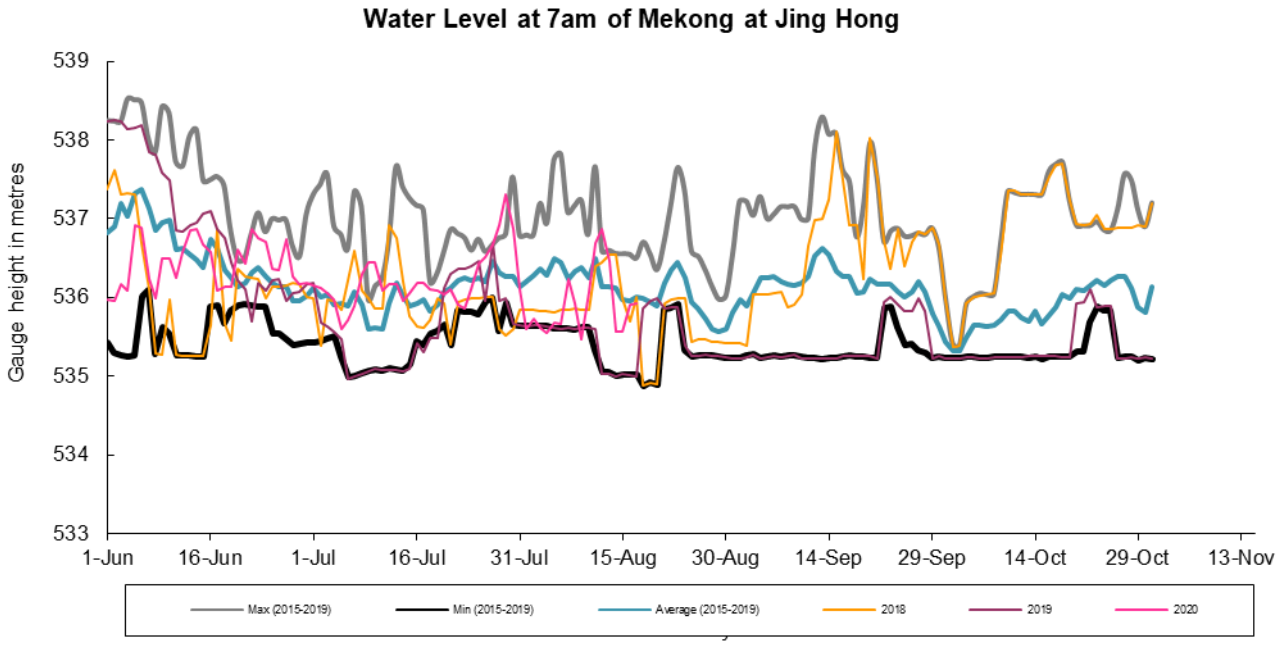
Although the trend of water levels appears positive over the next three-five days, they will remain below their LTA.

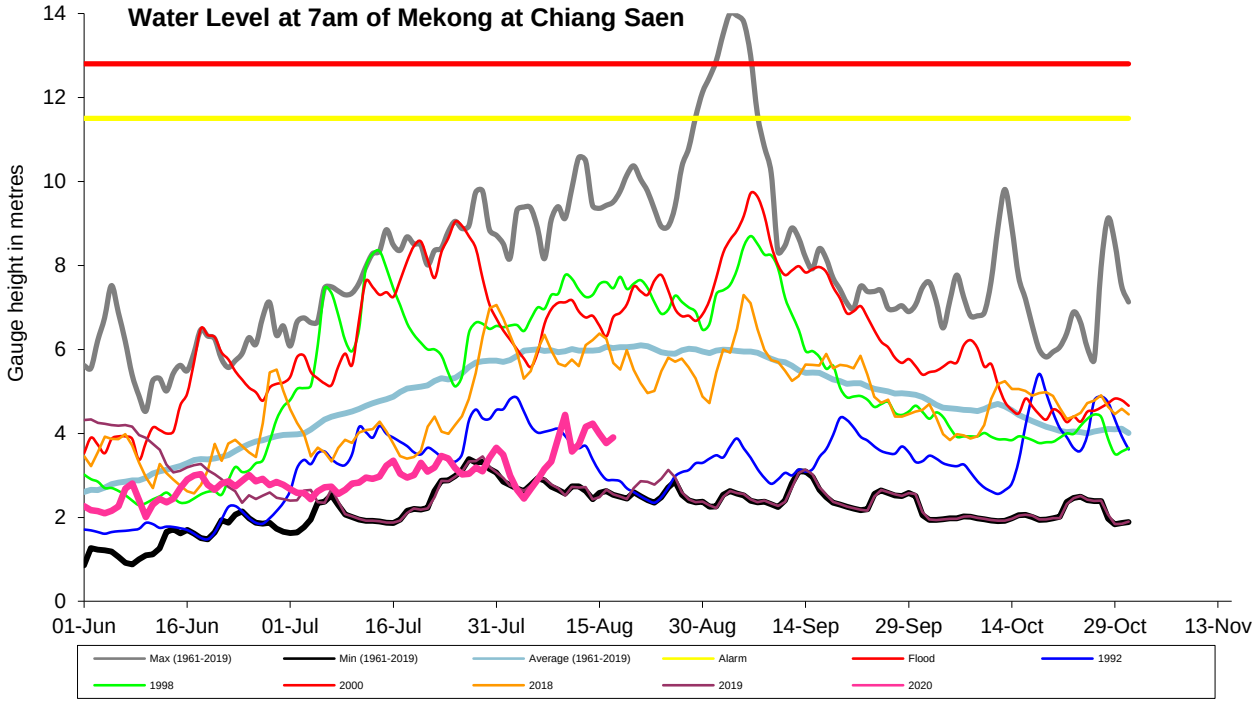
Since the beginning of this year (2020), water levels in the Lower Mekong River have been lower than their LTAs for all monitoring stations (from upper to lower stretches within the LMB). Like many parts of the world, the Mekong region has been affected by the prolonged El Nino phenomenon, the phenomenon 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.

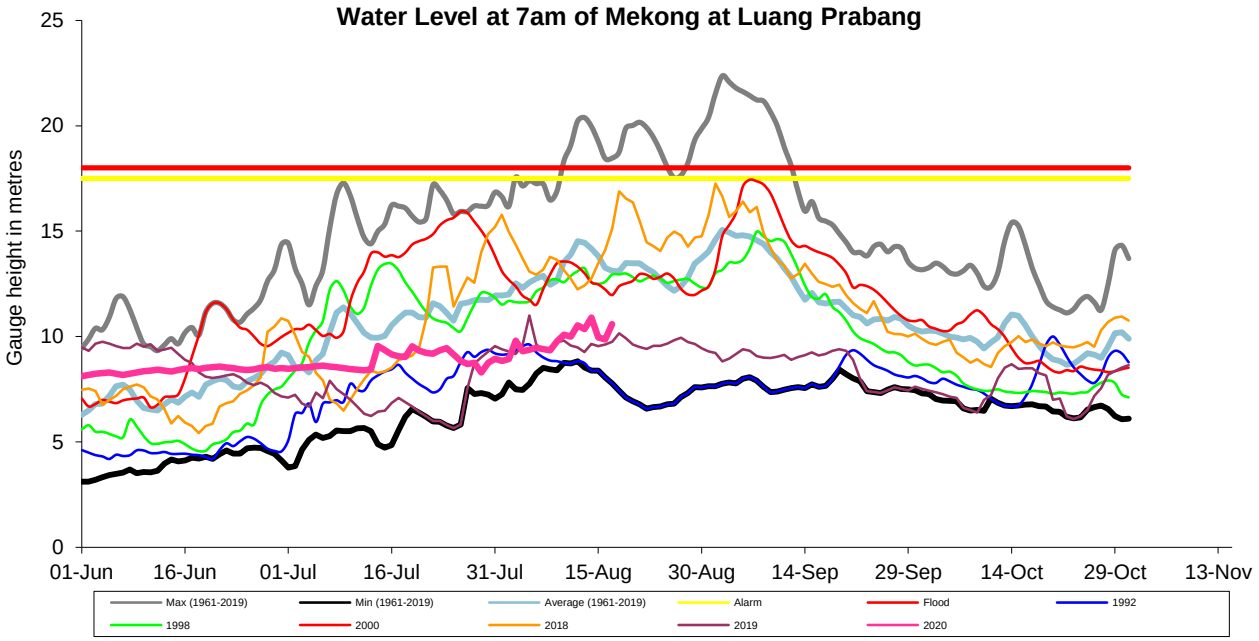
For a more complete preliminary analysis of the hydrological conditions in the LMB over January – July 2020, please refer to this Situation Report.

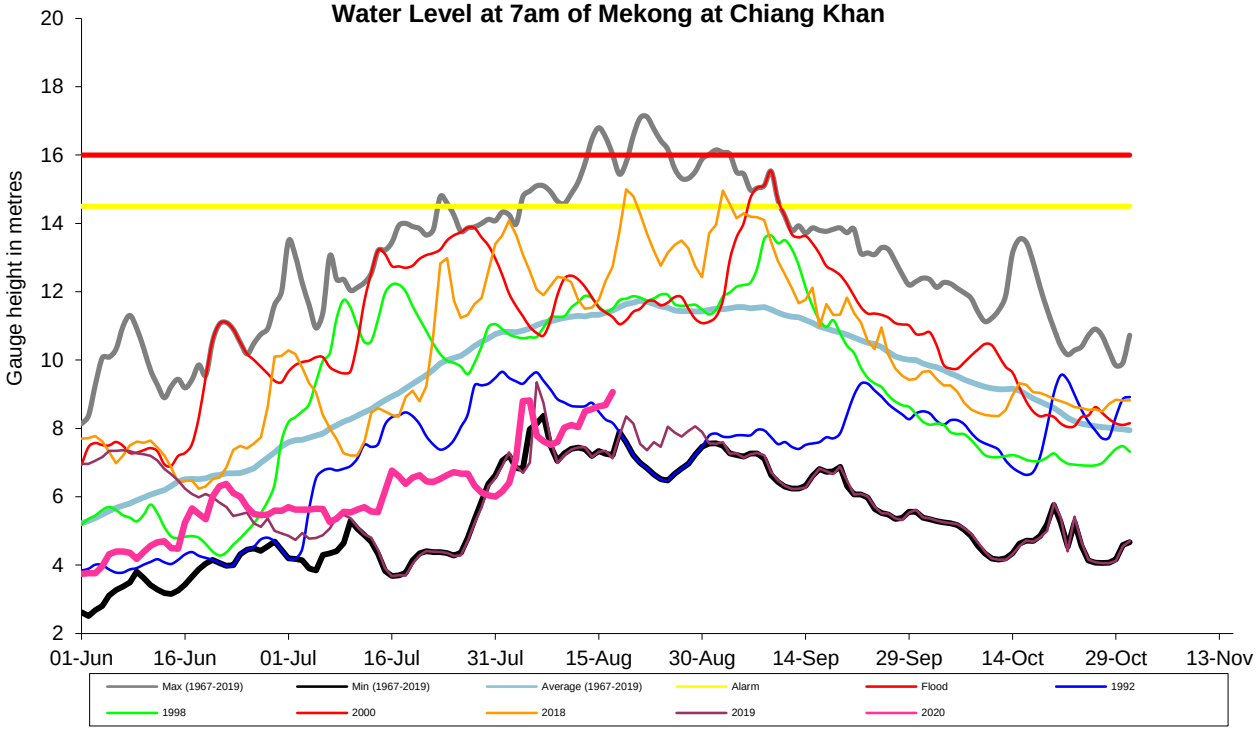
The contribution to the Mekong River's flow from the Upper Mekong Basin in China (Yunnan component) is about 16 % by the time the river discharges through the Mekong Delta into the Sea. By far the major contribution comes from the two major 'left-bank' (eastern) tributaries between Vientiane – Nakhon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

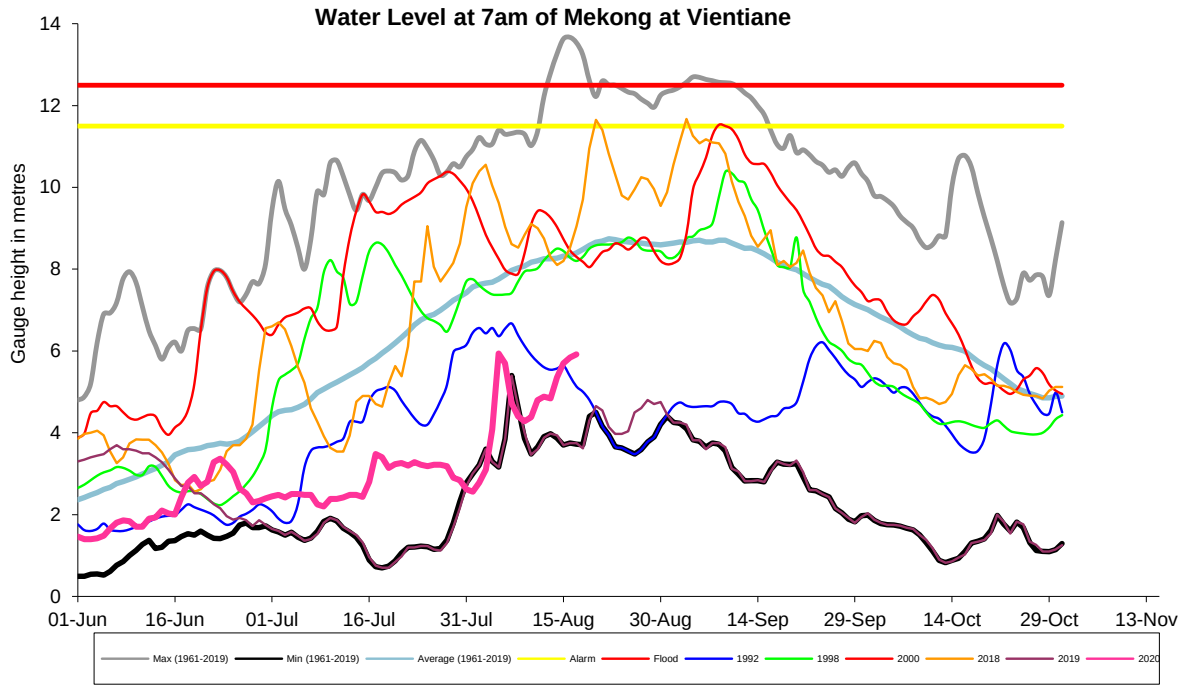
Annex 1: Hydrographs at mainstream stations in the wet season

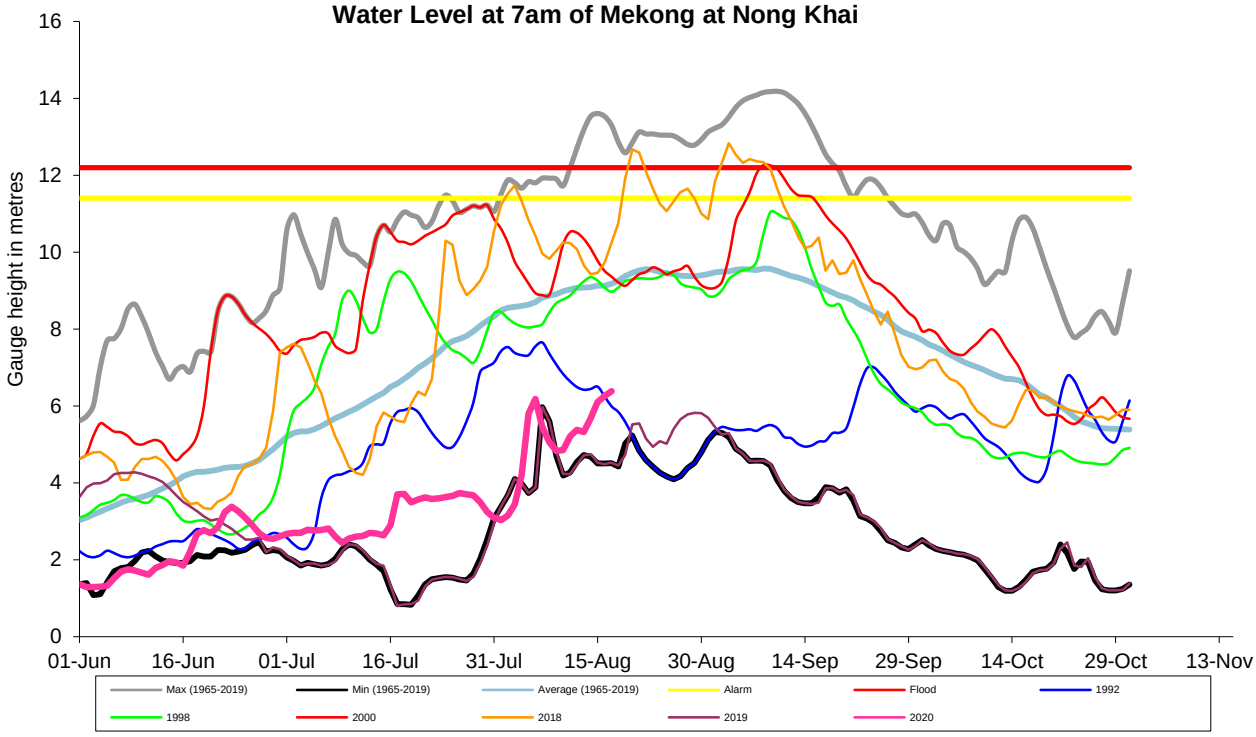


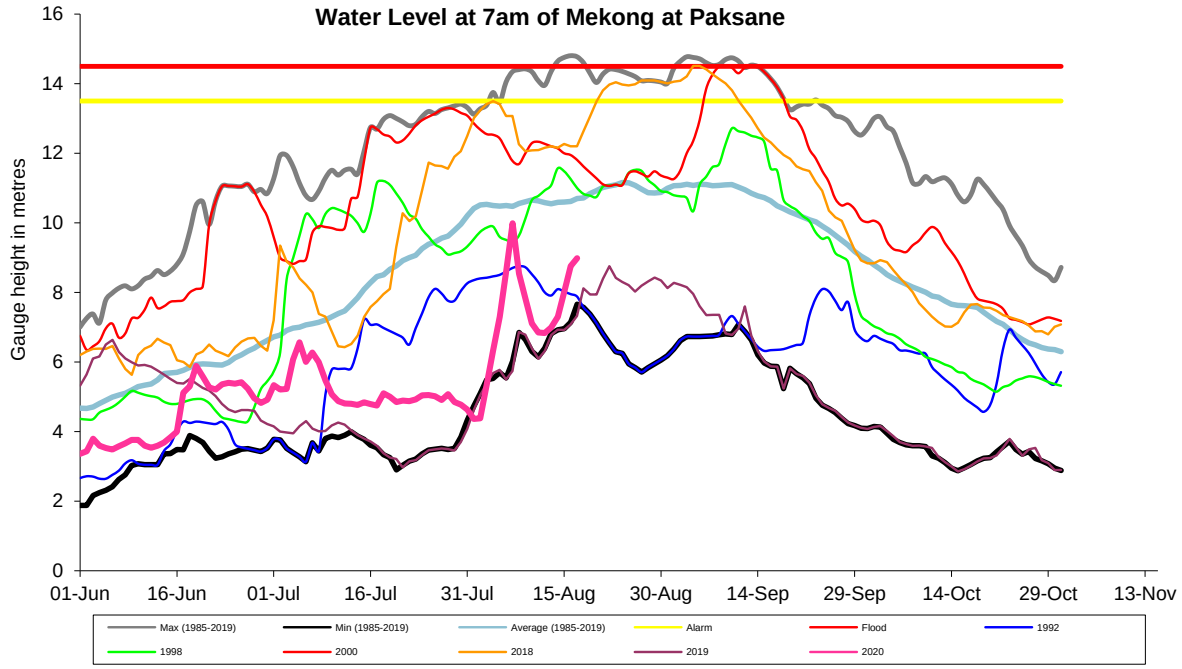


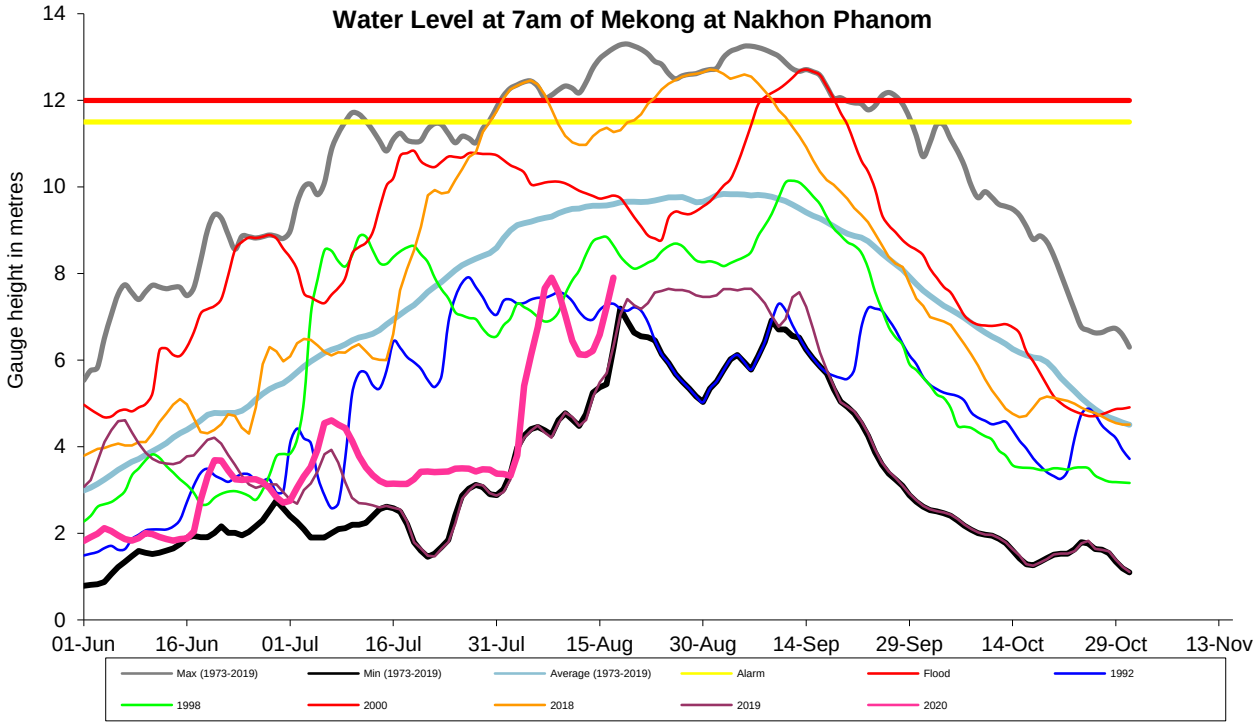

Water Level at 7am of Mekong at Luang Prabang
Gauge height in metres
25
20
15
10
5
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1961-2019)
Min (1961-2019)
Average (1961-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

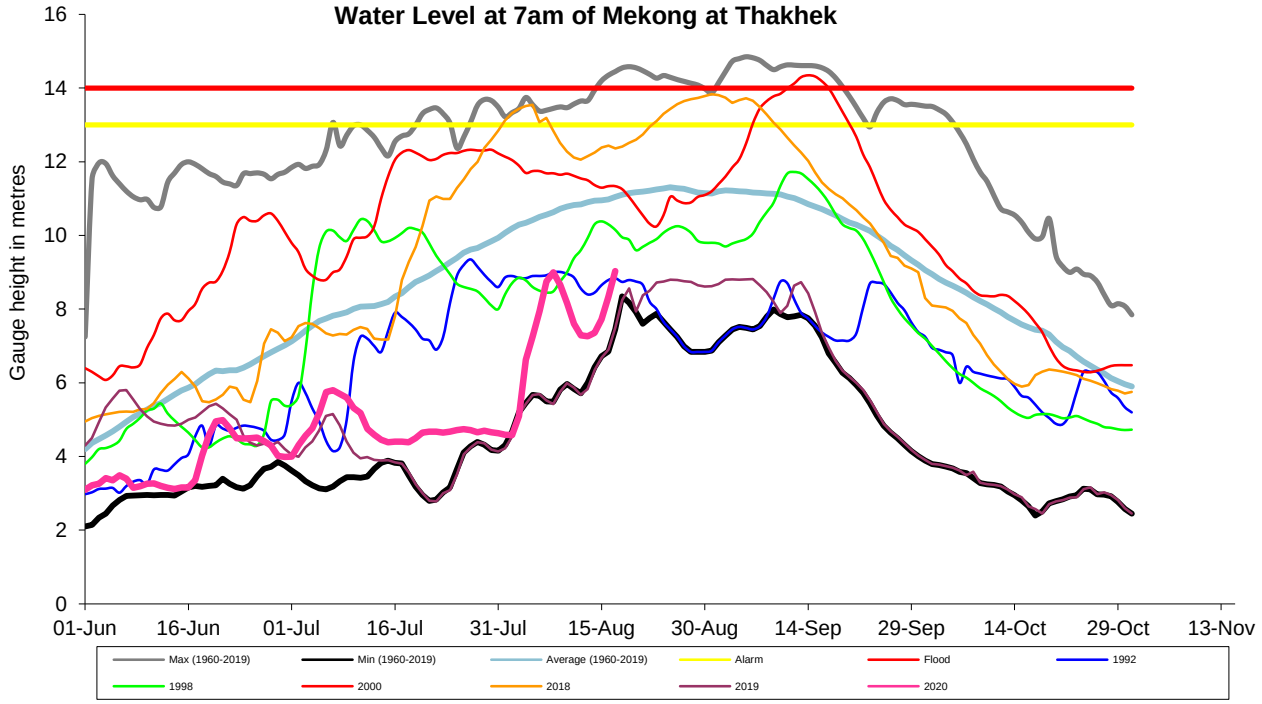

Water Level at 7am of Mekong at Chiang Khan
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1967-2019)
Min (1967-2019)
Average (1967-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

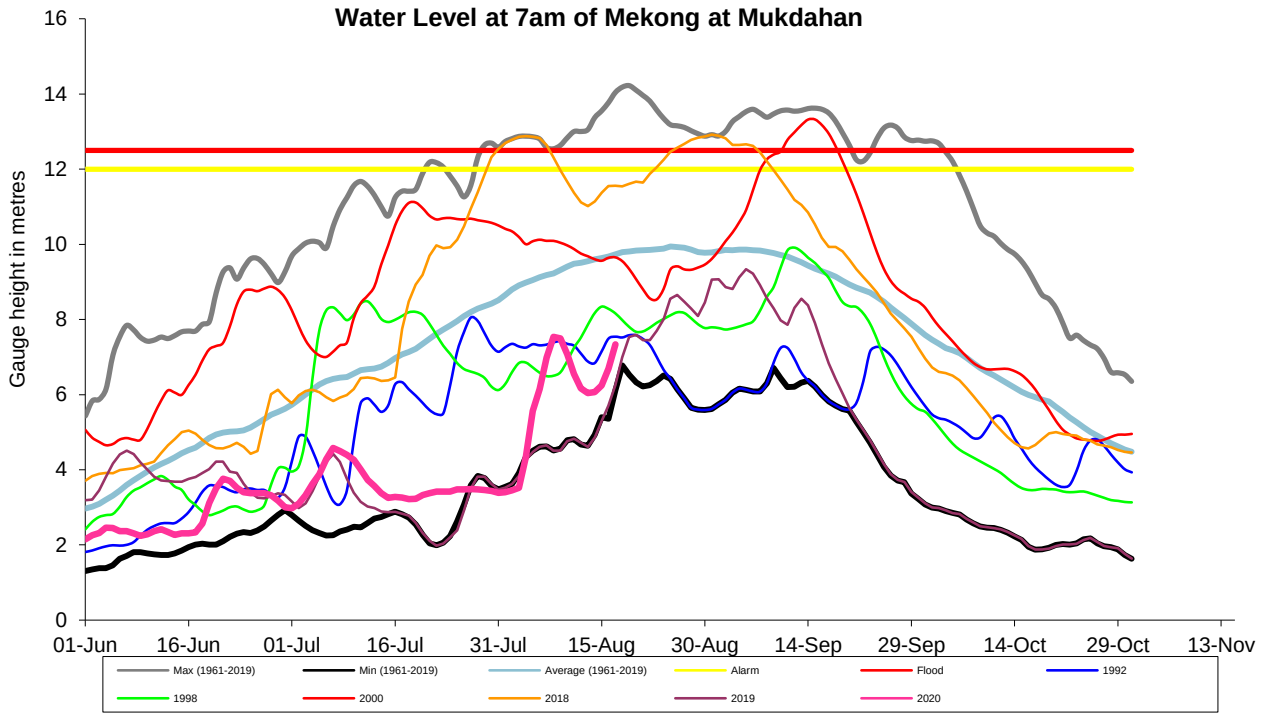

Water Level at 7am of Mekong at Vientiane
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1961-2019)
Min (1961-2019)
Average (1961-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

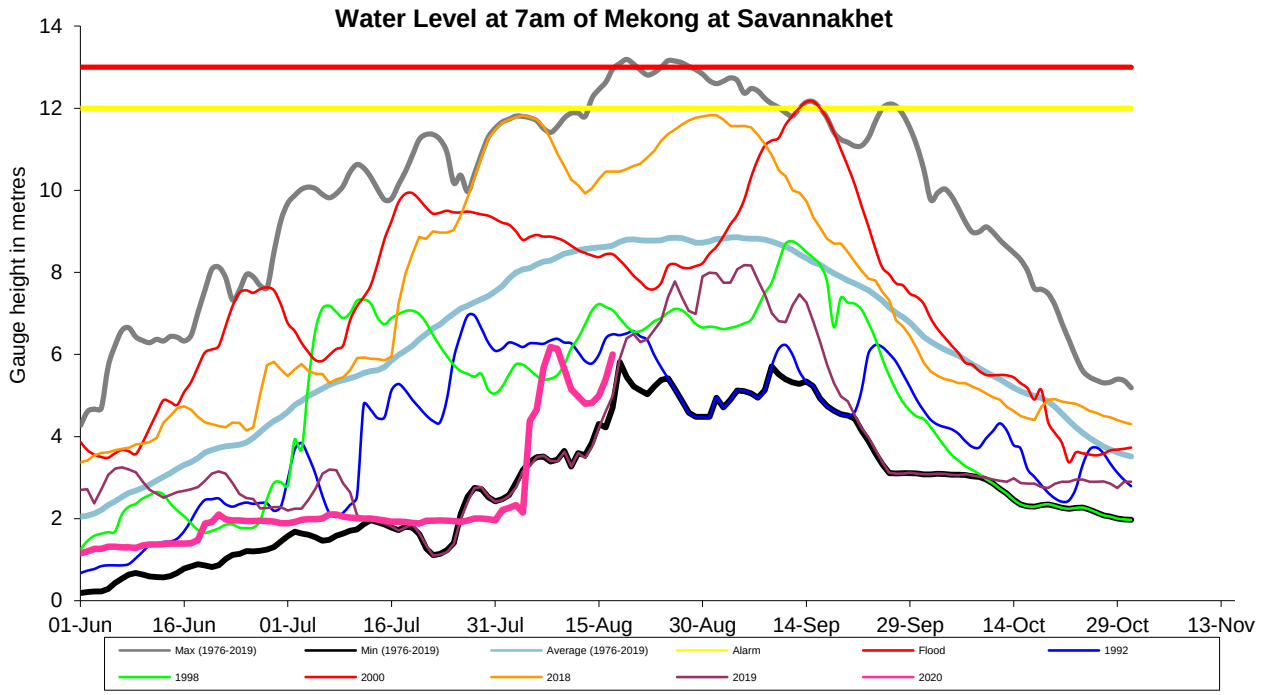

Water Level at 7am of Mekong at Nong Khai
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1965-2019)
Min (1965-2019)
Average (1965-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

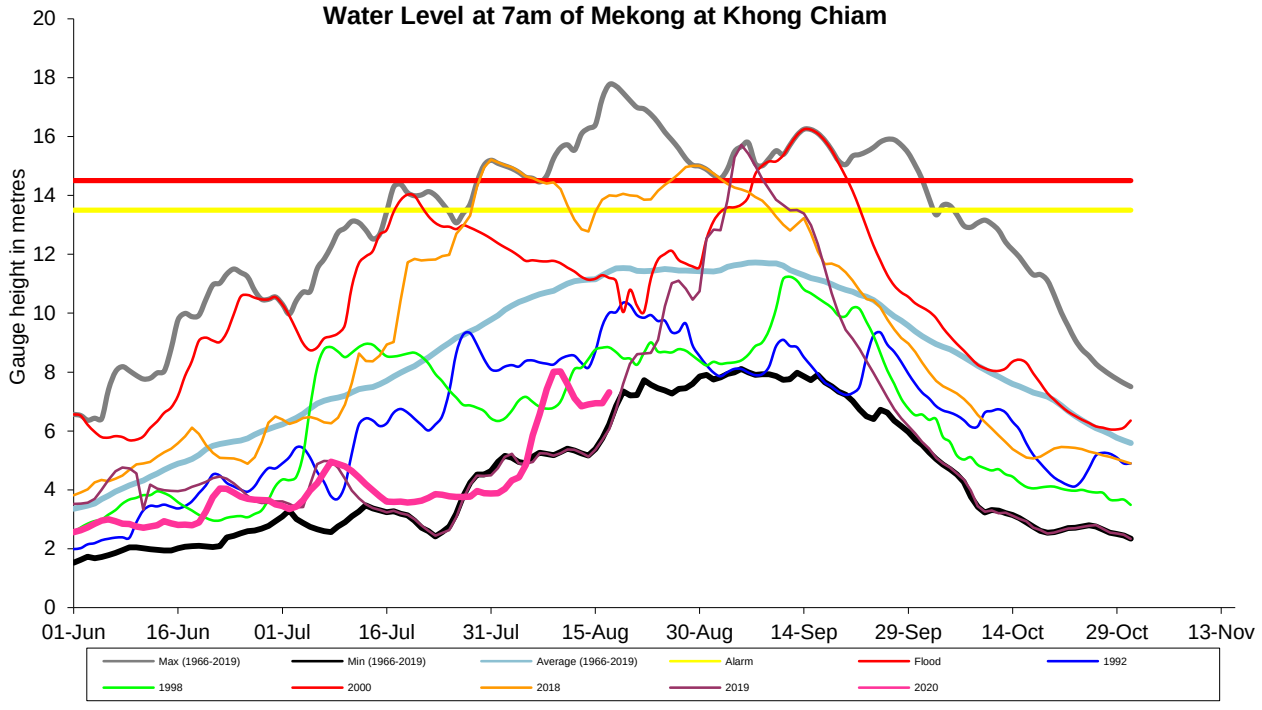

Water Level at 7am of Mekong at Paksane
Gauge height in metres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1985-2019)
Min (1985-2019)
Average (1985-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

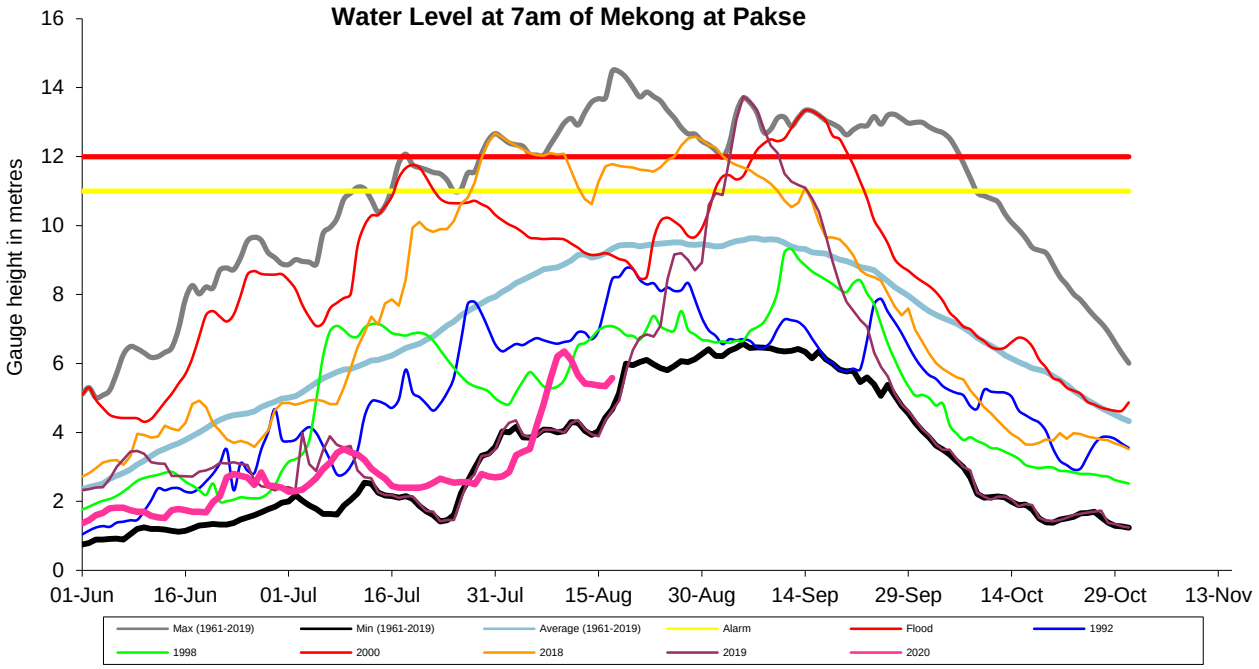

Water Level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1973-2019)
Min (1973-2019)
Average (1973-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

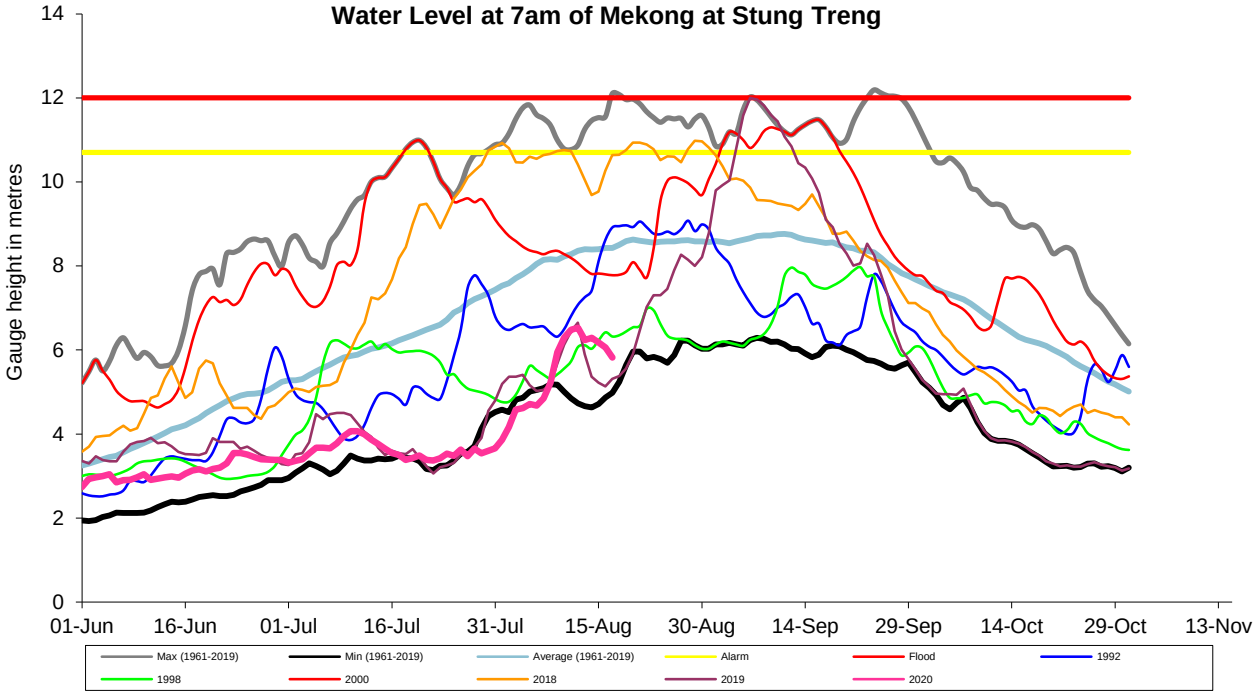

Water Level at 7am of Mekong at Thakhek
Gauge height in metres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1960-2019)
Min (1960-2019)
Average (1960-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020


Water Level at 7am of Mekong at Mukdahan
Gauge height in metres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1961-2019)
Min (1961-2019)
Average (1961-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

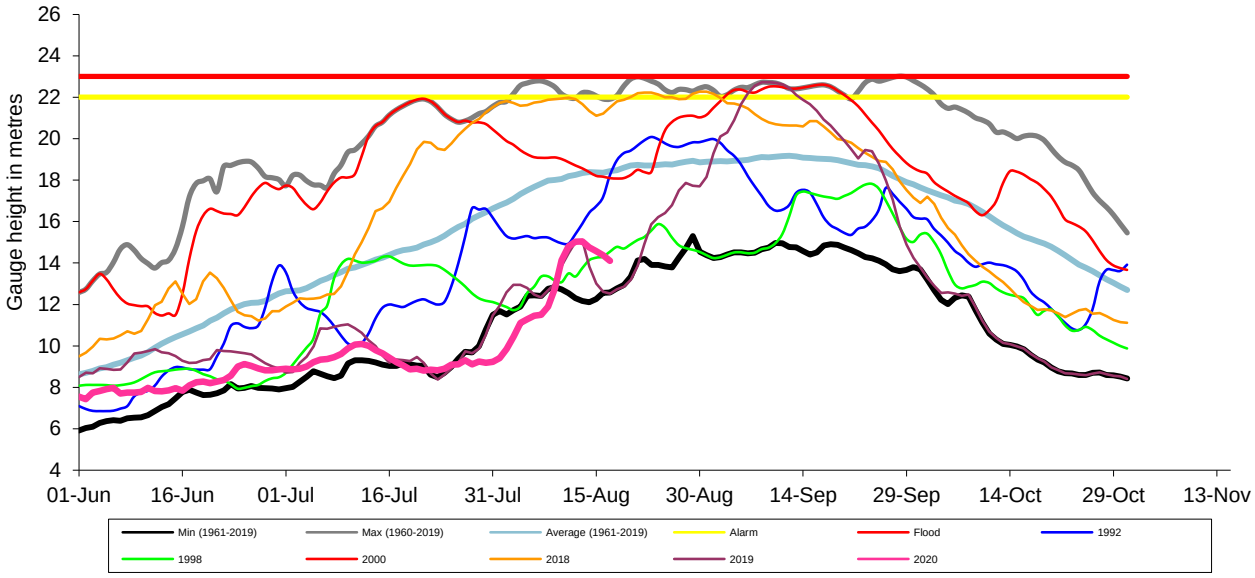

Water Level at 7am of Mekong at Savannakhet
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1976-2019)
Min (1976-2019)
Average (1976-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020


Water Level at 7am of Mekong at Khong Chiam
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1966-2019)
Min (1966-2019)
Average (1966-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

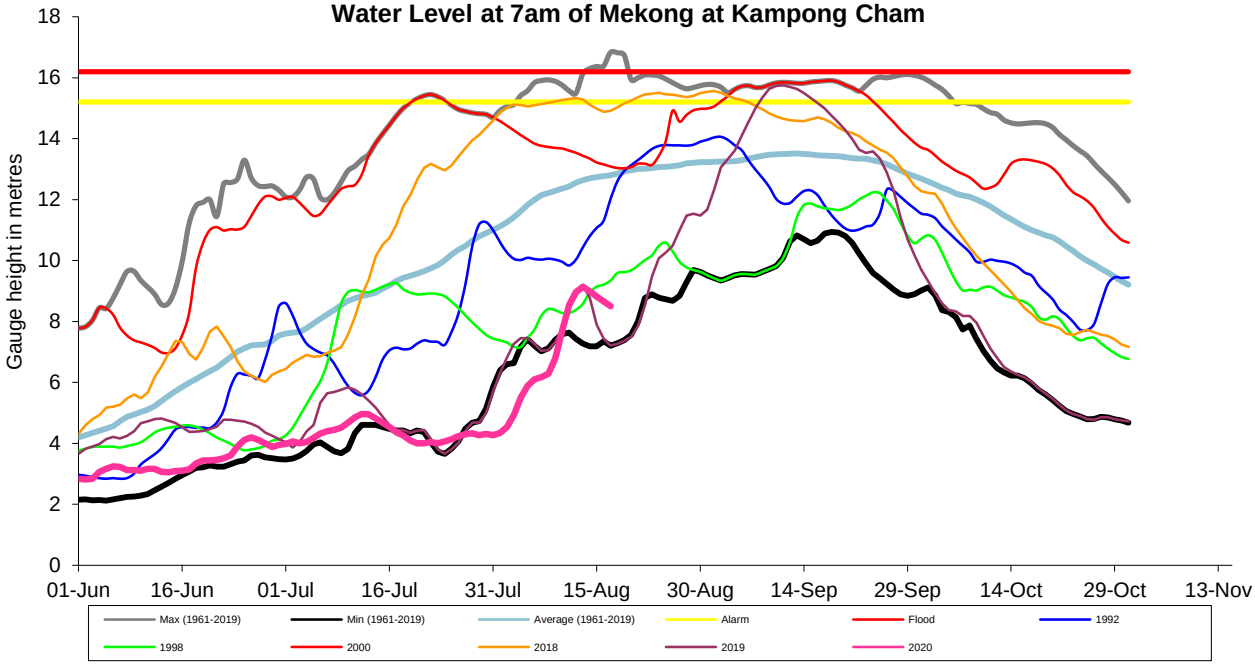

Water Level at 7am of Mekong at Pakse
Gauge height in metres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1961-2019)
Min (1961-2019)
Average (1961-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

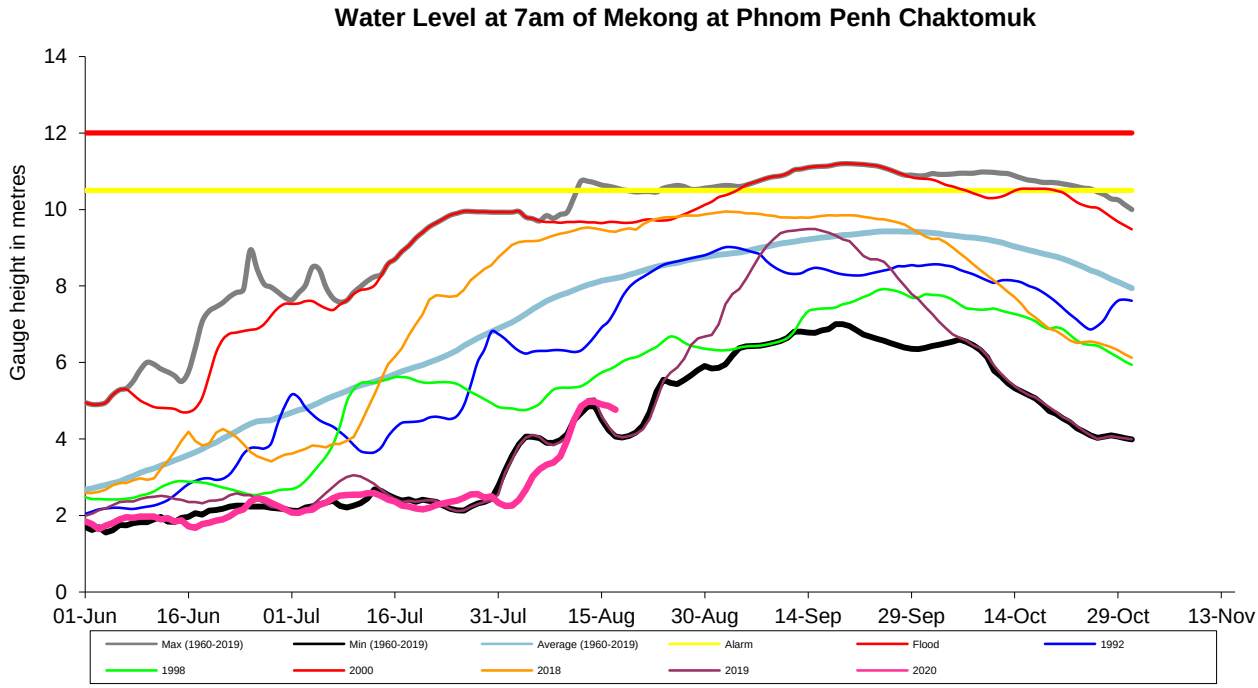

Water Level at 7am of Mekong at Stung Treng
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1961-2019)
Min (1961-2019)
Average (1961-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

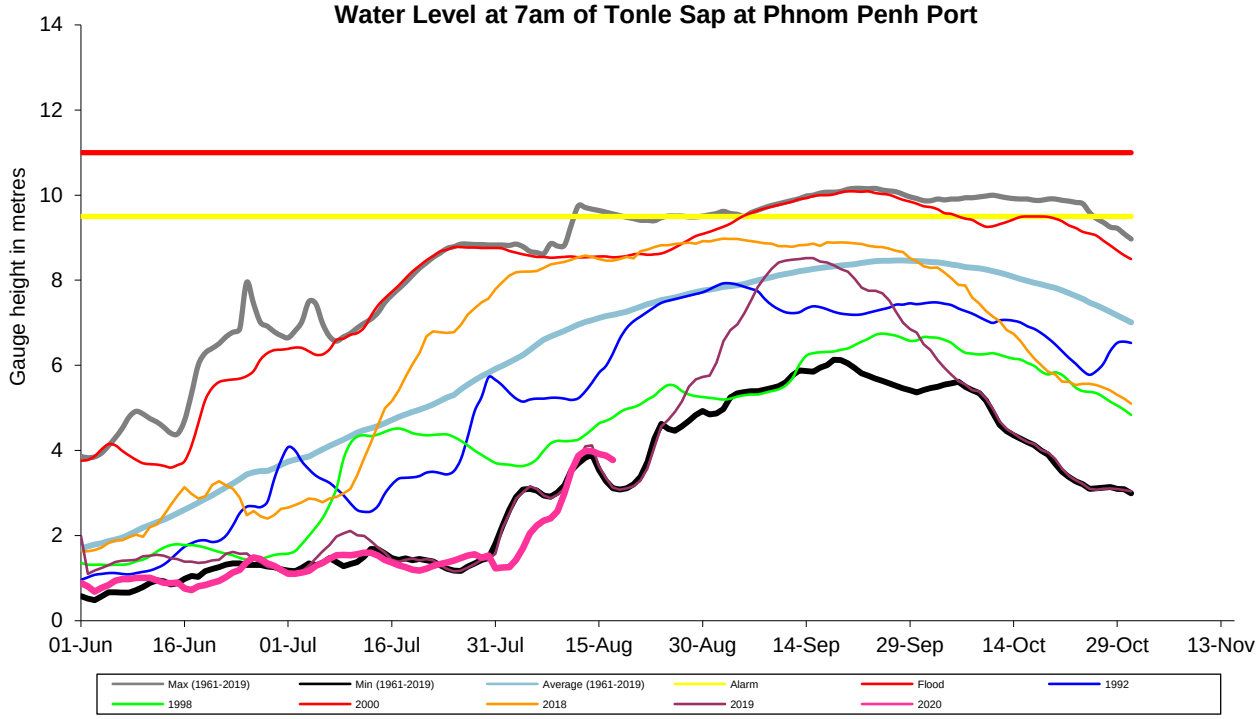
Water Level at 7am of Mekong at Kratie

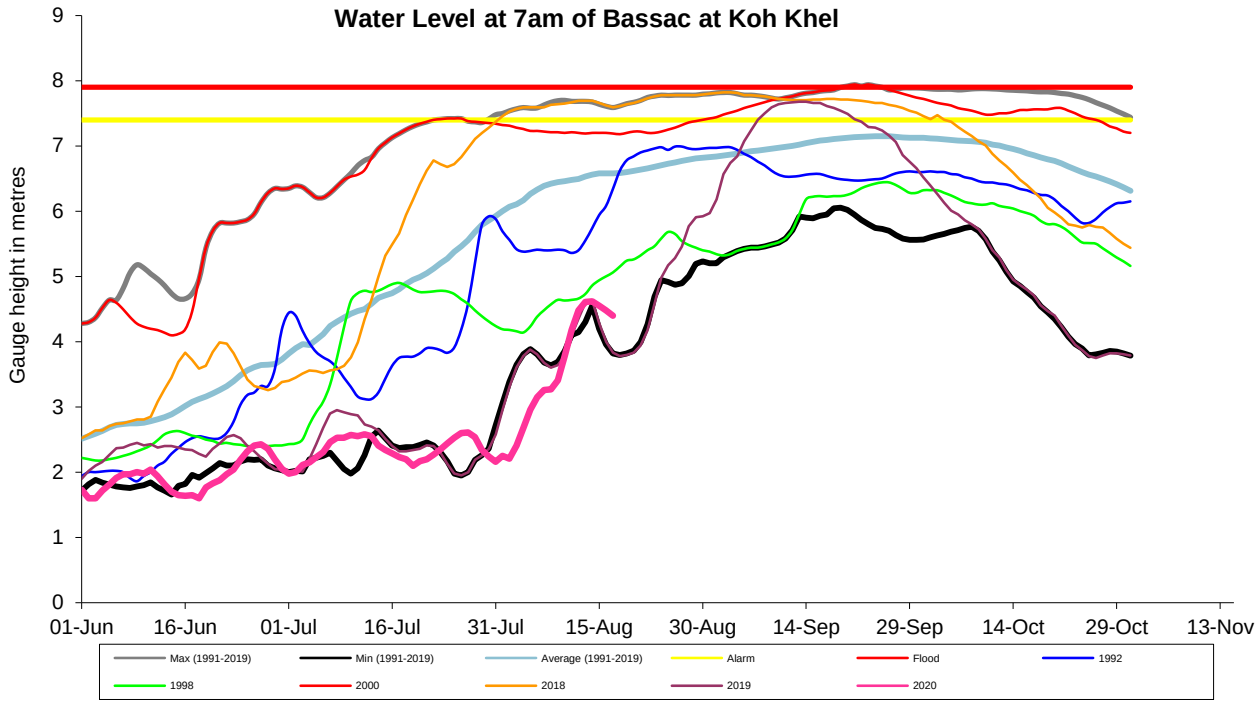


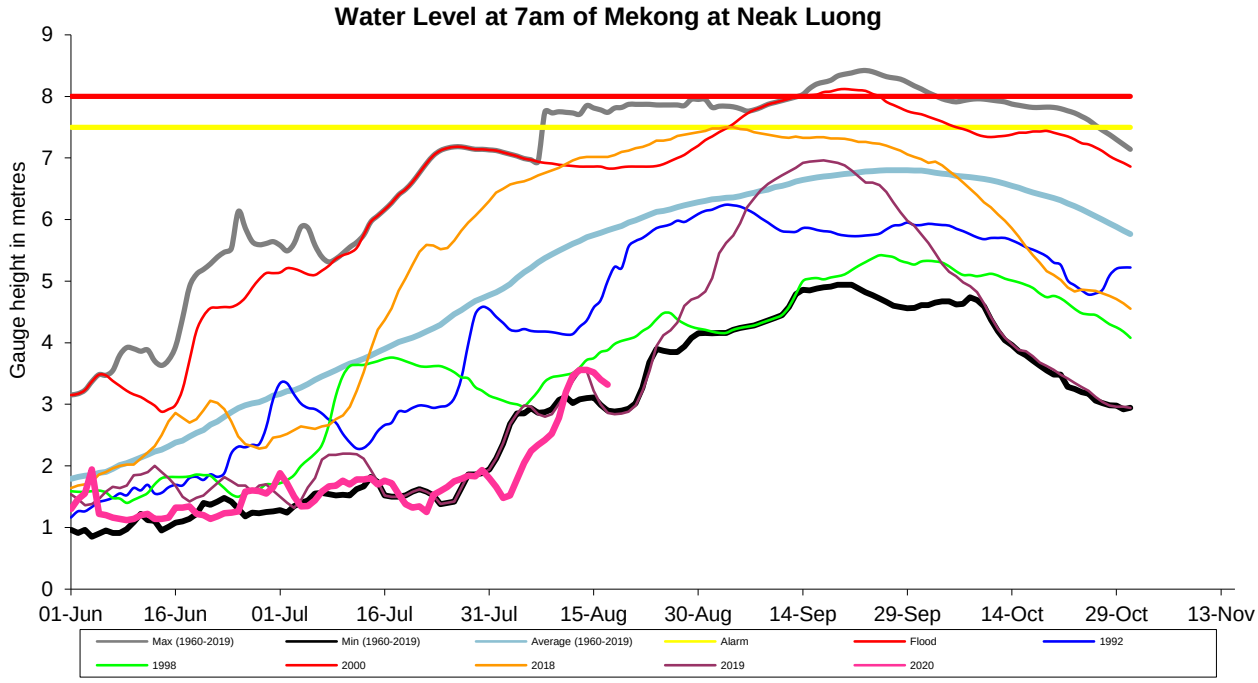
Water Level at 7am of Mekong at Kampong Cham

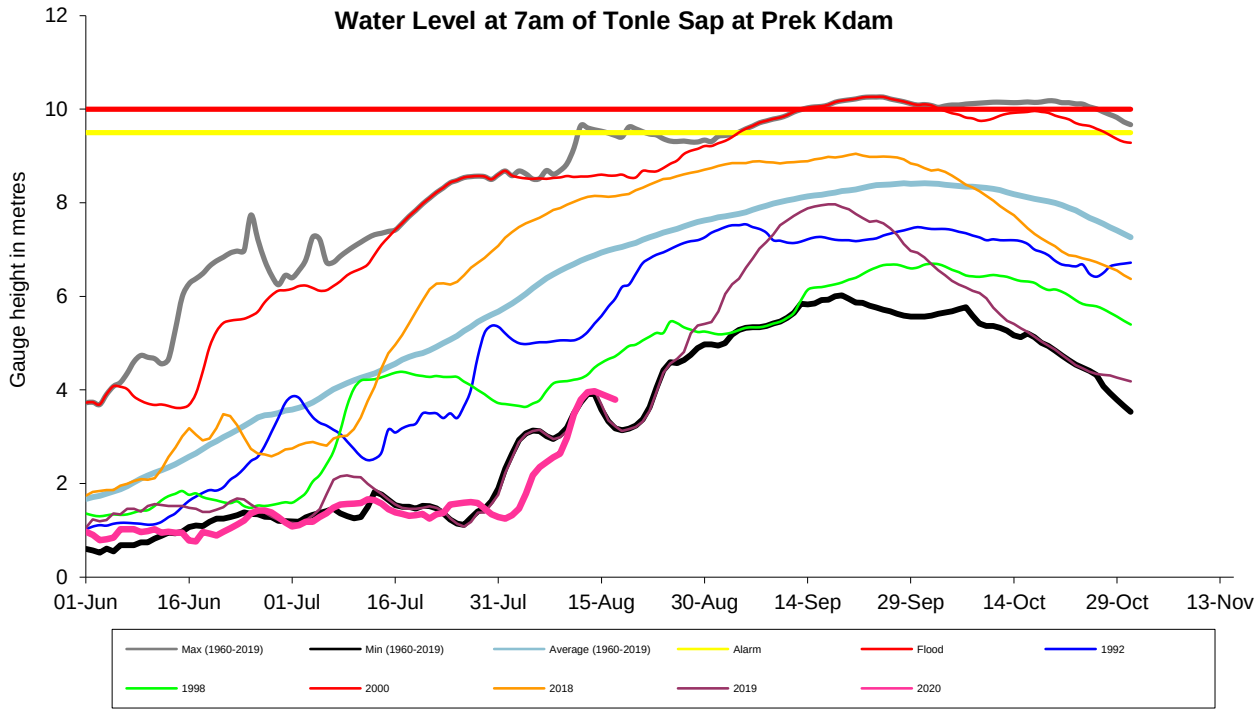


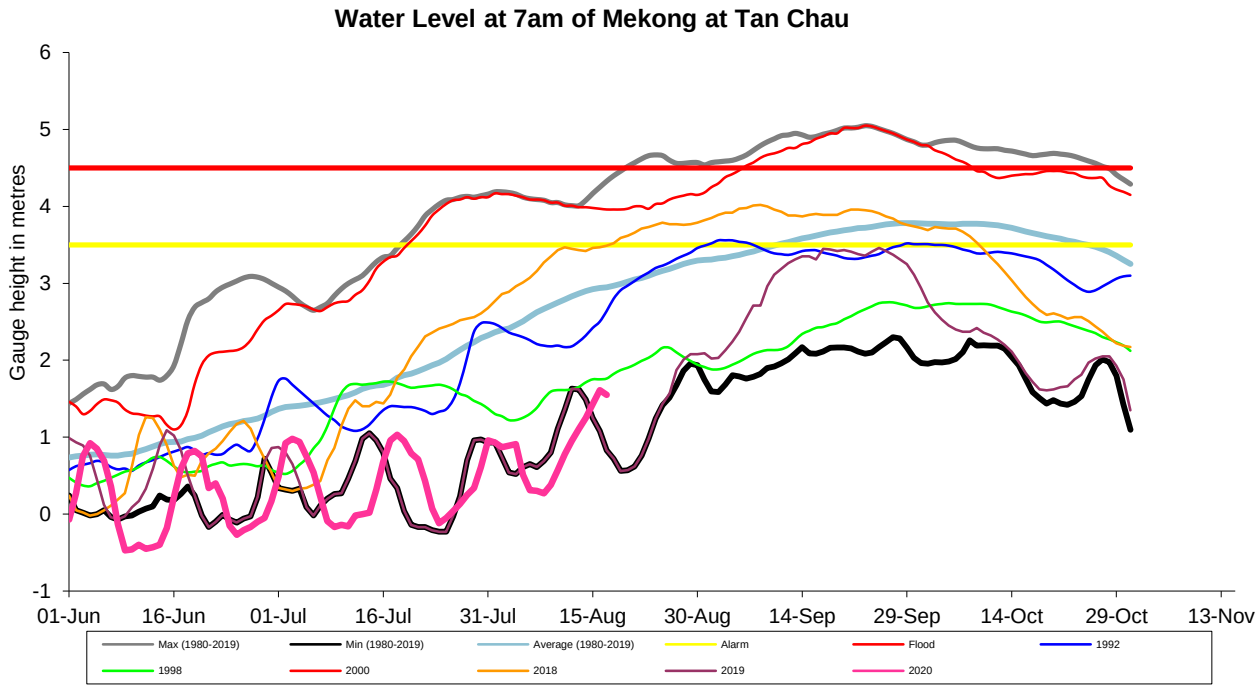

Water Level at 7am of Mekong at Phnom Penh Chaktomuk
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1960-2019)
Min (1960-2019)
Average (1960-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

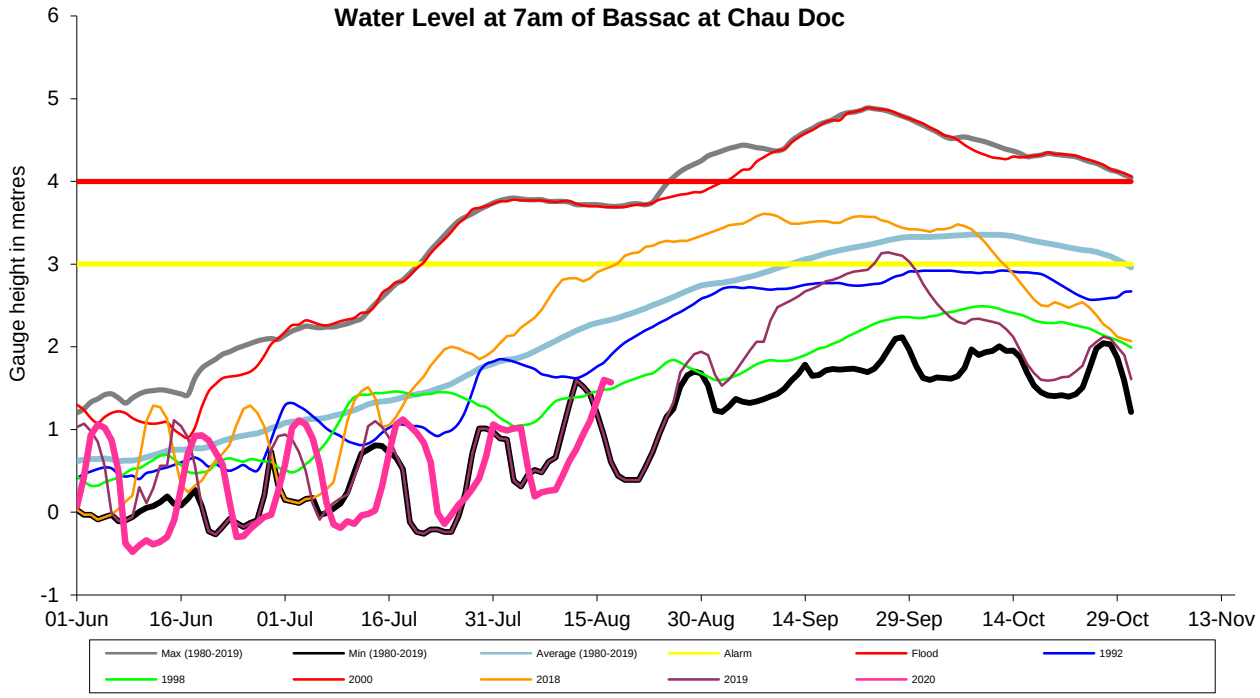

Water Level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Max (1961-2019)
Min (1961-2019)
Average (1961-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020


Water Level at 7am of 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
13-Nov
Max (1991-2019)
Min (1991-2019)
Average (1991-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020


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
Max (1960-2019)
Min (1960-2019)
Average (1960-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020


Water Level at 7am of Tonle Sap at Prek Kdam
Gauge height in metres
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
Max (1960-2019)
Min (1960-2019)
Average (1960-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020


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
13-Nov
Max (1980-2019)
Min (1980-2019)
Average (1980-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020


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
13-Nov
Max (1980-2019)
Min (1980-2019)
Average (1980-2019)
Alarm
Flood
1992
1998
2000
2018
2019
2020

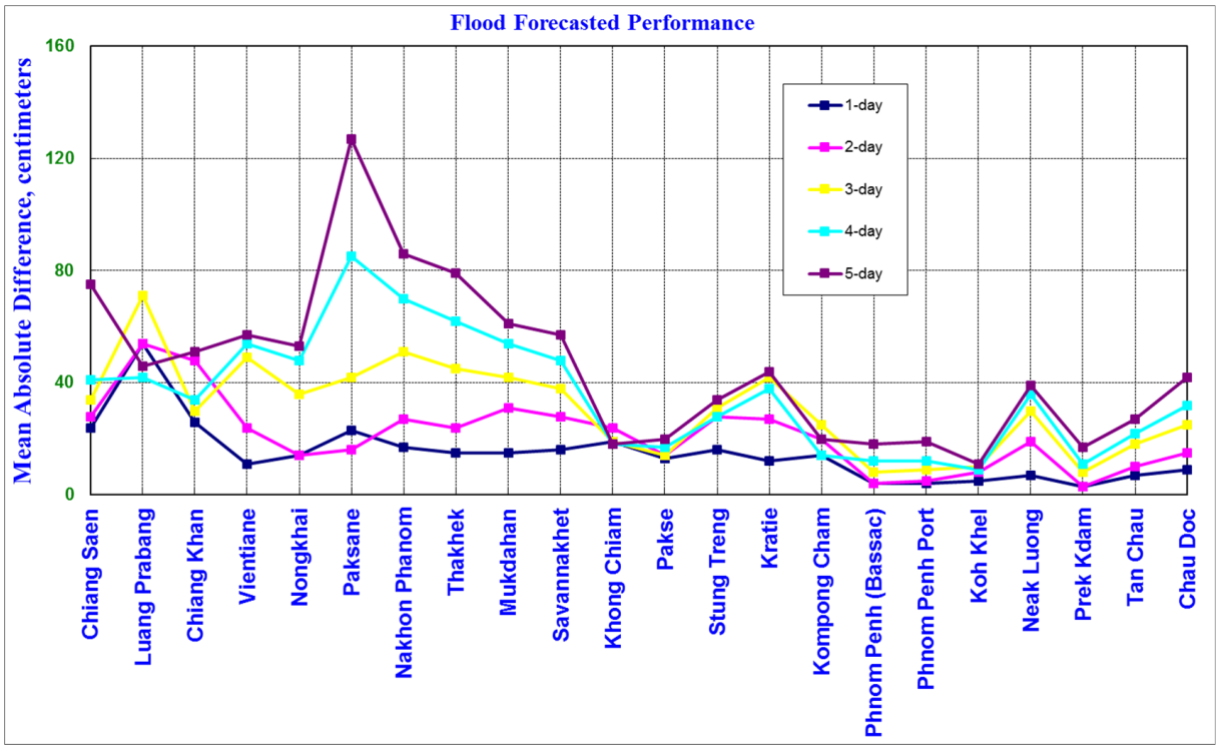
Annex 2: Performance of the weekly flood forecasting

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 11 to 17 August 2020.

The forecasting values from 11 to 17 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 Paksane, due to the hydropower operation and 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 flood forecasting achievement indicated in (%) and (cm) from 1-day to 5-day at each key station, against with Old Benchmark for a successful lead-time are presented in Table B1 and Table B2.

The evaluation of performance indicators, missing data and completion time for flood forecasting are presented in Table B3 and Figures B4, B5 and B6, respectively from 11 to 17 August 2020.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 11 – 17 Aug 2020 in cm

Lead-time Forecasted	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	57.1	71.4	71.4	71.4	42.9	57.1	42.9	57.1	57.1	71.4	42.9	57.1	57.1	71.4	57.1	71.4	42.9	71.4	42.9	57.1	***59.7***
2-day	83.3	50.0	33.3	33.3	66.7	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	66.7	50.0	66.7	66.7	50.0	50.0	***53.0***
3-day	40.0	40.0	80.0	40.0	60.0	60.0	40.0	40.0	60.0	40.0	40.0	40.0	40.0	60.0	60.0	60.0	80.0	80.0	60.0	60.0	40.0	40.0	***52.7***
4-day	50.0	75.0	75.0	75.0	75.0	25.0	50.0	50.0	50.0	50.0	50.0	50.0	75.0	75.0	50.0	75.0	75.0	50.0	50.0	50.0	75.0	50.0	***59.1***
5-day	66.7	33.3	66.7	66.7	66.7	33.3	66.7	66.7	66.7	66.7	66.7	33.3	33.3	33.3	66.7	66.7	66.7	33.3	33.3	66.7	66.7	33.3	***54.5***

Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 11 – 17 Aug 2020 in %

Lead-time Forecasted	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	24	54	26	11	14	23	17	15	15	16	19	13	16	12	14	4	4	5	7	3	7	9
2-day	28	54	48	24	14	16	27	24	31	28	24	14	28	27	20	4	5	8	19	3	10	15
3-day	34	71	30	49	36	42	51	45	42	38	19	14	31	42	25	8	9	10	30	8	18	25
4-day	41	42	34	54	48	85	70	62	54	48	18	17	28	38	14	12	12	9	36	11	22	32
5-day	75	46	51	57	53	127	86	79	61	57	18	20	34	44	20	18	19	11	39	17	27	42

Note: Red values are not well matched with the actual values in (%) and (cm)

Table B3: Overview of performance indicators for the past 8 days from 11 to 17 August 2020

	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)							
2020	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	*10:19*	*00:00*	-	-	*08:15*	*07:10*	*07:29*	*08:03*	*08:31*	*08:30*	*07:01*	*08:12*	*0*	*0*	*2*	*0*	*73*	*1*	*0*	*0*
month	*10:24*	*00:00*	-	-	*08:15*	*07:10*	*07:38*	*08:11*	*08:39*	*08:26*	*07:14*	*08:13*	*0*	*0*	*37*	*0*	*464*	*0*	*2*	*38*

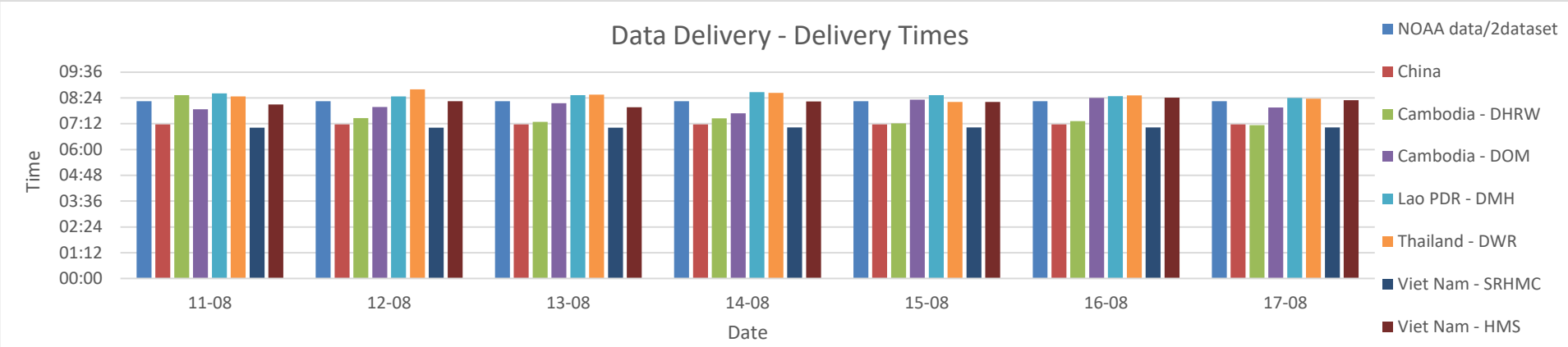


Fig. B4: Data delivery times for the past 8 days from11 to 17 August 2020

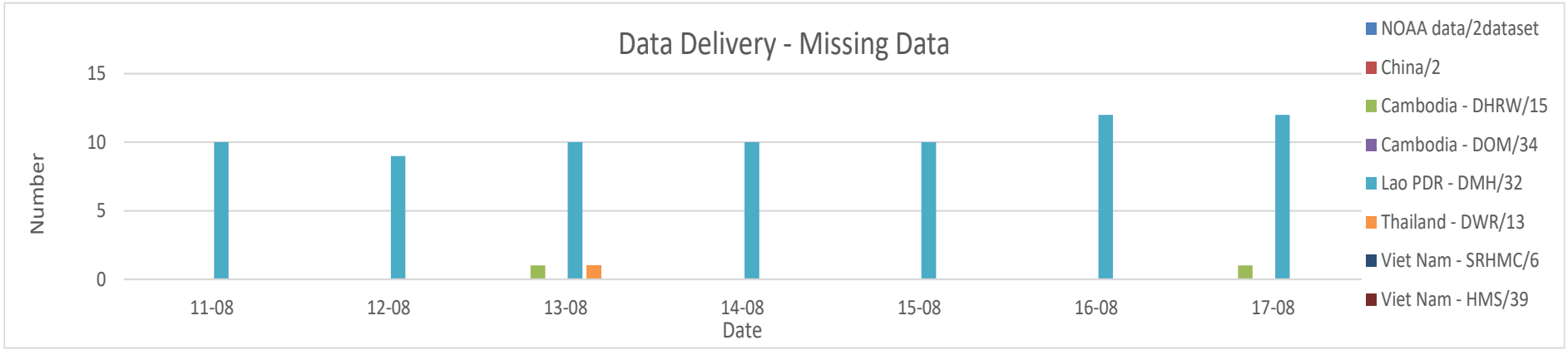


Fig. B5: Missing data for the past 7 days from 11 to 17 August 2020

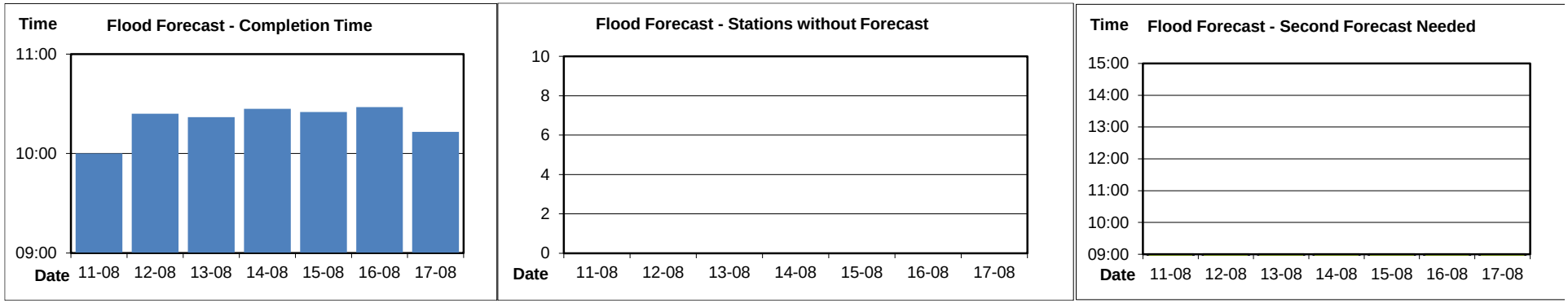


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 11 to 17 August 2020

Mekong River Commission Secretariat

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