Weekly Flood Situation Report for the Mekong River Basin

Draft by KHEM Sothea

covering the week from 20th to 26th August 2019 and potential trend next week

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

General weather patterns

During the week from 20th to 26th August 2019, the weather outlook bulletins and maps issued by the Thailand Meteorology Department (TMD) were used to verify the weather condition in the LMB. The low pressure was observed at the middle part of LMB (Vientiane/ Nong Khai to the 3S area), which attracted rainfall in these locations during this week. The abundant rainfall often occurs at this month (August) with more rain amount than previous months. Additionally, some tropical cyclones may move closer or toward the central highland of Vietnam and will hit the Vietnam and middle part of the LMB at the end of this month. **Figures 1 & 2** presented the weather map for 20th and 27th August 2019.

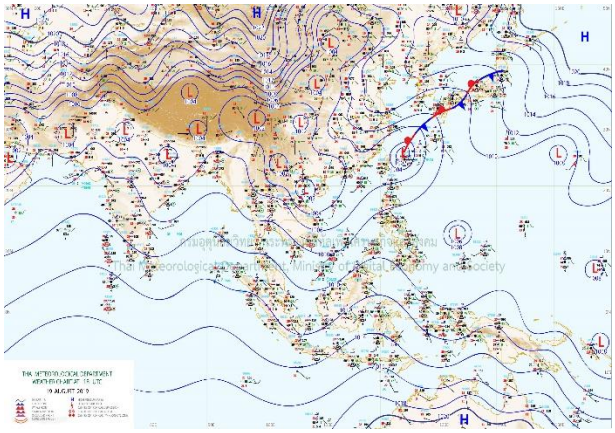


Figure 1: Weather map for 20th Aug 2019

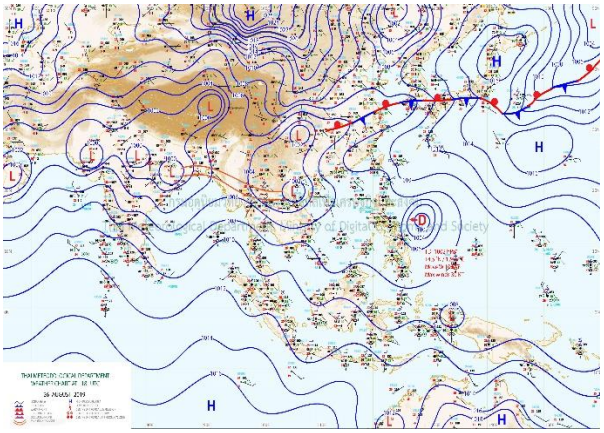


Figure 2: Weather map for 26th Aug 2019

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

No TD, TS or TY was presented in LMB during this week.

Other weather phenomena that affect the discharge

According to the Asian Specialized Meteorological Center (ASMC), climatologically, the prevailing Southwest Monsoon conditions are expected to persist till October 2019. The below-normal rainfall is predicted over the southern ASEAN region and over southern Philippines, while wetter-than-normal conditions are expected in the southern parts of Cambodia, Myanmar, Thailand and Viet Nam in August-September-October (ASO-2019). In terms of temperature, warmer-than-average conditions can be expected over the equatorial ASEAN region and the inland areas of Thailand. **Figure 2** showed the rainfall outlook over southern Southeast Asia for ASO-2019.

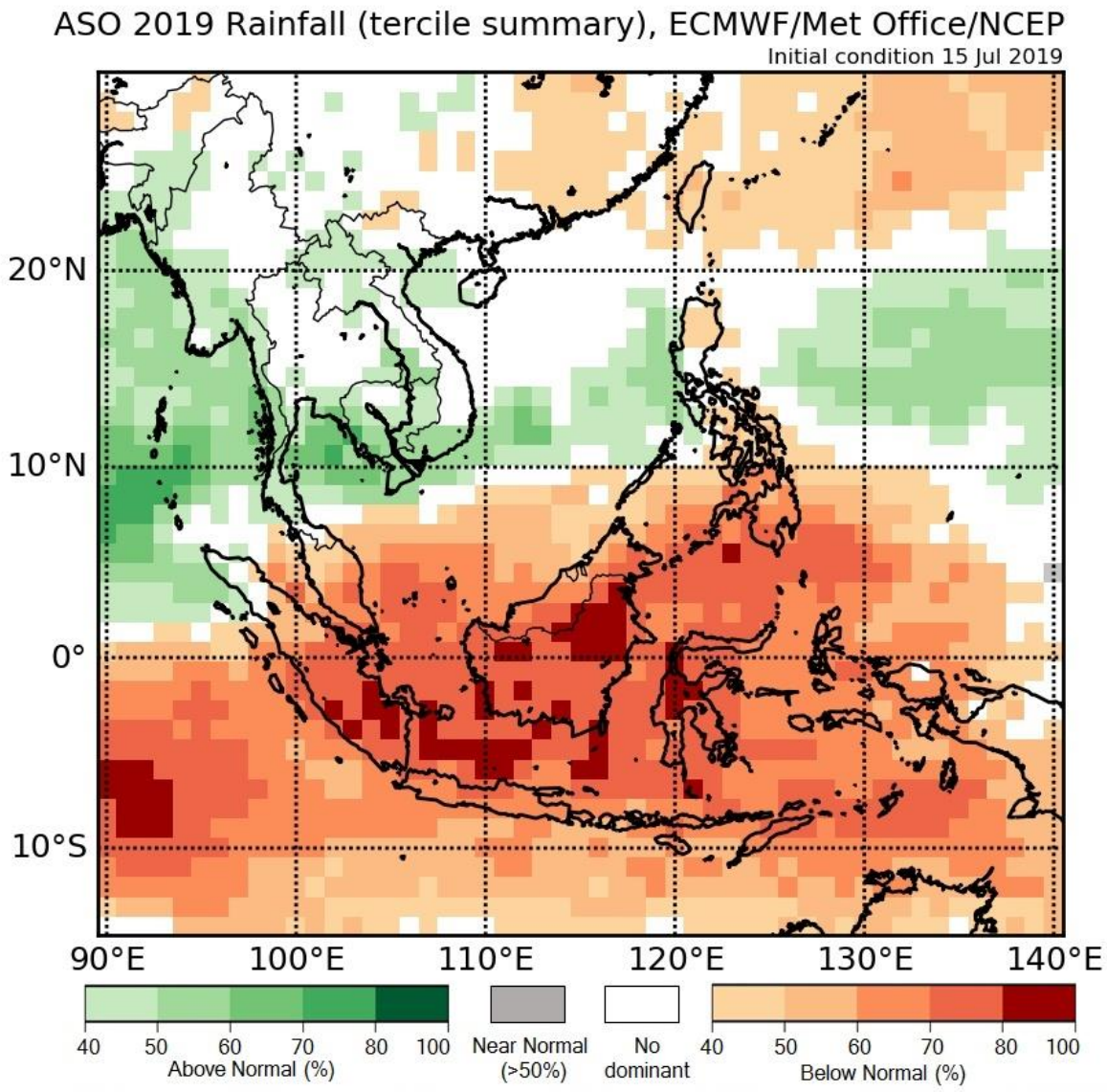


Figure 2: The predicted higher likelihood of above-normal rainfall in ASO-2019 in Southeast Asia

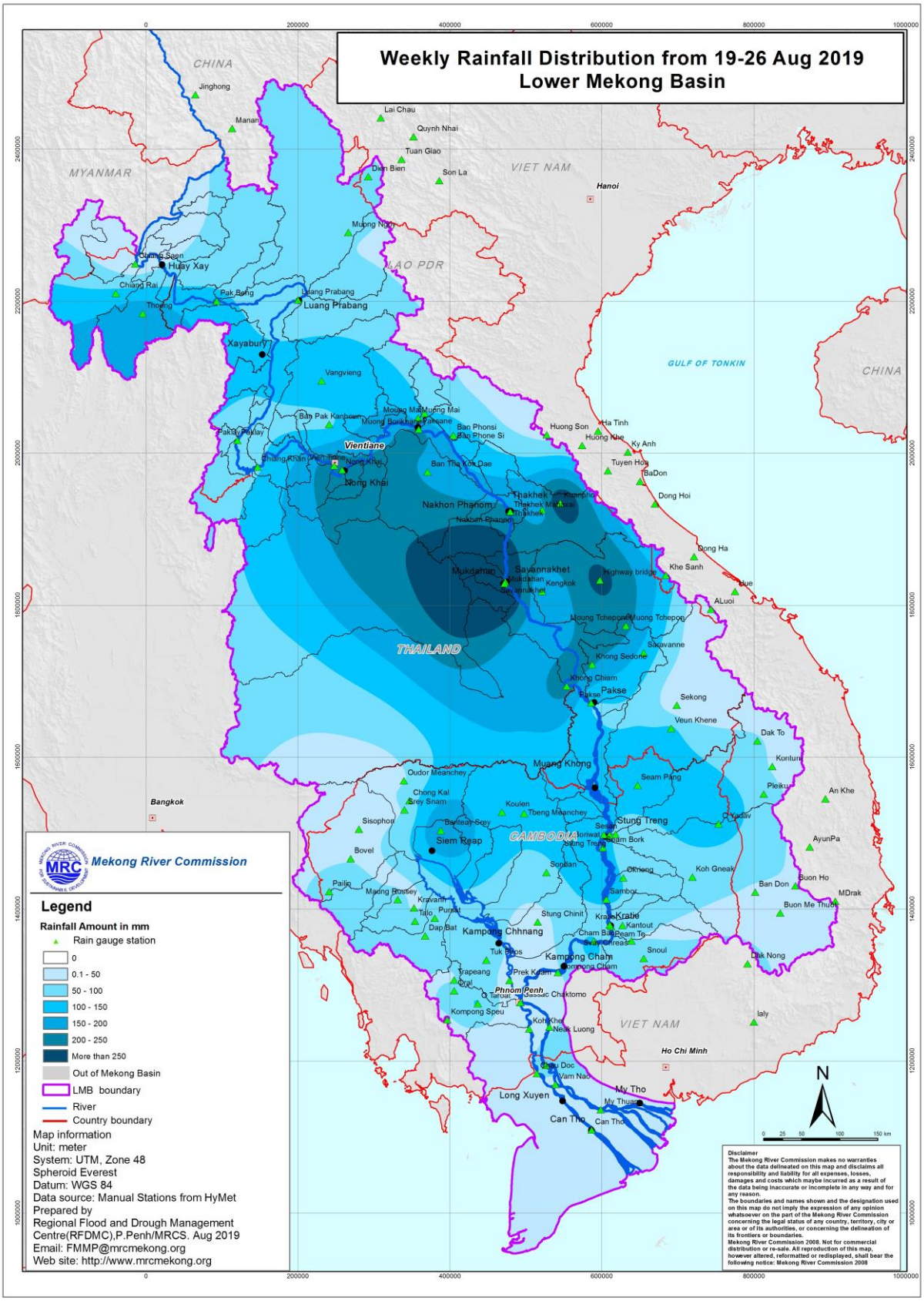
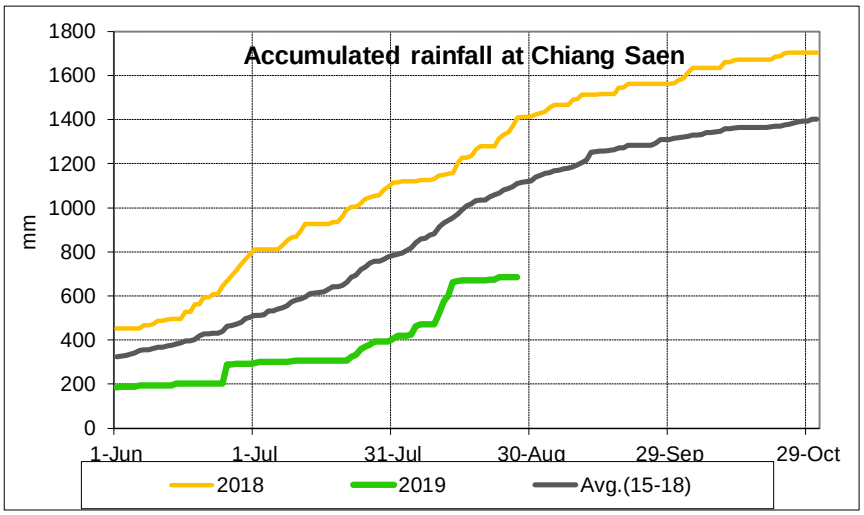


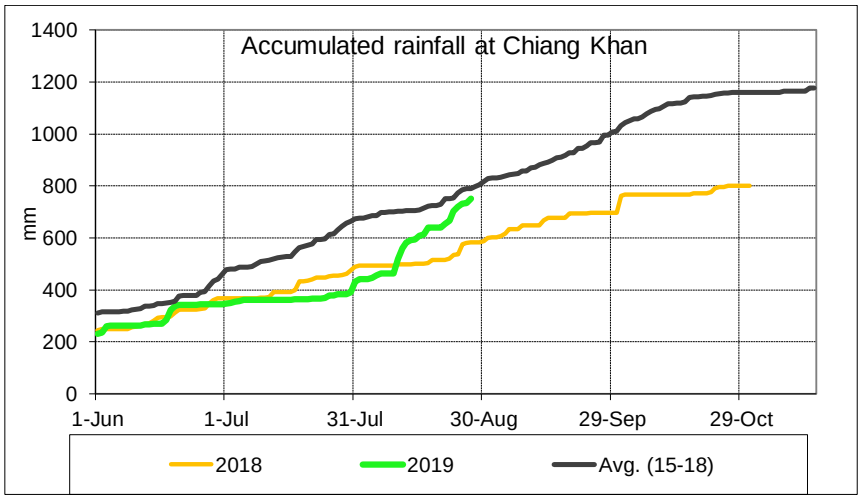
Figure 3: Weekly Rainfall Distribution over the LMB from 19th to 26th Aug 2019

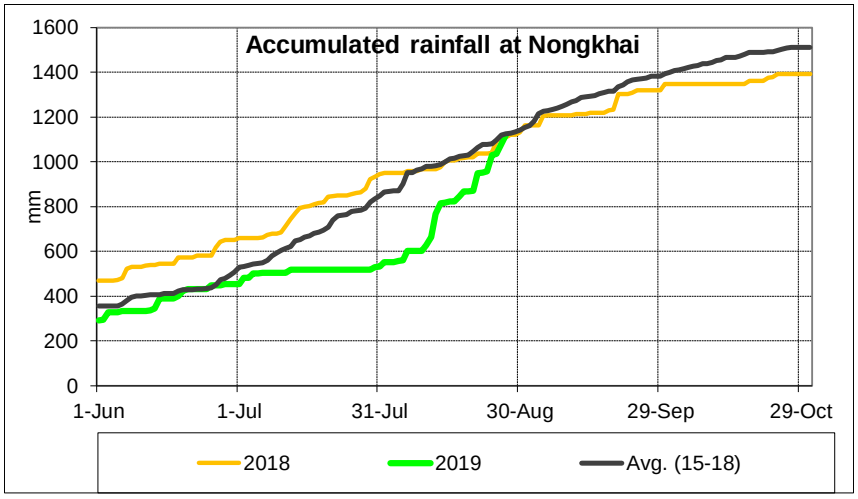
Over weather situation

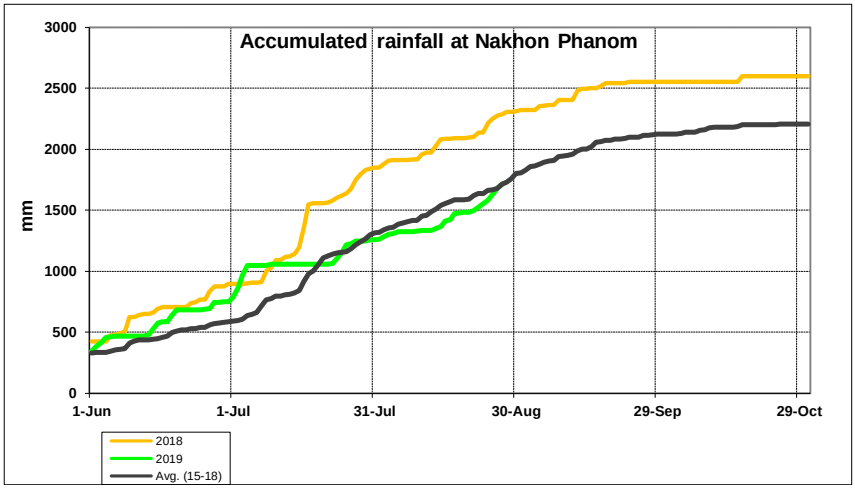
The weather of this week was scattered thundershowers with moderate and heavy rain of the Southwest monsoon and tropical depression. Consequently, in this week there was heavy rainfall covered from in the middle part of LMB, focused at Nakhon Phanom to Sovanakhet varied from 100 mm to more than 200 mm. The weekly rainfall distribution in the Lower Mekong Basin from 19th to 26th Aug 2019 is showed in **Figure 3.** The accumulated rainfall in the specific location at Chiang Sean, Chiang Khan, Nong Khai, Nakhon Phanom, Pakse, Kratie and Chau Doc up to 27th Aug 2019 are showed in **Figure 4**. It indicated the early August' s rainfall is still low in most of the stations, compared to their LTAs except at Kratie was higher than its LTA.

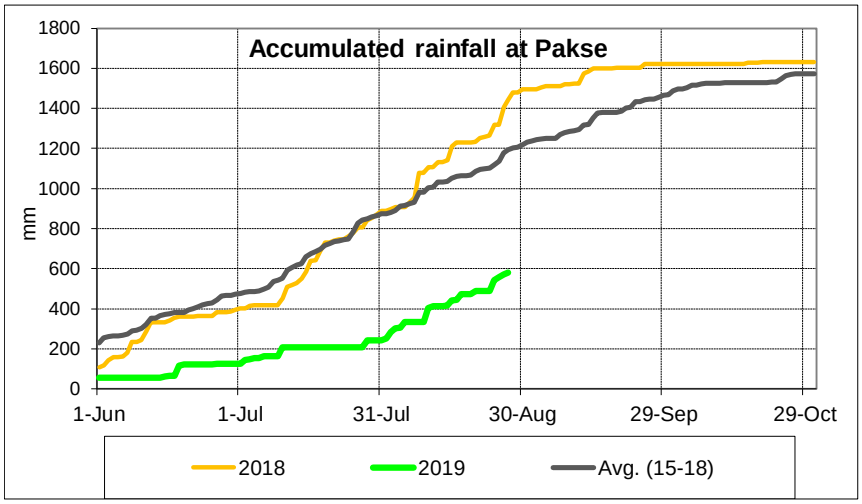
It was observed that last week rainfall distribution overt the LMB varied from place to places, which showed the less rainfall in the upper most part (Chiang Sean to Pkse), except at Naphon Phanom and Kratei rainfalls were about and higher than their LTAs.

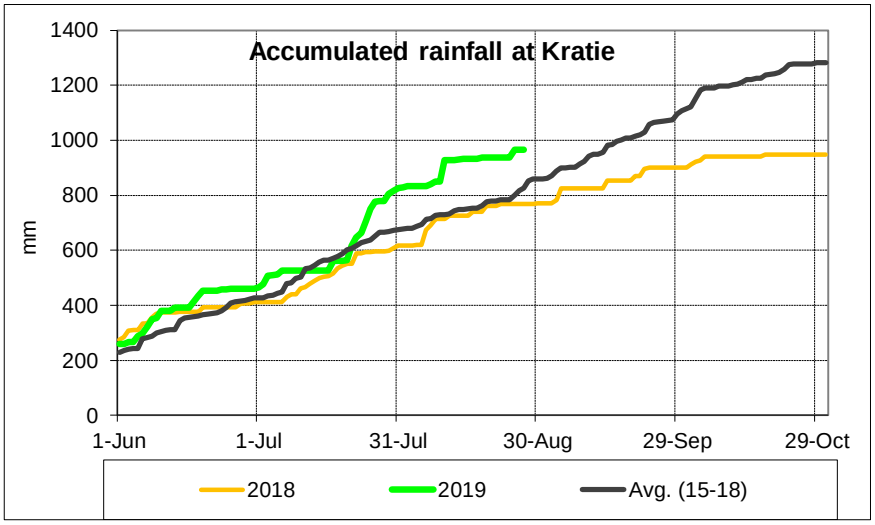





Accumulated rainfall at Nongkhai
mm
1600
1400
1200
1000
800
600
400
200
0
1-Jun
1-Jul
31-Jul
30-Aug
29-Sep
29-Oct
2018
2019
Avg. (15-18)


Accumulated rainfall at Nakhon Phanom
mm
3000
2500
2000
1500
1000
500
0
1-Jun
1-Jul
31-Jul
30-Aug
29-Sep
29-Oct
2018
2019
Avg. (15-18)


Accumulated rainfall at Pakse
mm
1800
1600
1400
1200
1000
800
600
400
200
0
1-Jun
1-Jul
31-Jul
30-Aug
29-Sep
29-Oct
2018
2019
Avg. (15-18)



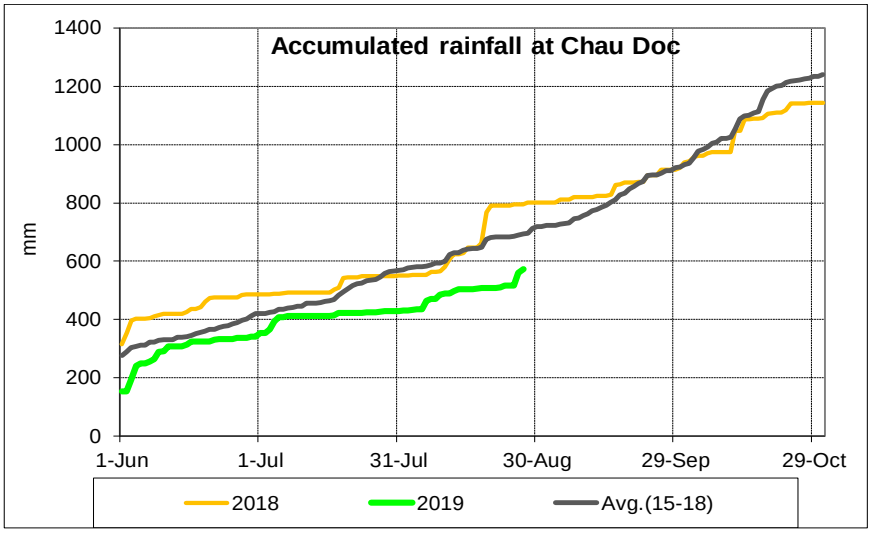


Figure 4: Accumulated Rainfall up to 27th August 2019 in specific stations over the LMB

General behaviour of the Mekong River

During last week, water levels from Chiang Sean to Vientiane/Nong Khai have fluctuated over their drought year 1992s, except at Luang Prabang station where water level was higher than its 1992's water levels. This can be affected by the operation of upstream inflow from tributaries and the downstream at Xayaburi. Water levels at stations at the middle part of LMB from Paksane to Pakse have been increasing significantly, due to more rainfalls in the catchment inflows. From Stung Treng inflows from Pakse and 3S area to Kompong Cham, water levels were also increased close to their LTAs that can be represented of heavy rainfall in this area.

For stations from Chiang Saen and Luang Prabang

Water levels from 20th to 26th Aug 2019 at Chiang Sean station were slightly decreased due to the decreased outflow from Jinghong from 11th to 15th August for power grid maintenance (Notification dated on 5th August 2019 to MRCS) and water levels were still staying below its drought year 1992l (1980-2018). At this station water levels decreased from 0.01 m to 0.35 m. For Luang Prabang station, water levels were slightly increased from 0.10 to 0.15 m (27 August 2019). The current water level at this station is higher than its levels of drought year 1992. It was observed that the Luang Prabang stations is likely nominated by hydro power dam operation upstream (tributaries) and downstream (Xayaburi) in which water levels always fluctuated above their LTAs, during the impounding reservoir at Xayaburi from end of October 2018 to May 2019.

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

Water levels from 20th to 26th Aug 2019 at these stations were also followed the same trend of upstream inflowed from Chiang Sean. It was observed that at Chiang Khan, Vientiane, Nong Khai and Paksane stations, water levels were slightly increased about 0.30 m to 0.60 m and reached upper than their historical their drought year 1992 (1980-2018).

For stations from Nakhon Phanom/Thakhet to Mukdaha/Sovannakhet

Water levels from 20th to 26th Aug 2019 at Nakhon Phanom/Thakhet to Mukdahan/Sovannakhet stations were also followed the same trend as upstream stations and influenced more rainfall from catchment inflows, which caused water level increased about 0.20m to 0.50 m. The current water levels at these stations are reach higher than their drought year 1992 (1980-2018).

For stations from Khong Chiam to Pakse

The same trend as upstream part, water levels from 20th to 26th Aug 2019 at Khong Chiam to Pakse stations were significantly increased from 0.25 m to 0.70 m. Water levels at these stations were reached close to their LTAs (1980-2018).

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

Water levels from 20th to 26th Aug 2019 at Stung Treng, Kratie and Kompong Cham were significantly increased from 0.14 m to 0.70 m due to the more rainfalls from catchment inflows. It was found that water levels at Stung Trend, Kratie and Kompong Cham stations were reached close to their LTAs (1980-2018), while at Chaktomuk on the Bassac, Phnom Penh port and Prekdam on the Bassac and Neak Luong on the Mekong higher than their Minimum Levels (1980-2018).

Tan Chau and Chau Doc

Water levels from 20th to 26th Aug 2019 at these 2 tidal stations were still maintaining fluctuated over their LTAs. Their water levels were not followed the historical trend based on the observation of long-term hydrograph of these 2 stations (See **Annex B**). The different trend of water level hydrographs might affect by the El Nino process in the South China Sea, based on the information done by Japan Meteorological Agency (JMA).

According to the Japan Meteorological Agency (JMA), Sea surface temperature (SST) variability in the tropics can significantly impact on the global climate through atmospheric circulation. El Niño event, which are identified by SST fluctuations from the central to the eastern equatorial Pacific (NINO.3), are widely known examples of this. The NINO3 index is one of several El Niño/Southern Oscillation (ENSO) indicators based on sea surface temperatures. The ENSO Forecast Probabilities based on JMA/MRI-CGCM2 is presented in **Figure 5**.

According to the ASMC, the El Niño Southern Oscillation (ENSO) has been downgraded to "Neutral" status at this time. While warmer sea-surface temperature (SSTs) remain over the Nino3.4 Region.

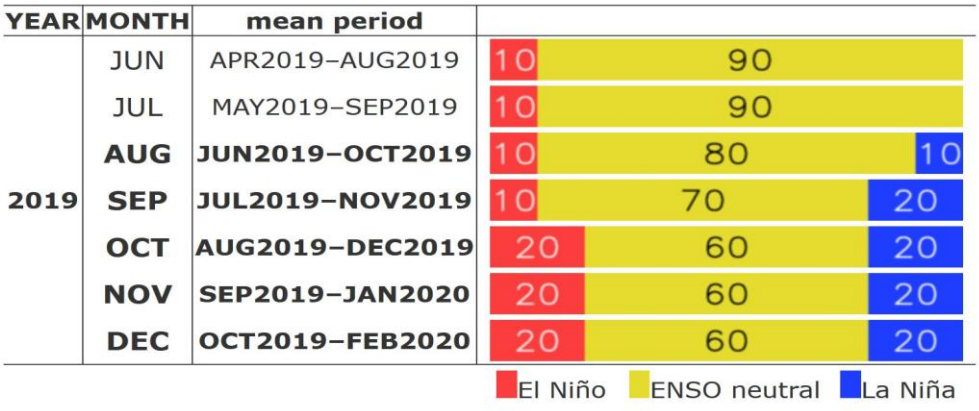


Figure 5 ENSO forecast probabilities based on JMA/MRI-CGCM2

Discussion and Conclusion

From 20th to 26th Aug 2019, the trend of water levels at Chiang Sean were slightly decreased to the decreased outflow from Jinghong from 11th to 15th August for power grid maintenance (Notification dated on 5th August 2019 to MRCS) and low rainfall in this week. Water flow realised from Jinghong Hydropower Station on Lancang was considered strong impact at this station. The impact could obviously see the gradually decreasing water level to downstream at Vientiane/Nong Khai. Based on a hydrological phenomenon, the inflow contribution of water from the upstream of Lancang-Mekong in China to the Mekong mainstream is about 16% in total during the Wet season from June to October. The whole inflow of water into the lower Mekong basin is influenced more by tributaries and a direct from catchment rainfall distribution.

However, from Paksane to Kratie water levels were increased roughly from 0.25 m to 0.75 m which could draw water levels at these key stations above their drought year levels (1992).

The initial conclusion (for discussion) is that the regional tail off in water levels is a combined response to regional low rainfall conditions and dam operation at the upper most (Chiang Sean to Veitaine/Nong Khai).

On the other hand, the hydrological conditions (rainfall and flows) of the Mekong River during early Wet Season 2019 (Aug-Sep) is characterized low at the upper part but moderate at the lower part from Paksane to Kratei based on observed rainfall at each key station.

Note: For detail information on the current flows and water levels situation from upstream to downstream, **Annex A** showed the monthly flow hydrograph at specific stations whereas in **Annex B** presented hydrographs of water level at the 22 key stations on the Mekong River.

The Trend of water level and its Outlook

Based on of the daily river flood forecasting outcomes for next week from 27 to 31 Aug 2019, water levels at Chiang Saen will slightly increase from 0.02 to 0.10 m, while the water level of the station at Luang Prabang will be fluctuated due to the impact of the inflow from reservoir operation upstream and downstream of this station, which could also be impacted downstream at Nong Khai station. From Paksane to Sovanakhet, water levels will rapidly increase from 0.15 m to 0.72 m due to heavy rainfall will focus on the middle part of Vientiane/Nong Khai, Paksane, Nakhon Phanom down to Pakse, including the 3S area extended from the Central Highland of Vietnam. The 5 days forecasted rainfall of NOAA (GFAS) of showed above abnormal rainfall at the end of this month.

According to the results of storm forecasting agencies bases in Viet Nam, Taiwan, and the Joint Typhoon Warning Center (JTWC) – US were predicted that the typhoon name "Podul" is likely hit Vietnam's inland this weekend (31 / 08 - September 1, 2019). It will causes large-scale heavy rainfall for some provinces from Thanh Hoa, Vinh and Nghe An of Viet Nam. It will extend to the central highland and move to Lao PDR, which expect flooding in some areas. **Fig. 6** showed the storm tracking of "Podul" moving close to Vietnam (NCHMF) and **Fig. 7** presented the forecasted rainfall bases on GFAS of NOAA for the next 4 days.

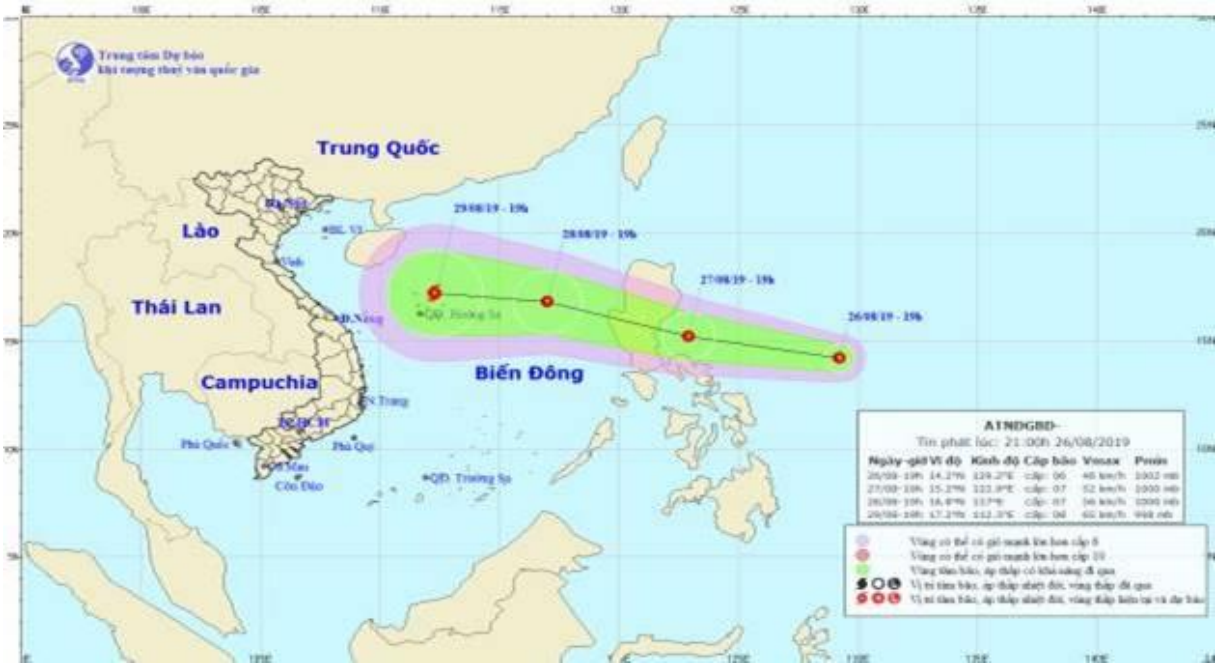


Figure 6 The moving of typhoon "Podul" close to Vietnam

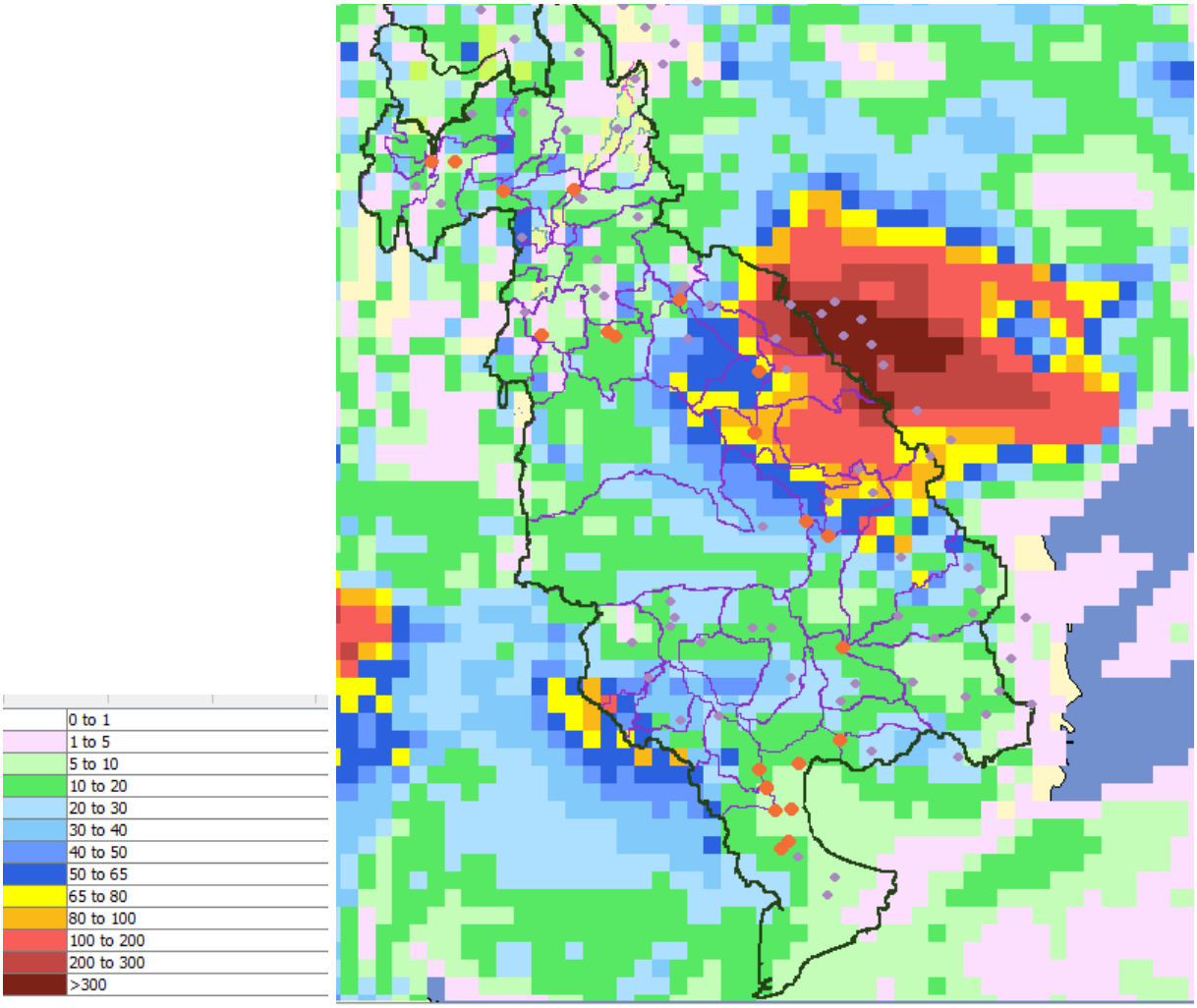
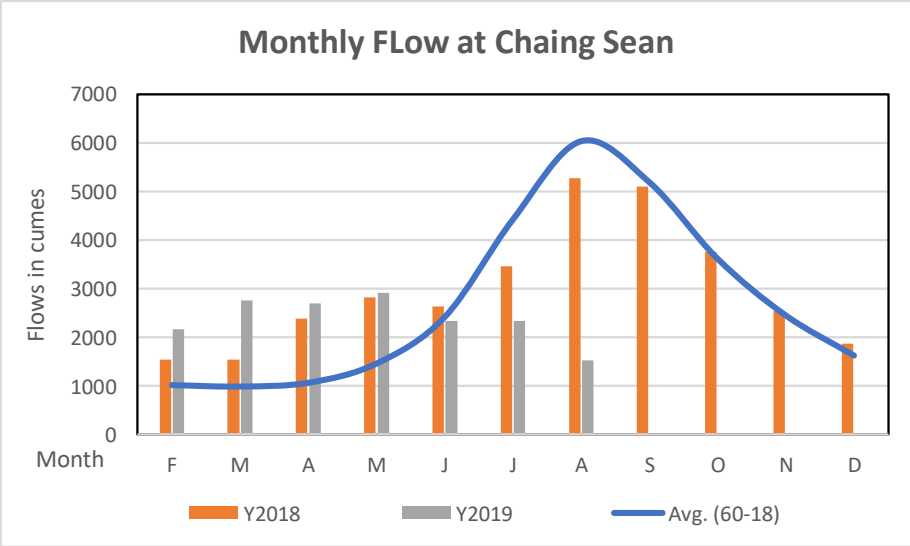


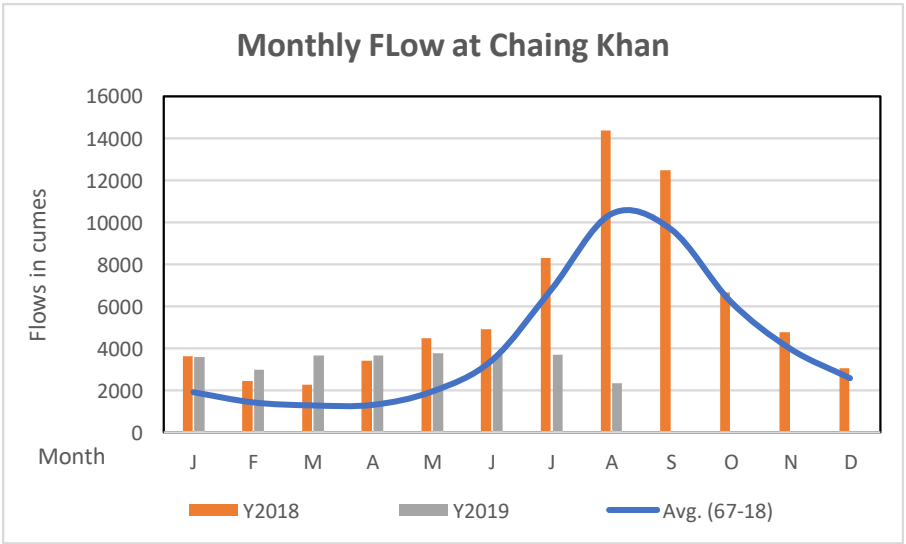
Figure 7 The forecasted rainfall in the next 4 days based on NOAA (GFAS)

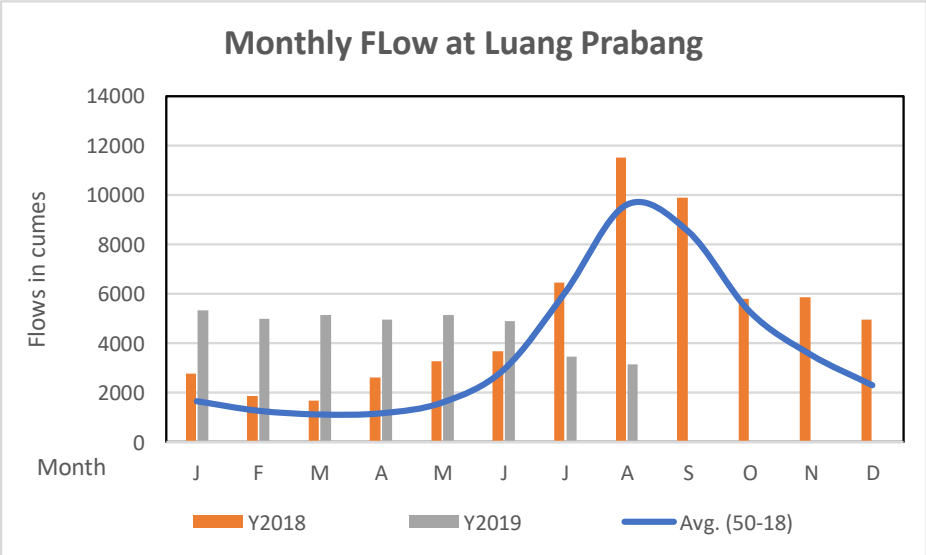
From Khong Chaim down to the Cambodia's stations at Stung Treng, Kratie, Kompaong Cham, Chaktomuk, Tole Sap at Phnom Penh Port, Prekdam on the Tonle Sap and Neak Luong on the Mekong, the 5 days forecasting from 27 to 31 August showed the increased trends of water levels varies from 0.12 m to 0.65 m.

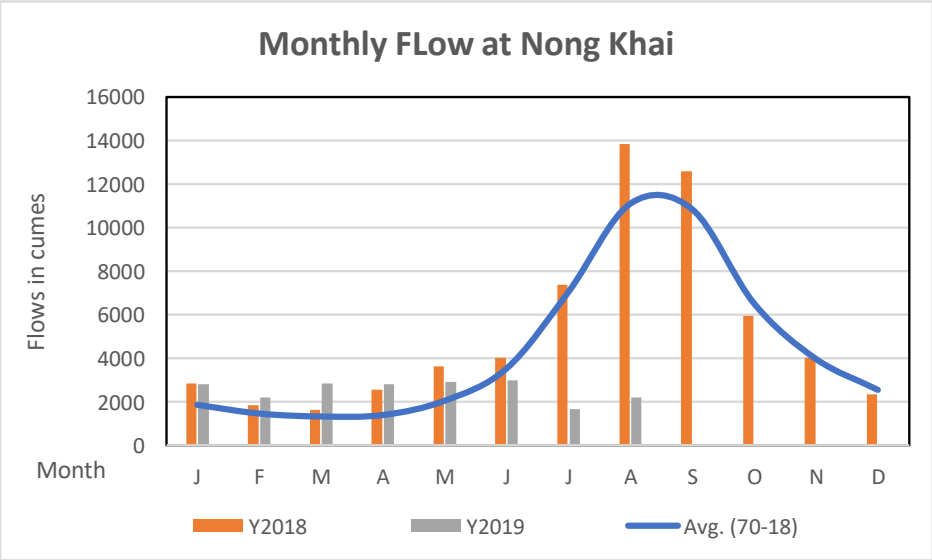
Annex A: Monthly Flow Hydrographs

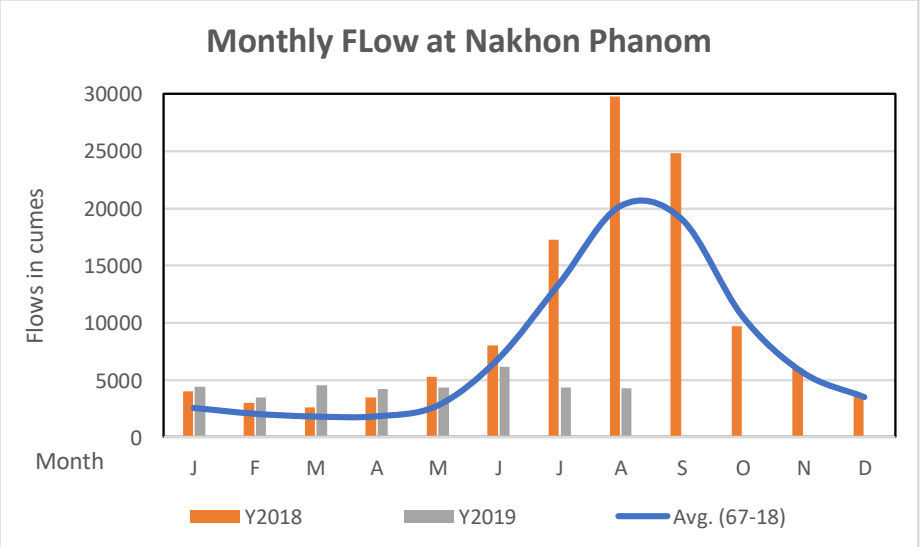
MONTHLY FLOWS HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS IN FLOOD SEASON FROM JAN TO JULY 2019

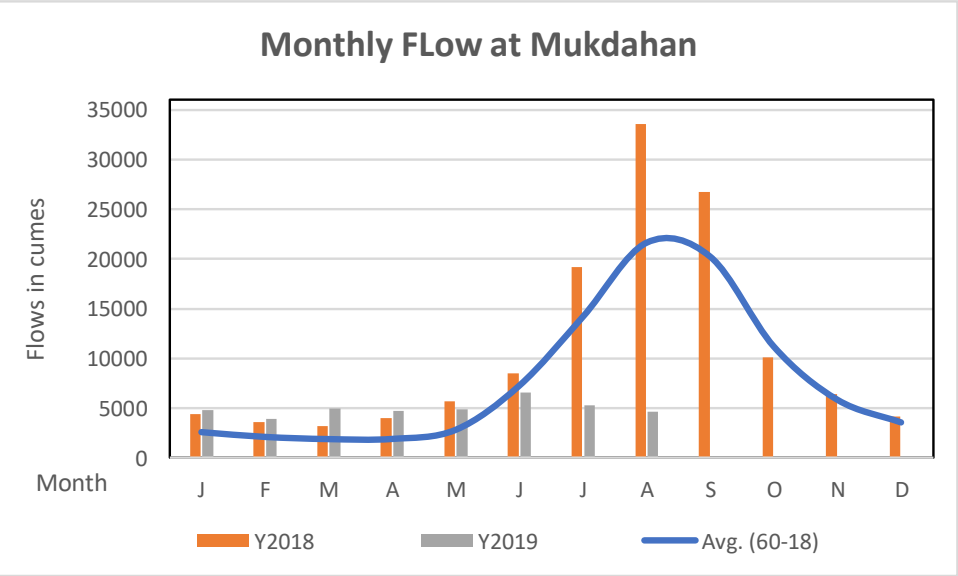


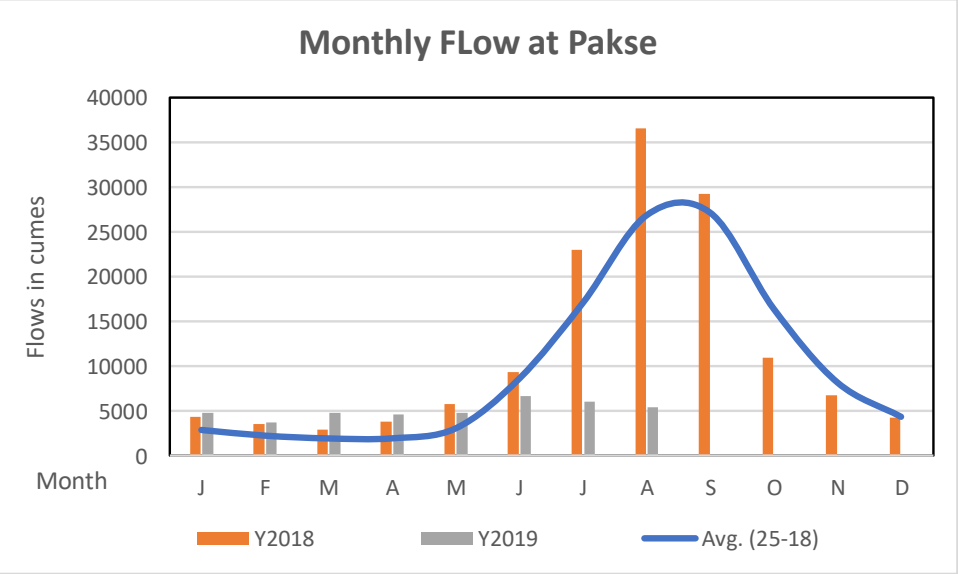


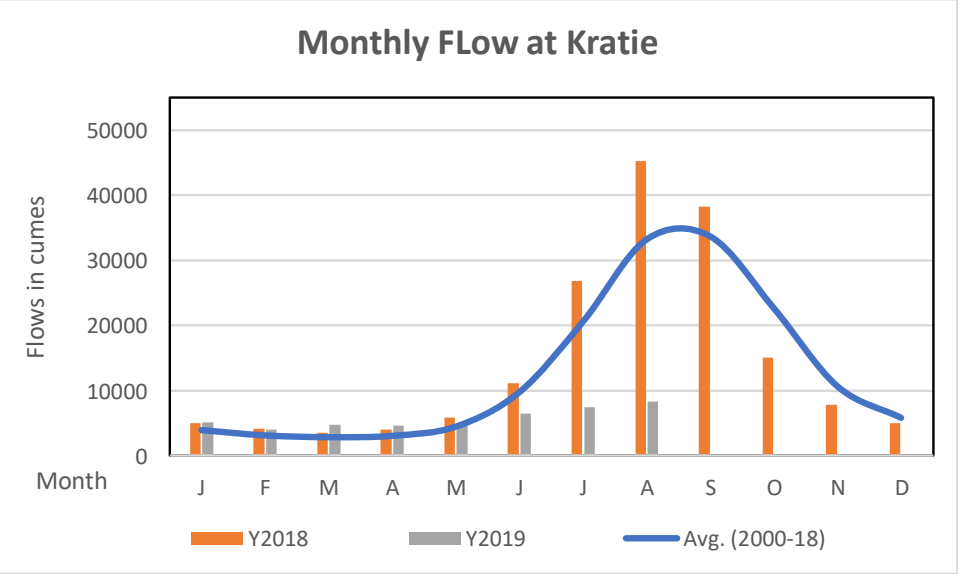

Monthly FLow at Luang Prabang
Flows in cumes
14000
12000
10000
8000
6000
4000
2000
0
Month
J F M A M J J A S O N D
Y2018
Y2019
Avg. (50-18)


Monthly FLow at Nong Khai
Flows in cumes
16000
14000
12000
10000
8000
6000
4000
2000
0
Month
J F M A M J J A S O N D
Y2018
Y2019
Avg. (70-18)


Monthly FLow at Nakhon Phanom
Flows in cumes
30000
25000
20000
15000
10000
5000
0
Month
J F M A M J J A S O N D
Y2018
Y2019
Avg. (67-18)

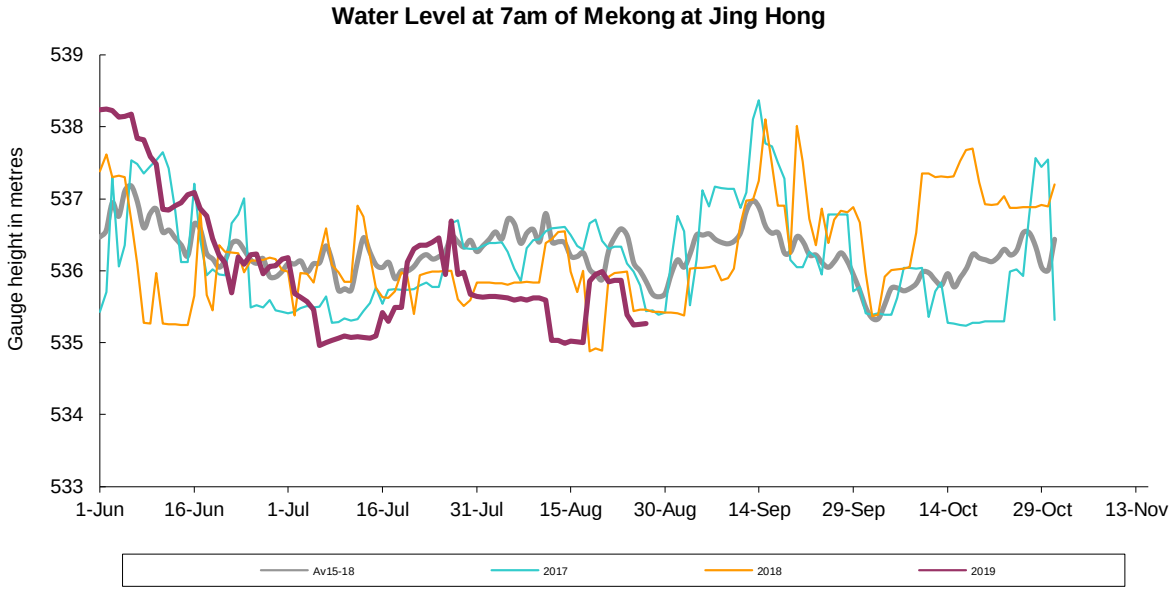

Monthly FLow at Mukdahan
Flows in cumes
35000
30000
25000
20000
15000
10000
5000
0
Month
J F M A M J J A S O N D
Y2018
Y2019
Avg. (60-18)

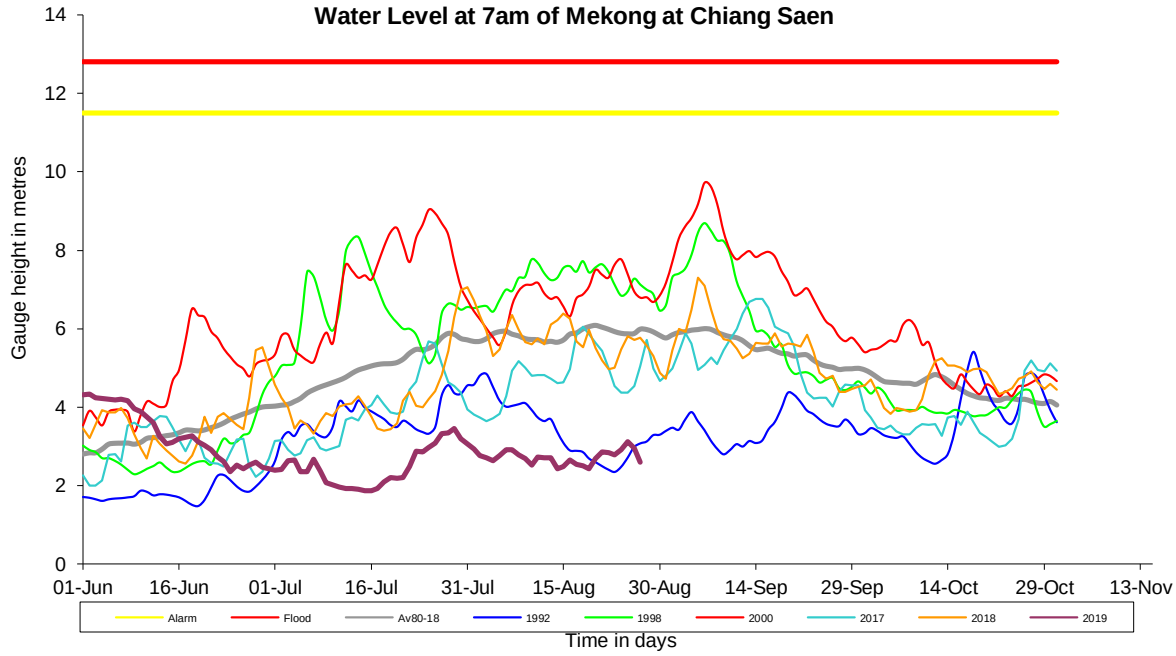

Monthly FLow at Pakse
Flows in cumes
40000
35000
30000
25000
20000
15000
10000
5000
0
Month
J F M A M J J A S O N D
Y2018
Y2019
Avg. (25-18)

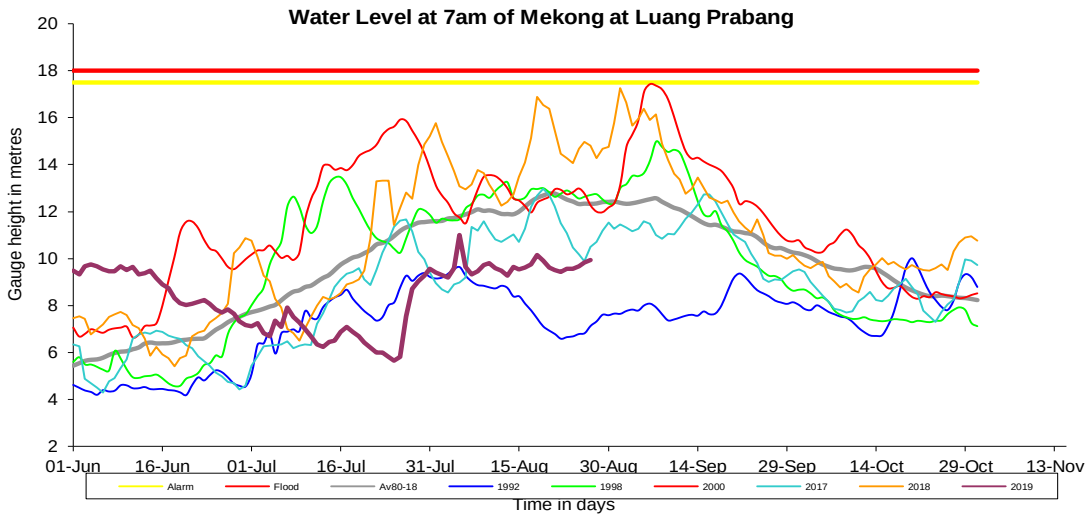

Monthly FLow at Kratie
Flows in cumes
50000
40000
30000
20000
10000
0
Month
J F M A M J J A S O N D
Y2018
Y2019
Avg. (2000-18)

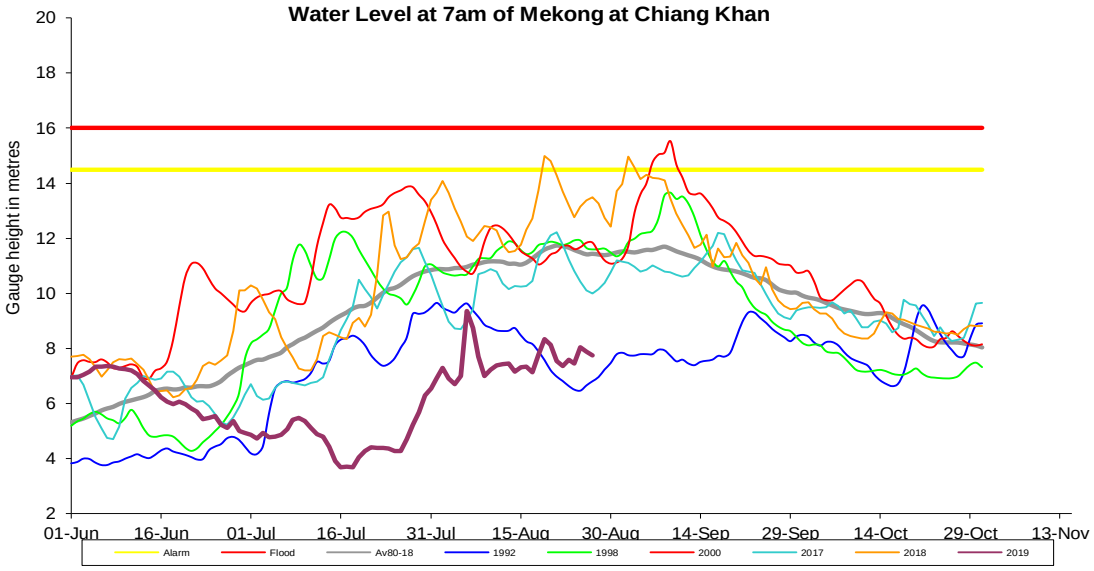
Annex B: Seasonal Water Level Hydrographs

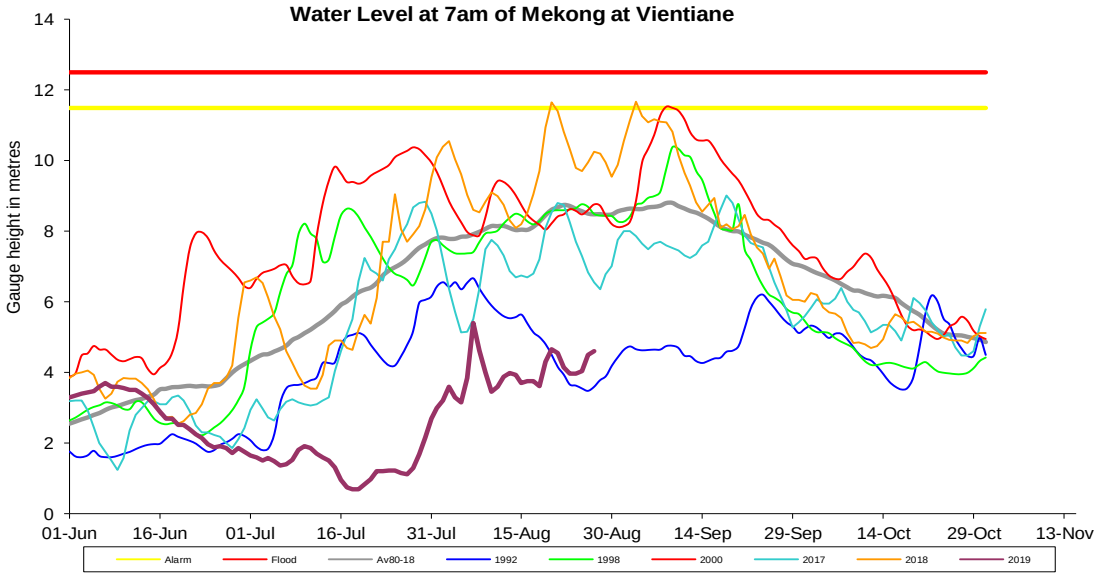
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS IN FLOOD SEASON FROM UP TO 27th AUG 2019

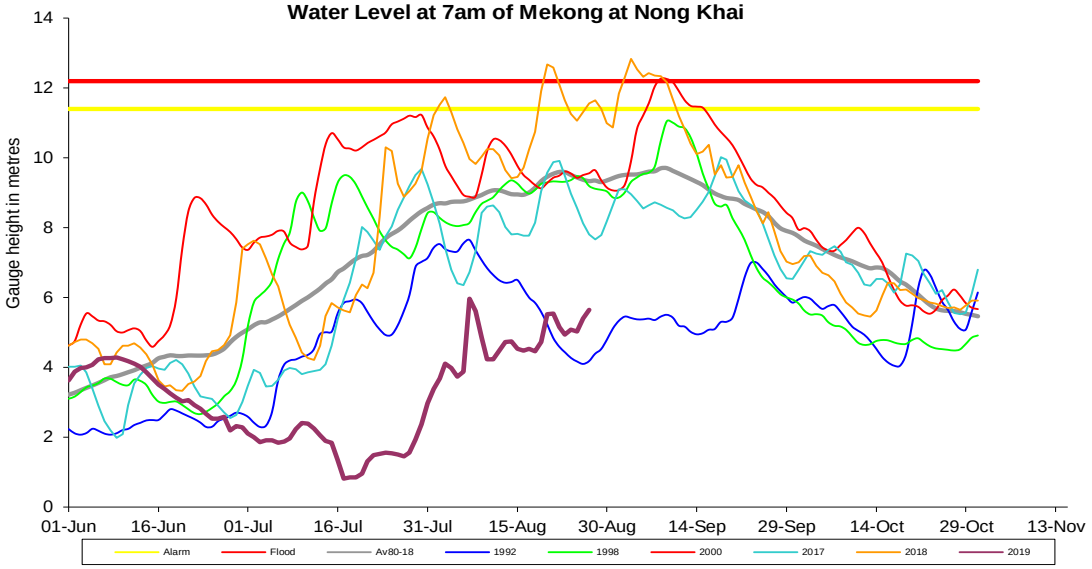


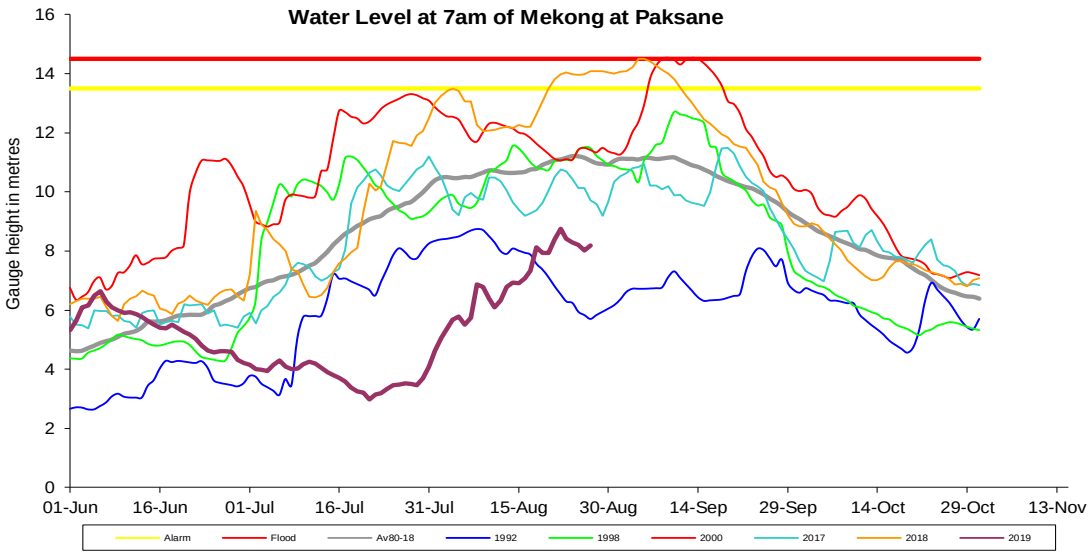


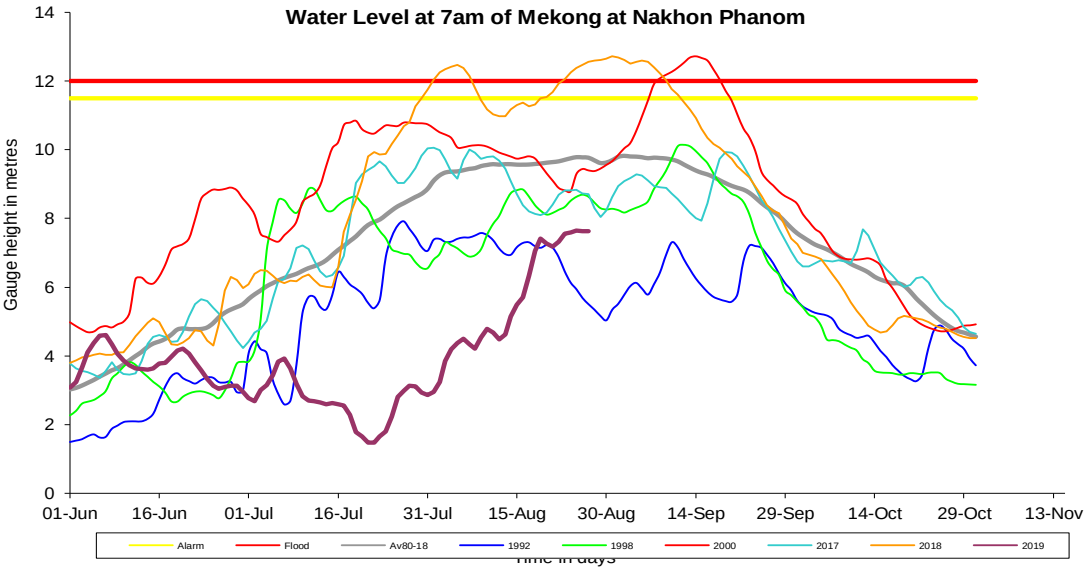

Water Level at 7am of Mekong at Luang Prabang
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019
Time in days

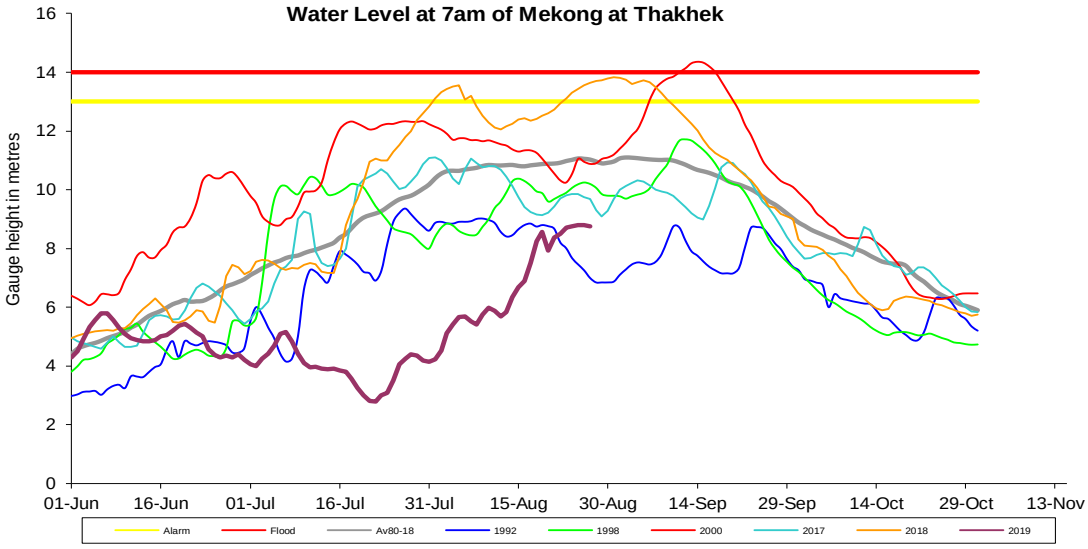

Water Level at 7am of Mekong at Chiang Khan
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

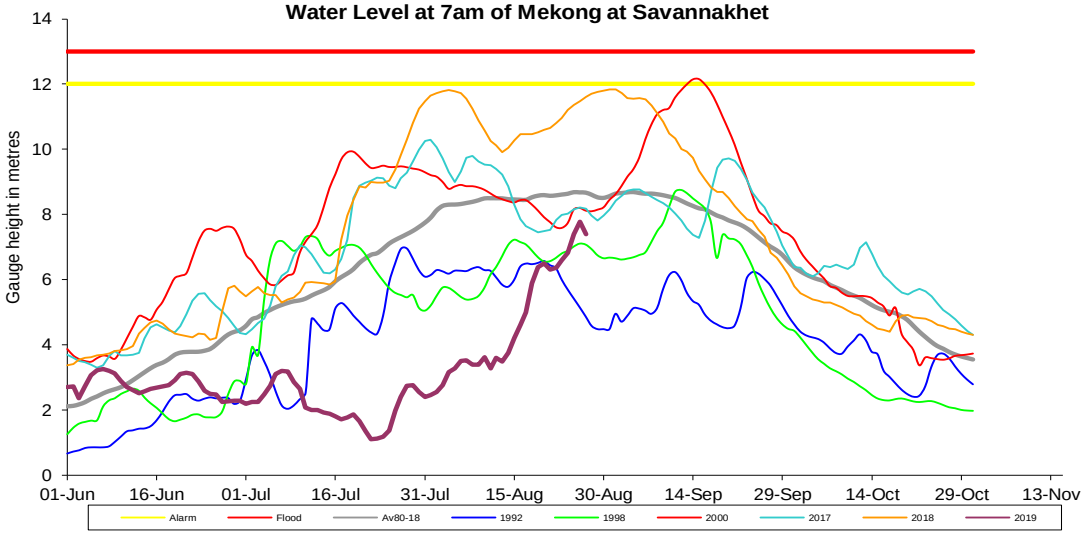

Water Level at 7am of Mekong at Vientiane
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

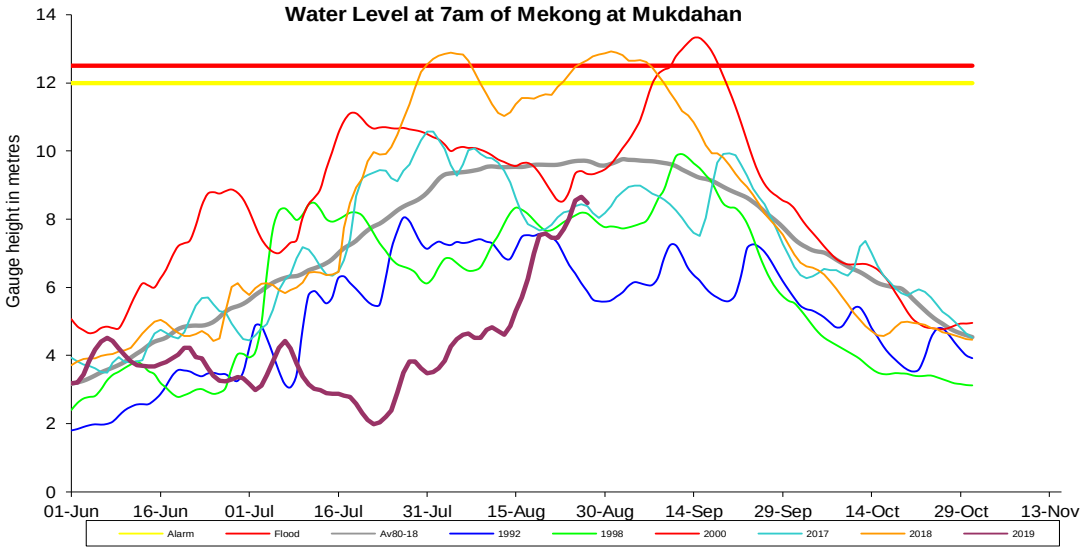

Water Level at 7am of Mekong at Nong Khai
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

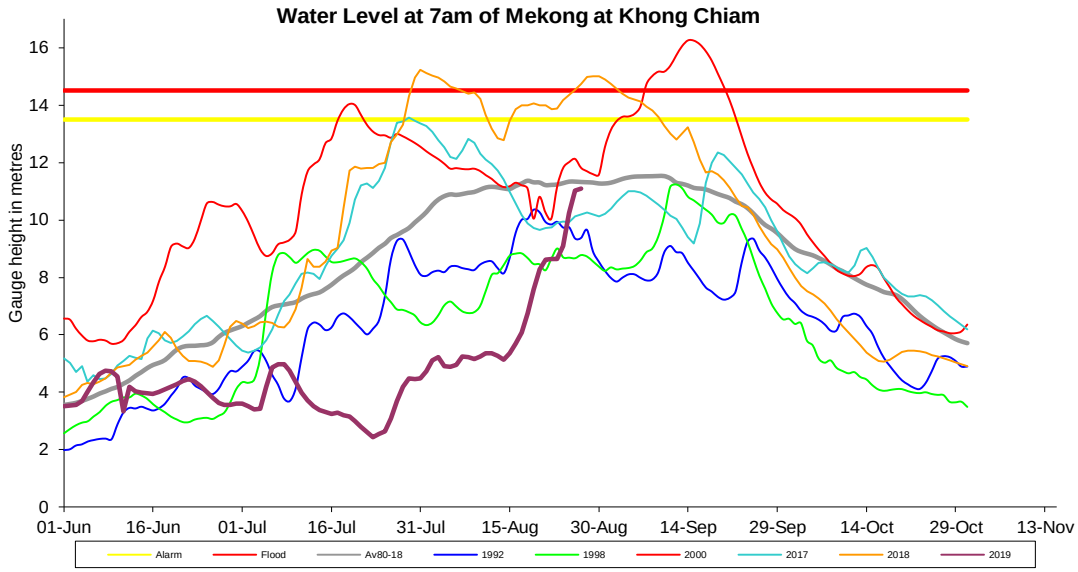

Water Level at 7am of Mekong at Paksane
Gauge height in metres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

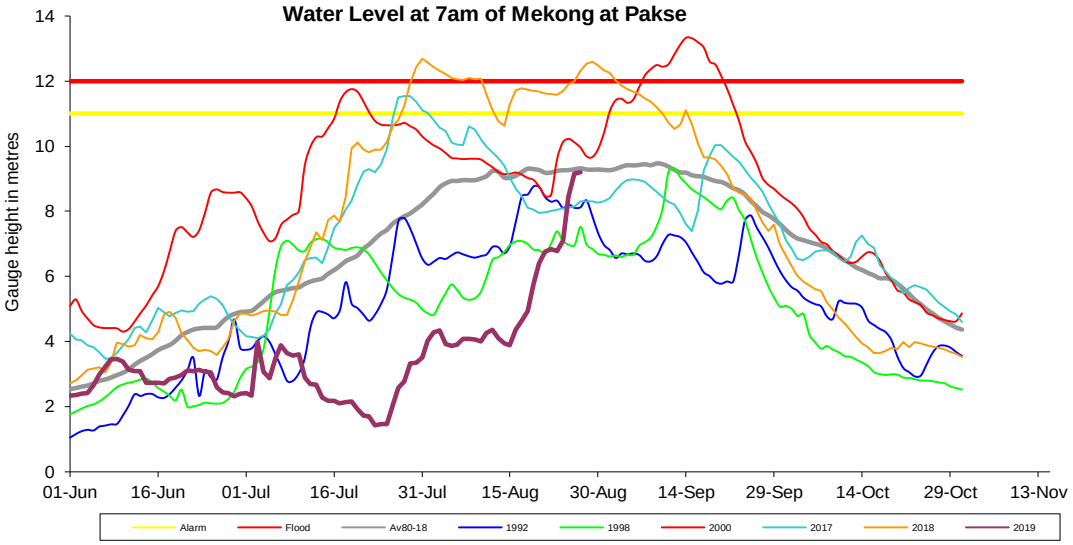

Water Level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

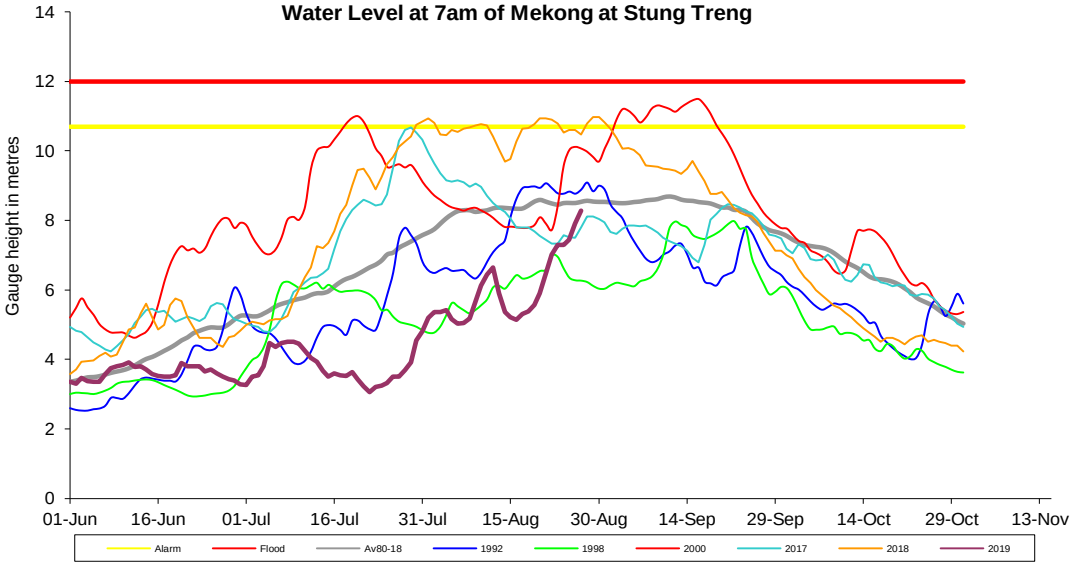

Water Level at 7am of Mekong at Thakhek
Gauge height in metres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

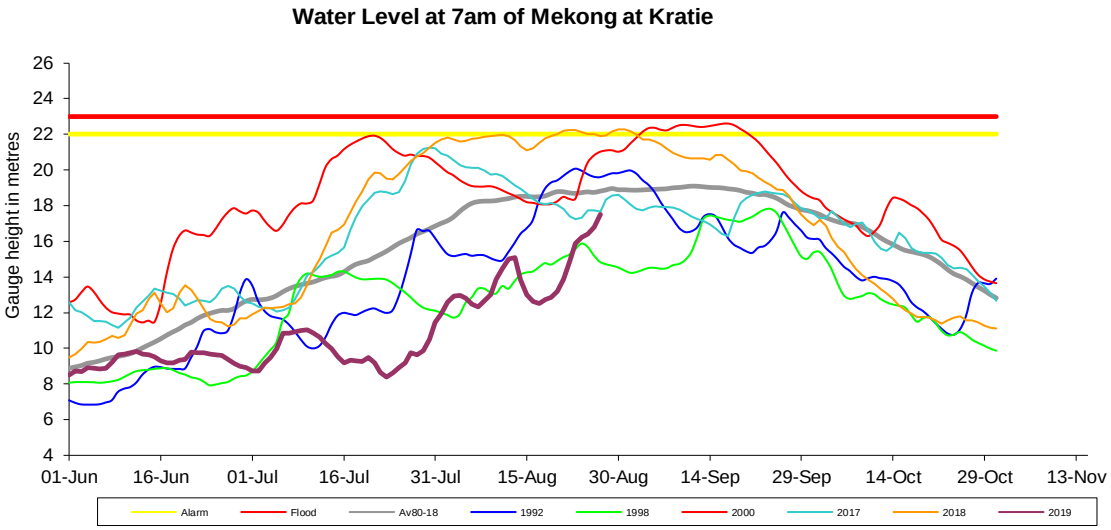

Water Level at 7am of Mekong at Savannakhet
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

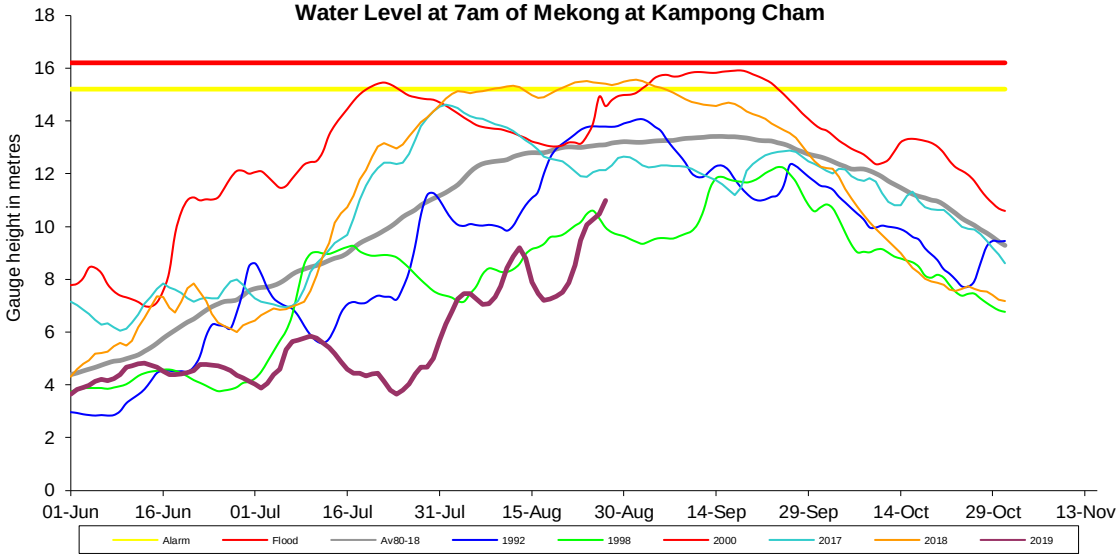

Water Level at 7am of Mekong at Mukdahan
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

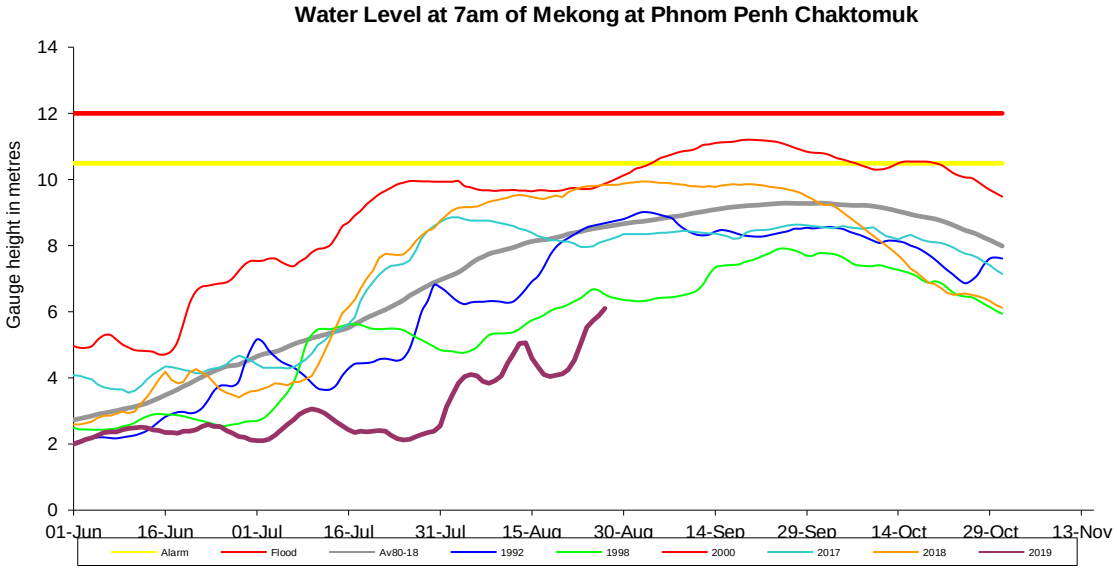

Water Level at 7am of Mekong at Khong Chiam
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

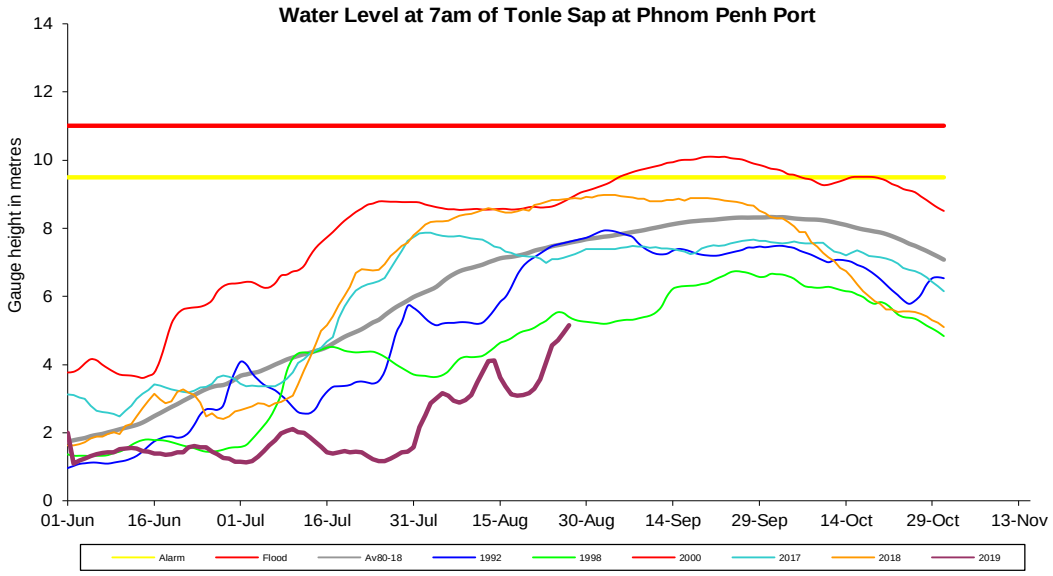

Water Level at 7am of Mekong at Pakse
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

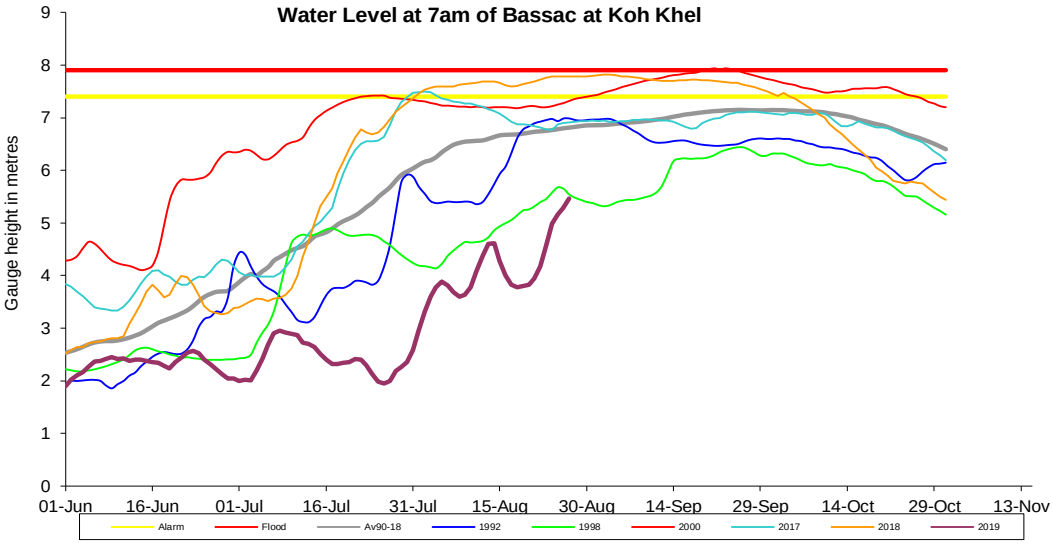

Water Level at 7am of Mekong at Stung Treng
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

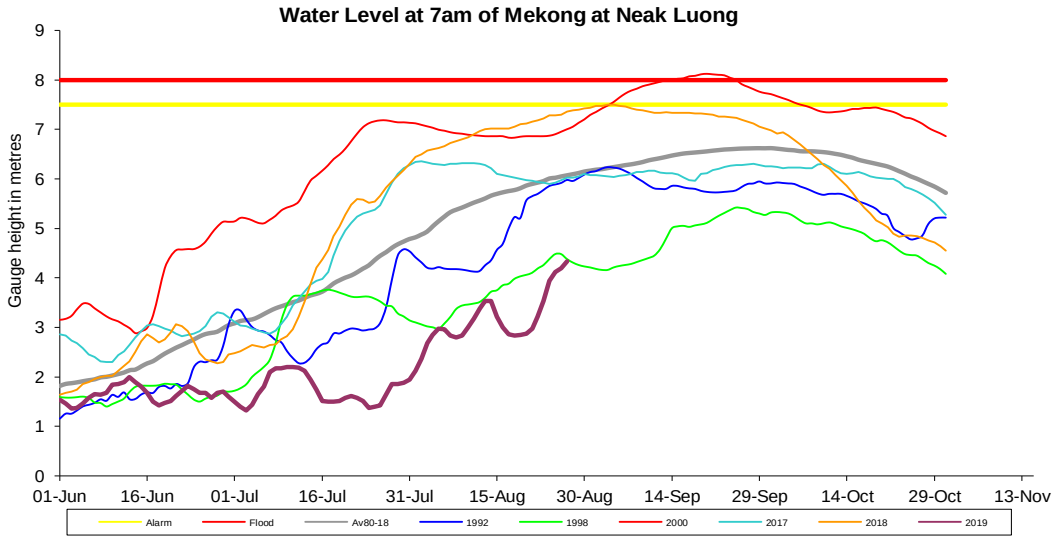

Water Level at 7am of Mekong at Kratie
Gauge height in metres
26
24
22
20
18
16
14
12
10
8
6
4
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

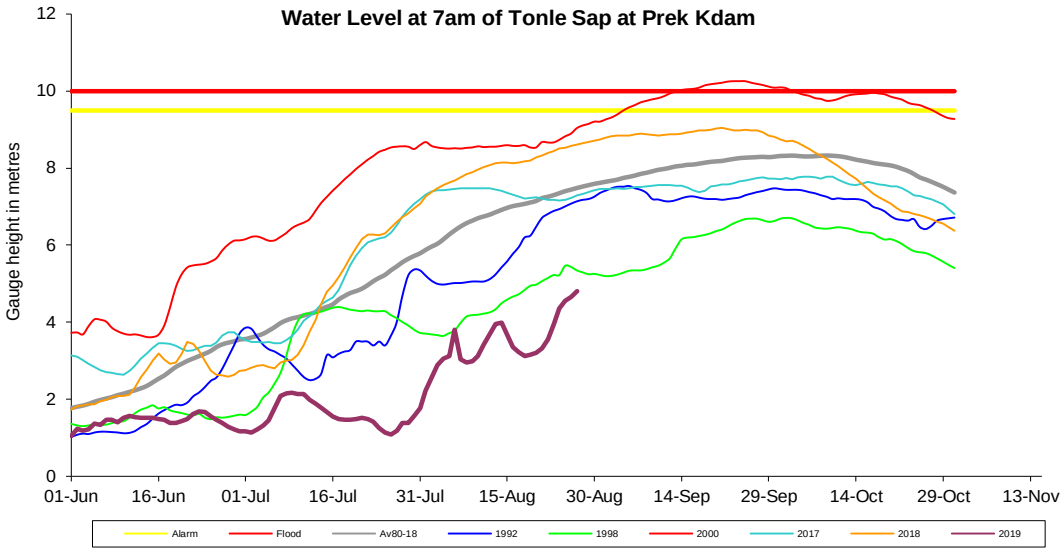

Water Level at 7am of Mekong at Kampong Cham
Gauge height in metres
18
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

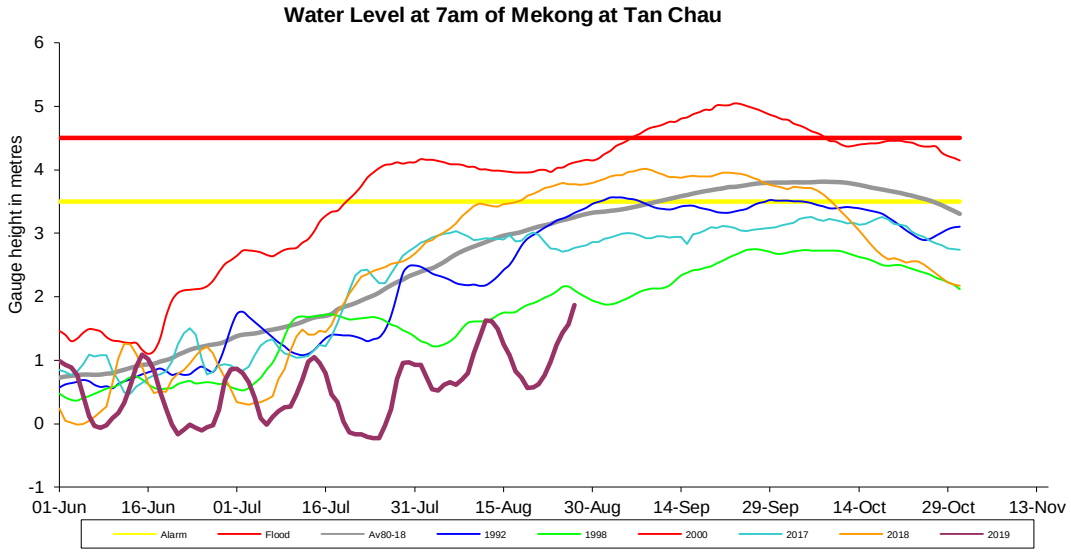

Water Level at 7am of Mekong at Phnom Penh Chaktomuk
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

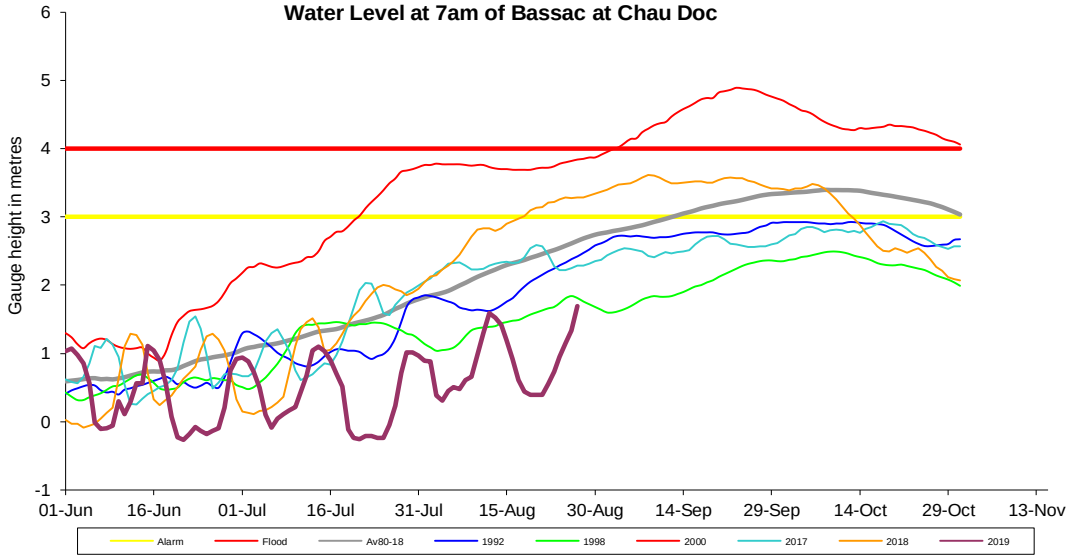

Water Level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019


Water Level at 7am of Bassac at Koh Khel
Gauge height in metres
9
8
7
6
5
4
3
2
1
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av90-18
1992
1998
2000
2017
2018
2019


Water Level at 7am of Mekong at Neak Luong
Gauge height in metres
9
8
7
6
5
4
3
2
1
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019


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
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019


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
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019


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
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019