Weekly Flood Situation Report for the Mekong River Basin

Draft by KHEM Sothea

covering the week from 03rd to 10th Sept 2019 and potential trend next week

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

General weather patterns

During the week from 03rd to 09th Sept 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, which attracted rainfall during this week. The abundant rainfall often occurs at the end of August and early September with more rain amount than previous months. They stated that some tropical cyclones sometime develop at the western side of the northern Pacific Ocean and move northwest and pass to the South China Sea. Consequently, LMB will meet abundant rainfall with heavy to very heavy rain amount at some areas. **Figures 1 & 2** presented the weather map for 05th and 09th Sept 2019.

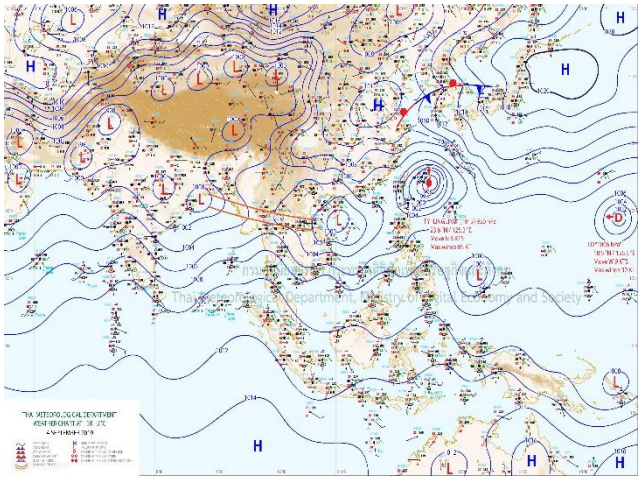


Figure 1: Weather map for 5th Sept 2019

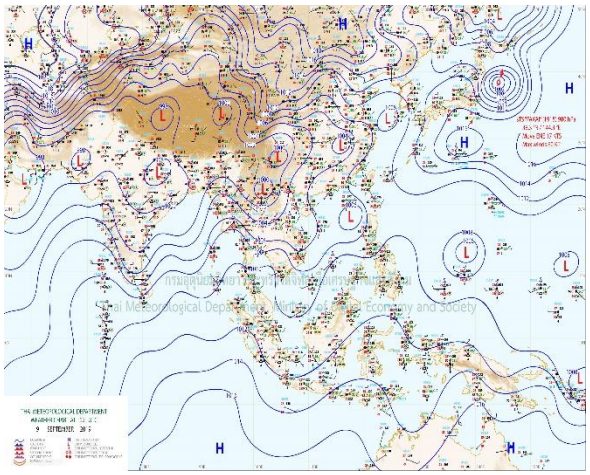


Figure 2: Weather map for 09th Sept 2019

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 above-normal rainfall is predicted over the Northeastern parts of Cambodia, Thailand and Viet Nam in September- 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 Southeast Asia in September 2019.

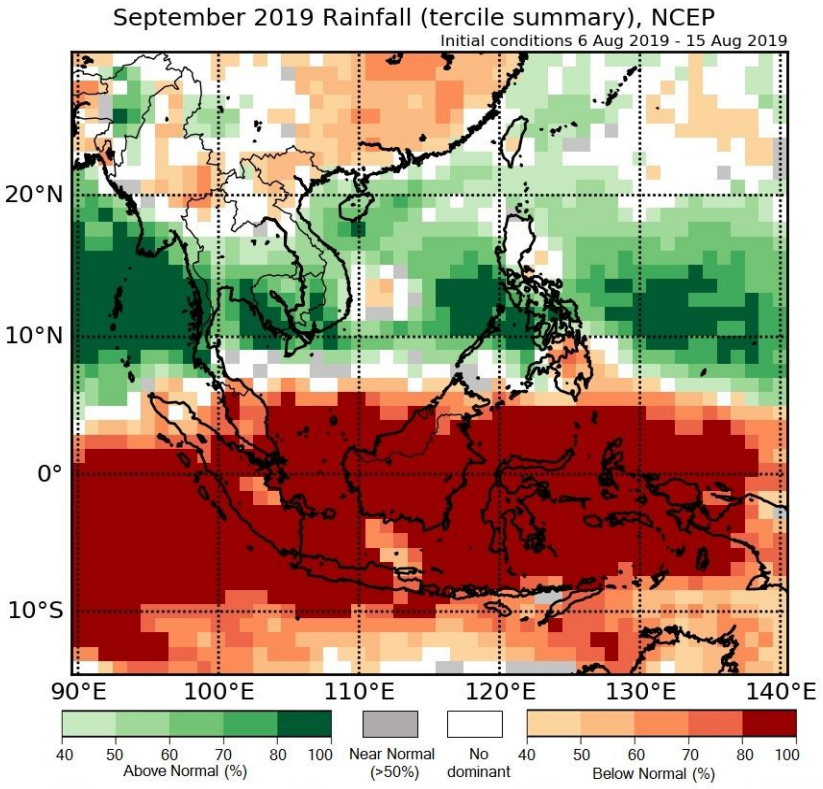


Figure 2: The predicted of above-normal rainfall in September 2019 in Southeast Asia

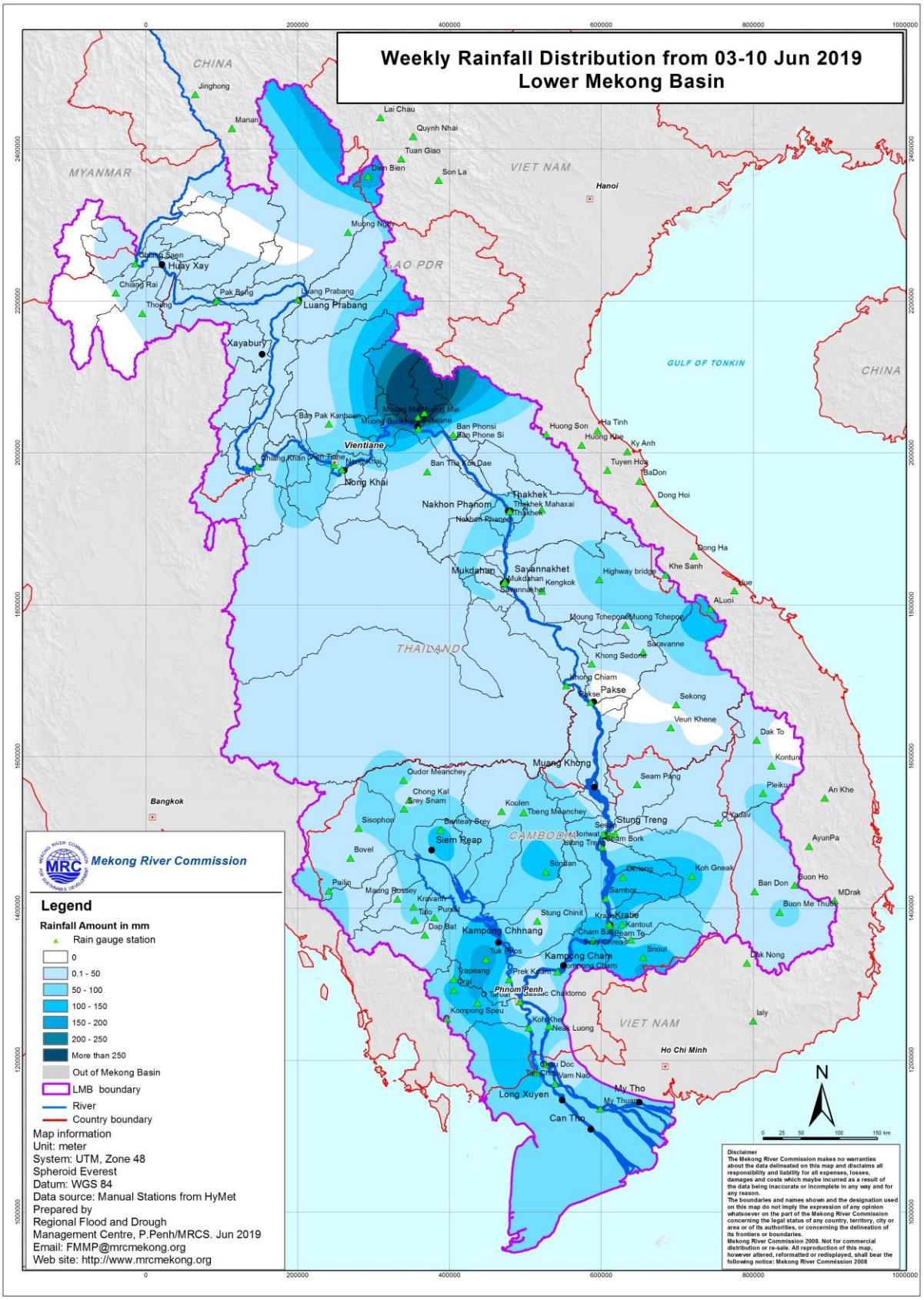
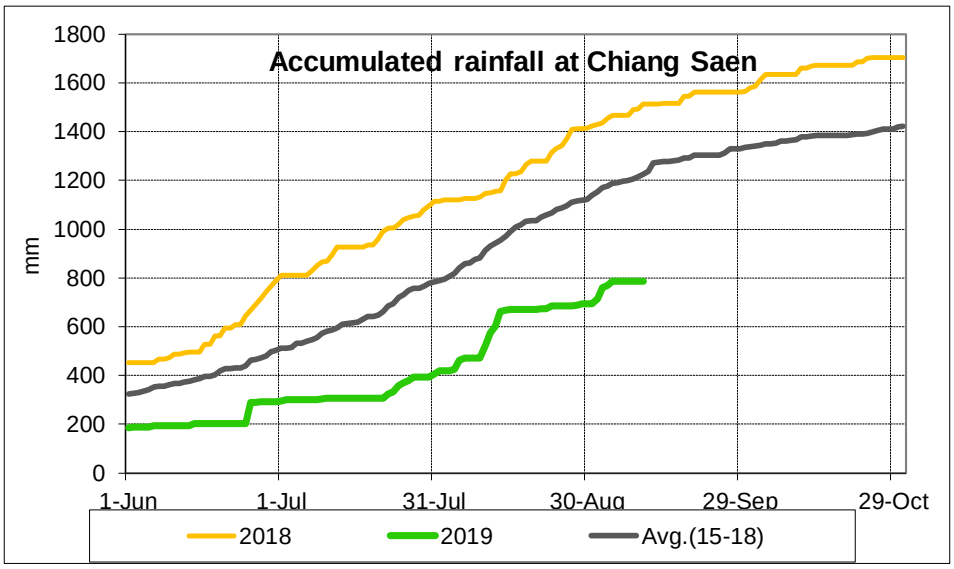


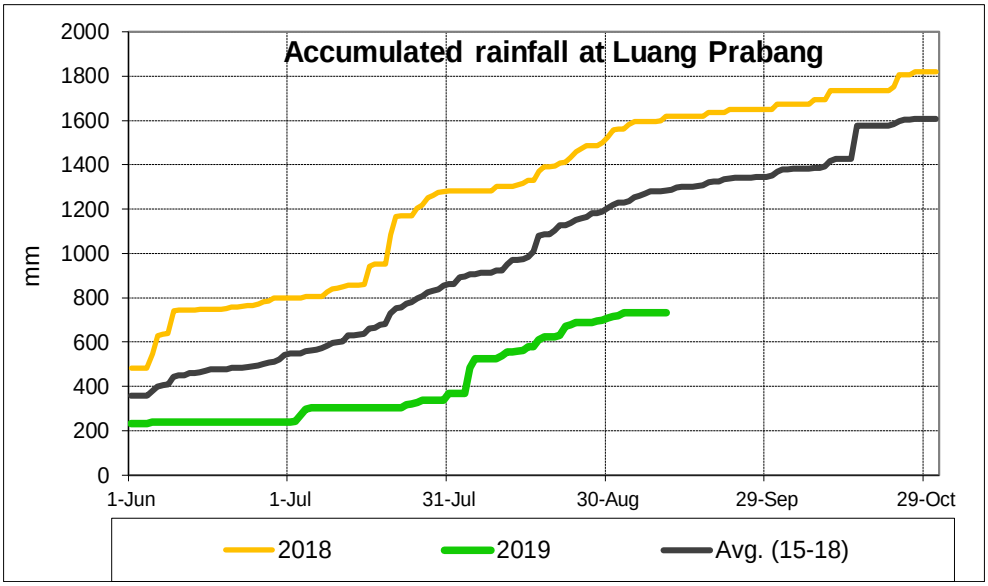
Figure 3: Weekly Rainfall Distribution over the LMB from 03rd to 10th Sept 2019

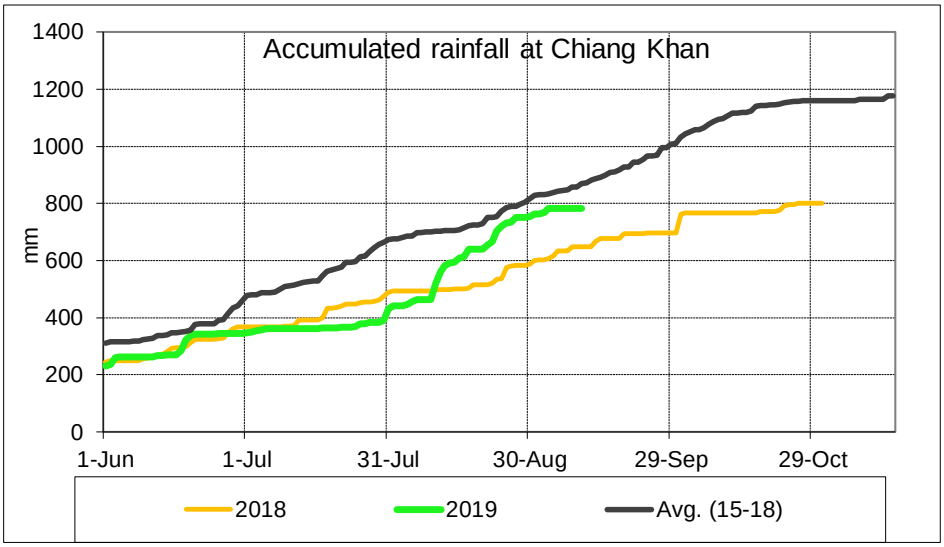
Over weather situation

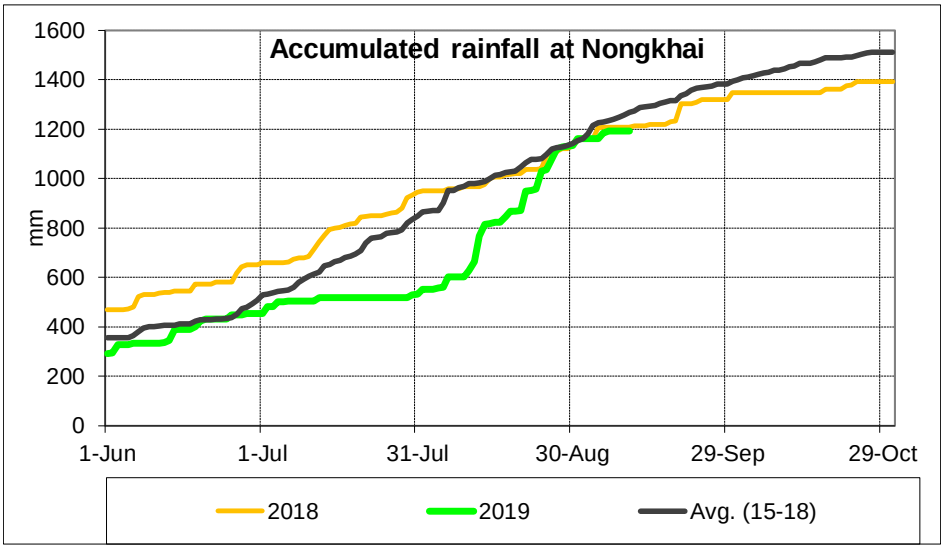
The weather of this week was brought heavy rainfall, after the Typical Cyclone PODUL and tropical depression. Rainfall in this week was considered moderate, covered from in the middle part of Sovanakhet to Pakse varied from 60 mm to 100 mm. The weekly rainfall distribution in the Lower Mekong Basin from 03rd to 10th Sept 2019 is showed in **Figure 3.** The accumulated rainfall in the specific location at Chiang Sean, Luang Prabang, Chiang Khan, Nong Khai, Nakhon Phanom, Pakse, Kratie and Chau Doc up to 10th Sept 2019 are showed in **Figure 4**. The rainfall was found at Kratie during this week.

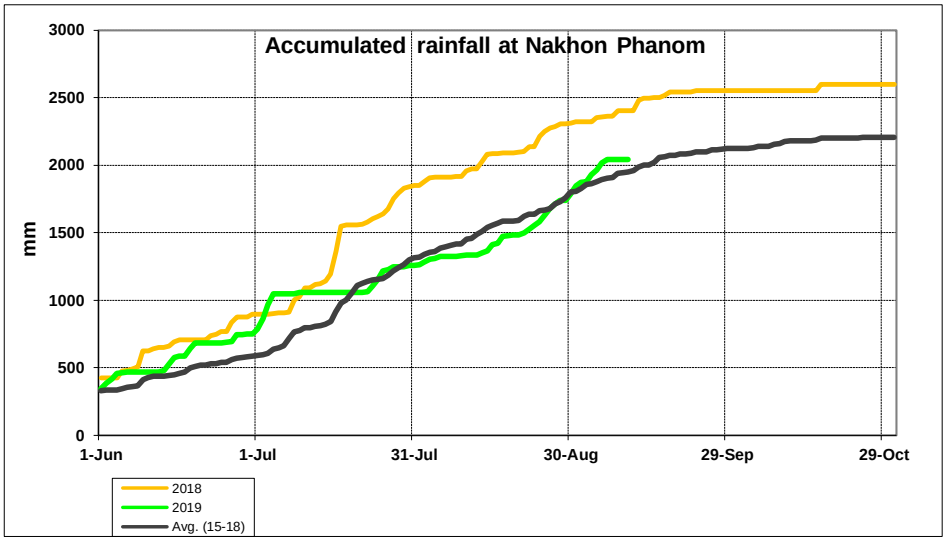
It also indicated that last week rainfall over the LMB varied from place to places, which showed the less rainfall in the upper most part (Chiang Sean to Nong Khai), but moderate at Nakhon Phanom and Kratei which showed higher than their LTAs (2015-2018).






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


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


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

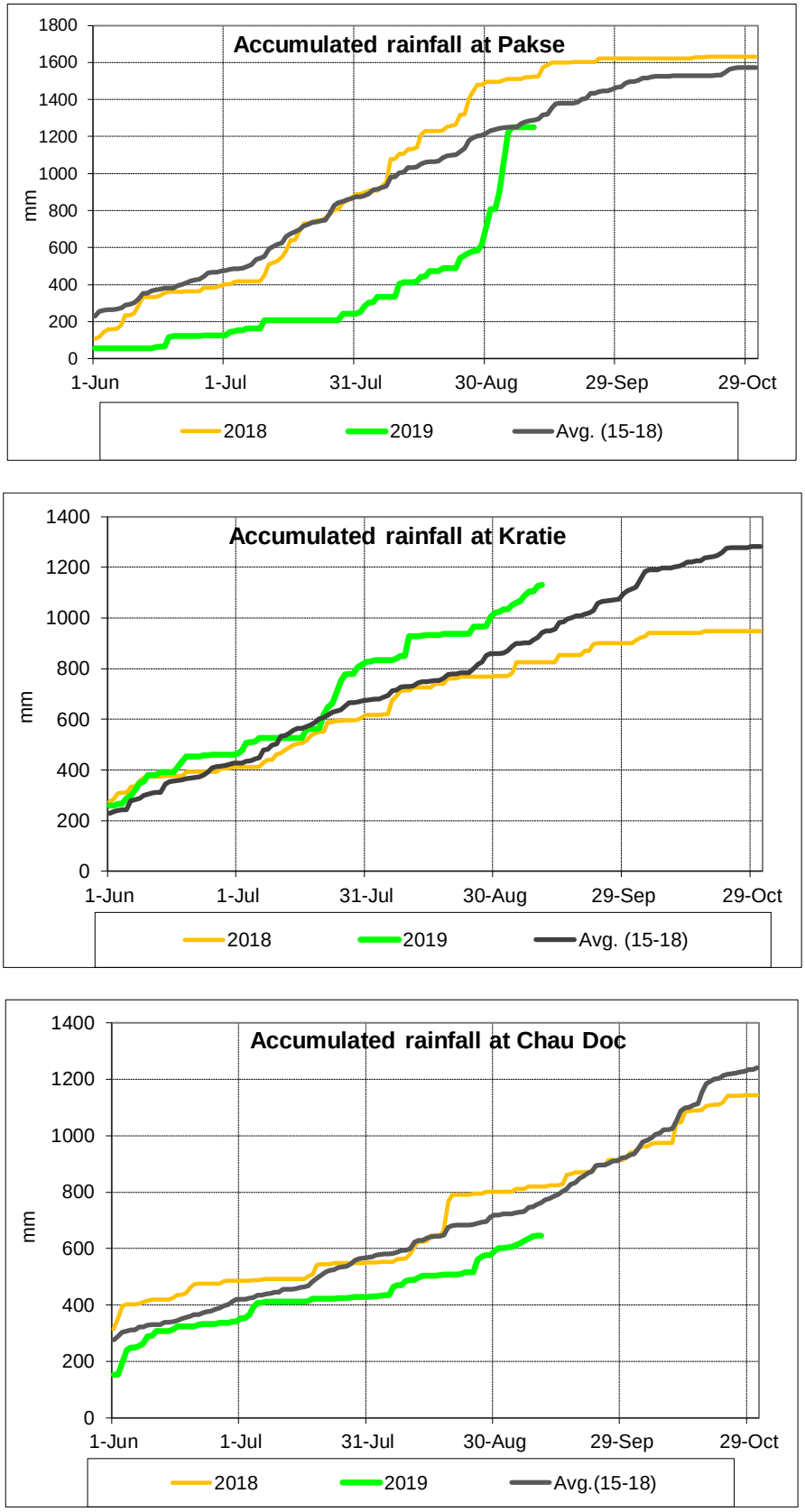


Figure 4: Accumulated Rainfall up to 03rd to 10th September to 2019 in specific stations over the LMB

General behaviour of the Mekong River

During last week, water levels from Chiang Sean to Vientiane/Nong Khai were decreased significantly below their drought year 1992s, except at Luang Prabang station still water levels were in between long-

term average and its drought year 1992. This trend likely 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 Sovanakhet have been slightly decreasing and stay below their LTAs. Flood waters have been observed at Khong Chiam, Pakse, Stung Treng and Kratei, after the heavy rainfalls brought by the Typical Cyclone PODUL from 31st Aug to 3rd Sept 2019. Flood situation was observed at Khong Chiam, Pakse and Stung Treng, while the ALARM stages were observed at Kratie, Kompong Cham and Koh Khel.

For stations from Chiang Saen and Luang Prabang

Water levels from 03rd to 10th Sept 2019 at Chiang Sean station were decreased and stay below its drough year 1992, due to the decreased outflow from Jinghong from 22th August which they kept water levels the same track at Jinghong (see its hydrograph in Annex A). At this station water levels decreased from 0.02 m to 0.13 m. At Luang Prabang station, water levels were also decreased, varied from 0.02 to 0.24 m (07 Sept 2019). The current water level at this station is in between LTA and 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 03rd to 10th Sept 2019 at these stations were followed the same trend of upstream inflowed at Chiang Sean, which decreased from 0.1 m to 0.50 m. The current observed water levels at Chiang Khan, Vientiane/Nong Khai and Paksane stations are lower than their historical drought year in 1992.

For stations from Nakhon Phanom/Thakhet to Mukdaha/Sovannakhet

Water levels from 03rd to 10th Sept 2019 at Nakhon Phanom/Thakhet to Mukdahan/Sovannakhet stations were decreased due to less inflow from upstream and below average rainfalls from the contribution inflow areas. The decreased water levels were varied from 0.01 m to 0.46 m. The current water levels at these stations are close to the drought year 1992.

For stations from Khong Chiam to Pakse

Water levels from 03rd to 10th Sept 2019 at Khong Chiam to Pakse stations were significantly decreased after over the flood situations early this month. The flood levels decreased from 0.22 m to 0.69 m. The current water levels at these stations are stay in between FLOOD and ALARM levels.

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

Water levels from 03rd to 10th Sept 2019 at Stung Treng was decreased from 0.04 m to 0.22 m, while at Kratie and Kompong Cham were still increased from 0.16 m to 0.78 m. The current water levels at Stung Trend, Kratie, Kompong Cham and Koh Khel stations were at their ALARM levels, while at Chaktomuk on the Bassac, Phnom Penh Port and Prekdam on the Tonle Sap and Neak Luong on the Mekong are close to their LTAs levels (1980-2018).

Tan Chau and Chau Doc

Water levels from 03rd to 10th Sept 2019 at these 2 tidal stations were still maintaining fluctuated over their LTAs. The water levels of these 2 stations were not followed the historical trend as observed at their long-term hydrographs (See **Annex A**). The different trend of water level hydrographs might be slightly affected 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.

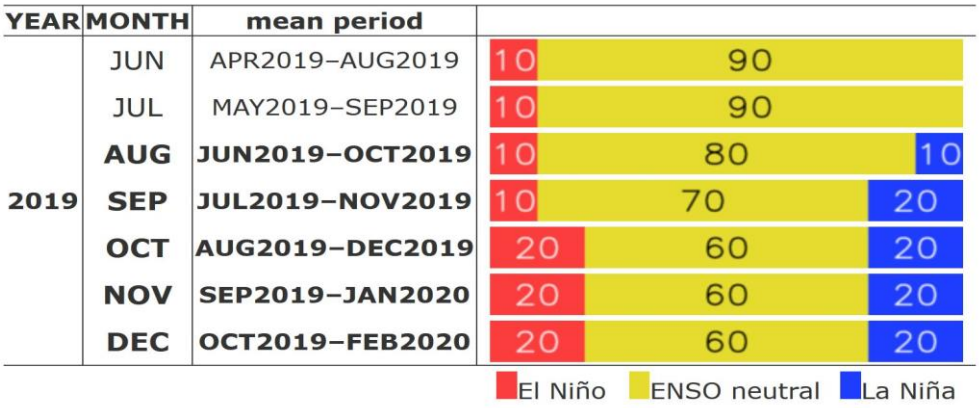


Figure 5 ENSO forecast probabilities based on JMA/MRI-CGCM2

Discussion and Conclusion

From 03rd to 10th Sept 2019, the trend of water levels at Chiang Sean were decreased due to the less outflow from Jinghong and low rainfall in catchment areas. Water level at Chiang Sean is realised from inflow from Jinghong Hydropower Station on Lancang and its catchment rainfall. The impact could obviously see the gradually decreasing water level to downstream to 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 Dry season from Nov to May, while 24% in the Wet season (Adamson. 2010). The whole inflow of water into the lower Mekong basin is influenced more by inflow from tributaries and the direct rainfall catchment.
However, water levels from Khong Chiam to Pakse are still stay in flood situation, although there have been decreased since 8th Sept 2019.
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 Vientiane/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 high at the lower part from Khong Chiam to Kratei based on heavy rainfall.

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

The Trend of water level and its Outlook

Based on daily river flood forecasting bulletin next week from 11th to 15th Sept 2019, water levels at Chiang Saen will slightly increase from 0.02 to 0.04 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. Water levels at Chiang Khan, Vientiane /Nong Khai and Paksane will slightly decrease varied from 0.04 to 0.11 m. From Nakhon Phanom to Sovanakhet, water levels will slightly decrease from 0.01 m to 0.05 m. The 5 days forecasted rainfall of NOAA (GFAS) of showed below-normal rainfall will continue in the next 5 days.

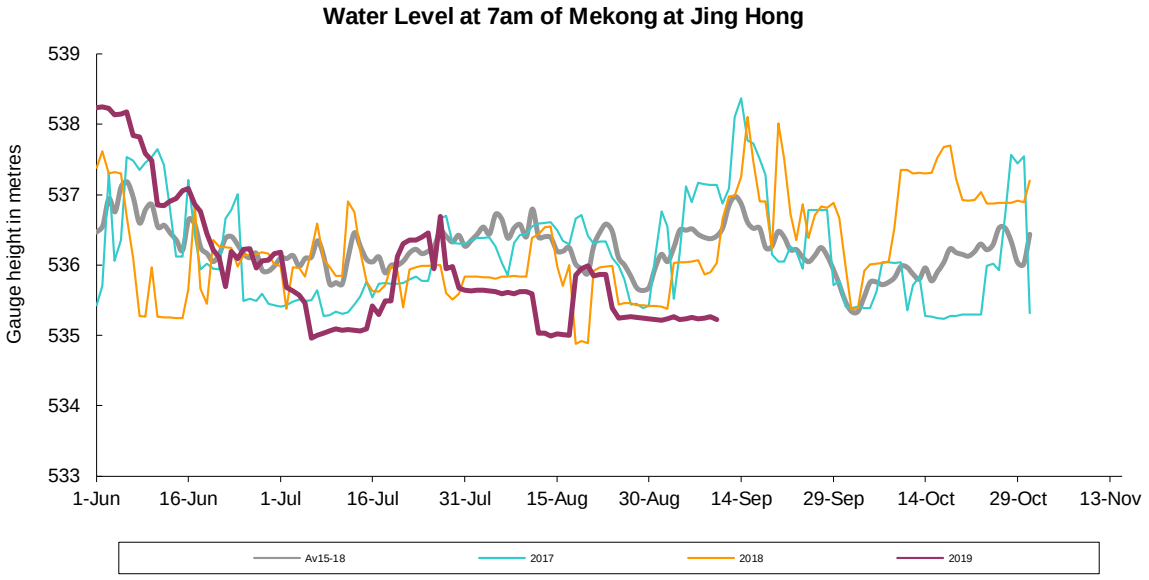
From Stung Treng, Kratie and Kompaong Cham, water levels for the 5 days forecasting from 11th to 15th Sept 2019 showed decreased from 0.01 m to 0.19 m, while at Chaktomuk, Tole Sap at Phnom Penh Port,

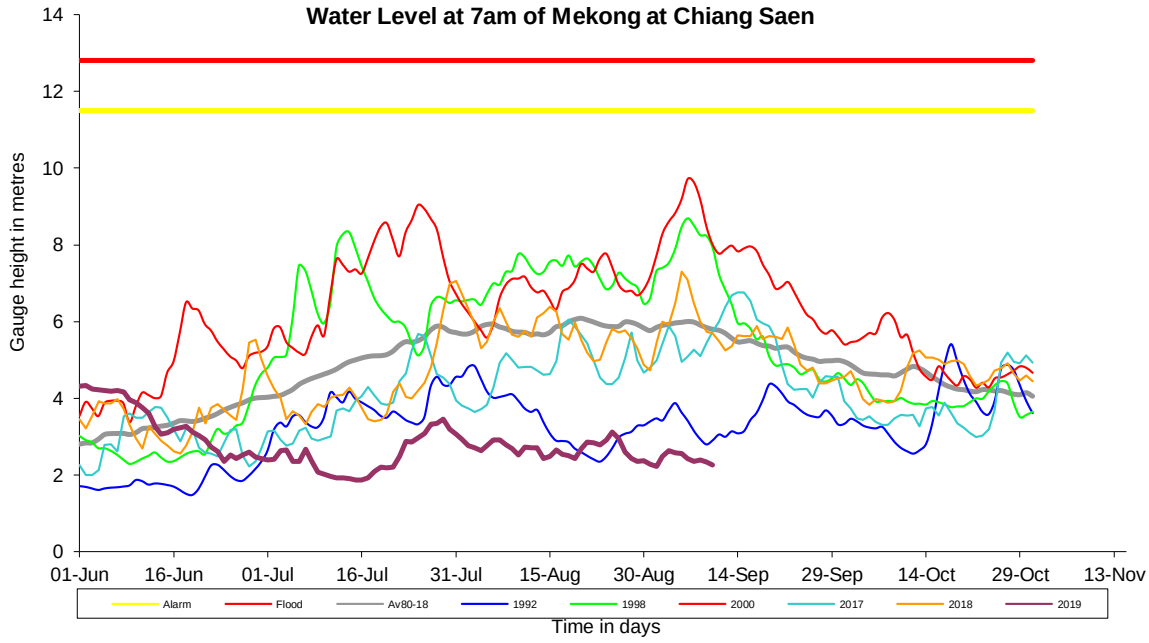
Prekdam on the Tonle Sap and Neak Luong on the Mekong will slightly increase due to the inflow from upstream of Kompong Cham.

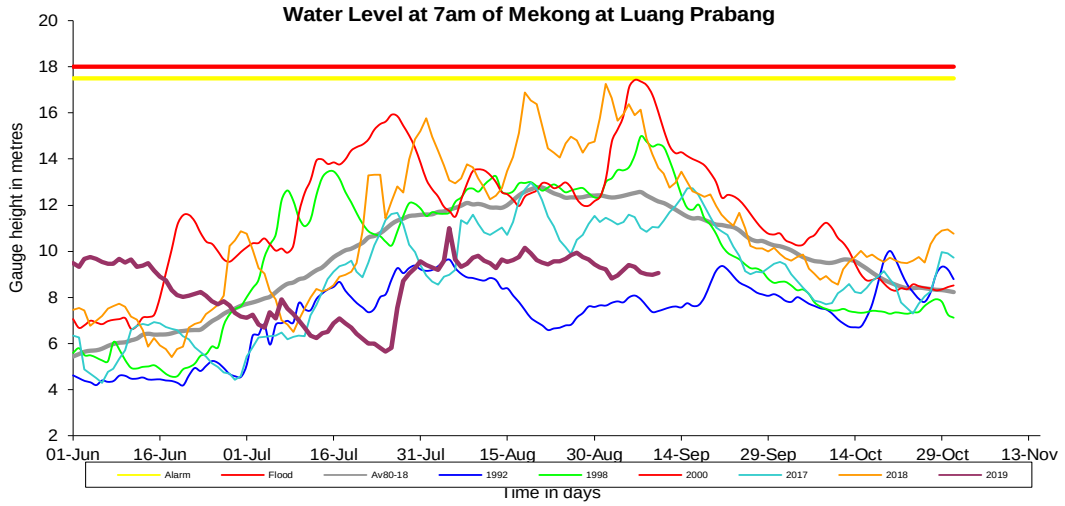
Annex A: Seasonal Water Level Hydrographs

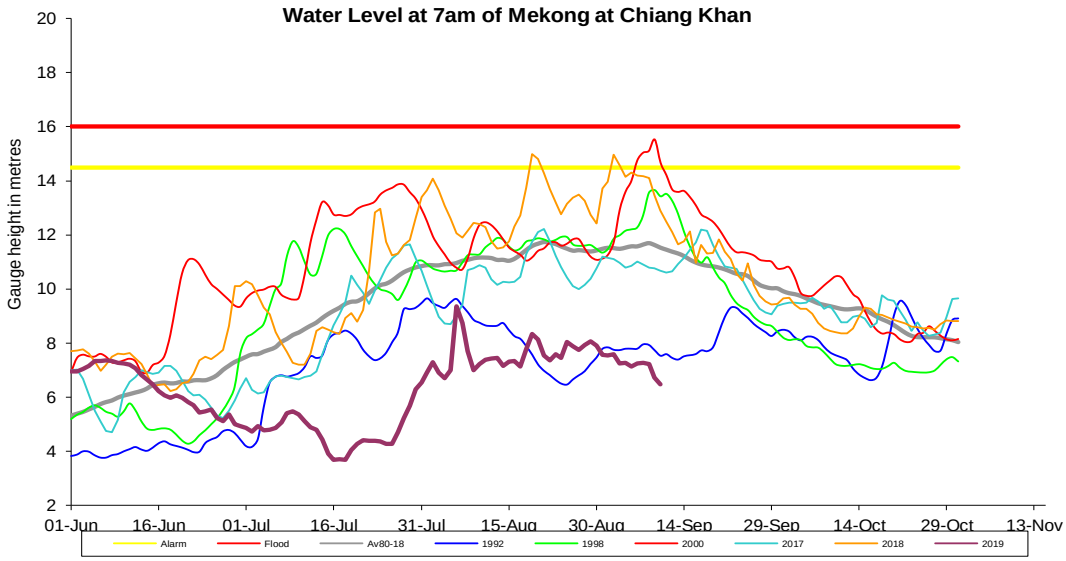
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS

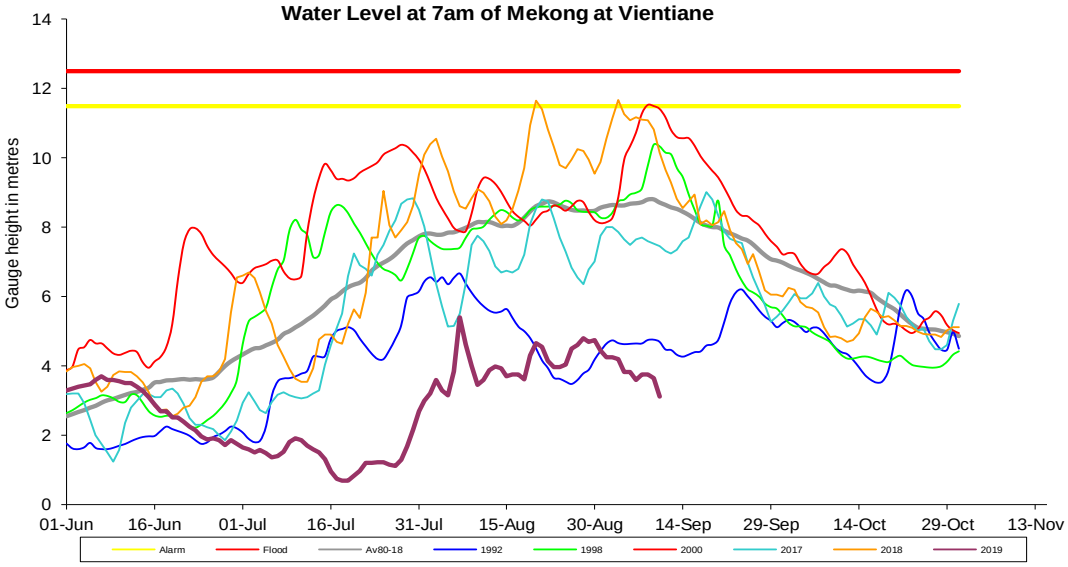
IN FLOOD SEASON FROM UP TO 10th SEPTEMBER 2019

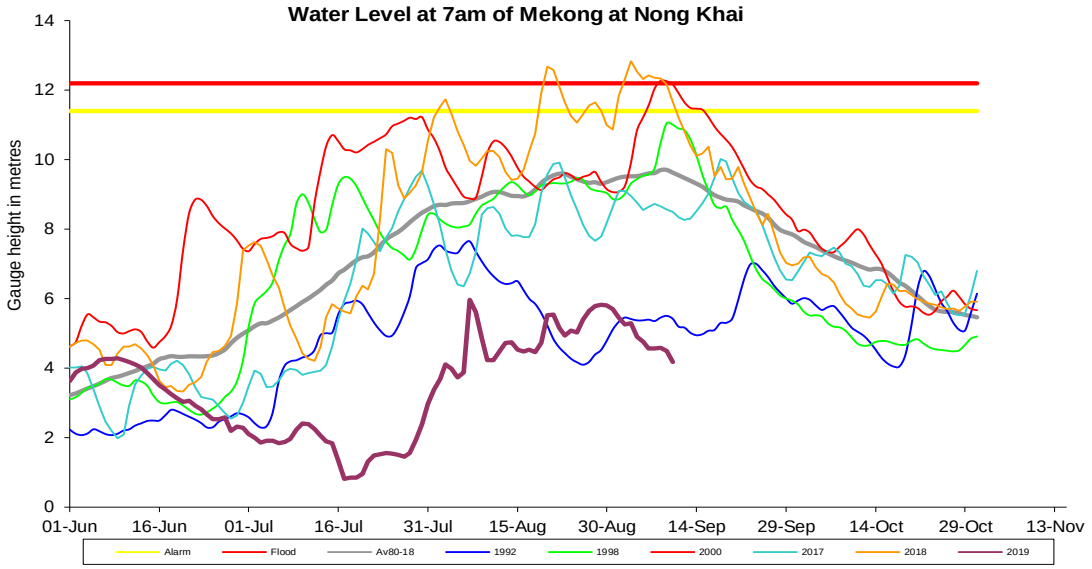


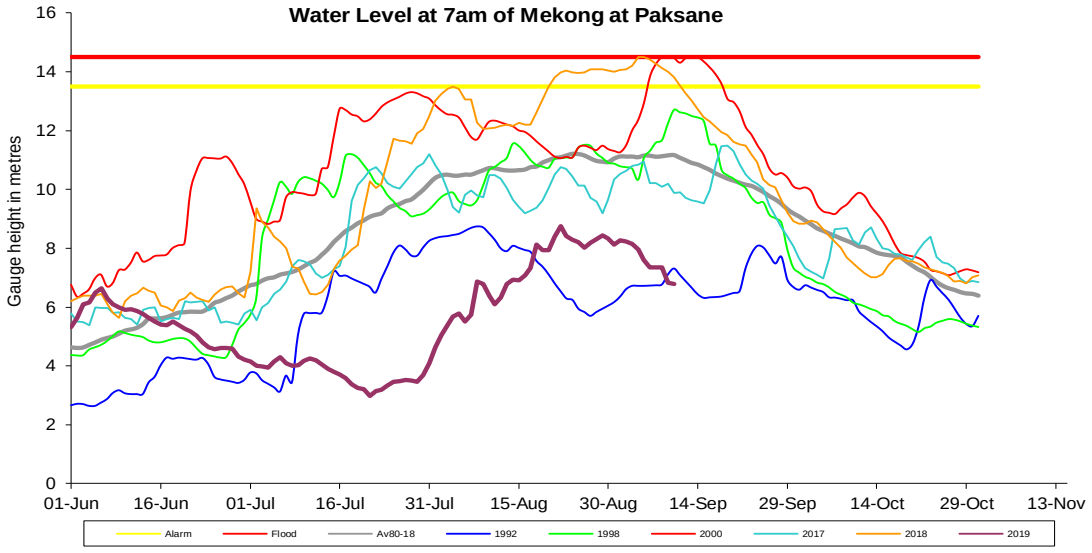


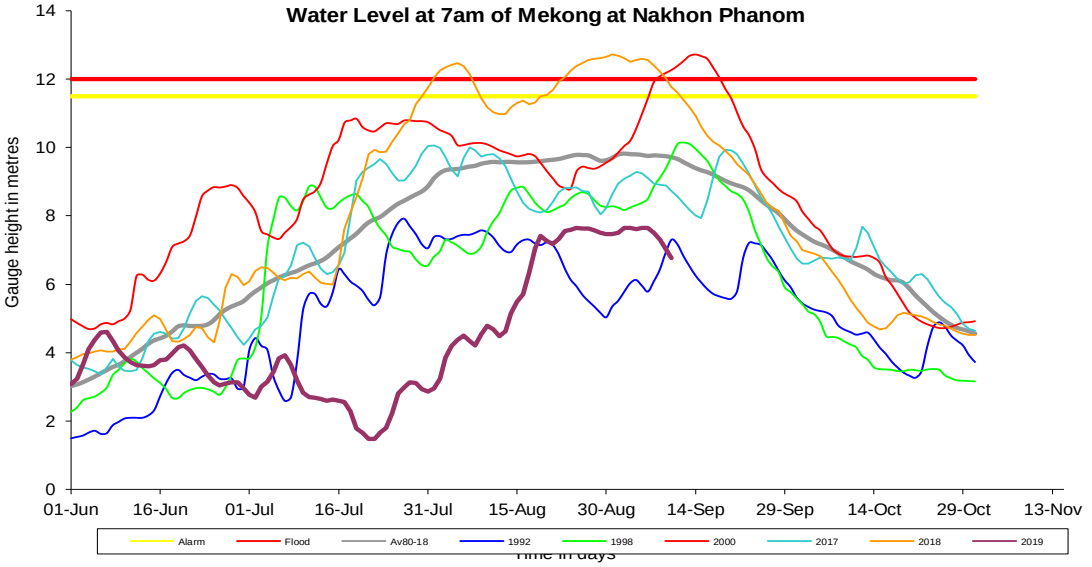

Water Level at 7am of Mekong at Luang Prabang
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019
Time in days

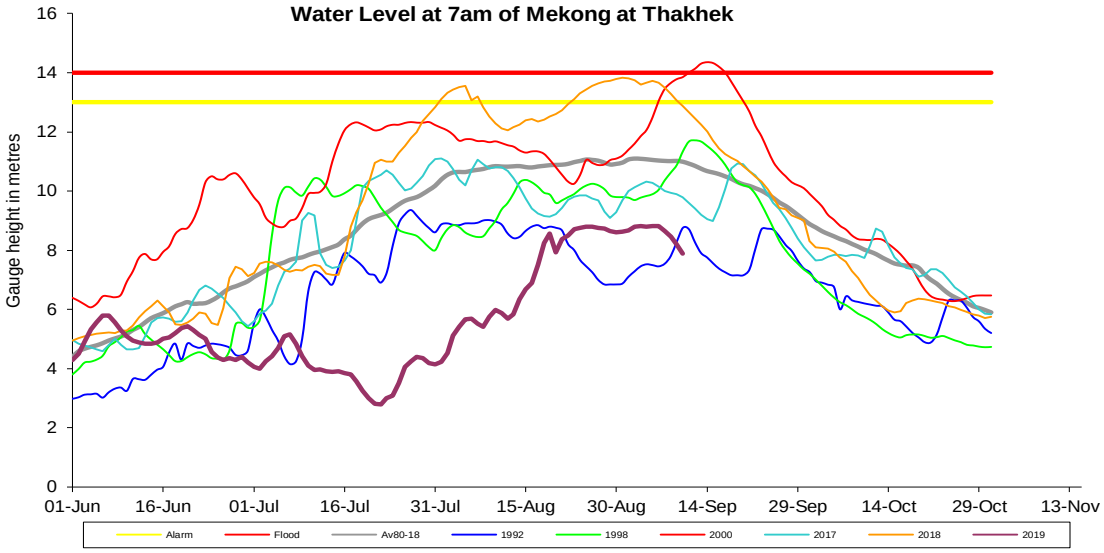

Water Level at 7am of Mekong at Chiang Khan
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

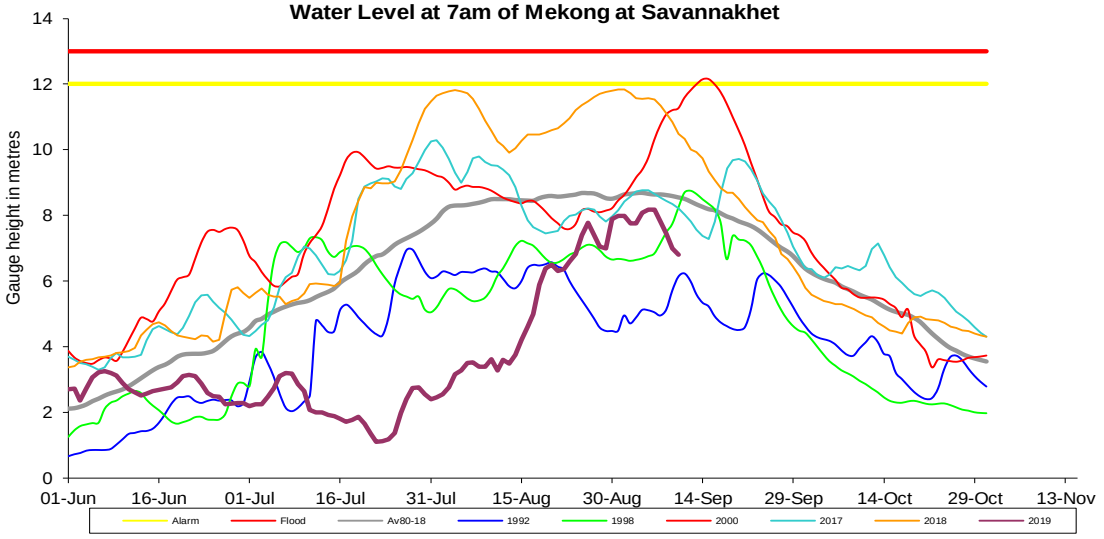

Water Level at 7am of Mekong at Vientiane
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

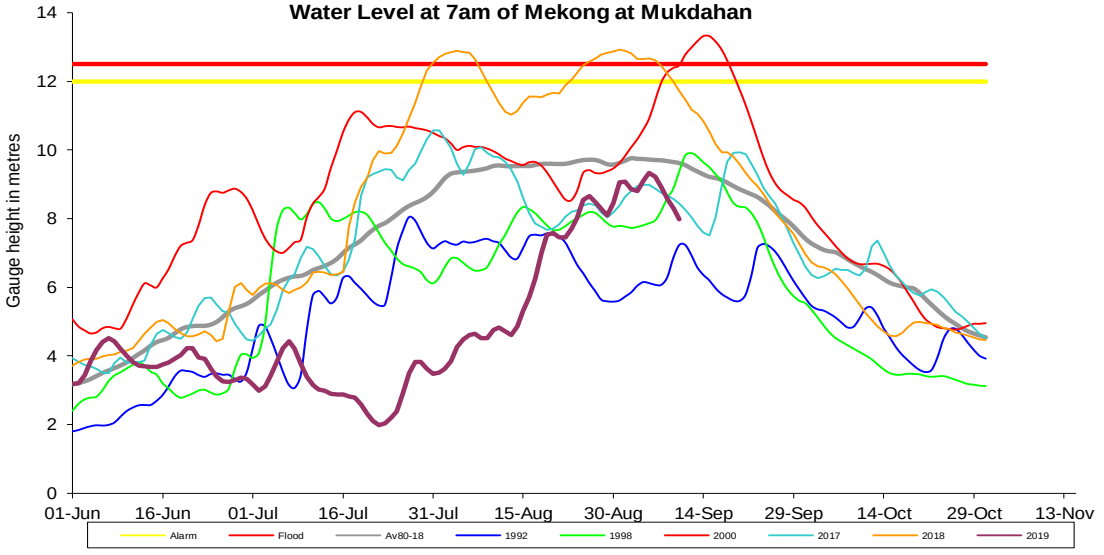

Water Level at 7am of Mekong at Nong Khai
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

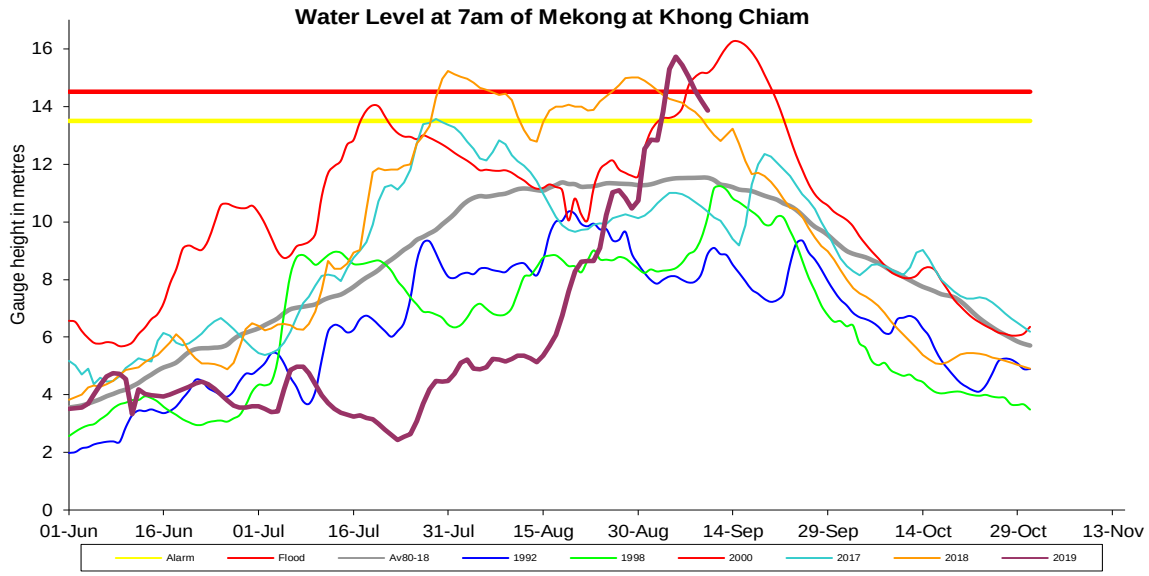

Water Level at 7am of Mekong at Paksane
Gauge height in metres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

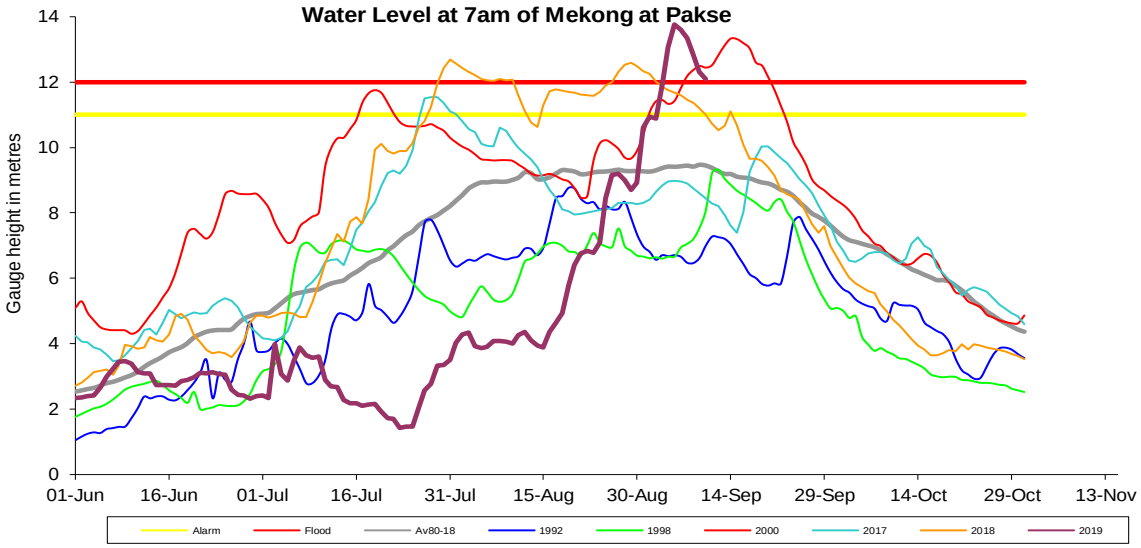

Water Level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

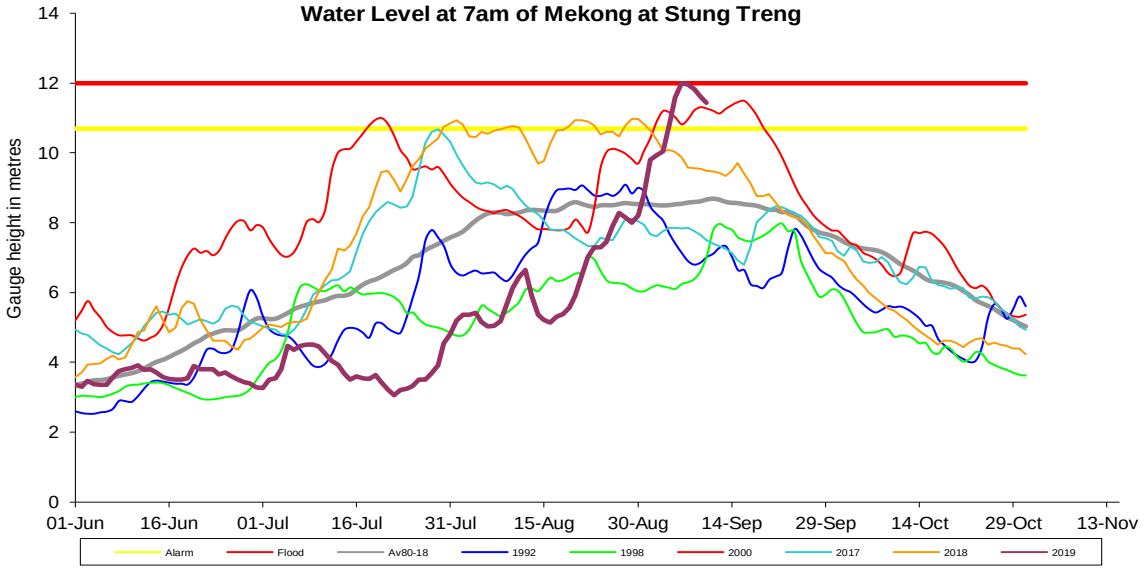

Water Level at 7am of Mekong at Thakhek
Gauge height in metres
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

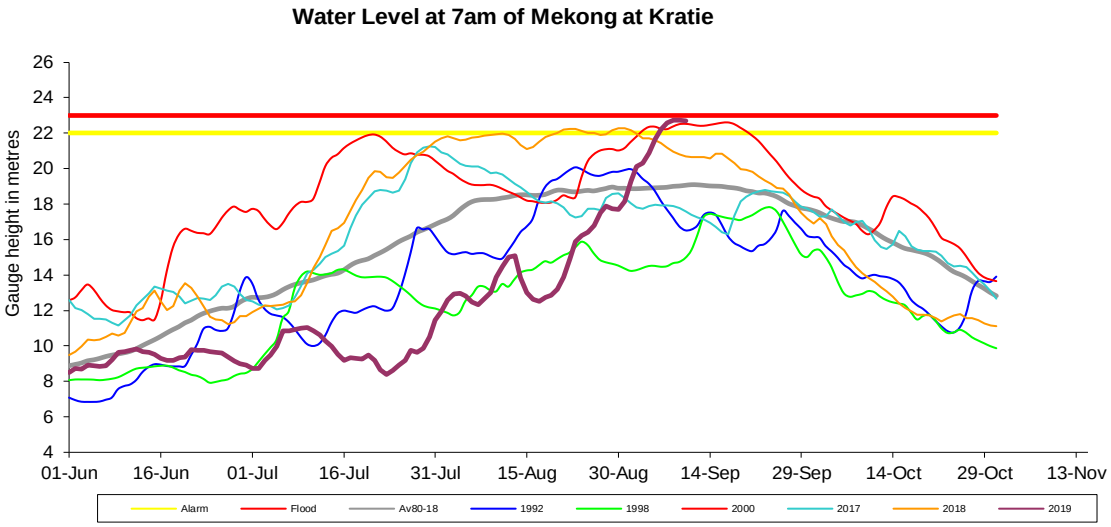

Water Level at 7am of Mekong at Savannakhet
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

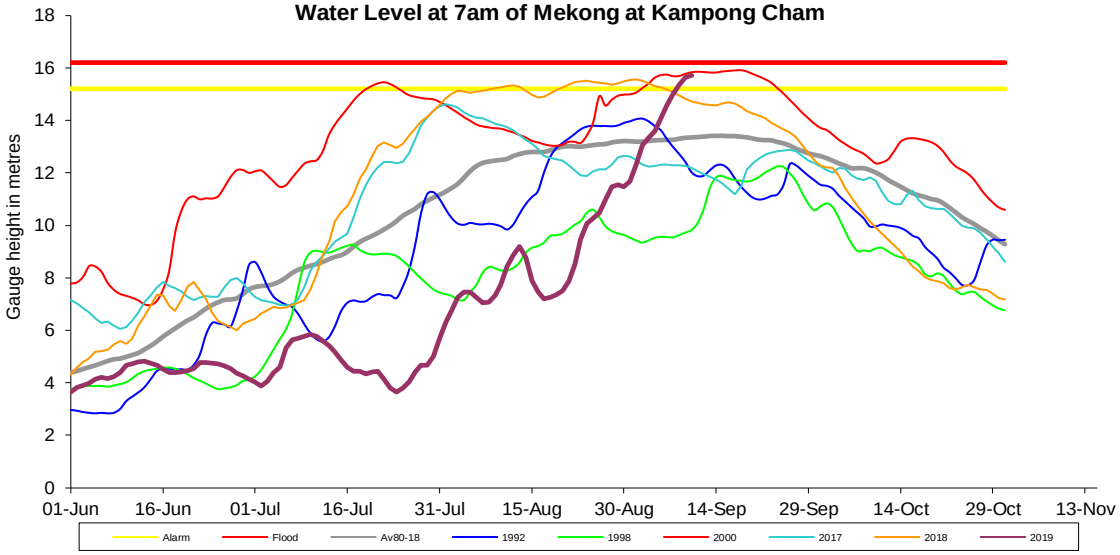

Water Level at 7am of Mekong at Mukdahan
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

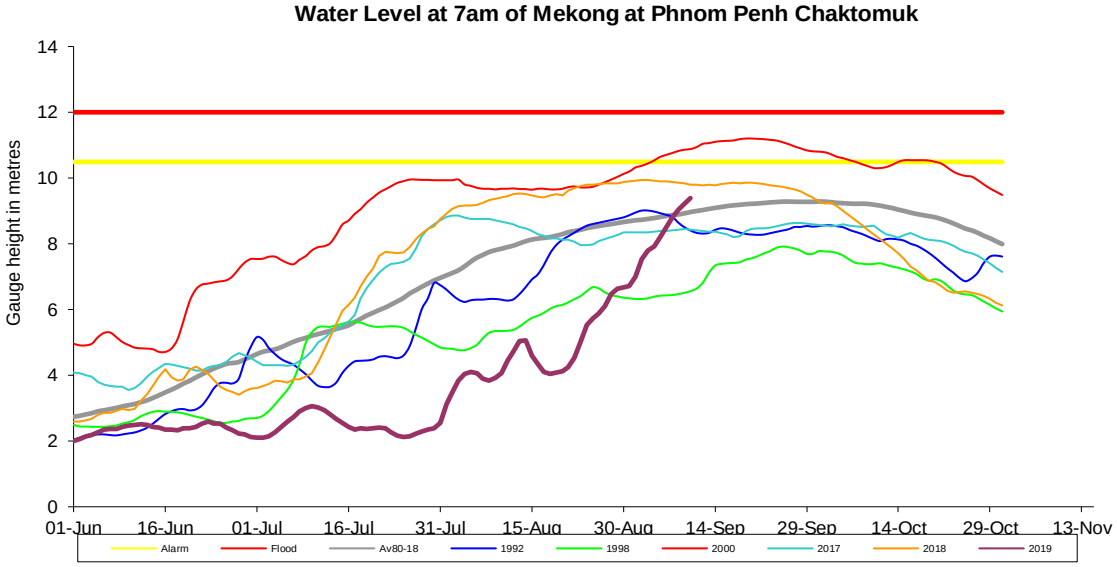

Water Level at 7am of Mekong at Khong Chiam
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

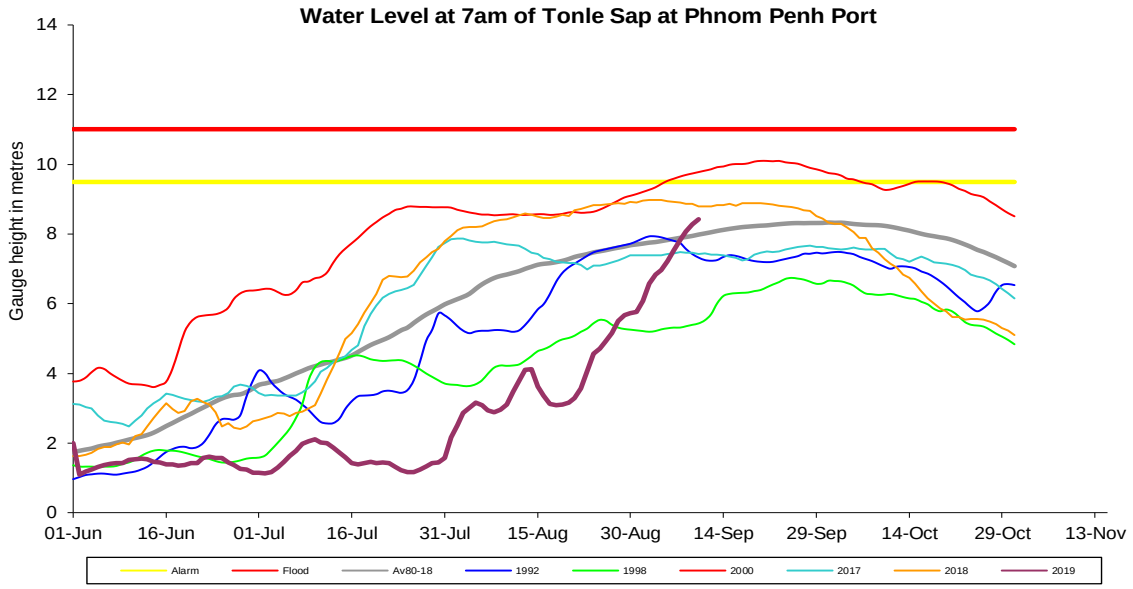

Water Level at 7am of Mekong at Pakse
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

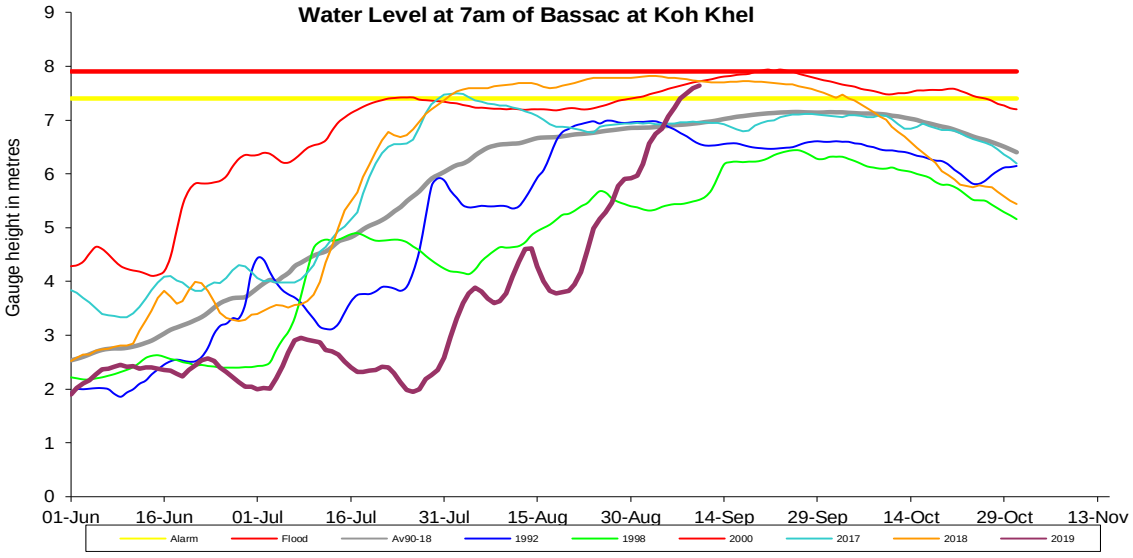

Water Level at 7am of Mekong at Stung Treng
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

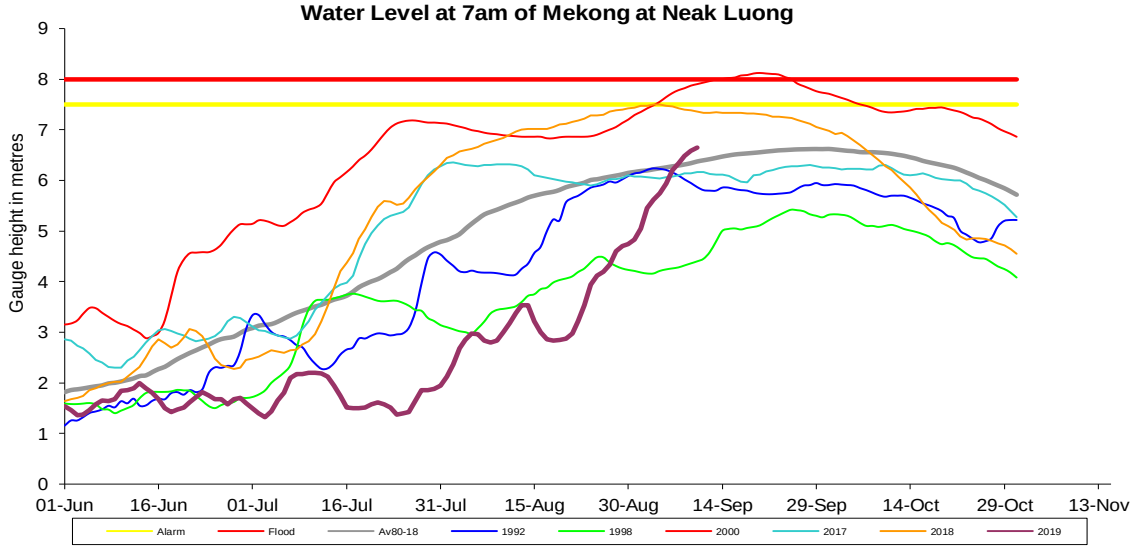

Water Level at 7am of Mekong at Kratie
Gauge height in metres
26
24
22
20
18
16
14
12
10
8
6
4
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

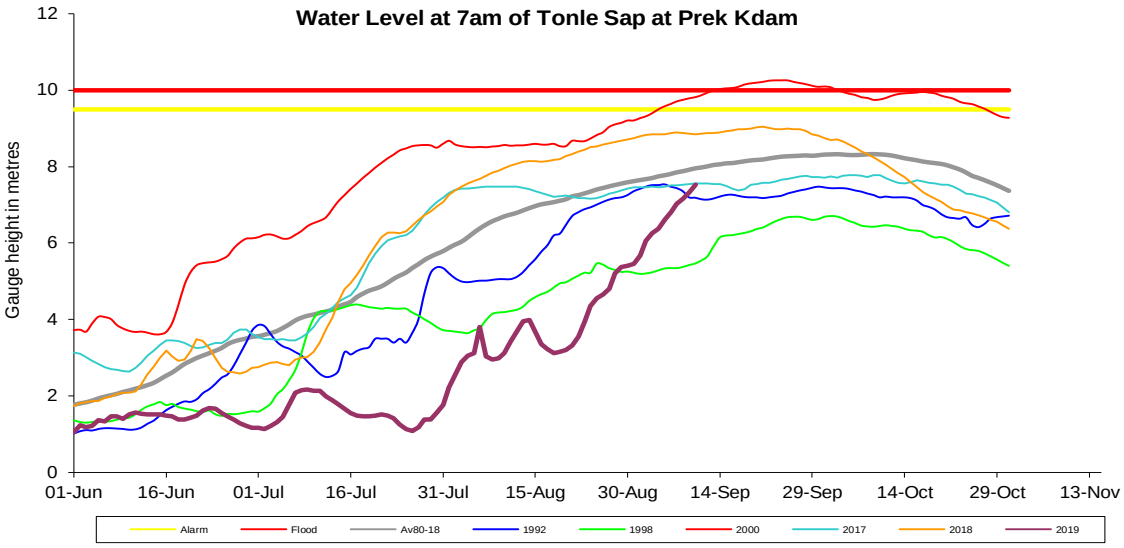

Water Level at 7am of Mekong at Kampong Cham
Gauge height in metres
18
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

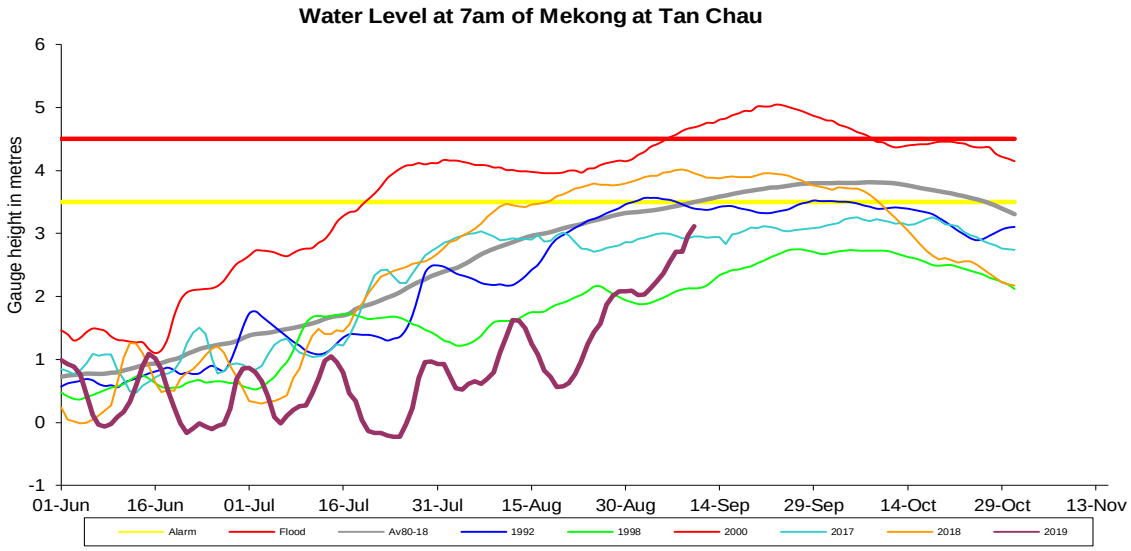

Water Level at 7am of Mekong at Phnom Penh Chaktomuk
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

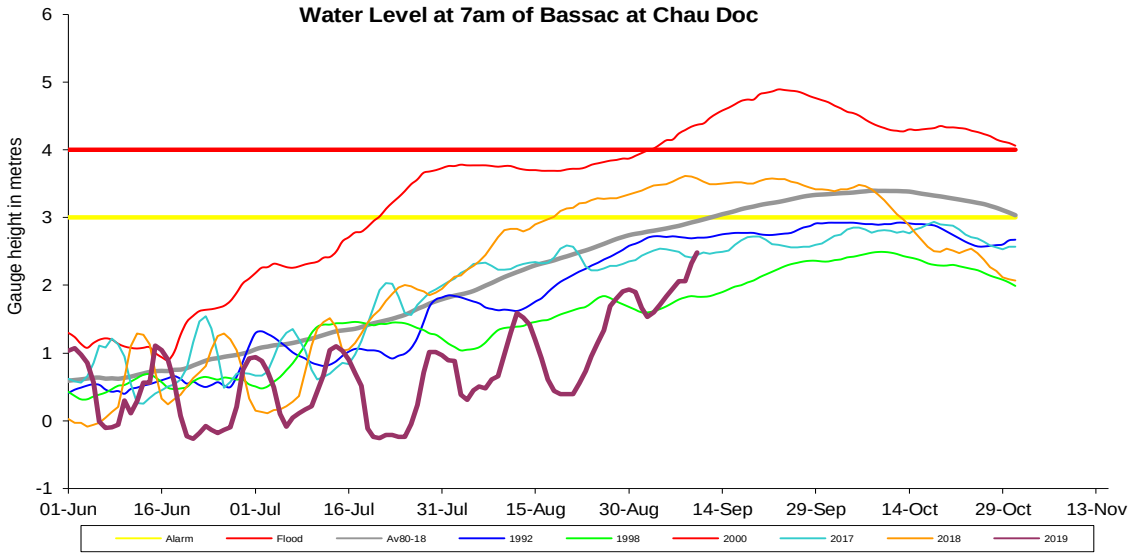

Water Level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019


Water Level at 7am of 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
Alarm
Flood
Av90-18
1992
1998
2000
2017
2018
2019


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