Weekly Flood Situation Report for the Mekong River Basin

Draft by KHEM Sothea

covering the week from 17th to 24th 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 17th to 24th 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. There were observed that the low-pressures went across the middle part of LMB, but not bring any heavy rainfall during this week, which concerned of low water levels at key station from Chaing Sean to Kratei stations although 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 moderate to heavy rain amount at some areas in early October. **Figures 1 & 2** presented the weather map for 19th and 24th Sept 2019.

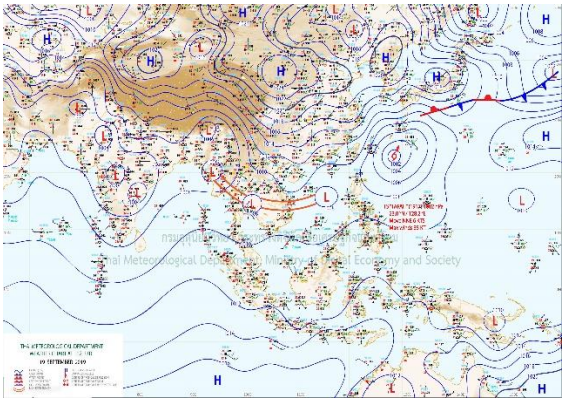


Figure 1: Weather map for 19th Sept 2019

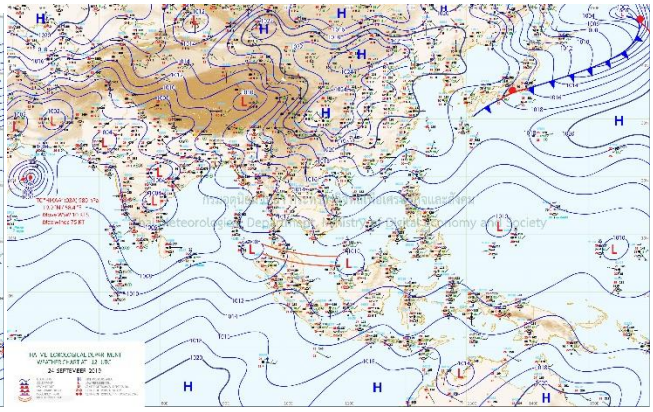


Figure 2: Weather map for 24th Sept 2019

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.

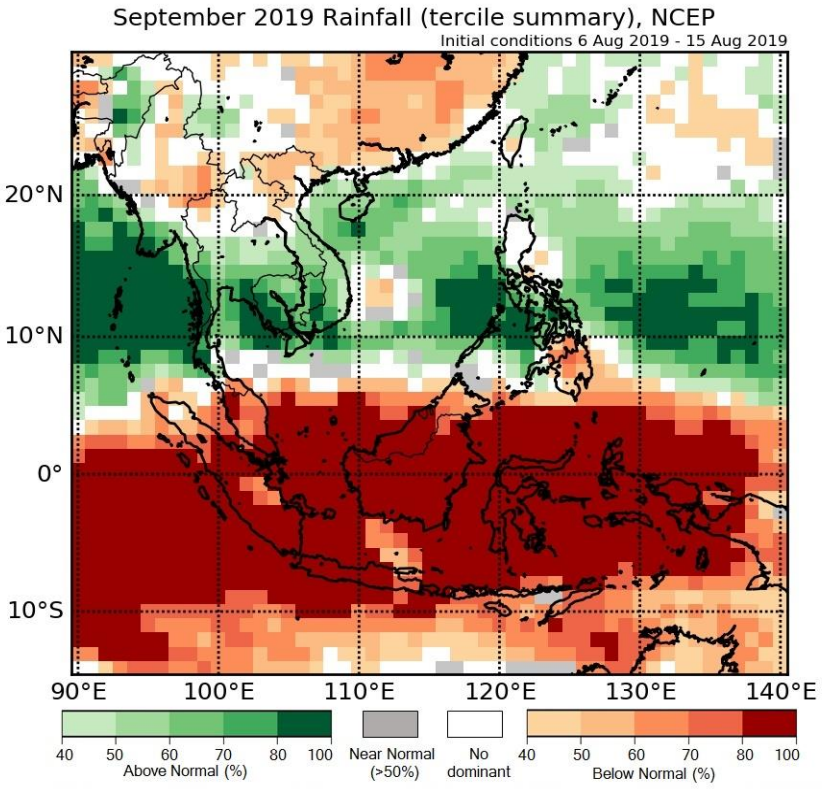


Figure 2: The predicted of above-normal rainfall in September 2019 in Southeast Asia

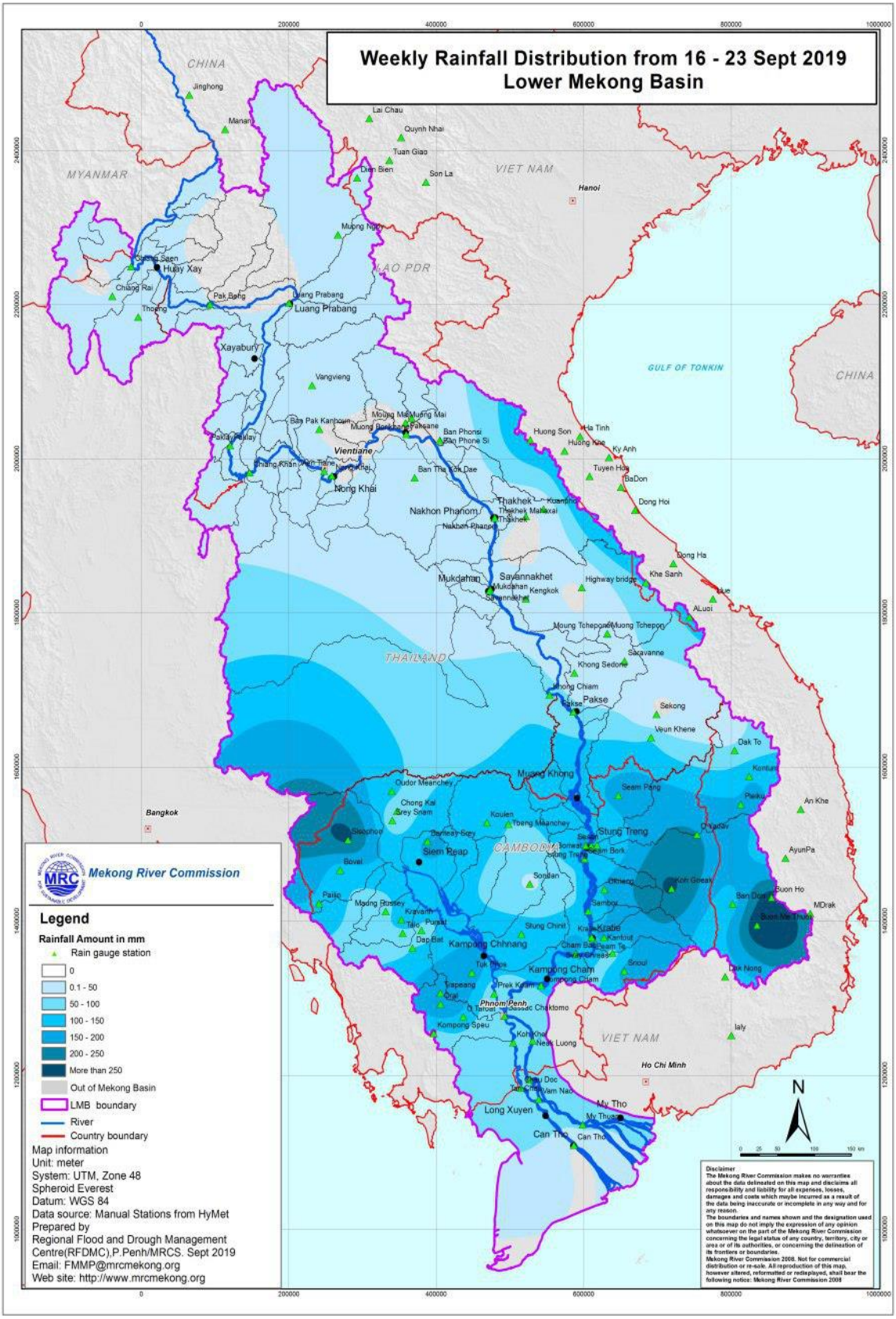
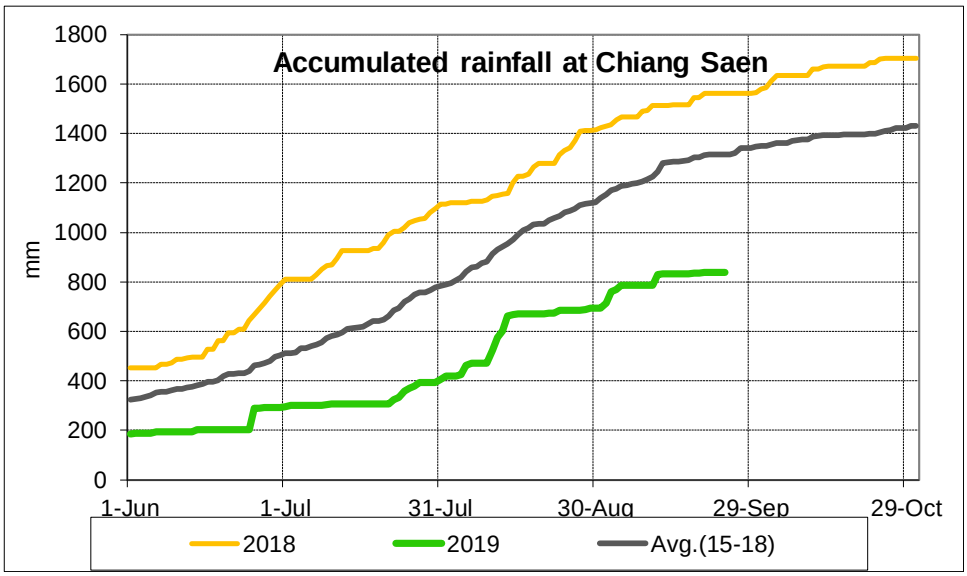


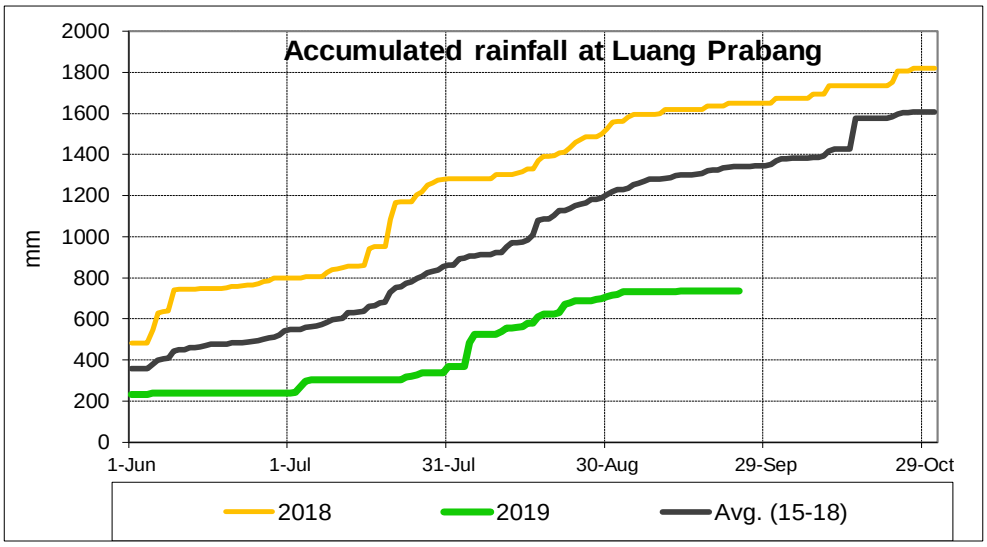
Figure 3: Weekly Rainfall Distribution over the LMB from 16th to 23th Sept 2019

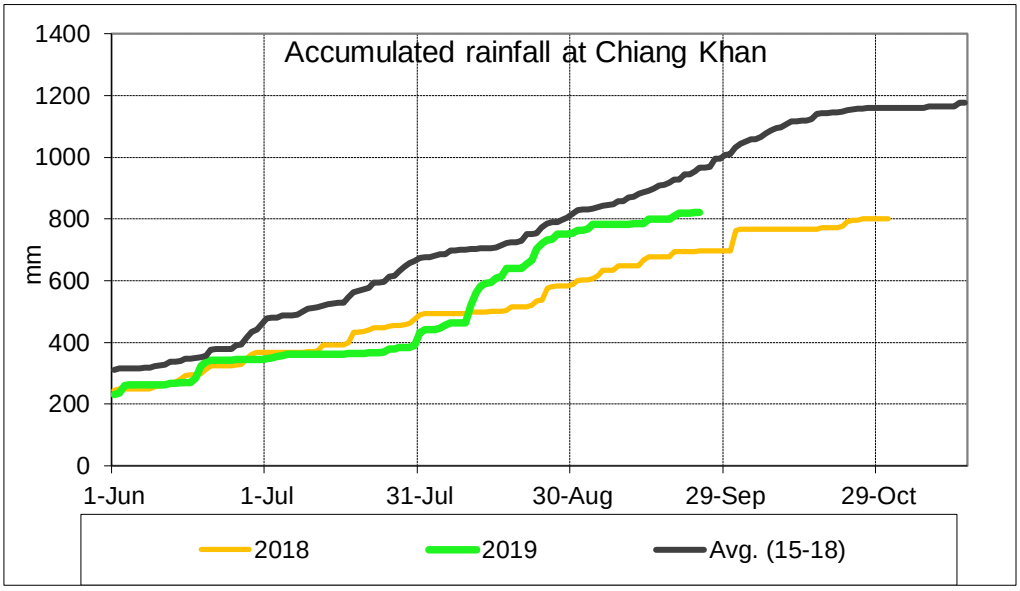
Over weather situation

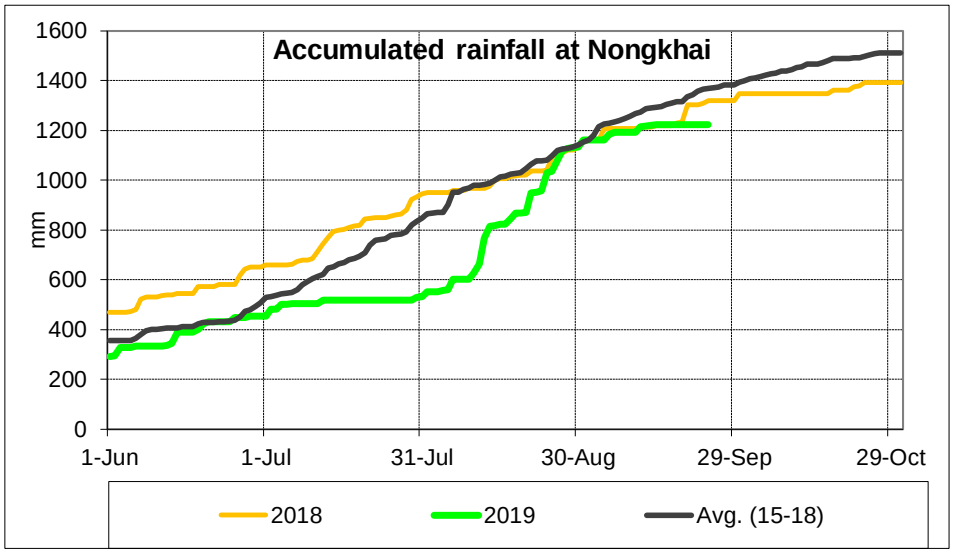
The weather of this week was brought moderate rainfall in the LMB. Rainfall in this week was considered high, covered the 3S area and the Mekong floodplain in Cambodia and Vietnam, varied from 100 mm to 200 mm. The weekly rainfall distribution in the Lower Mekong Basin from 16th to 23th Sept 2019 is 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 24th Sept 2019 are showed in **Figure 4**. The above- average rainfalls were found at Nakhon Phanom and Kratie during this week.

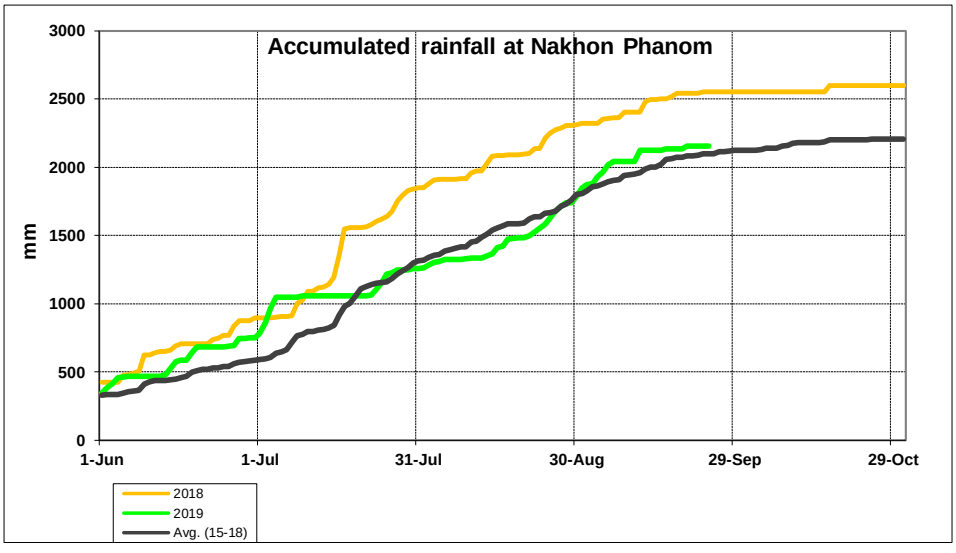
It also indicated that last week rainfall over the LMB varied from place to places, which showed the less rainfall in the upper most part (Chiang Sean to Nong Khai), but at Nakhon Phanom and Kratei were showed higher than their LTAs (2015-2018).

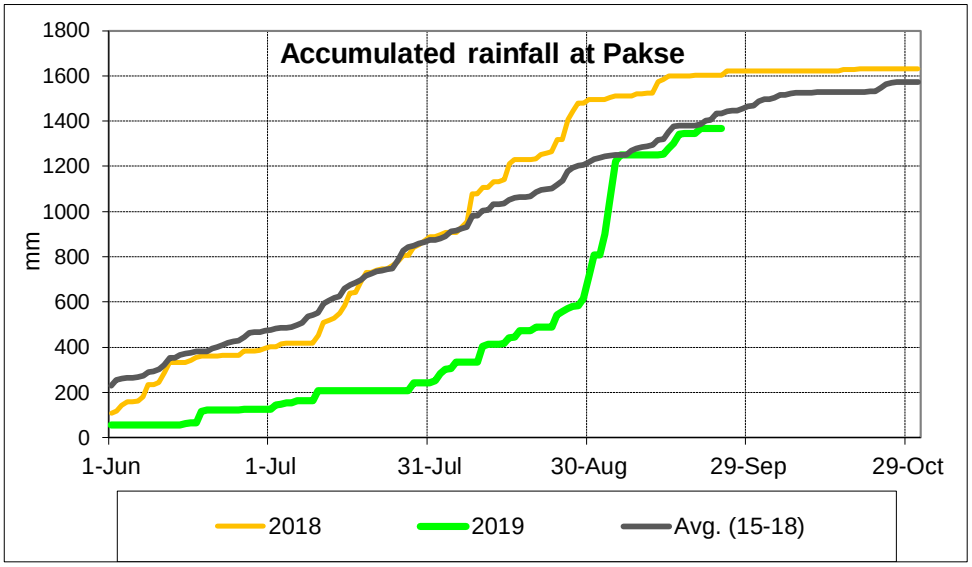


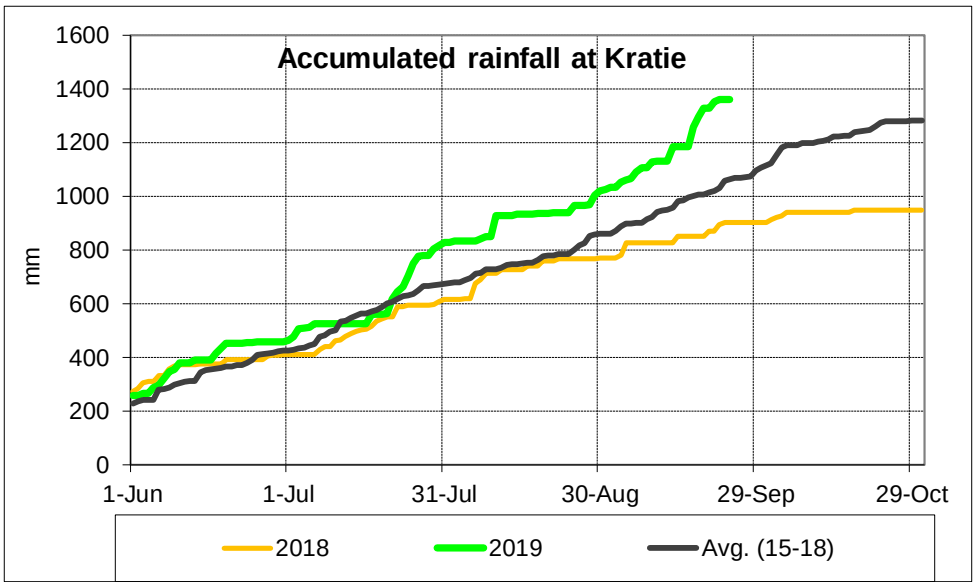



Accumulated rainfall at Chiang Khan
mm
1400
1200
1000
800
600
400
200
0
1-Jun
1-Jul
31-Jul
30-Aug
29-Sep
29-Oct
2018
2019
Avg. (15-18)


Accumulated rainfall at 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)


Accumulated rainfall at Kratie
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)

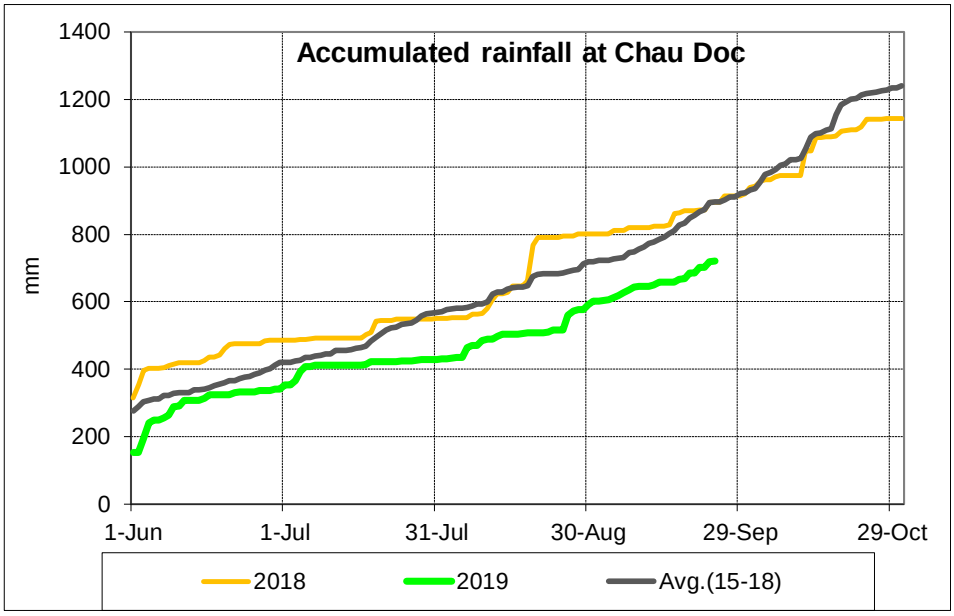


Figure 4: Accumulated Rainfall up to 24th September to 2019 in specific stations over the LMB

General behaviour of the Mekong River

This week from 17th to 24th Sept 2019, 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 downstream at Xayaburi. Water levels at stations at the middle part of LMB from Paksane to Sovanakhet have also decreased significantly below their LTAs. Water levels at Khong Chiam, Pakse were also decreased and stay below their LTAs. At Stung Treng, Kratei, Chaktomuk on the Bassac, Phnom Penh Port and Neak Luong were stay above their LTAs, while water levels at Koh Khel are stayed at the alarm level. For the 2 tidal stations at Tan Chau and Chau Doc, water levels are currently at alarm level and may oscillate around alarm level sever times within day up to 27th September 2019, due to tidal effect.

For stations from Chiang Saen and Luang Prabang

Water levels from 17th to 24th Sept 2019 at Chiang Sean station were significantly decreased and stay below its drought year 1992, due to the decreased low rainfall and low inflow 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 0.18m. At Luang Prabang station, water levels were fluctuated up and down over the drought year level (1992), varied from 0.07 to 1.33 m due to the impounding reservoir downstream of Xayaburi. The current water level at this station is below its 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 17th to 24th Sept 2019 at these stations were followed the same trend of upstream inflowed at Chiang Sean, which decreased from 0.01 m to 0.60 m. The current observed water levels at Chiang Khan, Vientiane/Nong Khai and Paksane stations are lower than their historical drought year of 1992.

For stations from Nakhon Phanom/Thakhet to Mukdaha/Sovannakhet

Water levels from 17th to 24th Sept 2019 at Nakhon Phanom/Thakhet to Mukdahan/Sovannakhet stations were significantly decreased due to less inflow from upstream and below average rainfalls from the

contribution inflow areas. The decreased water levels were varied from 0.12 m to 0.58 m. The current water levels at these stations are fluctuated over their drought years 1992.

For stations from Khong Chiam to Pakse

Water levels from 17th to 24th Sept 2019 at Khong Chiam to Pakse stations were significantly decreased after flood effected in early this month. The water levels decreased from 0.20 m to 0.85 m. The current water levels at these stations are stay below their drought years 1992.

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

Water levels from 17th to 24th Sept 2019 at Stung Treng, Kratie and Kompong Cham were decreased from 0.10 m to 0.81 m. The current water levels at Stung Trend, Kratie, Kompong Cham and Koh Khel stations were above their LTAs, while at Chaktomuk on the Bassac, Phnom Penh Port and Prekdam on the Tonle Sap and Neak Luong on the Mekong are below their LTAs levels (1980-2018). Water levels at Koh Khel are decreased but stay over its LTA.

Tan Chau and Chau Doc

Water levels from 17th to 24th Sept 2019 at the 2 tidal stations at Tan Chau and Chau Doc, water levels are currently at alarm level and may oscillate around alarm level sever times within day sine last week 16th September 2019, due to tidal effect. Water levels at these stations reached over alarm level several times in a day. 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 not widely spread as previous months. The NINO3 index is one of several El Niño/Southern Oscillation (ENSO) indicators based on sea surface temperatures.

Discussion and Conclusion

From 17th to 24th Sept 2019, the trend of water levels at Chiang Sean were significantly decreased due to the less outflow from Jinghong and low rainfall in catchment areas. Water level at Chiang Sean is relied 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.
The low inflows from upstream and less rainfall in catchments, resulting water levels from Paksane to Pakse are drastically dropped below their LTAs.
However, from Stung Treng, Kratie and Kompong Cham stations water levels are staying in between their alarm and long-term average levels while water levels at Koh Khel were stayed above its alarm level since for a week.
Wet Season 2019 (Aug-Sep) is characterized low rainfall at the upper part but high at the lower part from Khong Chiam to Kratei.
Due to the low flow of the Mekong, the upcoming Dry Season can be possible to face the dangerous shortage of water for drinking and agricultural production, fishery production, ecological systems, biodiversity, bank erosion, salinity intrusion in the Mekong Delta and waterway transport because not enough water for fish spawning and also aquatic lives ect. The reduced water flow could also affect to the expanding unsaturated soil which cause bank erosion and salinity intrusion from the sea.
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 25th to 30th Sept 2019, water levels at Chiang Saen will continue to decrease, which varies from 0.04 to 0.10 m, while the water level of the

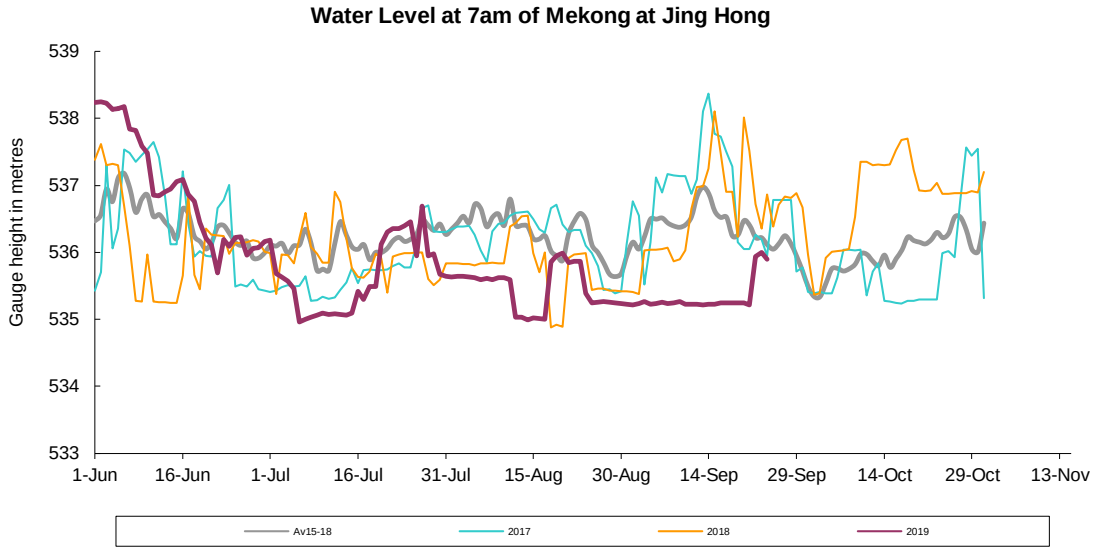
station at Luang Prabang will be fluctuated due to the impact of the inflow from reservoir operation upstream and downstream. Water levels at Chiang Khan, Vientiane /Nong Khai and Paksane will also continue to decrease, varied from 0.05 to 0.23 m. From Nakhon Phanom to Sovanakhet, water levels will be decreased from 0.06 m to 0.35 m. The 5 days forecasted rainfall of NOAA (GFAS) of showed below-normal rainfall will continue in the next 5 days.

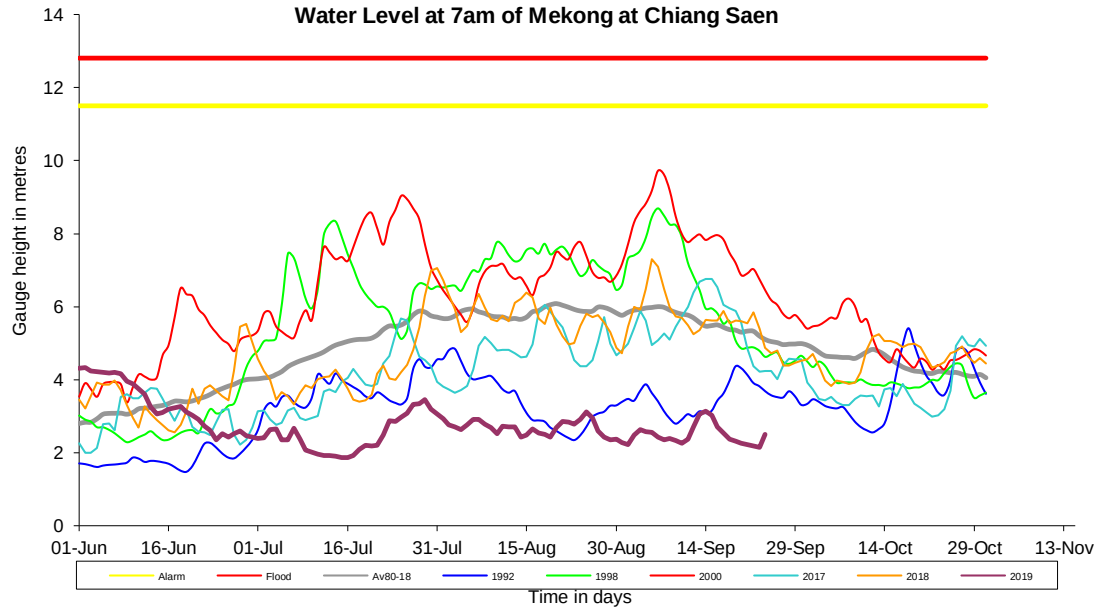
From Stung Treng, Kratie and Kompaong Cham, water levels for the 5 days forecasting from 25th to 30th Sept 2019 showed decreased from 0.05 m to 0.40 m, while at Chaktomuk, Tole Sap at Phnom Penh Port, Prekdam on the Tonle Sap and Neak Luong on the Mekong will slightly increase due to the inflow from upstream of Kompong Cham.

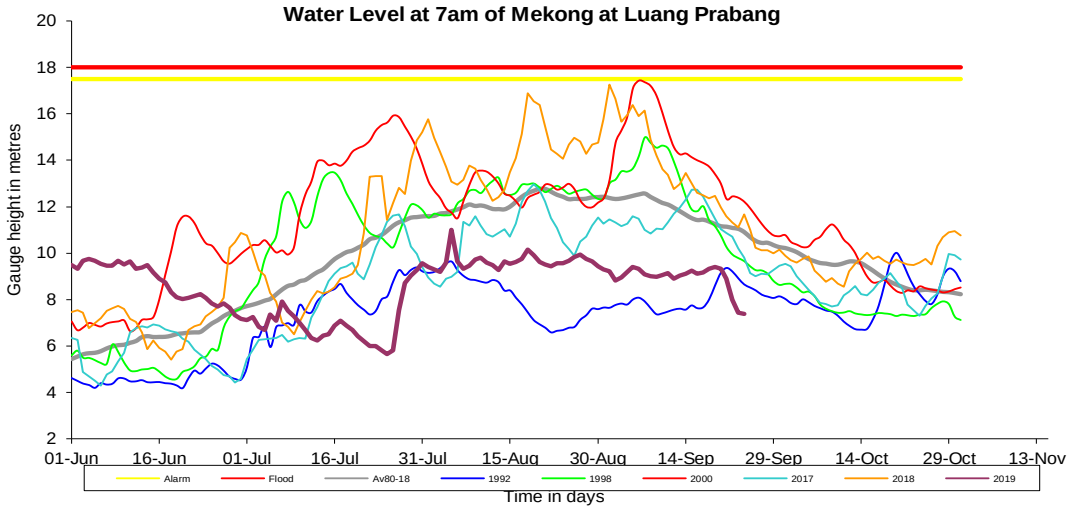
Stations at Tan Chau is currently at alarm level and may oscillate around alarm level sever times within day from 25th September 2019 and Chau Doc will be reached to alarm level from 25th to 30th, due to tidal effect.

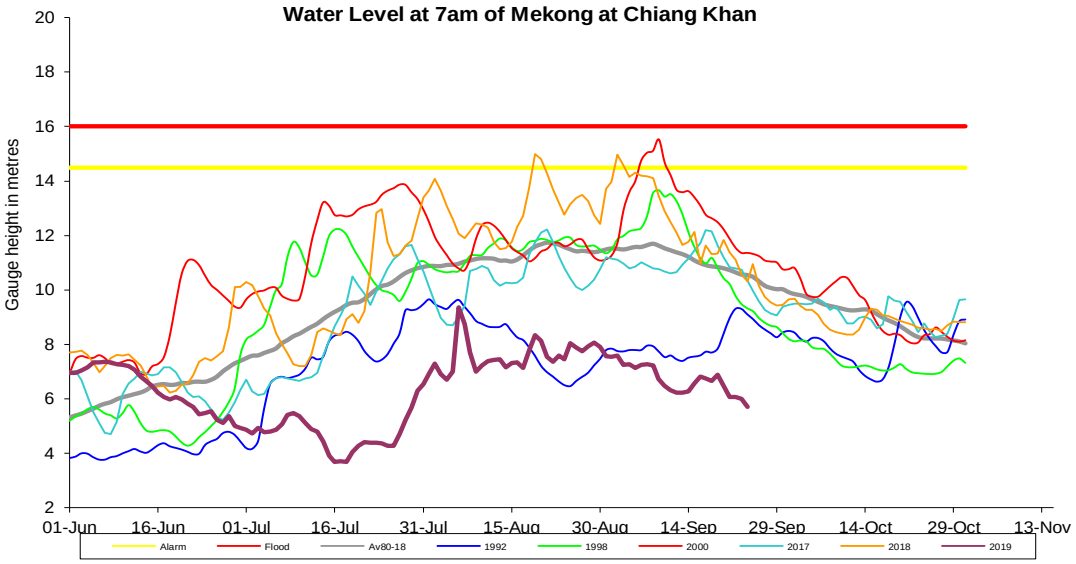
Annex A: Seasonal Water Level Hydrographs

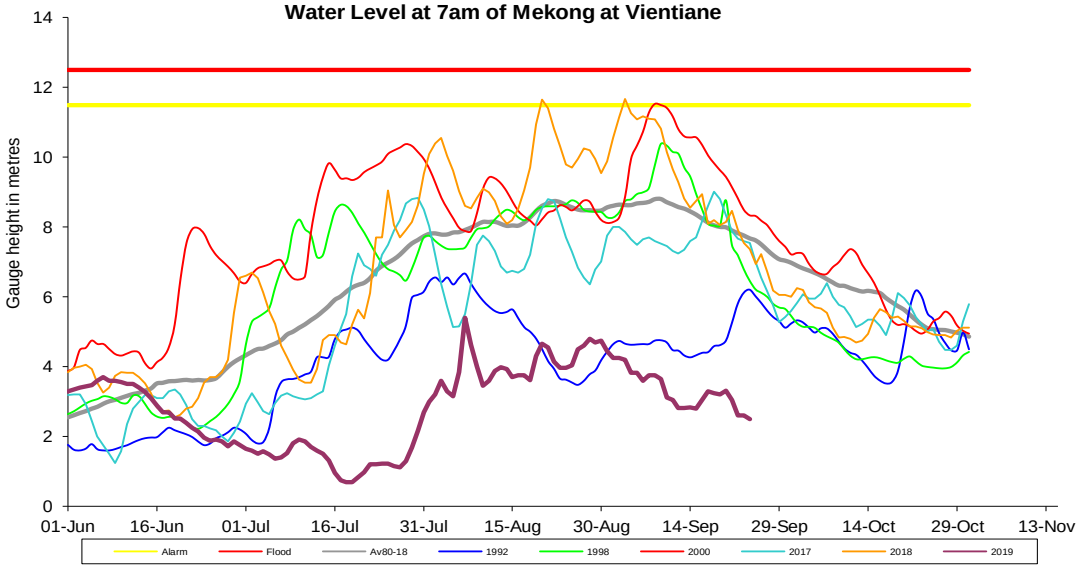
HYDROGRAPHS OF THE MEKONG AT MAINSTREAM STATIONS IN FLOOD SEASON FROM UP TO 25th SEPTEMBER 2019

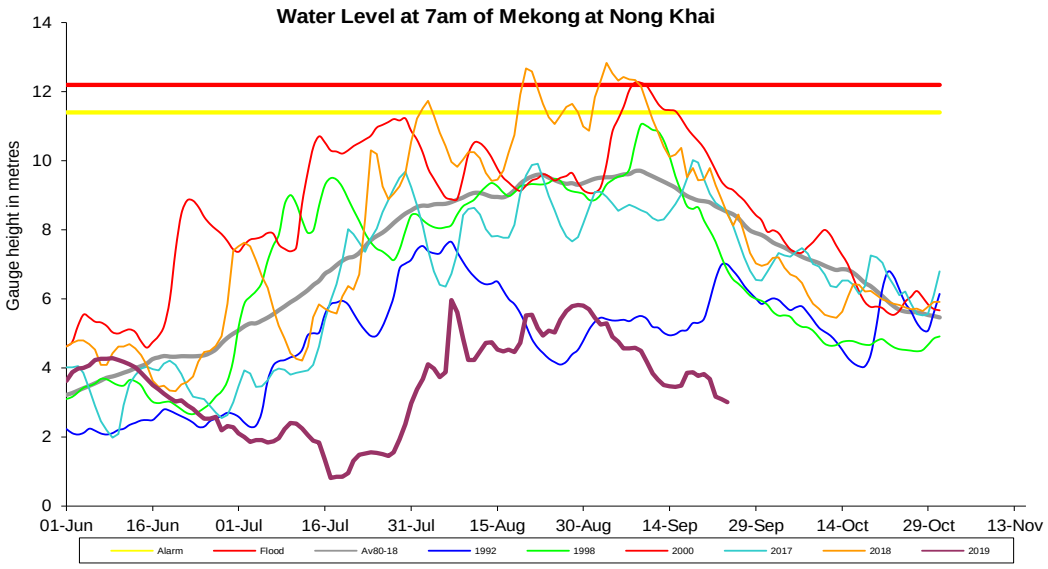


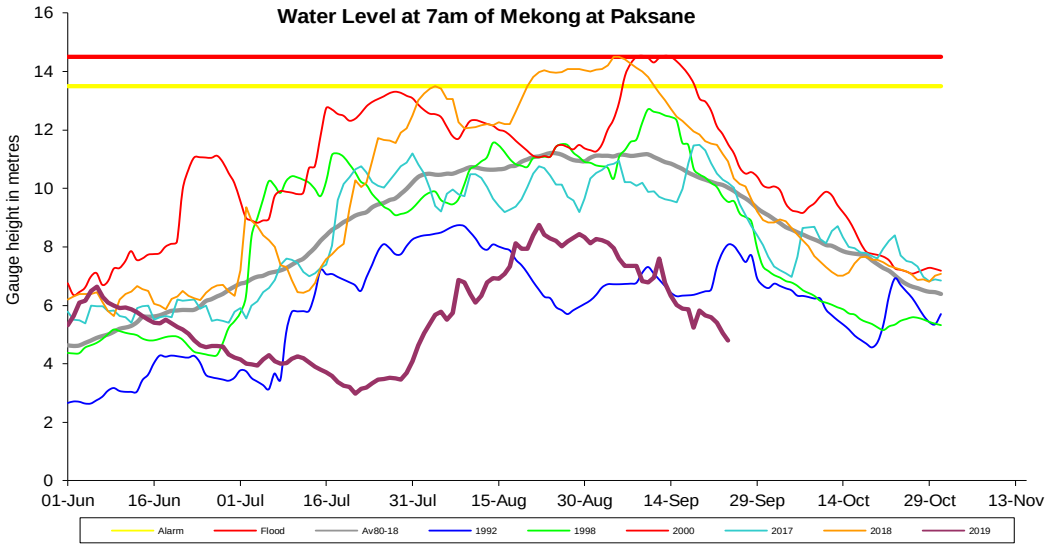


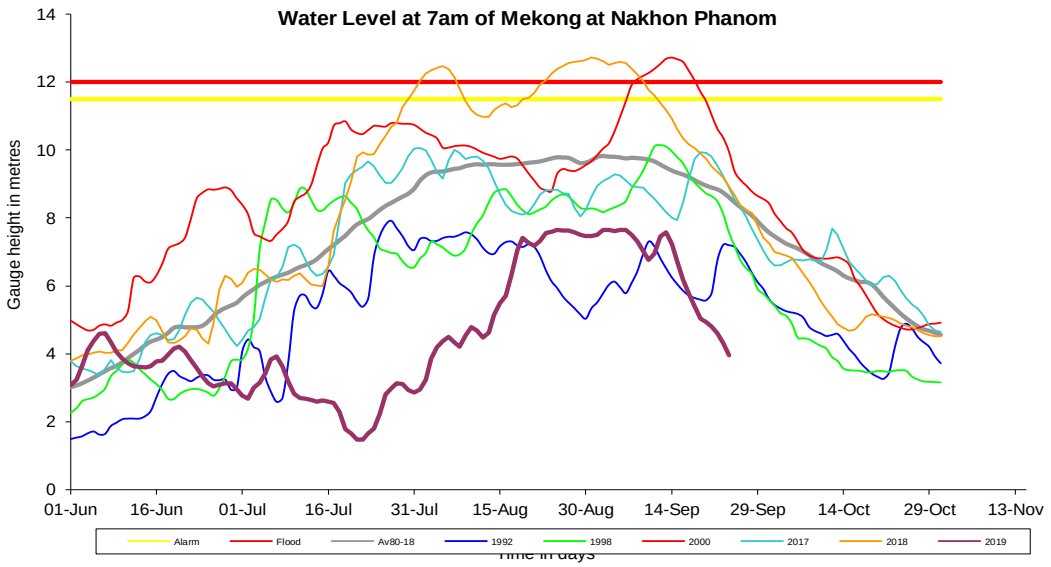

Water Level at 7am of Mekong at Luang Prabang
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019
Time in days

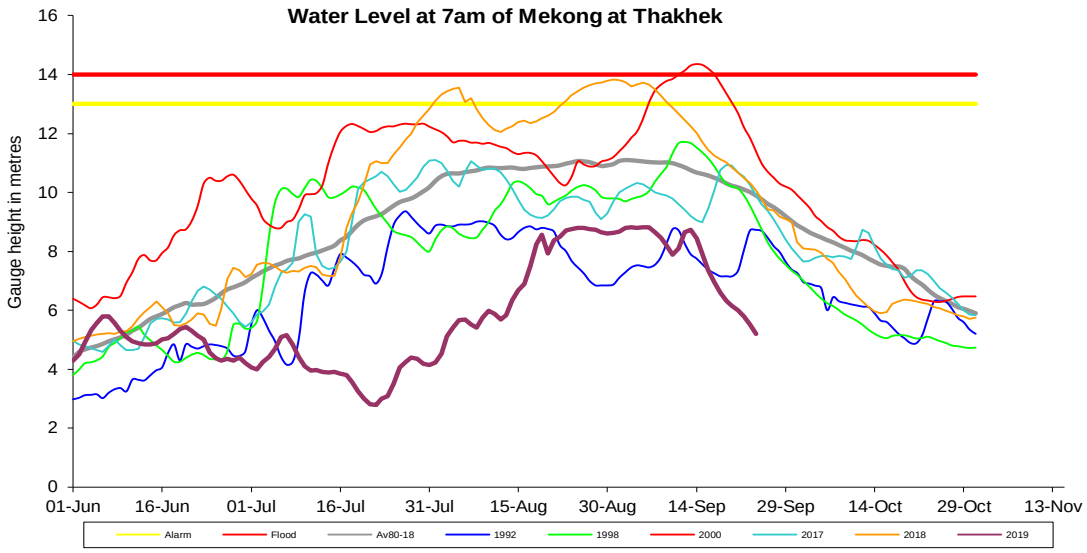

Water Level at 7am of Mekong at Chiang Khan
Gauge height in metres
20
18
16
14
12
10
8
6
4
2
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

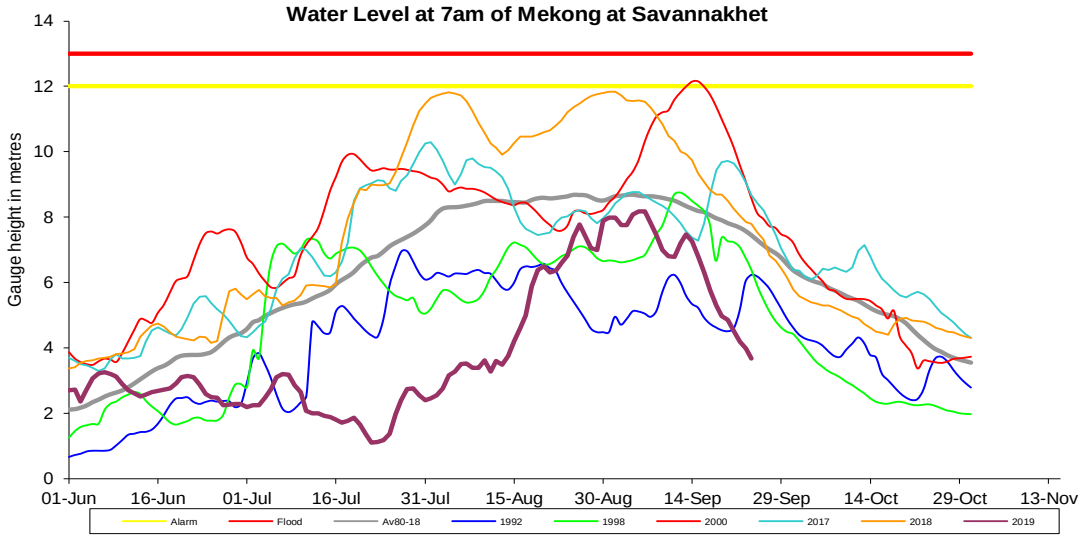

Water Level at 7am of Mekong at Vientiane
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

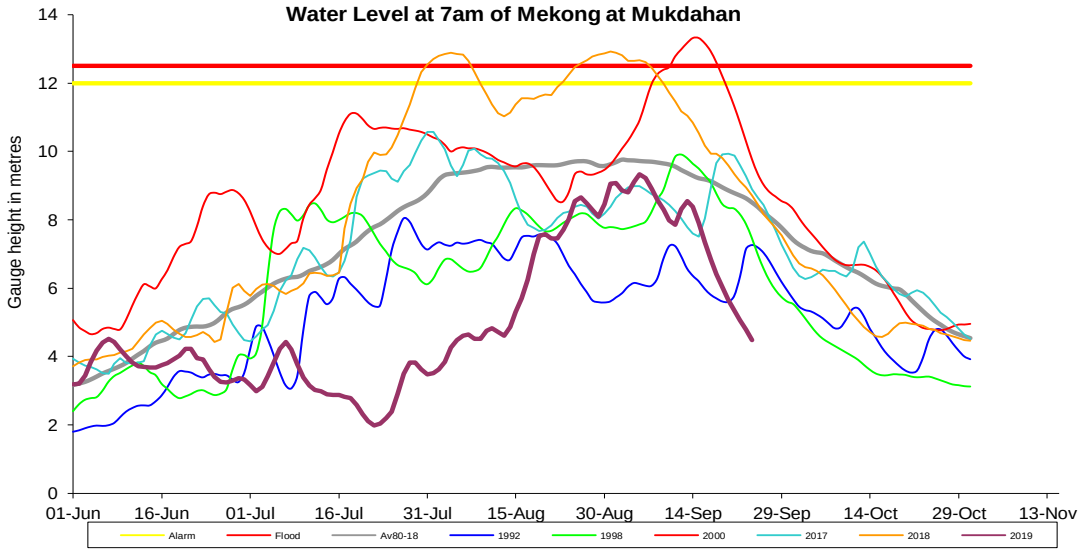

Water Level at 7am of Mekong at Nong Khai
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

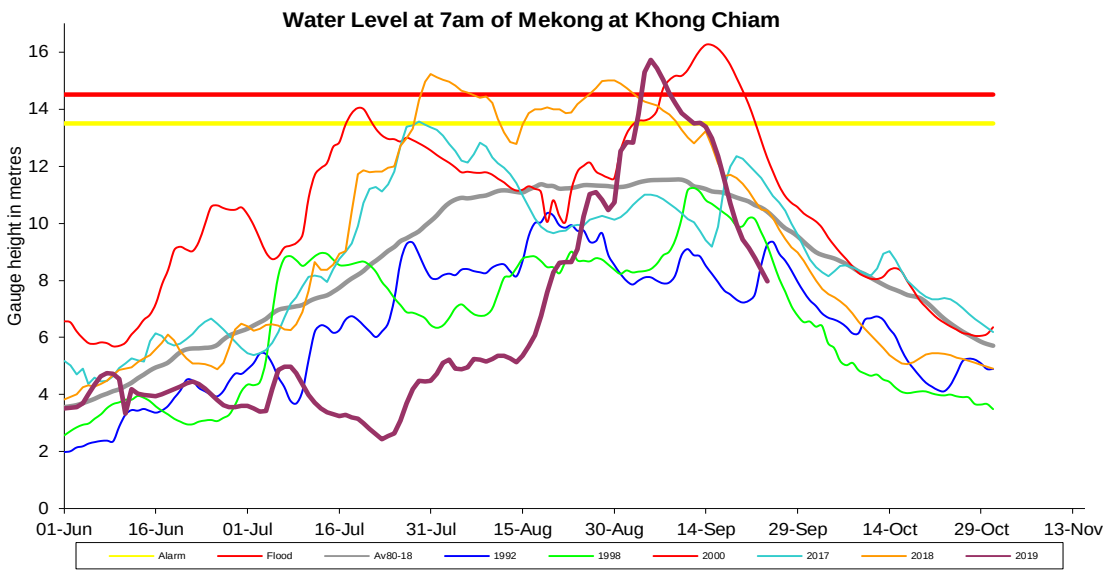

Water Level at 7am of Mekong at Paksane
Gauge height in metres
0
2
4
6
8
10
12
14
16
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

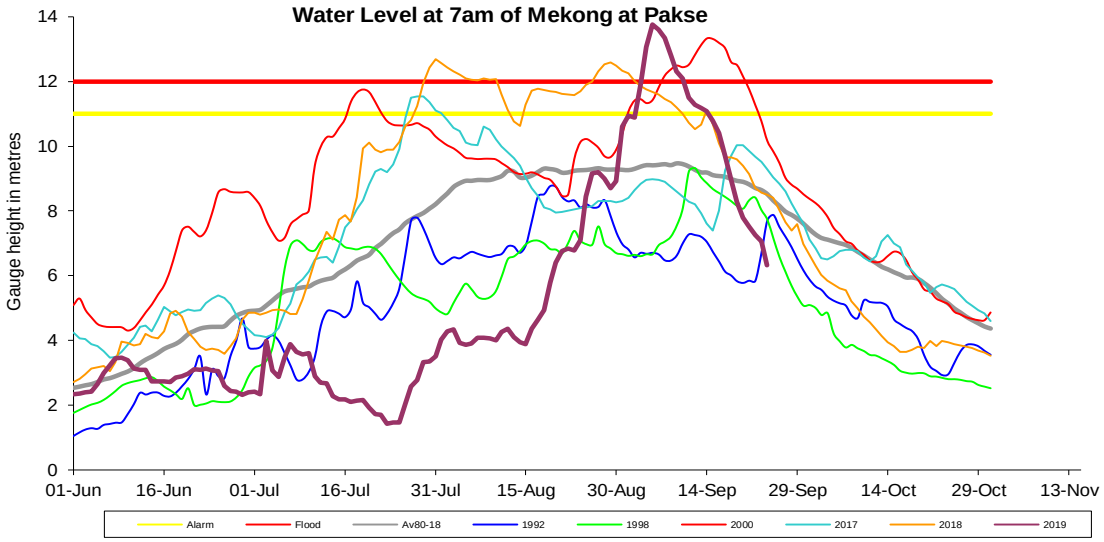

Water Level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019


Water Level at 7am of Mekong at 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
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1992
1998
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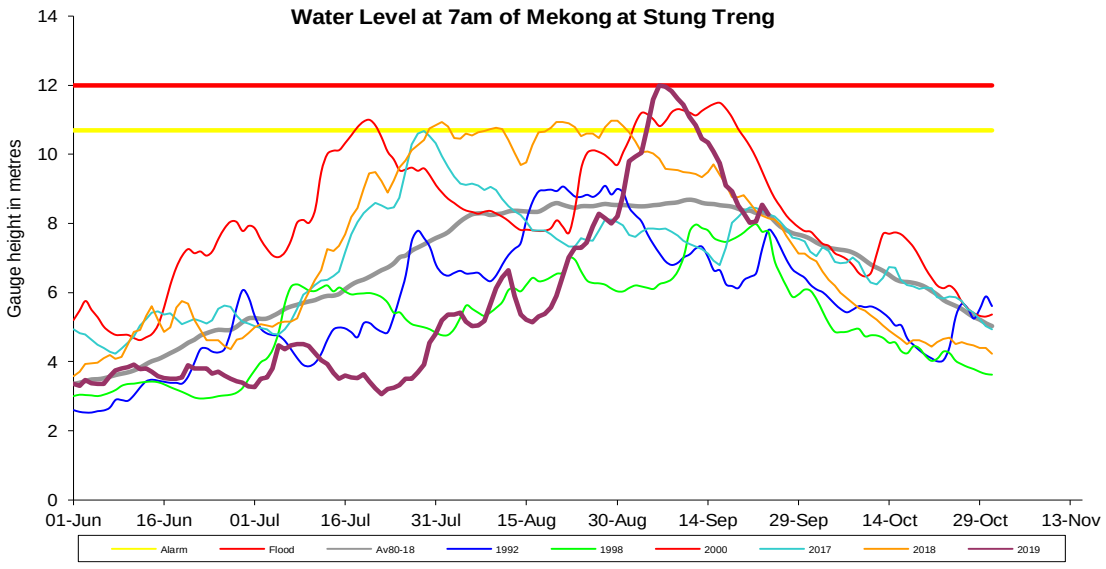
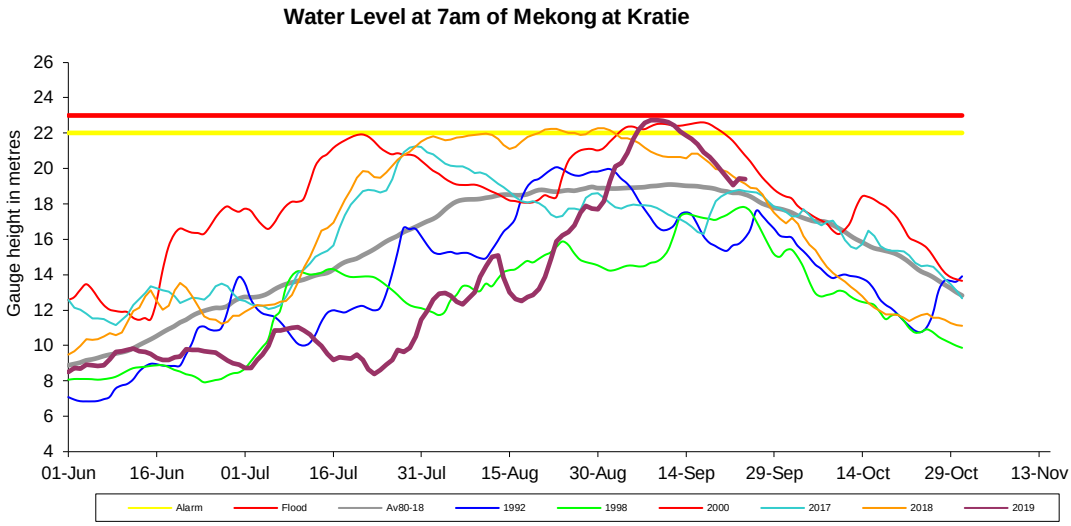
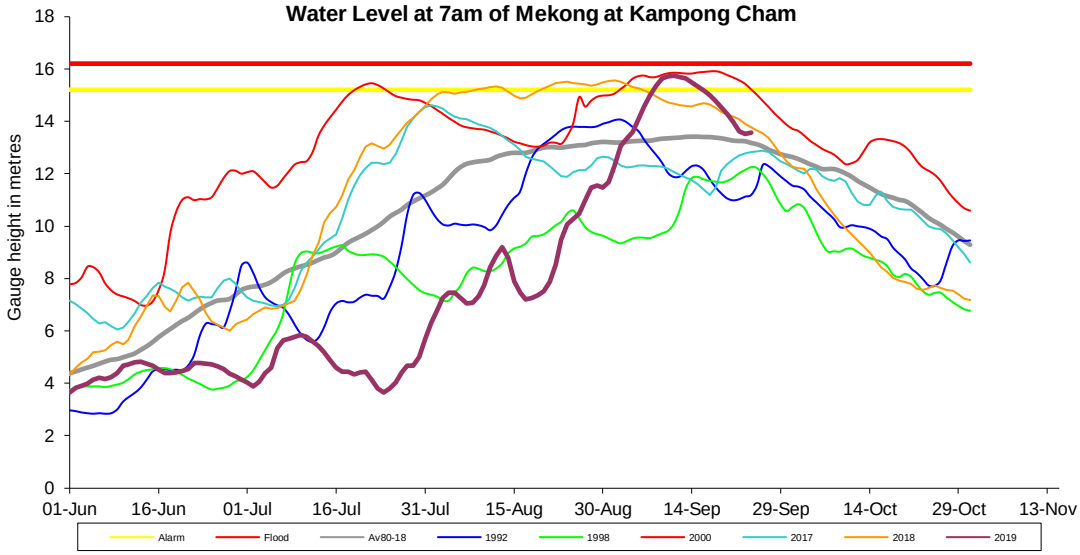
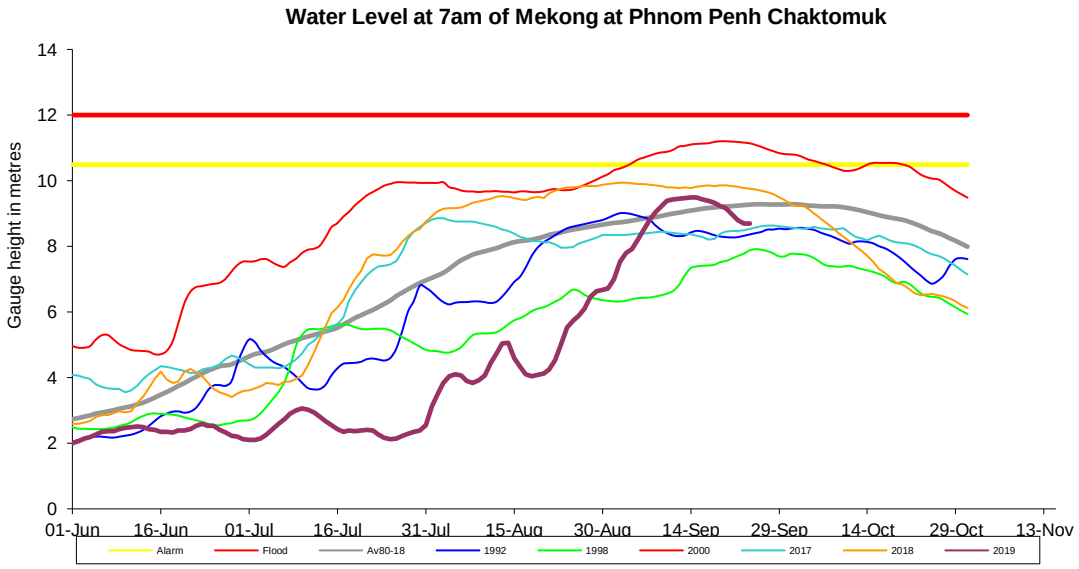
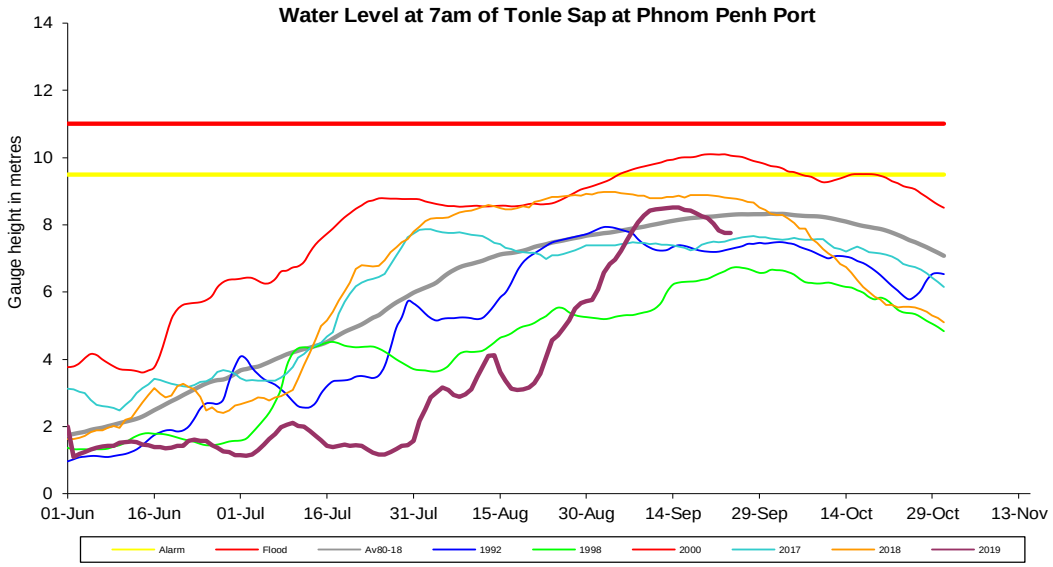
2017
2018
2019

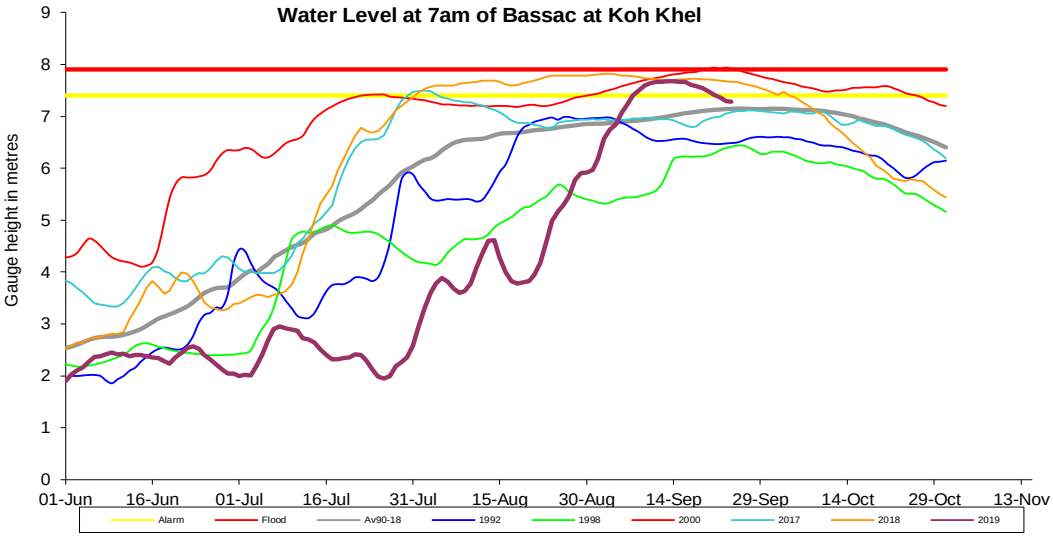

Water Level at 7am of Mekong at Stung Treng
Gauge height in metres
0
2
4
6
8
10
12
14
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

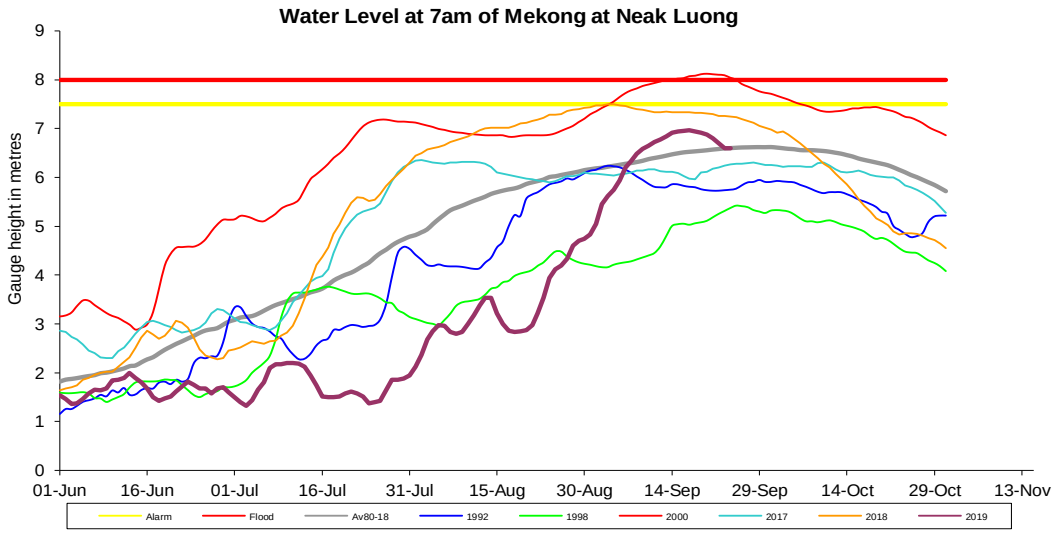

Water Level at 7am of Mekong at Kratie
Gauge height in metres
26
24
22
20
18
16
14
12
10
8
6
4
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

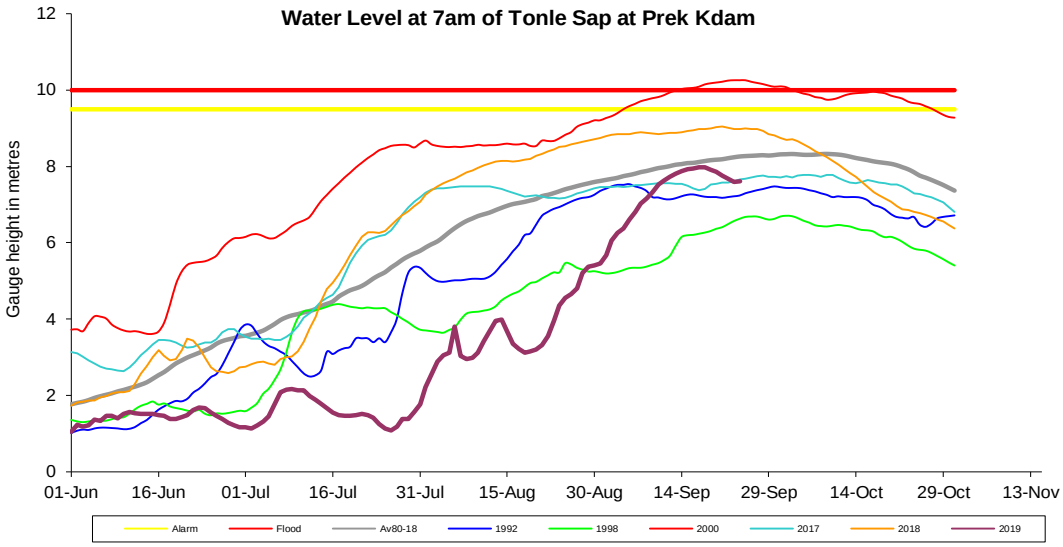

Water Level at 7am of Mekong at Kampong Cham
Gauge height in metres
18
16
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

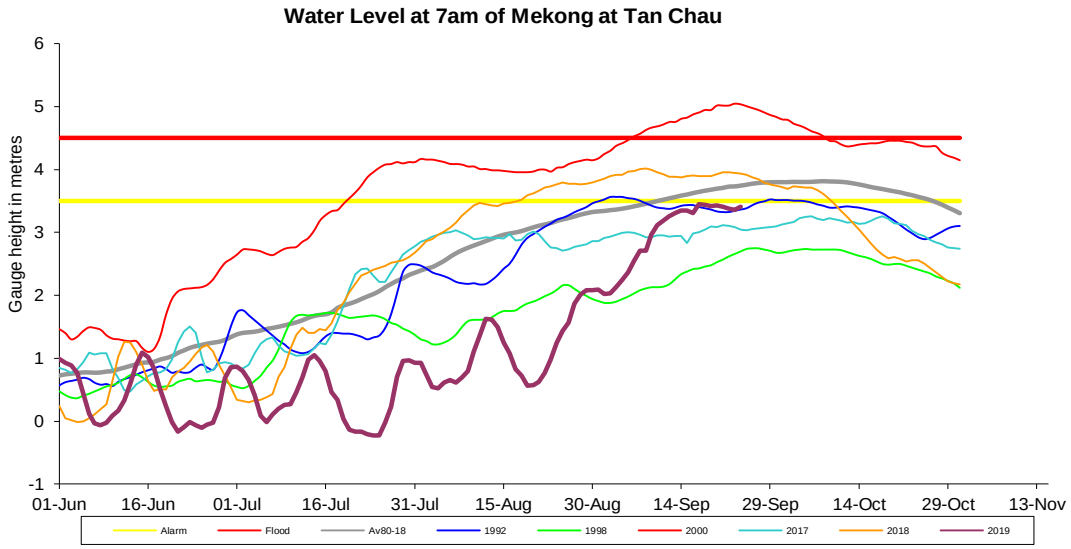

Water Level at 7am of Mekong at Phnom Penh Chaktomuk
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019

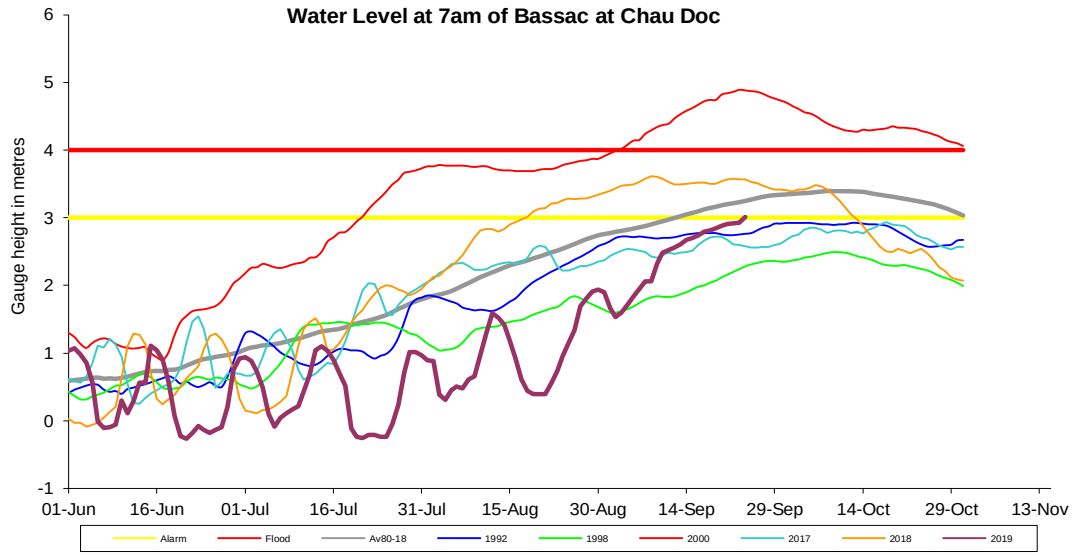

Water Level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
14
12
10
8
6
4
2
0
01-Jun
16-Jun
01-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
Alarm
Flood
Av80-18
1992
1998
2000
2017
2018
2019


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