Mekong River Commission

Regional Flood and Drought Management Centre

Weekly Dry Season Situation Report for the Mekong River Basin

Prepared on: 19/11/2019, covering the week from 12th to 18th November 2019.

Weather Patterns, General Behaviors of the Mekong River and Outlook Situation

General weather patterns:

From 12th to 18th November 2019, there was no rainfall in the LMB. Based on the weather outlook bulletins and maps issued by the Thailand Meteorology Department (TMD) were used to verify the weather condition in the LMB. They stated that for the next 3 months from November 2019 to January 2020, the total rain of northern, northeastern, eastern and central parts including with that of Bangkok Metropolitan and Vicinity would beabout40% below normal condition. **Figures 1 & 2** presented the weather map for 12th and 18th November 2019.

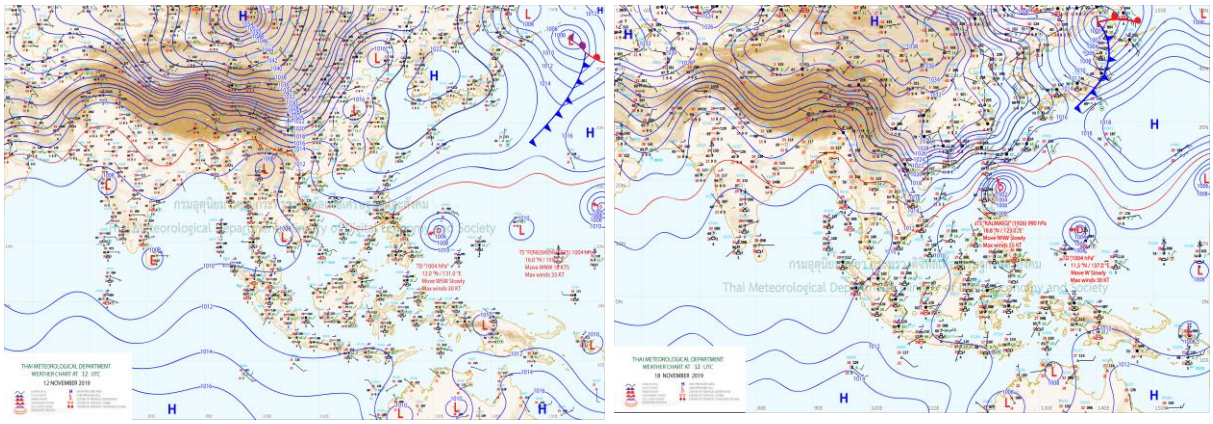


Figure 1: Summary of weather condition over the LMB from 12 to 18 November 2019

General behavior of the Mekong River:

This week from 12 to 18 November 2019, water levels from Chiang Sean were decreased slightly due to the inflow from China, varied from 0.03 m to 0.18 m and still stay below its historical minimum level. However, water level trend at Luang Prabang and Chiang Khan are likely impacted by hydropower dam at Xayaburi, in which they fluctuated, varied from 0.02 m to 0.36 m. Water levels at stations at the middle part of LMB from Vientiane to Pakse decreased and stay below their minimum levels. Follow the same trend of water levels from upstream, stations at Stung Treng, Kratie, Chaktomuk on the Bassac, Phnom Penh Port and Neak Luong were also below minimum levels. For the 2 tidal stations at Tan Chau and Chau Doc, water levels decreased the same trends as minimum levels in November 2019. The actual water levels were stayed below their LTAs.

For stations from Chiang Saen and Luang Prabang

Water levels from 12 to 18 November 2019 at Chiang Sean station were slightly decreased, due to the decreased flow from Jinghong (as observed during the wet season from June to October). At this station water levels decreased from 0.03 m to 0.18 m. However, at Luang Prabang station, water levels were fluctuated and stay above its LTA. Water levels at this station sometime increased rapidly in 0.66 m, due to the reservoir operation of upstream and downstream at Xayaburi. 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-Nong Khai and Paksane

Water levels from 12 to 18 November 2019 at Chiang Khan station were likely also nominated by upstream hydropower dam of Xayaburi, which was noted that water levels fluctuated from -0.76 to 0.44 m (see its hydrograph in **Annex B**). The current observed water levels at Chiang Khan, Vientiane/Nong Khai and Paksane stations are lower than their historical minimum levels.

For stations from Nakhon Phanom to Pakse

Water levels from 12 to 18 November 2019 at Khong Chiam to Pakse stations were continued to slightly decrease, followed the same trend as inflow from upstream. The water levels decreased from 0.01 m to 0.08 m. The current water levels at these stations below their minimum historical levels.

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

Water levels from 12 to 18 November 2019 at Stung Treng, Kratie and Kompong Cham were continued to decrease, varied from 0.02 m to 0.27 m. The current water levels at Stung Trend, Kratie, Kompong Cham, Chaktomuk Koh Khel, Phnom Penh Port, Neak Luong and Prekdam on the Tonle Sap were below their historical minimum levels, while at (1980-2018).

Tan Chau and Chau Doc

Water levels from 12 to 18 November 2019 at the 2 tidal stations at Tan Chau and Chau Doc were slightly decreased, follows the tidal effect from the sea. Water levels were kept the same trends as minimum levels in November 2019 and the actual water levels were stayed below their LTAs

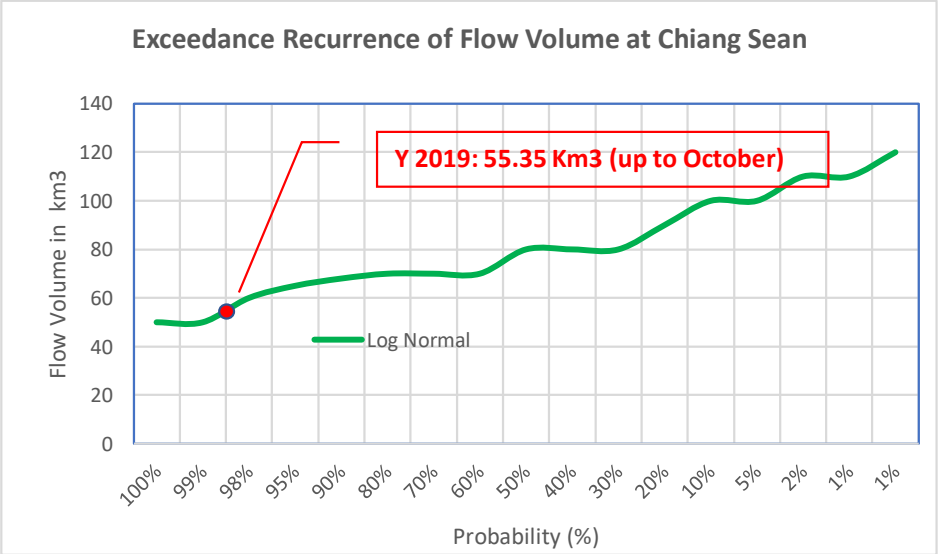
According to the Japan Meteorological Agency (JMA), Sea surface temperature (SST) variability in the tropics Neutral, which has no major impact.

Discussion and Conclusion

From 12 to 18 November 2019, the trend of water levels at Chiang Sean were slightly decreased due to the inflows from Jinghong and no rainfall. 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.

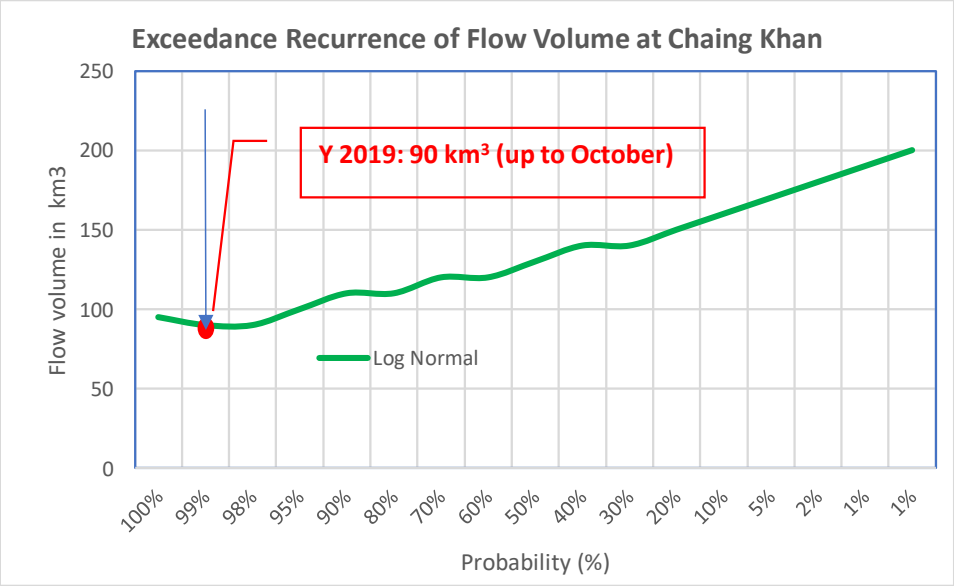
The low inflows from upstream and less rainfall in catchments, resulting water levels from Paksane to Pakse are drastically dropped below their minimum levels.
However, from Stung Treng, Kratie and Kompong Cham stations water levels are followed the same trend from upstream which stay below their minimum levels.
Based on the Exceedance Recurrence of the Minimum Flow Volumes at Chiang Sean, Chaing Khan and Kratie referred to historical data availability and the flows volume up to October 2019, it showed the current situation at these stations are considered as critical low flows in between ***50 to 100 year of return period of low flow condition***. **Figure 2** showed the Exceedance Recurrence Flow Volume with the table of probability condition of highlighted the low flows condition at Chiang Sean, Chiang Khan and Kratie.

A. Chaing Saen Station



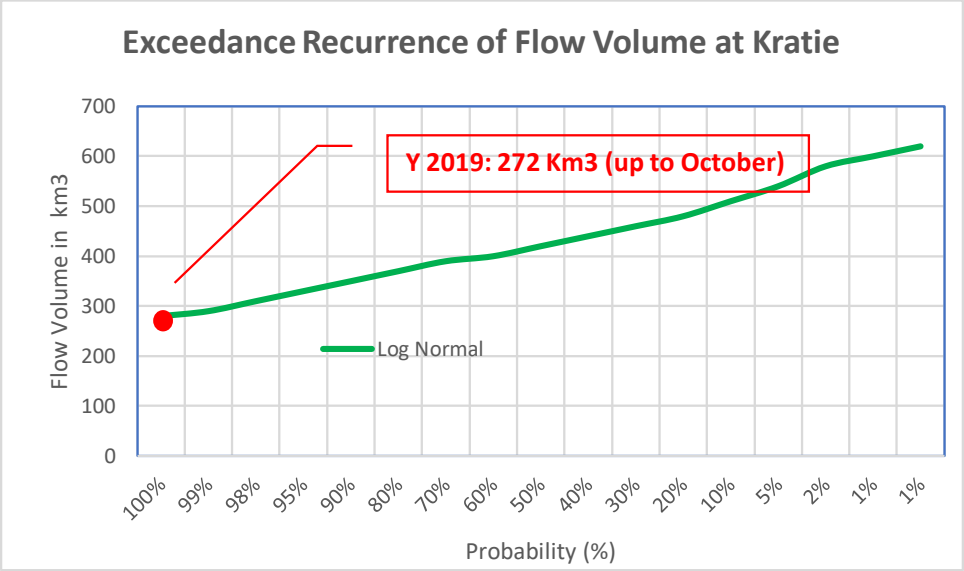
Probability	Recurrence Year	Log Normal [km^3]	Y2019 [km3]	Conditions
100%	200	50		Critical Low Flow
99%	100	50		
98%	50	60	55.35	Low Flow
95%	20	65		
90%	10	68		
80%	5	70		Normal Flow
70%	3	70		
60%	2	70		
50%	2	80		
40%	3	80		
30%	3	80		
20%	5	90		
10%	10	100		High Flow
5%	20	100		
2%	50	110		
1%	100	110		
1%	200	120		

B. Chiang Khan Station



Probability	Recurrence Year	Log Normal [km^3]	Y2019 [km3]	Conditions
100%	200	50		Critical Low Flow
99%	100	50		
98%	50	60	55.35	Low Flow
95%	20	65		
90%	10	68		
80%	5	70		Normal Flow
70%	3	70		
60%	2	70		
50%	2	80		
40%	3	80		
30%	3	80		
20%	5	90		
10%	10	100		High Flow
5%	20	100		
2%	50	110		
1%	100	110		
1%	200	120		

C. Kratie Station



Probability	Recurrence Year	Log Normal [km^3]	Y2019 [km3]	Conditions
100%	200	280		Critical Low Flow
99%	100	290	272	
98%	50	310		Low Flow
95%	20	330		
90%	10	350		
80%	5	370		Normal Flow
70%	3	390		
60%	2	400		
50%	2	420		
40%	3	440		
30%	3	460		
20%	5	480		
10%	10	510		High Flow
5%	20	540		
2%	50	580		
1%	100	600		
1%	200	620		
Flow data period: 1925-2019				

Figure 2: Exceedance Recurrence Flow Volumes and Probability of Low Flow condition at Chiang Saen, Chiang Khan and Krarie

Based on the low flow analyses of the Mekong from Chiang Saen to Kratie, the upcoming ***Dry Season*** can be possible of facing some problem, related to the shortage of drinking water 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.

The Trend of water level and its Outlook

Referred to weekly river monitoring bulletin, next week from 19th to 25th November 2019, water levels at Chiang Saen will slight increase that can be varied from 0.02 m to 0.18 m, while the water level of the station at Luang Prabang and Chiang Khan will be fluctuated due to the impact of the inflow from reservoir operation upstream and downstream. Water levels at Vientiane /Nong Khai and Paksane follow the same trend as upstream inflows, which will decrease from 0.02 to 0.18 m. From Nakhon Phanom to Sovanakhet, water levels will be decreased from 0.05 m to 0.18 m. The 7 days forecasted

rainfall of NOAA (GFAS) of showed below-normal rainfall will continue in the next 7 days in some places mainly in the low-lying area and the Mekong Delta.

From Stung Treng, Kratie and Kompong Cham, water levels for the next 7 days forecasting from 19th to 25th November 2019 will continue to decreased from 0.05 m to 0.35 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 some rainfall in the low-lying area in the Mekong Delta.

For the tidal stations at Tan Chau and Chau Doc will increased and follow the same trend as their minimum levels from 19th to 25th November 2019, varied from 0.03m to 0.35 m.

For details information on water levels and rainfall at each key station, Annex A and Annex B are presented as follows:

- Tables presents observed water levels and rainfall from last week (Annex A)
- The water levels hydrographs showing the observed water levels for the dry season (Annex B)

Tuesday 19th Nov 2019

Annex A: Graphs and Tables

Table A1: observed water levels

Unit: m

2019	Jinghong	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Mukdahan	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
12-11-2019	-	1.88	8.62	4.00	1.04	1.17	2.60	0.92	1.43	0.84	2.91	7.84	4.04	3.33	3.13	2.38	3.46	1.64	1.73
13-11-2019	-	1.83	8.52	4.06	1.04	1.18	2.67	0.91	1.45	0.82	2.90	7.72	3.92	3.25	3.07	2.34	3.36	1.63	1.70
14-11-2019	-	1.84	8.47	4.06	1.08	1.18	2.70	0.90	1.45	0.84	3.01	7.59	3.86	3.17	2.97	2.34	3.29	1.51	1.63
15-11-2019	-	1.83	8.53	4.03	1.12	1.22	2.68	0.94	1.45	0.84	3.03	7.97	3.78	3.19	3.05	2.32	3.27	1.44	1.55
16-11-2019	-	1.80	8.57	3.99	1.12	1.22	2.74	0.94	1.45	0.85	2.98	8.10	4.06	3.29	3.17	2.45	3.27	1.26	1.39
17-11-2019	-	1.80	8.52	3.94	1.10	1.19	2.68	0.94	1.47	0.85	2.93	8.02	4.14	3.38	3.20	2.48	3.27	1.12	1.16
18-11-2019	-	1.78	8.47	3.88	1.03	1.18	2.60	0.96	1.49	0.82	2.91	7.91	3.96	3.34	3.18	2.41	3.19	1.06	1.08

Table A2: observed rainfall

2019	Jinghong	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Mukdahan	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
12-11-2019	-	0	0	0	0	0	0	0	0	0	3.5	14	8.4	6.5	0	0	7.3	0	0
13-11-2019	-	0	0	0	0	0	0	0	0.4	0	1	0	1	1	0	0	0	0	0
14-11-2019	-	0	0	0	0	0	1.7	7.6	0	0	0	0	16.5	0	0	0	9.4	0	3
15-11-2019	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-11-2019	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-11-2019	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-11-2019	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

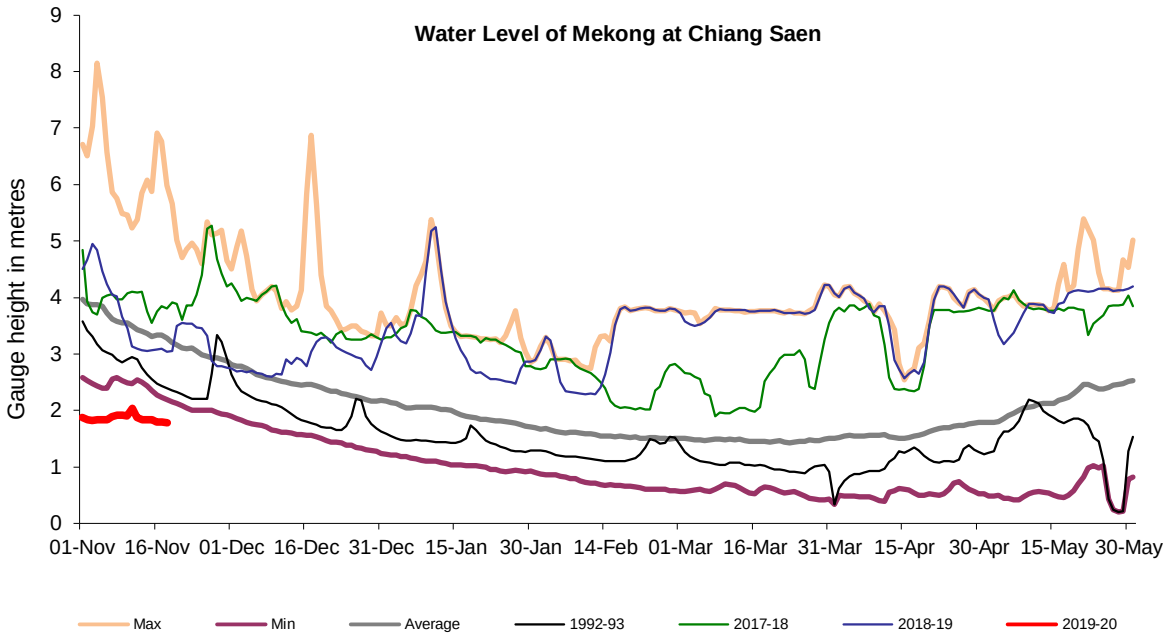
Unit: mm

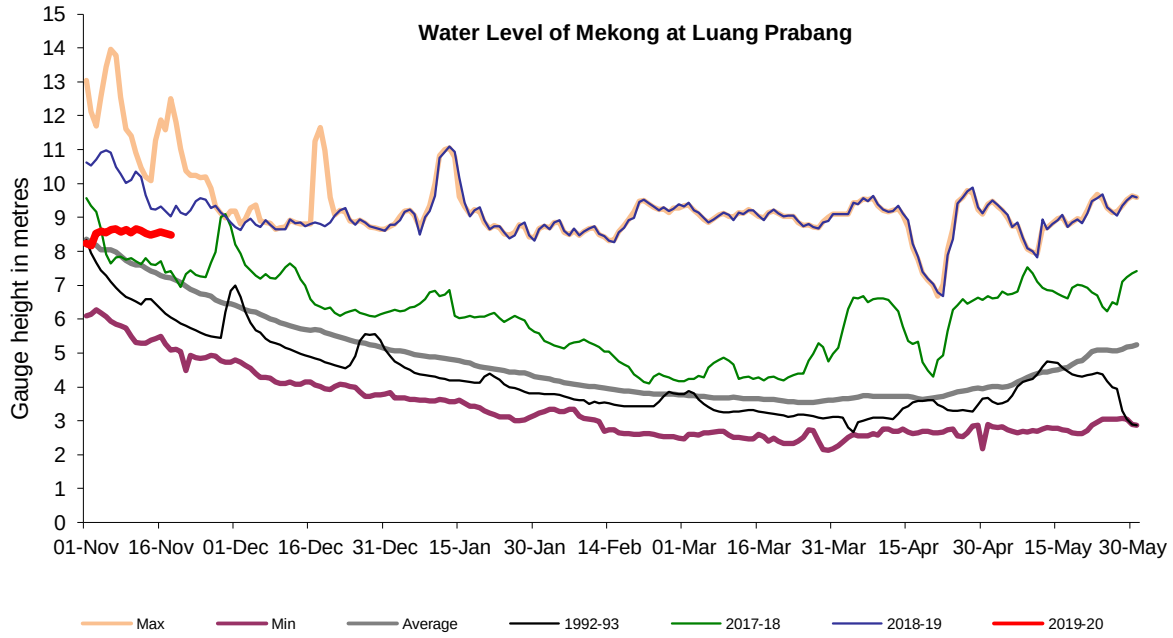
Note: No data available from China during the Dry Season

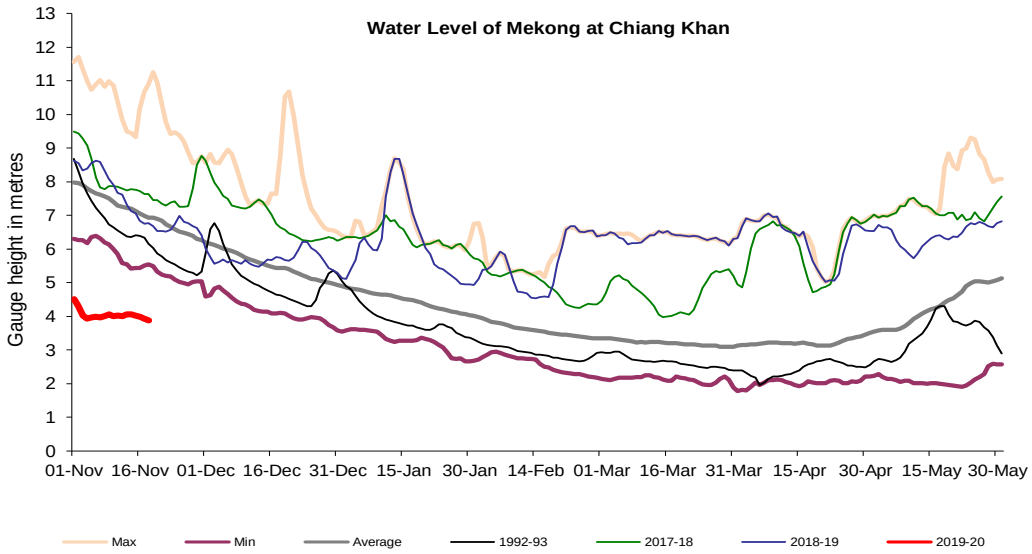
Annex B: Season Water Level Hydrographs

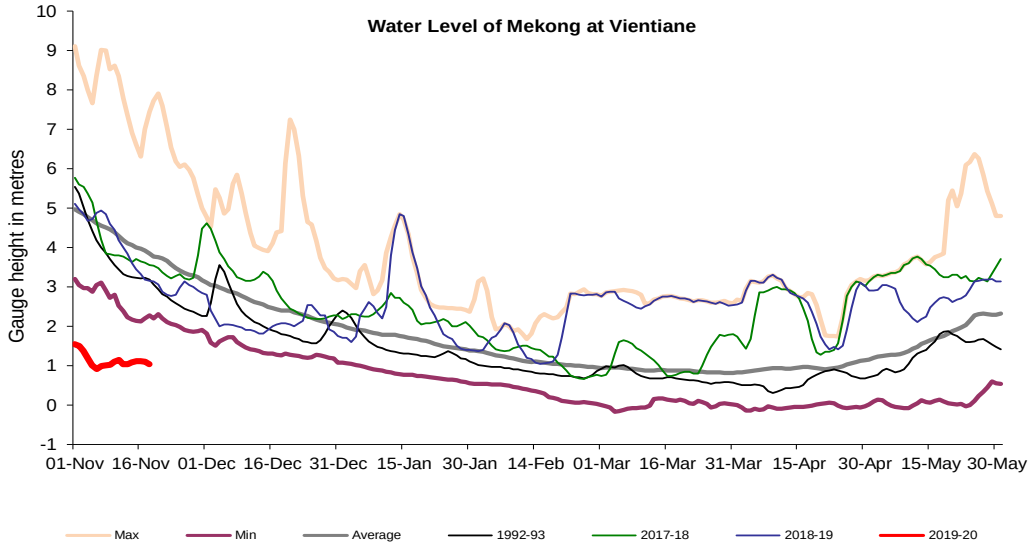
This Annex showed water level hydrographs of each key station. These hydrographs distributed weekly water level for River Monitoring purpose.

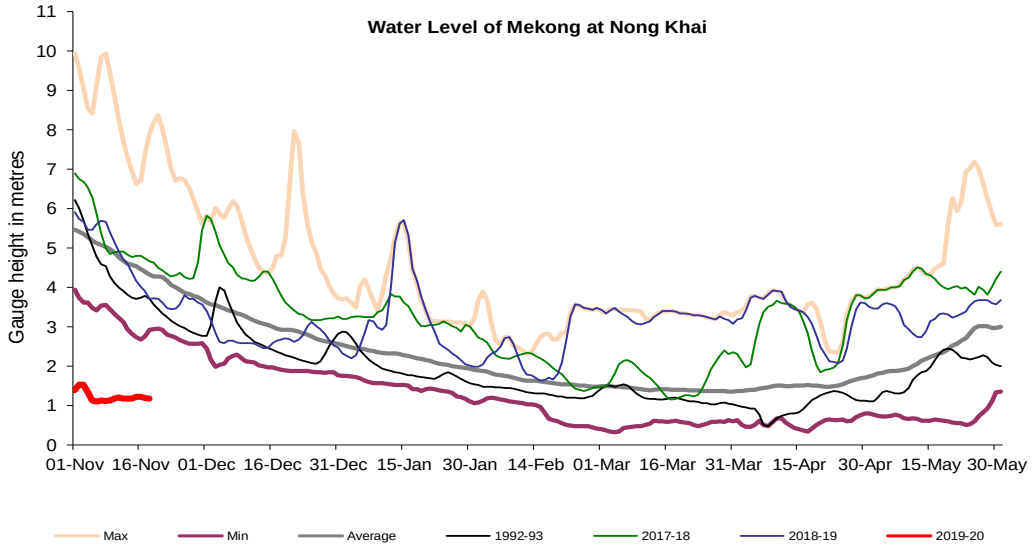
HYDROGRAPH AT 7 AM OF MEKONG TONLE SAP AND BASSAC AT MAINSTREAM STATIONS IN DRY SEASON UP TO 18th November 2019

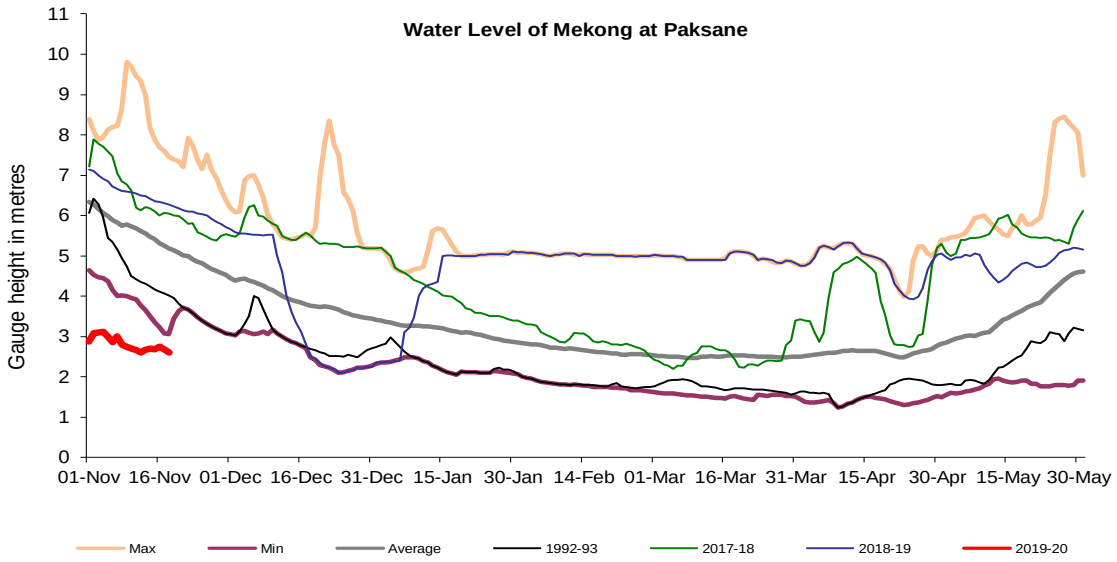


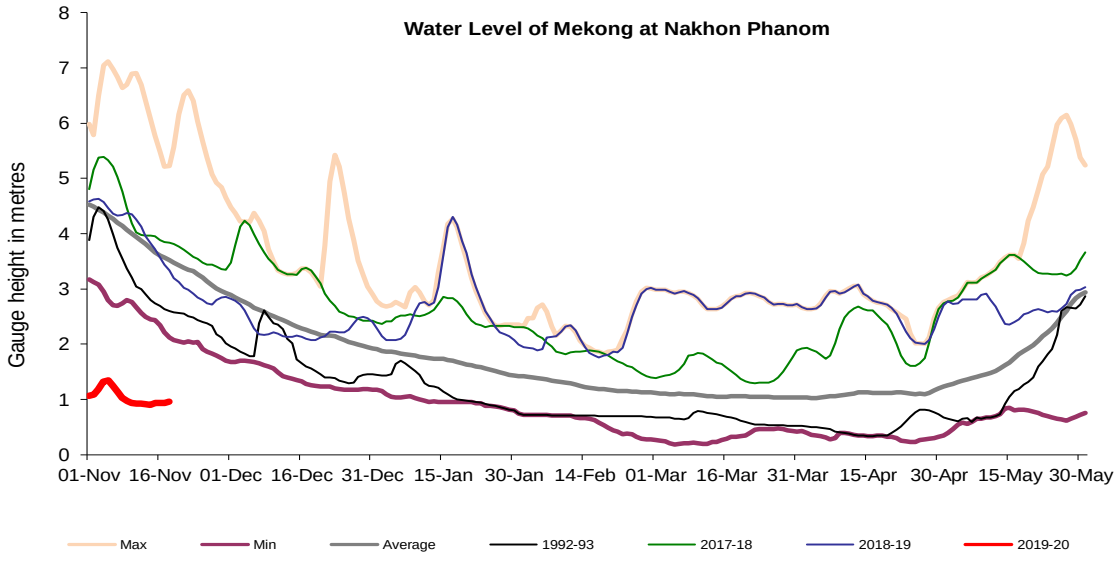


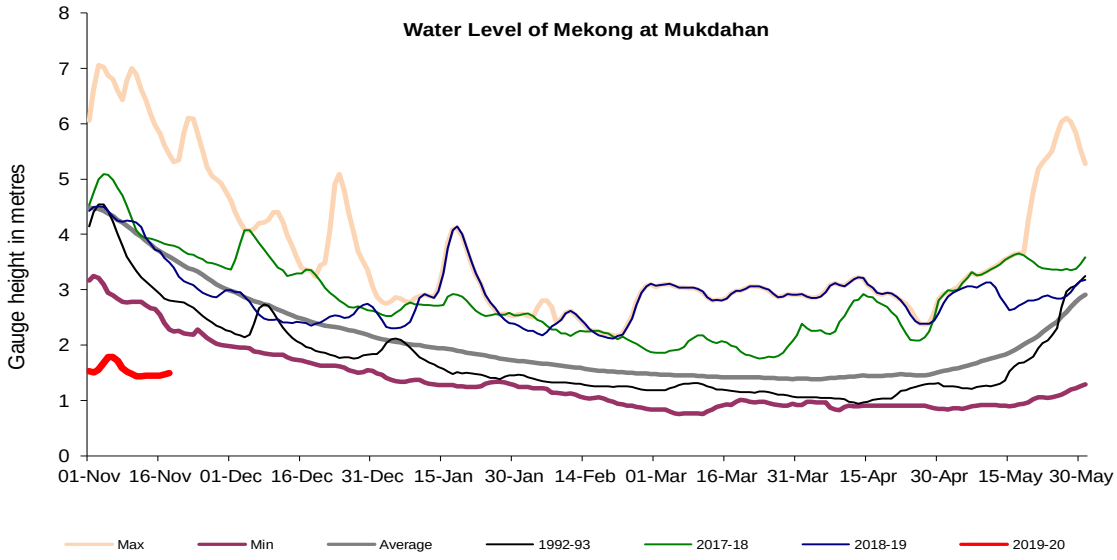

Water Level of Mekong at Chiang Khan
Gauge height in metres
13
12
11
10
9
8
7
6
5
4
3
2
1
0
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

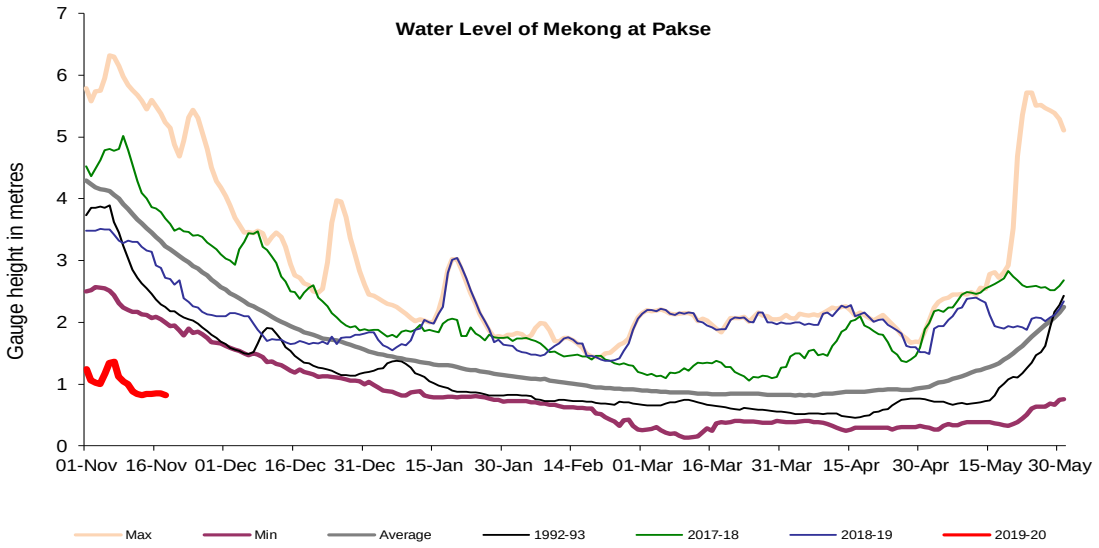

Water Level of Mekong at Vientiane
Gauge height in metres
10
9
8
7
6
5
4
3
2
1
0
-1
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

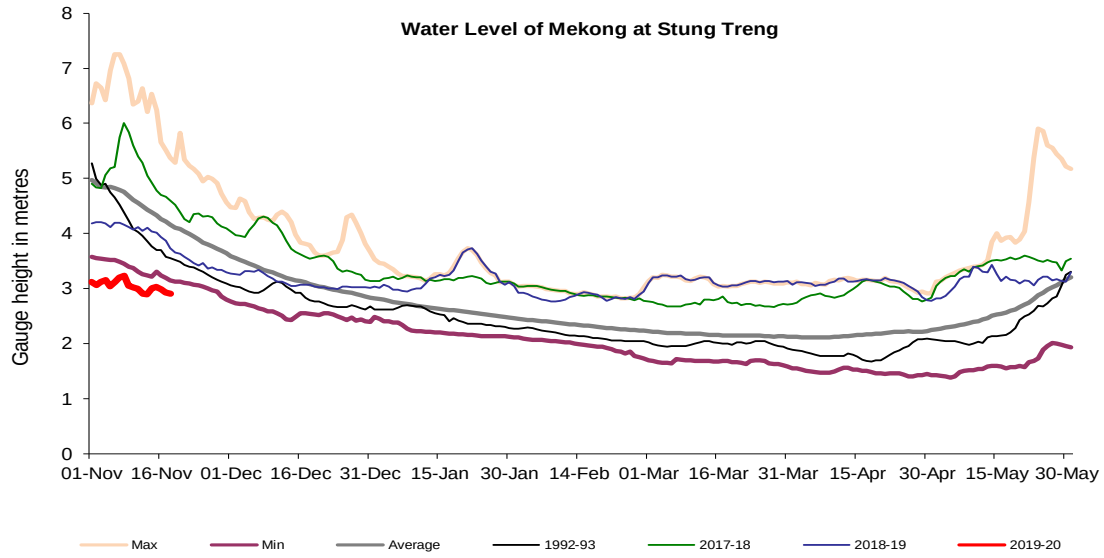

Water Level of Mekong at Nong Khai
Gauge height in metres
11
10
9
8
7
6
5
4
3
2
1
0
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

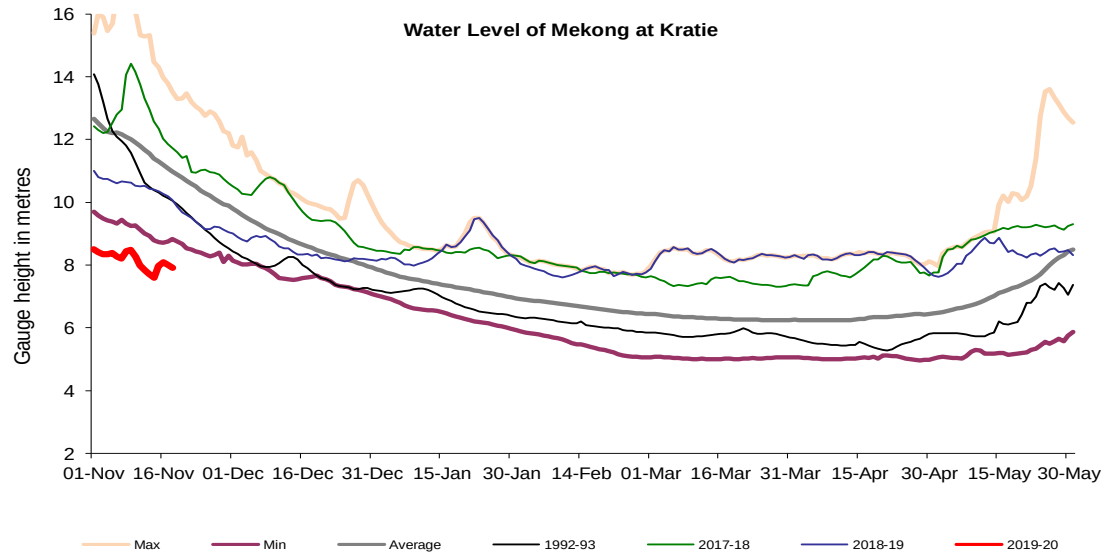

Water Level of Mekong at Paksane
Gauge height in metres
11
10
9
8
7
6
5
4
3
2
1
0
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

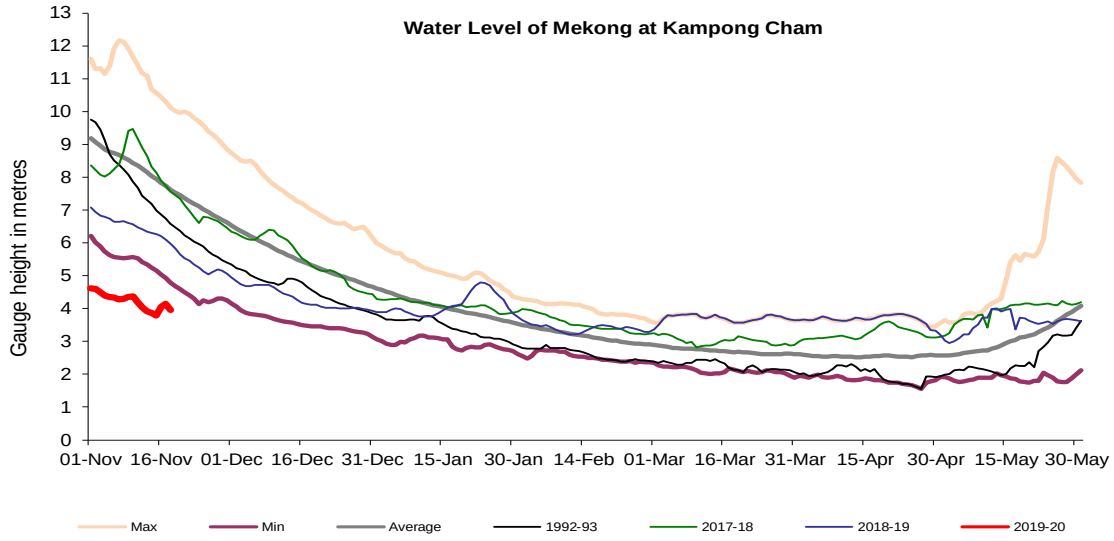

Water Level of Mekong at Nakhon Phanom
Gauge height in metres
8
7
6
5
4
3
2
1
0
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

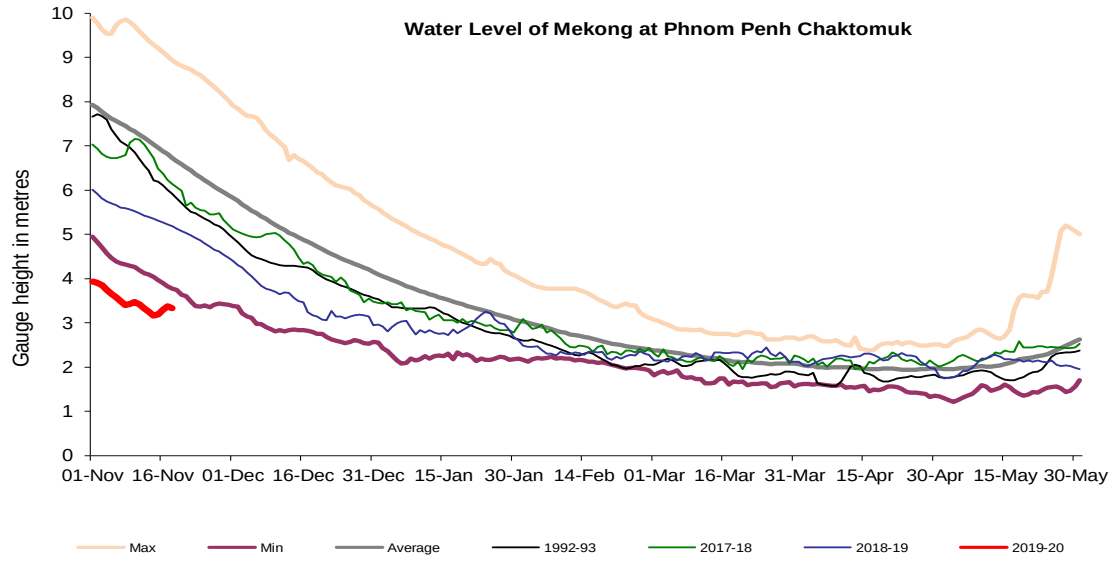

Water Level of Mekong at Mukdahan
Gauge height in metres
8
7
6
5
4
3
2
1
0
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

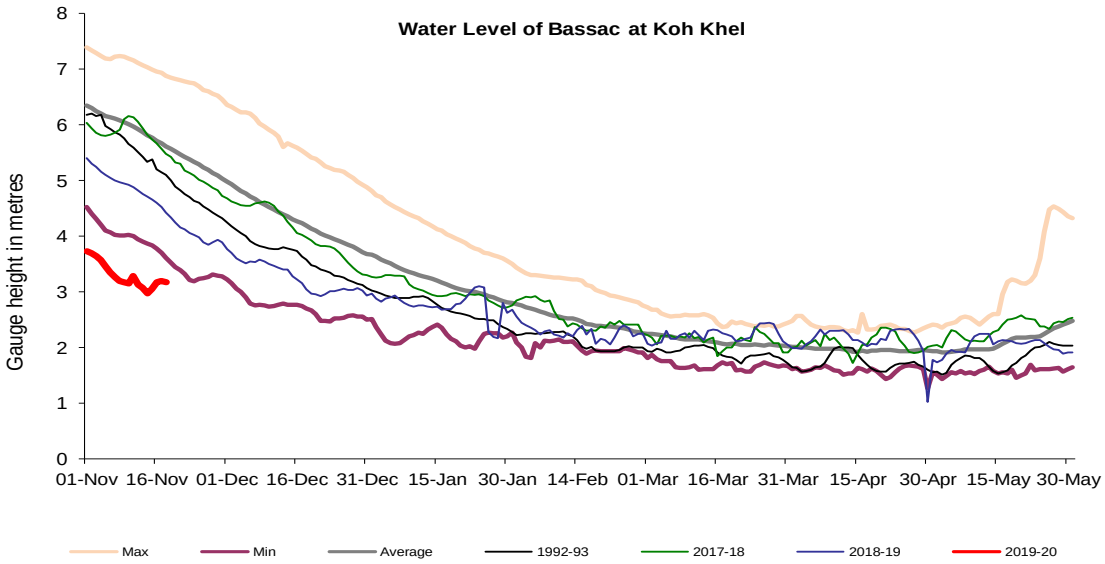

Water Level of Mekong at Pakse
Gauge height in metres
0
1
2
3
4
5
6
7
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

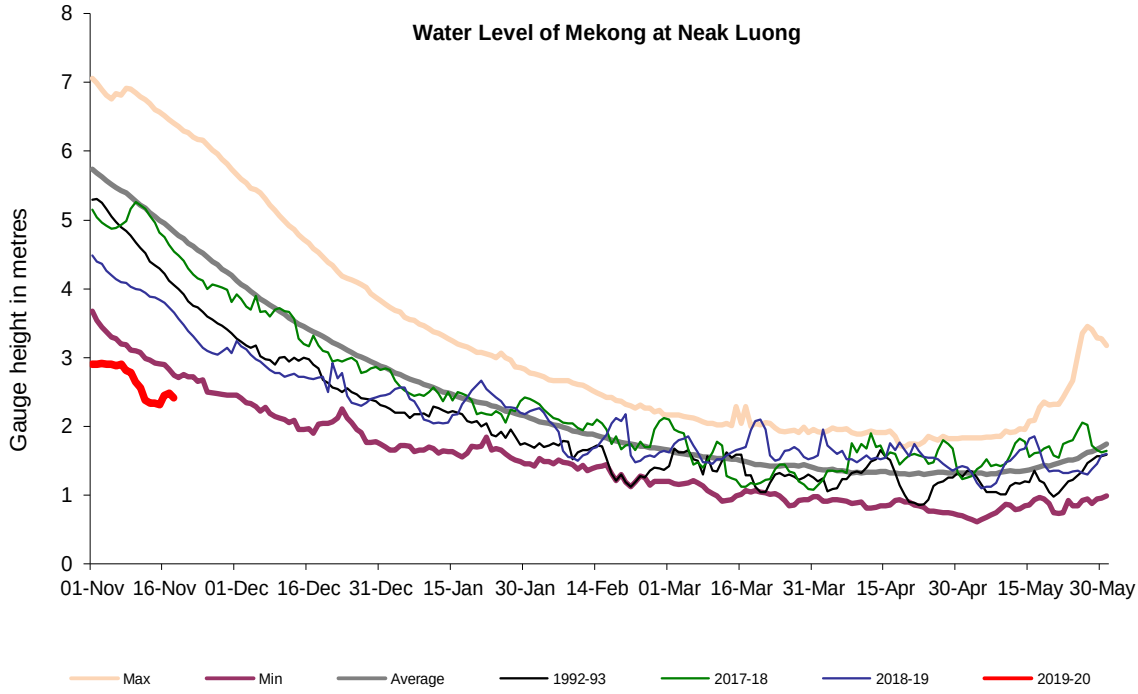

Water Level of Mekong at Stung Treng
Gauge height in metres
0
1
2
3
4
5
6
7
8
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

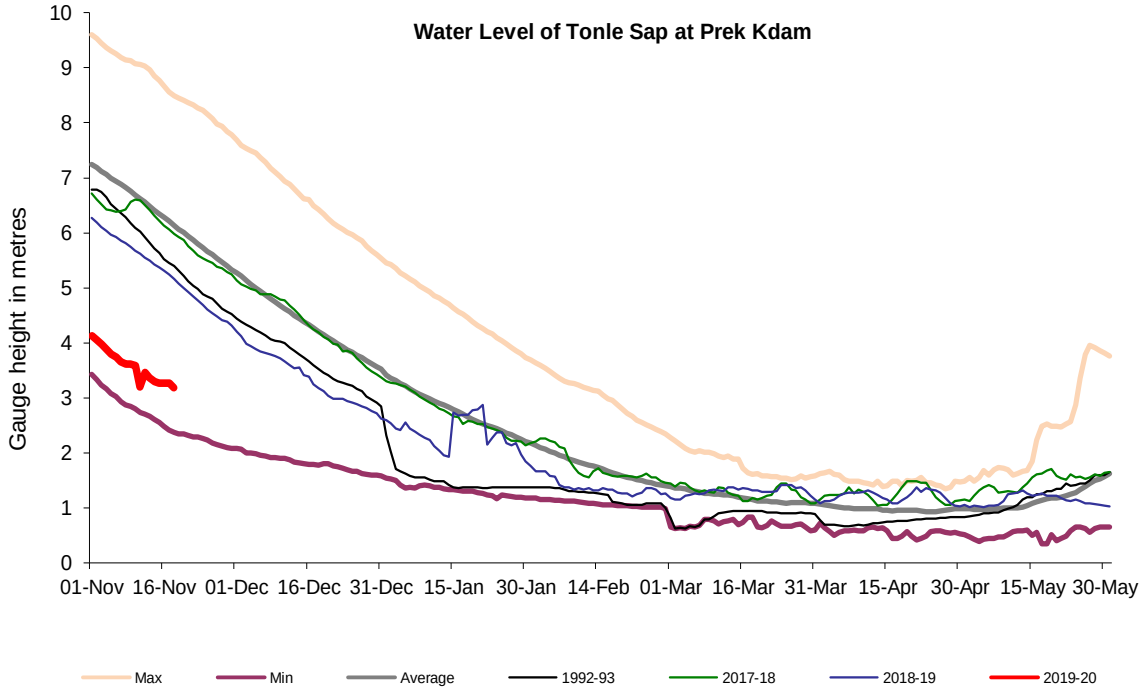

Water Level of Mekong at Kratie
Gauge height in metres
2
4
6
8
10
12
14
16
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

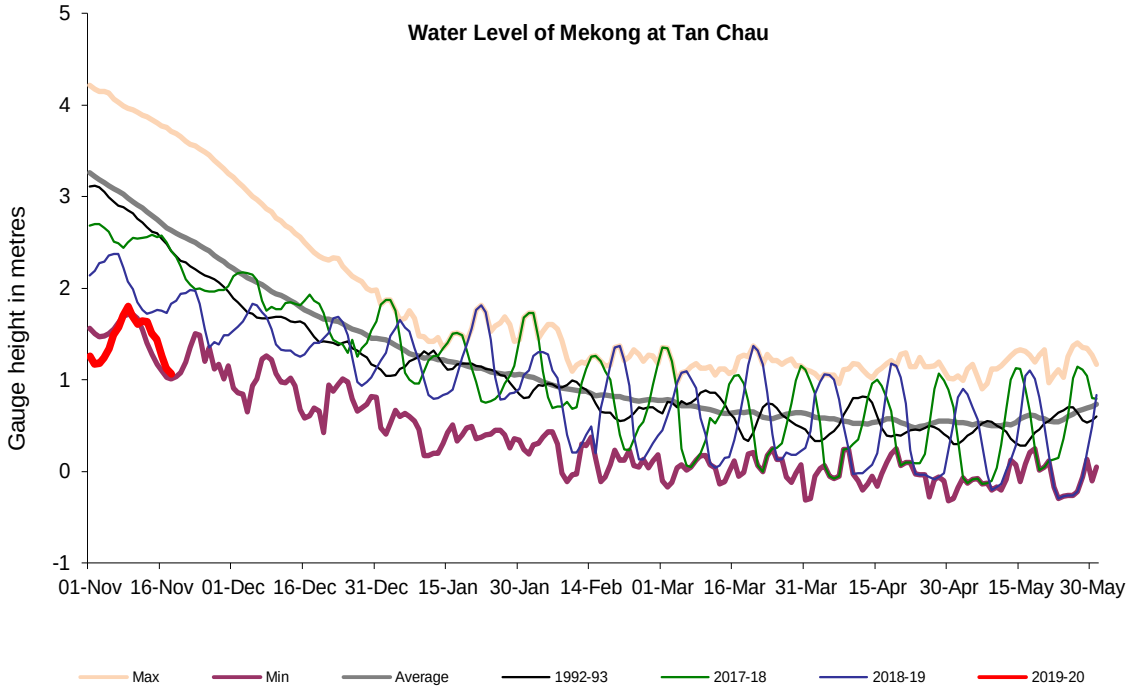

Water Level of Mekong at Kampong Cham
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
10
11
12
13
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

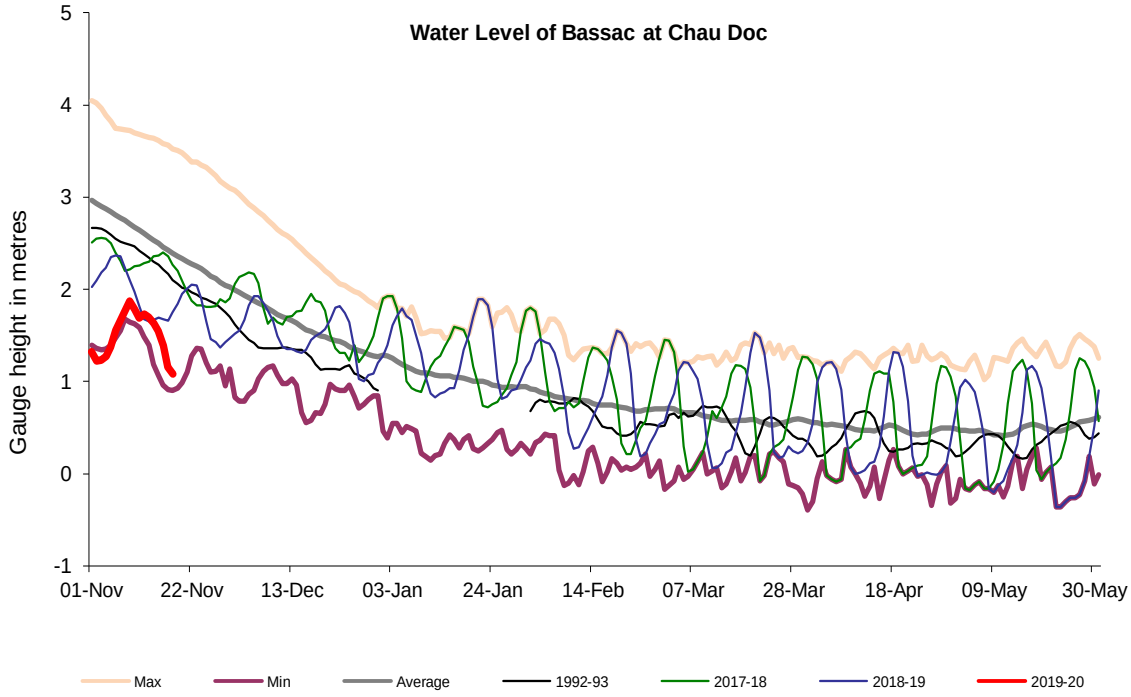

Water Level of Mekong at Phnom Penh Chaktomuk
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
10
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Bassac at Koh Khel
Gauge height in metres
0
1
2
3
4
5
6
7
8
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Mekong at Neak Luong
Gauge height in metres
0
1
2
3
4
5
6
7
8
01-Nov
16-Nov
01-Dec
16-Dec
31-Dec
15-Jan
30-Jan
14-Feb
01-Mar
16-Mar
31-Mar
15-Apr
30-Apr
15-May
30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Tonle Sap at Prek Kdam
Gauge height in metres
0
1
2
3
4
5
6
7
8
9
10
01-Nov
16-Nov
01-Dec
16-Dec
31-Dec
15-Jan
30-Jan
14-Feb
01-Mar
16-Mar
31-Mar
15-Apr
30-Apr
15-May
30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Mekong at Tan Chau
Gauge height in metres
5
4
3
2
1
0
-1
01-Nov
16-Nov
01-Dec
16-Dec
31-Dec
15-Jan
30-Jan
14-Feb
01-Mar
16-Mar
31-Mar
15-Apr
30-Apr
15-May
30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Bassac at Chau Doc
Gauge height in metres
5
4
3
2
1
0
-1
01-Nov
22-Nov
13-Dec
03-Jan
24-Jan
14-Feb
07-Mar
28-Mar
18-Apr
09-May
30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20