Mekong River Commission

Regional Flood and Drought Management Centre

Weekly Dry Season Situation Report for the Mekong River Basin

Prepared on: 10/03/2020, covering the week from 02 to 09 March 2020

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

General weather patterns:

From 02 to 09 March 2020, 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 March 2020, sweltering and dry weather with little humidity will occurs with very hot weather on some days, especially around the Upper Thailand because mostly southerly wind prevails over LMB. However, at some periods, coldly high-pressure air masses from China will meet hot air masses already prevailing over LMB. They also stated that summer thunderstorms will often occur at short durations over the LMB. **Figures 1** presented the weather map for 05 and 09 Mar 2020.

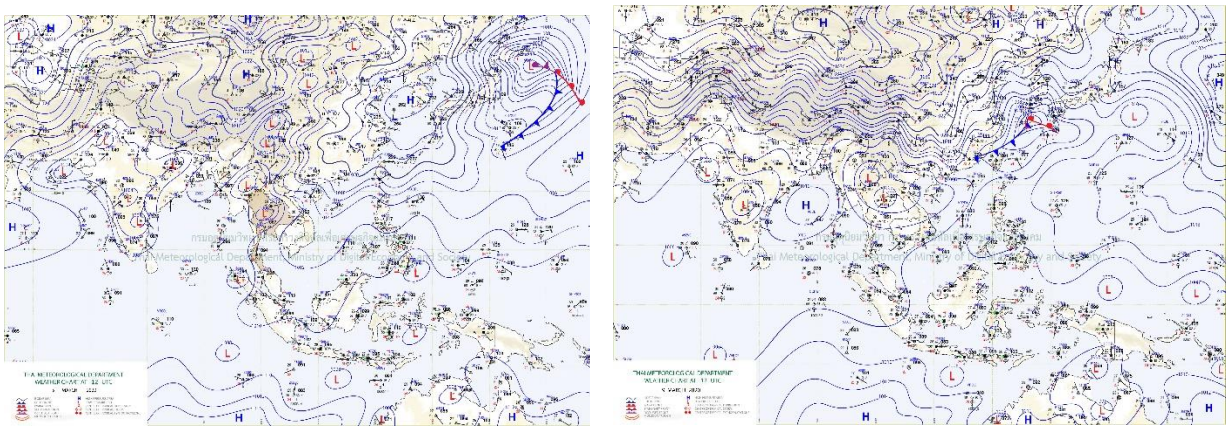


Figure 1: Summary of weather condition over the LMB from 05 and 09 Mar 2020

General behavior of the Mekong River:

This week from 02 to 09 March 2020, water levels from Chiang Sean were seemed to be stable, slightly varied from 0.01 m to 0.03 m since finishing the test of equipment of hydropower station at Jinghong, China at 4 Jan 2020. Water levels at this station were fluctuated above its Long-Term-Average (LTA). However, water level at Luang Prabang and Chiang Khan are likely impacted by hydropower dam at Xayaburi and upstream hydropower dams in which water level at this station were also slightly increased but still stay close to its maximum levels, varied from 0.03 m to 0.13 m. Water levels at Chaining (downstream of Xayaburi) were stay below their LTAs. Water levels at stations in the middle part of LMB from Vientiane to Pakse were slightly increased based on the trend inflows from upstream. These stations are considered in critical condition due to water levels were lower than their LTAs. Follow the same trend of water levels from upstream, except normal condition at stations of Stung Treng and Kratie, stations at Chaktomuk on the Bassac, Phnom Penh Port and Prekdam on the Tonle Sap were considered critical condition due to the water levels were lower than LTAs. For the 2 tidal stations at Tan Chau and Chau Doc, water levels increased and stay above their minimum levels last week (see its hydrograph in **Annex B**).

For stations from Chiang Saen and Luang Prabang

Water levels from 02 to 09 March 2020at Chiang Sean station were seemed to be stable, slightly varied from 0.01 m to 0.03 m since finishing the test of equipment of hydropower station at Jinghong, China at 4 Jan 2020. At Luang Prabang station, water levels were also slightly increased and still stay close to its historical maximum levels. Water levels at this station increased in between 0.03 m to 0.13 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 02 to 09 March 2020 at Chiang Khan station were likely nominated by upstream hydropower dam of Xayaburi, which was noted that water levels increased, varied from 0.02 to 0.04 m. The current observed water levels at Vientiane and Nong Khai stations were slightly increased but still is considered in critical conditions due to water levels stay below their LTAs.

For stations from Nakhon Phanom to Pakse

Water levels from 02 to 09 March 2020 at Nakhon Phanom to Pakse stations were also slightly increased, followed the same trends from upstream and varied from 0.02 to 0.04 m and considered as critical condition due to their water level below their LTAs. However, the current water levels at Mukdahan is considered normal since its raised up to the LTA level.

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

Water levels from 02 to 09 March 2020 at Stung Treng and Kratie stations were considered normal condition since their water levels were stay above LTAs. The current water levels at Kompong Cham, Chaktomuk, Koh Khel, Phnom Penh Port and Prekdam on the Tonle Sap are considered in critical situations due water levels are lower than their LTAs. However, water level at Neak Luong seems to have effected by tidal from the sea.

Tan Chau and Chau Doc

Water levels from 02 to 09 March 2020 at the 2 tidal stations at Tan Chau and Chau Doc were increased and reached above their LTA levels. This could be influent by the tidal effect from the sea.

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

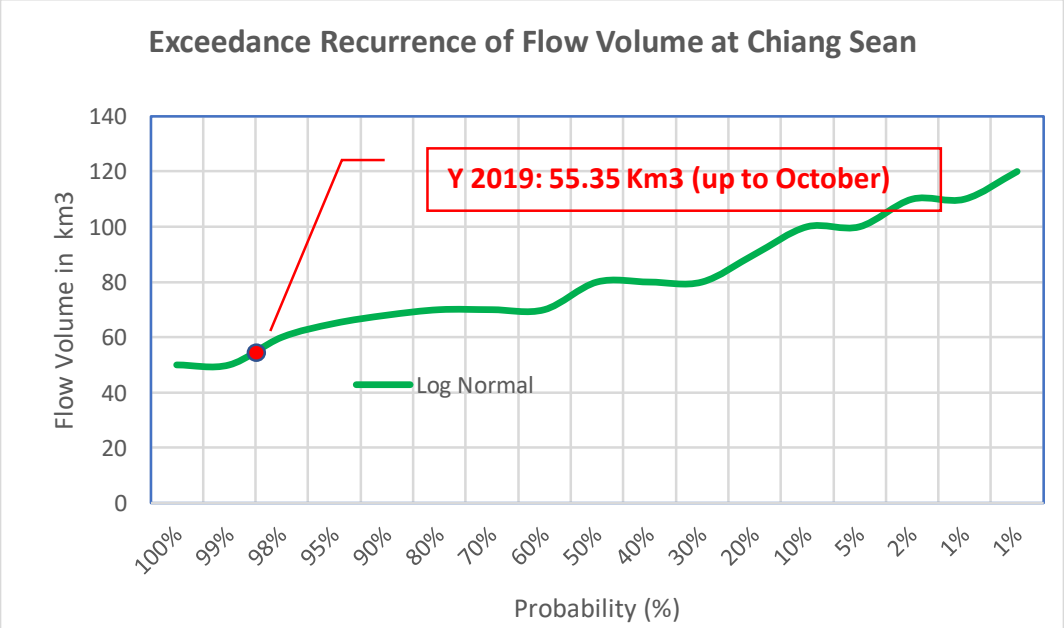
Discussion and Conclusion

From 02 to 09 March 2020, the trend of water levels at Chiang Sean were slightly increased after finishing test of equipment of hydropower dam at Jinghong at 4 Jan 2020. Water level at Chiang Sean is relied from inflow at Jinghong Hydropower Station on Lancang and its catchment rainfall. The impact could obviously see the gradually increasing 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. Water levels at stations in the middle part of LMB from Vientiane to Pakse were slightly decreased based on the trend inflows from upstream, but their water levels were still staying below their LTAs. However, downstream from Komgpong Cham on the Mekong river, Phnom Penh Port to Prekdam on the Tonle Sap and Chaktomuk and Koh Khel on the Bassac river, the water levels were stay below their LTAs and even close to their Minimum Levels. These stations were also considered as very critical condition.

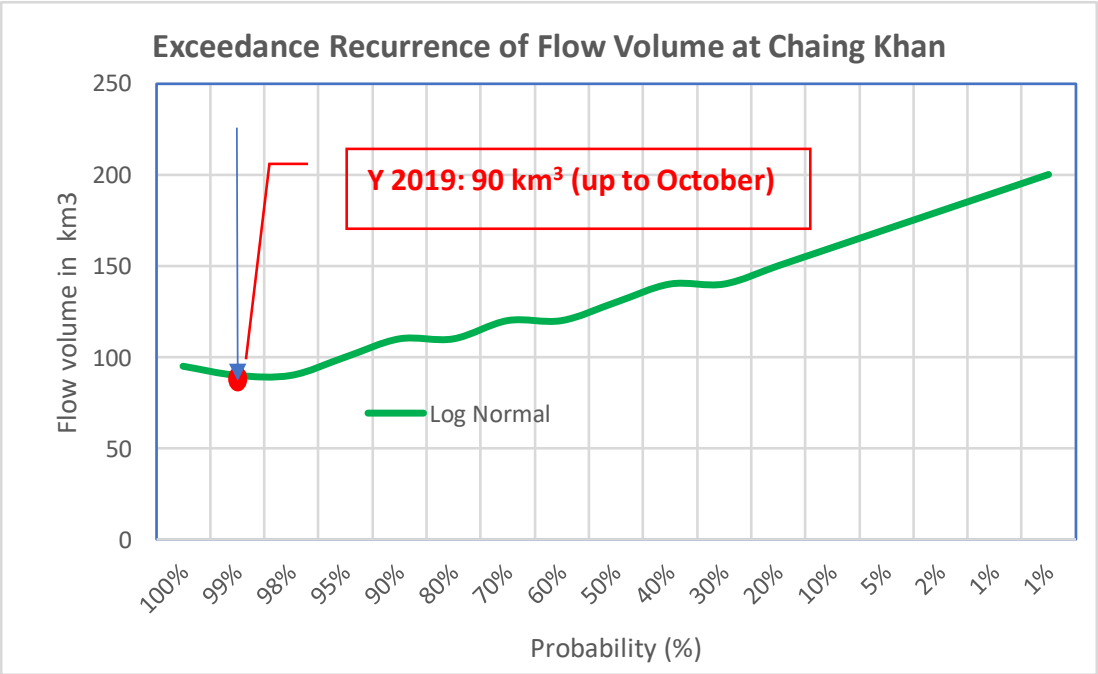
Based on the Exceedance Recurrence of the Minimum Flow Volumes at Chiang Sean, Chaing Khan and Kratie referred to historical data availability and the flows volume up to October 2019, it showed the current situation at these stations are considered as critical low flows in between ***50 to 100 year of 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 Sean Station



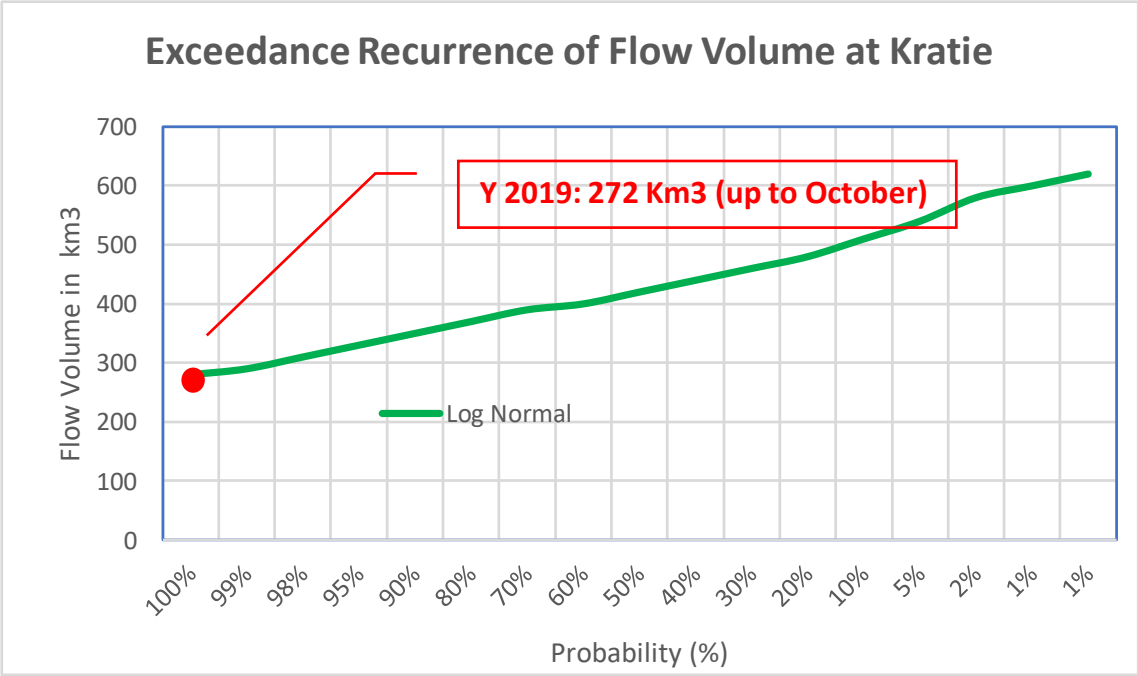
Probability	Recurrence Year	Log Normal [km^3]	Y2019 [km3]	Conditions
100%	200	50		Critical Low Flow
99%	100	50		
98%	50	60	55.35	Low Flow
95%	20	65		
90%	10	68		
80%	5	70		Normal Flow
70%	3	70		
60%	2	70		
50%	2	80		
40%	3	80		
30%	3	80		
20%	5	90		
10%	10	100		High Flow
5%	20	100		
2%	50	110		
1%	100	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 problem, related to the shortage of drinking water and agricultural

productions, 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

From 10 to 16 Mar 2020, water levels along the lower Mekong River from Thailand's Chiang Saen will continue to increase varies from 0.01 m to 0.05 m. From Lao PDR's Vientiane and Thailand's Nong Khai, water levels will also be slightly increased, followed the same trend from upstream vary from 0.02 m to 0.06 m. From Thailand's Nakhon Phanom to Lao PDR's at Pakse, water levels will be slightly increased, varying from 0.02 m to 0.06 m. From Cambodia's at Stung Treng to Neak Loung on the Mekong River, water will be slightly decreased varies from -0.03 m to -0.06 m.
For Viet Nam's Tan Chau on the Mekong River and Chau Doc on the Bassac River, water levels will be decreased lower than their LTAs due to the daily effect tidal from the sea.

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**)

Annex A: Graphs and Tables

Table A1: observed water levels

Unit: m

2020	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
03-03-2020	-	1.83	-	3.06	-	0.72	-	0.70	1.31	-	2.32	6.40	2.31	1.86	2.00	1.25	1.02	-0.02	0.06
04-03-2020	-	1.83	-	2.91	-	0.76	-	0.71	1.31	-	2.33	6.26	2.27	1.91	1.88	1.30	1.02	0.04	0.14
05-03-2020	-	1.82	-	2.92	-	0.73	-	0.79	1.34	-	2.29	5.88	2.30	1.78	1.94	1.32	1.03	0.13	0.21
06-03-2020	-	1.85	-	2.92	-	0.72	-	0.85	1.40	-	2.25	5.79	2.32	1.91	1.95	1.52	1.02	0.35	0.42
07-03-2020	-	1.81	-	2.92	-	0.74	-	0.9	1.47	-	2.3	5.58	2.35	1.91	1.7	1.64	1.03	0.61	0.7
08-03-2020	-	1.79	-	2.98	-	0.75	-	0.91	1.51	-	2.32	5.66	2.36	1.78	1.67	1.68	1.03	0.88	1.03
09-03-2020	-	1.79	-	3.00	-	0.80	-	0.85	1.50	-	2.34	5.60	2.39	1.65	1.65	1.60	1.02	1.09	1.24

Table A2: observed rainfall

Unit: mm

2020	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
03-03-2020	-	0	-	0.5	-	0	-	0	0	-	0	0	0	0	0	0	0	0	0
04-03-2020	-	0	-	3.5	-	13.5	-	3.6	0	-	0	0	0	0	0	0	0	0	0
05-03-2020	-	0	-	6.4	-	12	-	9.8	2.2	-	0	0	0	0	0	0	0	0	0
06-03-2020	-	0	-	14.8	-	2	-	10.2	2.3	-	0	0	0	0	0	0	0	0	0
07-03-2020	-	0	-	0	-	14.9	-	27.7	18.6	-	0	0	0	0	0	0	0	0	0
08-03-2020	-	0	-	0	-	0	-	0	0	-	0	0	0	0	0	0	0	0	0
09-03-2020	-	0	-	0	-	0	-	0	0	-	0	0	0	0	0	0	0	0	0

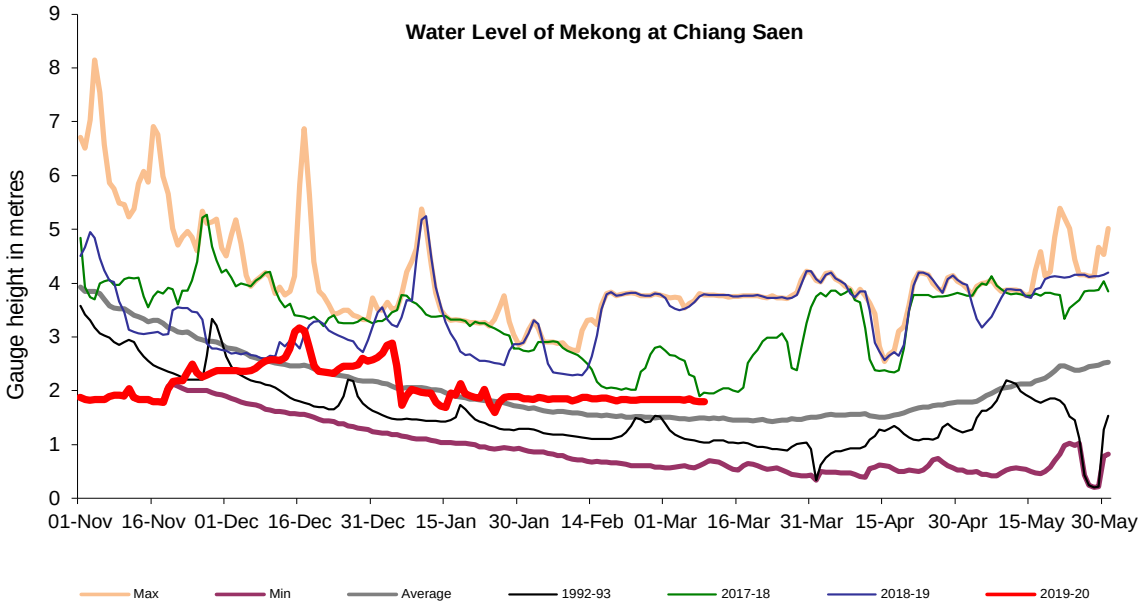
Note: No data available from China during the Dry Season

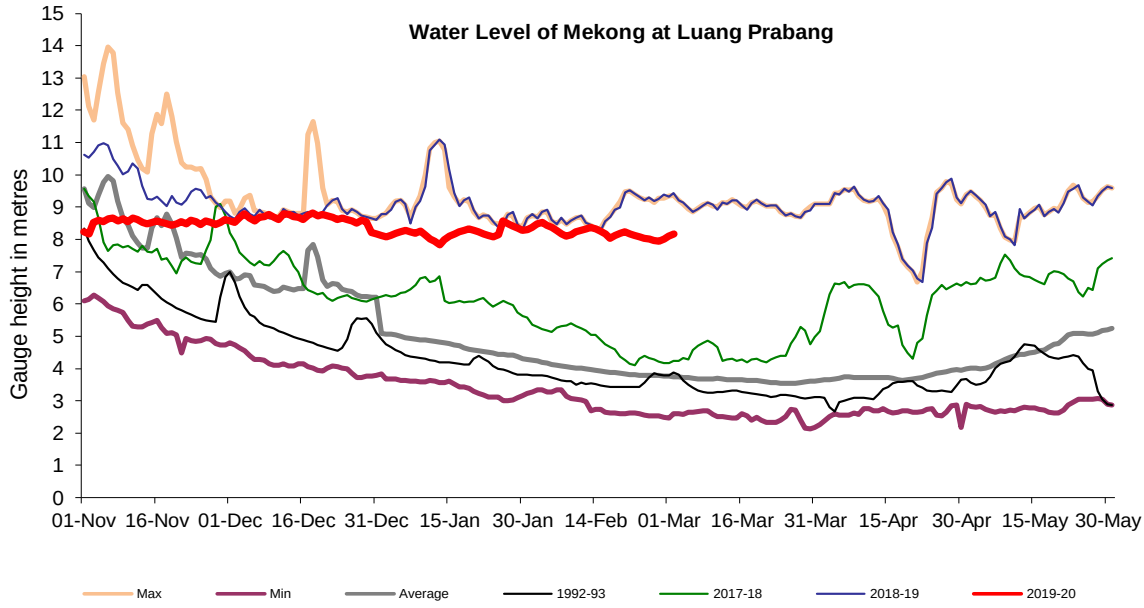
Annex B: Season Water Level Hydrographs

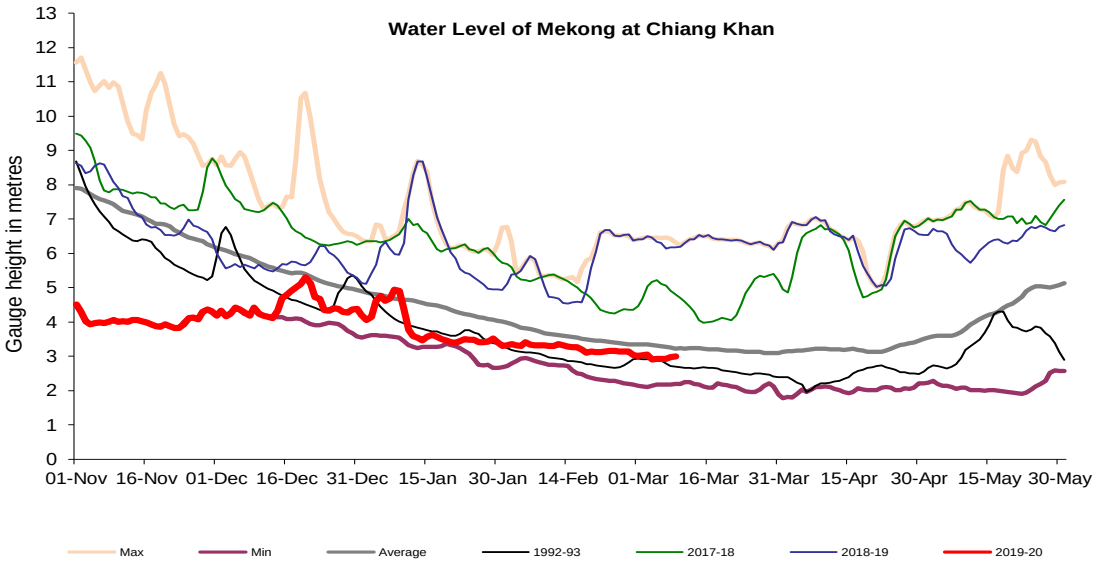
This Annex showed water level hydrographs of each key station. These hydrographs distributed weekly water level for River Monitoring purpose.

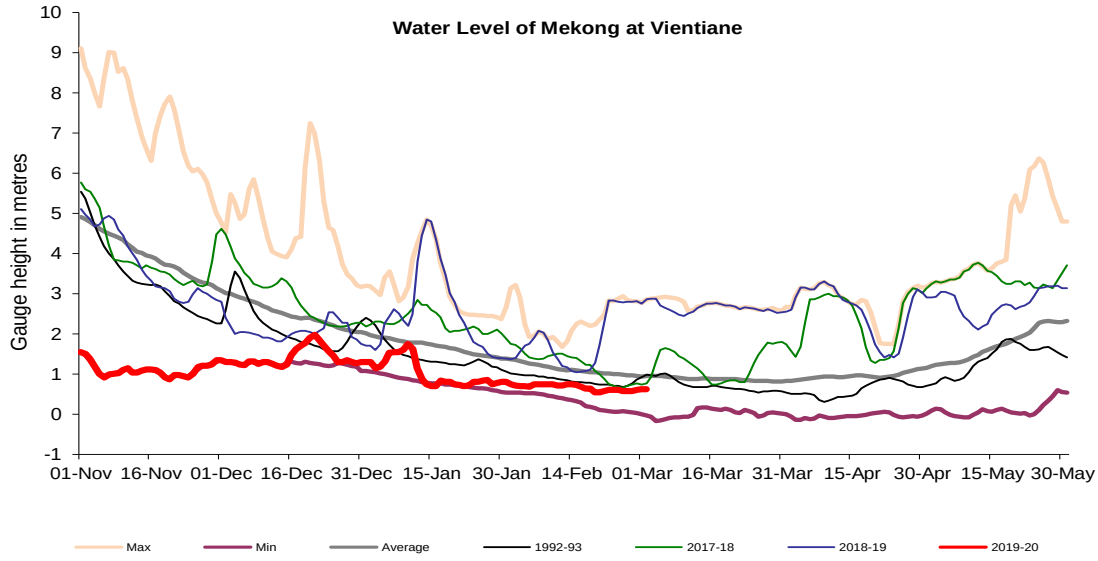
HYDROGRAPH AT 7 AM OF MEKONG TONLE SAP AND BASSAC AT MAINSTREAM STATIONS IN DRY SEASON UP TO 09 MARCH 2020

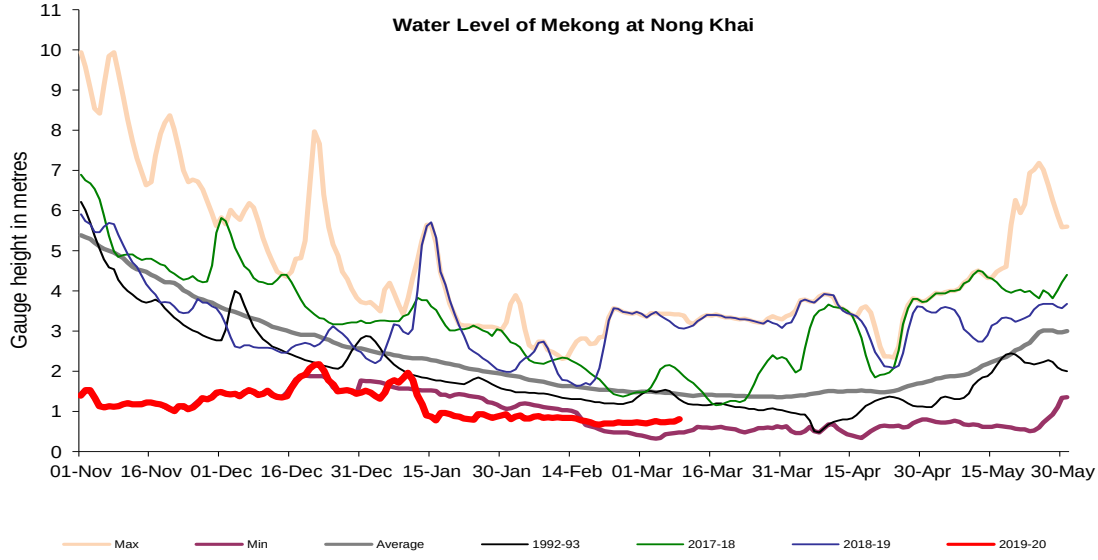
(No Data from Lao PDR from 03 to 09 March 2020)

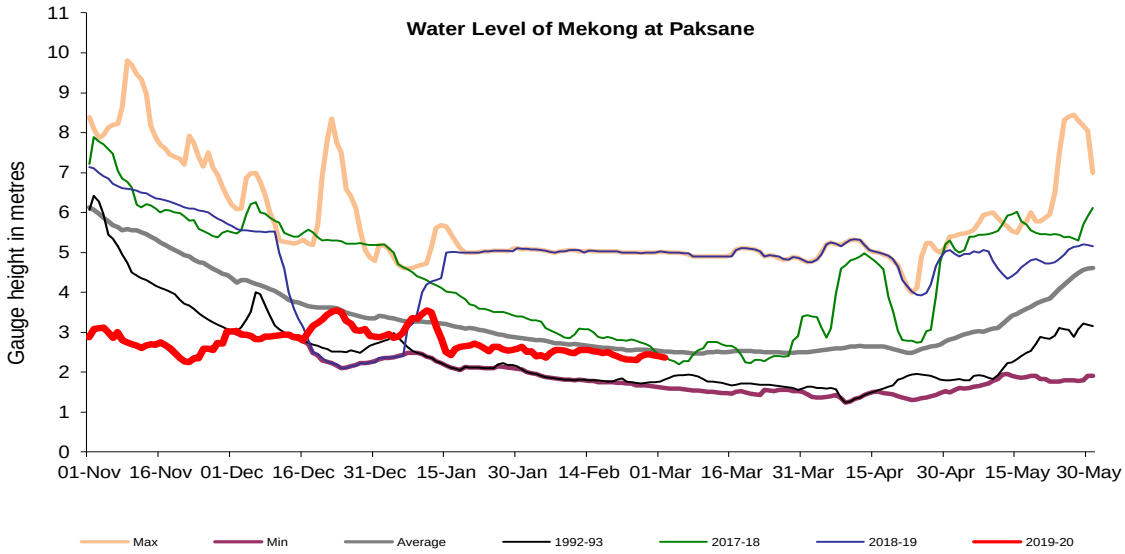


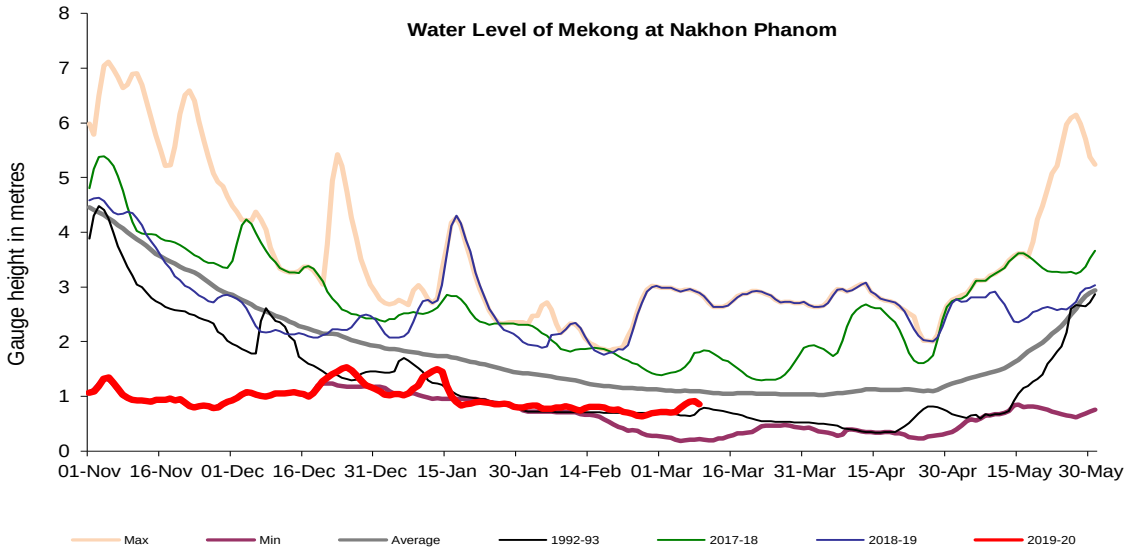


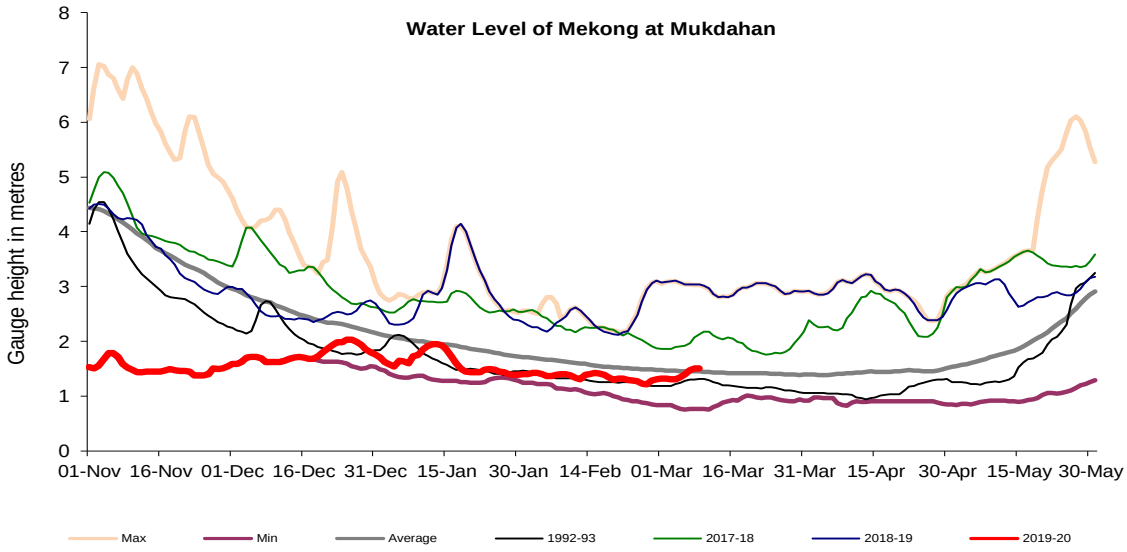

Water Level of Mekong at Chiang Khan
Gauge height in metres
13
12
11
10
9
8
7
6
5
4
3
2
1
0
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

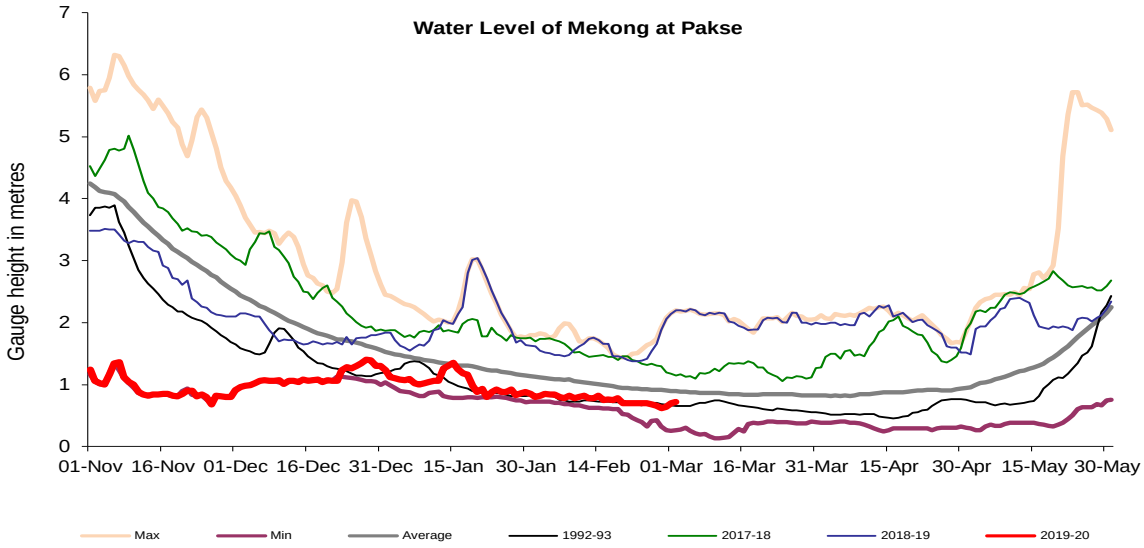

Water Level of Mekong at Vientiane
Gauge height in metres
10
9
8
7
6
5
4
3
2
1
0
-1
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


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
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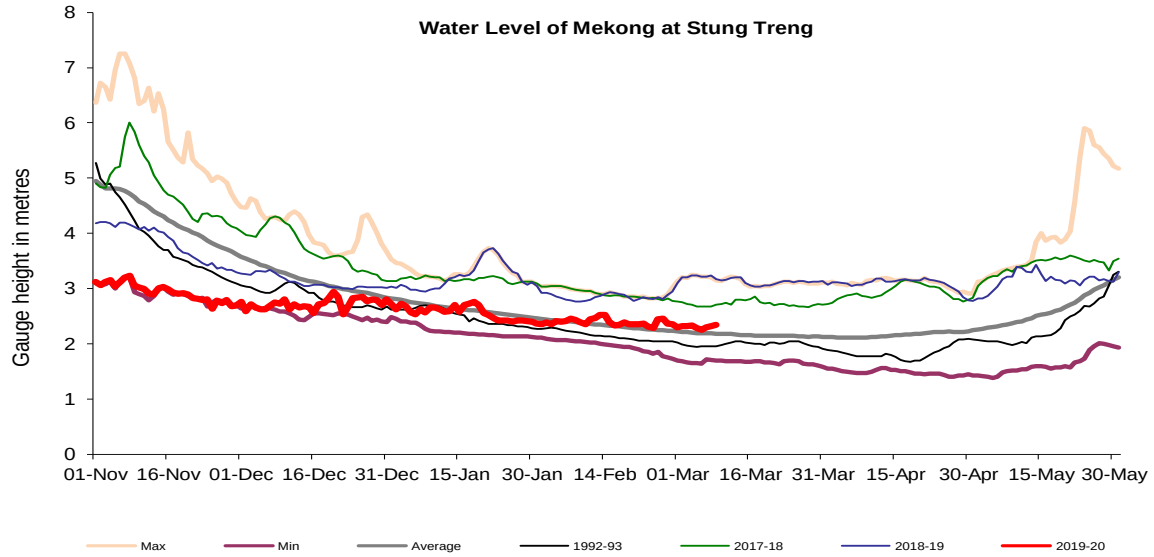
5
6
7
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Mekong at Stung Treng
Gauge height in metres
0
1
2
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4
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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
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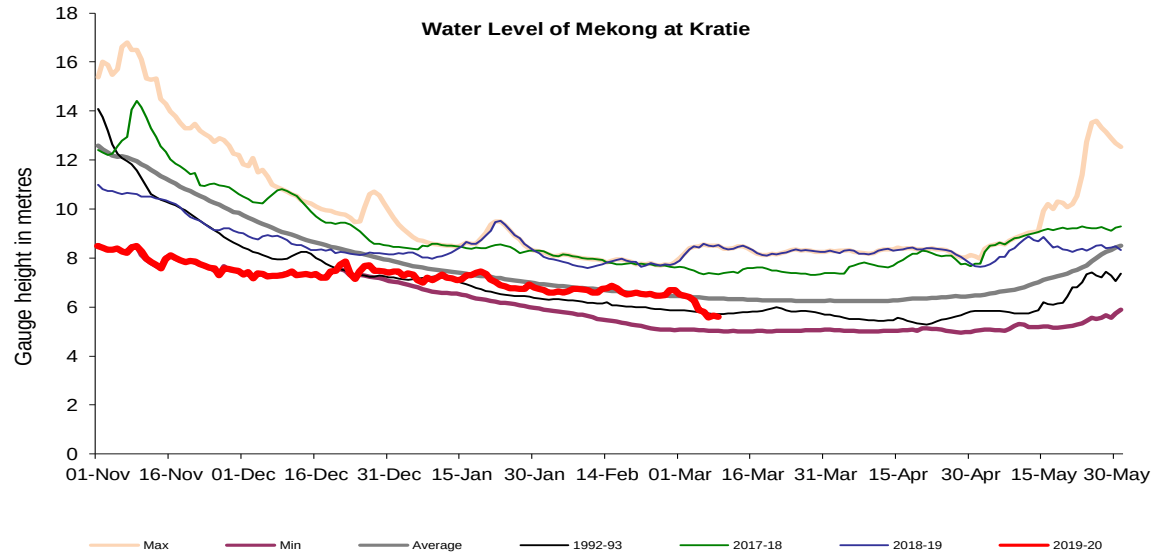
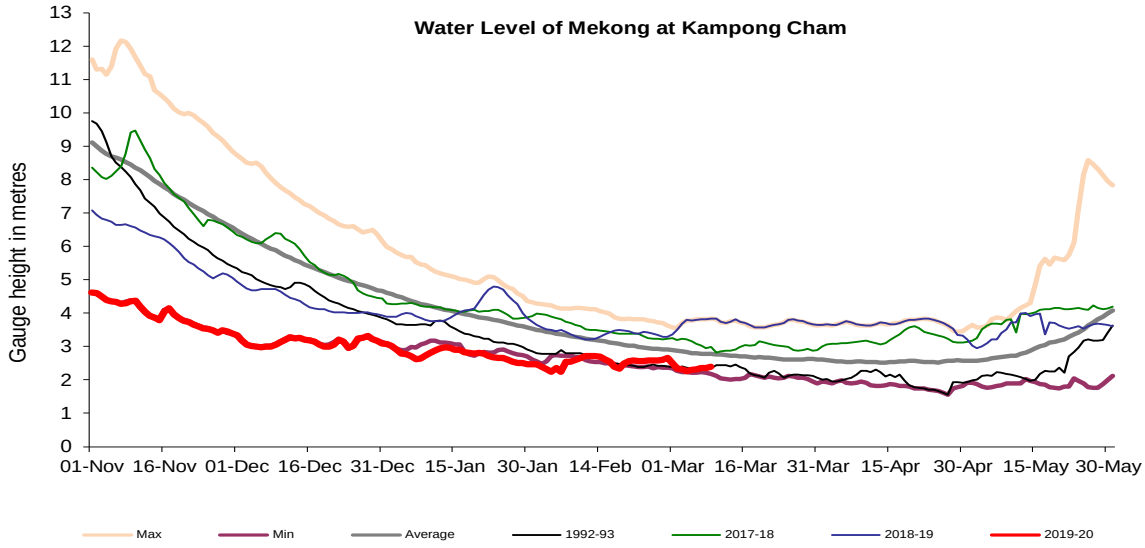
Average
1992-93
2017-18
2018-19
2019-20


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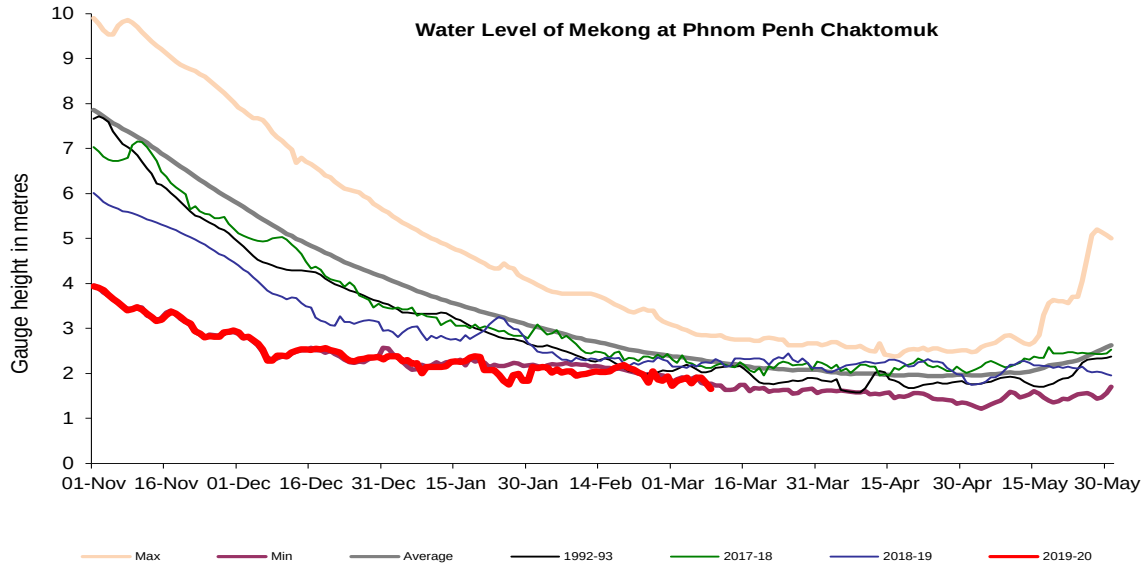
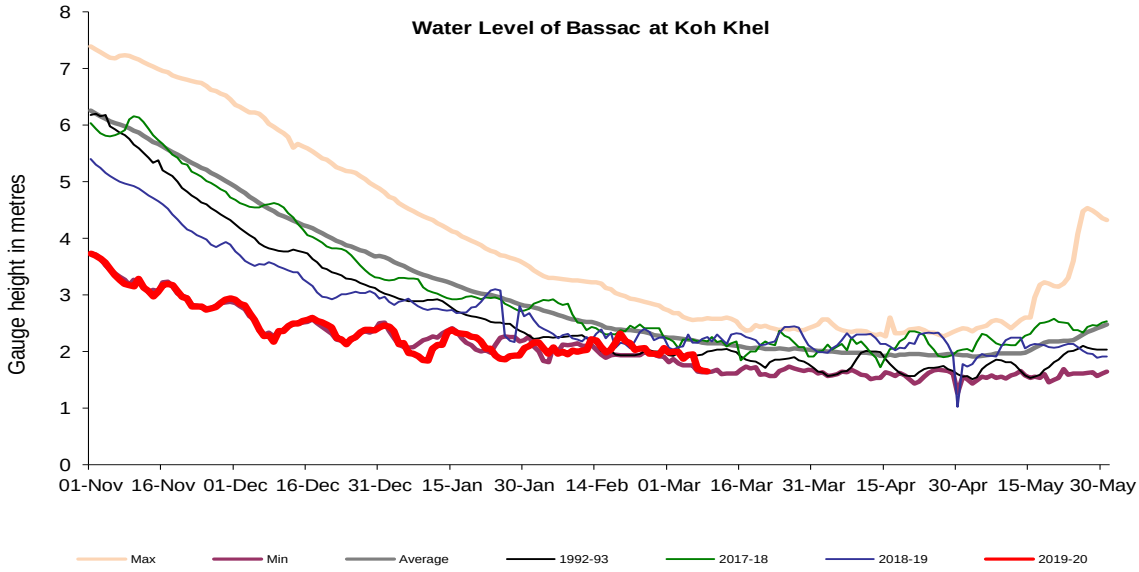
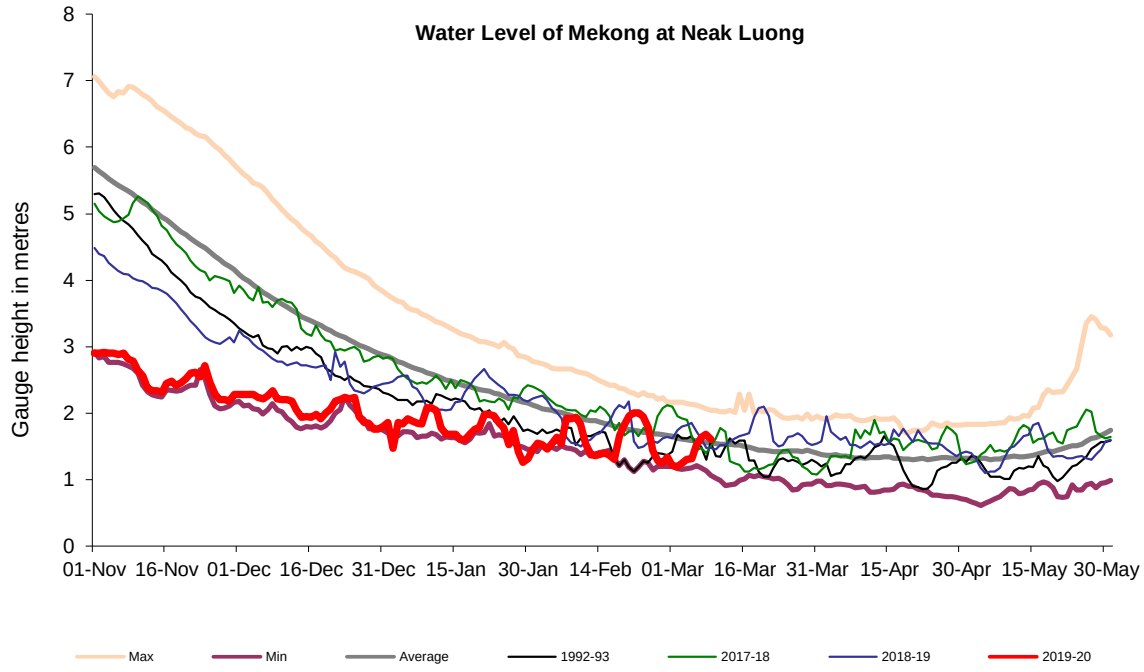
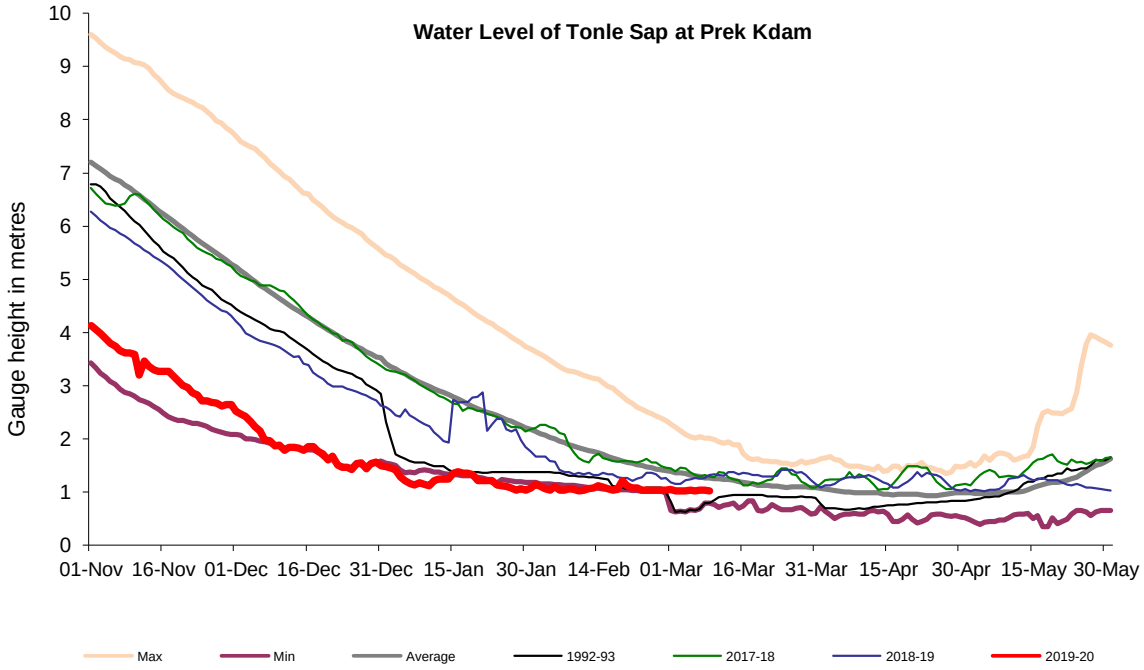
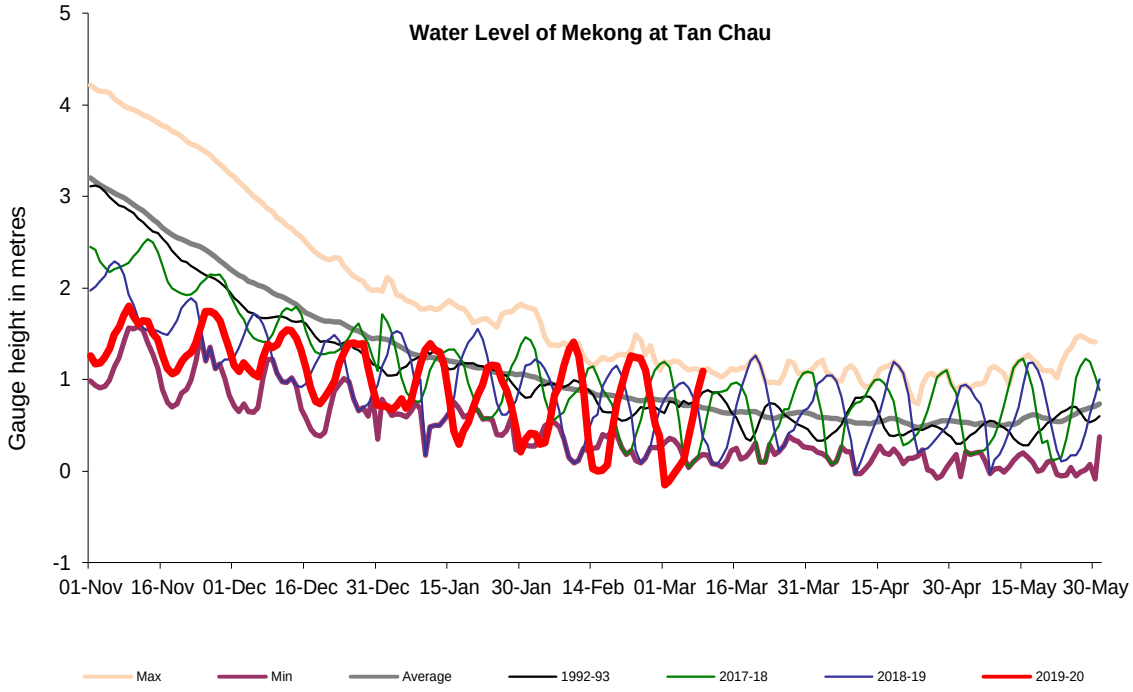
0
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20

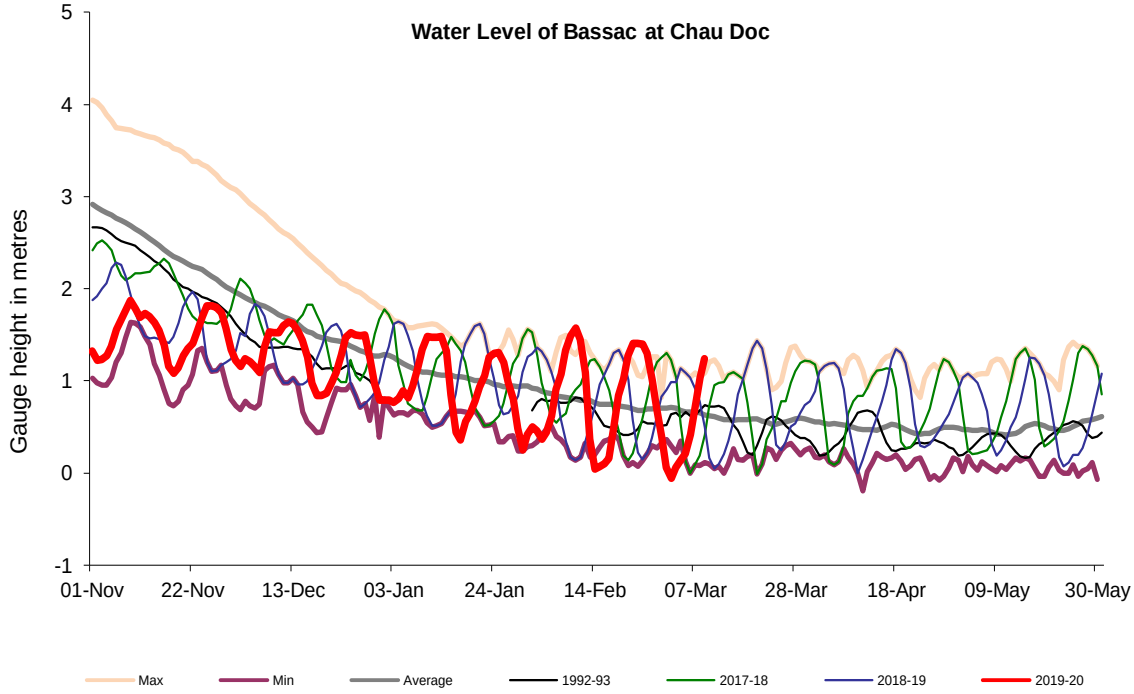

Water Level of Mekong at Phnom Penh Chaktomuk
Gauge height in metres
10
9
8
7
6
5
4
3
2
1
0
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Bassac at Koh Khel
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 Neak Luong
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 Tonle Sap at Prek Kdam
Gauge height in metres
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 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