Mekong River Commission

Regional Flood and Drought Management Centre

Weekly Dry Season Situation Report for the Mekong River Basin

Prepared on: 07/01/2020, covering the week from 31 Dec 2019 to 5 Jan 2020

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

General weather patterns:

From 31 Dec 2019 to 6 Jan 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 the next 3 months from Jan to Mar 2020, the cold appears because the influentially high-pressure air mass areas prevail over Thailand for the whole month. However, at some periods, coldly high-pressure air masses from China will meet hot air masses already prevailing over LMB. **Figures 1 & 2** presented the weather map for 31 December 2019 and 5 Jan 2020.

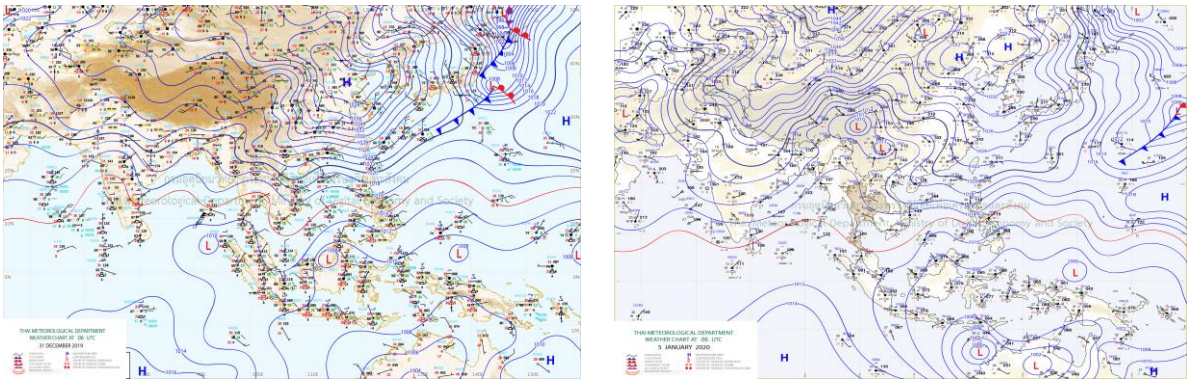


Figure 1: Summary of weather condition over the LMB from 31 Dec 2019 and 6 Jan 2020

General behavior of the Mekong River:

This week from 31 Dec 2019 to 6 Jan 2020, water levels from Chiang Sean were decreased drastically, varied from 0.03 m to 0.76 m due to the test the equipment of hydropower station at Jinghong, China. Water levels at these stations were below its Long-term -Average (LTA). 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 0.20 m. Water levels at stations at the middle part of LMB from Vientiane to Pakse were decreased based on the trend inflows from upstream, and water levels from VTE/Nong Khai to Pakse were below their LTA 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 low and stay closely to their minimum levels. For the 2 tidal stations at Tan Chau and Chau Doc, water levels increased followed the same trends as minimum levels in January 2020. The actual water levels at most of the key station are staying below their LTAs and even Min Levels (see its hydrograph in **Annex B**).

For stations from Chiang Saen and Luang Prabang

Water levels from 31 Dec 2019 to 6 Jan 2020at Chiang Sean station were drastically decreased by almost eight-day from 27 Dec 2019 to 4 Jan 2020, according to an official notification from China's Ministry of Water Resources which copied to the Mekong River Commission Secretariat on 31st Dec 2019. The decrease of water levels was the test of equipment of hydropower station at Jinghong, China. At this station water levels decreased from 0.03 m to 0.76 m. However, at Luang Prabang station, water levels were fluctuated close to its historical maximum levels. Water levels at this station sometime increased rapidly in 0.20 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 31 Dec 2019 to 6 Jan 2020at Chiang Khan station were likely also nominated by upstream hydropower dam of Xayaburi, which was noted that water levels decreased, varied from 0.02 to 0.38 m. The current observed water levels at Chiang Khan, Vientiane/Nong Khai and Paksane stations below their historical LTA levels.

For stations from Nakhon Phanom to Pakse

Water levels from 31 Dec 2019 to 6 Jan 2020 at Khong Chiam to Pakse stations were also decreased, varied from 0.02 to 0.13m. The current water levels at these stations area still below their minimum historical levels.

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

Water levels from 31 Dec 2019 to 6 Jan 2020 at Stung Treng, Kratie and Kompong Cham were continued to decrease, varied from 0.02 m to 0.08 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 found close to their historical minimum levels (1980-2018).

Tan Chau and Chau Doc

Water levels from 31 Dec 2019 to 6 Jan 2020 at the 2 tidal stations at Tan Chau and Chau Doc were slightly decreased, follows the same trends of their minimum levels due to the tidal effect from the sea. Water levels were kept the same trends as minimum levels since early December 2019 and the actual water levels are stayed below their LTAs

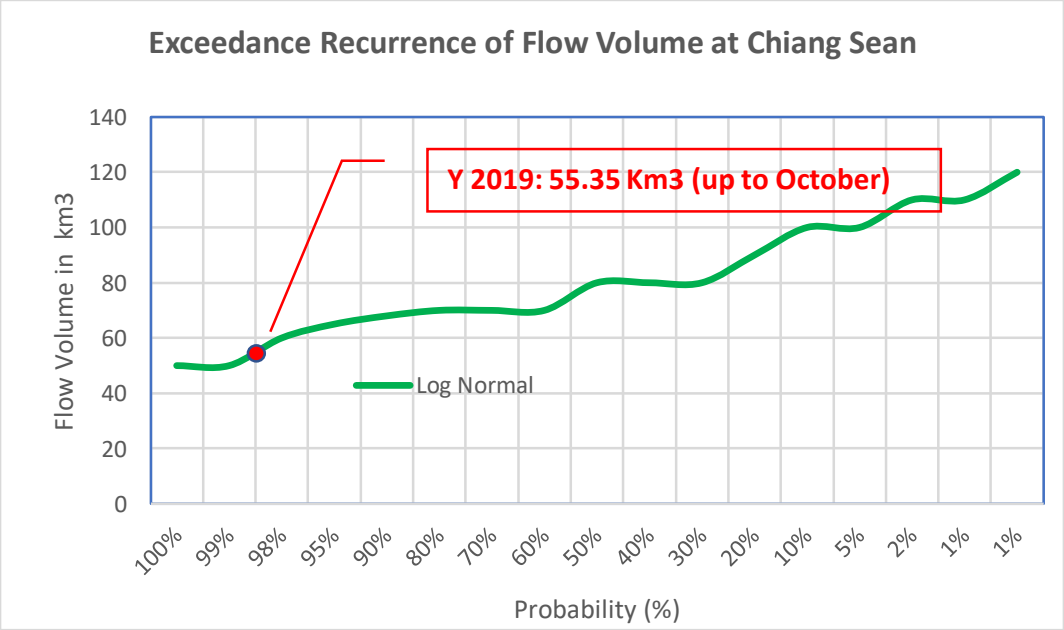
According to the Japan Meteorological Agency (JMA), Sea surface temperature (SST) variability in the tropics Neutral, which has no major impact.

Discussion and Conclusion

From 31 Dec 2019 to 6 Jan 2020, the trend of water levels at Chiang Sean were decreased about 0.76m, due to the test of equipment of hydropower dam at Jinghong from 27 Dec 2019 to 4 Jan 2020. 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 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.

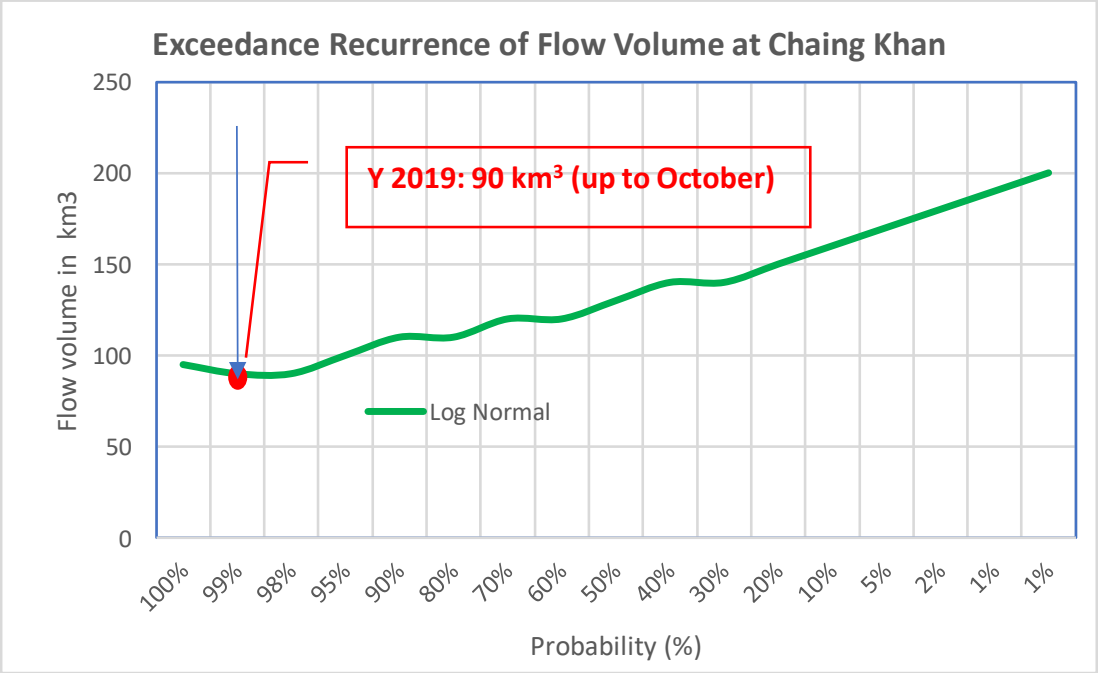
The low inflows from upstream and less rainfall in catchments, resulting water levels from Paksane to Pakse are drastically dropped below their minimum levels. Also, from Stung Treng, Kratie and Kompong Cham stations water levels are followed the same trend from upstream which stay below their minimum 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 Sean Station



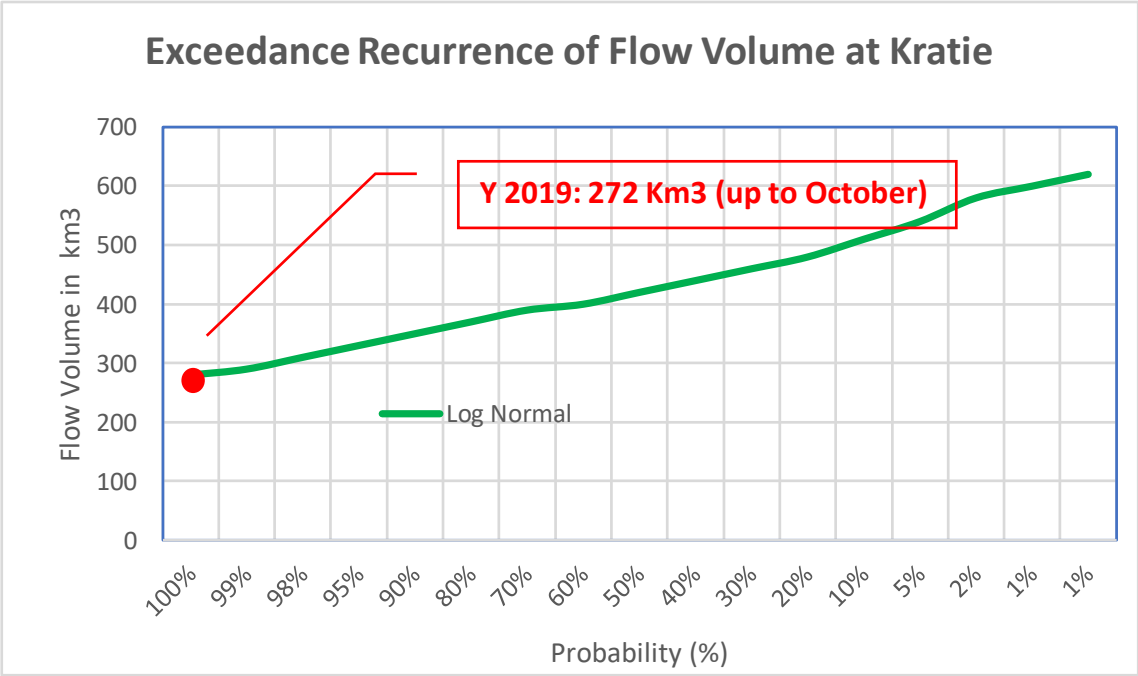
Probability	Recurrence Year	Log Normal [km^3]	Y2019 [km3]	Conditions
100%	200	50		Critical Low Flow
99%	100	50		
98%	50	60	55.35	Low Flow
95%	20	65		
90%	10	68		
80%	5	70		Normal Flow
70%	3	70		
60%	2	70		
50%	2	80		
40%	3	80		
30%	3	80		
20%	5	90		
10%	10	100		High Flow
5%	20	100		
2%	50	110		
1%	100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

According to a notification from China's Ministry of Water Resources that the Mekong River Commission Secretariat received yesterday, the tests of the "equipment of the power station" will result in water outflow decrease from the dam from 1,200 – 1,400 cubic meters per second (m^3/s) to between 800 – 1,000m^3/s from 1-3 January 2020.
The amount of water flow was further reduced to its lowest point of 504-800m^3/s on January 4 before it is restored to its original volumes, the notification said.
Based on the MRC's observed and forecasting water levels, the tests was seen the water level in Chiang Saen – the first monitoring station on the Mekong River in Thailand located approximately 300km away from Jinghong – drop between 0.76m on 6 January 2020.
The stretches from Vientiane to Paksane of Lao PDR, including Nongkhai of Thailand, were experienced a 0.02 – 0.50-meter decrease in their water levels during January 10, 2020.
In the Mekong mainstream from Thailand's Nakhon Phanom, Mukdahan and Khong Chiam to Lao PDR's Thakhek, Savannakhet and Pakse, their water levels was between 0.02 and 0.40 meters during January 12 – 14, 2020.
In Cambodia, the water levels along the Mekong River in Stung Treng, Kratie, Kompong Cham, Phnom Penh, Koh Khel and Neak Luong were dropped from 0.02 – 0.30 meters during January 15 – 18, 2020.
For Viet Nam's Tan Chau on the Mekong River and Chau Doc on the Bassac River, water levels were fluctuated under their long-term averages (LTAs) with different trends from last year 2018.

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
31-12-2019	-	2.58	8.17	4.38	1.30	1.46	2.89	1.14	1.76	1.30	2.80	7.39	3.10	2.31	2.43	1.80	1.49	0.72	0.79
01-01-2020	-	2.61	8.12	4.20	1.30	1.51	2.87	1.09	1.70	1.23	2.72	7.46	3.07	2.38	2.47	1.86	1.48	0.71	0.79
02-01-2020	-	2.70	8.07	4.06	1.30	1.46	2.91	1.03	1.62	1.12	2.62	7.45	3.02	2.38	2.44	1.47	1.45	0.70	0.79
03-01-2020	-	2.85	8.13	4.16	1.14	1.38	2.96	1.02	1.57	1.10	2.73	7.27	2.90	2.38	2.36	1.86	1.42	0.67	0.77
04-01-2020	-	2.89	8.19	4.60	1.18	1.31	2.86	1.04	1.54	1.08	2.68	7.37	2.79	2.27	2.13	1.84	1.28	0.71	0.81
05-01-2020	-	2.47	8.24	4.76	1.32	1.46	2.89	1.04	1.65	1.07	2.57	7.32	2.77	2.30	2.15	1.92	1.22	0.79	0.89
06-01-2020	-	1.73	8.29	4.62	1.53	1.72	2.98	1.02	1.63	1.09	2.53	7.09	2.72	2.22	1.98	1.88	1.16	0.69	0.82

Table A2: observed rainfall

Unit: mm

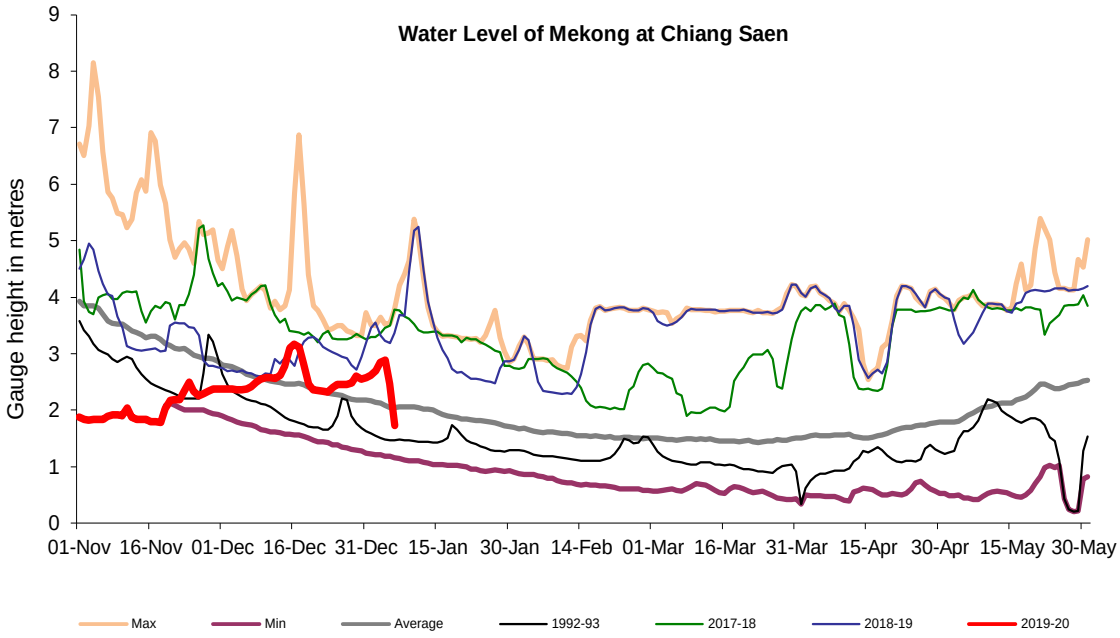
2020	Jinghong	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Mukdahan	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
31-12-2019	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01-01-2020	-	0	0	0	0	0	0	0	0	0	0	0	0	0	4.5	0	0	0	0
02-01-2020	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03-01-2020	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04-01-2020	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05-01-2020	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06-01-2020	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

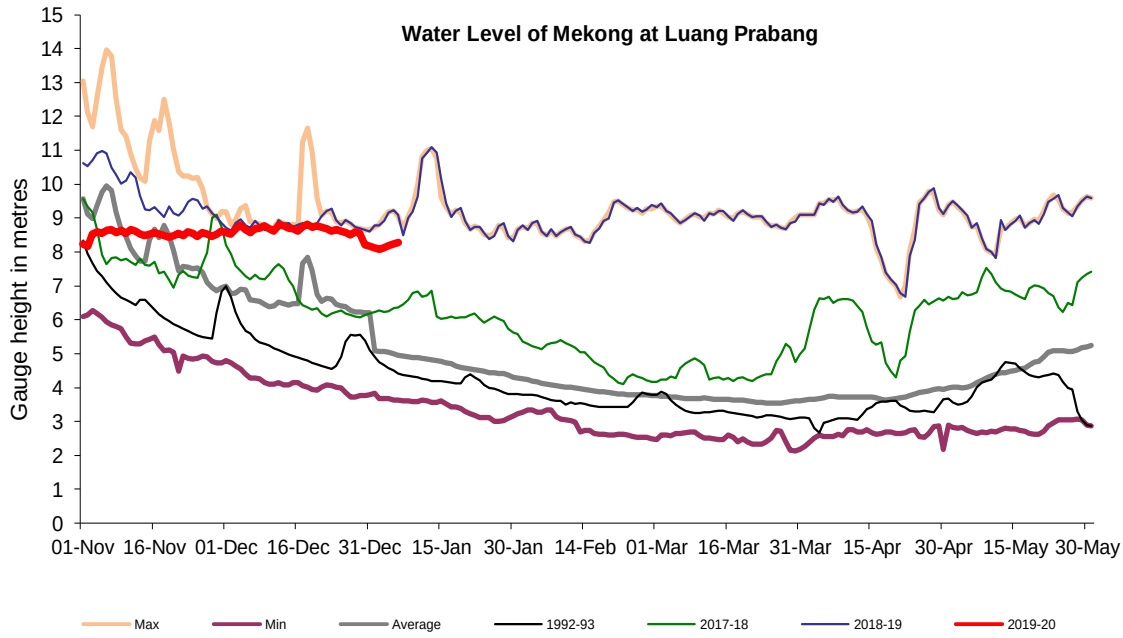
Note: No data available from China during the Dry Season

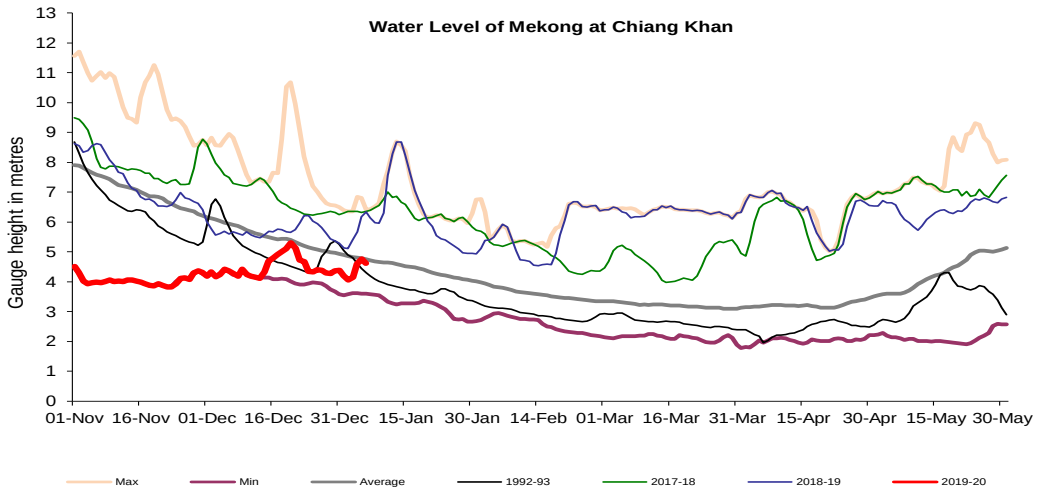
Annex B: Season Water Level Hydrographs

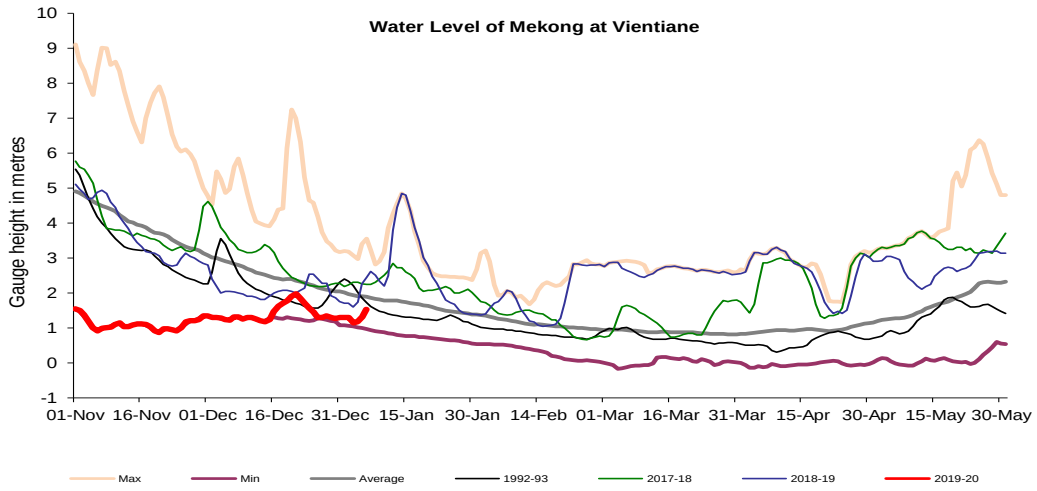
This Annex showed water level hydrographs of each key station. These hydrographs distributed weekly water level for River Monitoring purpose.

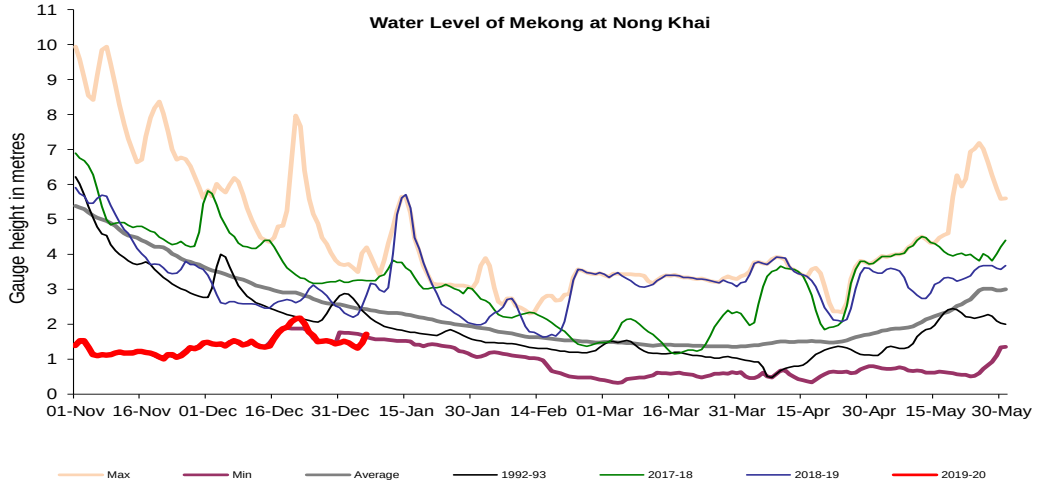
HYDROGRAPH AT 7 AM OF MEKONG TONLE SAP AND BASSAC AT MAINSTREAM STATIONS IN DRY SEASON UP TO 6 JAN 2020

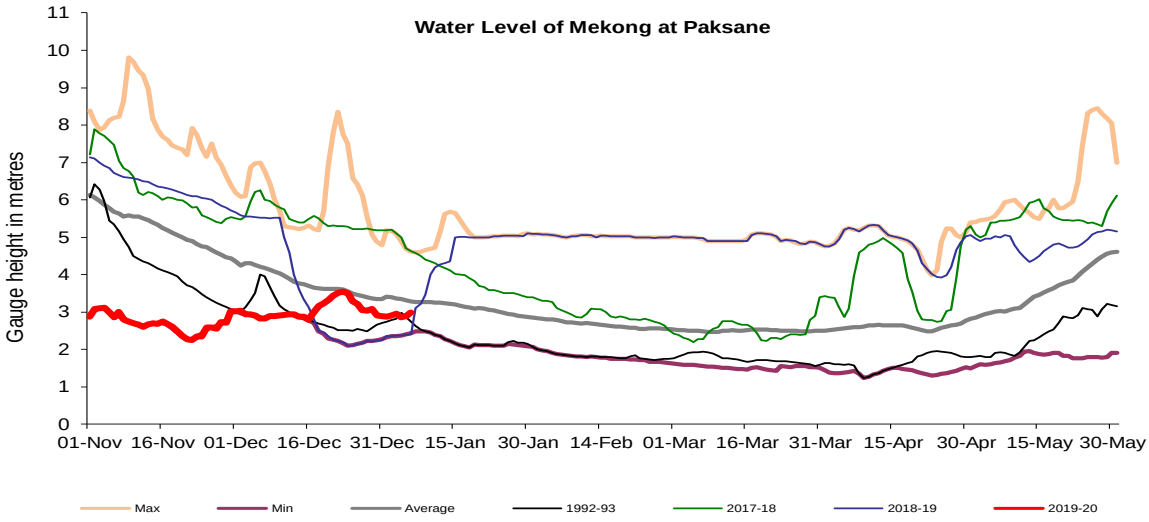





Water Level of Mekong at Chiang Khan
Gauge height in metres
13
12
11
10
9
8
7
6
5
4
3
2
1
0
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


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
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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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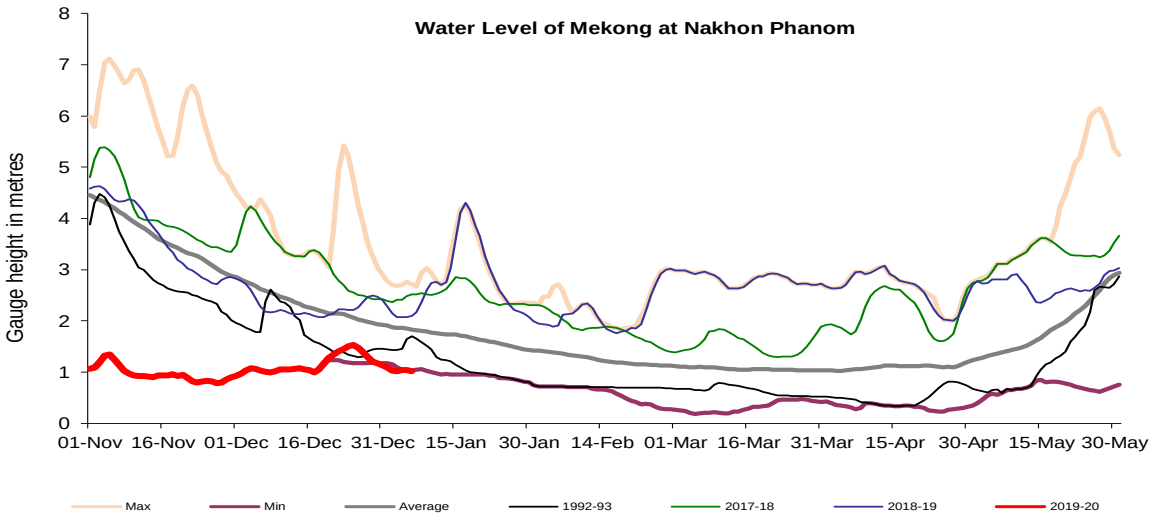
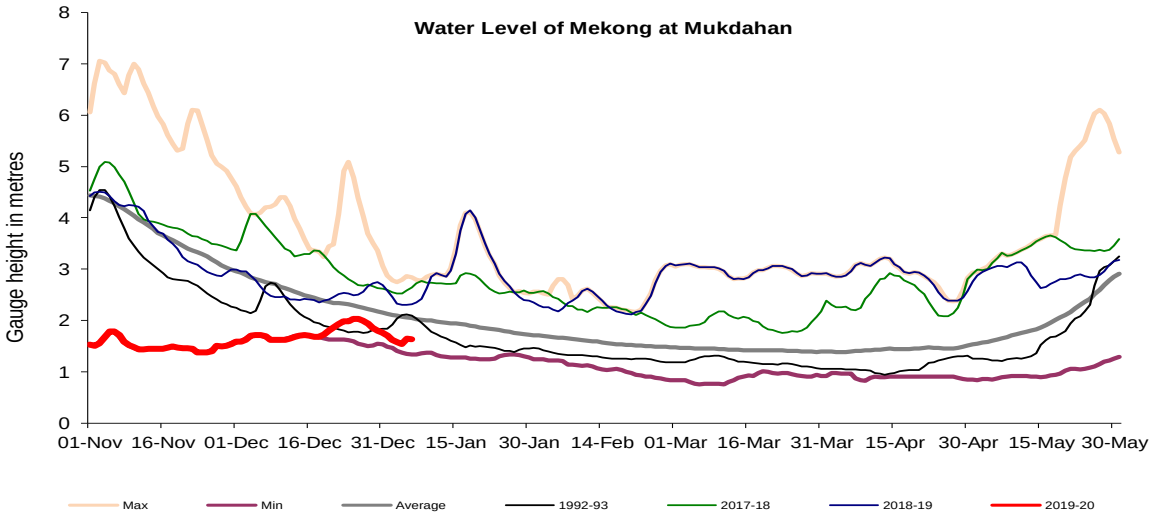
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Mekong at 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
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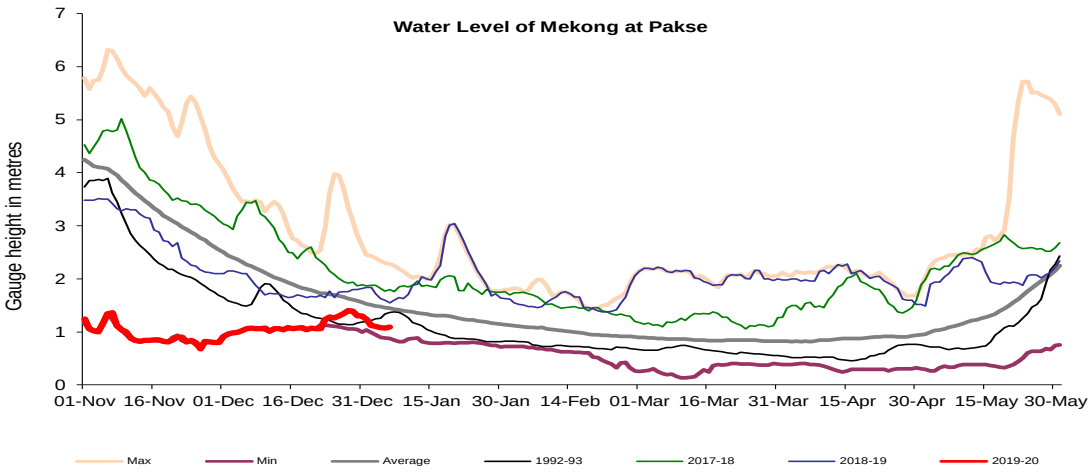
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Mekong at Pakse
Gauge height in metres
0
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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
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Average
1992-93
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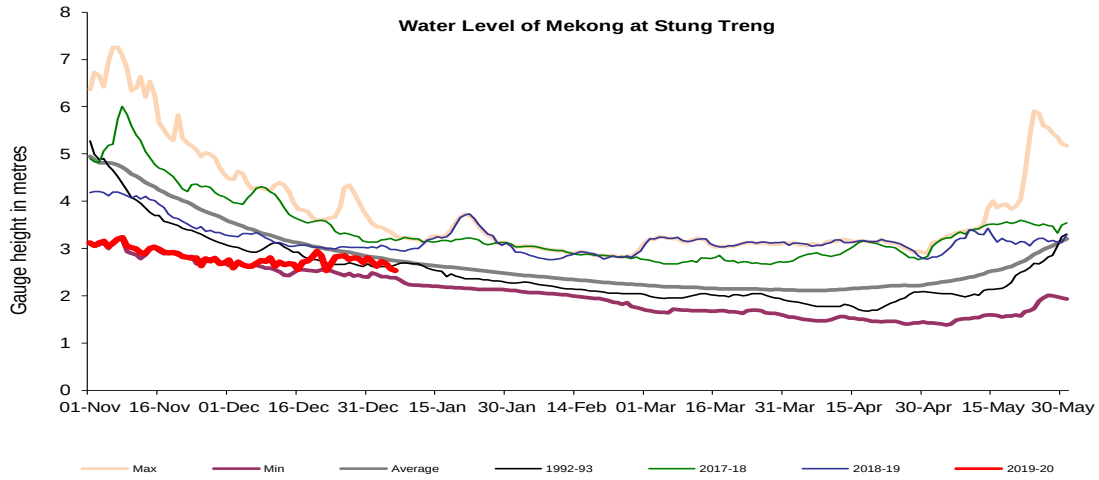
2018-19
2019-20


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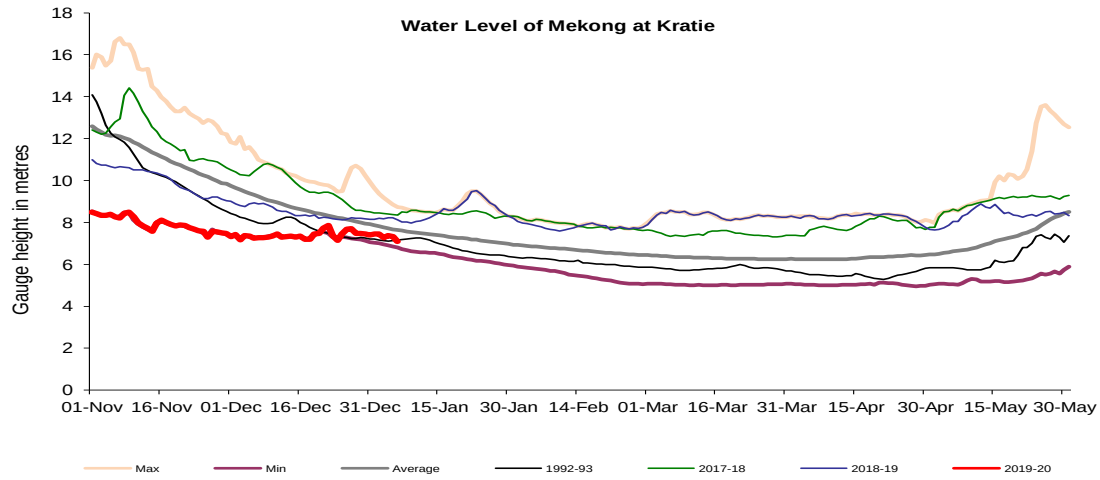
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Mekong at Kratie
Gauge height in metres
0
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16
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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
Min
Average
1992-93
2017-18
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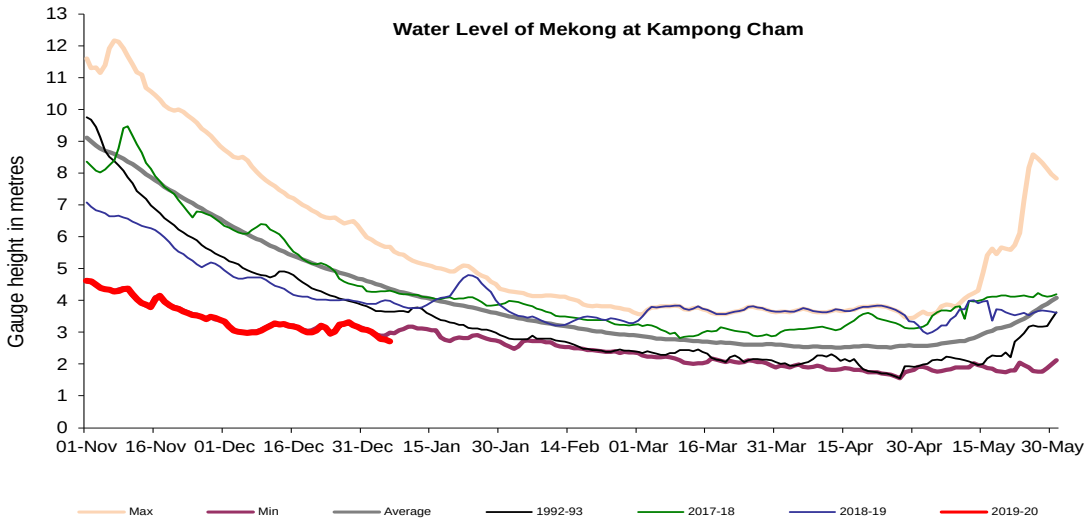
2019-20


Water Level of Mekong at Kampong Cham
Gauge height in metres
0
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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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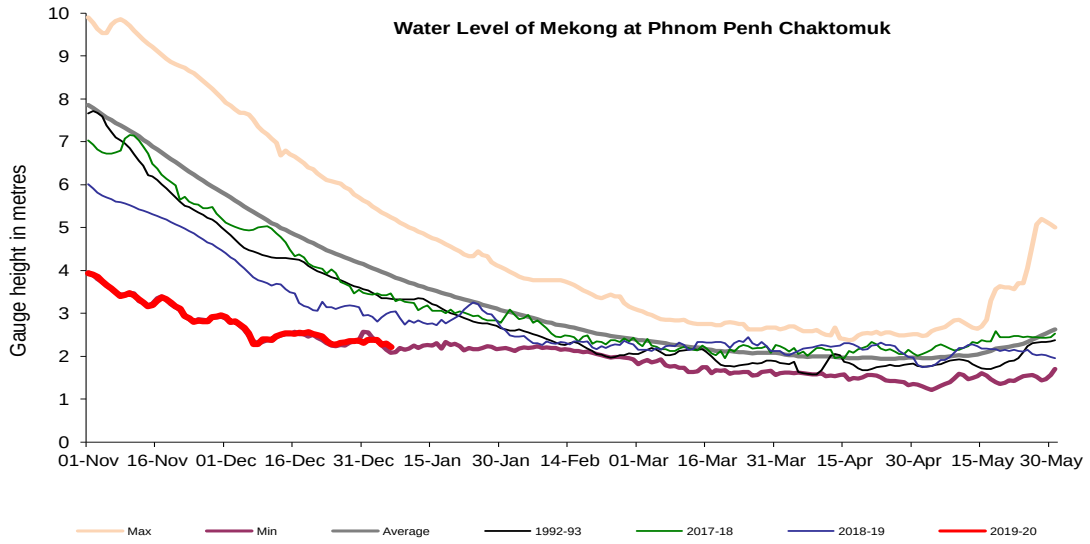
Average
1992-93
2017-18
2018-19
2019-20


Water Level of Mekong at Phnom Penh Chaktomuk
Gauge height in metres
0
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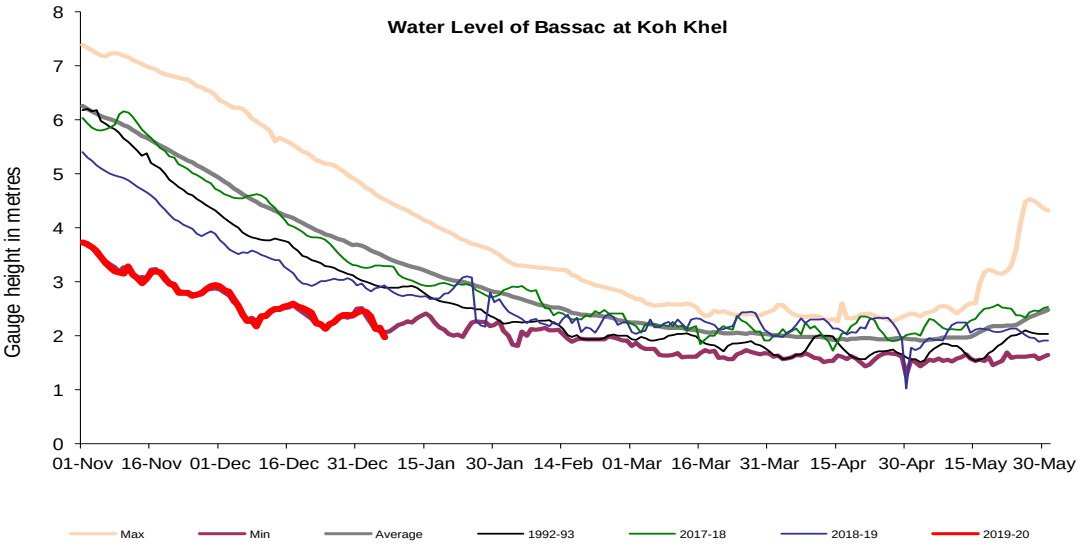
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


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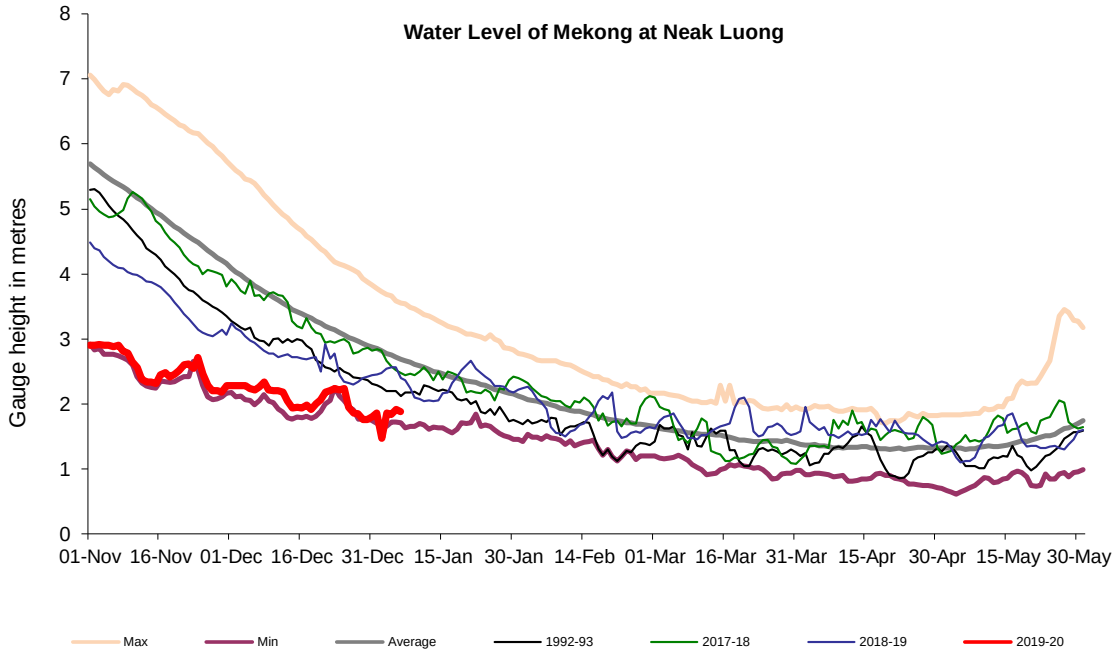
8
01-Nov 16-Nov 01-Dec 16-Dec 31-Dec 15-Jan 30-Jan 14-Feb 01-Mar 16-Mar 31-Mar 15-Apr 30-Apr 15-May 30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


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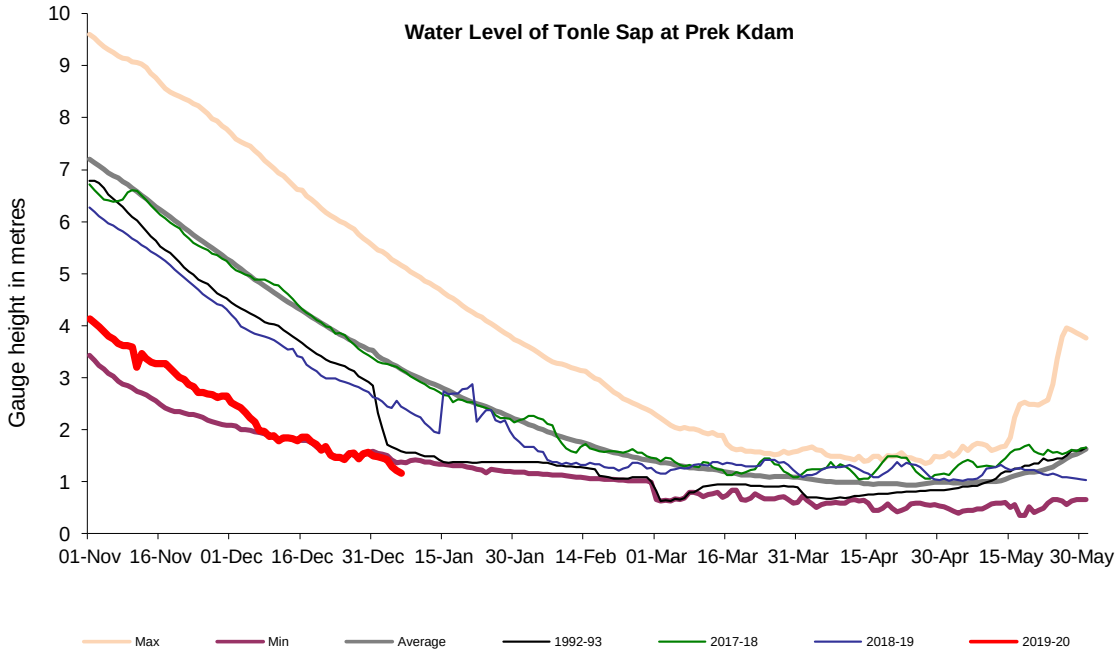
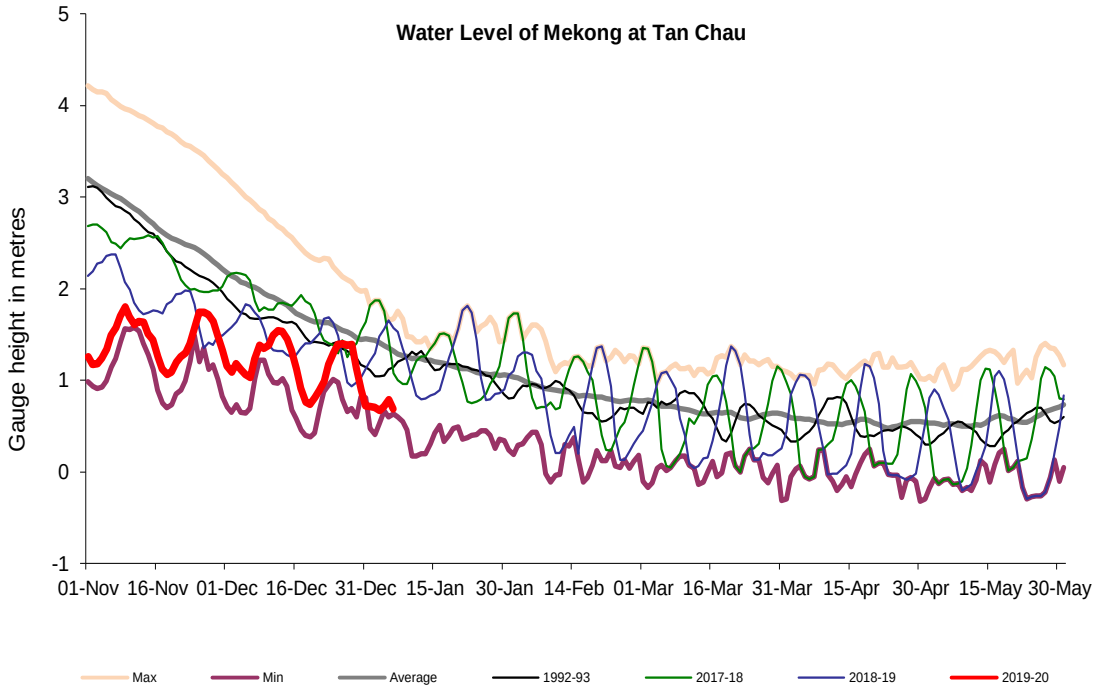
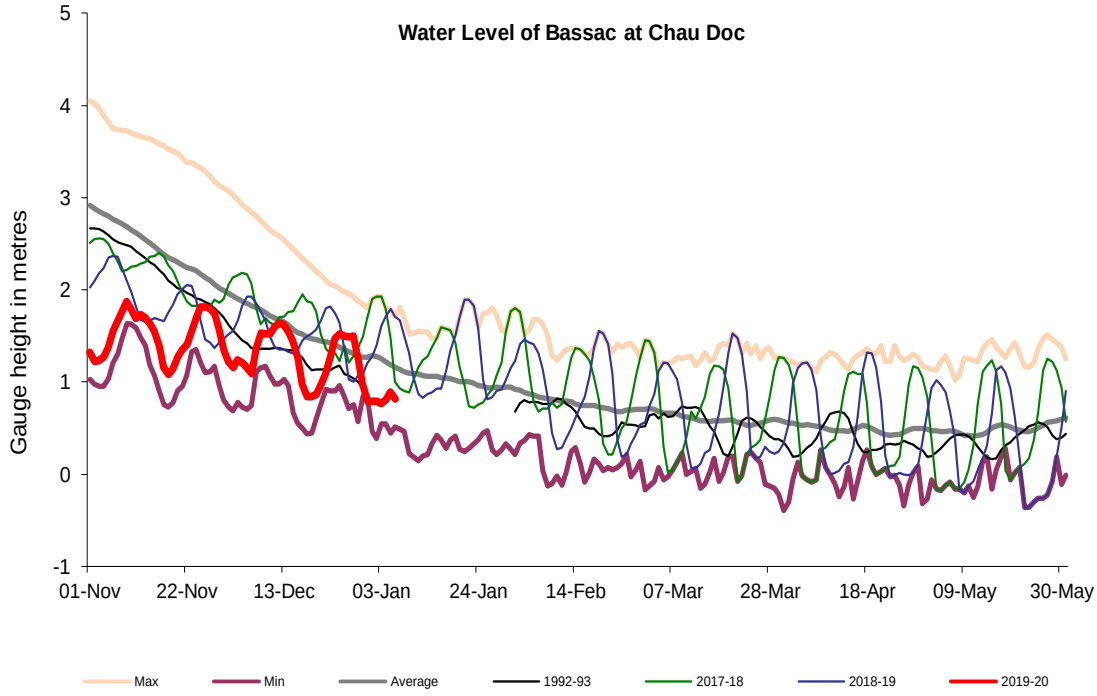
16-Mar
31-Mar
15-Apr
30-Apr
15-May
30-May
Max
Min
Average
1992-93
2017-18
2018-19
2019-20


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