



Mekong River Commission

**Weekly Wet Season Situation Report
in the Lower Mekong River Basin
27 October–2 November 2020**

Prepared by
The Regional Flood and Drought Management Centre
3 November 2020

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1 Introduction

This Weekly Wet Season Situation Report presents a preliminary analysis of the weekly hydrological situation in the Lower Mekong River Basin (LMB) for **27 October–2 November 2020**. The trend and outlook for water levels are also presented.

This analysis is based on the daily hydro-meteorological data provided by the Mekong River Commission (MRC) Member Countries – Cambodia, Lao PDR, Thailand, and Viet Nam – and on satellite data. All water level indicated in this report refers to a above zero gauge of each station.

The report covers the following topics that are updated weekly:

- General weather patterns, including rainfall patterns over the LMB
- Water levels in the LMB, including in the Tonle Sap
- Flash flood and drought situation in the LMB
- Weather, water level and flash flood forecast, and
- Possible implications.

Mekong River water levels are updated daily and can be accessed from:
http://ffw.mrcmekong.org/bulletin_wet.php.

Drought monitoring and forecasting information is available at:
<http://droughtforecast.mrcmekong.org>

Flash flood information is accessible at: <http://ffw.mrcmekong.org/ffg.php>

2 General Weather Patterns

The weather outlook bulletins for three months (October, November and December) and the weather maps issued by the Thailand Meteorology Department (TMD) were used to verify weather conditions in the LMB.

Since early October 2020, moderate to above normal rainfall has been observed in the LMB, with the amount gradually increasing from the first week of September. The data from the TMD predict that instances of low pressure and tropical cyclones may continue moving closer to the Mekong region in October, when heavy rainfall often occurs in the Mekong region. The TMD also predicts that scattered thundershowers throughout October and November will continue in the north-eastern part of Thailand (within the Mekong region).

[Figure 1](#) presents the weather map of 2 November 2020, showing a line of low pressure of the Monsoon Trough crossing the lower Mekong region which can bring heavy rainfall over the next few days.

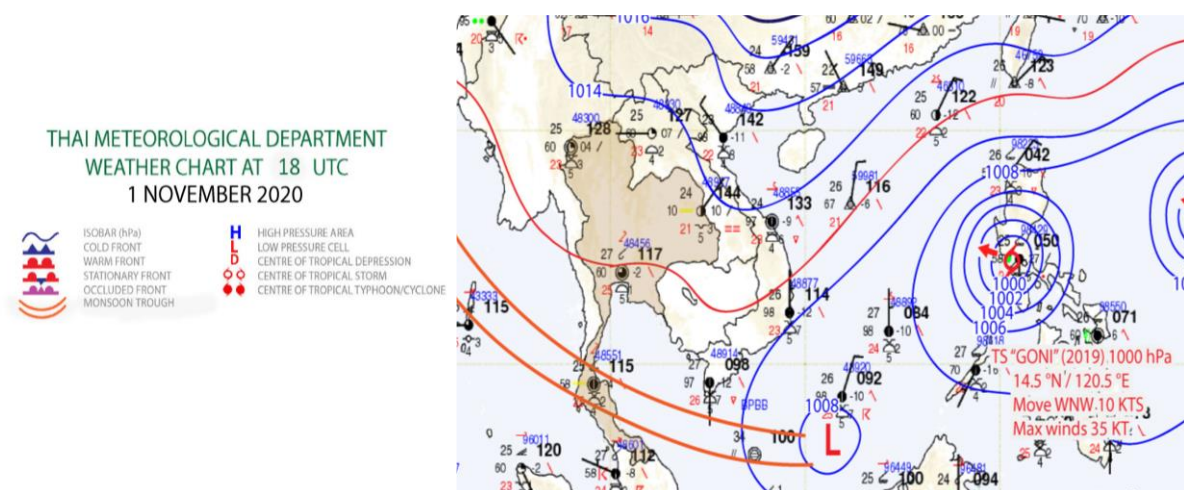


Figure 1: Summary of weather conditions over the LMB.

According to the Asian Specialised Meteorological Centre (ASMC), wetter conditions are predicted over the eastern half of Southeast Asia for the week from November 2 to 15, which can increase showers over the Mekong sub-region. During this time, the ASMC confirms that the wetter conditions in the eastern mainland Southeast Asia (Cambodia, Lao PDR, Viet Nam, and parts of Thailand) will depend on tropical cyclone evolution.

Subsequently, from November to December, there is a decreasing chance of above average rainfall for most Asian countries, especially in the Mekong region. [Figure 2](#) shows the outlook of rainfall of 2–15 November in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

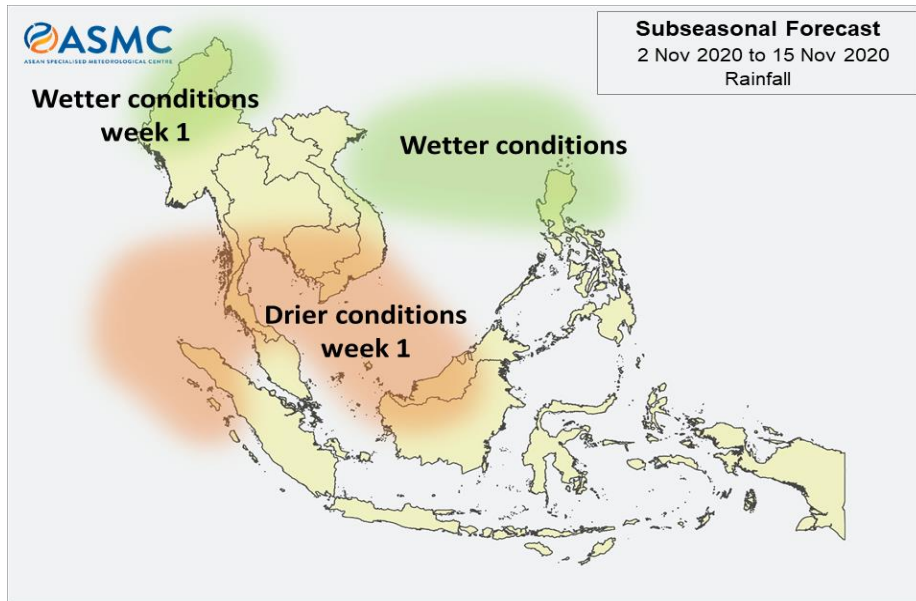


Figure 2: Outlook of rainfall over the Asian countries by ASMC.

Tropical depressions (TD), tropical storms (TS) and typhoons (TY)

Based on the Tropical Storm Risk’s (TSR) website, Tropical Storm *Goni* (Figure 3) is moving from Northwest Pacific Ocean across the Philippines and is expected to hit Viet Nam and the Mekong region on November 7–8.

This might cause heavy rainfall in the lower part of the basin from Lao PDR’s Savannakhet in the upper part to Thailand’s Khong Chiam and Lao PDR’s Pakse and from Stung Treng in Cambodia to the lower part, as well as in the 3S area (Se Kong, Se San and Sre Pok) and the Mekong Delta in Viet Nam.

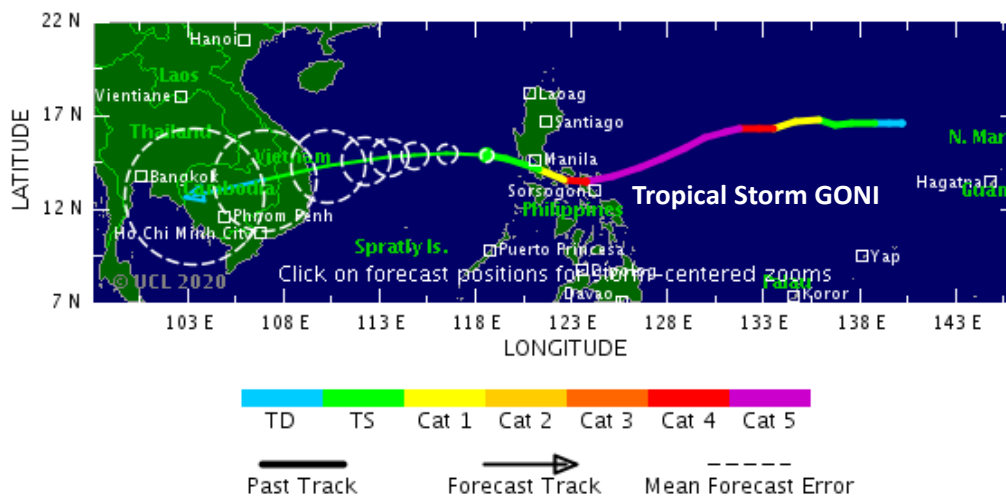


Figure 3: Tropical Storm *Goni* movement towards the Mekong region, observed on 2 Nov. 2020.

Rainfall patterns over the LMB

This week’s rainfall is considered above average, varying from 4.6 mm to 96 mm at different stations along the LMB from Chiang Saen in Thailand to Tan Chau and Chau Doc in Viet Nam. Unlike the situation last week, rainfall during this reporting week concentrated in the middle part of the basin starting from Thailand’s Khong Chaim to Lao PDR’s Pakse and the lower part from Cambodia’s Stung Treng to Viet Nam’s Tan Chau and Chau Doc, ranging from 7.5 mm to 96 mm. But the upper part from Chiang Saen to Vientiane in the LMB received less amount of rainfall compared to other areas.

The total observed rainfall of the week at those selected stations, compared with average rainfall in October, are shown in [Figure 4](#).

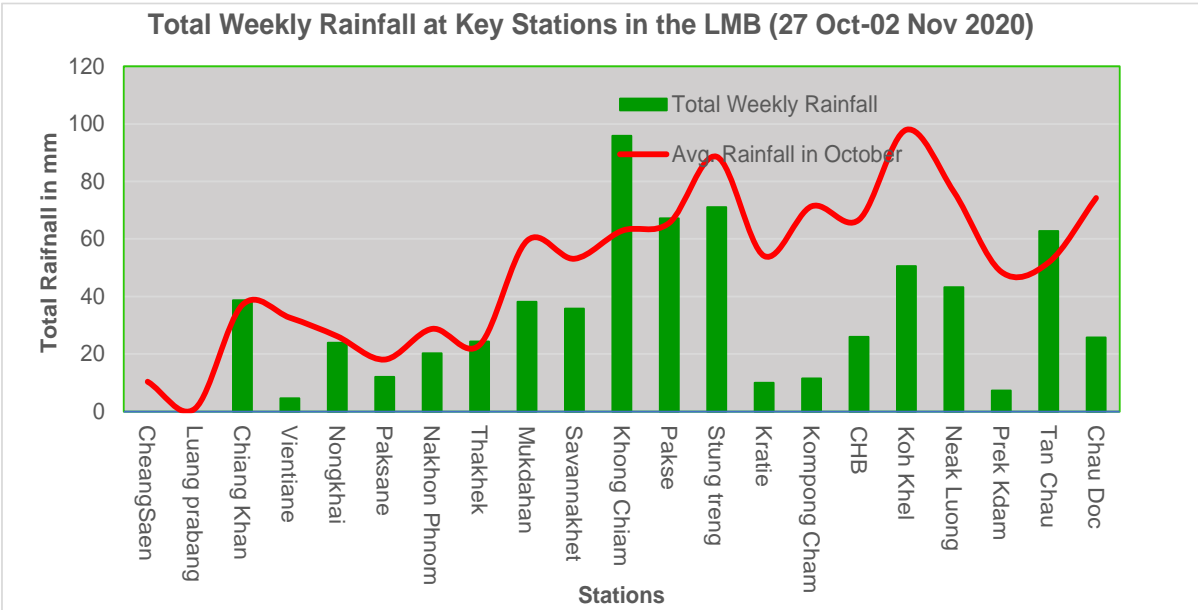


Figure 4: Weekly total rainfall at key stations in the LMB.

To verify area rainfall distribution, [Figure 5](#) shows a map of the weekly accumulated rainfall based on observed data provided by the MRC Member Countries – Cambodia, Lao PDR, Thailand, and Viet Nam – from 27 October to 2 November 2020.

The amount of rainfall this week – from 4.6 mm to 96 mm – is considered lower than average in the whole Mekong region.

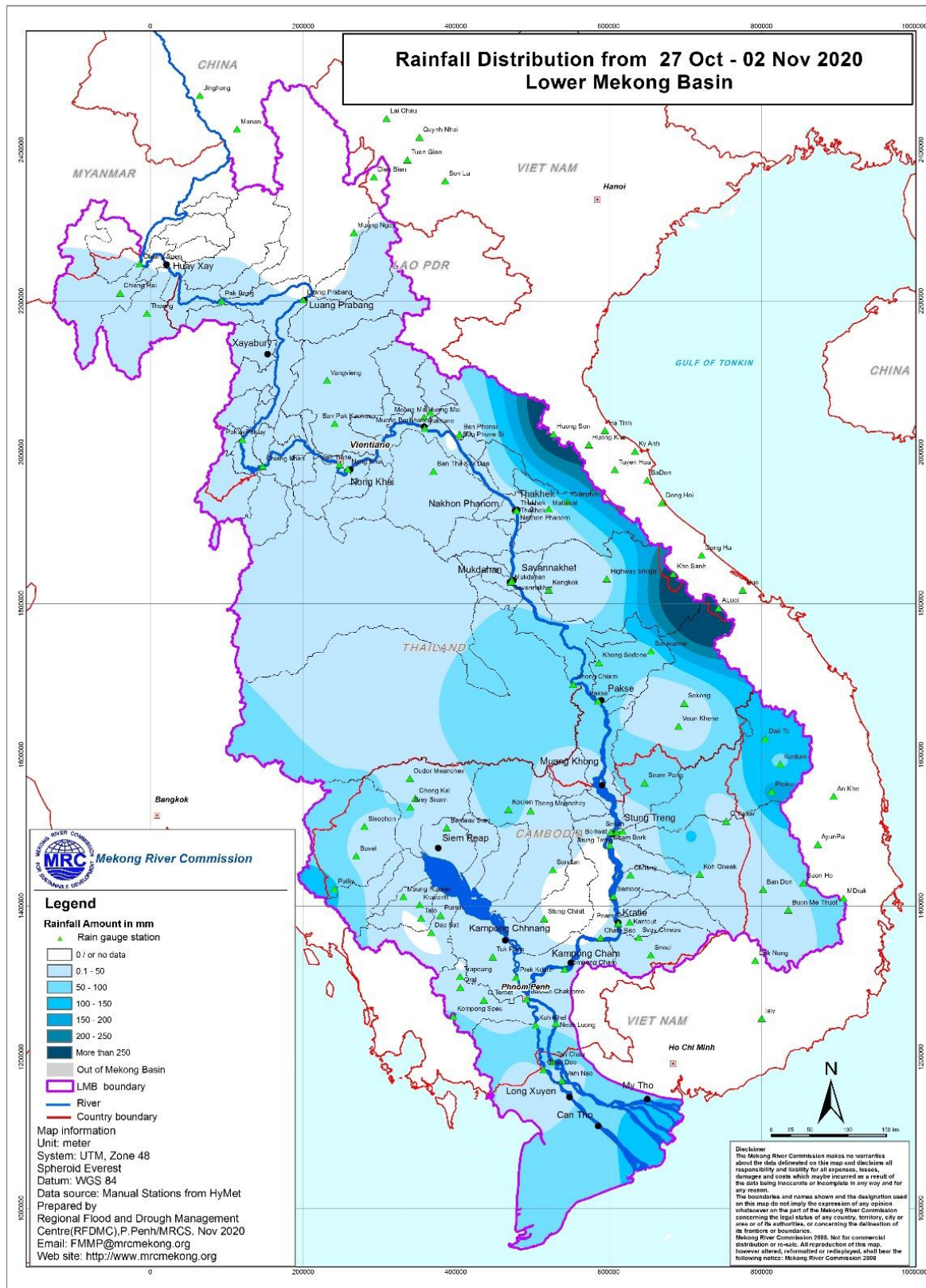


Figure 5: Weekly rainfall distribution over the LMB.

3 Water Levels in the Lower Mekong River

The hydrological regimes of the Mekong mainstream are illustrated by recorded water levels and flows at key mainstream stations: at Chiang Saen to capture mainstream flows entering from the Upper Mekong Basin (UMB); at Vientiane to present flows generated by climate conditions in the upper part of the LMB; at Pakse to investigate flows influenced by inflows from the larger Mekong tributaries; at Kratie in Cambodia to capture overall flows of the Mekong Basin; and at Viet Nam’s Tan Chau and Chau Doc to monitor flows to the Delta.

The key stations along the LMB and their respective model application for River Flood Forecasting during the wet season from June to October and River Monitoring during the dry season from November to May are presented in [Figure 6](#). The hydrograph for each key station is available from the MRC’s River Flood Forecasting: <http://ffw.mrcmekong.org/overview.php>.

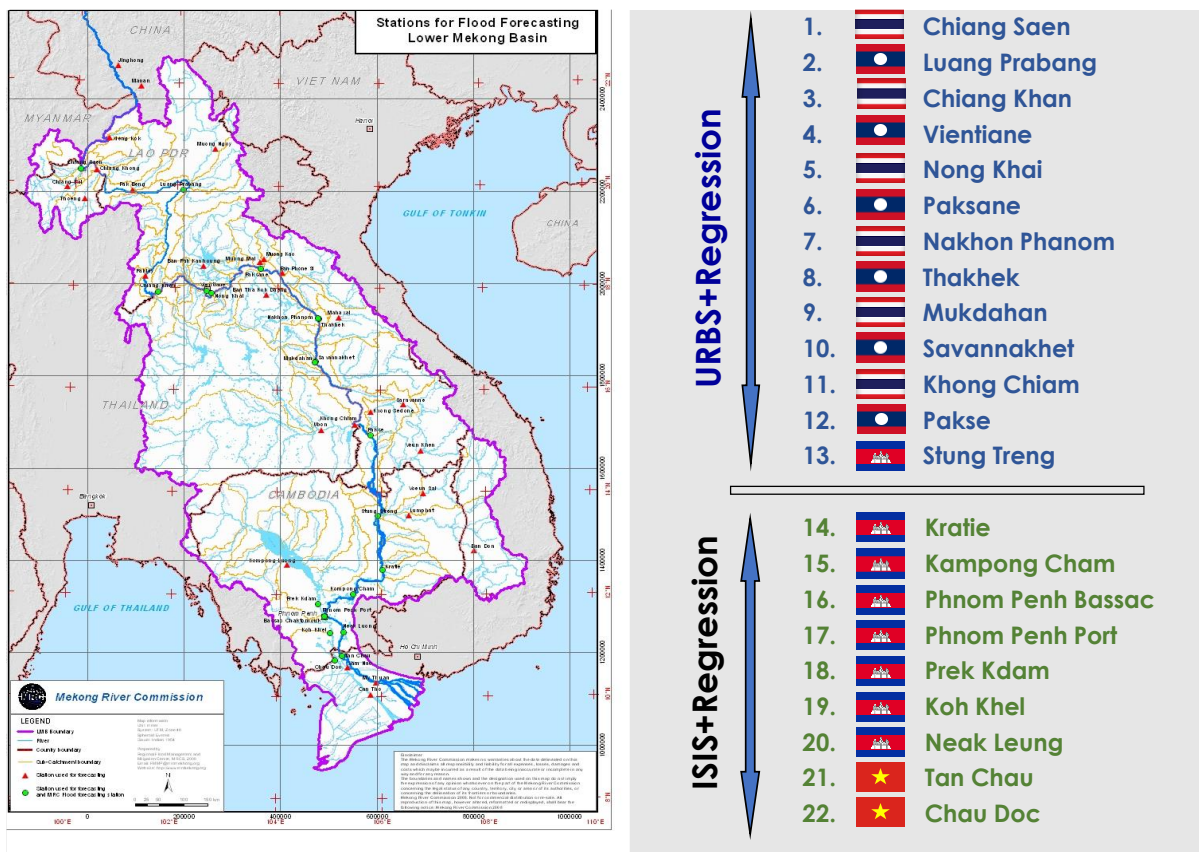


Figure 6: Key stations and model application for River Monitoring and Flood Forecasting.

Chiang Saen and Luang Prabang

Water level during October 27 and November 2 at Thailand’s Chiang Saen was slightly decreasing from 2.36 metres to 2.29 metres. The main causes of such a phenomenon are believed to be a less quantity of inflow volume from the upstream stemming from Lao PDR, Myanmar and Lancang (Mekong) in China, and low contributing inflows from catchment which

were due to continued low rainfall over the recent weeks. When comparing to last week, this week’s water level is relatively lower.

Water level at Luang Prabang station in Lao PDR was also decreasing from 8.72 metres to 8.52 metres, during the reporting period. Compared to last week, the figure shows a decreased amount of about 0.20 metres. This level is higher than that of 2019 but lower than its long-term average (LTA).

Being situated between the upstream (Nam Beng, Nam Ou, Nam Suong, and Nam Khan) and downstream (Xayaburi) hydropower dams, Luang Prabang station has a unique characteristic as it is influenced by the operations of all its surrounding dams. **Thus, the water level at this station can possibly change very rapidly during the wet season.**

Chiang Khan, Vientiane-Nong Khai and Paksane

Water level at Chiang Khan in Thailand was slightly decreasing from 6.12 metres to 5.91 metres during this week, showing 1.56 metres below its LTA value. Downstream water levels from Vientiane to Paksane in Lao PDR followed the same direction of the Chiang Khan’s ones. The decreased values varied between 0.03 metres and 0.06 metres. Less water contribution from upstream inflows and rainfall from sub-catchments are likely the main reason. Compared to this time last year, the current water levels at these stations are between 0.25 metres and 1.93 meters higher. **However, the water level at Paksane is lower than its recorded values in 1992, one of the lowest-flow years in the Mekong history.**

Nakhon Phanom to Pakse

Similarly, water levels from Nakhon Phanom in Thailand to Thakhet in Lao PDR were slightly decreasing by about -0.28 metres, during the reporting period. Below-average rainfall in upstream and its adjacent catchments are likely the cause of these increasing water levels. **However, constant heavy rainfall since October 8 at tributaries of Nam Phao and Se Bang Fai in Lao PDR has moved water levels at Khong Chiam in Thailand and Pakse in Lao PDR remarkably up close to their historical maximum levels, as shown in [Figure 7](#).**

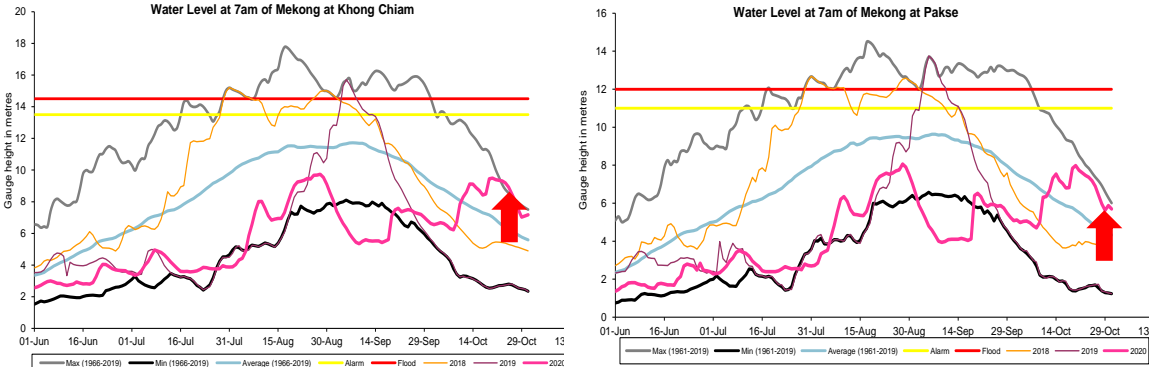


Figure 7: Water levels at Khong Chiam of Thailand and Pakse of Lao PDR.

Stung Treng to Kampong Cham/Phnom Penh to Koh Khel/Neak Luong

Like many upstream stations, heavy rainfall from the upper part of the Mekong River and the 3S river (Sekong, Se San and Sre Pok) have caused water levels at Stung Treng, Kratie, and Kampong Cham to significantly increase. The water levels at these stations rose up, making them just 0.05 metres below their historical maximum levels.

Similarly, water levels at Chaktomuk, Koh Khel, Phnom Penh Port, and Prek Kdam stations in Cambodia were also affected by heavy rainfall in the area from last week, but gradually decreased by about 0.50 metres during this reporting week. On the other hand, **water levels at Stung Treng and Kratie were between 0.2 to 0.45 metres higher than their maximum levels, as shown in Figure 8. However, from Phnom Penh to Neak Luong, the levels were still lower than their LTAs.**

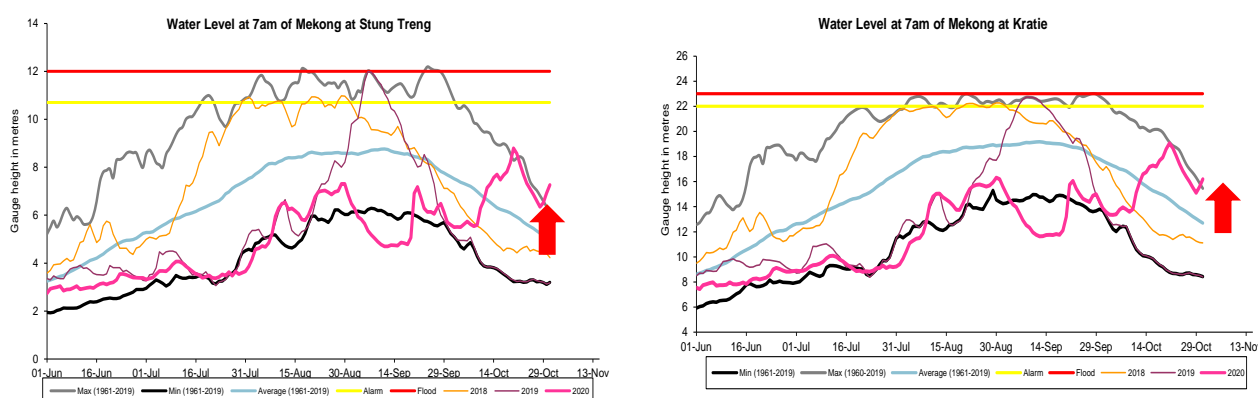


Figure 8: Water levels at Stung Treng and Kratie on the Mekong River.

Tidal stations at Tan Chau and Chau Doc

Like last week, this week from October 27 to November 2, water levels at the two tidal stations of Viet Nam's Tan Chau and Chau Doc were fluctuating below their LTAs and minimum level due to daily tidal effects from the sea. **The figures are considered as critical.**

The Tonle Sap Flow

At the end of the dry season, when water levels along the Mekong River increase, flows of the Mekong River reverse into the Tonle Sap Lake (TSL). This phenomenon normally takes place from mid-May to mid-October.

[Figure 9](#) shows the seasonal changes of the inflow/reverse flow and the outflow of the TSL at Prek Kdam in comparison with the flows of 2018 and 2019, and their LTA level (1997-2019). Up to November 2 of this reporting period, **it is observed that the main reverse flow into the TSL has started since August 4. There were also two extremely small instances of the reverse flow in July, but they were not significant.** The recorded incident matches the record on

reverse flow into TSL by the PMFM’s (Procedures for the Maintenance of Flows on the Mainstream) tool on Article 6B (monitoring area). The delay of the reverse flow was due to the low water levels on the Mekong mainstream which were caused by deficit rainfall in upper sub-catchment areas, among other factors. Due to the heavy rain from last week in some of the provinces around the Tonle Sap Lake, the inflows to TSL this week showed a significant increase.

Although the reverse flows have started since August 4, water volume of the Lake up to this point has been considered critical as it is still lower than its minimum level. [Figure 10](#) shows seasonal changes in monthly flow volume up to November 2 for the TSL compared with the volumes in 2018 and 2019 and their LTA and the fluctuating levels (1997-2019). It shows that in July, August, and October (up to 31 October) water volume of the Lake was **at a very critical level**, compared with last year (2019) figure and historical minimum levels at the same period. [Table 1](#) shows the monthly change in flow volume of the TSL and the critical flow volume of the TLS in July, August and September 2020 compared to its historical minimum value and volumes of 2018 and 2019. This reveals that the TSL is still affected by low inflows from the Mekong River and insufficient rainfall in the surrounding sub-catchments since 2019.

The low inflows (inflows from the Mekong River and from tributaries) in the early wet season of 2020 has resulted in a very critical situation of the TSL. This demonstrates the influence of the relationships between the reverse flows, water levels of the Mekong River, and the flow direction in the complex hydraulic environment of the TSL during this wet season. The data show that more than half of the annual inflow volume into the lake originates from the Mekong mainstream. Thus, flow alterations in the mainstream could have direct impacts on the Tonle Sap Lake water levels and on hydrology.

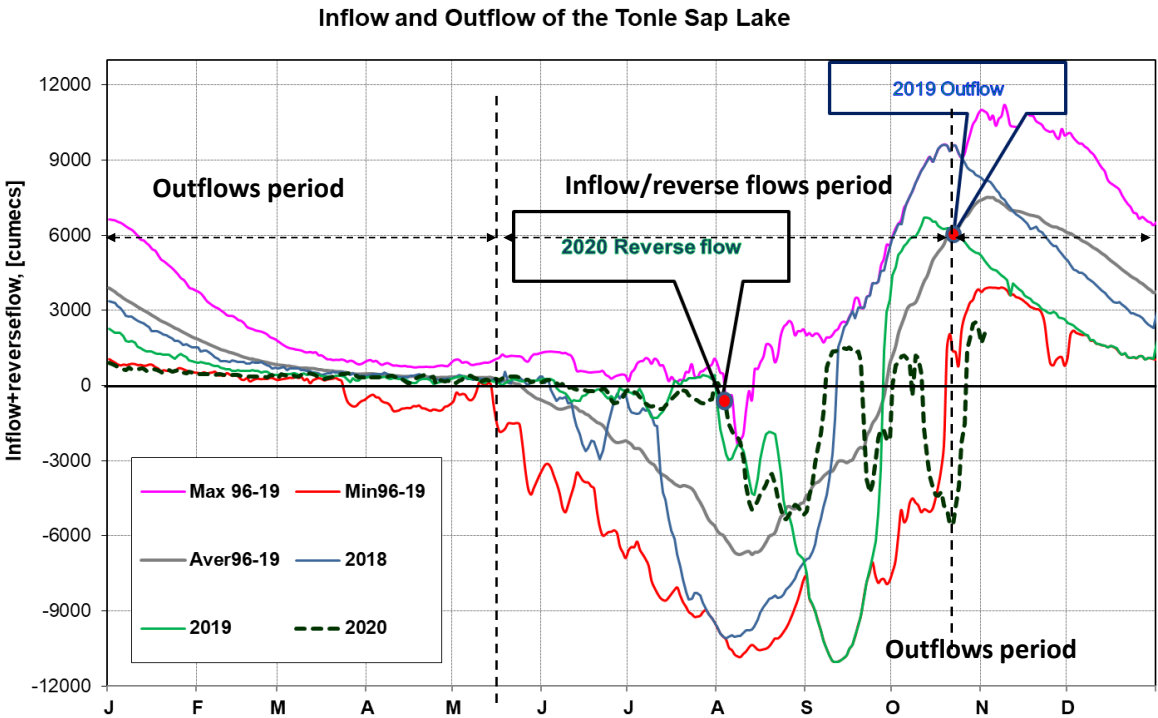


Figure 9: Seasonal change of inflows and outflows of Tonle Sap Lake.

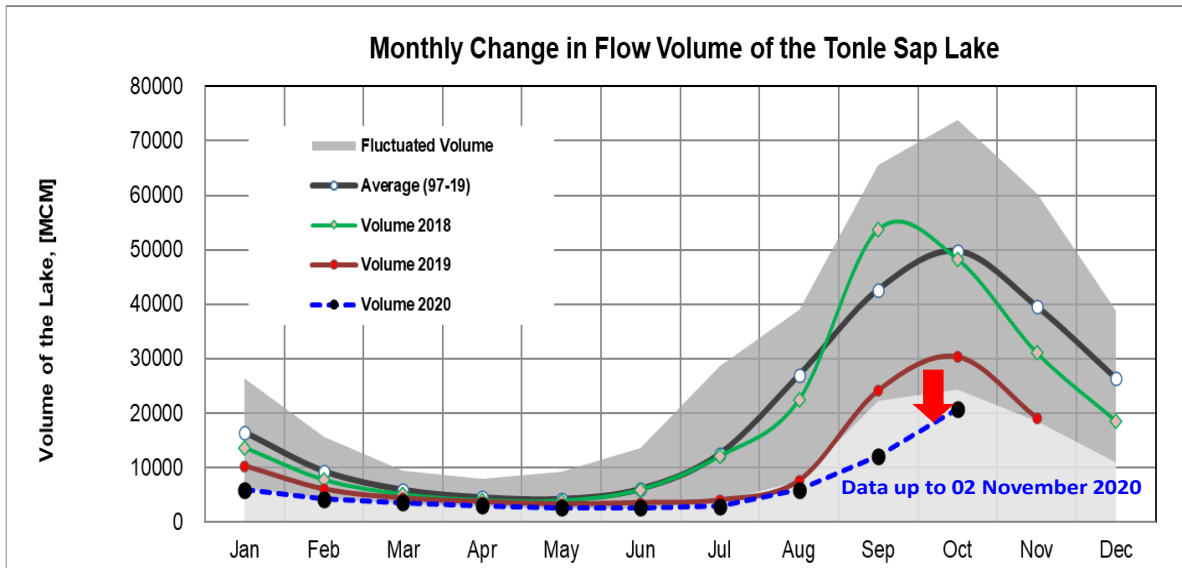


Figure 10: The seasonal change in monthly flow volume of Tonle Sap Lake.

Table 1. The monthly change in the flow volume of Tonle Sap Lake.

Month	Average Volume (97-19) [MCM]	Max Volume [MCM]	Min Volume [MCM]	Volume 2018 [MCM]	Volume 2019 [MCM]	Volume 2020 [MCM]	Percentage of Volume in 2020 [%]
Jan	16452.95	26357.53	6272.01	13633.41	10285.31	5906.80	35.90
Feb	9312.36	15596.22	4281.41	7729.72	6019.30	4264.19	45.79
Mar	5868.92	9438.24	3350.92	5037.06	4354.62	3553.99	60.56
Apr	4474.98	8009.14	2875.42	3956.47	3667.47	2992.61	66.87
May	4166.07	9176.93	2417.81	3864.00	3266.43	2594.92	62.29
Jun	6034.10	13635.01	2470.54	5919.18	3517.06	2641.88	43.78
Jul	12502.58	28599.56	3832.51	12024.96	4001.99	2925.86	23.40
Aug	26934.35	39015.12	7554.93	22399.65	7622.71	5941.07	22.06
Sep	42644.05	65632.35	22180.73	53639.54	24194.19	12105.31	28.39
Oct	49698.19	73757.23	24276.79	48193.08	30358.38	20799.13	
Nov	39542.58	60367.33	18576.01	31036.07	19112.65		
Dec	26325.13	38888.95	10869.43	18469.21	10577.29		
	Critical situation, compared with historical Min values						
	Normal condition, compared with LTA (Long term average)						
	Low volume situation, compared with LTA values						
Unit: Million Cubic Meter (1 MCM= 0.001 Km ³)							

4 Flash Flood in the Lower Mekong Basin

During October 26 and November 2, the LMB received three main weather factors (i) Influence of Typhoon *Saude*¹, (ii) Influence of typhoon *Molave*², and (iii) Northeast Monsoon, which prevailed over the Gulf of Thailand. According to the MRC-Flash Flood Guidance System (FFGS) and analysis, flash flood events were detected in some areas of Viet Nam with the impact ranging from low to moderate levels, as shown in [Figure 11](#) and [Table 2](#).

The figure and table also show Flash Flood Guidance (FFG) results for the next one, three, and six hours produced on October 29 at 00:00 UTC (07:00 local time).

Table 2. Detected flash flood in Viet Nam on Oct 29.

01-Hour Flash Flood Risk and location				3-Hour Flash Flood Risk and location				6-Hour Flash Flood Risk and location			
Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks
Phu Yen	Tuy Hoa	South Central Coast	Low-Risk	Kon Tum	Sa Thay	Central Highlands	Low-Risk	Kon Tum	Sa Thay	Central Highlands	Low-Risk
				Quang Tri	Da Krong	North Central	Low-Risk	Quang Tri	Da Krong	North Central	Low-Risk
				Quang Ngai	Tra Bong	South Central Coast	Low-Risk	Quang Ngai	Tra Bong	South Central Coast	Low-Risk
				Kon Tum	Kon Plong	Central Highlands	Low-Risk	Kon Tum	Kon Plong	Central Highlands	Low-Risk
				Binh Dinh	Phu Cat	South Central Coast	Low-Risk	Binh Dinh	Phu Cat	South Central Coast	Low-Risk
				Gia Lai	Krong Pa	Central Highlands	Low-Risk	Gia Lai	Krong Pa	Central Highlands	Low-Risk
				Gia Lai	Kbang	Central Highlands	Low-Risk	Gia Lai	Kbang	Central Highlands	Low-Risk
				Phu Yen	Tuy Hoa	South Central Coast	Moderate-Risk	Phu Yen	Tuy Hoa	South Central Coast	Moderate-Risk
				Khanh Hoa	Van Ninh	South Central Coast	Moderate-Risk	Khanh Hoa	Van Ninh	South Central Coast	Moderate-Risk
				Khanh Hoa	Ninh Hoa	South Central Coast	Low-Risk	Khanh Hoa	Ninh Hoa	South Central Coast	Low-Risk

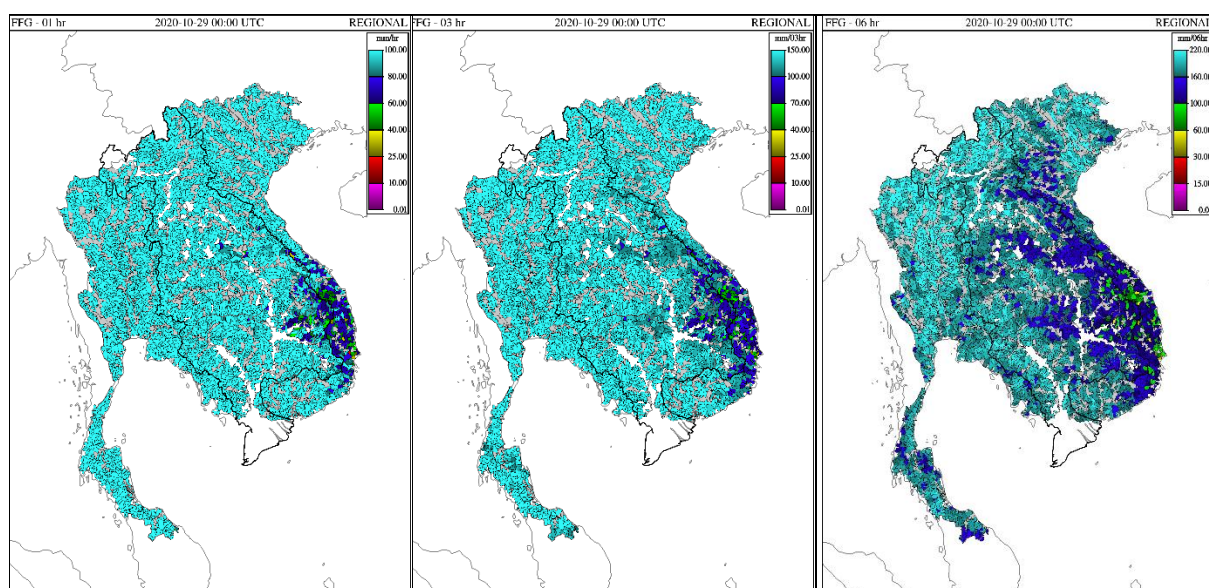


Figure 11: Flash Flood Guidance for the next 1 hour, 3 hours and 6 hours on Oct 29.

¹ Typhoon *Saude* made landfall on Viet Nam as tropical depression strengthened in the morning of October 26 then moved to Lao PDR before finally disappearing in the afternoon on the same day.

² Typhoon *Molave* hit Quang Ngai of Viet Nam in the evening of 28 October then moved to Lao PDR before lessened to be a tropical depression.

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from October 22 to 28

Drought monitoring data are available from Thursday to Wednesday every week; thus, the reporting period is normally delayed for one week compared to Flood and Flash Flood reports.

- **Weekly Standardised Precipitation Index (SPI1)**

Drought condition of the LMB from October 22 to 28, as shown in [Figure 12](#), was very wet in the central and eastern parts of the LMB. Meteorological indicator of SPI shows that the LMB received average rainfall in the upper and lower parts and above average rainfall in the central part of the LMB.

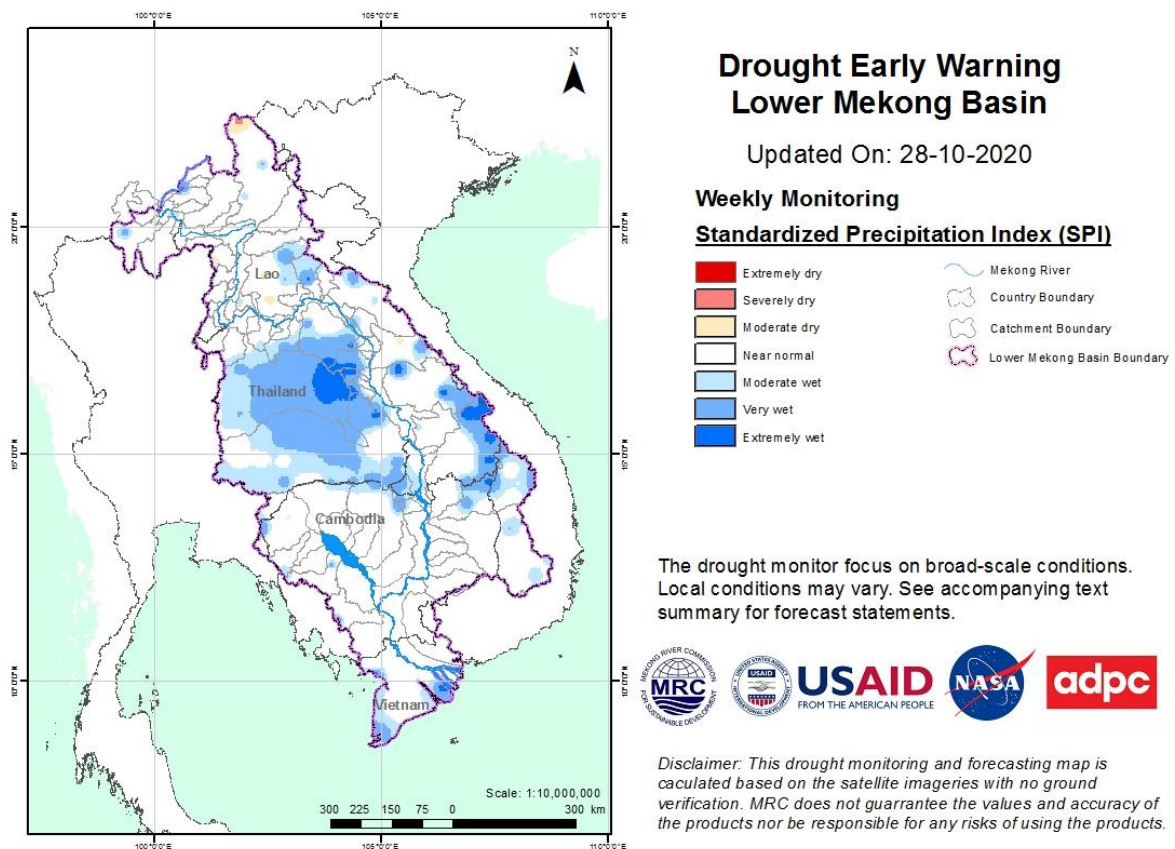


Figure 12: Weekly standardised precipitation index from Oct 22 to 28.

- **Weekly Soil Moisture Anomaly (SMA)**

The successive rainfall in the eastern part of the region during the monitoring week from October 22 to 28 has made soil moisture ultimately saturated in southern provinces of Lao PDR and north-eastern provinces of Cambodia. Nevertheless, some provinces in the region’s northern part were still dry. The soil moisture anomaly, as displayed in [Figure 13](#), shows moderate dryness in some areas of Chiang Mai, Chiang Rai, and Payao of Thailand; and Bokeo, Luang Namtha, Xayaburi, and Luang Prabang of Lao PDR. The situation was less severe than that of last week.

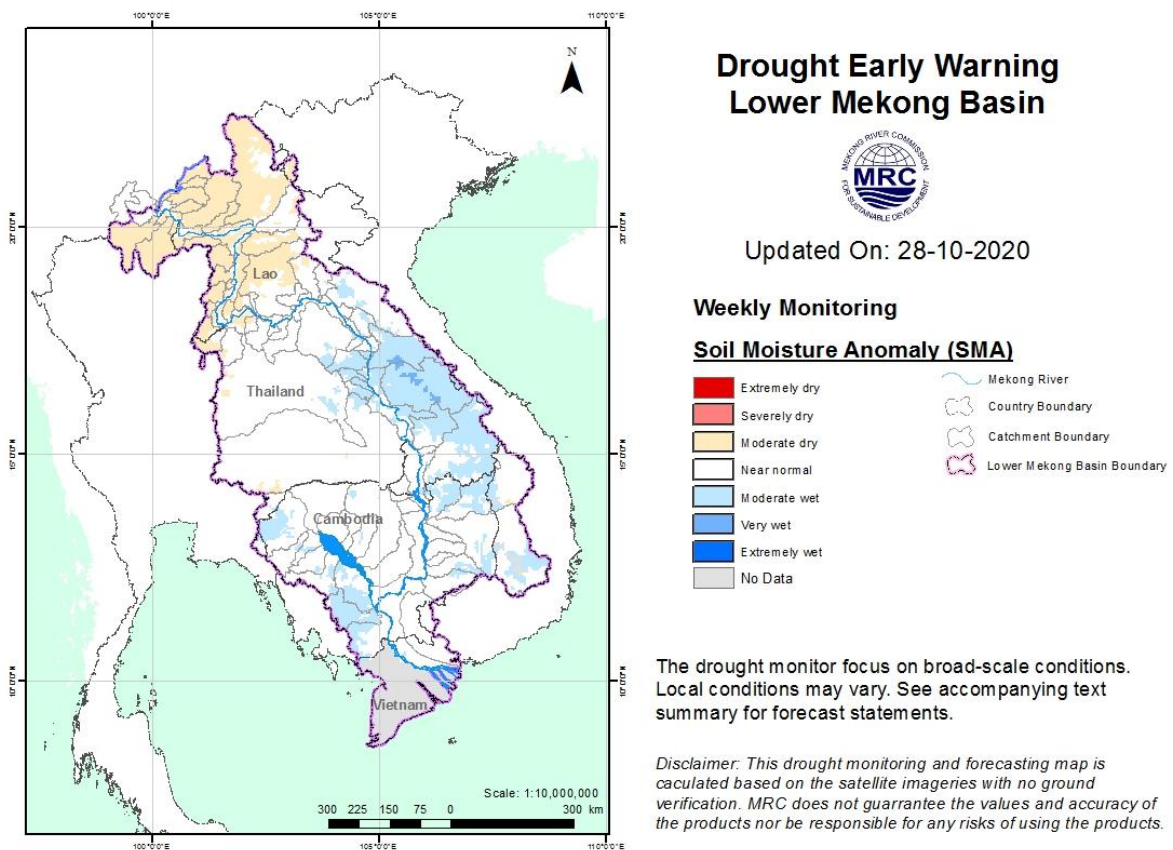
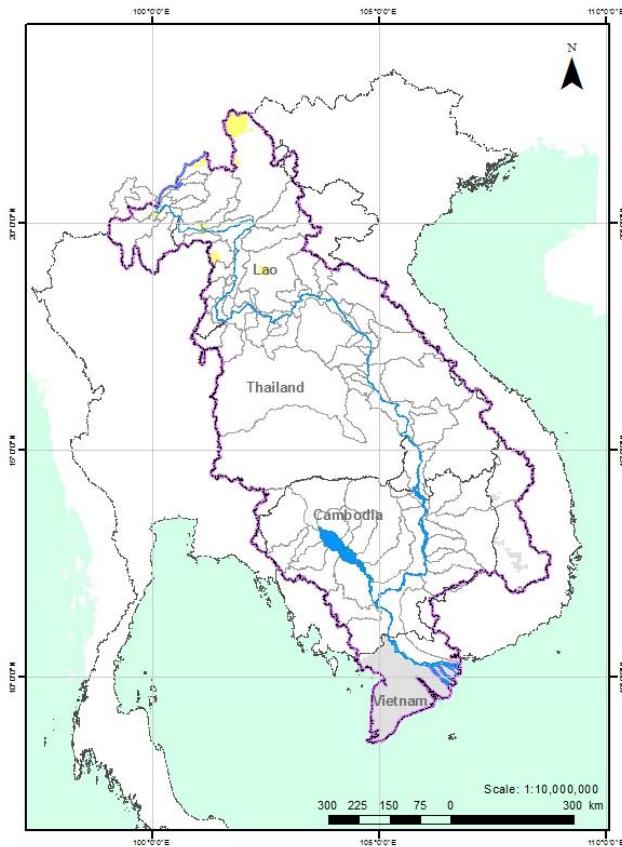


Figure 13: Weekly Soil Moisture Anomaly from Oct 22 to 28.

- **Weekly Combined Drought Index (CDI)**

With a better soil moisture this week from October 22 to 28, the overall drought condition through combined drought index, as displayed in [Figure 14](#), shows no drought threat over the region. The only moderate dry condition is found in northern part of the region which covers small area of Phongsaly of Lao PDR.



Drought Early Warning Lower Mekong Basin



Updated On: 28-10-2020

Weekly Monitoring

Combined Drought Index (CDI)

	D4 (Exceptional Drought)		Mekong River
	D3 (Extremely Drought)		Country Boundary
	D2 (Severely Drought)		Catchment Boundary
	D1 (Moderate Drought)		Lower Mekong Basin Boundary
	D0 (Normal Condition)		
	No Data		

The drought monitor focus on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Disclaimer: This drought monitoring and forecasting map is calculated based on the satellite imageries with no ground verification. MRC does not guarantee the values and accuracy of the products nor be responsible for any risks of using the products.

Figure 14: Weekly Combined Drought Index during Oct 22-28.

More information on Drought Early Warning and Forecasting as well as the explanation is available here: <http://droughtforecast.mrcmekong.org/templates/view/our-product>

6 Weather and Water Level Forecast and Flash Flood Information

6.1 Weather and rainfall forecast

Typhoon *Goni* – one of the latest storms to have hit the region – has been forming in the Sea and is now moving towards Viet Nam. Based on the forecasting by the Joint Typhoon Warning Center (JTWC), indicated in [Figure 15](#), the TD is likely to move northwest towards the central region of Viet Nam. It may hit the area on November 5-6.

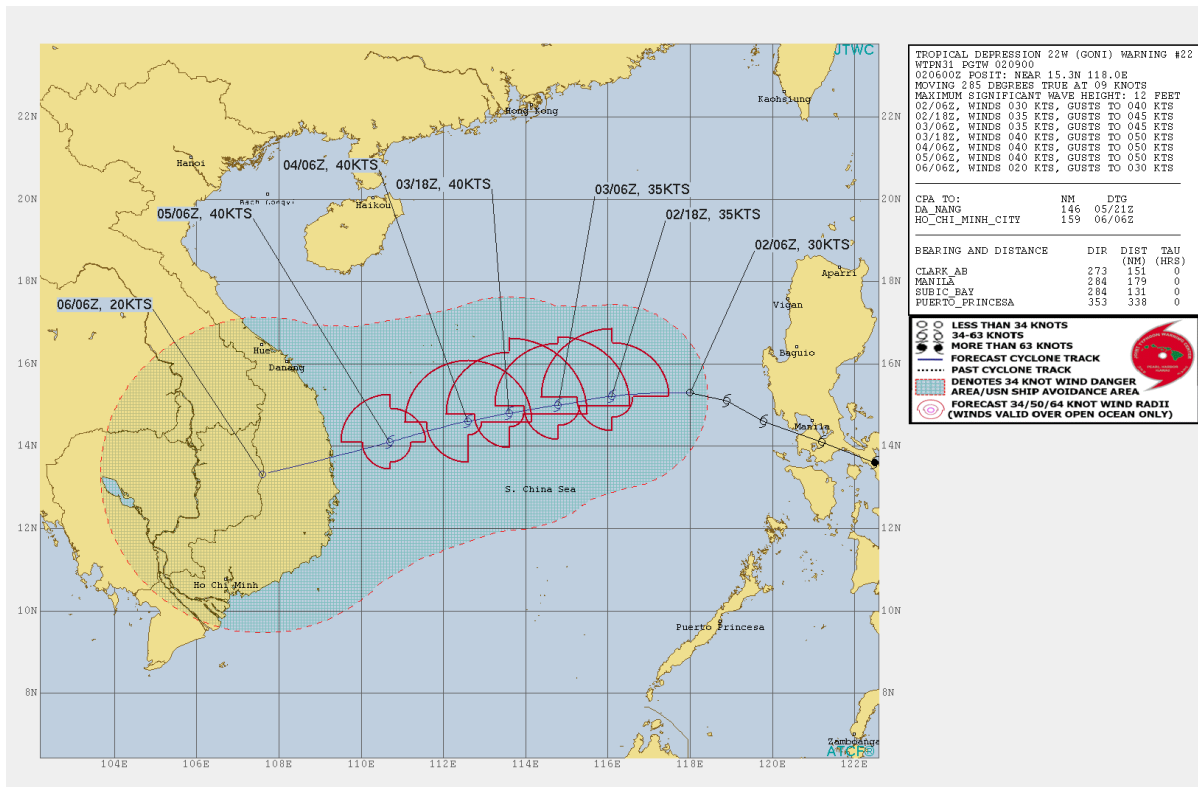
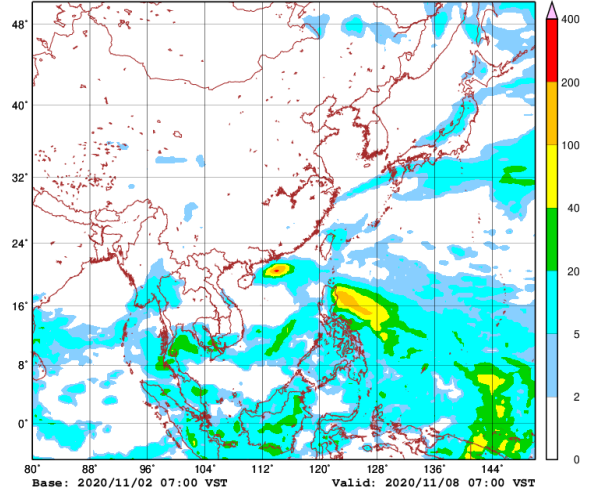
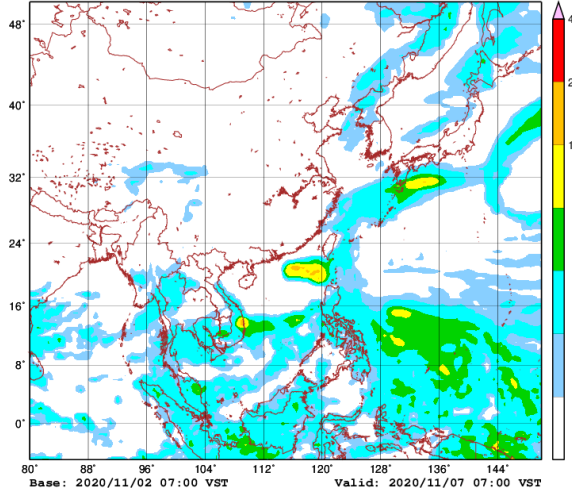
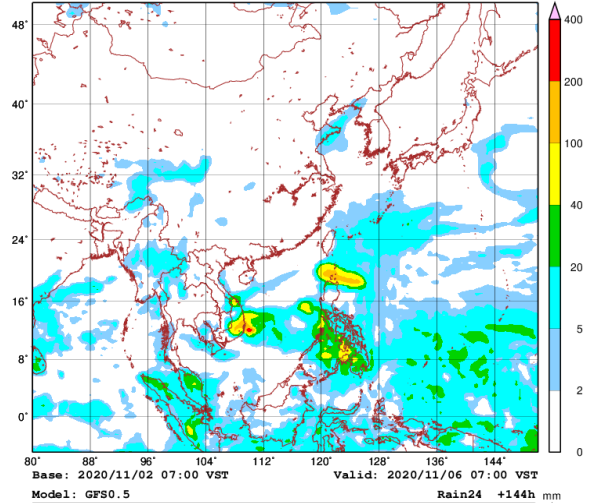
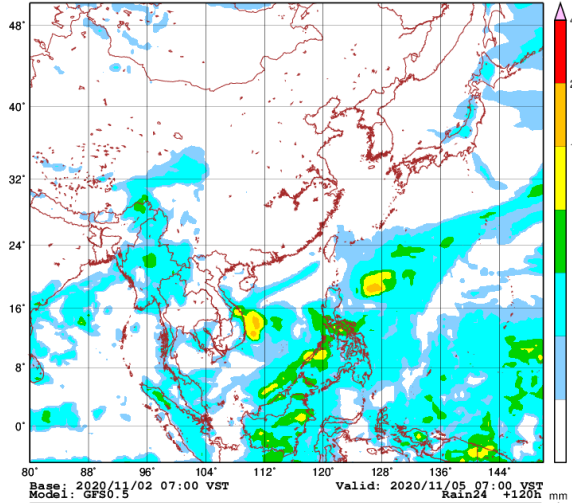
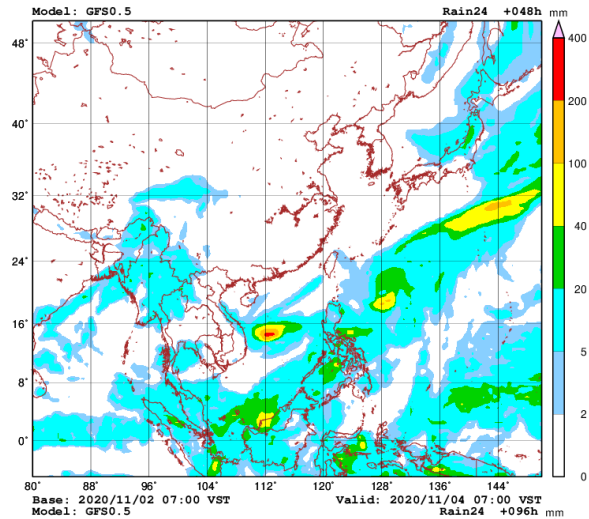
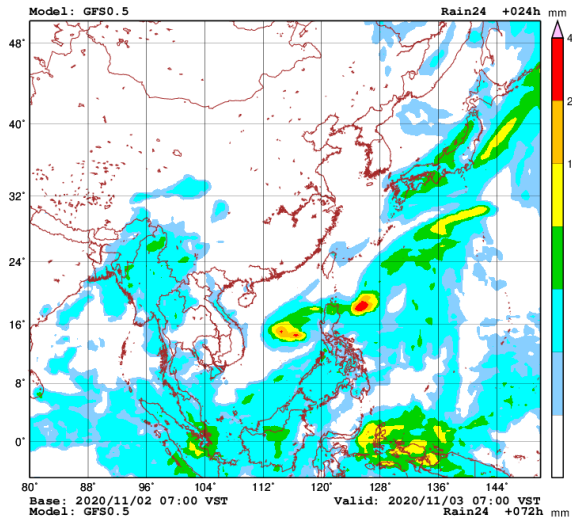


Figure 15: Track forecast of Typhoon *Goni*. Source: JTWC

Based on the analysis of the synoptic meteorological information and result from the Global Forecast System (GFS) Model, in the coming week, there might be three factors affecting the LMB, very much like what had happened over the past weeks. They include (i) Typhoon's circulation, (ii) Monsoon *Trough* moving from the upstream part, and (iii) the on-going prevailing Southwest Monsoon from the Gulf of Thailand to the lower part of the LMB. During that period, moderate (20-50mm/24hrs) may occur in some areas from the middle to lower part of the LMB.

[Figure 16](#) shows accumulated rainfall forecast (24hrs) of the GFS model from November 3 through 9.



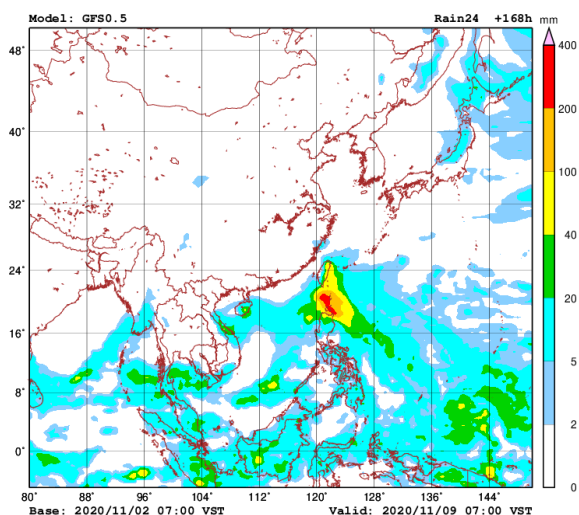


Figure 16: Accumulated rainfall forecast (24 hrs) of model GFS.

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on November 2's daily flood bulletin, the daily forecast water level at Chiang Saen in Thailand is expected to slightly increase from 2.29 to 2.67 metres in the next five days.

For Luang Prabang in Lao PDR, the water level will increase from about 9.52 to 9.78 metres during the same period.

Even so the trend of water levels at these stations will continue staying below their LTAs.

Chiang Khan, Vientiane-Nong Khai and Paksane

Water level at Vientiane station in Lao PDR is forecasted to go down slightly from 3.40 to 3.11 metres. At Paksane in Lao PDR, the level will also decrease slightly from 3.32 to 3.30 metres in the next five days. Average quantity of precipitation is forecasted in the area. The water levels here will remain lower than their LTAs, nevertheless.

Nakhon Phanom to Pakse

Water levels from Nakhon Phanom in Thailand and Thakhet in Lao PDR will slightly increase by about 0.09 metres in the next five days. From Khong Chiam in Thailand to Pakse in Lao PDR the water will decrease by about 0.30 metres.

Stung Treng to Kampong Cham/Phnom Penh to Koh Khel/Neak Luong

From Stung Treng to Neak Luong along the Mekong River in Cambodia, water levels will slightly decrease by about 0.30 meters in the next five days as no heavy rain is forecasted in the 3S (Sekong, Se San and Sre Pok) or in the surrounding areas.

Water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port, as well as at Phnom Penh, Chaktomuk, and Koh Khel on the Bassac River, will decrease by about 0.16 metres over the next five days.

With the trend, water levels at these stations will continue staying just below their LTA levels, particularly from the Bassac at Phnom Penh to Neak Luong.

Tidal stations at Tan Chau and Chau Doc

For Viet Nam's Tan Chau on the Mekong River and Chau Doc on the Bassac River, water levels will be moving up and down below their LTAs, following daily tidal effects from the sea.

[Table 3](#) shows the River Monitoring Bulletin issued on November 2. Results of the started weekly river monitoring bulletin are also available at http://ffw.mrcmekong.org/bulletin_wet.php.

The performance of the weekly flood forecast, with an accuracy and data input evaluation from 27 October to November 2, is presented in [Annex 1](#).

6.3 Flash Flood Information

With some potential rainfall forecasted for next week, flash flood events are likely to happen from the middle to the lower parts of the LMB. Moreover, local heavy rain in a short period of time is also possible with unexpected short flash floods. The information on flash flood guidance for the next one, three, and six hours is updated twice daily at <http://ffw.mrcmekong.org/ffg.php>.

Further detailed information on Flash Flood Information Warning, as well as on its explanation, is available for download [here](#).

6.4 Drought forecast

There are several climate-prediction models with different scenarios on the upcoming months until December 2020. The MRC's Drought Forecasting and Early Warning System (DFEWS) adopts an ensemble model, which averages all scenarios called the North America Multi-Model Ensemble (NMME).

Temporarily, the global scale of rainfall prediction is used to see how the rain distribution looks like for the coming months. [Figure 17](#) of the monthly anomaly maps shows daily average of each month in mm/day from October to December 2020 produced by the NMME.

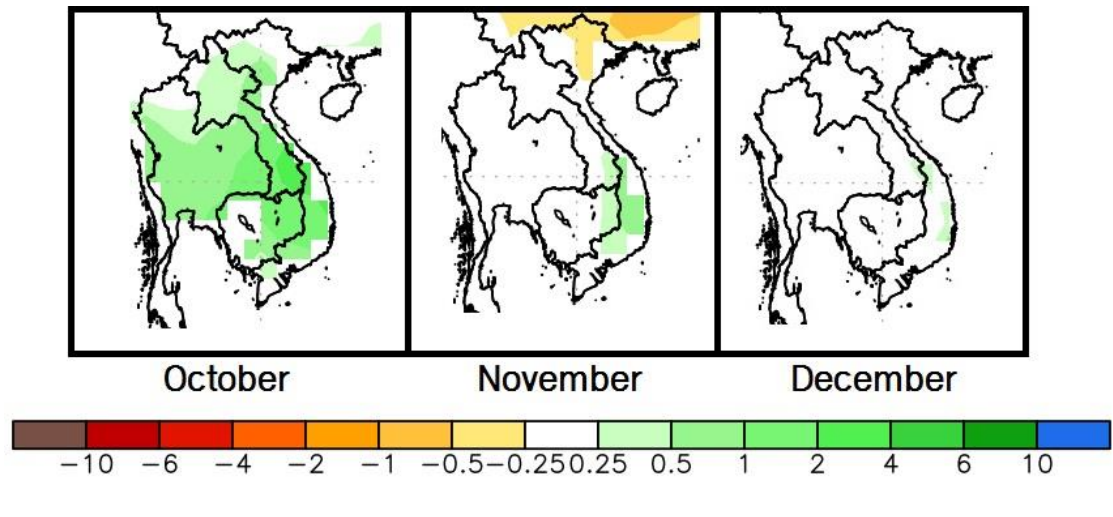


Figure 17: Daily average of monthly rainfall anomaly forecast from Oct to Dec 2020.

From the ensemble prediction model, the LMB is likely to receive average rainfall in November and the least rainfall amount in December 2020. Among the upcoming two months, November is likely wet in the southeast and a bit dry in the upper north.

Table 3. River Flood Forecasting Bulletin.



Mekong Bulletin

Mekong River Commission Secretariat (MRCS)

Regional Flood and Drought Management Centre (RFDMC)

P.O. Box 623 #576, National Road #2, Chak Angre Krom, Meanchey, Phnom Penh, Cambodia

Tel: (855-23) 425353, Fax: (855-23) 425363, Email: floodforecast@mrcmekong.org

River Flood Forecast: 03 to 09 November 2018

Date: 02 November 2020

LOCATION	Country	Observed Rainfall (mm)	Zero gauge above M.S.L (m)	Min water level against zero gauge (m)	Observed W. level against zero gauge (m)		Forecasted Water Levels (m)							
					01-Nov	02-Nov	03-Nov	04-Nov	05-Nov	06-Nov	07-Nov	08-Nov	09-Nov	
Jinhong		-	-	-	535.80	536.34								
Chiang Saen		0.0	357.110	0.00	2.29	2.29	2.39	2.59	2.68	2.75	2.67	2.60	2.53	
Luang Prabang		0.0	267.195	2.53	8.57	8.52	8.47	8.43	8.55	8.78	8.90	8.80	8.70	
Chiang Khan		0.0	194.118	1.91	6.12	5.91	5.79	5.70	5.66	5.75	5.86	5.95	6.02	
Vientiane		0.0	158.040	-0.28	3.24	3.40	3.22	3.13	3.05	3.01	3.11	3.23	3.33	
Nongkhai		0.0	153.648	0.33	2.89	3.15	2.99	2.90	2.82	2.77	2.88	3.01	3.12	
Paksane		0.0	142.125	0.10	2.24	3.32	3.65	3.50	3.40	3.34	3.30	3.40	3.51	
Nakhon Phanom		0.0	130.961	0.18	2.82	2.81	3.21	3.37	3.30	3.24	3.20	3.18	3.23	
Thakhek		0.0	129.629	1.38	4.09	4.07	4.47	4.63	4.56	4.50	4.44	4.41	4.48	
Mukdahan		0.0	124.219	0.72	3.53	3.46	3.44	3.65	3.73	3.70	3.67	3.64	3.62	
Savannakhet		0.0	125.410	-0.65	2.60	2.58	2.57	2.65	2.69	2.67	2.66	2.65	2.63	
Khong Chiam		0.0	89.030	1.02	7.08	6.55	6.11	5.80	6.00	6.10	6.00	5.89	5.82	
Pakse		0.0	86.490	0.03	5.52	5.20	4.87	4.65	4.74	4.80	4.73	4.65	4.61	
Stung Treng		0.0	36.790	0.32	6.72	6.25	5.91	5.63	5.45	5.50	5.54	5.50	5.45	
Kratie		0.0	-1.080	3.06	16.41	15.60	15.05	14.60	14.25	14.00	14.00	14.03	14.00	
Kompong Cham		0.0	-0.930	0.65	10.76	10.48	9.82	9.38	9.07	8.83	8.64	8.60	8.62	
Phnom Penh (Bassac)		0.0	-1.020	1.58	7.27	7.28	7.00	6.80	6.65	6.52	6.42	6.40	6.40	
Phnom Penh Port		nr	0.000	0.14	6.29	6.26	5.97	5.76	5.59	5.46	5.35	5.32	5.31	
Koh Khel		0.0	-1.000	1.52	6.39	6.39	6.20	6.01	5.87	5.77	5.69	5.67	5.65	
Neak Luong		0.0	-0.330	0.81	5.28	5.31	5.14	4.87	4.66	4.52	4.43	4.33	4.30	
Prek Kdam		0.0	0.080	0.58	6.36	6.37	6.13	5.95	5.82	5.71	5.63	5.59	5.56	
Tan Chau		0.0	0.000	-0.37	2.65	2.62	2.58	2.51	2.41	2.29	2.19	2.00	1.87	
Chau Doc		0.0	0.000	-0.60	2.52	2.50	2.48	2.44	2.37	2.27	2.18	2.00	1.90	

REMARKS:

-: not available.
 *: reference stations without forecast.
 nr: no rain.

River Flood Forecaster

KHEM Sothea

NOTE: Discharge at Luang Prabang may be influenced by hydropower operations (at both upstream and downstream).
 For more info, please refer to this link:
<http://www.mrcmekong.org/>; http://ffw.mrcmekong.org/bulletin_wet.php; <http://ffw.mrcmekong.org/reportflood.php>

7 Summary and Possible Implications

7.1 Rainfall and its forecast

Rainfall during this reporting week was considered above average in the middle and lower parts of the LMB (4.6 to 96 mm). However, rainfall in the upper part was considered very low, varying from 0.2 mm to 39 mm at different stations along the LMB from Chiang Saen to Nong Khai in Thailand. The highest concentration was from Khong Chiam in Thailand to Cambodia's Stung Treng and Viet Nam's Tan Chau-Chau Doc area (up to 96 mm). Compared with last week's amount, the rainfall this week was considered lower in the middle and downstream parts.

Typhoon *Goni* is expected to hit the LMB during November 5-9, causing heavy rainfall in some areas within the middle and lower parts of the Mekong region.

Based on the forecasted rainfall from satellite using GFS data, rainfall is likely to take place in the areas from Pakse in Lao PDR to the low area of Cambodia and the Central Highland of Viet Nam, varying from 50 mm to 100 mm during November 5-9. This will increase the chance of rainfall concentration over the LMB in the upcoming week (average rainfall expected).

7.2 Water level and its forecast

Water levels in the lower part of the monitoring locations in the LMB during this reporting week were decreasing from Khong Chiam in Thailand to Stung Treng, Kratie and Kompong Cham in Cambodia, after the end of heavy rainfall from last week. However, water levels at Neak Luong, Bassac at Phnom Penh, and Prek Kdam in Cambodia were still lower than their LTA levels. The low level was due to little rainfall in the region from October 27 to November 2. Generally, this week's water levels were relatively lower than those of last week in the upper part but higher in the lower part of the LMB.

The starting date of the reverse flow from the Mekong River into the Tonle Sap Lake took place on August 4, slightly late compared to a normal event. However, two extremely small and brief instances happened in July. Due to late reverse flows this year, the water volume of the Lake at this reporting point remains extremely small and less than its minimum volume (even than the 2019's) and is considered at critical level.

Over the next few days, water levels across most monitoring stations in the LMB are expected to continue slightly increasing, ranging from 0.05 to 0.25 metres. Albeit this increasing trend, the situation will continue to put most stations' water levels below their LTAs, except at Khong Chiam, Pakse, Stung Treng, Kratie and Kampong Cham where water levels will stay higher than their LTA levels.

The situation in Tan Chau on the Mekong River and Chau Doc on the Bassac River is expected to remain unchanged.

Below average precipitation during the past months is believed to be one of the main factors causing low water levels at most of the stations along the Mekong mainstream.

Since the beginning of this year (2020), water levels in the LMB have been lower than their LTAs for all monitoring stations (from upper to lower stretches within the LMB). Like many parts of the world, the Mekong region has been affected by the prolonged El Nino event, the phenomenon that usually causes extreme heat and insufficient rainfall. This climate change impact has been observed since 2019. Therefore, the main cause of low water levels in the Mekong mainstream from June to July 2020 could be the unusual low rainfall as results of the climate change affecting the Lower Mekong Region.

For a more complete preliminary analysis of the hydrological conditions in the LMB over January – July 2020, please refer to this [Situation Report](#).

The contribution to the Mekong River's flow from the Upper Mekong Basin in China (Yunnan component) is about 16 % by the time the river discharges through the Mekong Delta into the Sea. By far the major contribution comes from the two major 'left-bank' (Eastern) tributaries between Vientiane – Nakhon Phanom and Pakse – Stung Treng, which together contribute more than 40% of the flows.

7.3 Flash flood and its trends

With the predicted moderate amounts of rainfall for the coming week as mentioned earlier in [section 6.1](#), major flash floods are likely to happen in some areas from middle to lower parts of the LMB on 5-7 November 2020.

7.4 Drought condition and its forecast

Drought condition of the LMB from October 22 to 28 was even better than last week (October 15-21). The region only showed some moderate dry soil moisture in northern part and no meteorological drought in the whole LMB. In general, drought condition was getting much better - with no potential threat - over the region.

For the upcoming two-month forecast, the LMB is likely to receive average rainfall in November, and the least rainfall amount in December 2020. November is likely wet in the southeast and a bit dry in the upper north.

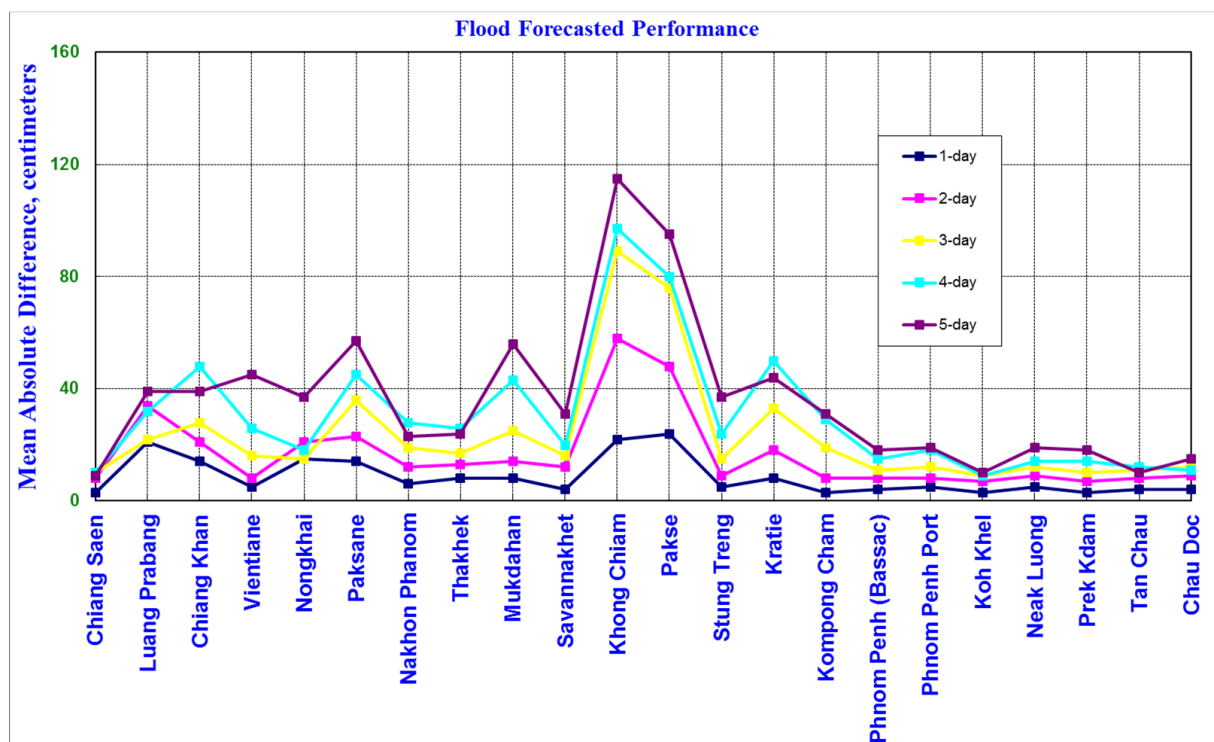
Annex 1: Performance of the weekly flood forecasting

Accuracy

“Accuracy” here refers to the state where data recorded in the MRC’s Mekong River Flood Forecasting System are cleaned and verified.

The adjustment of flood forecasting outcomes from the flood forecasting system requires flood forecasters to have extensive knowledge in hydrology and statistical modelling for estimating the relationships between stations upstream and downstream in the Mekong River Basin. Flood forecasting performance presented in the graph below shows the average flood forecasting accuracy at each key station along the Mekong mainstream from 27 October to 2 November 2020.

The forecasting values from 27 October to 2 November 2020 show that the overall accuracy is fair for a one-day to three-day forecast in lead time at stations in the middle to the lower parts of the Mekong River from Khong Chiam to Pakse due to the effect of heavy rain in this area during the report period.



Note: The higher percentage of flood forecasting accuracy is due to several key factors as follows:

- Missing data and data input are not sufficient to be used for inputting into the flood forecasting model system.
- The influence of heavy rainfall caused by storms and hydropower operations from upstream (Xayaburi), tributaries inflows and the lower part of the Mekong floodplain.

- Luang Prabang, Chiang Khan and Paksane stations have been affected by hydropower operations of Xayaburi and Nam Nguem (water retention and release). Rainfall always accumulates at this spot, which could be causing rapid high-water levels.
- Rapid fluctuations of water levels at Tan Chau and Chau Doc stations due to daily tidal effects of the sea in the Mekong Delta.
- Satellite rainfall data was not representative of the actual rainfall at ground stations in some areas of the Mekong region.

Performance based on data from the Member Countries

Flood forecasting performance is based on the hydro-met data received from the Member Countries. The flood forecasting achievement indicated in (%) and (cm) from 1 day to 5 days at each key station, against with Old Benchmark are presented in Table B1 and Table B2.

The evaluation of performance indicators, missing data and completion time for flood forecasting are presented in Table B3 and Figures B4, B5 and B6, respectively from 27 October to 2 November 2020.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 27 October-2 November 2020 in cm

Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
1-day	3	<u>21</u>	14	5	15	14	6	8	8	4	<u>22</u>	<u>24</u>	5	8	3	4	5	3	5	3	4	4
2-day	8	<u>34</u>	<u>21</u>	8	<u>21</u>	<u>23</u>	12	13	14	12	58	<u>48</u>	9	18	8	8	8	7	9	7	8	9
3-day	10	<u>22</u>	<u>28</u>	16	15	<u>36</u>	19	17	<u>25</u>	16	89	76	15	<u>33</u>	19	11	12	9	12	10	11	12
4-day	10	<u>32</u>	<u>48</u>	<u>26</u>	18	<u>45</u>	<u>28</u>	<u>26</u>	<u>43</u>	<u>20</u>	97	80	<u>24</u>	<u>50</u>	<u>29</u>	15	18	9	14	14	12	11
5-day	9	<u>39</u>	<u>39</u>	<u>45</u>	<u>37</u>	57	<u>23</u>	<u>24</u>	56	<u>31</u>	115	95	<u>37</u>	<u>44</u>	<u>31</u>	18	19	10	19	18	10	15

Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 27 October-2 November 2020 in %

Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc	Average
1-day	85.7	71.4	71.4	<u>42.9</u>	71.4	71.4	71.4	57.1	<u>42.9</u>	71.4	71.4	57.1	57.1	57.1	57.1	57.1	71.4	57.1	57.1	<u>42.9</u>	71.4	85.7	63.6
2-day	66.7	<u>33.3</u>	<u>50.0</u>	66.7	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>33.3</u>	66.7	66.7	<u>50.0</u>	<u>50.0</u>	66.7	<u>50.0</u>	<u>50.0</u>	<u>33.3</u>	<u>50.0</u>	<u>33.3</u>	66.7	66.7	66.7	66.7	53.8
3-day	60.0	60.0	60.0	60.0	60.0	80.0	60.0	60.0	60.0	60.0	<u>40.0</u>	60.0	60.0	60.0	<u>20.0</u>	60.0	60.0	<u>40.0</u>	60.0	<u>40.0</u>	60.0	80.0	57.3
4-day	75.0	<u>50.0</u>	75.0	<u>50.0</u>	75.0	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	75.0	75.0	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>25.0</u>	<u>50.0</u>	75.0	<u>50.0</u>	75.0	75.0	58.0
5-day	66.7	66.7	66.7	66.7	66.7	<u>33.3</u>	66.7	66.7	66.7	<u>33.3</u>	66.7	66.7	<u>33.3</u>	66.7	<u>33.3</u>	66.7	<u>33.3</u>	<u>33.3</u>	66.7	<u>33.3</u>	66.7	<u>33.3</u>	54.5

Note: Red values are not well matched with the actual values in (%) and (cm)

Table B3: Overview of performance indicators for the past 7 days from 27 October-2 November 2020

	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)								
	FF completed and sent (time)	Stations without forecast	FF2 completed and sent (time)	Weather data available (time)	NOAA data	China	Cambodia - DHRW	Cambodia - DOM	Lao PDR - DMH	Thailand - DWR	Viet Nam - SRHMC	Viet Nam - HMS	NOAA data/2dataset	China/2	Cambodia - DHRW/15	Cambodia - DOM/34	Lao PDR - DMH/32	Thailand - DWR/13	Viet Nam - SRHMC/6	Viet Nam - HMS/39	
2020																					
week	10:21	00:00	-	-	08:15	07:10	07:09	08:09	08:32	08:36	07:05	08:20	0	0	0	0	67	14	0	0	
month	10:24	00:00	-	-	08:15	07:10	07:38	08:11	08:39	08:26	07:14	08:17	0	0	37	0	464	0	2	38	

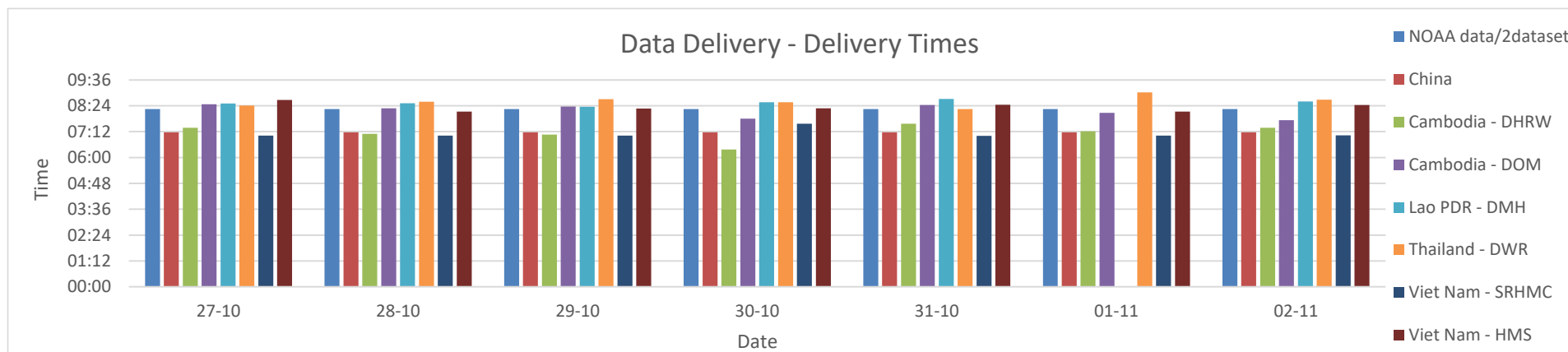


Fig. B4: Data delivery times for the past 7 days from 27 October-2 November 2020

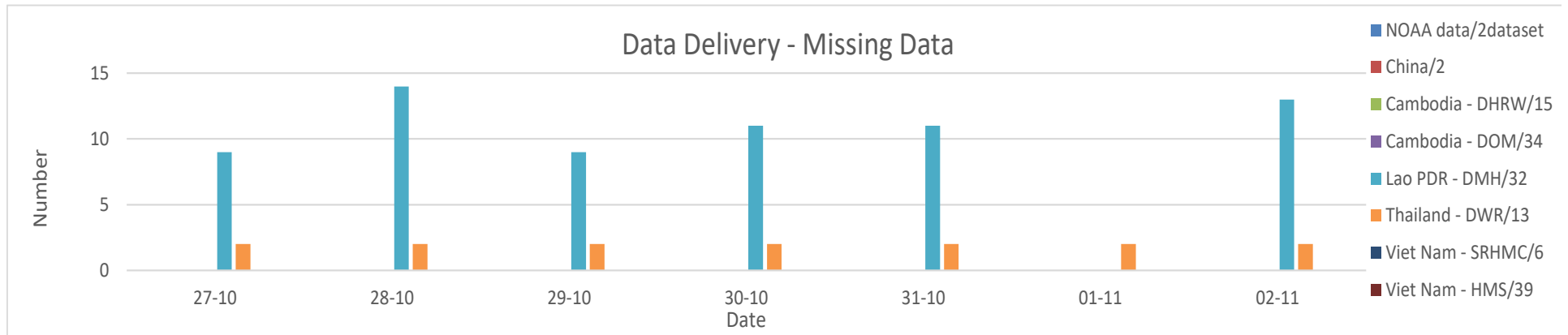


Fig. B5: Missing data for the past 7 days from 27 October-2 November 2020

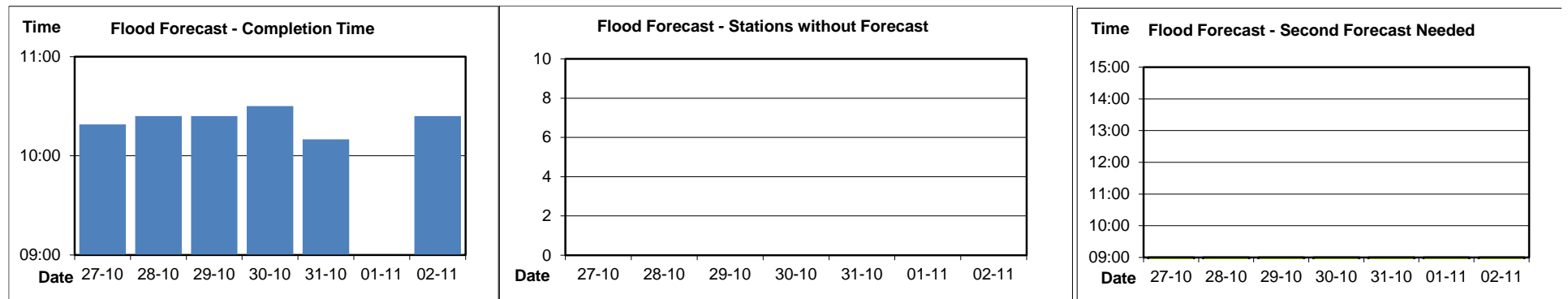


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 27 October-2 November 2020



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