



**Mekong River Commission**

# **Weekly Wet Season Situation Report in the Lower Mekong River Basin 05 – 11 October 2021**

Prepared by  
The Regional Flood and Drought Management Centre  
12 October 2021

*The MRC is funded by contributions from its Member Countries and Development Partners, including Australia, Belgium (Flanders), the European Union, France, Germany, Japan, the Netherlands, New Zealand, Sweden, and Switzerland.*

**Copyright © Mekong River Commission, 2021**

First published (2021)

Some rights reserved

This work is the product of the Mekong River Commission Secretariat. While all efforts are made to present accurate information, the Secretariat does not guarantee the accuracy of the data included in this work. The boundaries, colours, denomination, and other information shown on any map in this work do not imply any judgement on the part of the MRC concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Nothing herein shall constitute or be considered to be a limitation upon or waiver of the privileges and immunities of the MRC, all of which are specifically reserved.

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made and notification is sent to the MRC. The MRC would appreciate receiving a copy of any publication that uses this publication as a source. This publication cannot be used for sale or for any other commercial purpose whatsoever without permission in writing from the MRC.

**Title:** Weekly wet season situation report in the Lower Mekong River Basin for 05-11 October 2021

ISSN: 1728-3248

Keywords: flood/drought/weather/Mekong/Tonle Sap

For bibliographic purposes, this volume may be cited as:

Mekong River Commission. (2021). *Weekly wet season situation report in the Lower Mekong River Basin for 05-11 October 2021*. Vientiane: MRC Secretariat.

Information on MRC publications and digital products can be found at  
<http://www.mrcmekong.org/publications/>

**All queries on rights and licenses should be addressed to:**

Mekong River Commission

Documentation and Learning Centre

184 Fa Ngoum Road, Unit 18, Ban Sithane Neua, Sikhottabong District, Vientiane 01000, Lao PDR

Telephone: +856-21 263 263 | E-mail: [mrccs@mrcmekong.org](mailto:mrccs@mrcmekong.org) | [www.mrcmekong.org](http://www.mrcmekong.org)

# Contents

Figures.....	v
Table .....	vi
Key Messages .....	1
1 Introduction .....	3
2 General Weather Patterns .....	4
2.1 Tropical depressions (TD), tropical storms (TS) and typhoons (TY) .....	5
2.2 Rainfall patterns over the LMB .....	6
3 Water Levels in the Lower Mekong River .....	8
4 Flash Flood in the Lower Mekong Basin .....	15
5 Drought Monitoring in the Lower Mekong Basin .....	17
6 Weather and Water Level Forecast and Flash Flood Information .....	20
6.1 Weather and rainfall forecast .....	20
6.2 Water level forecast .....	21
6.3 Flash Flood Information .....	22
6.4 Drought forecast .....	23
7 Summary and Possible Implications .....	25
7.1 Rainfall and its forecast .....	25
7.2 Water level and its forecast .....	25
7.3 Flash flood and its trends .....	26
7.4 Drought condition and its forecast .....	26
Annex 1: Performance of the weekly flood forecasting .....	27

## Figures

<b>Figure 1.</b> Summary of weather conditions over the LMB. ....	4
<b>Figure 2.</b> Outlook of wet and dry conditions over the Asian countries by ASMC. ....	5
<b>Figure 3.</b> A tropical depression risk observed on 11 October 2021. ....	5
<b>Figure 4.</b> Weekly total rainfall at key stations in the LMB during 5-11 Oct 2021.....	6
<b>Figure 5.</b> Weekly rainfall distribution over the LMB during 5 - 11 October 2021. ....	7
<b>Figure 6.</b> Key stations and model application for River Monitoring and Flood Forecasting. ....	8
<b>Figure 7.</b> Water level at the Jinghong hydrological station during 1 July-11 October 2021. ....	9
<b>Figure 8.</b> Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.....	10
<b>Figure 9.</b> Water levels Veintiane and Paksane in Lao PDR.....	11
<b>Figure 10.</b> Weekly water levels at Nakhon Phanom in Thailand and Pakse in Lao PDR.....	11
<b>Figure 11.</b> Water levels at Stung Treng and Kratie on the Mekong River. ....	12
<b>Figure 12.</b> Seasonal change of inflows and outflows of Tonle Sap Lake .....	13
<b>Figure 13.</b> The seasonal change in monthly flow volume of Tonle Sap Lake. ....	13
<b>Figure 14.</b> Flash Flood Guidance for the next 1 hour, 3 hours and 6 hours on Oct 8.....	16
<b>Figure 15.</b> Weekly standardized precipitation index from 01 to 08 October 2021.....	17
<b>Figure 16.</b> Weekly Soil Moisture Anomaly from 02 to 08 October 2021.....	18
<b>Figure 17.</b> Weekly Combined Drought Index from 02 to 08 October 2021.....	19
<b>Figure 18.</b> Accumulated rainfall forecast (24 h) based on a GFS model.....	21
<b>Figure 19.</b> Daily average of monthly rainfall anomaly forecast from October to December 2021.....	23

## Table

<b>Table 1.</b> The monthly change in the flow volume of Tonle Sap Lake. ....	14
<b>Table 2.</b> Weekly River Monitoring Bulletin. ....	24

## Key Messages

Key messages for this weekly report are presented below.

### Rainfall and its forecast

- Rainfall focused in the areas from Chiang Saen in Thailand to Pakse in Lao PDR, including the lower part in Cambodia and Viet Nam, varying from 3.20 millimetres (mm) to 135.60 mm.
- There will be average rainfalls for the next 5 days over the Mekong region from 12 to 18 October 2021 due to low-pressure dominating the Mekong region.

### Water level and its forecast

- According to MRC's observed water level data, the outflows at Jinghong hydrological station showed water level changes over the monitoring period from 5 to 11 October 2021. Water levels at this station significantly increased from 535.27 m on 8 Oct to 536.03 on 11 Oct 2021 (recorded on 7:00 am) and stayed about 0.21 m higher than its long-term-average (LTA) value. The outflow was up from 832 m<sup>3</sup>/s on 8 Oct to 1354 m<sup>3</sup>/s on 11 Oct 2021. From October 8 to 11, water level at this station rose about 0.77 m and was about 0.11 m higher than its LTA value.
- Amid the significant increased outflow from Jinghong upstream, water levels of monitoring stations at Chiang Saen in Thailand still decreased from 5 to 11 October 2021. Moreover, from Chiang Khan in Thailand to Vientiane in Lao PDR, water levels decreased about 0.30 m during October 5-11 due to less rainfall in the area and influence of dam operation. Water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR were also decreasing. Unlike, the above stations, water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia were significantly increasing, due to high rainfall and following the same trend of the upstream flow (at Pakse and 3S area in Viet Nam).
- The water volume of the Tonle Sap Lake was lower than its LTA and the levels in 2019 but was higher than 2020 during the same period from 5 to 11 October 2021.
- Over the next few days, the water levels across most monitoring stations are expected to increase but remain lower than their long-term average value in most stations.

### Drought condition and its forecast

- Soil moisture conditions were anomaly dry in some areas of the upper part of the LMB. However, the combined drought indicator shows that the LMB did not face any significant drought during the monitoring week from October 2 to 8. The entire LMB region received from average to above average rainfall.
- For the upcoming three-month forecast, the LMB is likely to receive above average rainfall in October mainly in the central and southern parts of the region. Like 2020, the forecast shows that October is likely the wettest month of the year. November is forecasted to receive from average to above average rainfall throughout the LMB; the

wetter part is likely to take place in the south. Lastly, in December the forecast shows some rain which likely take place in the south of the region.



# 1 Introduction

This Weekly Wet Season Situation Report presents a preliminary analysis of the weekly hydrological and drought situation in the Lower Mekong River Basin (LMB) for the period from **05 – 11 October 2021**. 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 (MCs) – Cambodia, Lao PDR, Thailand, and Viet Nam – and on satellite data. All the water levels indicated in this report refer to an 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 Lake
- 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](http://ffw.mrcmekong.org/bulletin_wet.php).

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

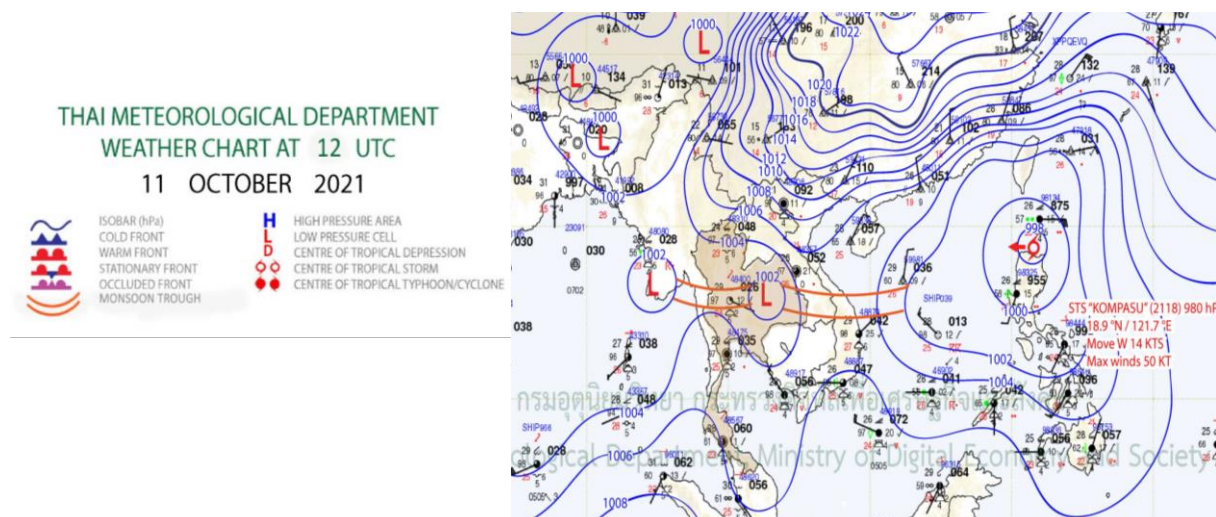
Flash flood information is accessible at: <http://ffw.mrcmekong.org/ffg.php>

## 2 General Weather Patterns

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

The TMD states that the transition period moving from the rainy to the winter season will start from October and the below average rainfall which reduces temperature and cool weather will start from the end of this month onward. However, low pressure and Tropical Storms will lay across the southern part of the LMB mainly in Viet Nam, which will bring more rainfall in October and early November.

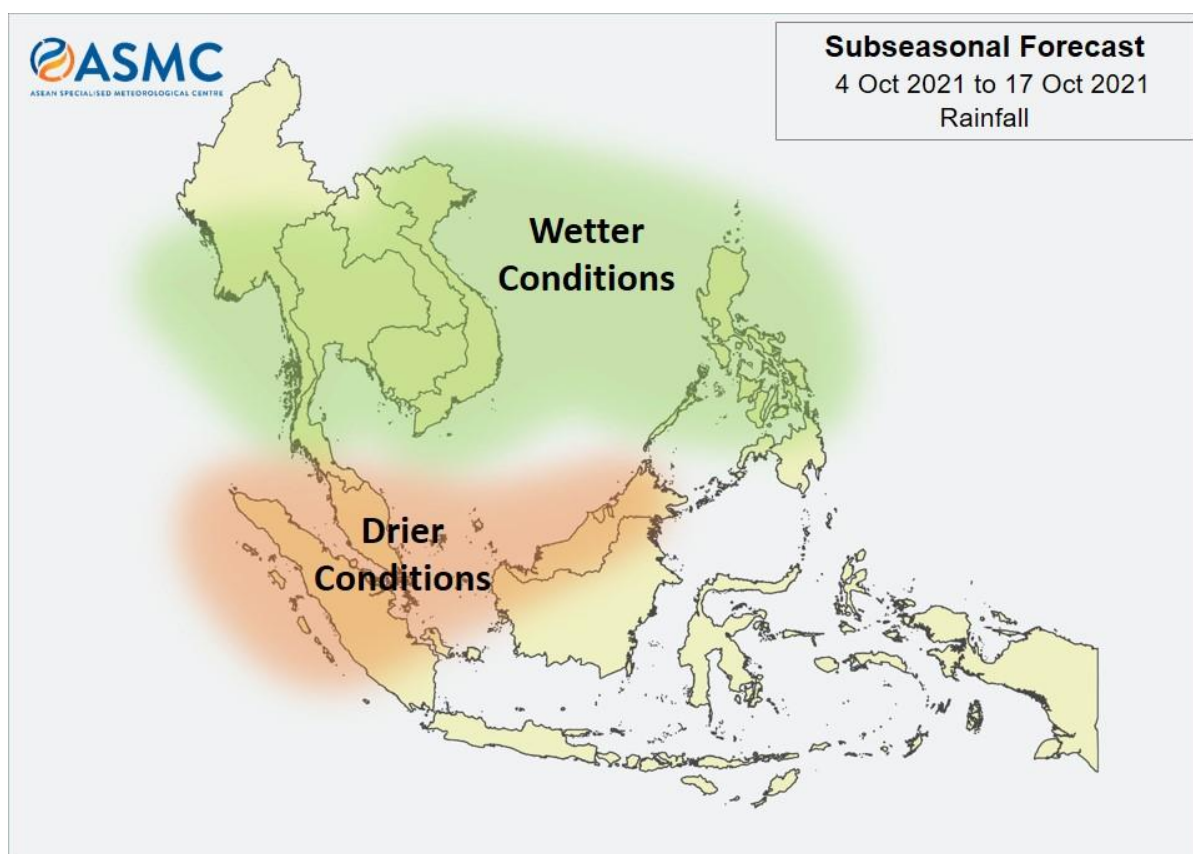
[Figure 1](#) presents the weather map on 11 October 2021, showing low-pressure lines are dominating the middle part of LMB, under influence of the Tropical Storm KOMPASU. Rainfall might focus on the lower part of northern Thailand, Lao PDR and Viet Nam and the 3S area (Sesan, Sre Pok, and Sekong) of Cambodia and Viet Nam.



**Figure 1.** Summary of weather conditions over the LMB.

According to the ASEAN Specialised Meteorological Centre (ASMC), a highest probability of wetter condition is predicted over of the lower part of the Mekong region covering Lao PDR and Thailand from 4 to 17 October 2021, during the 1<sup>st</sup> and 2<sup>nd</sup> weeks of October. Moreover, LMB is likely dominated by wetter condition, which may receive more rainfall in general (above-average rainfall) in the Lower part to the LMB.

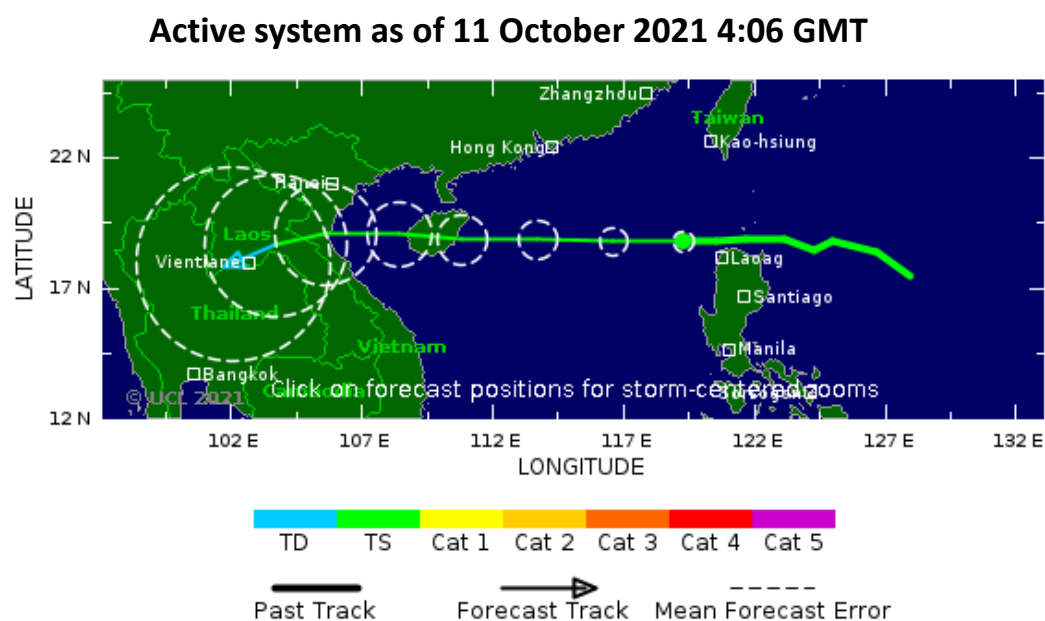
[Figure 2](#) shows the outlook of comparative wet conditions from 4 to 17 October 2021 covering the whole LMB region, based on results from the NCEP model (National Centres for Environmental Prediction).



**Figure 2.** Outlook of wet and dry conditions over the Asian countries by ASMC.

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

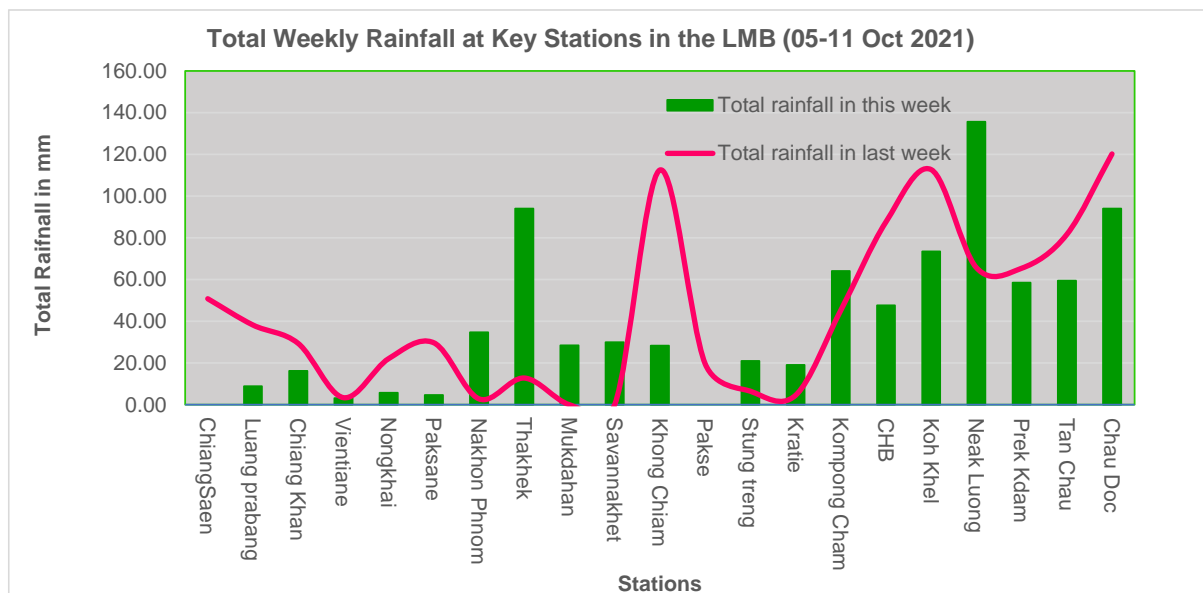
There is a Tropical Storm “KOMPASU” moving from the Philippines to Viet Nam and the middle part of the LMB on 11 October 2021, as shown in [Figure 1](#). Also, based on the Tropical Storm Risk (TSR), the KOMPASU will hit the LMB from 16 to 17 October 2021, as displayed in [Figure 3](#).



**Figure 3.** A tropical depression risk observed on 11 October 2021.

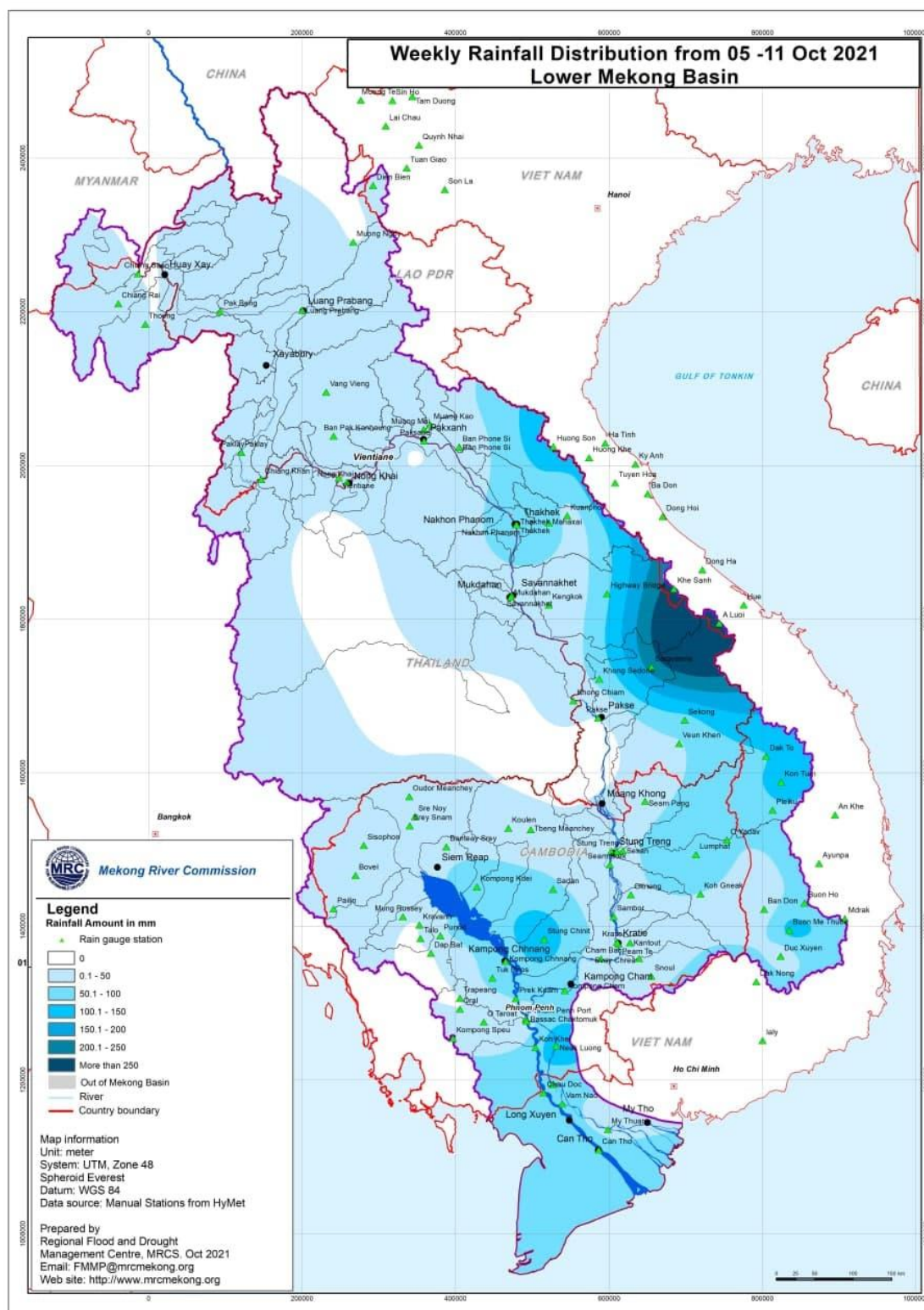
## 2.2 Rainfall patterns over the LMB

This week, rainfall focused in the areas from Chiang Saen in Thailand to Pakse in Lao PDR, including the lower part in Cambodia and Viet Nam, varying from 3.20 mm to 135.60 mm. The weekly total rainfall from 5 to 11 October 2021 in this reporting week was considered high from Nakhon Phanom in Thailand to Chau Doc in Viet Nam. This week rainfall was lower than last week rainfall in the Upper and Middle parts of the LMB (see [Figure 4](#)).



**Figure 4.** Weekly total rainfall at key stations in the LMB during 5-11 Oct 2021.

To verify area rainfall distribution, [Figure 5](#) shows a map of the weekly accumulated rainfall based on observed data provided by the MRC MCs – Cambodia, Lao PDR, Thailand, and Viet Nam – from 5 to 11 October 2021.



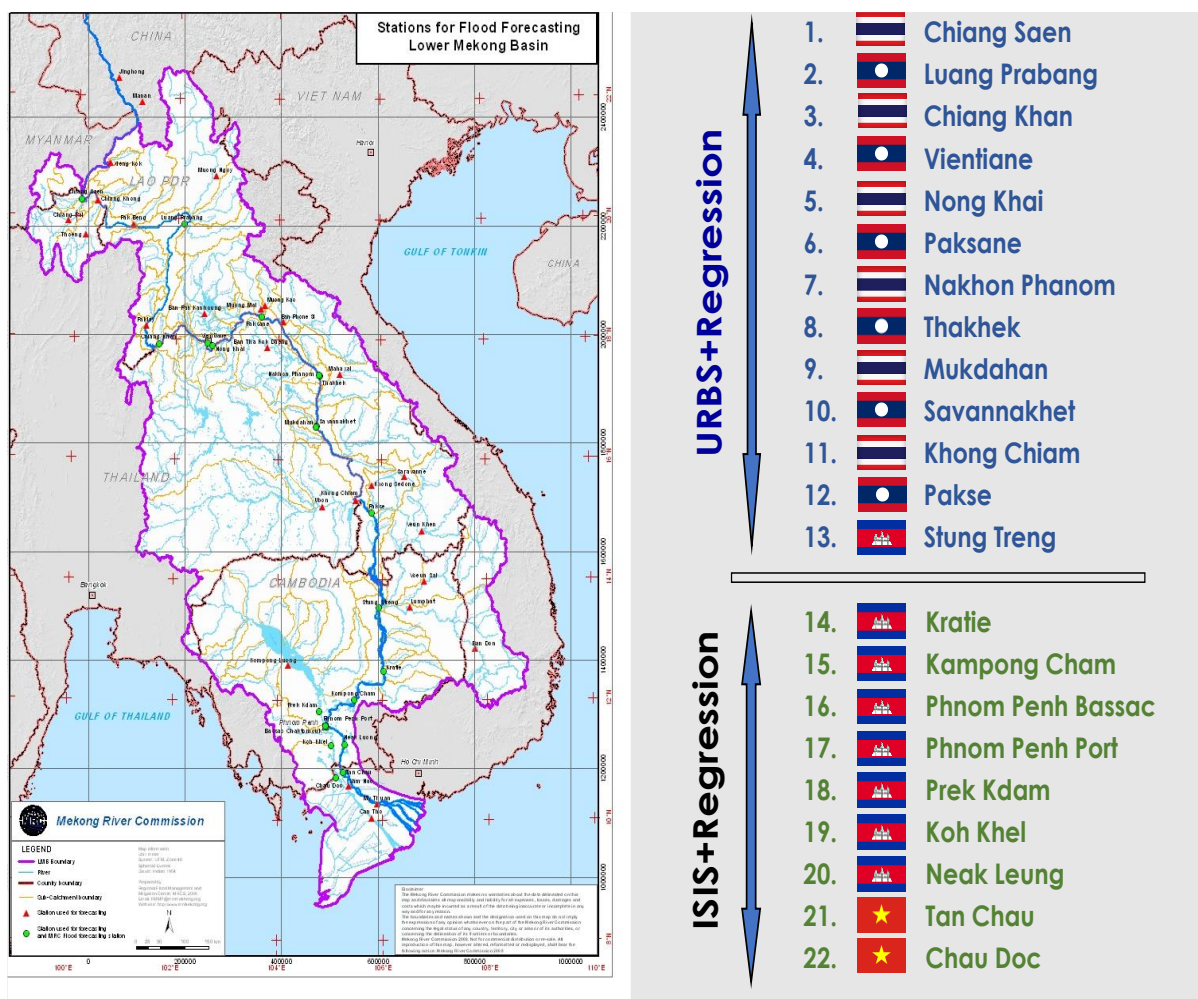
**Figure 5.** Weekly rainfall distribution over the LMB during 5 - 11 October 2021.



### 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 in Thailand to capture mainstream flows entering from the Upper Mekong Basin (UMB); at Vientiane in Lao PDR to present flows generated by climate conditions in the upper part of the LMB; at Pakse in Lao PDR 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.

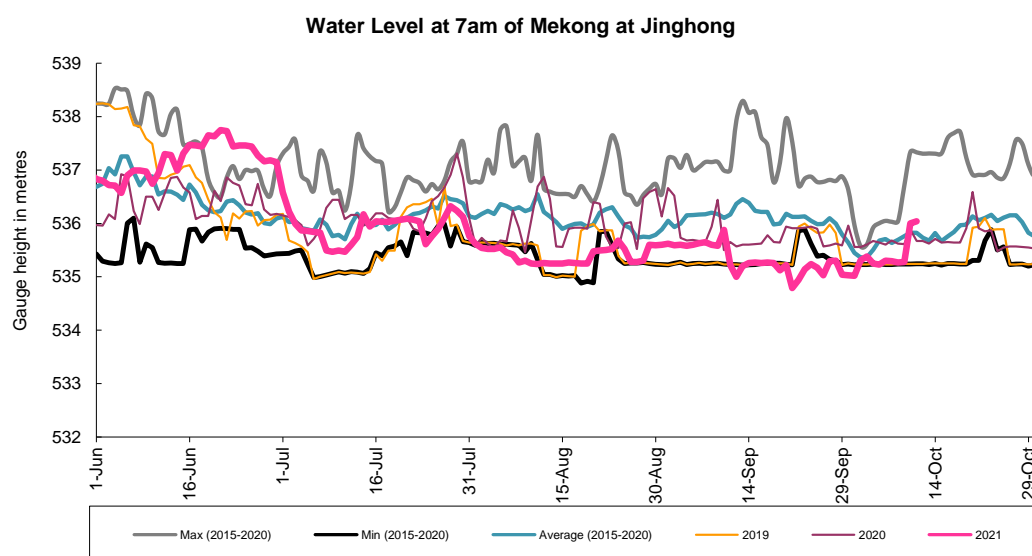
The key stations along the LMB and their respective model application for River Flood Forecasting during the wet season from June to October and River Monitoring during the dry season from November to May are presented in [Figure 6](#). The hydrograph for each key station is available from the MRC's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



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

According to MRC's observed water level data, the outflows at Jinghong hydrological station showed water level changes over the monitoring period from 5 to 11 October 2021. Water levels at this station showed **significantly increase from 535.27 m on 8 Oct to 536.03 on 11 Oct 2021 (recorded on 7:00 am) and stayed about 0.21 m higher than its long-term-average (LTA) value**. The outflow was up from 832 m<sup>3</sup>/s on 8 Oct to 1354 m<sup>3</sup>/s on 11 Oct 2021. From October 8 to 11, water level at this station increased about 0.77 m and was about 0.11 m higher than its LTA value.

[Figure 7](#) below presents water level that decreased at the Jinghong hydrological station<sup>1</sup>, indicating the trend of fluctuating water level up to 11 October 2021 and showing about 0.21 m higher than its LTA level.



**Figure 7.** Water level at the Jinghong hydrological station during 1 July-11 October 2021.

Amid the significant increased outflow from Jinghong upstream, water levels of monitoring stations at Chiang Saen in Thailand decreased from 5 to 11 October 2021. Moreover, from Chiang Khan in Thailand to Vientiane in Lao PDR, water levels decreased about 0.30 m during 5-11 October due to less rainfall in the area and influence of dam operation. Water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR were also decreasing. However, water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia were significantly increasing, due to high rainfall and following the same trend of the upstream flow (at Pakse and 3S area in Viet Nam).

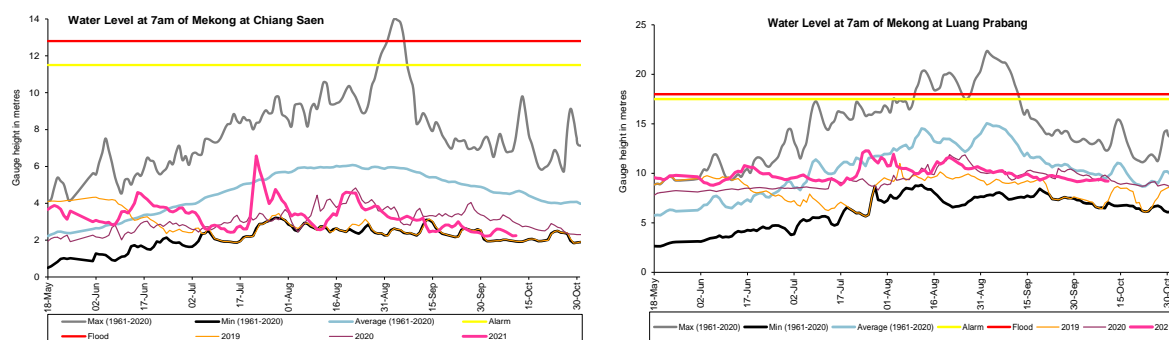
Based on hydrological phenomenon, the contribution of inflow water from the upstream of Lancang-Mekong in China to the Mekong mainstream is about 16% in total during the wet season from June to October. The whole inflow of water into the LMB is influenced by rainfall at the Mekong mainstream and its tributaries during the wet season.

<sup>1</sup> Near-real time data of hydro-meteorological monitoring at the Jinghong hydrological station is available at <https://portal.mrcmekong.org/monitoring/river-monitoring-telemetry>.

### Chiang Saen and Luang Prabang

The water level from 5 to 11 October 2021 at Thailand's Chiang Saen decreased from 2.60 m to 2.24 m, showing 0.36 m down and was about 2.39 m lower than its Long-Term-Average (LTA) value, which considered critical. The water level at Luang Prabang station in Lao PDR slightly decreased from 9.28 m to 9.21 m during the reporting period. This level shows 0.50 m lower than its long-term-average (LTA) value. The trend – sometimes higher or lower to its historical maximum and LTA values – has been observed since early 2021. The phenomenon was potentially caused by upstream dam operations, downstream Xayaburi dam, and heavy rainfall in the surrounding areas. The water levels at Chiang Saen and Luang Prabang are shown in [Figure 8](#) below.

Being situated between the upstream (Nam Beng, Nam Ou, Nam Suong, and Nam Khan) and downstream (Xayaburi) hydropower dams, the 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 early of wet and dry season.**

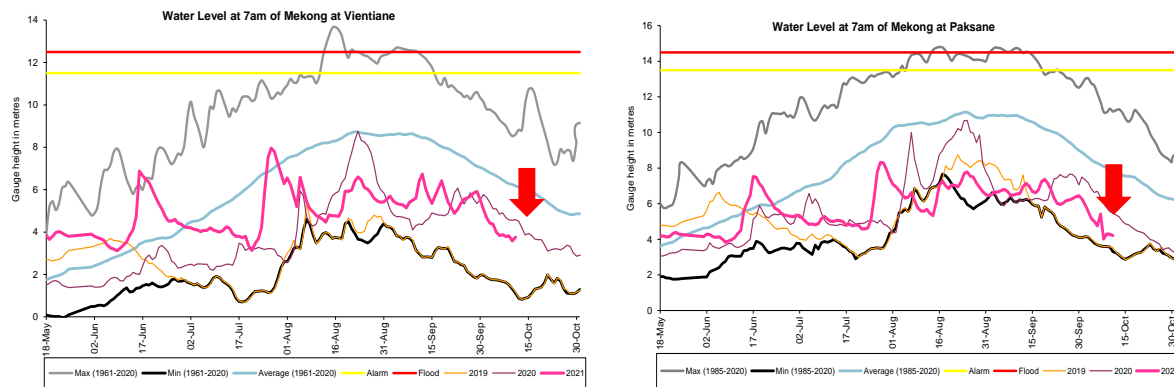


**Figure 8.** Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.

### Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand (downstream of the Xayaburi dam) slightly decreased from 6.47 m to 6.46 m during the reporting week. It showed 2.68 m lower than its Long-Term-Average (LTA). The water level downstream at Vientiane in Lao PDR followed the upstream trend. It also decreased from 4.00 m to 3.76 m and was about 2.42 m lower than its LTA during 5-11 October 2021. However, at Nong Khai station in Thailand, the water level also decreased during the reporting period. It was down from 3.85 m to 3.48 m, showing 3.32 m lower than its LTA. For Paksane in Lao PDR, water levels decreased about 0.79 m, dropping from 5.00 m to 4.21 m. The WL at this station was still about 3.61 m lower than its LTA. The recently decreased water levels were obviously due to the low rainfall in the sub-catchment area, amid the inflows and water storing from upstream. The water levels at Vientiane and Paksane are shown in [Figure 9](#) below.

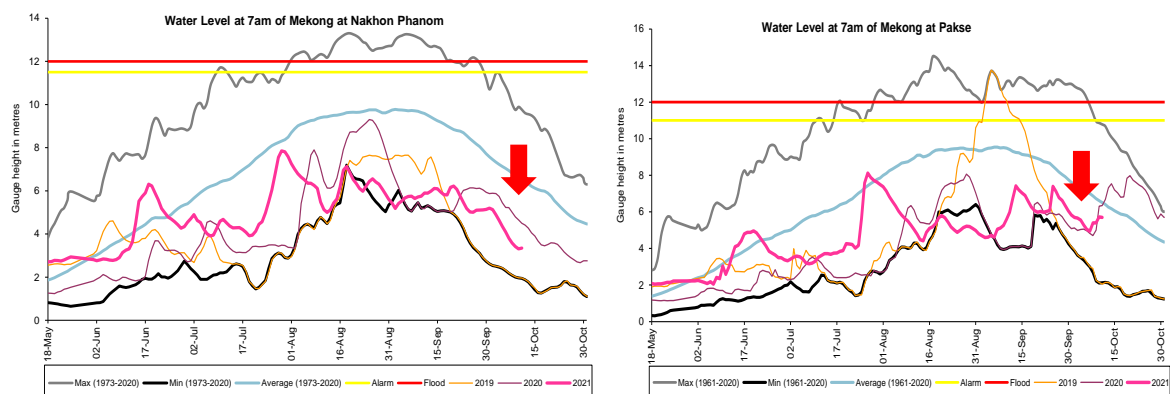




**Figure 9.** Water levels Veintiane and Paksane in Lao PDR.

### Nakhon Phanom to Pakse

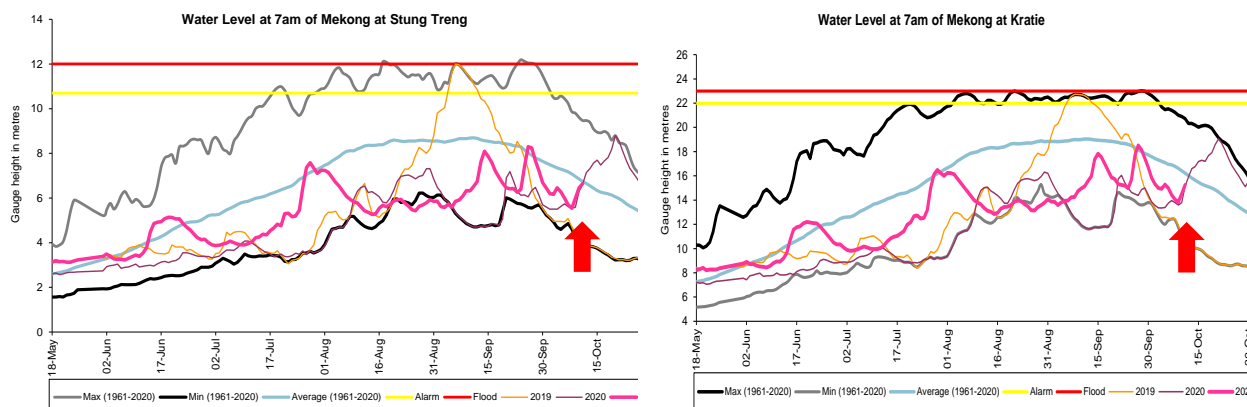
The water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR were decreasing about 0.80 m due to low rainfall and less inflow from upstream. Further downstream from Khong Chiam in Thailand to Pakse in Lao PDR, water level also decreased, dropping about 0.35 m due to low rainfall in the catchment area. **Water levels at these stations (Nakhon Phanom to Pakse) were staying below their LTA level, which were still considered critical.** [Figure 10](#) shows the water levels at Nakhon Phanom and Pakse stations.



**Figure 10.** Weekly water levels at Nakhon Phanom in Thailand and Pakse in Lao PDR

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

Following the same trend from the upstream part of the Mekong River and the 3S river (Sekong, Se San, and Sre Pok), the water levels from Stung Treng to Kratie in Cambodia remarkably went up during 5-11 October 2021. This week water level at Stung Treng and Kratie increased about 0.37 m and 0.04 m, respectively, moving up to about 0.09 m and 0.98 m below their LTA (as showed in [Figure 11](#)). The water level at Kompong Cham decreased about 0.19 m and was still about 2.25 m lower than its LTA. Generally, the **Water levels at these stations were moving down to the level lower than their TLA, which considered critical.**



**Figure 11.** Water levels at Stung Treng and Kratie on the Mekong River.

At Chaktomuk on the Bassac River, due to deficit rainfall in the inflow catchment, the water level slightly decreased (almost stable) by about 0.02 m and stayed 2.56 m lower than its LTA value; while at Koh Khel, water level was stable, staying 1.08 m lower than its LTA value. The water level at Prek Kdam on the Tonle Sap Lake decreased about 0.07 m and was about 2.48 m lower than its LTA value. The water level at the Tonle Sap Lake (observed at Kompong Luong) was similar to Prek Kdam station's water level. The recently decreased water level was because of less inflow and low inflow contributed from upstream of the Tonle Sap Lake area during the reporting period. The water level at the Tonle Sap Lake (observed at Kompong Luong) followed the same trend of Prek Kdam station's water level. **Water levels at these stations were staying lower than their LTA level, which still considered critical.**

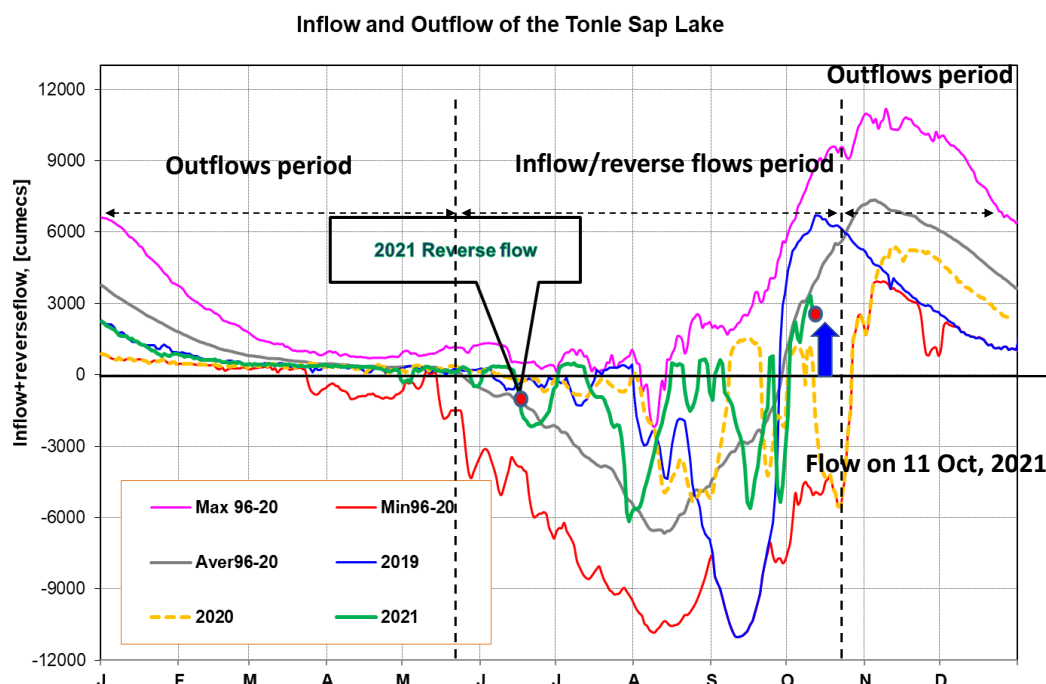
### Tidal stations at Tan Chau and Chau Doc

Like last week, the water levels from 5 to 11 October 2021 at Viet Nam's Tan Chau and Chau Doc were fluctuating due to daily tidal effects from the sea. The fluctuation levels were between 1.80 m and 2.38 m; they were in between the range of their LTA and historical minimum levels and **considered normal**.

### The Tonle Sap Flow

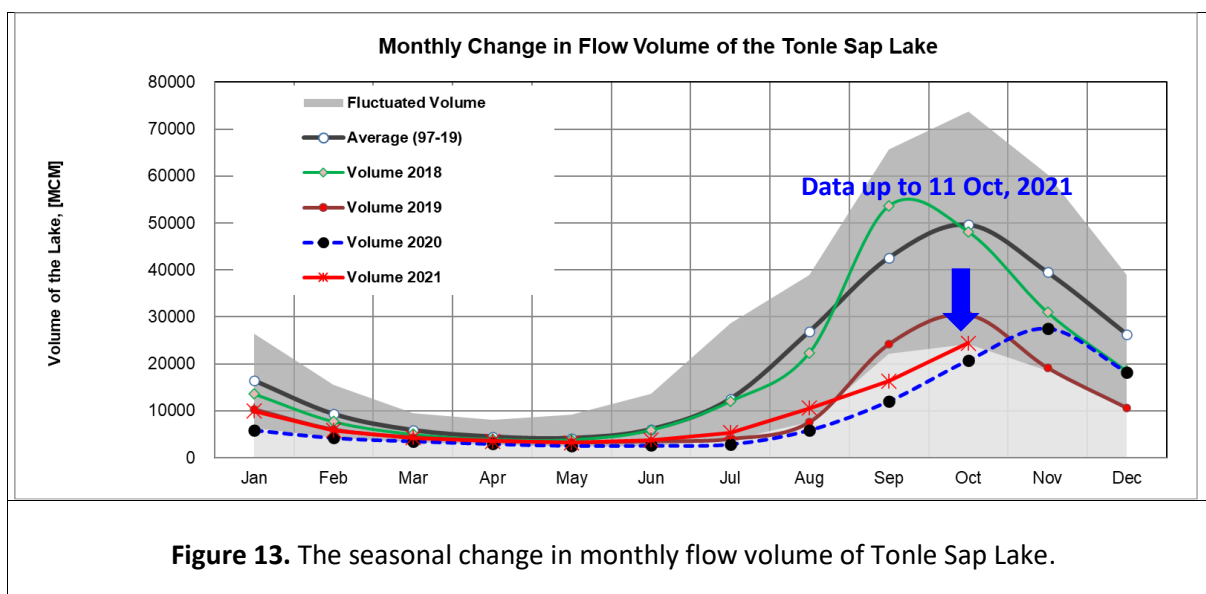
At the end of the dry season, when water levels along the Mekong River increase, flows of the Mekong River reverse into the Tonle Sap Lake and then to the Delta. This phenomenon normally takes place from June to early August.

[Figure 12](#) shows the seasonal changes of the outflow of the Tonle Sap Lake at Prek Kdam in comparison with the flows of 2018 and 2019, and their LTA levels (1997–2019). Up to October 11 of this reporting period, **it was observed that the main inflow/reverse flow to Tonle Sap Lake decreased due to low rainfall from upstream**. This decreased inflow of Tonle Sap Lake was most likely caused by less inflows from the catchment area and from the Mekong River. Up to 11 October 2021, the inflow into the Tonle Sap Lake condition in 2021 was lower than 2019 but higher than 2020 inflow conditions. For next week, rainfall is forecasted for the Tonle Sap area; thus, the inflow into the Tonle Sap Lake is likely to slightly increase from the current level.



**Figure 12.** Seasonal change of inflows and outflows of Tonle Sap Lake

The water volume of the Tonle Sap Lake up to this point has been considered low in comparison with its 2019 and LTA levels. [Figure 13](#) shows seasonal changes in monthly flow volumes up to October 11 for the Lake compared with the volumes in 2018, 2019 and 2020, their LTA, and the fluctuation levels (1997–2019). It shows that up to October 11, **the water volume of the Tonle Sap Lake is lower than its LTA and also lower than the levels in 2019 but higher than 2020 during the same period**. The figure is displayed in [Table 1](#), which indicates that the Tonle Sap Lake has been affected by water levels from the Mekong River, the tributaries, and rainfall in the surrounding sub-catchments and **considered very critical**.



**Figure 13.** 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]	Volume 2021 [MCM]
Jan	16452.95	26357.53	6272.01	13633.41	10285.31	5906.80	9923.80
Feb	9312.36	15596.22	4281.41	7729.72	6019.30	4264.19	5832.97
Mar	5868.92	9438.24	3350.92	5037.06	4354.62	3553.99	4264.88
Apr	4474.98	8009.14	2875.42	3956.47	3667.47	2992.61	3556.68
May	4166.07	9176.93	2417.81	3864.00	3266.43	2594.92	3240.78
Jun	6034.10	13635.01	2470.54	5919.18	3517.06	2641.88	3798.29
Jul	12502.58	28599.56	3832.51	12024.96	4001.99	2925.86	5346.73
Aug	26934.35	39015.12	7554.93	22399.65	7622.71	5941.07	10547.80
Sep	42644.05	65632.35	22180.73	53639.54	24194.19	12105.31	16382.34
Oct	49698.19	73757.23	24276.79	48193.08	30358.38	20799.13	24410.72
Nov	39542.58	60367.33	18576.01	31036.07	19112.65	27546.80	
Dec	26325.13	38888.95	10869.43	18469.21	10577.29	18251.65	
	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 <sup>3</sup> )							

This demonstrates the influence of the relationships between the reverse flows, water levels of the Mekong River, inflows from tributaries, and the flow direction in the complex hydraulic environment of the Tonle Sap Lake during the wet and dry seasons. The data show that about half of the annual inflow volume into the Tonle Sap Lake has originated from the Mekong mainstream. Thus, flow alterations in the mainstream could have direct impact on the Tonle Sap Lake water levels and on its hydrology.

## 4 Flash Flood in the Lower Mekong Basin

During October 4-11, the LMB was affected by two weather factors (i) The monsoon trough lay across the lower central, eastern, and upper southern parts during the first half of the week. It laid toward a tropical depression over the central East Sea during the middle of the week. This storm moved northwest to the upper East Sea nearby and intensified into the tropical storm “Lionrock” in the early morning of Oct 8. Then it moved to the Gulf of Tonkin in the evening of Oct 9 and made landfall over the upper Viet Nam in the afternoon of Oct 10, and it downgraded into a tropical depression covering Viet Nam; (ii) the southwest monsoon which prevailed over the Andaman Sea and the Gulf of Thailand was active during the second half of the week. These conditions caused rainfall over LMB, especially in the middle and lower parts.

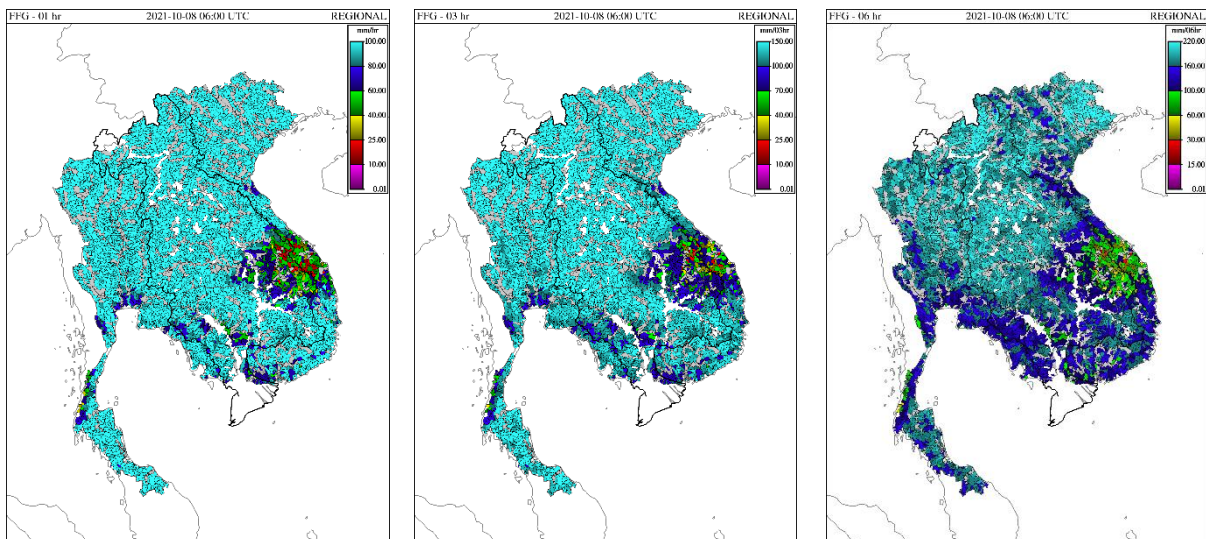
According to the MRC-Flash Flood Guidance System (MRC-FFGS) and analysis, flash flood events were detected during the reporting period in several areas of the LMB for Thailand, Lao PDR, Cambodia, and Viet Nam with ranging from low risk level to high level. as shown in [Figure 14](#) and [Table 2](#).

**Table 2.** Detected flash flood in Thailand, Cambodia, and Viet Nam on October 8.



Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Cambodia															
Date of FFG products 08/10/2021 06:00 UTC time															
01-Hour Flash Flood Risk and Location					03-Hour Flash Flood Risk and Location					06-Hour Flash Flood Risk and Location					
Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk	
Ratana Kiri	Ou Chum	Tun	Northeast	Low-Risk	Kampong Cham	Stueng Trang	Sampieng Kraom	Central Lowland	Low-Risk	Ratana Kiri	Ou Chum	Tun	Northeast	Low-Risk	
Ratana Kiri	Koun Mom	Ko Hokseb	Northeast	Low-Risk	Kampong Thom	Baray	Kokir Thum	Northwest	Low-Risk	Ratana Kiri	Veun Sai	Tiem Kraom	Northeast	Low-Risk	
Kampong Chhnang	Kampong Leang	Kandal	Central	Low-Risk	Kampong Thom	Baray	Pongro Ling	Northwest	Low-Risk	Ratana Kiri	Koun Mom	Ko Hokseb	Northwest	Low-Risk	
Kampong Cham	Stueng Trang	Sampieng Kraom	Central Lowland	Low-Risk						Pursat	Bakan	Kdei Chhnul	Western	Low-Risk	
Kampong Thom	Stueng	Slak Kranh	Northwest	Low-Risk						Pursat	Veal Veang	Chamka Chrey Khang Thong	Western	Low-Risk	
Kampong Thom	Baray	Kokir Thum	Northwest	Low-Risk						Kampong Chhnang	Kampong Leang	Kandal	Central	Low-Risk	
Kampong Thom	Baray	Pongro Ling	Northwest	Low-Risk						Kampong Cham	Stueng Trang	Veal Preah	Central Lowland	Low-Risk	
Kampong Thom	Baray	Khnhaom	Northwest	Low-Risk						Kampong Cham	Stueng Trang	Sampieng Kraom	Central Lowland	Low-Risk	
Kampong Cham	Cheung Prey	Ruessei Lor	Central Lowland	Low-Risk						Kampong Thom	Kampong Svay	Kaoh Krob Bay	Northwest	Low-Risk	
Kampong Cham	Cheung Prey	Kngaok	Central Lowland	Low-Risk						Kampong Thom	Stueng	Slak Kranh	Northwest	Low-Risk	
										Kampong Thom	Baray	Kokir Thum	Northwest	Low-Risk	
										Kampong Thom	Baray	Pongro Ling	Northwest	Low-Risk	
										Kampong Chhnang	Kampong Leang	Trapeang Meas	Central	Low-Risk	
										Kampong Cham	Baathway	Rout	Central Lowland	Low-Risk	
										Kampong Thom	Baray	Khnhaom	Northwest	Low-Risk	
										Kampong Cham	Cheung Prey	Ruessei Lor	Central Lowland	Low-Risk	
										Kampong Cham	Cheung Prey	Kngaok	Central Lowland	Low-Risk	
										Sihanouk Ville	Prey Nob	Chumpu Khmau	Southwest	Low-Risk	

Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Viet Nam												
Date of FFG products 08/10/2021 06:00 UTC time												
01-Hour Flash Flood Risk and Location				3-Hour Flash Flood Risk and Location in Vietnam				6-Hour Flash Flood Risk and Location in Vietnam				
Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks	
Kon Tum	Sa Thay	Central Highlands	Moderate-Risk	Gia Lai	la Grai	Central Highlands	Moderate-Risk	Kon Tum	Sa Thay	Central Highlands	Moderate-Risk	
Gia Lai	la Grai	Central Highlands	Moderate-Risk	Gia Lai	Duc Co	Central Highlands	Low-Risk	Gia Lai	la Grai	Central Highlands	Moderate-Risk	
Thua Thien Hue	Phong Dien	North Central	Moderate-Risk	Quang Tri	Huong Hoa	North Central	Low-Risk	Gia Lai	Duc Co	Central Highlands	Low-Risk	
Thua Thien Hue	Quang Dien	North Central	Low-Risk	Thua Thien Hue	A Luoi	North Central	High-Risk	Quang Tri	Huong Hoa	North Central	Low-Risk	
Gia Lai	Duc Co	Central Highlands	Low-Risk	Quang Nam	Nam Giang	South Central Coast	High-Risk	Quang Tri	Da Krong	North Central	Low-Risk	
Quang Tri	Huong Hoa	North Central	Low-Risk	Thua Thien Hue	Nam Dong	North Central	Moderate-Risk	Thua Thien Hue	A Luoi	North Central	Low-Risk	
Quang Tri	Da Krong	North Central	Low-Risk	Da Nang	Hoa Vang	South Central Coast	Low-Risk	Quang Nam	Nam Giang	South Central Coast	High-Risk	
Kon Tum	Ngoc Hoi	Central Highlands	Moderate-Risk	Da Nang	Hoa Vang	South Central Coast	Moderate-Risk	Thua Thien Hue	A Luoi	North Central	Moderate-Risk	
Thua Thien Hue	A Luoi	North Central	High-Risk	Quang Nam	Hien	South Central Coast	Moderate-Risk	Kon Tum	Ngoc Hoi	Central Highlands	Moderate-Risk	
Quang Nam	Nam Giang	South Central Coast	High-Risk	Da Nang	Hoa vang	South Central Coast	Low-Risk	Quang Binh	Le Thuy	North Central	Low-Risk	
Quang Nam	Hien	South Central Coast	High-Risk	Thua Thien Hue	Phong Dien	North Central	Moderate-Risk	Quang Nam	Dai Loc	South Central Coast	Moderate-Risk	
Thua Thien Hue	Nam Dong	North Central	Low-Risk	Kon Tum	Dak Glei	Central Highlands	High-Risk	Thua Thien Hue	Nam Dong	North Central	Low-Risk	
Da Nang	Hoa Vang	South Central Coast	Low-Risk	Quang Nam	Dai Loc	South Central Coast	Moderate-Risk	Thua Thien Hue	Nam Dong	North Central	Moderate-Risk	
Da Nang	Hoa Vang	South Central Coast	Moderate-Risk	Quang Nam	Tra My	South Central Coast	High-Risk	Da Nang	Hoa Vang	South Central Coast	Low-Risk	
Thua Thien Hue	Nam Dong	North Central	Low-Risk	Quang Nam	Que Son	South Central Coast	High-Risk	Da Nang	Lien Chieu	South Central Coast	Low-Risk	
Kon Tum	Dak Glei	Central Highlands	High-Risk	Quang Nam	Phuoc Son	South Central Coast	Low-Risk	Da Nang	Hoa Vang	South Central Coast	Moderate-Risk	
Da Nang	Hoa vang	South Central Coast	Low-Risk	Quang Ngai	Tra Bong	South Central Coast	High-Risk	Quang Nam	Hien	South Central Coast	Moderate-Risk	
Quang Nam	Dai Loc	South Central Coast	Moderate-Risk	Kon Tum	Dak To	Central Highlands	High-Risk	Da Nang	Hoa vang	South Central Coast	Low-Risk	
Kon Tum	Dak To	Central Highlands	High-Risk	Quang Ngai	Son Tinh	South Central Coast	Low-Risk	Thua Thien Hue	Phong Dien	North Central	Moderate-Risk	
Quang Nam	Phuoc Son	South Central Coast	Moderate-Risk	Quang Ngai	Son Ha	South Central Coast	Low-Risk	Dong Thap	Thap Muoi	Southwest-Mekong River Delta	Low-Risk	
Quang Nam	Tien Phuoc	South Central Coast	Low-Risk	Quang Nam	Nui Thanh	South Central Coast	Low-Risk	Dong Thap	Tan Hong	Southwest-Mekong River Delta	Low-Risk	
Quang Nam	Tra My	South Central Coast	Low-Risk	Kon Tum	Kon Plong	Central Highlands	Moderate-Risk	Dong Thap	Tam Nong	Southwest-Mekong River Delta	Low-Risk	
Quang Nam	Tra My	South Central Coast	High-Risk	Kon Tum	Ngoc Hoi	Central Highlands	Moderate-Risk	Long An	Thu Thua	Southwest-Mekong River Delta	Low-Risk	
Quang Nam	Que Son	South Central Coast	High-Risk	Kon Tum	Dak Ha	Central Highlands	Low-Risk	Tien Giang	Cai Be	Southwest-Mekong River Delta	Low-Risk	
Quang Nam	Nui Thanh	South Central Coast	Low-Risk	Kon Tum	Sa Thay	Central Highlands	Low-Risk	An Giang	Cho Moi	Southwest-Mekong River Delta	Low-Risk	
Quang Ngai	Son Ha	South Central Coast	Low-Risk	Quang Ngai	Son Tay	South Central Coast	Moderate-Risk	Gia Lai	Chu Pah	Central Highlands	Moderate-Risk	
Quang Ngai	Son Tay	South Central Coast	High-Risk	Quang Ngai	Minh Long	South Central Coast	Moderate-Risk	Gia Lai	Kbang	Central Highlands	Moderate-Risk	
Quang Ngai	Tra Bong	South Central Coast	High-Risk	Quang Ngai	Duc Pho	South Central Coast	Low-Risk	Phu Yen	Tuy Hoa	South Central Coast	Low-Risk	
Kon Tum	Kon Plong	Central Highlands	High-Risk	Binh Dinh	Hoai An	South Central Coast	Low-Risk	Khanh Hoa	Van Ninh	South Central Coast	Low-Risk	
Quang Ngai	Ba To	South Central Coast	Moderate-Risk	Binh Dinh	Phu Cat	South Central Coast	Low-Risk	Long An	Can Giuoc	Southwest-Mekong River Delta	Low-Risk	



**Figure 14.** Flash Flood Guidance for the next 1 hour, 3 hours and 6 hours on Oct 8.

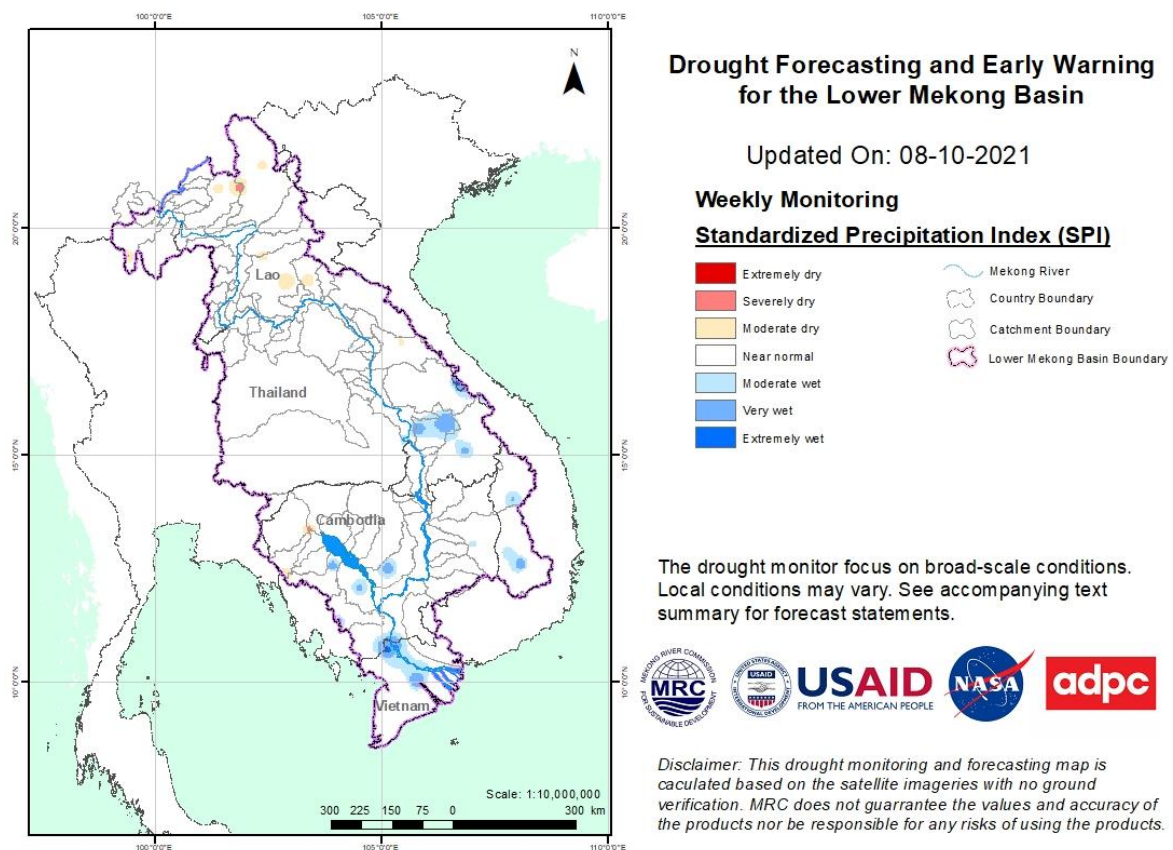
## 5 Drought Monitoring in the Lower Mekong Basin

### Weekly drought monitoring from 02 to 08 October 2021

Drought monitoring data for 2021 are available from Saturday to Friday every week; thus, the reporting period is normally delayed by three days compared to Flood and Flash Flood reports. We adopt the Index of Soil Water Fraction (ISWF) data obtained from FFGS to represent soil moisture of agricultural indicator for both dry and wet seasons.

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

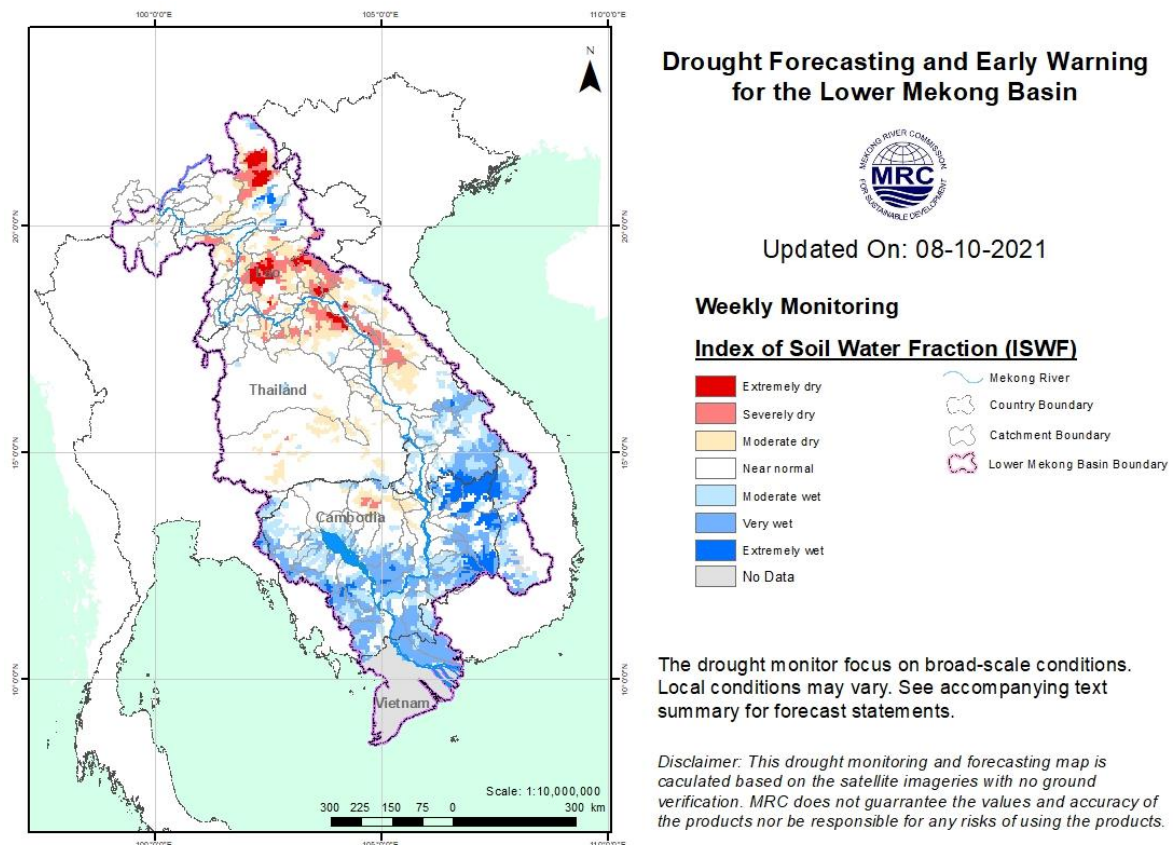
Meteorological drought indicator of SPI from October 2 to 8, as shown in [Figure 15](#), shows that the entire LMB was either normal or wet; the region received from average to above average rainfall during the monitoring week.



**Figure 15.** Weekly standardized precipitation index from 01 to 08 October 2021.

- **Weekly Index of Soil Water Fraction (ISWF)**

Like last week (Sep 25 to Oct 1), the soil water fraction from October 2 to 8, as displayed in [Figure 16](#), shows wet condition in the middle and lower parts and dry condition in the upper part of the LMB. The anomaly dry soil moistures covered some area of Phongsaly, Oudomxay, Luang Prabang, Xiengkhuang, Vientiane, Xaysomboun, Borikhamxay, and Khammuane of Lao PDR and Nong Khai, Udon Thani, and Sakon Nakhon of Thailand. The conditions were at moderate and severely dry.

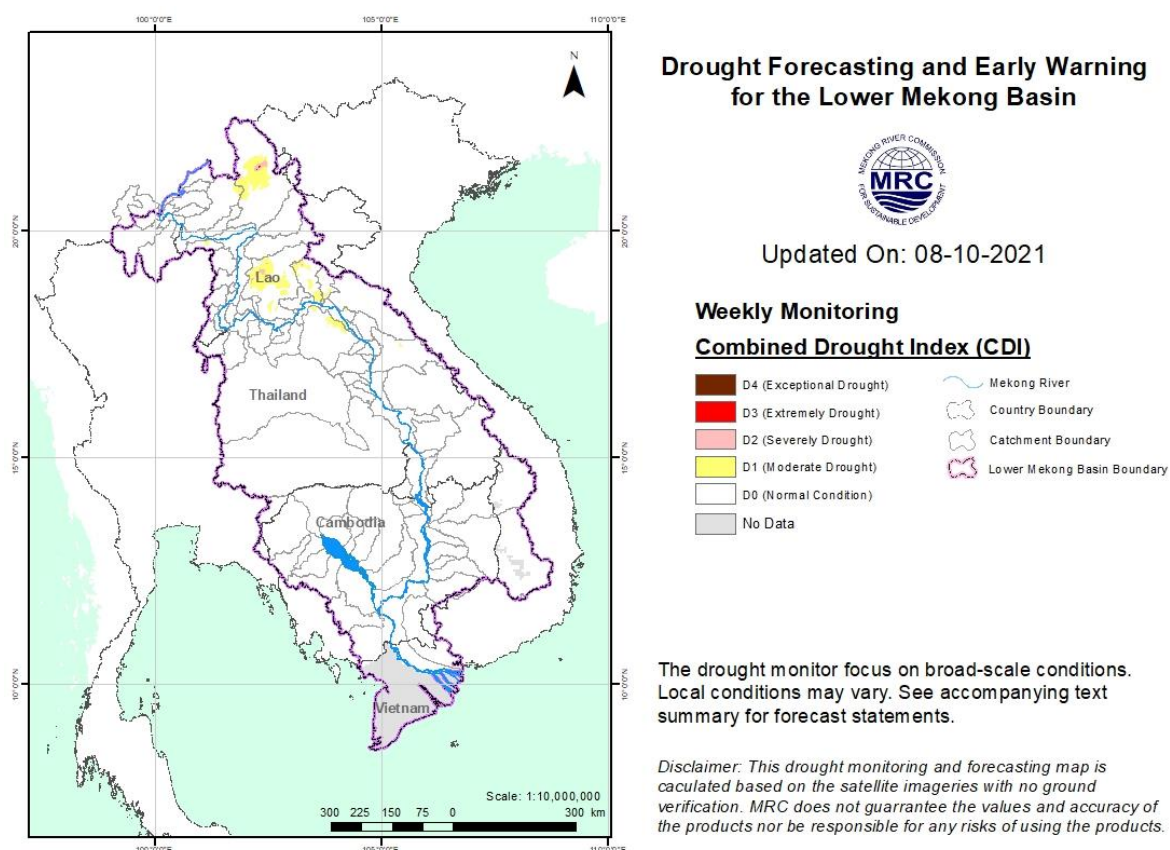


**Figure 16.** Weekly Soil Moisture Anomaly from 02 to 08 October 2021.

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

Amid some anomaly dry soil moistures in the northern part, the LMB were generally at normal during the monitoring week, as displayed in [Figure 17](#). The combined drought indicator reveals normal conditions in most part of the region.





**Figure 17.** Weekly Combined Drought Index from 02 to 08 October 2021.

More information on Drought Forecasting and Early Warning (DFEW) as well as the explanation is available here: <http://droughtforecast.mrcmekong.org/templates/view/our-product>. DFEW provides not only weekly monitoring and forecasting information but also a three-month forecast of drought indicators with seasonal outlook which are updated every month based on international weather forecast models. Details on drought forecast are described in section [6.4](#) of this report.

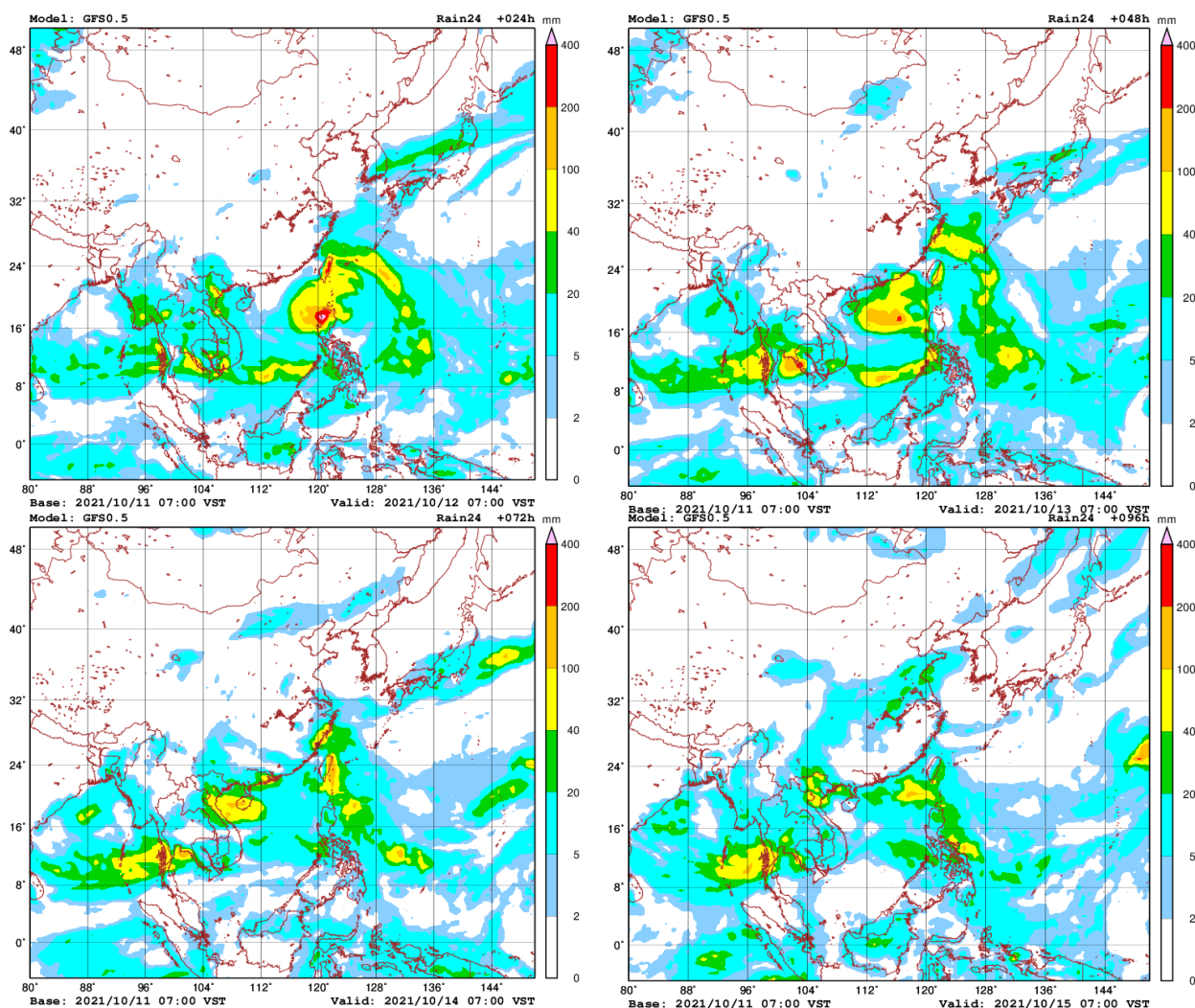
## 6 Weather and Water Level Forecast and Flash Flood Information

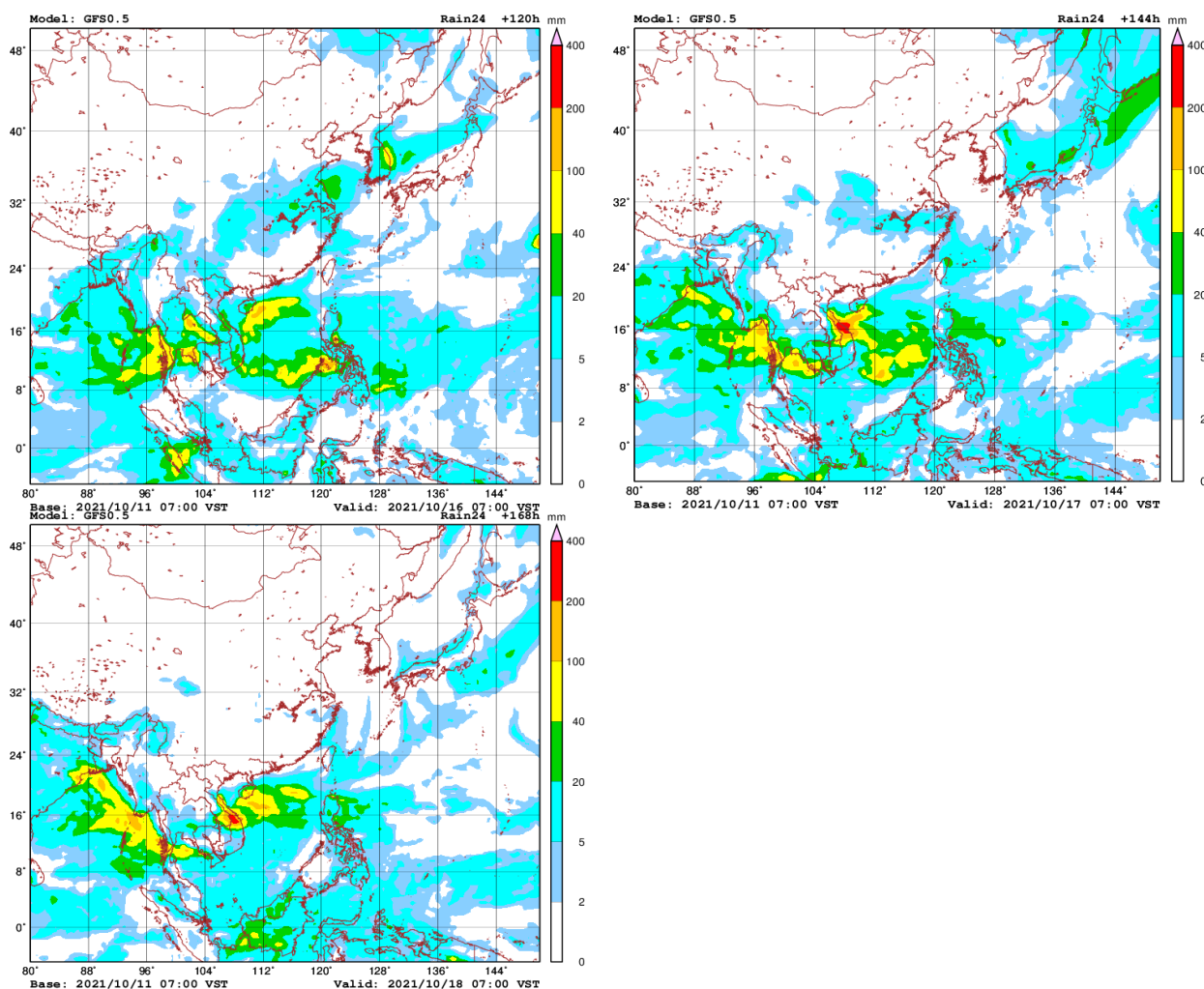
### 6.1 Weather and rainfall forecast

Based on the analysis of the synoptic meteorological information and result from the Global Forecast System (GFS) model, in the coming week, the southwest monsoon and tropical depression will be prevailing over the LMB.

In general, from October 12 to 13, small (<20 mm/24h) moderate rainfall (20-50 mm/24h) will likely occur over the LMB. However, from October 14 to 18, heavy rainfall (50-100 mm/24h) and very heavy rainfall (>100 mm/24h) will likely occur in some areas of the middle and lower parts of the LMB.

[Figure 18](#) shows accumulated rainfall forecast (24 h) of the GFS model from October 12-18.





**Figure 18.** Accumulated rainfall forecast (24 h) based on a GFS model.

## 6.2 Water level forecast

### Chiang Saen and Luang Prabang

Based on October 11's daily flood forecasting bulletin, the daily forecasted water level at Chiang Saen in Thailand is expected to increase from 2.24 m to 2.52 m over the next five days. The trend will keep the water level at this station below its LTA.

For Luang Prabang in Lao PDR, the water level will also increase from 9.21 m to 9.80 m during the next five days. The current water level is lower than its LTA. Precipitation is forecasted for the area between Chiang Saen and Luang Prabang next week.

### Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand is forecasted to go up approximately 0.79 m, while water level at Vientiane in Lao PDR will also increase up to 1.00 m. Furthermore, from Nong Khai in Thailand, the water level will increase also about 1.00 m over the next five days; at Paksane in Lao PDR water level will increase about 0.64 m due to forecasted rainfall in the upper catchments. Rainfall is forecasted for the area of Paksane next week.

The water levels at these stations are remaining lower than their LTA.

### **Nakhon Phanom to Pakse**

The water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR are forecasted to significantly increase between 0.35 m and 1.00 m over the next five days. Water level at these stations will stay lower than their LTA level. Rainfall is forecasted for the area next week.

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

From Stung Treng to Kampong Cham along the Mekong River in Cambodia, the water levels will go up from 0.10 m to 0.96 m over the next five days. Precipitation is forecasted for the area between Stung Treng and Kampong Cham during next week.

The water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port as well as at Phnom Penh's Chaktomuk on the Bassac River will increase by about 0.35 m over the next five days.

Water levels at most of the stations will continue to stay lower than their LTA value, particularly in the lower part of the region from the Bassac at Phnom Penh to Koh Khel as well as from Tonle Sap at Prek Kdam to Phnom Penh Port, including the Tonle Sap Lake. Precipitation is forecasted for the low-lying area of Cambodia next week.

### **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, the water levels will be fluctuating above their minimum level, following daily tidal effects from the sea. Rainfall is forecasted for the Delta area next week.

The performance of the weekly flood forecast, with an accuracy and data input evaluation from 5 to 11 October 2021, is presented in **Annex 1**.

[Table 2](#) shows the daily flood forecasting Bulletin issued on October 11. Results of the weekly river monitoring bulletin are also available at [http://ffw.mrcmekong.org/bulletin\\_wet.php](http://ffw.mrcmekong.org/bulletin_wet.php).

## **6.3 Flash Flood Information**

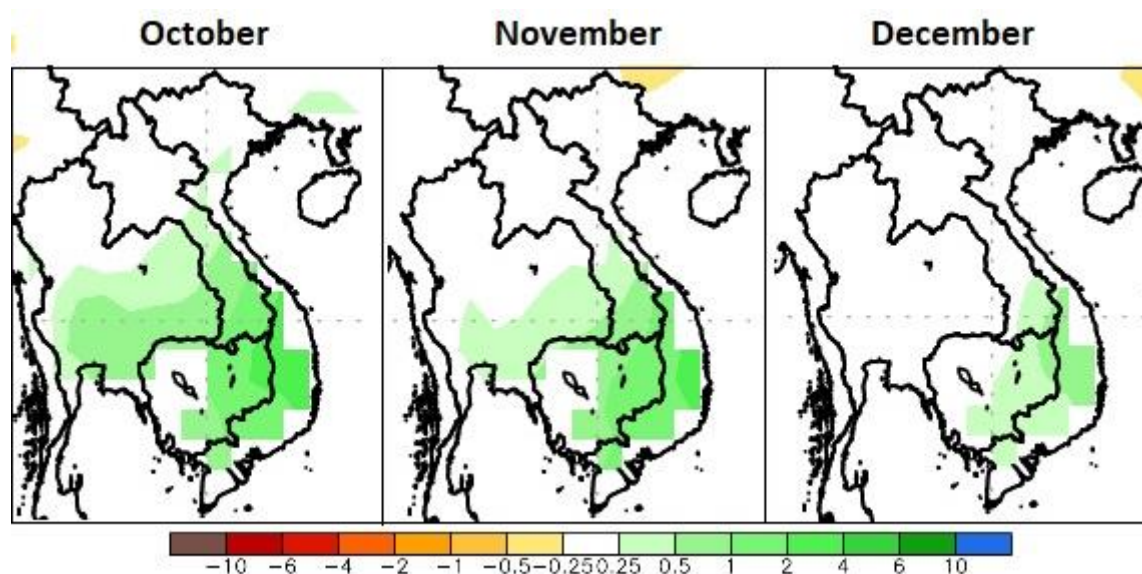
With moderate and heavy rainfall forecasted for next week, flash floods with high level are expected to take place in the LMB. And local heavy rain in a short period of time is possible with unexpected short flash floods. The information on flash flood guidance for the next one, three, and six hours is updated twice a day at: <http://ffw.mrcmekong.org/ffg.php>.

Detailed information on Flash Flood Warning Information 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 November 2021. The MRC's DFEWS adopts an ensemble model called the North America Multi-Model Ensemble (NMME), which averages all scenarios.

The global scale of rainfall prediction is used to see how the rain distribution looks like for the coming months. [Figure 18](#) shows the ensemble mean of daily average precipitation (mm/day) each month from October to December 2021 produced by the NMME.



**Figure 19.** Daily average of monthly rainfall anomaly forecast from October to December 2021.

The ensemble prediction model based on the initial conditions in September reveals that the LMB is likely to receive above average rainfall in October mainly in the central and southern parts of the region. Like 2020, the forecast shows that October is likely the wettest month of the year. November is forecasted to receive from average to above average rainfall throughout the LMB; the wetter part is likely to take place in the south. Lastly, in December the forecast shows some rain which likely take place in the south of the region.

The 2021 dry season is relatively wetter than that of 2020 and the monsoon rain in the 2021 wet season has arrived earlier than it did in 2019 and 2020 especially over the upper and central parts of the LMB.


























**Table 2. Weekly River Monitoring 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: 12 October - 16 October 2021

Date: 11 October 2021

Location	Country	24-hr Observed Rainfall (mm)	Zero gauge above M.S.L. (m)	Flood level (m)	Alarm level (m)	Observed W. level against zero gauge (m)		Forecasted Water Levels (m)						There is currently no flood warning in place at monitoring sites on the Mekong							
		10-Oct				11-Oct	12-Oct	13-Oct	14-Oct	15-Oct	16-Oct	11	12	13	14	15	16				
Jinghong		0.0				536.00	536.04										X	X	X	X	X
Chiang Saen		0.0	357.110	12.80	11.50	2.23	2.24	2.61	2.64	2.66	2.60	2.52			↑						
Luang Prabang		8.9	267.195	18.00	17.50	9.23	9.21	9.25	9.30	9.70	9.75	9.80					↑				
Chiang Khan		0.5	194.118	16.00	14.50	6.47	6.46	6.57	6.73	6.85	7.20	7.25			↑	↑	↑	↑			
Vientiane		3.2	158.040	12.50	11.50	3.79	3.76	3.88	4.05	4.25	4.40	4.80			↑	↑	↑	↑	↑		
Nongkhai		5.7	153.648	12.20	11.40	3.48	3.48	3.60	3.77	4.00	4.17	4.58			↑	↑	↑	↑	↑		
Paksane		4.7	142.125	14.50	13.50	4.28	4.21	4.25	4.37	4.52	4.72	4.85					↑	↑	↑	↑	
Nakhon Phanom		28.4	130.961	12.00	11.50	3.31	3.35	3.57	3.63	3.74	3.87	4.05			↑			↑	↑	↑	
Thakhek		93.1	129.629	14.00	13.00	4.64	4.62	5.05	5.14	5.28	5.43	5.63			↑			↑	↑	↑	
Mukdahan		28.5	124.219	12.50	12.00	3.59	3.62	3.77	4.19	4.27	4.35	4.45			↑	↑					↑
Savannakhet		30.0	125.410	13.00	12.00	2.09	2.09	2.24	2.63	2.70	2.78	2.87			↑	↑					
Khong Chiam		0.0	89.030	14.50	13.50	7.18	7.06	7.15	7.36	7.85	8.00	8.15			↓			↑	↑	↑	↑
Pakse		0.0	86.490	12.00	11.00	5.72	5.70	5.76	5.94	6.37	6.49	6.60			↑	↑	↑	↑	↑	↑	
Stung Treng		3.5	36.790	12.00	10.70	6.46	6.65	6.67	6.71	6.83	7.20	7.30			↑				↑	↑	
Kratie		nr	-0.101	23.00	22.00	14.53	15.25	15.51	15.56	15.62	15.77	16.15			↑	↑	↑	↑	↑	↑	
Kompong Cham		nr	-0.930	16.20	15.20	8.92	9.48	9.98	10.20	10.25	10.30	10.44			↑	↑	↑	↑	↑	↑	
Phnom Penh (Bassac)		10.0	-1.020	12.00	10.50	6.38	6.56	6.78	6.86	6.88	6.90	6.96			↑	↑	↑				↑
Phnom Penh Port		-	0.070	11.00	9.50	5.40	5.58	5.80	5.88	5.90	5.92	5.98			↑	↑	↑				↑
Koh Khel (Bassac)		0.1	-1.000	8.40	7.90	5.76	5.88	6.07	6.13	6.15	6.17	6.21			↑	↑	↑				↑
Neak Luong		nr	-0.330	8.00	7.50	4.62	4.75	4.93	5.05	5.13	5.14	5.16			↑	↑		↑			
Prek Kdam		nr	0.080	10.00	9.50	5.65	5.76	5.92	5.99	6.02	6.04	6.05			↑	↑	↑	↑			
Tan Chau		3.0	0.000	4.50	3.50	2.03	2.01	2.00	2.02	2.04	2.07	2.07								↑	
Chau Doc		nr	0.000	4.00	3.00	1.80	1.80	1.77	1.78	1.79	1.82	1.80				↓				↑	

### REMARKS:

nr: not available.

nr: no rain.

LEGEND	
rising water level	↑
stable water level	→
falling water level	↓
alarm stage	Yellow background
alarm situation	Orange background
flood stage	Red background
no data available	X

**Note:** Stable water level is defined as a daily change of less than 10cm from Chiang Saen to Savannakhet; less than 5cm at Pakse and Stung Treng; and no more than 3cm cm from Kratie downstream.  
**Flood stage** is when the flood level exceeds. A flood level is determined by each Member Country.  
**Alarm stage** is when the water level ranges between alarm and flood levels.  
**Alarm situation** is when the water level is forecasted to reach the flood stage within the next three days.

River Flood Forecaster

*K. Sothea*

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/bulletin_wet.php); <http://ffw.mrcmekong.org/reportflood.php>

## 7 Summary and Possible Implications

### 7.1 Rainfall and its forecast

Rain was observed from Chiang Saen in Thailand to Pakse in Lao PDR during October 5-11, including the lower part in Cambodia and Viet Nam, varying 3.20 mm to 135.60 mm, and considered high at the lower part compared with last week.

Based on the forecasted satellite data, rainfall is forecasted for some areas of the LMB with the value range from 30 mm to 200 mm for the next seven days. The forecasting model using GFS data, moreover, shows that significant rainfall (<100 mm) is likely to take place in the Mekong region from 12 to 18 October 2021.

### 7.2 Water level and its forecast

According to MRC's observed water level data, the outflows at Jinghong hydrological station showed water level changes over the monitoring period from 5 to 11 October 2021. The water levels showed **significant increase from 535.27 m on 8 Oct to 536.03 on 11 Oct 2021 (recorded on 7:00 am) and stayed about 0.21 m higher than its long-term-average (LTA) value**. The outflow was up from 832 m<sup>3</sup>/s on 8 Oct to 1354 m<sup>3</sup>/s on 11 Oct 2021. From 8 to 11 October 2021, water level at this station rose about 0.77 m and was about 0.11 m higher than its LTA value.

Amid the significantly increased outflow from Jinghong upstream, water levels of monitoring stations at Chiang Saen in Thailand still decreased from 5 to 11 October 2021. Moreover, from Chiang Khan in Thailand to Vientiane in Lao PDR, water levels decreased about 0.30 m during October 5-11 due to less rainfall in the area and influence of dam operation. Water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR were also decreasing. Water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia, however, were significantly increasing, due to high rainfall and following the same trend of the upstream flow (at Pakse and 3S area in Viet Nam).

Over the next five days, the water levels from Khong Chiam to Pakse and from Stung Treng to the lower part at key stations in Cambodia are expected to go up between 0.30 m and 1.00 m.

The flow volume of the Tonle Sap Lake is lower than its LTA. From next week, the flow is expected to slightly increase due to the rainfall forecasted in the inflow catchments of the Tonle Sap Lake.

From Stung Treng to Kampong Cham, the water levels will continue staying lower than their LTA. The water levels – at Neak Luong on the Mekong River, from Prek Kdam to Phnom Penh Port on the Tonle Sap, and from Chaktomuk to Koh Khel on the Bassac – are forecasted to remain lower than their LTA.

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

Since the fourth week of October 2021, water levels across most monitoring stations in the LMB have significantly dropped to the level lower than their LTA (from upper to lower stretches within the LMB). For a more complete preliminary analysis of the hydrological conditions in the LMB over July–December 2020 and November 2020 to May 2021 see this [Situation Report](#).

The contribution to the Mekong River's flow from the UMB 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 amount of rainfall for the coming week as mentioned earlier in [section 6.1](#), the major flash floods are expected in the LMB during next week. And local heavy rain in a short period of time is possible with unexpected short flash floods.

### **7.4 Drought condition and its forecast**

Soil moisture conditions were anomaly dry in some areas of the upper part of the LMB. However, the combined drought indicator shows that the LMB did not face any significant drought during the monitoring week from October 2 to 8. The entire LMB region received from average to above average rainfall.

For the upcoming three-month forecast, the LMB is likely to receive above average rainfall in October mainly in the central and southern parts of the region. Like 2020, the forecast shows that October is likely the wettest month of the year. November is forecasted to receive from average to above average rainfall throughout the LMB; the wetter part is likely to take place in the south. Lastly, in December the forecast shows some rain which likely take place in the south of the region.



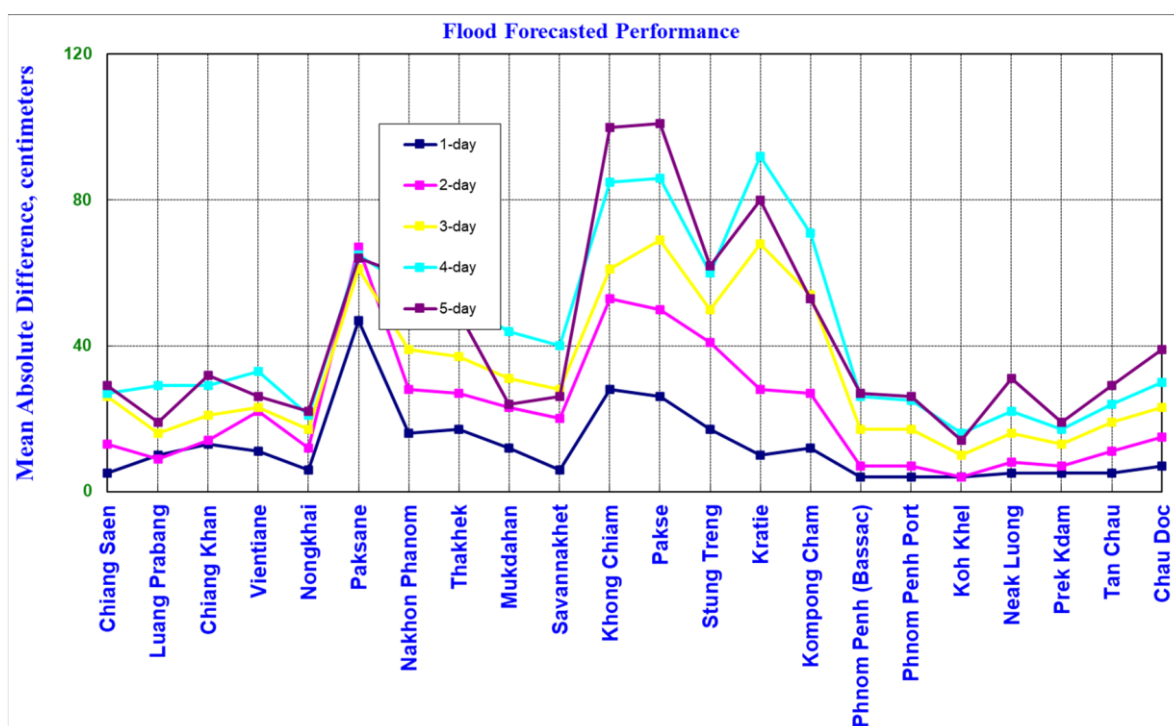
## Annex 1: Performance of the weekly flood forecasting

### 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 5 to 11 October 2021.

The forecasting values from 5 to 11 October 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 Luang Prabang to Chiang Khan due to the effect of heavy rainfall and dams operation in this area during the report period.



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

- Missing rainfall in Cambodia (DOM) data and data input are not sufficient to be used for inputting into the flood forecasting model system.
- Luang Prabang to Chiang Khan have been effluent by hydropower operations upstream, tributaries inflows.
- The influence of heavy rainfall caused by storms and hydropower operations from upstream, tributaries inflows and the lower part of the Mekong floodplain, including

the 3S (Stung Treng and Kratie).

- Khong Chaim, Pakse, Stung Treng and Kratie stations have been affected by heavy rainfall from Viet Nam and some hydropower operations on Sekong, Sesan and Sre Pok (water retention and release). Rainfall always accumulates at this spot, which could be causing rapidly high-water levels.
- Fluctuations of the water levels at Tan Chau and Chau Doc stations were due to daily tidal effects of the sea in the Mekong Delta.
- Satellite rainfall data were 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 5 to 11, October 2021.

**Table B1:** The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 5 to 11 October, 2021 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	5	10	13	11	6	<u>47</u>	16	17	12	6	<u>28</u>	<u>26</u>	17	10	12	4	4	4	5	5	5	7
2-day	13	9	14	<u>22</u>	12	67	<u>28</u>	<u>27</u>	<u>23</u>	<u>20</u>	53	<u>50</u>	<u>41</u>	<u>28</u>	<u>27</u>	7	7	4	8	7	11	15
3-day	<u>26</u>	16	<u>21</u>	<u>23</u>	17	61	<u>39</u>	<u>37</u>	<u>31</u>	<u>28</u>	61	69	<u>50</u>	68	54	17	17	10	16	13	19	<u>23</u>
4-day	<u>27</u>	<u>29</u>	<u>29</u>	<u>33</u>	<u>21</u>	65	56	52	<u>44</u>	<u>40</u>	85	86	60	92	71	<u>26</u>	<u>25</u>	16	<u>22</u>	17	<u>24</u>	<u>30</u>
5-day	<u>29</u>	19	<u>32</u>	<u>26</u>	<u>22</u>	64	59	<u>49</u>	<u>24</u>	<u>26</u>	100	101	62	80	53	<u>27</u>	<u>26</u>	14	<u>31</u>	19	<u>29</u>	<u>39</u>

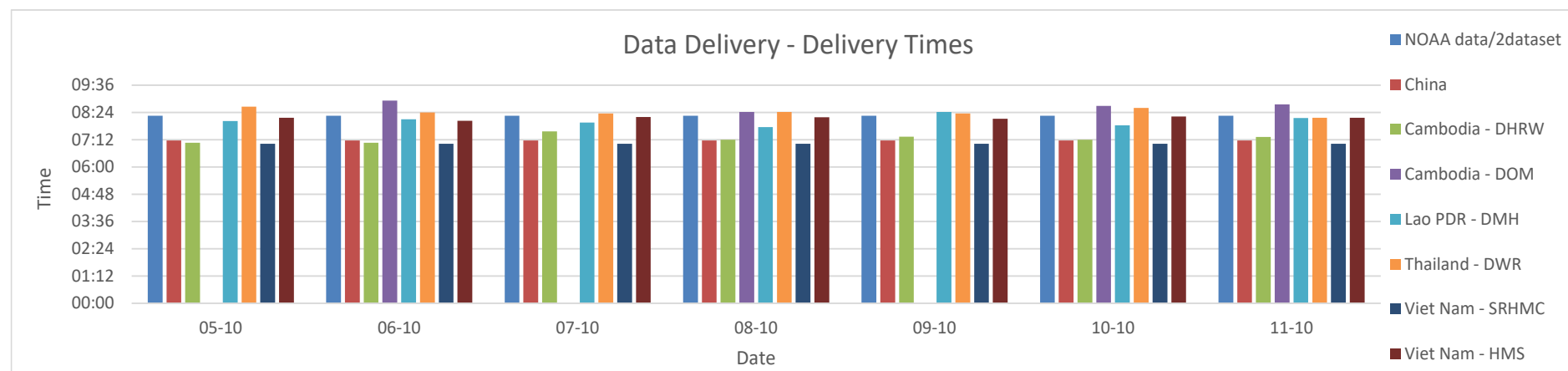
**Table B2:** The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 5 to 11 October, 2021 in %

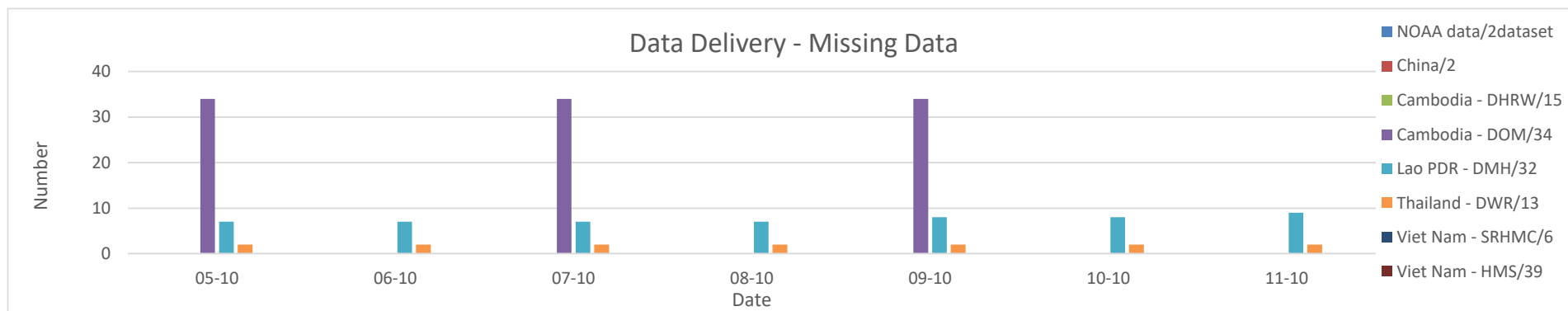
Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc	Average
1-day	57.1	71.4	57.1	57.1	71.4	57.1	85.7	71.4	57.1	85.7	<u>42.9</u>	57.1	71.4	85.7	71.4	57.1	57.1	71.4	57.1	<u>42.9</u>	57.1	<u>42.9</u>	63.0
2-day	<u>50.0</u>	<u>50.0</u>	66.7	<u>33.3</u>	<u>50.0</u>	<u>50.0</u>	66.7	66.7	66.7	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	66.7	<u>33.3</u>	<u>50.0</u>	<u>50.0</u>	66.7	83.3	<u>50.0</u>	66.7	66.7	56.1
3-day	60.0	60.0	60.0	<u>40.0</u>	60.0	60.0	60.0	60.0	80.0	<u>40.0</u>	<u>40.0</u>	<u>40.0</u>	60.0	60.0	60.0	<u>40.0</u>	<u>40.0</u>	60.0	<u>40.0</u>	60.0	60.0	60.0	54.5
4-day	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>50.0</u>	<u>50.0</u>	<u>25.0</u>	<u>50.0</u>	<u>50.0</u>	75.0	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	52.3
5-day	66.7	66.7	<u>33.3</u>	66.7	66.7	66.7	<u>33.3</u>	<u>33.3</u>	66.7	66.7	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	66.7	66.7	66.7	66.7	66.7	66.7	<u>33.3</u>	66.7	66.7	56.1

**Table B3: Overview of performance indicators for the past 7 days from 5 to 11 October 2021**

	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)							
2021	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
week	10:21	00:00	-	-	08:15	07:10	07:15	08:41	08:01	08:25	07:01	08:09	0	0	0	102	53	14	0	0
month	10:30	00:00	-	-	08:15	07:10	07:21	08:36	08:26	08:14	07:17	08:09	0	0	14	272	334	48	7	38

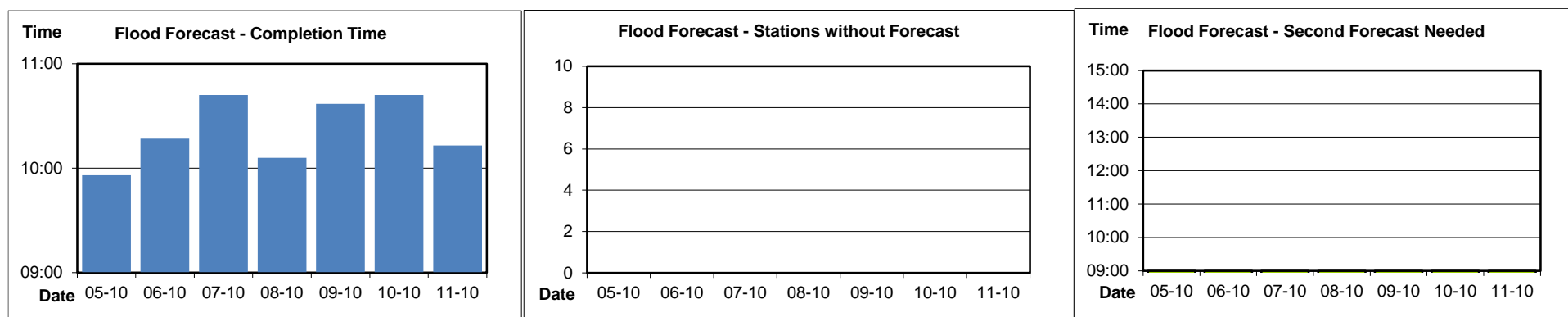
**Fig. B4: Data delivery times for the past 7 days from 5 to 11 October 2021**





**Fig. B5: Missing data for the past 7 days from 5 to 11 October 2021**

**Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 5 to 11 October 2021**





## Mekong River Commission Secretariat

P. O. Box 6101, 184 Fa Ngoum Road, Unit 18 Ban Sithane Neua, Sikhottabong District, Vientiane 01000, Lao PDR  
Tel: +856 21 263 263. Fax: +856 21 263 264 [www.mrcmekong.org](http://www.mrcmekong.org)

© Mekong River Commission 2021