Mekong River Commission

Weekly Dry Season Situation Report in the Lower Mekong River Basin

10-16 January 2023

Prepared by
The Regional Flood and Drought Management Centre
17 January 2023

The MRC is funded by contributions from its Member Countries and Development Partners, including Australia, Belgium, the European Union, Finland, France, Germany, Japan, Luxembourg, the Netherlands, Sweden, Switzerland, the United States and the World Bank.

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Title: Weekly wet season situation report in the Lower Mekong River Basin for 10-16 January 2023.

ISSN: 1728-3248

Keywords: River monitoring/drought/weather/the Mekong/the Tonle Sap Lake

For bibliographic purposes, this volume may be cited as:
Mekong River Commission. (2020). *Weekly dry season situation report in the Lower Mekong River Basin for 10-16 January 2023*. Vientiane: MRC Secretariat.

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Key Messages

Key messages for this weekly report are presented below.

Rainfall and its forecast

- During January 10-16, rainfall was observed along the Mekong River, from Nakhon Phanom in Thailand to Tan Chau and Chau Doc in Viet Nam.
- There will be strong winds and cold temperatures for the next 7 days over the Mekong region from 17 to 24 January 2023.

Water level and its forecast

- The MRC's observed water level (WL) at Jinghong showed a decreased value of about 0.17 m from 536.13 m to 535.96 m between 10 and 16 Jan 2023. The outflow decreased from 1,410.00 m^3/s to 1,290.00 m^3/s between 10 and 16 Jan 2023.
- Along with the decreased outflow at Jinghong upstream, water level of monitoring station at Chiang Saen in Thailand was also down about 0.21 m during the reporting period and stayed 0.14 m above its LTA, considered normal. WLs at the monitoring stations at Chiang Khan in Thailand decreased about 0.05 m, staying 0.54 m below its LTA value, while at Vientiane in Lao PDR it decreased about 0.16 m and stayed about 0.04 m below its LTA value. The current WL from Nong Khai in Thailand was about 1.04 m lower than its LTA value, while at Paksane in Lao PDR it was about 0.49 m lower than its LTA level, which considered low water levels. WLs from Thailand's Nakhon Phanom to Pakse increased between 0.08 m and 0.47 m, but still considered low levels. Water levels from the stretches of the river from Stung Treng to Kratie in Cambodia, however, were increasing due to contributed rainfall from the upstream part (at Pakse and 3S area in Viet Nam) and stayed higher than their LTA value. WL at Kompong Cham is about 0.72 m lower than its LTA value.
- The water volume of the Tonle Sap Lake was still slightly higher than its LTA during the same period from 10 to 16 Jan 2023, considered normal.
- The current water levels for most of the stations are below their LTA value, except at Chiang Saen, Luang Prabang, Pakse, Stung Treng and Kratie. WLs at the 2 tidal stations at Tan Chau and Chau Doc fluctuated between their minimum and LTA values, during this monitoring period.
- Over the next seven days, the water levels across most monitoring stations are expected to go down and remain lower than their long-term average value in most stations.

Drought condition and its forecast

- During Jan 9-15, the LMB was at normal condition in the upper and middle parts but at moderate dry in some areas of Vientiane, Borikhamxay, Khammuane, Nong Khai, and Nakhon Phanom in the north and Surin, Si Saket, Ubon Ratchathani, and Otdar Meanchey in the lower part. Those specific drought hotspots are considered normal as they are caused by dry soil moisture phenomenon during dry season.

- For the coming three months, no drought is forecasted over the LMB. In Jan, Feb, and Mar 2023 the LMB will be likely wet in the southern part and normal in the upper and middle parts.

1 Introduction

This Weekly Dry Season Situation Report presents a preliminary analysis of the weekly hydrological situation in the Lower Mekong River Basin (LMB) for **10-16 January 2023**. 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. Water level indicated in this report refers 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
- 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 (December, January and February) and the weather maps issued by the Thai Meteorological Department (TMD) were used to verify weather conditions in the LMB.

Since the end of December 2022, the cold weather has appeared because the influentially high-pressure air mass areas prevail over the LMB, with gradually decreasing water levels in both mainstream and tributaries. The data from the TMD predict that low pressure of air-mass will bring cool weather condition in the upper part of Thailand, Lao PDR and Viet Nam. As a result, the temperature in the upper part of Thailand will drop sharply as commonly chilly weather, specifically at the upper portion of the northern and north-eastern parts together with very cold weather in mountainous areas (within the Mekong region).

Figure 1 presents the weather map on 10 Jan 2023, indicating that a low-pressure cell was active in the South-Sea of Viet Nam but no impact in the LMB. Generally, the Mekong region is dominated by north-easterly winter monsoon winds. In the meantime, a low-pressure cell was active in the Gulf of Thailand. Under this weather situation, there was moderate to very heavy rain occurred over the whole of Cambodia, and over central to southern Viet Nam.

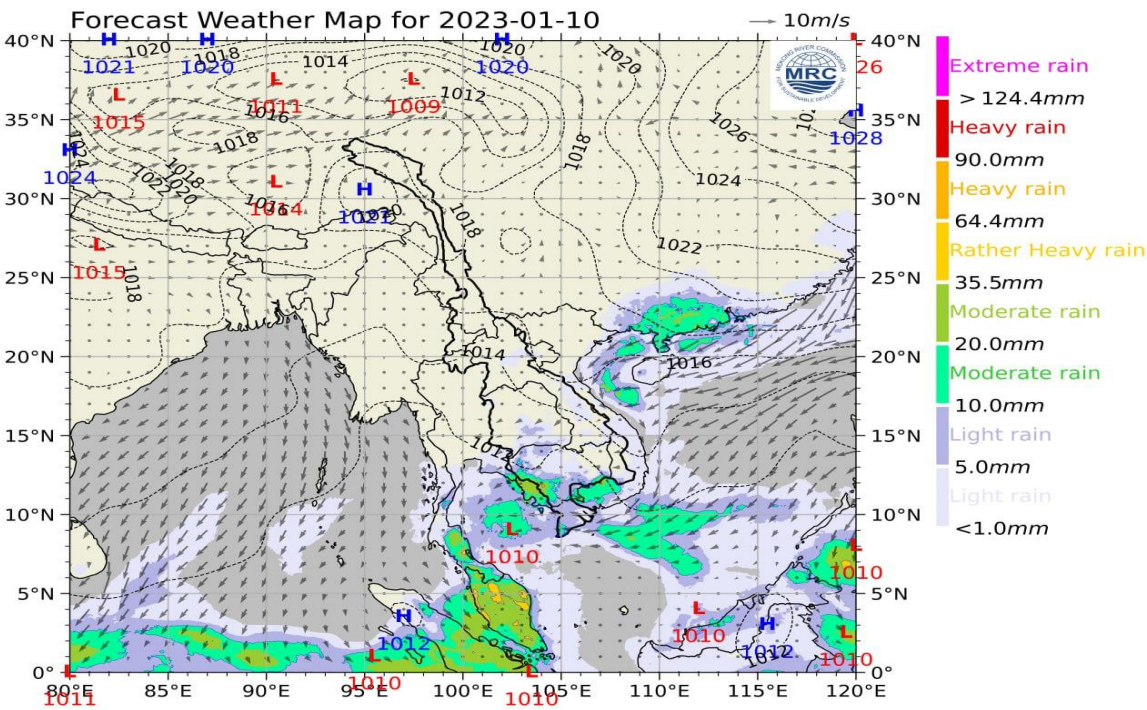


Figure 1: Summary of weather conditions over the LMB.

According to the ASEAN Specialised Meteorological Centre (ASMC), a highest probability of warm condition is predicted over of the lower part of the Mekong region covering Lao PDR and Thailand from 9 to 22 January 2023, during the 2nd and 3rd weeks of January 2023. **Figure 2** shows the outlook of weather condition from 9 to 23 January 2023 in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

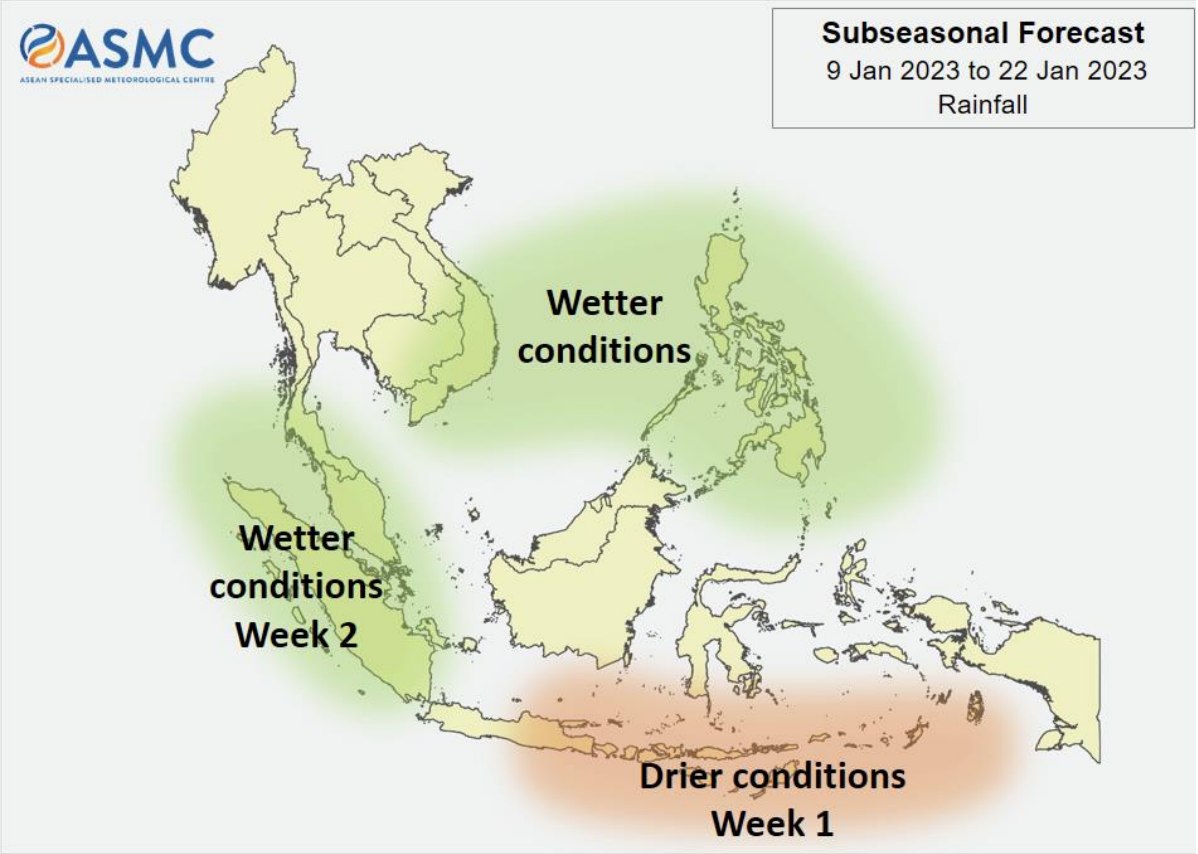


Figure 2: Outlook of wet and dry conditions over the Asian countries by ASMC.

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

There was tracking storm covering the LMB during 10-16 January 2023, showing no low-pressure line over the LMB. No movement of storm was detected over Viet Nam, as displayed in Figure 3.

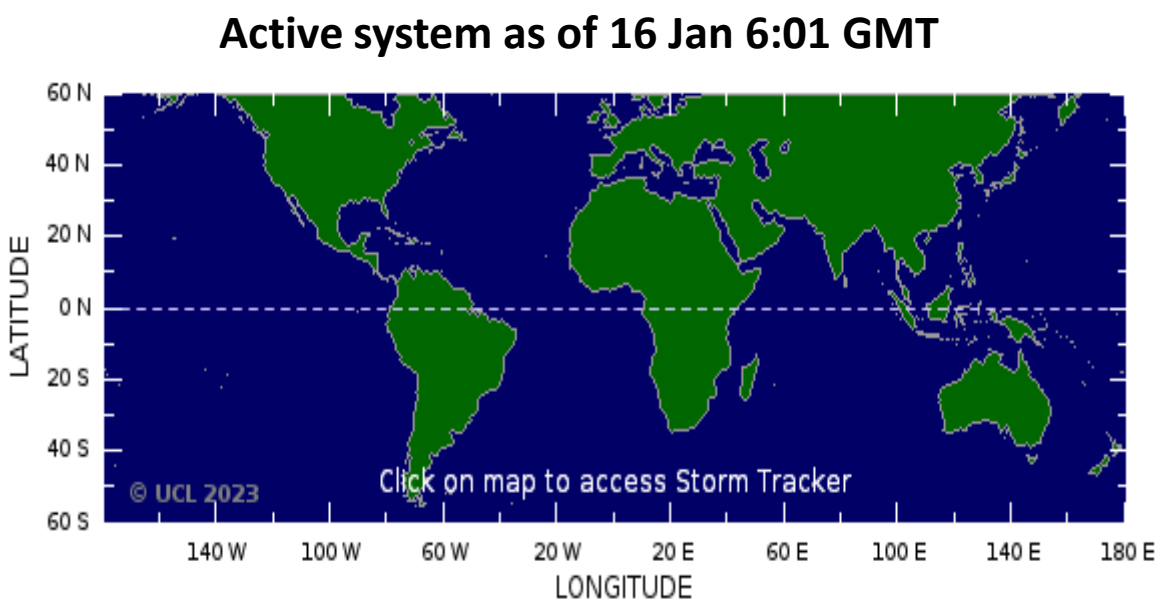


Figure 3: No tropical storm risk observed on 16 January 2023.

Rainfall patterns over the LMB

This week from 10 to 16 January 2023, rainfall was observed along the Mekong River from Nakhon Phanom in Thailand to Tan Chau and Chau Doc in Viet Nam in the Lower Mekong Basin (LMB). The highest rainfall was observed between Kompong Cham and Prek Kdam in Cambodia which reached up to 78.60 mm. The total rainfall of this week report in the Mekong region, compared with last week and its long-term-average (LTA) is showed in Figure 4. The total rainfall of this week was considered low in the LMB.

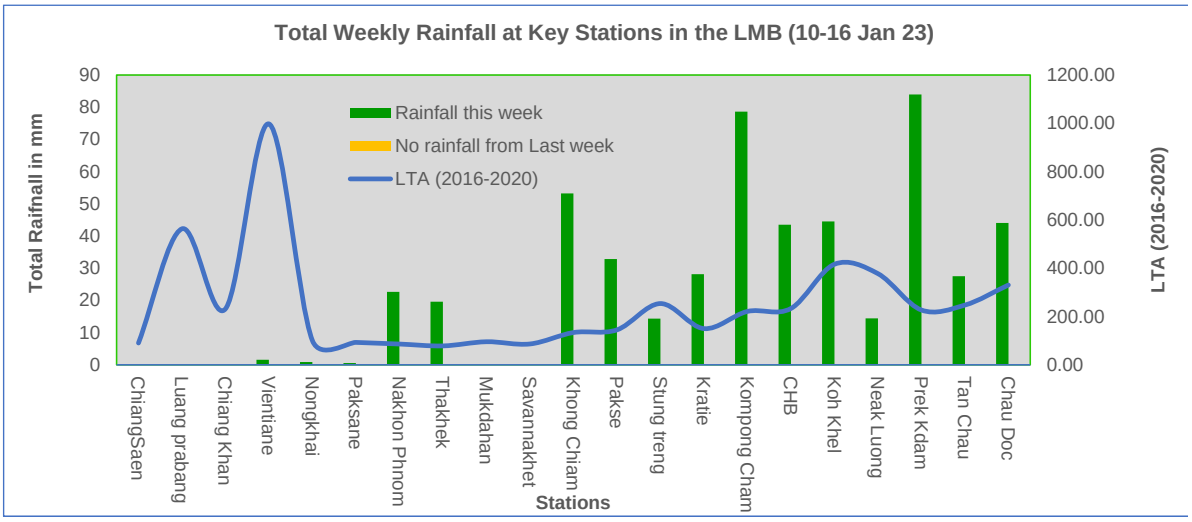


Figure 4: Weekly total rainfall at key stations in the LMB.

To verify area rainfall distribution, Figure 5 shows a map of the weekly accumulated rainfall based on the observed data provided by the MRC Member Countries – Cambodia, Lao PDR, Thailand, and Viet Nam – from 10 to 16 January 2023.

Absence of rain this week is an indication of the end of the rainy season in the LMB.

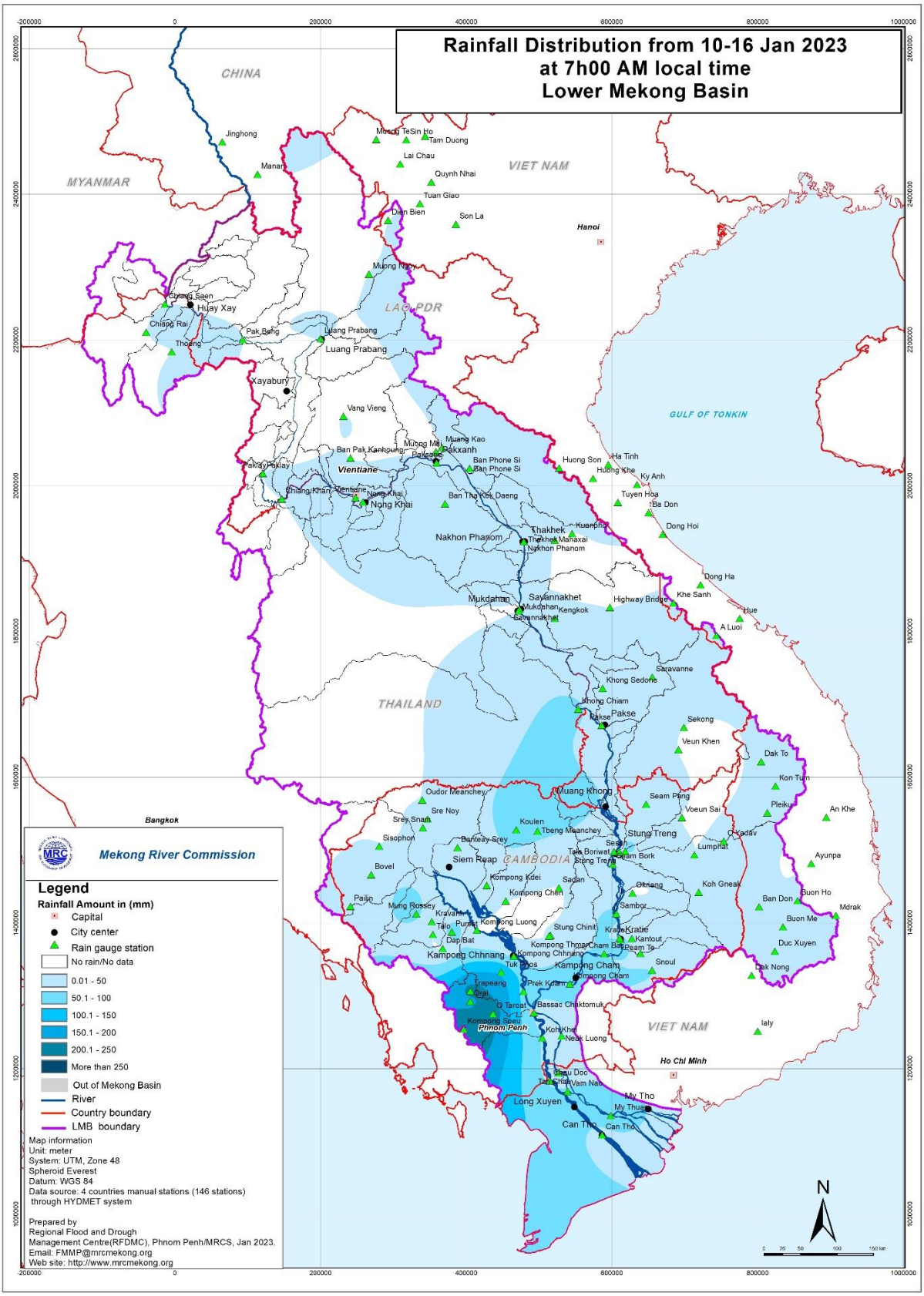


Figure 5: Weekly rainfall distribution over the LMB.

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. The weekly water levels and rainfall at each key station are summarised in **Annex A**.

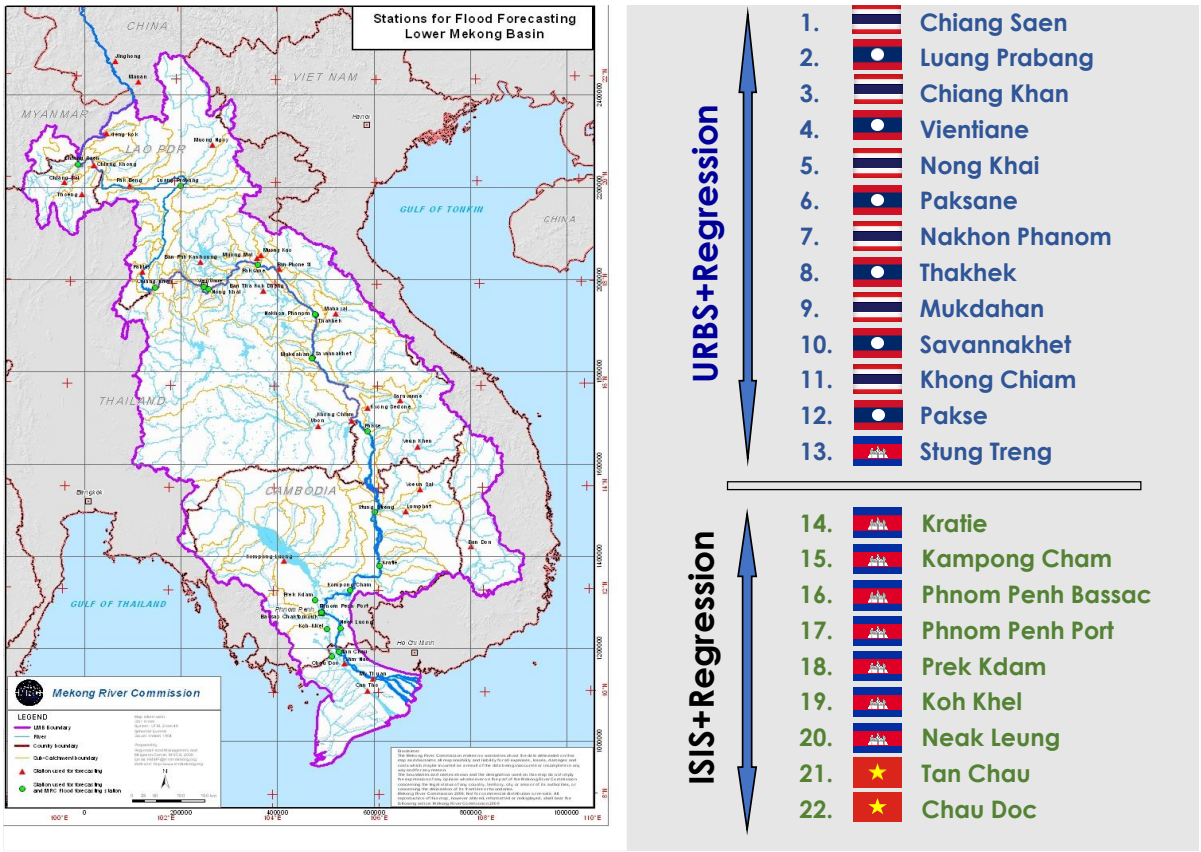


Figure 6: Key stations and model application for River Monitoring and Flood Forecasting.

The MRC's observed water level (WL) at Jinghong showed a decreased value about 0.17 m from 536.13 m to 535.96 m between 10 and 16 Jan 2023 (recorded on 7:00 am). The outflow decreased from 1,410.00 m^3/s to 1,290.00 m^3/s between 10 and 16 Jan 2023.

Figure 7 below presents water level that decreased at the Jinghong hydrological station[1], indicating the trend of fluctuating water level up to 16 January 2023.

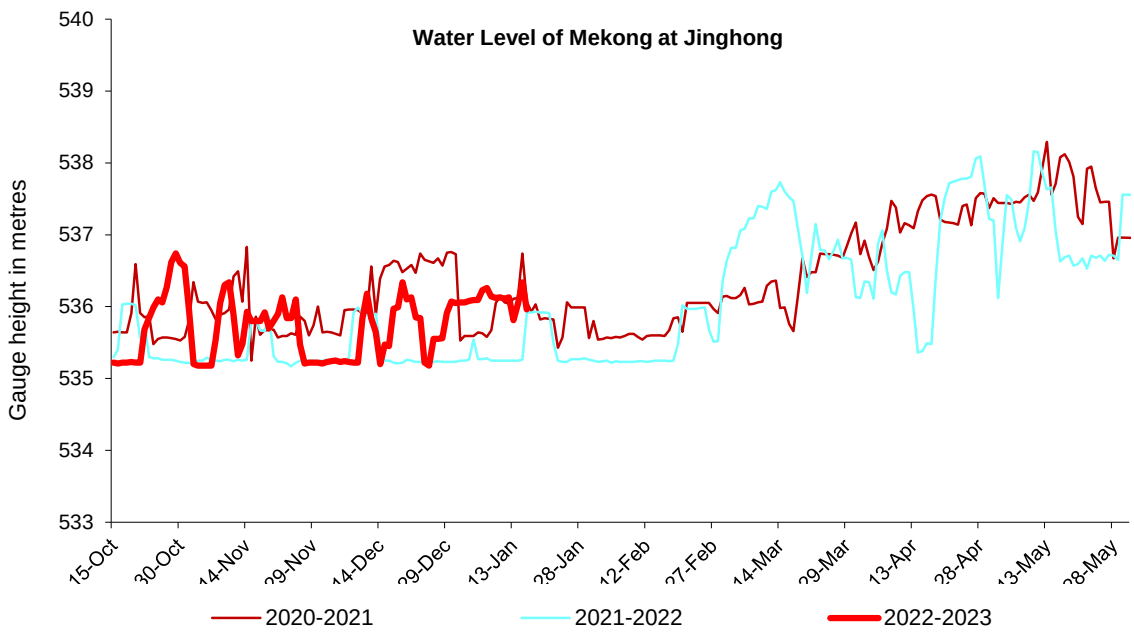


Figure 7. Water level at the Jinghong hydrological station during to 16 January 2023.

Along with the decreased outflow from Jinghong upstream, water level of monitoring station at Chiang Saen in Thailand decreased 0.21 m from 10 to 16 Jan 2023 and stayed about 0.14 m higher than its long-term average (LTA), which considered normal. WLs at the monitoring station at Chiang Khan in Thailand decreased 0.05 m and stayed 0.53 m lower than its LTA, while at Vientiane in Lao PDR it decreased about 0.16 m and stayed about 0.04 m above its LTA value. The current WLs from Nong Khai in Thailand, on the other hand, increased 0.02 m and stayed 1.04 m lower than its LTA, while at Paksane in Lao PDR it stayed stable at 2.95 m and stayed 0.49 m lower than its LTA value. WLs at these stations were considered low. Water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR increased between 0.08 m and 0.47 m. WLs at these stations were staying below their LTA value, except at Khong Chaim and Pakse the WLs were slightly higher than their LTA value. Water levels from the stretches of the river from Stung Treng to Kratie and at Kompong Cham in Cambodia, moreover, were increasing between 0.29 m and 0.45 m due to some contributed rainfall from the upstream part (at Pakse and 3S area in Viet Nam). WLs at Stung Treng and Kratie were staying about 0.29 m and 0.41 m higher than their LTA value, respectively. WL at Kompong Cham was staying about 0.72 m lower than its LTA value.

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 and about 25% in total during the dry season from November to

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

May. The whole inflow of water into the LMB is influenced by rainfall at the Mekong mainstream and its tributaries during the wet season.

Chiang Saen and Luang Prabang

Water level during 10-16 Jan 2023 at Thailand's Chiang Saen decreased from 2.52 m to 2.31 m, staying about 0.14 m higher than its Long-Term-Average (LTA), which is considered normal. When compared to last week, this week's water level is relatively lower.

Water level at the Luang Prabang station in Lao PDR decreased from 8.82 m to 8.77 m, during the reporting period. Compared to last week, the figure shows it is down about 0.05 m. The water level at this station was 2.35 m higher than its LTA value and about 0.56 m lower than its historical maximum value. 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 dry season**.

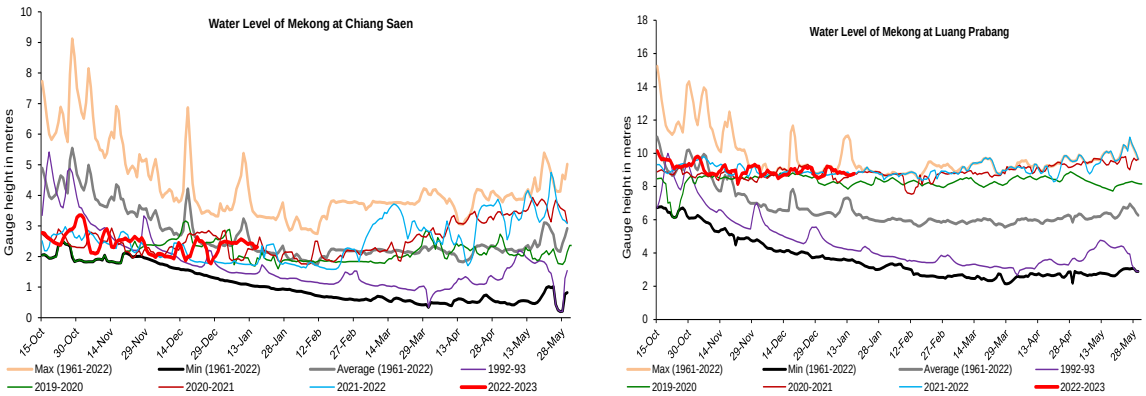


Figure 8. Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.

Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand (downstream of the Xayaburi dam) decreased about 0.05 m, during the reporting week. It showed 0.53 m lower than its LTA. Furthermore, water level downstream at Vientiane in Lao PDR decreased from 2.65 m to 2.49 m and was about 0.04 m higher than its LTA during 10-16 Jan 2023. At Nong Khai station in Thailand, the water level increased 0.02 m during the reporting period. It rose from 1.96 m to 1.98 m and showed 1.04 m lower than its LTA value, **which considered low water level**. At Paksane in Lao PDR, water level was stable at 2.95 m staying about 0.49 m lower than its LTA value. The recently decreased water levels were obviously due to inflow from upstream and water operation from upstream and no rainfalls in the sub-catchment area. The water levels at Vientiane and Paksane are shown in Figure 9 below.

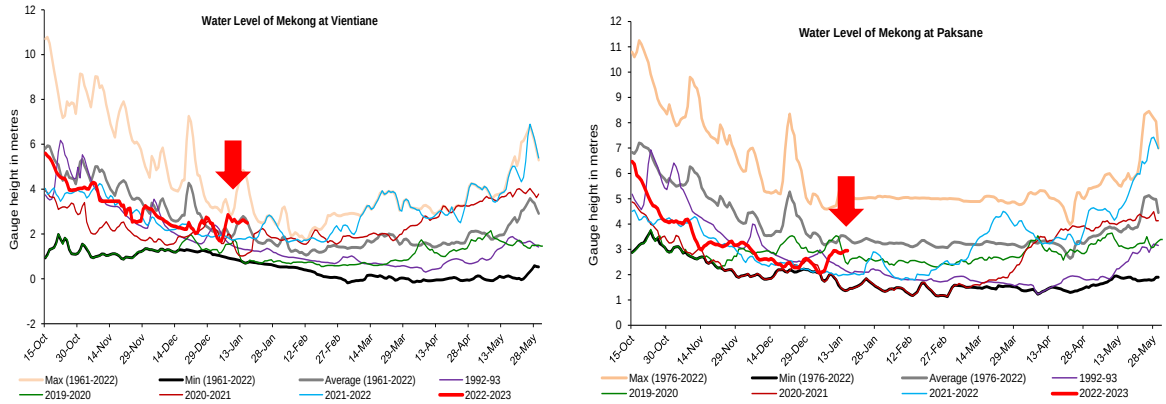


Figure 9. Water levels Vientaine and Paksane in Thailand and Lao PDR.

Nakhon Phanom to Pakse

Similarly, water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR increased between 0.08 m and 0.47 m. The water levels of those stations were lower than their LTA value, except at Khong Chaim and Pakse where the WLs are slightly higher than their LTA value. Figure 10 shows the water levels at Nakhon Phanom and Pakse stations.

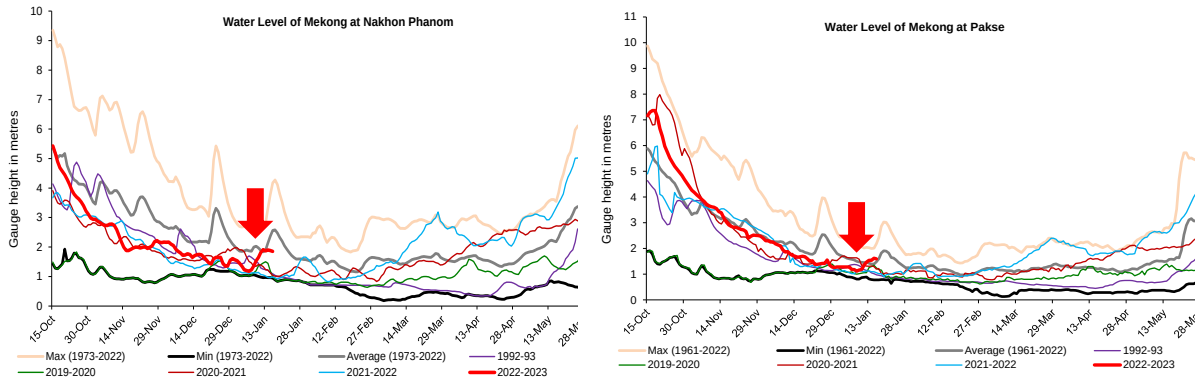


Figure 10: Water levels at Nakhon Phanom and Savannakhet of Thailand and Lao PDR.

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

Due to less rainfall 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 were increasing during 10-16 Jan 2023. This week water level from Stung Treng to Kratie increased about 0.29 m and 0.45 m, respectively. However, water levels at Stung Treng and Kratie are remaining about 0.29 m and 0.41 m higher than their LTA value. Water levels at these two stations were considered normal (as showed in Figure 11).

This week, the water levels at Kompong Cham were down about 0.02 m and stayed 0.72 m below their LTA value, which considered low water levels.

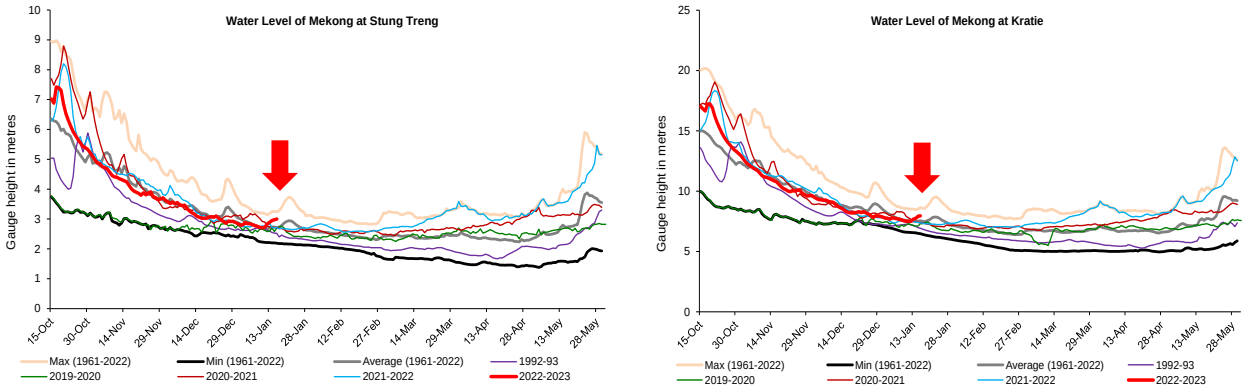


Figure 11: Water levels at Stung Treng and Kratie on the Mekong River.

At Chaktomuk on the Bassac River, due to less contributed flows from upstream catchment, the water level was down by about 0.13 m and stayed 0.72 m lower than its LTA value; while at Koh Khel, water level increased about 0.06 m, staying 0.39 m lower than its LTA value. However, water level at Prek Kdam on the Tonle Sap Lake decreased about 0.07 m and was about 0.43 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 due to absence of rainfall and less 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 low water level**.

Tidal stations at Tan Chau and Chau Doc

Like last week, the water levels from 10 to 16 Jan 2023 at Viet Nam's Tan Chau and Chau Doc were fluctuating between their LTA and minimum values due to daily tidal effects from the sea. The fluctuation levels were between 0.52 m and 1.37 m. In Tan Chau and Chau Doc, the fluctuation of water levels at these stations were lower than their LTA level, which **considered critical**.

The Tonle Sap Flow

At the end of the wet season, when water levels along the Mekong River subside, the outflows of the Tonle Sap Lake return into the Mekong River and then to the Delta. This phenomenon normally takes place at any date in between end of September and October. Based on flow observation at Prek Kdam, the outflow of the Tonle Sap Lake was taking place since 29 October 2022.

Figure 12 shows the seasonal changes of the inflow/reverse flow and the outflow of the TSL at Prek Kdam in comparison with the flows of 2019-2021 and 2022, and their LTA level (1997-2021). Up to January 16 of this reporting period, **it was observed that the main outflow to Tonle Sap Lake decreased due to less rainfall and inflows from upstream**. This decreased outflow of Tonle Sap Lake was most likely caused by less inflows and rainfall from the catchment area. Up to this date, the outflow from the Tonle Sap Lake condition in 2022 is higher than 2019, 2020 and 2021 outflow conditions. The outflow in early 2023 is still slightly

lower than its LTA. For next week, less rainfall is forecasted for the Tonle Sap area; thus, the outflow into the Tonle Sap Lake is likely continuing to decrease from the current level.

Figure 13 shows seasonal changes in monthly flow volumes up to 16 January 2023 for the Lake compared with the volumes in 2019, 2020, 2021 and their LTA, and the fluctuation levels (1997–2021). It shows that up to January 16, **the water volume of the Tonle Sap Lake was staying slightly higher than its LTA (about 5%) and higher than 2019, 2020, 2021 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 normal***.

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.

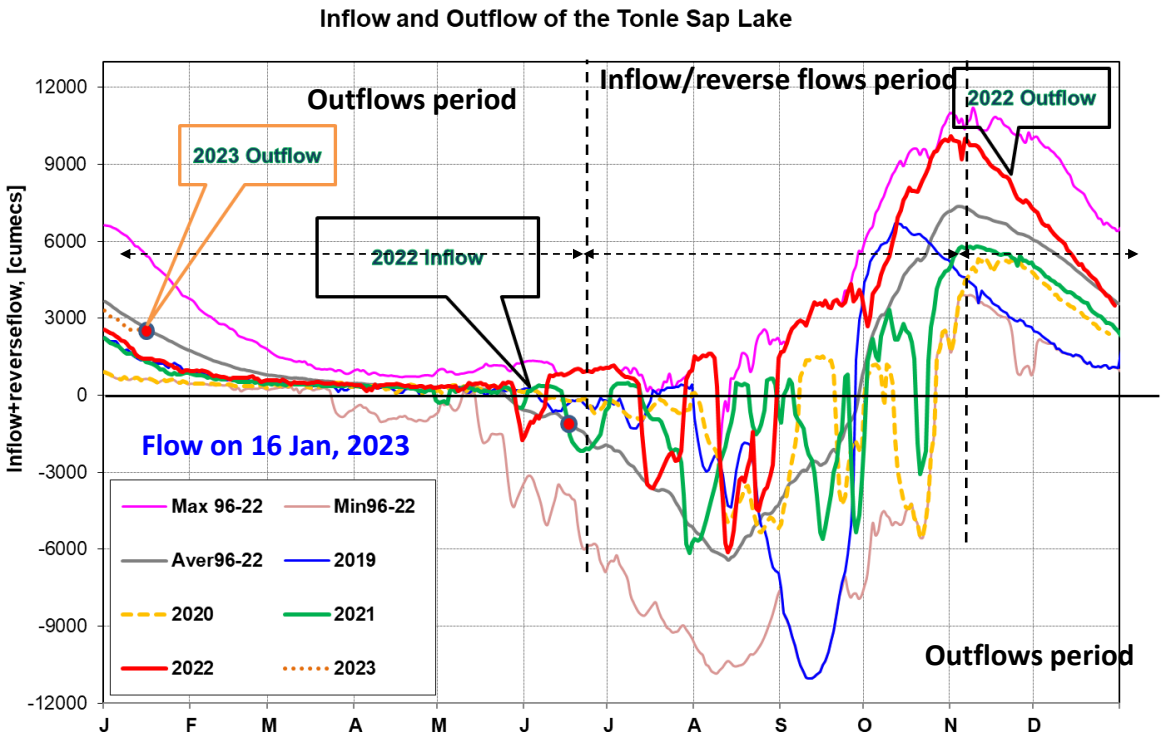


Figure 12: Seasonal change of inflows and outflows of Tonle Sap Lake.

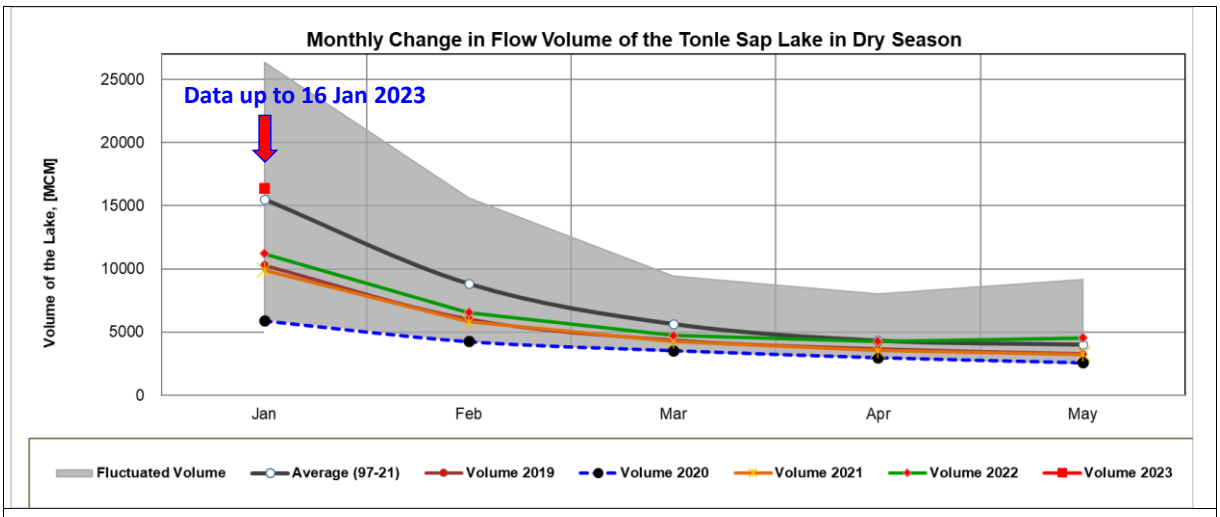


Figure 13. The seasonal change in monthly flow volume of Tonle Sap Lake.

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

Month	LTA (97-22) [MCM]	Max Volume [MCM]	Min Volume [MCM]	Volume 2019 [MCM]	Volume 2020 [MCM]	Volume 2021 [MCM]	Volume 2022 [MCM]	Volume 2023 [MCM]	Volume in 2023 [%], compared with its LTA
Jan	15523.23	26357.53	5906.80	10285.31	5906.80	9923.80	11214.32	16388.57	105.57
Feb	8837.89	15596.22	4198.60	6019.30	4264.19	5832.97	6558.79		
Mar	5654.18	9438.24	3347.07	4354.62	3553.99	4264.88	4736.52		
Apr	4346.65	8009.14	2866.91	3667.47	2992.61	3556.68	4288.31		
May	4030.23	9176.93	2417.81	3266.43	2594.92	3240.78	4556.83		
Jun	5708.30	13635.01	2468.70	3517.06	2641.88	3798.29	7489.04		
Jul	11493.25	28599.56	2925.86	4001.99	2925.86	5346.73	9703.79		
Aug	24666.69	39015.12	4433.46	7622.71	5941.07	10547.80	19554.70		
Sep	39634.03	65632.35	12105.31	24194.19	12105.31	16382.34	32860.34		
Oct	46873.44	73757.23	19705.50	30358.38	20799.13	27318.21	48199.12		
Nov	37823.16	60367.33	18534.61	19112.65	27546.80	28982.93	39452.53		
Dec	25126.11	38888.95	10563.49	10577.29	18251.65	20170.76	25346.65		
	Critical situation, comapred with historical Min values								
	Normal condition, compared with LTA (Long term average)								
	Low volume situation, comapred with LTA values								
Unit: Million Cubic Meter (1 MCM= 0.001 Km^3)					LTA: Long-Term-Average				

4 Flash Flood in the Lower Mekong Basin

During 10-16 January 2023, the LMB was affected by two main weather factors. These include (i) the high-pressure area with cold air mass covered the upper and middle parts and (ii) the active northeast monsoon prevailed over the Gulf of Thailand. These conditions caused generally cool weather and thunderstorms in some areas of the LMB.

According to the MRC-Flash Flood Guidance System (MRC-FFGS) and analysis, flash flood events were not detected during the reporting period over the LMB.

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from 9 to 15 January 2023

Drought monitoring data for 2022 are available from Monday to Sunday every week; thus, the reporting period is normally delayed by one day 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 condition of the LMB from Jan 9 to 15, as shown in Figure 11, was normal in the north and middle part and relatively wet in the south. No meteorological drought was found during the monitoring week.

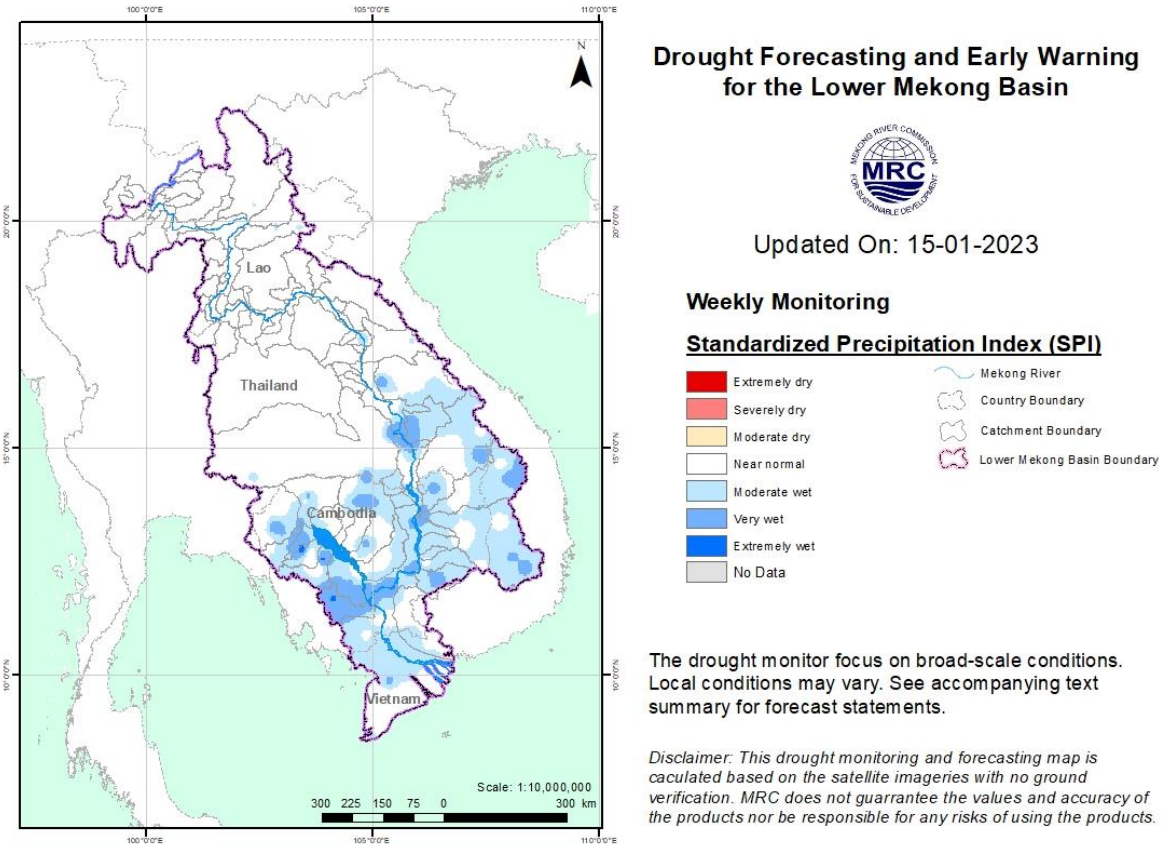


Figure 14: Weekly standardised precipitation index from Jan 9 to 15.

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

With relatively less rainfall in the northern and southern parts of the region, soil moisture condition from Jan 9 to 15, as displayed in Figure 12, were severely dry in some areas in the north and middle part of the LMB. However, this condition is normal during dry season and is slightly different from the condition last week.

Note: The index of soil water fraction presents the current soil water fraction conditions compared with normal month; therefore, it normally shows extremely dry during dry season which is completely different from SPI that is standardized to its specific month of the years. However, this does not mean that the areas are threatened by agricultural drought as generally during transition period of wet and dry seasons and dry season only the irrigated areas are used for agricultural plantation.

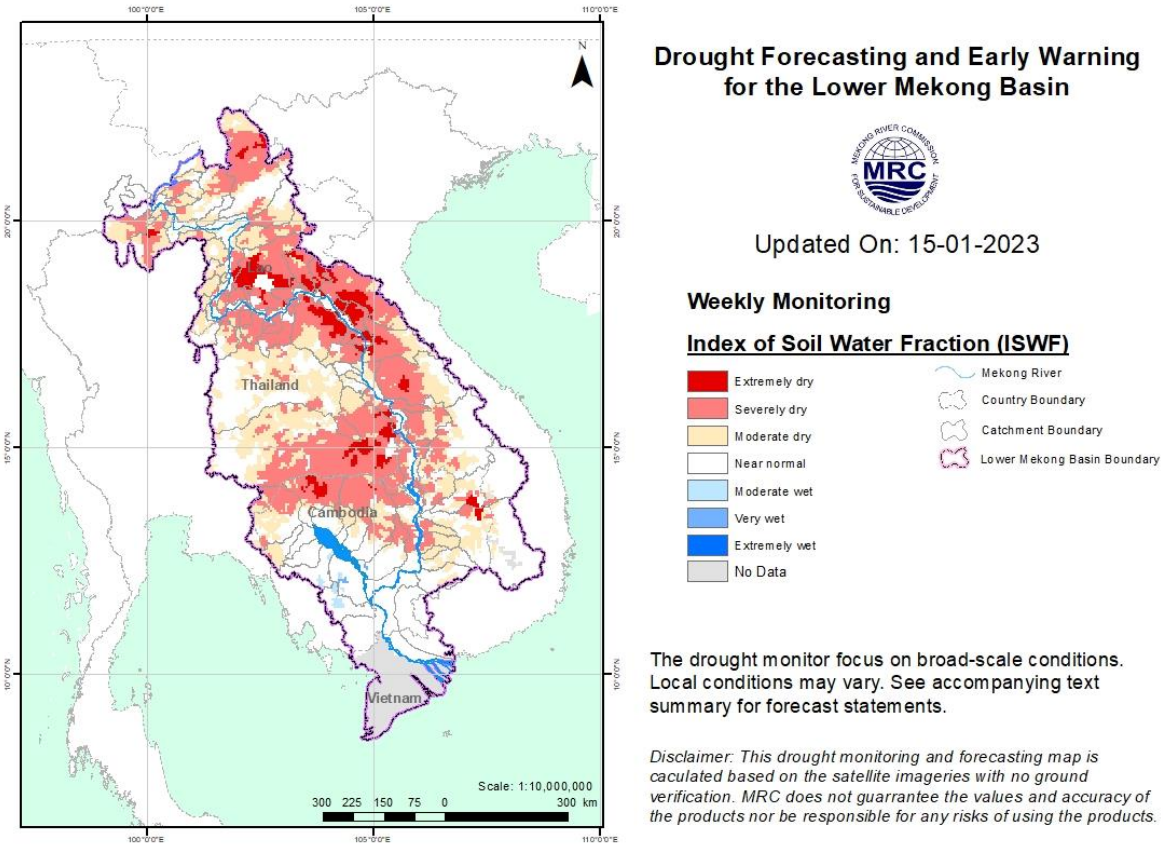


Figure 15: Weekly Index of Soil Water Fraction from Jan 9 to 15.

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

The combined drought indicator, as displayed in Figure 13, reveals that during Jan 9-15 the LMB was at normal condition in the upper and middle parts but at moderate dry in some areas of Vientiane, Borikhamxay, Khammuane, Nong Khai, and Nakhon Phanom in the north and Surin, Si Saket, Ubon Ratchathani, and Otdar Meanchey in the lower part. Those specific drought hotspots are considered normal as they are caused by dry soil moisture phenomenon during dry season.

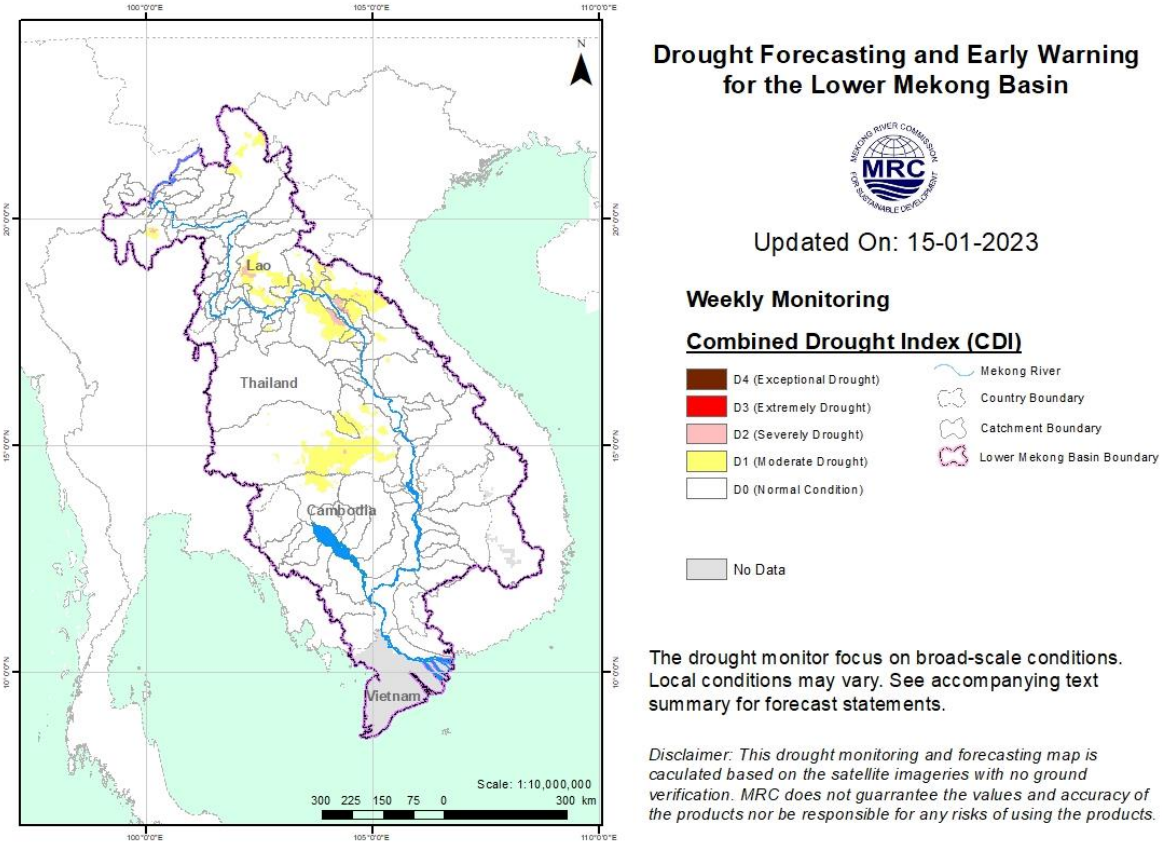


Figure 16: Weekly Combined Drought Index duing Jan 9-15.

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.

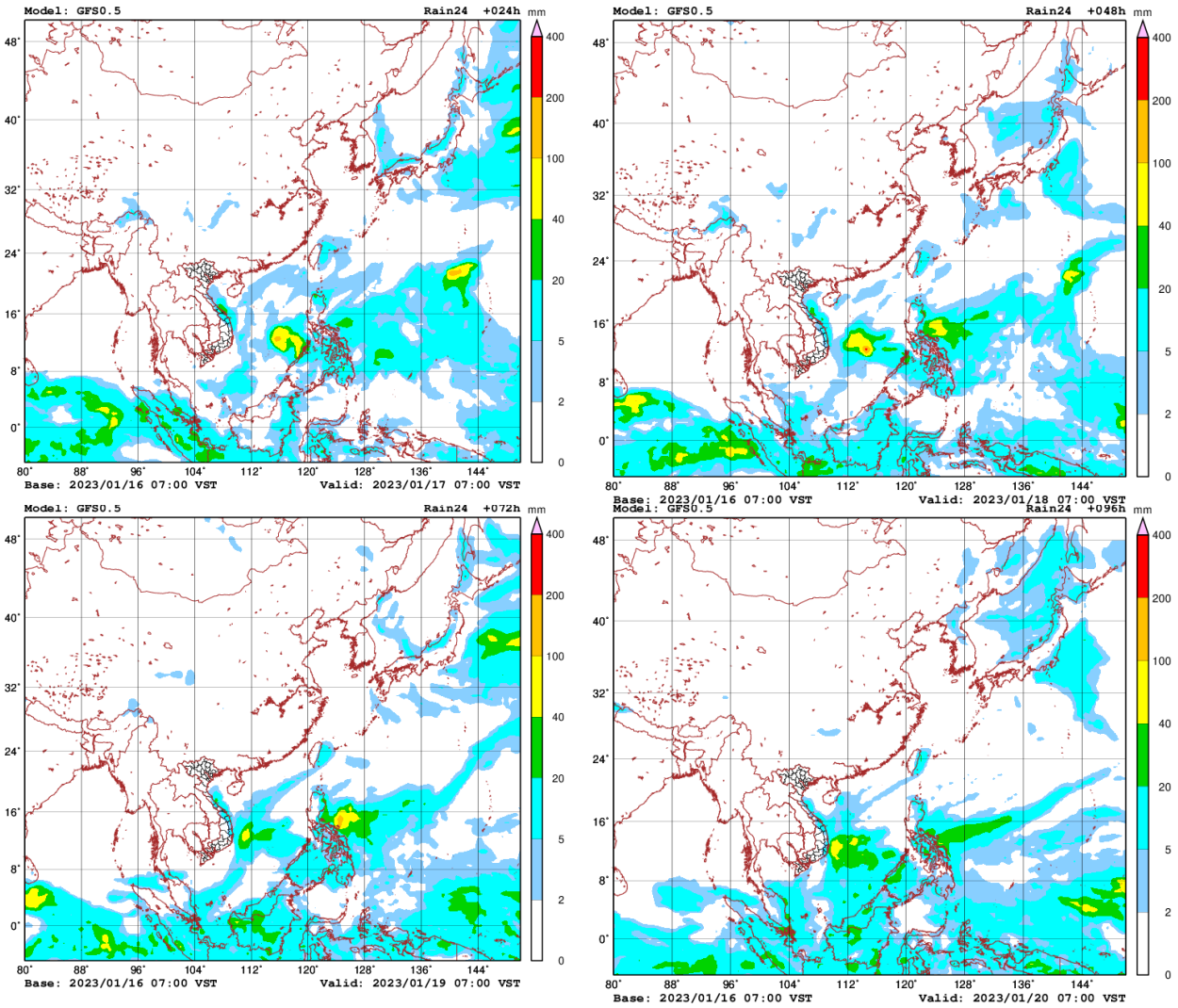
6 Weather and Water Level Forecast and Flash Flood Information

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, two main factors might affect the LMB. They include (i) moderate and high-pressure area from China covers the upper and middle parts and (ii) the on-going prevailing Southwest Monsoon from the Gulf of Thailand to the lower part of the LMB.

During 17-23 January 2023, small rainfall (5-20 mm/24h) may occur in the LMB.

Figure 14 shows accumulated rainfall forecast (24hrs) of the GFS model during 17-23 January 2023.



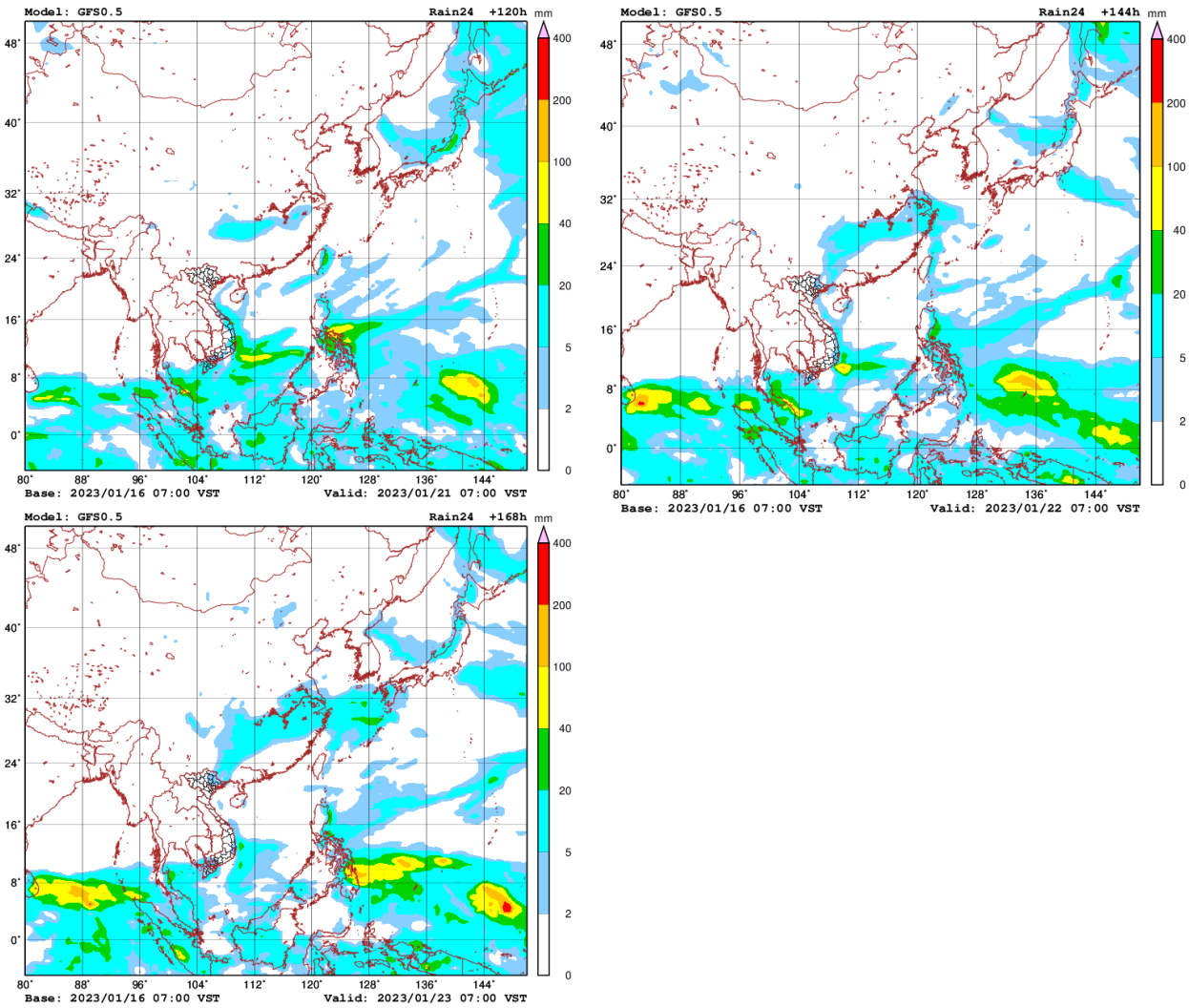


Figure 17: Accumulated rainfall forecast (24 hrs) of model GFS.

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on January 16's weekly river monitoring bulletin, the weekly forecast water level at Chiang Saen in Thailand is expected to slightly decrease from 2.31 m to 2.10 m in the next seven days. The trend of water levels at these stations will continue staying above its LTA.

For Luang Prabang in Lao PDR, the water level is likely decreasing about 0.27 m during the same period. The current water level is about 2.35 m higher than its LTA and about 0.56 m lower than its historical maximum value.

Chiang Khan, Vientiane-Nong Khai and Paksane

Water level at Chiang Khan station in Thailand is forecasted to be down about 0.16 m for the next seven days. At Vientiane in Lao PDR and Nong Khai in Thailand WLs will be down between 0.13 m and 0.20 m in the next seven days. At Paksane in Lao PDR, water level will decrease about 0.05 m due to some effect of inflow from the upper catchments. No rainfalls are

forecasted in the area due to low pressure dominated in the upper sub-catchments. The water levels here will remain lower than their LTA.

Nakhon Phanom to Pakse

Water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR will decrease between 0.02 m and 0.20 m in the next seven days. Water levels at these stations will stay lower than their LTA level. Next week below-average precipitation is forecasted in the area.

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

From Stung Treng to Kratie along the Mekong River in Cambodia, the water levels will likely go down between 0.08 m and 0.15 m over the next seven days. For Kompong Cham, the WL will be down about 0.05 m and stay lower than its LTA. Below average-rainfall is forecasted for the area between Stung Treng and Kompong 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 decrease between 0.02 m and 0.20 m over the next seven 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 in Phnom Penh to Koh Khel as well as from Tonle Sap in Prek Kdam to Phnom Penh Port, including the Tonle Sap Lake. Below-average rainfall 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, water levels will be moving up and down between their LTA and Maximum values following daily tidal effects from the sea.

Table 3 shows the weekly River Monitoring Bulletin issued on January 16. Results of the started weekly river monitoring bulletin are also available at http://ffw.mrcmekong.org/bulletin_wet.php. Tables for weekly updated water levels and rainfall at the Key Stations are presented in **Annex A**.

6.3 Flash Flood Information

Flash flood events are not likely to happen in the LMB next week. However, local heavy rain in a short period of time might still be possible with unexpected short flash floods. During the dry season if extreme weather occurs, the information on flash flood guidance for the next one, three, and six hours is updated 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 in the upcoming months. The MRC's DFEWS adopts an ensemble model called the North America Multi-Model Ensemble (NMME), which averages all scenarios, and downscales the forecasts to the regional level. The Viable Infiltration Capability (VIC) is then used to generate soil moisture and runoff for the whole basin.

Figure 18 below shows the NMME forecasts of rainfall anomaly (mm/day) for Jan, Feb, and Mar 2023 in over the LMB area.

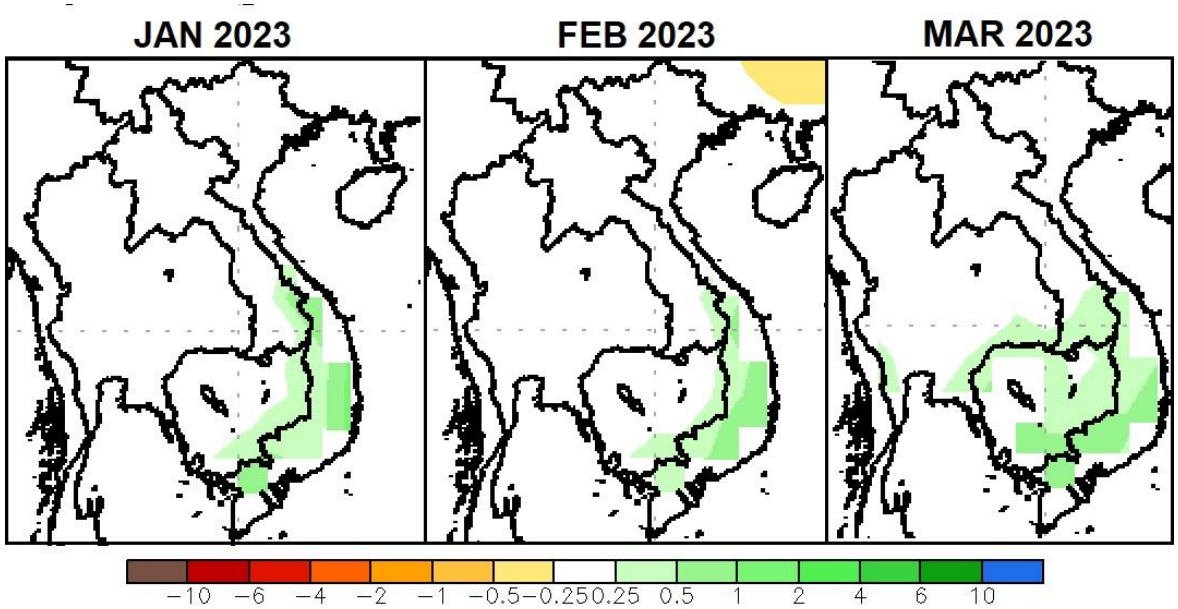


Figure 18. Monthly forecast of NMME for Jan, Feb and Mar 2023.

Figure 18 above shows that in Jan, Feb, and Mar 2023 the LMB will be likely wet in the southern part and normal in the upper and middle parts. No drought is forecasted for the next coming three months.

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

Forecast period from: 17 January to 23 January 2023

Date: 16 January 2023

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)						
		15-Jan			15-Jan	16-Jan	17-Jan	18-Jan	19-Jan	20-Jan	21-Jan	22-Jan	23-Jan
Jinhong		0.0	-	-	536.34	535.96							
Chiang Saen		0.0	357.110	0.00	2.27	2.31	2.42	2.30	2.16	2.05	2.00	2.03	2.10
Luang Prabang		0.0	267.195	2.53	8.72	8.77	8.71	8.74	8.82	8.72	8.64	8.55	8.50
Chiang Khan		0.0	194.118	1.91	4.98	4.86	4.82	4.80	4.81	4.87	4.80	4.76	4.70
Vientiane		0.0	158.040	-0.28	2.55	2.49	2.42	2.36	2.33	2.34	2.40	2.33	2.30
Nongkhai		0.0	153.648	0.33	2.03	1.98	1.92	1.87	1.85	1.87	1.93	1.88	1.85
Paksane		0.0	142.125	0.10	2.95	2.95	2.92	2.89	2.86	2.85	2.87	2.90	2.92
Nakhon Phanom		0.0	130.961	0.18	1.88	1.85	1.81	1.77	1.72	1.69	1.66	1.70	1.74
Thakhek		0.0	129.629	1.38	3.16	3.18	3.19	3.17	3.13	3.10	3.07	3.11	3.15
Mukdahan		0.0	124.219	0.72	2.16	2.14	2.12	2.10	2.06	2.03	2.00	2.02	2.06
Savannakhet		0.0	125.410	-0.65	1.20	1.18	1.16	1.15	1.13	1.11	1.10	1.12	1.14
Khong Chiam		0.0	89.030	1.02	2.59	2.60	2.57	2.53	2.50	2.45	2.40	2.36	2.40
Pakse		0.0	86.490	0.03	1.62	1.60	1.58	1.55	1.53	1.50	1.47	1.45	1.48
Stung Treng		nr	36.790	0.32	2.98	3.00	2.98	2.96	2.94	2.93	2.91	2.89	2.87
Kratie		nr	-1.080	3.06	7.92	7.96	8.00	8.01	7.97	7.93	7.90	7.87	7.85
Kompong Cham		nr	-0.930	0.65	3.18	3.25	3.27	3.30	3.31	3.29	3.26	3.23	3.20
Phnom Penh (Bassac)		nr	-1.020	1.58	2.64	2.76	2.80	2.82	2.83	2.82	2.80	2.78	2.76
Phnom Penh Port		-	0.000	0.14	1.95	1.97	2.00	2.02	2.03	2.02	2.00	1.98	1.96
Koh Khel		nr	-1.000	1.52	2.82	2.82	2.84	2.86	2.87	2.88	2.86	2.84	2.83
Neak Luong		nr	-0.330	0.81	1.98	2.01	2.04	2.06	2.08	2.08	2.08	2.06	2.04
Prek Kdam		nr	0.080	0.58	2.58	2.52	2.50	2.48	2.46	2.43	2.40	2.37	2.35
Tan Chau		0.0	0.000	-0.37	0.52	0.65	0.80	0.98	1.05	1.10	1.15	1.21	1.30
Chau Doc		nr	0.000	-0.60	0.60	0.72	0.85	1.02	1.07	1.12	1.17	1.22	1.30

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

This week, rainfall was observed over the Mekong region from Nakhon Phanom station down to the lower part at Tan Chau and Chau Doc in Viet Nam. The highest rainfall was about 78.60 mm at Prek Kdam in Cambodia. Compared with last week's amount, the rainfall this week was considered higher in the Mekong region.

Based on the forecasted rainfall from satellite using GFS data, rainfall is likely to take place in the areas from the lower part of Cambodia to the 3S area and Mekong Delta in Viet Nam during 17-24 January 2023, varying from 0.05 mm to 30.00 mm. This indicates that the dry season has covered the LMB.

7.2 Water level and its forecast

The MRC's observed water level (WL) at Jinghong showed a decreased value about 0.17 m from 536.13 m to 535.96 m between 10 and 16 Jan 2023. The outflow decreased from 1,410.00 m^3/s to 1,290.00 m^3/s between 10 and 16 Jan 2023.

Water levels in the lower part of the monitoring locations in the LMB during this reporting week were decreasing from Chiang Saen to Vientiane, but still staying slightly above their LTA value. Water levels at Nong Khai and Paksane were staying lower than their LTA value. Water levels from Nakhon Phanom in Thailand down to Sovannakhet in Lao PDR were staying lower than their LTA value, considered low water levels. Water levels at Khong Chaim and Pakse were staying close to their LTA value. Also, water levels from Stung Treng to Kratie were staying above their LTA level, considered normal. At Kompong Cham, Chaktomuk, Prek Kdam and Koh Khel in Cambodia, water levels were down and staying lower than their LTA level. Water levels at Prek Kdam in Cambodia were lower than their LTA level. The low level was due to low inflows from upstream and less rainfall in the region from 10 to 16 Jan 2023. Generally, this week's water levels were relatively lower than those of last week from the upper of Chiang Saen to Vientiane but higher from the lower part from Khong Chaim to Kratie on the Mekong River.

The flow volume of the Tonle Sap Lake is still higher than its LTA. From next week, the flow is expected to continue decreasing due to less rainfall forecasted in the inflow catchments of the Tonle Sap Lake.

From Stung Treng to Kompong Cham, the water levels will continue to go down. 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 stay below their LTA.

The situation in Tan Chau on the Mekong River and Chau Doc on the Bassac River is expected to remain fluctuating. In Tan Chau and Chau Doc, the fluctuation of water levels was lower and higher than their LTA level, which **considered normal.**

Since the third week of September 2022, water levels across most monitoring stations in the LMB have increased due to the above-average rainfall but still staying lower than their LTA value (from middle to lower stretches within the LMB). The preliminary analysis of the hydrological conditions in the LMB over July–December 2020 and November 2020 to May 2021 was done as Situation Report, which can be used as reference for the trend of water level and flows of the Mekong River Basin.

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 of rainfall for the coming week as mentioned earlier in section 6.1, major flash floods are not likely to happen in the LMB.

7.4 Drought condition and its forecast

During Jan 9-15, the LMB was at normal condition in the upper and middle parts but at moderate dry in some areas of Vientiane, Borikhamxay, Khammuane, Nong Khai, and Nakhon Phanom in the north and Surin, Si Saket, Ubon Ratchathani, and Otdar Meanchey in the lower part. Those specific drought hotspots are considered normal as they are caused by dry soil moisture phenomenon during dry season.

For the coming three months, no drought is forecasted over the LMB. In Jan, Feb, and Mar 2023 the LMB will be likely wet in the southern part and normal in the upper and middle parts.

Annex A: Tables for weekly updated water levels and rainfall at the Key Stations

Table A1: Weekly observed water levels

2023	Jinghong	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
10-01-2023	536.13	2.52	8.82	4.91	2.65	1.96	2.95	1.65	2.94	1.88	1.10	2.13	1.18	2.71	7.51	3.27	2.89	2.05	2.76	2.00	2.59	1.26	1.37
11-01-2023	536.11	2.46	8.84	5.03	2.51	1.92	2.93	1.82	3.05	1.88	1.15	2.27	1.36	2.72	7.50	3.24	2.79	1.94	2.84	2.15	2.55	1.14	1.17
12-01-2023	536.13	2.40	8.74	5.12	2.49	1.90	2.87	1.91	3.07	2.13	1.17	2.39	1.47	2.83	7.50	3.20	2.76	1.97	2.82	2.00	2.61	0.89	0.93
13-01-2023	535.81	2.44	8.68	5.18	2.57	1.96	2.84	1.87	3.07	2.19	1.20	2.51	1.54	2.89	7.67	3.17	2.72	1.90	2.80	2.00	2.57	0.68	0.72
14-01-2023	536.04	2.42	8.68	5.10	2.63	2.02	2.89	1.90	3.12	2.17	1.20	2.58	1.54	2.95	7.75	3.16	2.68	1.82	2.80	1.98	2.58	0.57	0.61
15-01-2023	536.34	2.27	8.72	4.98	2.55	2.03	2.95	1.88	3.16	2.16	1.20	2.59	1.62	2.98	7.92	3.18	2.64	1.95	2.82	1.98	2.58	0.52	0.60
16-01-2023	535.96	2.31	8.77	4.86	2.49	1.98	2.95	1.85	3.18	2.14	1.18	2.60	1.60	3.00	7.96	3.25	2.76	1.97	2.82	2.01	2.52	0.65	0.72

Table A2: Weekly observed rainfall

2023	Jinghong	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
10-01-2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	1.4	3
11-01-2023	0	0	0	0	0	0.2	0.5	0.2	0	0	0	2	0	0	26.4	77.6	29.2		8.5	14.4	23.4	6.6	15
12-01-2023	0	0	0	0	1.5	0.6	0	22.4	19.6	0	0	19	18.2	3.3	0	0	2.1		0	0	54.3	0.6	10
13-01-2023	0	0	0	0	0	0	0	0	0	0	0	32.2	14.6	2	1.7	1	12.2		36	0	6.2	18.9	16
14-01-2023	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0		0	0	0	0	0
15-01-2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
16-01-2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Sum	0.0	0.0	0.0	0.0	1.5	0.8	0.5	22.6	19.6	0.0	0.0	53.2	32.8	14.3	28.1	78.6	43.5		44.5	14.4	83.9	27.5	44.0

Mekong River Commission Secretariat

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