

# Mekong River Wetness Anomalies in the 2019 Monsoon Season

Detailed Analysis of the Monthly Wetness Index from May to October 2019

Alan Basist

Eyes on Earth, Inc.

and

Claude Williams

Global Environmental Satellite Applications, Inc.

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Key points throughout this document:

## WETNESS INDEX

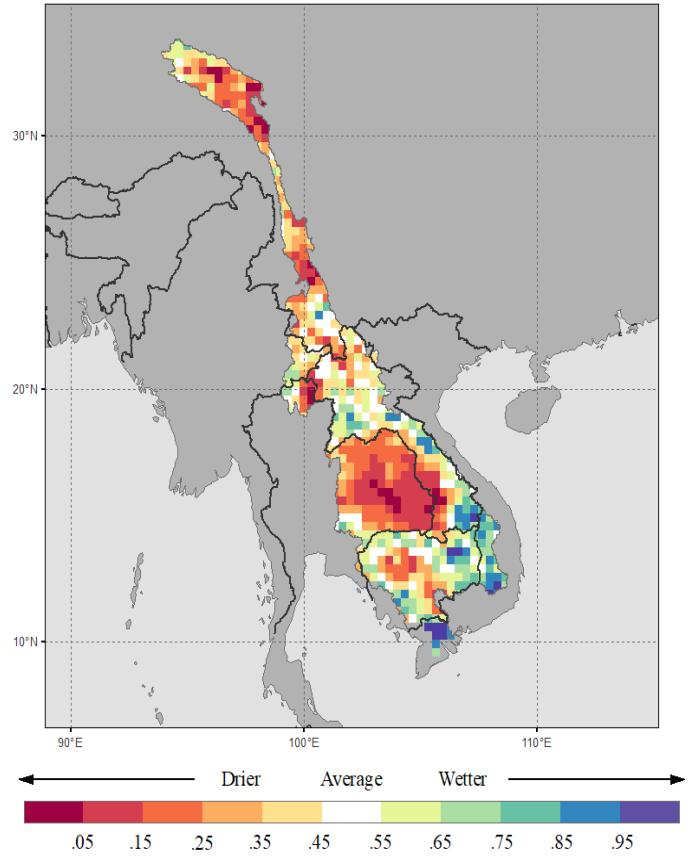
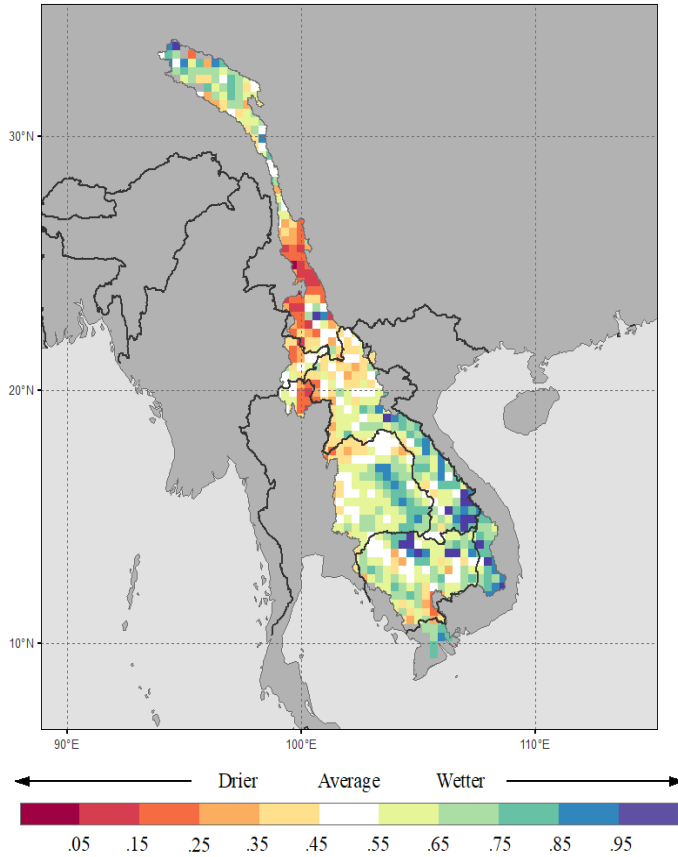
The WETNESS INDEX integrates: (1) Upper-level soil moisture; (2) Water accumulating into the drainage basins (rivers) of the world; (3) Melting snow packs; (4) Lakes and bogs; (5) Water in the canopy, and (6) Rainfall. The wetness index is a cumulative probability function, where the expected value is around the 0.50 (50%) value. Values less than 0.50 are increasingly drier than expected, while values greater than 0.50 are increasingly wetter than expected, relative to the 27 year climatology (1992-2018).

## Plot Legend

In all of the following plots the dark red anomaly means there is less than 5% chance the upper level of the soil moisture would be this dry. That is, there is a 1 in 20 chance the soil would be this dry, at that location and time of the year. In contrast the purple (greater than .95) mean 95% of the time it was drier, or said another way, only 5% of the time would the soil be wetter at that location and time of the year.

Mekong River Basin  
 Wetness Anomaly  
 May 2019

Mekong River Basin  
 Wetness Anomaly  
 June 2019

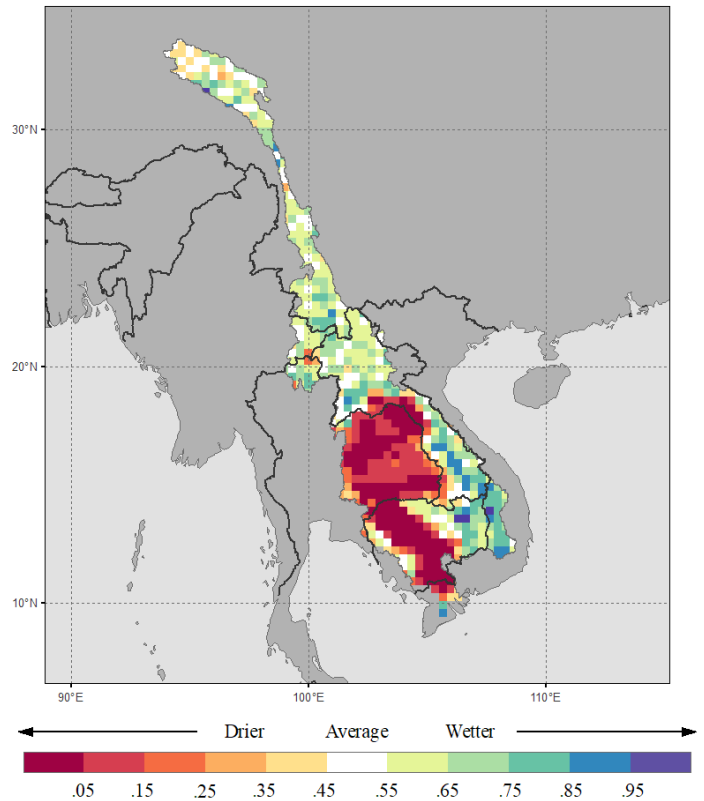
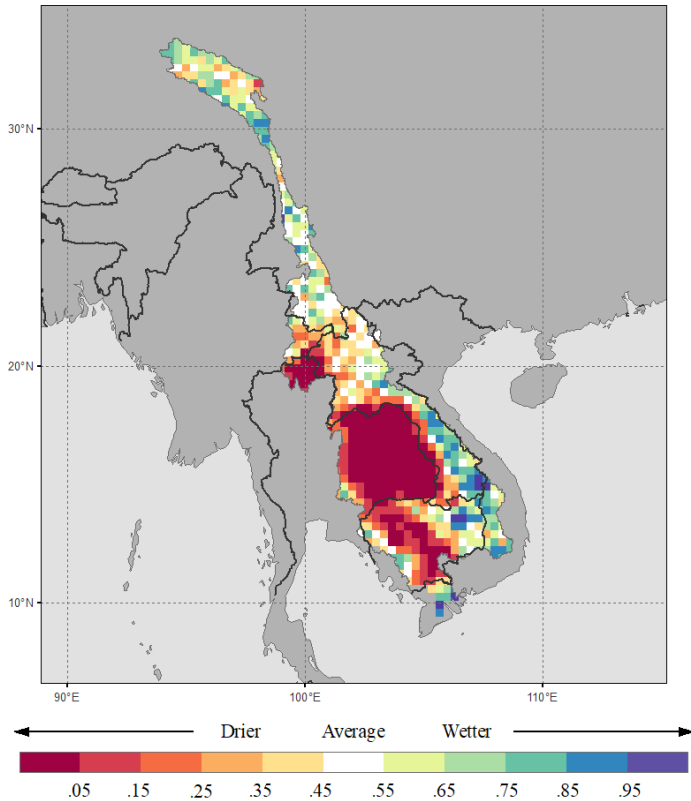


In May the Mekong basin headwaters have average to slightly above average wetness. The wetness is largely the result of melting snow and glaciers at a faster rate than normal. In contrast, the Canyon region and adjoining basin to the west have drier than average surface conditions. Combining the slightly positive anomalies in the upper basin with slightly below the expected value further down, indicate that wetness in the larger area is slightly below average. Downstream of the gauge there is about average wetness in Laos and Thailand, with a ribbon of above average wetness running down the center of Thailand. The 3 S river basins are wetter than average. The Tonle Sap and most of Cambodia are near average, with slightly more positive anomalies in the north of the country.

In June there is distinct dryness in the upper Mekong basin and negative anomalies dominate the region. Dry anomalies are greatest in two distinct regions; the headwater and the lower canyon. Near the gauge, in the golden crescent, there is a small area with drier than average surface wetness. Downstream of the gauge, an even larger area of dry anomalies occurs in the agricultural lands (mainly rice) of Thailand, with a small area of dryness in Cambodia around the Tonle Sap. There is above average wetness in the 3 S river basins

**Mekong River Basin  
 Wetness Anomaly  
 July 2019**

**Mekong River Basin  
 Wetness Anomaly  
 August 2019**

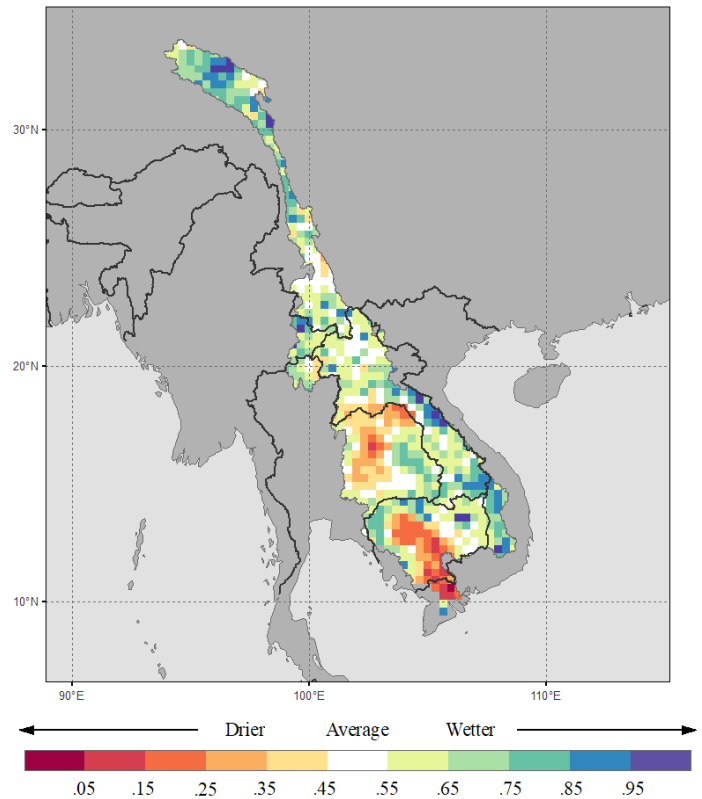
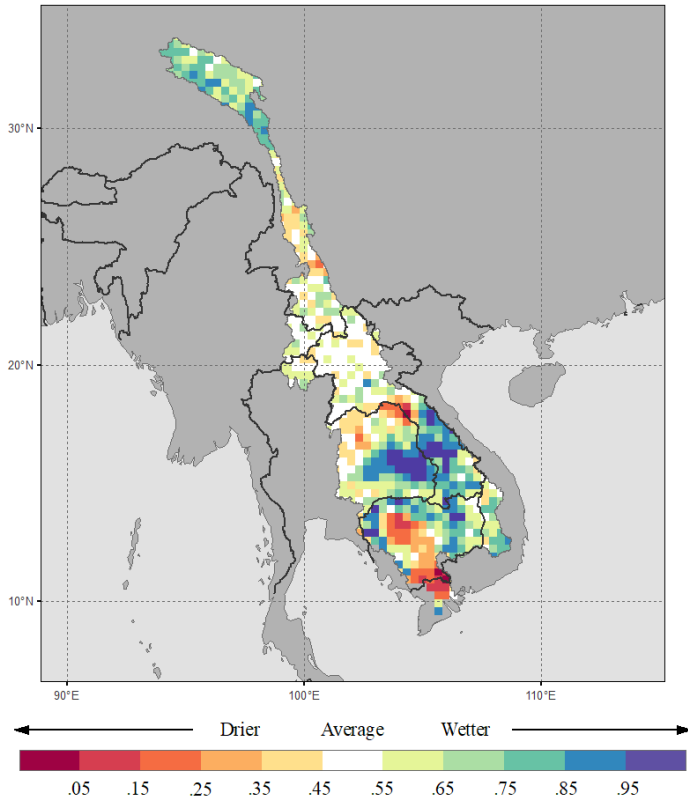


In July the headwaters have about average wetness. There is a checkered pattern of slightly wet and dry values. Further into the canyon the values are slightly wetter than average. Near average wetness continues to the Thai border. Directly south of the Thai border there is small area of extreme drought, while much of Laos is near normal. However, further south there is a large area of severe drought across the entire southeastern third of Thailand, where much of the country's rice is grown. This extreme drought extends into the larger delta, including the Tonle Sap. In contrast, there is above average wetness in the 3 S basins.

In August the headwaters in August have a similar pattern to July. It is slightly dry in the far north, but slightly wetter than average throughout the remainder of the upper basin. Below the gauge, there are slight above wetness values in Laos, while extreme dryness is evident in Thailand to the south. The severity of the drought abated at the end of the month, as evident in the reduction of dark red areas. However, further south, the drought intensified in the delta region. And the Tonle Sap basin is filled with extreme values of dryness. Still, there is above average wetness in the 3 S basins.

**Mekong River Basin  
 Wetness Anomaly  
 September 2019**

**Mekong River Basin  
 Wetness Anomaly  
 October 2019**



In September the headwaters of the basin have above average wetness, while further downstream in the canyon there is a mixture of slightly wet and dry anomalies. Most of Laos has near average wetness values. Much of the area in Thailand that experienced severe drought in the previous months, now has much above average wetness. Moreover, some of these areas are extremely wet relative to normal at this time of year. There is residual dryness in the Tonle Sap and areas along the delta, although above average wetness values exist in northern Cambodia.

In October the headwaters of the basin have distinct positive wetness. More than average wetness begins appearing in the canyon region and north of the Thai border. Average wetness conditions continue in Laos. Thailand has a mix of wet and dry anomalies. However, residual dryness continues in the Tonle Sap and the delta through October.

**In summary, the wet season of 2019 was relatively average in the upper Mekong basin. The region started with slight dryness in May, pronounced dryness in June, near average wetness in July, slightly wetter than average in August and September, followed by pronounced wet conditions in October. Consequently, the model prediction of flow is near to slightly above average for the season. Therefore, the natural annual cycle present in all the previous years should have been observed at the Chiang Saen gauge. However, the natural flow from the upper Mekong basin was greatly impeded, as shown by the river height measurements and the report: [https://558353b6-da87-4596-a181-b1f20782dd18.filesusr.com/ugd/81dff2\\_68504848510349d6a827c6a433122275.pdf](https://558353b6-da87-4596-a181-b1f20782dd18.filesusr.com/ugd/81dff2_68504848510349d6a827c6a433122275.pdf)**