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Executive summary

● A long-lasting drought is affecting parts of South East Asia (Vietnam, Laos, Thailand, Myanmar, Cambodia) due to a combination of precipitation deficit inherited from 2019 and a poor start of the monsoon 2020, with regional variations.

● Rivers within the Mekong basin and beyond recorded extreme lows in the past few weeks, while reservoirs are lower than expected for this time of the year. The drought is affecting primarily rice crops. Fisheries, power production and water supply in general may be affected too. Indeed the Mekong River Commission advised all member countries to implement their drought plans.

● The outlook until October is very wet, with well above average rainfall in the area. The abundant precipitation should compensate for the poor first half of the season, but might not be enough for the longer-term deficit.

This document builds on the previous report published in March 2020¹ and July 2019², please refer to them for more insight on the drought and earlier reported impacts.

Risk of drought impact for agriculture (RDRI-Agri)

The GDO indicator RDRI-Agri shows the risk of having impacts from a drought, by taking into account the exposure and socio-economic vulnerability of the area, with particular focus on the agricultural impacts.

With a marked rainfall seasonality, a significant amount of annual water supply depends on a few months. The main rivers play a fundamental role in the economy and lives of millions, providing water for agriculture, consumption, fisheries and energy production. Agriculture is the main source of income and subsistence for the majority of the population, and rice is the main staple crop in the peninsula.

Compared to the situation of March 2020, the drought eased over central Thailand and intensified again over the Mekong basin (Lao and Vietnam primarily), northern Vietnam and Myanmar. The RDrI-Agri indicator shows a wide region under moderate risk (Figure 1), with southern and coastal Myanmar as the most exposed region, as well as central and central and north of Lao and Vietnam.

**Figure 1:** Risk of drought impact for agriculture (RDrI-Agri) for the last dekad of July 2020 (21st to 31st).

**Precipitation**

The months from May to October are the wettest in the area of interest and, despite slightly different patterns, July and August are at the core of the rainy season, accounting between 30% and 50% of total annual rainfall. Therefore, the lack of rainfall during those months is crucial for the entire annual water balance. The wet season of 2019 was uneven, with a poor first half followed by an extremely wet August, but generally ending with a slight cumulative deficit that persisted throughout the dry season (Figure 2). The following monsoon has so far underperformed compared to the long-term normals, with the exception of central Thailand and southern Vietnam.
Myanmar (E 96.5, N 18.5) North Vietnam (E 105.5 N 21.3)

Cambodia (E 105, N 13.5) Central Thailand (E 102.4, N 15.1)

Figure 2: Monthly precipitation from February 2019 to July 2020 in selected representative locations, two cover the last and ongoing wet seasons. Bars show observed monthly precipitation (mm). Lines show the long-term monthly average (1981-2010) with one standard deviation.

Standardized Precipitation Index (SPI)
The SPI indicator is used to monitor the occurrence of meteorological drought. The lower (i.e. more negative) the SPI, the more intense is the drought.

The SPI-3 for July (Figure 3, top-left) shows a widespread negative anomaly of precipitation, from mild to severe, indicating a substantial failure of the first half of the wet season in those areas. This is supported by looking at the annual SPI (figure 3, top-right), which is not as extreme and, despite strong deficit regionally, was still able to partly or entirely compensate for the later deficit. However, the two-year cumulative view (Figure 3, bottom-left) displays again a very strong and consistent precipitation deficit, including central Thailand too. The latter benefits from a milder seasonality of rainfall and had normal precipitation between March and July, but had a particularly dry 2018 which is still dragging SPI to very low values.
Outlook for Standardized Precipitation Index (SPI)
Southeast Asia has a wet climate, with only a short dry season between December and February. The precipitation outlook from August to October 2020 forecasts much wetter than normal conditions over the whole peninsula (Figure 4). If it proves true, it will compensate for the first half of the season, while might still not suffice to compensate for longer term deficits.
fAPAR Anomaly
The fraction of Absorbed Photosynthetically Active Radiation (fAPAR) represents the fraction of the solar energy absorbed by leaves. fAPAR anomalies, specifically the negative deviations from the long-term average over the same period, are a good indicator of drought impacts on vegetation.

Soil Moisture Anomaly
This indicator provides an assessment of the top soil water content, which is a direct measure of drought conditions, specifically the difficulty for plants to extract water from the soil.

Soil moisture remained at low levels during all of 2020, for about one third of the area under analysis or more, when looking at the second half of 2019 (e.g. Figure 6).
Figure 6: Soil Moisture Anomaly, recent temporal evolution in Myanmar (top), Laos (middle), and Thailand (bottom).

Affected areas did not follow the same path, as showed by figure 7: northern Vietnam moved from wet anomaly towards dry, as opposite to Cambodia that is now under relatively better conditions than earlier in the year, despite the very poor beginning of wet season. Laos showed a general moisture lowering during May, which was later compensated in the southern part of the country. The most remarkable anomaly is currently in northern Thailand and Myanmar, both of which were relatively normal at the beginning of the rainy season.
Regarding groundwater, measured with the Total Water Storage (TWS) indicator, as of June 2020 it stood well under the normal for northern parts of Thailand and Laos (figure 8). To a lesser degree, the neighboring areas show significant deficit too, down to Cambodia in the south and the Chinese borders in the north.
Reported impacts

The Mekong River Commission reported of potential impacts in a detailed report on the situation for the lower Mekong basin during the first half of 2020. In general, despite dam operations in China that raised artificially the level of upper Mekong, further downstream the average flow has been lower than average throughout 2020 to date. To all countries touched by the river basin, they recommended to implement drought management plans and to advice water storage operators to prepare additional releases and irrigators to reduce their abstractions.

In central Thailand, due to deficits accumulated in the past couple years, many reservoirs are much lower than expected or empty, to the point that fears for water supply in the incoming months were raised. Indeed usable capacity stands below one third of total capacity of reservoirs and measures are being set up for potential emergencies. In Vietnam, apart from the region falling into the Mekong basin, the water levels are variable depending on location but overall reservoirs are below half their capacity. Crop damages are reported especially from the centre and north of the country. In Cambodia, issues related to drought were reported for

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rice crops and government is providing some support\textsuperscript{12} \textsuperscript{13}. No information were found for Myanmar.

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\textsuperscript{12} \url{https://www.rasmeinews.com/archives/349793}; \url{https://www.rasmeinews.com/archives/349241}
\textsuperscript{13} \url{https://www.cen.com.kh/archives/231478.html/}
Drought in mainland Southeast Asia – August 2020

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