INDONESIA

Impact Monitoring of Hydrometeorological Hazards

July – September (Q3) 2022

November 2022

A Joint Bulletin by:

BMKG

BNPB

BADAN PUSAT STATISTIK

Kementerian PPN/ Bappenas

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Key Messages

Climate Situation – Q3 2022: From July to September 2022, rainfall across Indonesia was higher than the thirty-year long-term average. This was the result of the early start of the rainy season in combination with the persisting La Niña phenomenon. Most areas in Jawa, Sulawesi, Kalimantan, Maluku, Papua and the southern part of Sumatera experienced rainfall above normal condition, while the northern parts of Sumatera, Kalimantan and Papua experienced rainfall below normal resulting in drier conditions compared to the long-term average.

Impact of Climate and Hydrometeorological Disasters on Agriculture: The Ministry of Agriculture reported that floods and droughts were the primary causes of paddy crop disturbances in August 2022. Both floods and droughts affected a total of 1,500 hectares of paddy cultivation. Around 80% of paddy cultivation disturbances were caused by floods; 20% of flood disturbances resulted in crop failures.

Status of Food Security and Nutrition: The National Food Agency has reported that most provinces were food secure in August 2022. Thirty-one provinces were found to be stable, while three provinces were under watch for possible deterioration of food security and nutrition. These include Nusa Tenggara Timur, Kalimantan Barat and Sulawesi Barat.

Impact of Disasters – Q3 2022: The National Disaster Management Agency reported that at least 634 disasters occurred between July and September 2022, which represents a 35% increase compared to the same period in 2021. Most disasters were caused by hydrometeorological hazards including floods, droughts, landslides, extreme weather (e.g., storms and cyclones). Forty percent of all disasters took place in Jawa Barat, Aceh, and Jawa Timur.

Rice Production – Jan to Sep 2022: Statistics Indonesia (BPS) reported that between January and September rice production reached 26.1 million tonnes. Compared to the same period in the previous year, the harvested areas and rice production only slightly decreased by 0.86% and 0.22% respectively. Overall, BPS estimates that national rice production will be 32 million tonnes by the end of the year representing an increase of 2.3% compared to 2021.

Climate Forecast on Agriculture: The National Research and Innovation Agency (BRIN) predicted that 5.4 million hectares of paddy cultivation will receive more rainfall between October and December 2022 than the thirty-year long-term average. More than 80% of the paddy cultivation areas in Jawa are predicted to experience rainfall above normal condition. This poses a risk of floods and pest disturbances, which can lead to crop failures.

Climate Outlook – Nov 2022 to Jan 2023: The La Niña phenomenon is still ongoing and forecasted to continue, despite with a weaker effect until the end of the year. The current La Niña phenomenon has continued to prevail for three consecutive years since 2020 (Triple-dip La Niña). Latest trends show that ENSO anomalies are now occurring once every 2-3 years. Before 1980, these events only happened once every 5 years. Increased rainfall is expected in Jawa, Nusa Tenggara, Sulawesi, Maluku and Papua. Rainfall in Sumatera and Kalimantan is expected to be normal, while below normal rainfall is predicted in Sumatera Barat, Riau, Kalimantan Barat and Kalimantan Tengah.

Media Reports

Bulog Papua: In Merauke, replenishment of rice stocks has proven to be challenging due to crop failures

(20/07/2022) ANTARANEWS.COM - The Head of Bulog in the Regional Office of Papua and West Papua, Raden Guna Dharma said that due to crop failures in Merauke Regency, replenishment of rice stocks in the first and second quarters only reached 50 percent of the target of 32,000 tonnes,

Bulog had to import 2,000 tonnes of rice from South Sulawesi to ensure available stocks. “Thankfully, for now, we have a stock of 28,000 tonnes of rice to ensure food security for the next 3.5 months based on per capita consumption in both regions," he said. [1].

Lanny Jaya Regency Government & the Ministry of Social Affairs distribute food assistance due to the frost disaster

(07/08/2022) ANTARANEWS.COM - The Ministry of Social Affairs and the Lanny Jaya Regency Government distributed food assistance to 548 people in the remote district of Kuyawage (Lanny Jaya, Papua) due to the frost disaster which affected their crops.

In addition, the Lanny Jaya Regency Government also sent health workers to provide medical treatment for residents who were starting to get sick. [2].

Food prices rise. The National Food Agency will issue reference prices for consumers and producers

(10/08/2022) KOMPAS.COM - The National Food Agency (NFA) is currently in the process of determining reference prices for both producers and consumers. "Hopefully, we can publish these soon, so that they can become a reference for producers, consumers and traders," said Risfaheri, Acting Deputy for Food Availability and Stabilization (NFA).

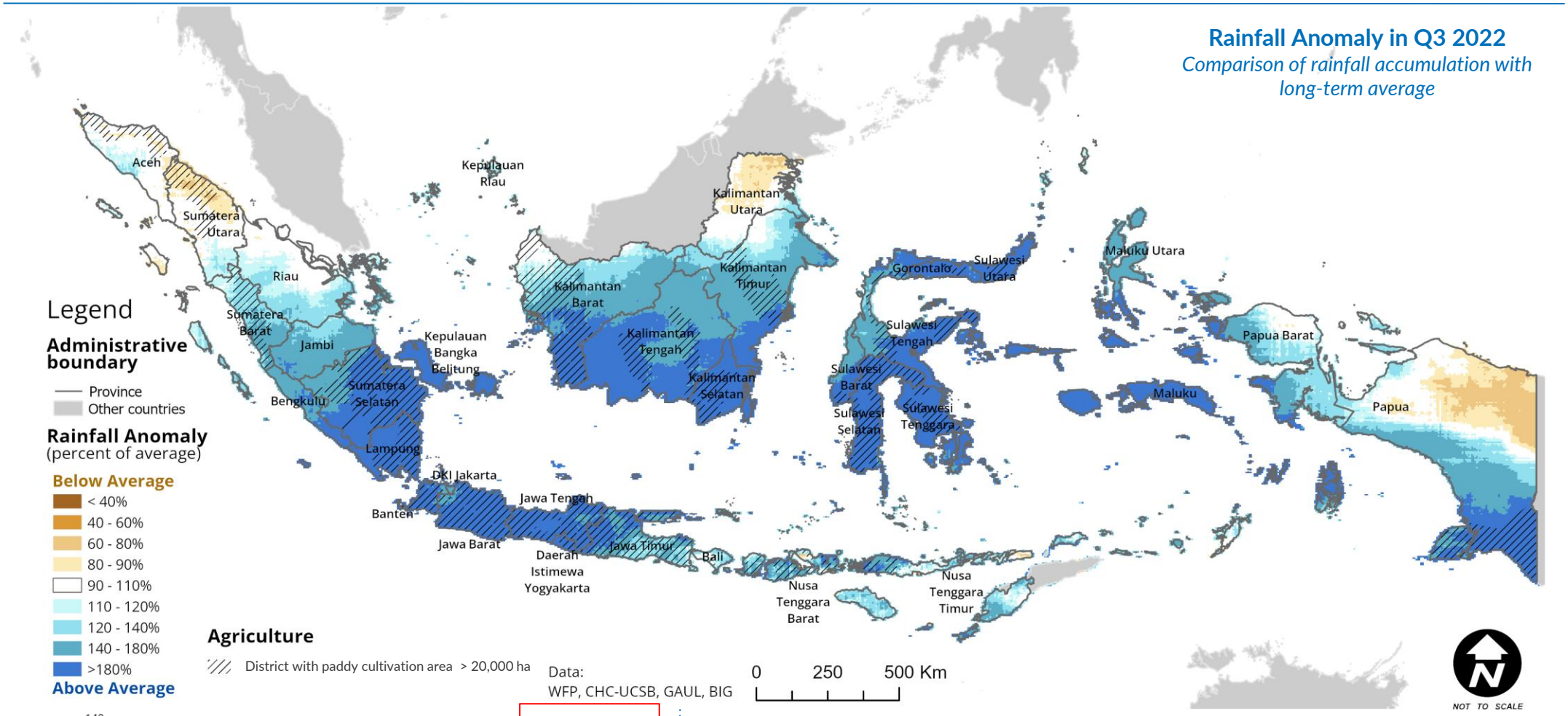
The concern of the NFA is that farmers must continue to make profit. If farmers are not making profit, then the availability of production will be threatened. Meanwhile, the NFA must contain inflation as to not affect people's purchasing power. "This is a concern for us at the NFA. How do we set prices taking into consideration both the producer and consumer sides," said Risfaheri [4].

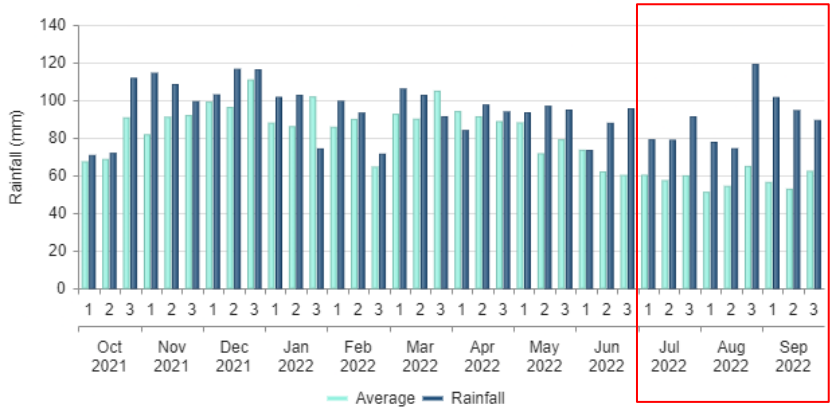
BMKG: Watch Out for Triple-dip La Niña Phenomenon

(16/10/2022) TEMPO.CO - Dwikorita Karnawati, Head of the Meteorological, Climatological, and Geophysical Agency (BMKG), stated that Indonesia should watch out for the 2020-2023 Triple-dip La Niña that threatens several countries worldwide.

The public, central government, and regional governments should be wary of hydrometeorological disasters, such as floods, strong winds, extreme weather, and landslides. Karnawati explained that La Niña started in mid-2020 and is estimated to continue until the end of 2022, potentially even the start of 2023. The Triple-dip La Niña had previously occurred only twice from 1973 to 1975 and from 1998 to 2001. The current phenomenon is likely to affect weather and climate patterns in Indonesia, including an early start of the rainy season across nearly half of the country. Karnawati warns to be alert for diseases that usually emerge during the rainy season, such as diarrhea, dengue fever, leptospirosis, acute respiratory infections (ARI), and skin diseases [3].

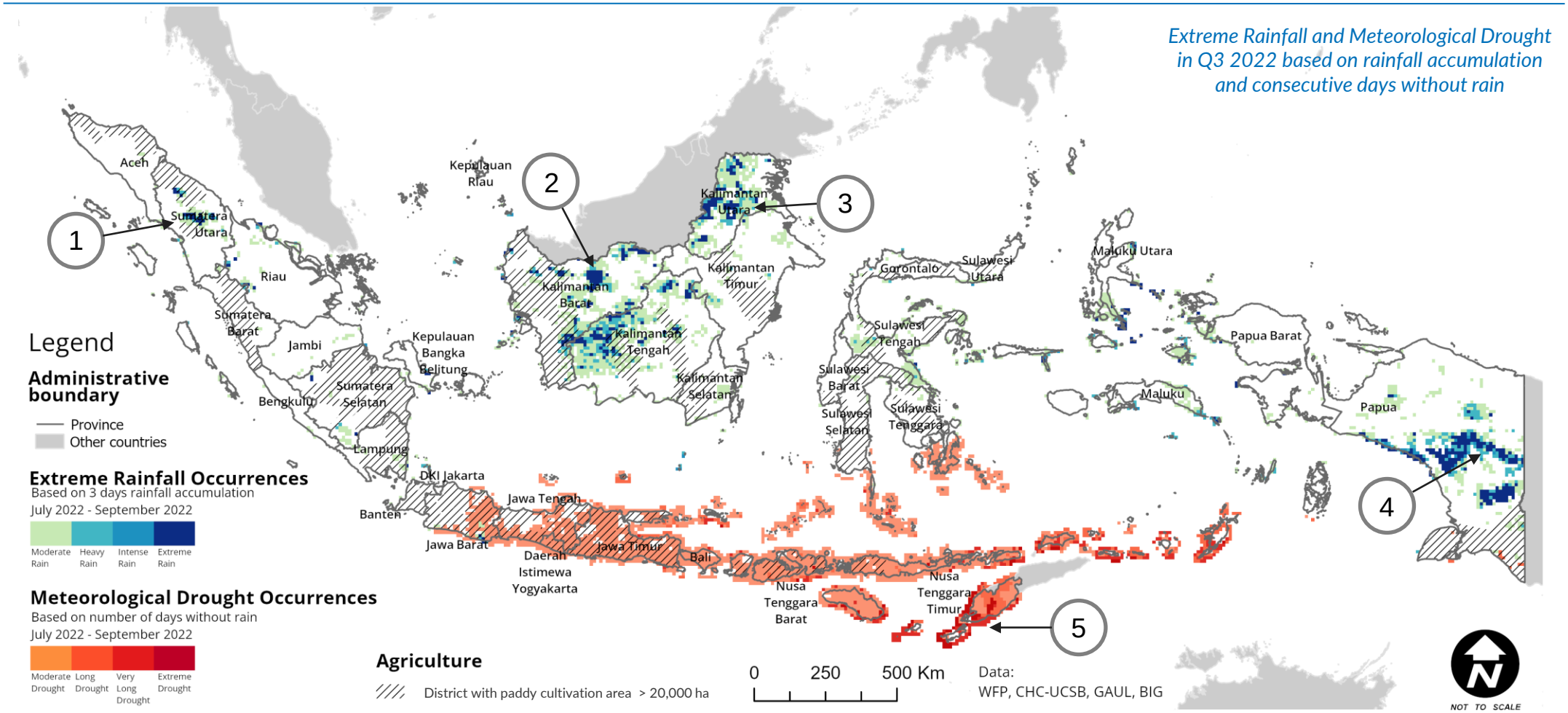
Rainfall Anomaly: July – September 2022





From July to September 2022, rainfall across Indonesia was higher than the long-term average (30 years). The amount of rainfall started to increase significantly in the 3rd week of August indicating that most areas entered the rainy season early. Most areas in Jawa, Sulawesi, Kalimantan, Maluku, Papua and the southern part of Sumatera experienced rainfall above average due to a combination of early rainy season and persisting La Niña phenomenon. Contrary to this, the northern parts of Sumatera, Kalimantan and Papua experienced below average rainfall resulting in drier conditions compared to the long-term average.

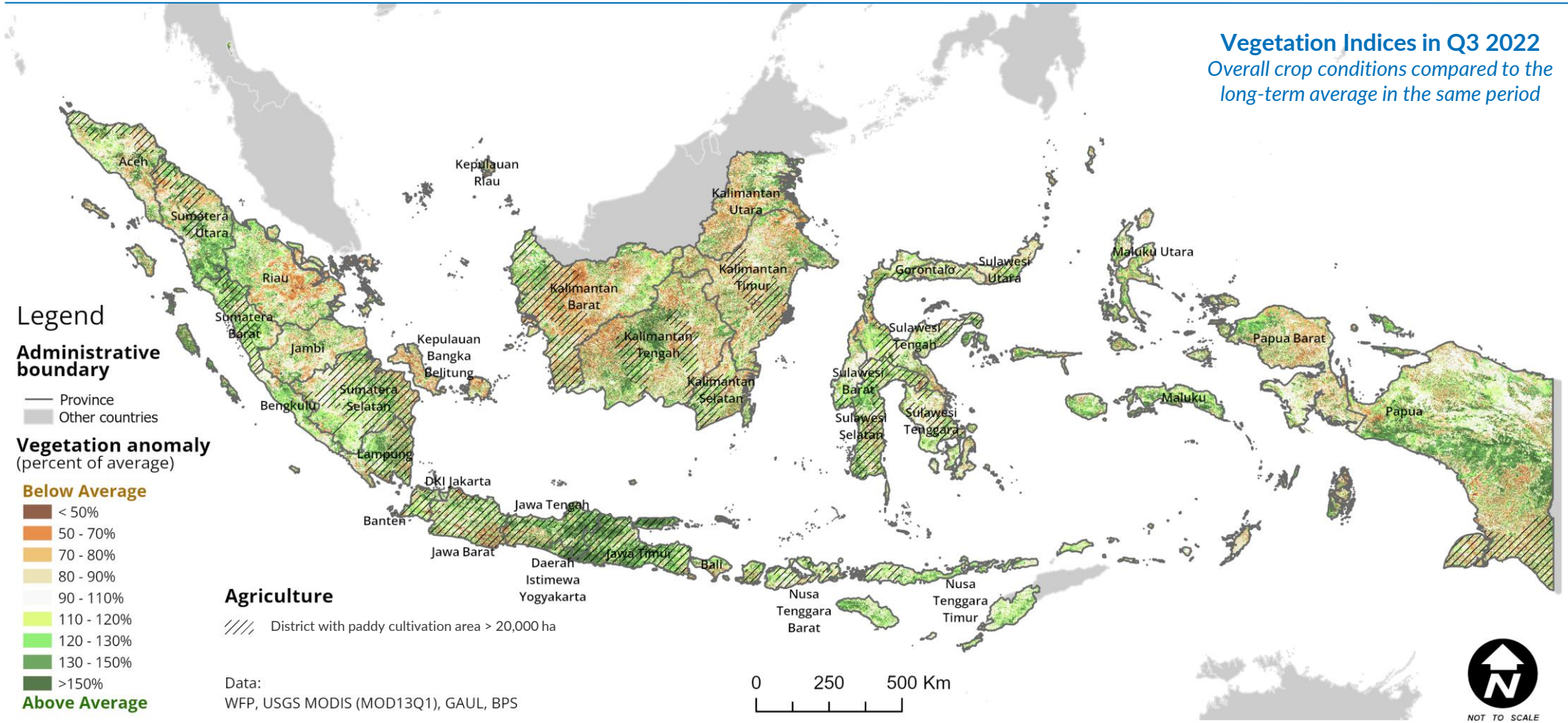
Meteorological Events: Extreme Rainfall and Meteorological Drought

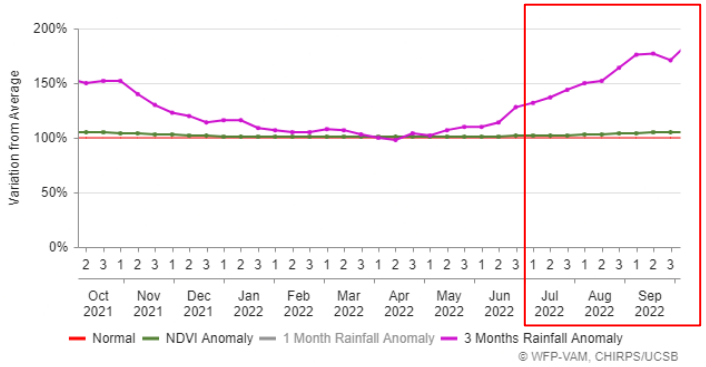


From July to September, extreme rainfall (based on 3-day rainfall accumulation) was detected in Sumatera Utara, Kalimantan Barat, Kalimantan Tengah, Kalimantan Utara and Papua. The occurrence of these events is associated with the early onset of the rainy season and the ongoing La Niña phenomenon. As indicated by circles on the map, the incidence of localised extreme rainfall caused floods and landslides in the districts of Toba (1), Sintang (2), Nunukan (3), Yahukimo (4).

At the same time, moderate meterological droughts (>30 days without rainfall) were also observed in Jawa Barat, Jawa Tengah, D.I. Yogyakarta, Jawa Timur, Maluku and Nusa Tenggara. Some events of extreme drought occurred in the districts of Sumba Timur and Kupang where the period of consecutive dry days or days without rain exceeded more than five months (5).

Crop Monitoring: Overall Vegetation Situation in Q3 2022

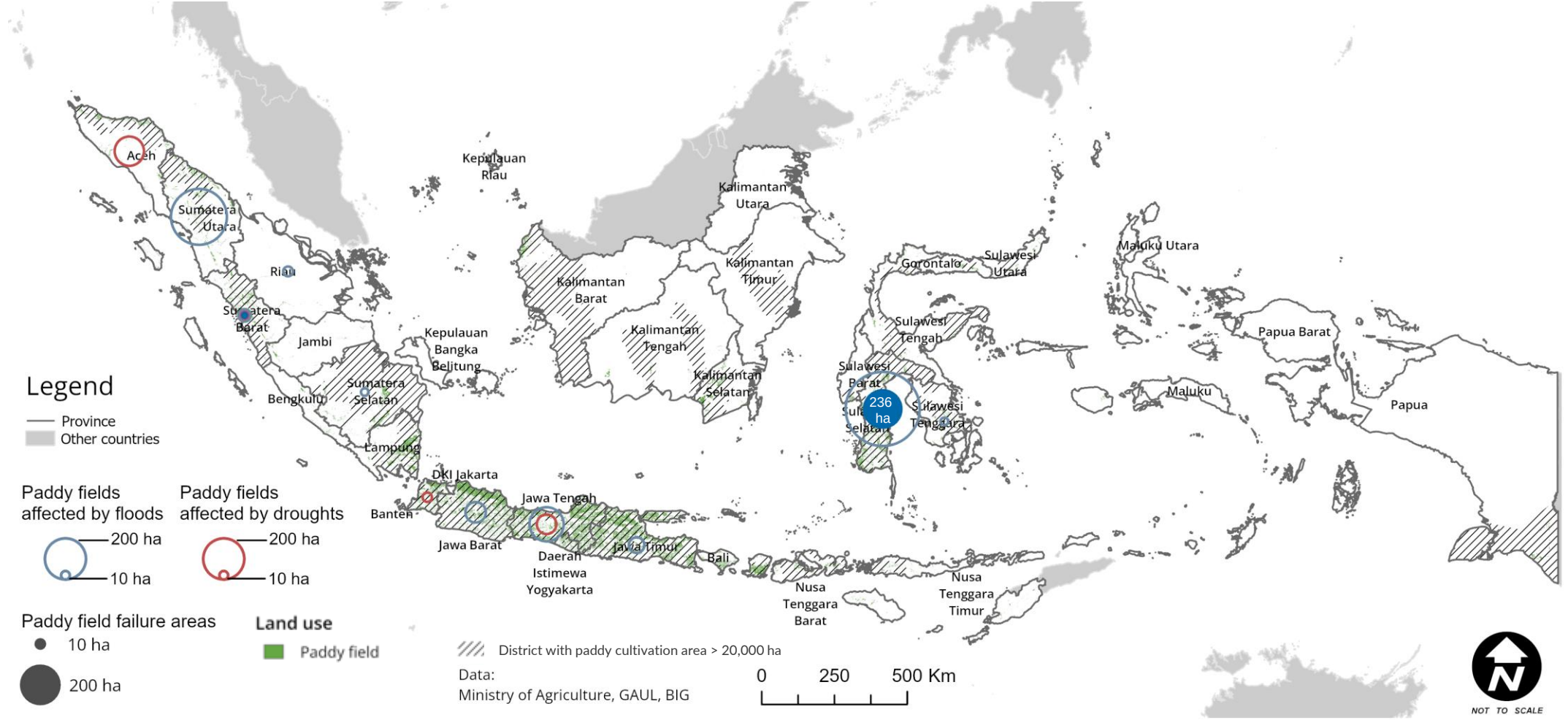




In Q3 2022, the Vegetation Index (VI) across Indonesia varied compared to the twenty-year long-term average. Higher VI figures represent an increase in vegetation greenness, which correlates with healthy vegetation or crop coverage. On the contrary, low VI indicates less biomass and lower vegetation density.

Above average VI were detected in Jawa Tengah, Jawa Timur, Sumatera Utara, Sumatera Barat, Kalimantan Tengah, and Papua. Meanwhile, below average VI were found in Riau, Kalimantan Barat, Kalimantan Utara, Kalimantan Timur, Papua Barat, eastern parts of Sumatera Utara, southern parts of Aceh, Jawa Barat and Papua.

Paddy Cultivation Disturbances by Floods and Droughts: August 2022

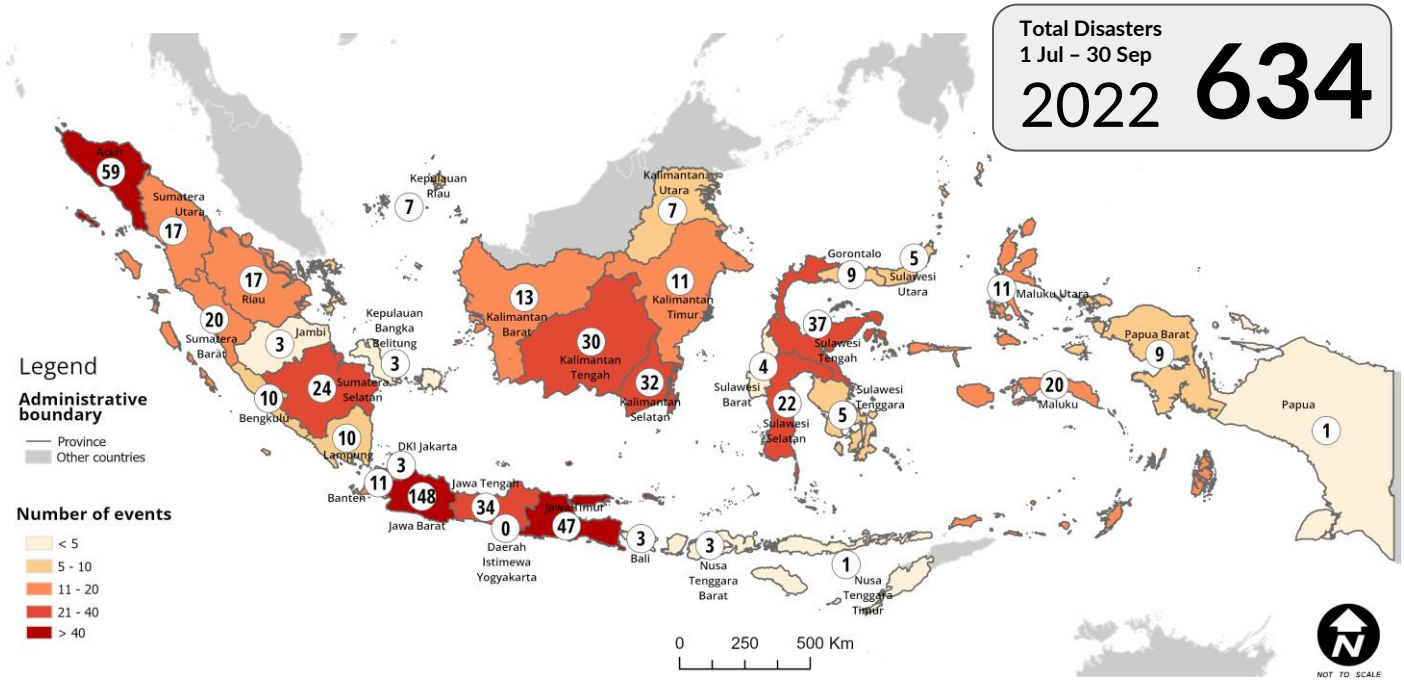


As reported by the Ministry of Agriculture, floods and droughts have caused disturbances to paddy cultivation in some areas. In August 2022, both floods and droughts affected 1,500 hectares of paddy cultivation. Around 80% of paddy cultivation disturbances were caused by floods, 20% of which resulted in crop failures. The most affected area was Luwu district (Sulawesi Selatan) where 481 hectares of paddy cultivation were damaged by floods due to overflowing of the Rongkong river [1].

Significant floods that caused disturbances to paddy cultivation were also reported in Sumatera Utara (352 hectares), Jawa Tengah (196 hectares) and Jawa Barat (99 hectares). On the other hand, a rainfall deficit in Aceh [page 5] caused droughts which affected at least 160 hectares of paddy cultivation in August [2].

Impact of Disasters: July – September 2022

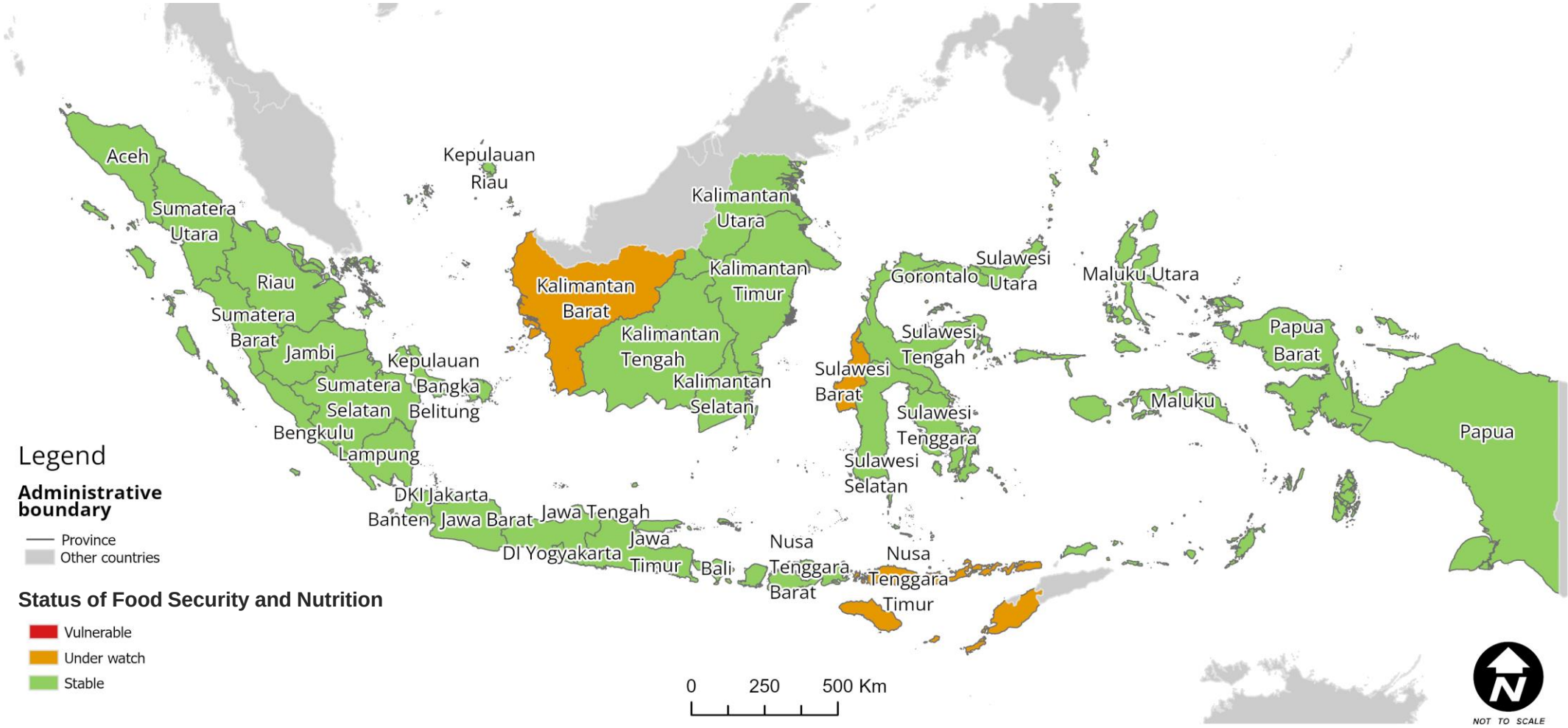
	2022 Jul-Sep	2021 Jul-Sep	
			+34.8%
Flood	263	236	+11.4%
Extreme weather	144	125	+15.2%
Land & forest fire	125	139	-10.1%
Landslide	83	77	+7.8%
Earthquake	7	2	+250%
Tidal wave & abrasion	9	2	+350%
Drought	3	7	-57.1%
Disaster Impact			
Impacted population	514 thousand	722 thousand	-28.8%
Damaged house	3,517	2,909	+21.1%



The National Disaster Management Agency reported the occurrence of at least 634 disasters between July and September 2022, which represents a 35% increase compared to the same period in 2021 (588 disasters). The majority of disasters were caused by hydrometeorological hazards like floods, droughts, landslides, extreme weather (e.g. storms and cyclones). The highest number of disasters occurred in Jawa Barat, Aceh, and Jawa Timur with a total of 254 disasters.

Despite the increasing number of disasters, casualty losses caused by disasters decreased by around 29% compared to July-September 2021. It was reported that 41 people died, 13 people went missing, 65 people were physically injured, and 514 thousand people were impacted by disasters and consequently displaced. The damages to houses and public facilities were 21% higher compared to the same period last year.

Status of Food Security and Nutrition : August 2022

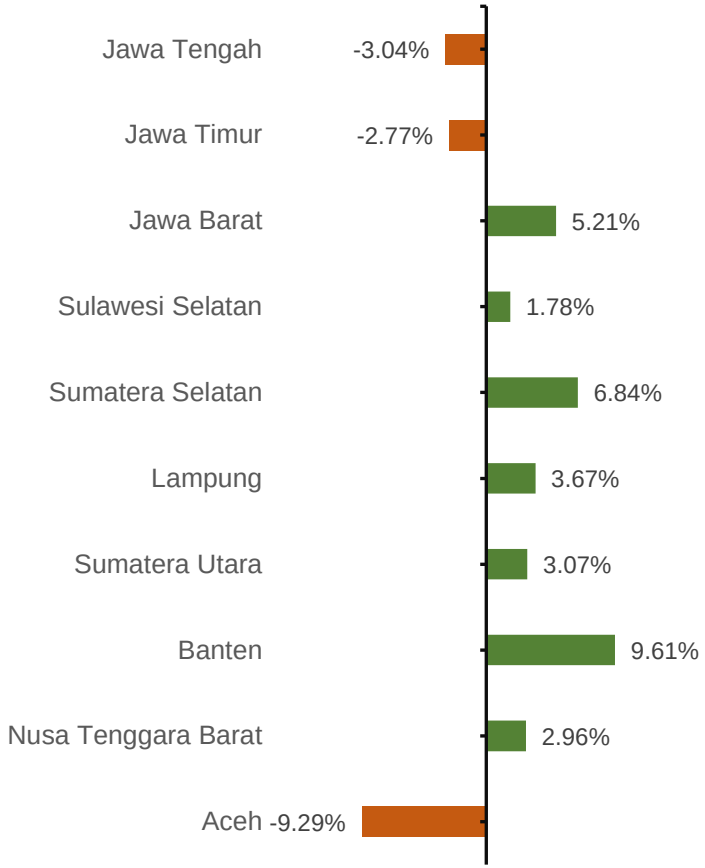


According to the latest analysis of the Food and Nutrition Surveillance System (SKPG), the National Food Agency has reported that most provinces were food secure in August 2022. Thirty-one provinces were found to be stable, while three provinces were under watch for possible deterioration of food security and nutrition status. These include Nusa Tenggara Timur, Kalimantan Barat and Sulawesi Barat.

On a monthly basis, the NFA through SKPG monitors the food security and nutrition status of provinces by using several indicators including planted areas and crop failures, average prices of food commodities, and changes in the weight of children under five.

Paddy Crop Monitoring: January – September 2022

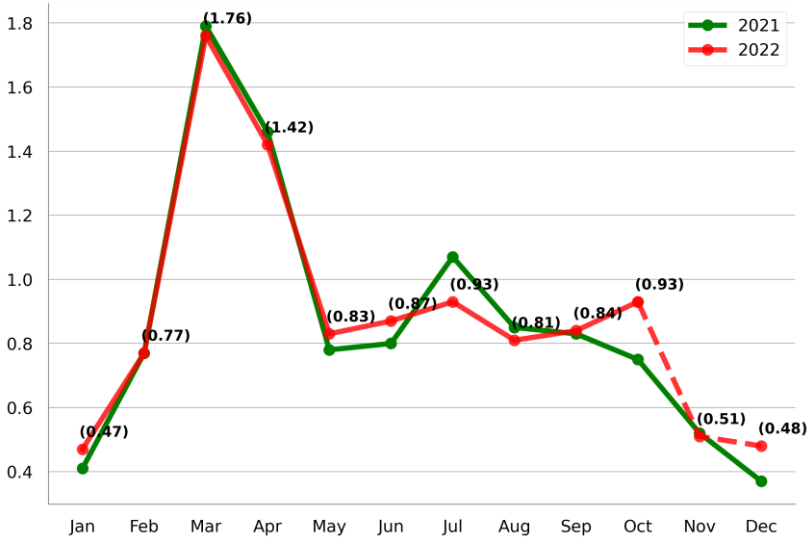
Changes in top 10 main rice-producing provinces
Jan - Sep 2021 and Jan – Sep 2022



Top five provinces in rice production
(January – September 2022):

1. Jawa Tengah (± 4.73 million tonnes)
2. Jawa Timur (± 4.71 million tonnes)
3. Jawa Barat (±4.47 million tonnes)
4. Sulawesi Selatan (± 2.42 million tonnes)
5. Sumatera Selatan (± 1.41 million tonnes)

Total harvested area per month (million hectares)*
2021 - 2022



Harvested paddy area (2021-2022),
in million hectares

Jan - Sep 2021:	Jan - Sep 2022:
8.76	8.69

-0.86%

Rice production (2021-2022),
in million tonnes

Jan - Sep 2021:	Jan - Sep 2022:
26.23	26.17

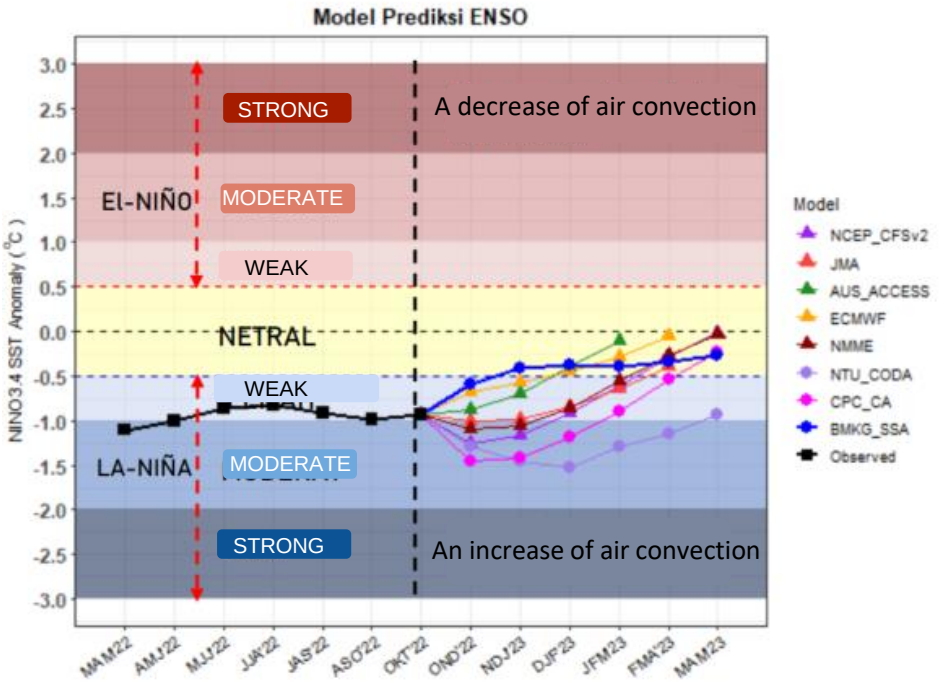
- 0.22%

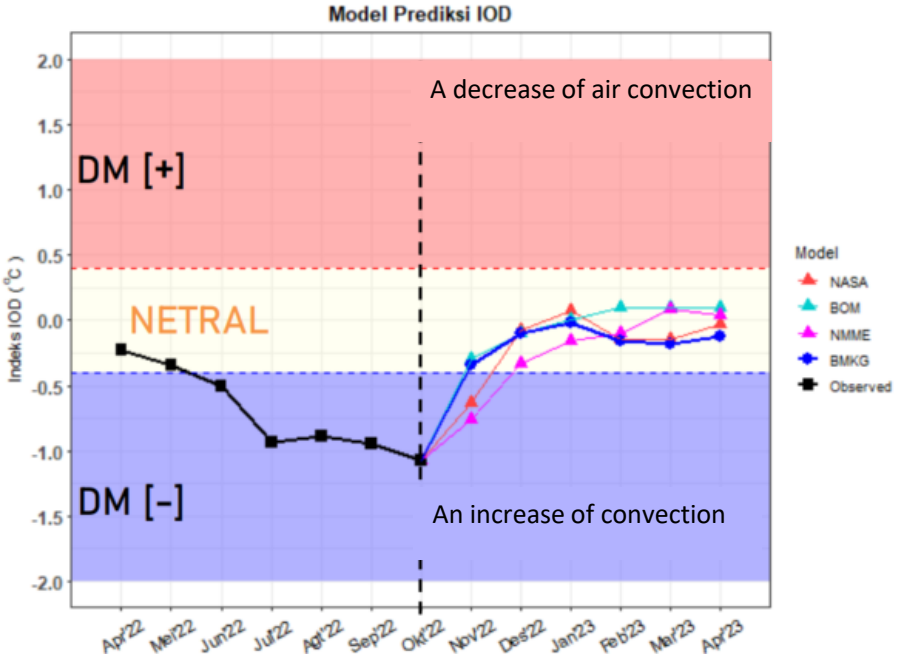
Statistics Indonesia (BPS) has reported that the harvested areas and rice production remained relatively stable from January to September 2022. A small difference of less than 1% was recorded compared to the same period in 2021. Overall, BPS estimates that national rice production in 2022 will reach approximately 32 million tonnes, representing a 2.3% increase compared to last year's rice production.

The chart on the left shows the changes in rice production for the top ten main rice-producing provinces compared to the same period last year. Seven out of ten provinces had an increase in rice production, including Banten where the Ministry of Agriculture intervened with their Planting Index programme (IP400) where rice is harvested four times a year, resulting in a rise of rice production by 9.6% [1]. However, rice production in Jawa Tengah, Jawa Timur and especially Aceh decreased during the observed period.

*Rice production from October – December 2022 is estimated.

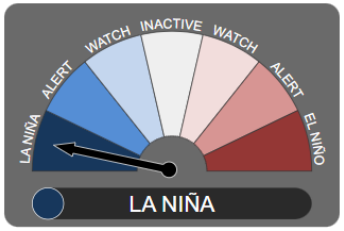
ENSO and IOD Outlook: October 2022

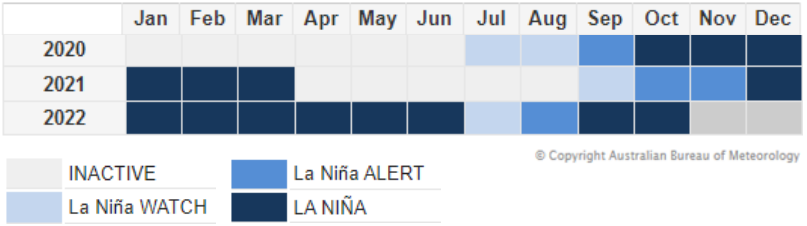




Monthly ENSO Outlook Values

As of October 2022, Indonesia is still exposed to La Niña. Although some effects are persisting, they are expected to be of weakening intensity until the end of the year.





ENSO and IOD Analysis

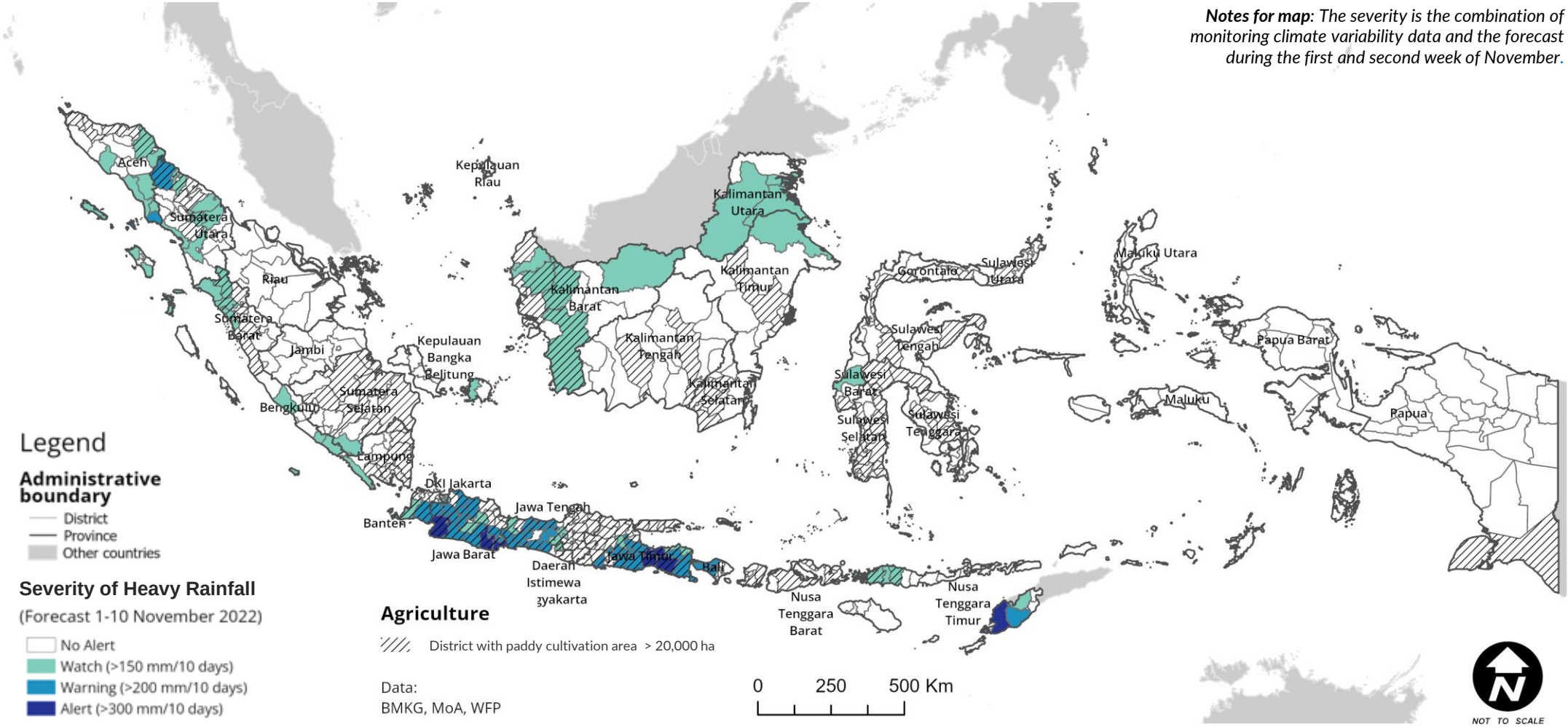
The rainfall variability is generally influenced by El Niño–Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD). Both phenomena contribute to an increase in convective activity from the Pacific Ocean and Indian Ocean towards Indonesia. Consequently, they often cause heavy rains which increase the potential of floods. Atmospheric and oceanic indicators suggest ongoing La Niña.

The ENSO index is used to identify La Niña or El Niño as well as the rainfall patterns associated with these climate phenomena. The occurrence of ENSO anomalies (El Nino and La Niña) was found to have increased over the past 40 years. Latest trends show that ENSO anomalies are now occurring once every 2-3 years. Before 1980, these events only happened once every 5 years.

The current La Niña phenomenon has continued to prevail for three consecutive years since 2020 (Triple-dip La Niña). This long-lasting La Niña is the first of the 21st century. Triple-dip La Niña occurred only twice in the last 50 years, from 1973-1975 and from 1998-2001.

Based on the latest oceanic observation, the ENSO and IOD show negative values of -0.93 and -1.07 in October 2022, which indicates a persisting (although weakening) La Niña phenomenon. BMKG and several climate agencies in the world predict that the ENSO and IOD indexes will gradually move to neutral phase towards the end of 2022.

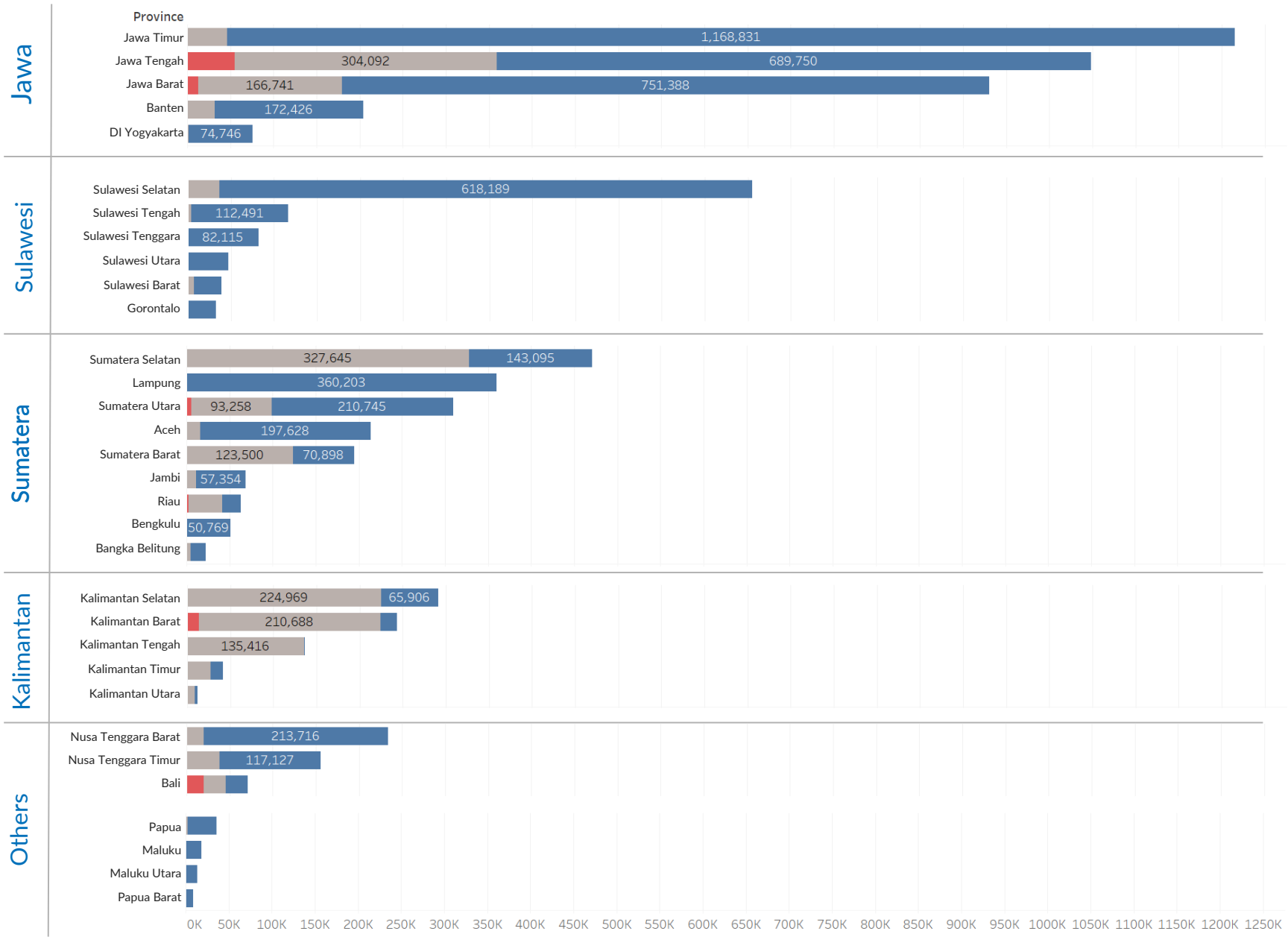
Early Warning: Heavy Rainfall - November 2022



Based on the Meteorological, Climatological, and Geophysical Agency (BMKG) early warning data as of 31 October 2022, several districts were forecasted to experience heavy rainfall during in the first 10 days of November which could increase the likelihood of floods and landslides. This is due to an early rainy season combined with the persisting La Niña phenomenon.

From 1 to 10 November, the alert for extreme heavy rainfall (>300mm/10 days) is predicted in a total of 8 districts in Jawa Barat, Jawa Timur and Nusa Tenggara Timur. The warning for heavy rainfall (200 – 300mm/10 days) is predicted in 37 districts in Aceh, Sumatera Utara, Bali, Banten, Jawa Barat, Jawa Tengah, Jawa Timur and Nusa Tenggara Timur. Potential heavy rain (150 – 200mm/10 days) is also estimated for 58 districts in Aceh, Banten, Bengkulu, DI Yogyakarta, DKI Jakarta, Jawa Barat, Jawa Tengah, Jawa Timur, Kalimantan Barat, Kalimantan Timur, Kalimantan Utara, Bangka Belitung, Lampung, Nusa Tenggara Timur, Sulawesi Barat, Sumatera Barat, Sumatera Selatan and Sumatera Utara.

Agricultural Forecast: Rainfall in Paddy Cultivation - October to December 2022



The Center for Climate and Atmospheric Research (PRIMA) of the National Research and Innovation Agency (BRIN) predicts that 73% of paddy cultivation area will experience more rainfall from October to December 2022.

In total, 5.4 million hectares of paddy cultivation are estimated to experience above normal rainfall. This poses a risk of floods and pest disturbances, which can lead to crop failures.

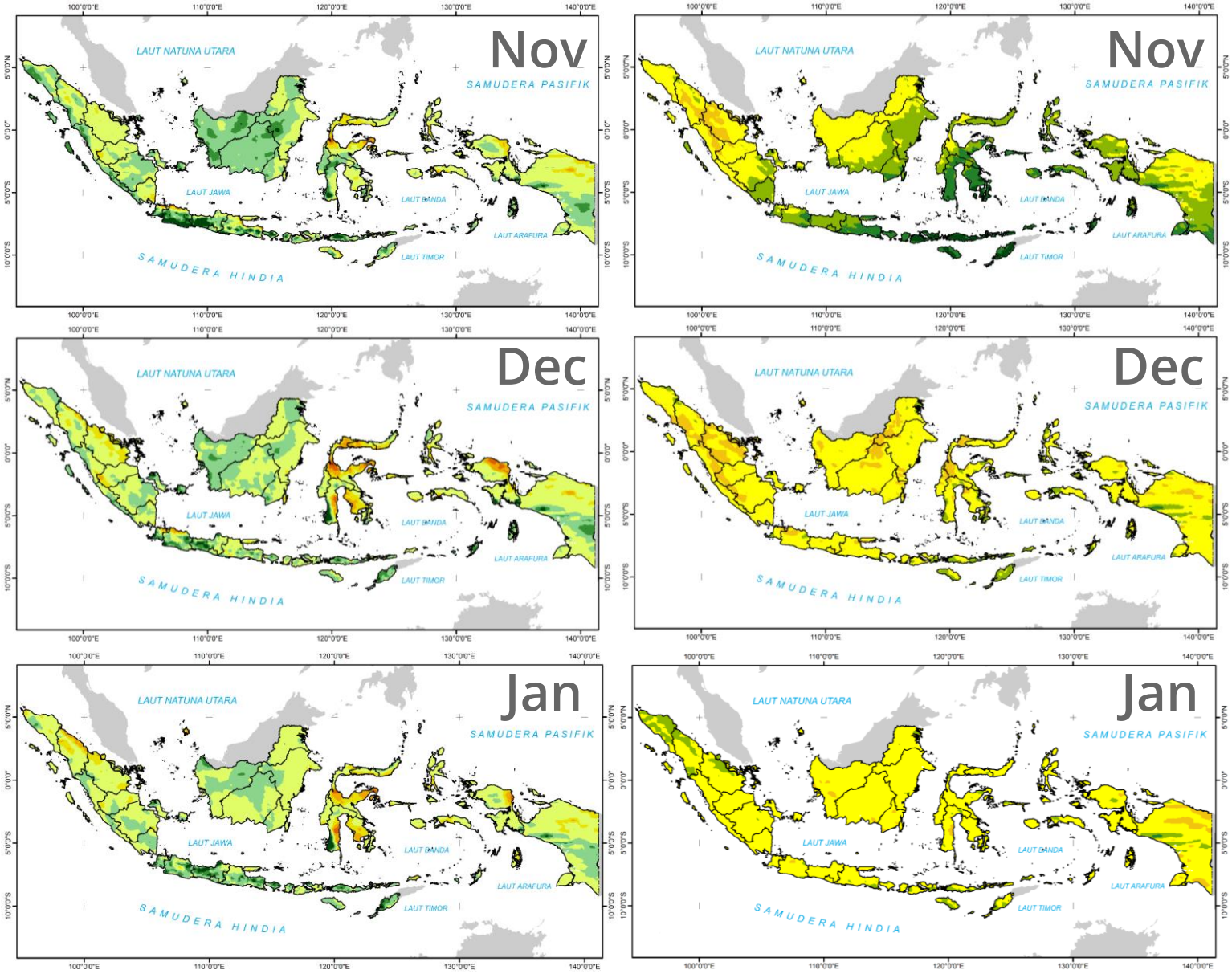
The chart on the left shows the hectares of paddy cultivation that may experience a rainfall anomaly from October to December. More than 80% of paddy cultivation in Jawa are predicted to have rainfall above the long-term average (30 years).

On the other hand, rainfall below average is predicted in smaller areas in Jawa Tengah, Jawa Barat, Sumatera Utara, Kalimantan Barat and Bali.

Predicted rainfall anomaly

- Above average
- Average
- Below average

Climate Outlook Nov 2022 - Jan 2023: BMKG Rainfall Forecast



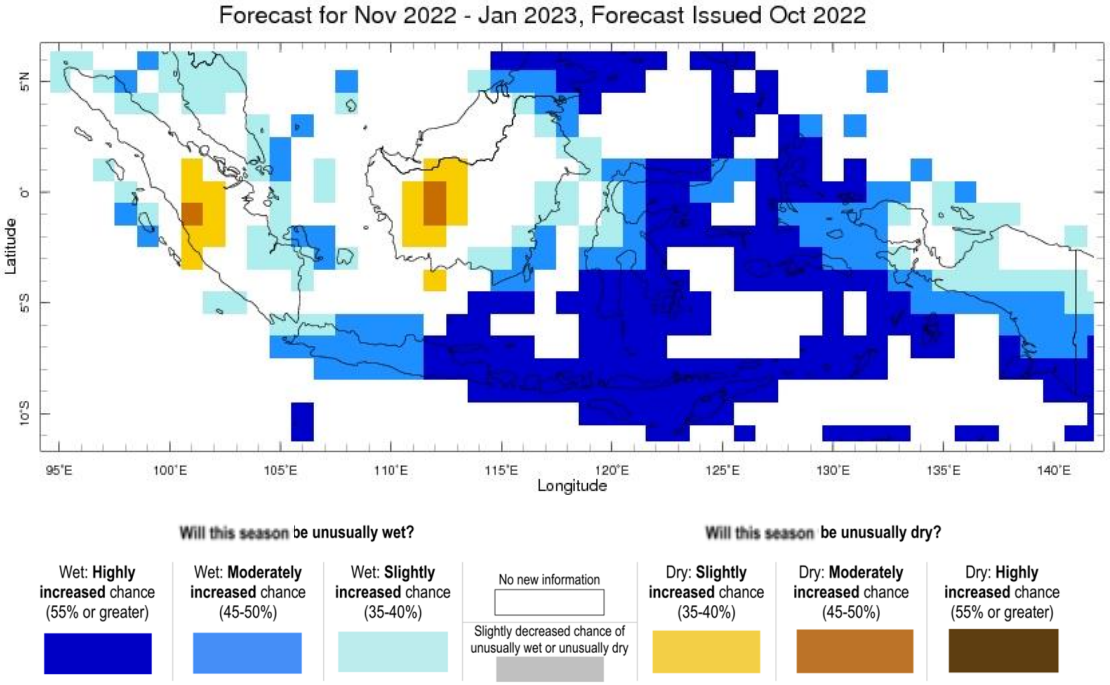
Based on BMKG forecasts, moderate to heavy rainfall is expected between November 2022 and January 2023. As of October 2022, 48,6% of Indonesia had entered the rainy season. The early onset of the rainy season combined with the persisting effect of La Niña contributed to the increase of rainfall in most areas.

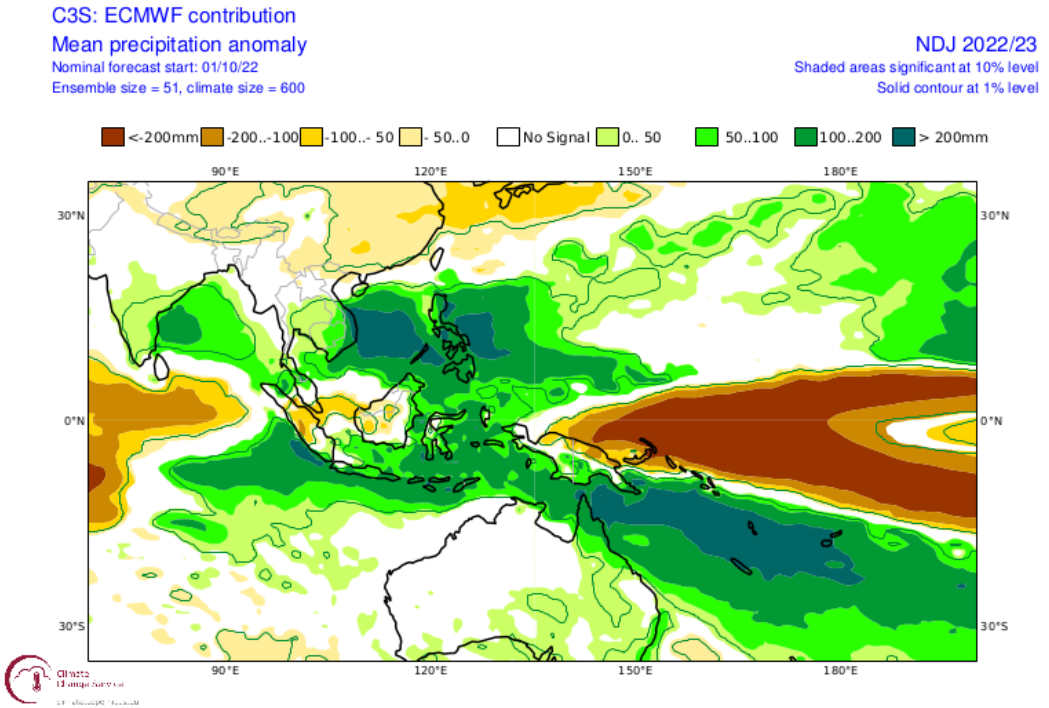
In November 2022, 53% of the Indonesian territory is predicted to experience moderate rainfall, while 47% is likely to have high rainfall. Rainfall anomaly in Jawa, Sulawesi, Nusa Tenggara, Maluku, the eastern parts of Kalimantan, and the southern parts of Papua are likely to be above normal. Riau and its surrounding areas are predicted to experience less rainfall, while most areas in Sumatera, the eastern part of Kalimantan and the northern part of Papua will have rainfall within the normal range.

In December 2022, 67% of Indonesia is predicted to experience moderate rainfall, while 33% will have high rainfall. Rainfall anomaly is likely to be within the normal range except for Riau, Sumatera Utara, Sumatera Barat, Jambi, Sulawesi Tengah, and some districts in Kalimantan Tengah and Kalimantan Utara. Nusa Tenggara Timur is predicted to have above normal rainfall.

In January 2023, 72% of Indonesia is likely to experience moderate rainfall, while 28% will have high rainfall. The amount of rainfall is expected to be normal except for Aceh, where rainfall is predicted to increase and the northern part of Papua where there will likely be less rainfall.

Climate Outlook Nov 2022 - Jan 2023: Indonesia in Global Rainfall Forecast





IRI Columbia University and ECMWF show a similar precipitation forecast for the period of November 2022 to January 2023.

Most areas in Jawa, Nusa Tenggara, Sulawesi, Maluku and Papua are expected to have increasing rainfall during this three-month period. On the other hand, rainfall in Sumatera and Kalimantan are expected to be in normal condition except for the areas around Sumatera Barat, Riau, Kalimantan Barat and Kalimantan Tengah where there will likely be less rainfall.

These forecasts show the probability of accumulated rainfall over the next three months, either situated above or below normal conditions compared to the long-term average. They do not indicate the likelihood of individual heavy rainfall events and should not be used to forecast local conditions or floods.

Left: IRI Columbia University seasonal forecast for Nov 2022 - Jan 2023 indicates a probability of total rainfall within the next three months to be unusually high or low:
http://iridl.ldeo.columbia.edu/maproom/IFRC/FIC/prcp_fcst.html?bbox=bb%3A94.584%3A-11.255%3A141.811%3A6.308%3Abb

Right: ECMWF three-month seasonal forecast for Nov 2022 - Jan 2023 where green, white, and brown shades indicate wet, normal, and dry condition, respectively:
https://climate.copernicus.eu/charts/c3s_seasonal/c3s_seasonal_spatial_ecmf_rain_3m?facets=Parameters,precipitation&time=2022100100,744,2022110100&type=ensm&area=area12

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