



Dec 2023

INDONESIA

A joint collaboration by:

Seasonal Monitoring Bulletin

July – September (Q3) 2023





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Key Messages

Meteorological drought across Indonesia: With El-Niño at a moderate level, positive IOD index, parts of Indonesia have experienced prolonged meteorological drought during the dry season. As a result, in August 2023, around 23,451 hectares of paddy cultivation area were affected nationally and about 6.964 ha of experienced crop failure.

Delayed rainy season: Meteorological, Climatological, and Geophysics Agency (BMKG) data indicates that only 73 of the expected 178 seasonal zones experienced rainy season in the second half of October 2023. Thus, indicating a delayed rainy season across Indonesia.

Increased frequency of disasters: Indonesia's National Disaster Management Agency (BNPB) reported 1,185 disasters between July and September 2023, of which majority are drought related. This number is significantly higher compared to the same period in 2022.

Decreased Rice Production: By October 2023, Statistics Indonesia (BPS) estimated a decrease of rice production of 645 thousand tons resulting into total production of 30.9 tons. This is two percent decrease in comparison with 2022. BPS also estimated that throughout 2023, paddy harvested area in Indonesia will reach approximately 10.20 million hectares, which is 2.45 percent or 255.79 thousand hectares lesser when compared to 2022 (10.45 million hectares).

Status of Food Security and Nutrition: According to the National Food Agency (NFA), more than half of all provinces in Indonesia were considered food secure by September 2023. Out of 34 provinces, 22 provinces were categorized as stable. 12 provinces were being monitored for possible deterioration for its food security and nutrition situation, compared to 3 last year.

Continued impact of El Niño: The National Research and Innovation Agency (BRIN) predicted that the ongoing El Niño conditions and its resulting climate conditions over Indonesia is likely to have implications on rice planting and production, even with the regular start of rainy season in November 2023. Additionally, delayed onset of the rainy season could potentially result in reduced rice production by late 2023 and early 2024.



SEASONAL MONITORING

RAINFALL ANALYSIS

VEGETATION MONITORING

TEMPERATURE MONITORING

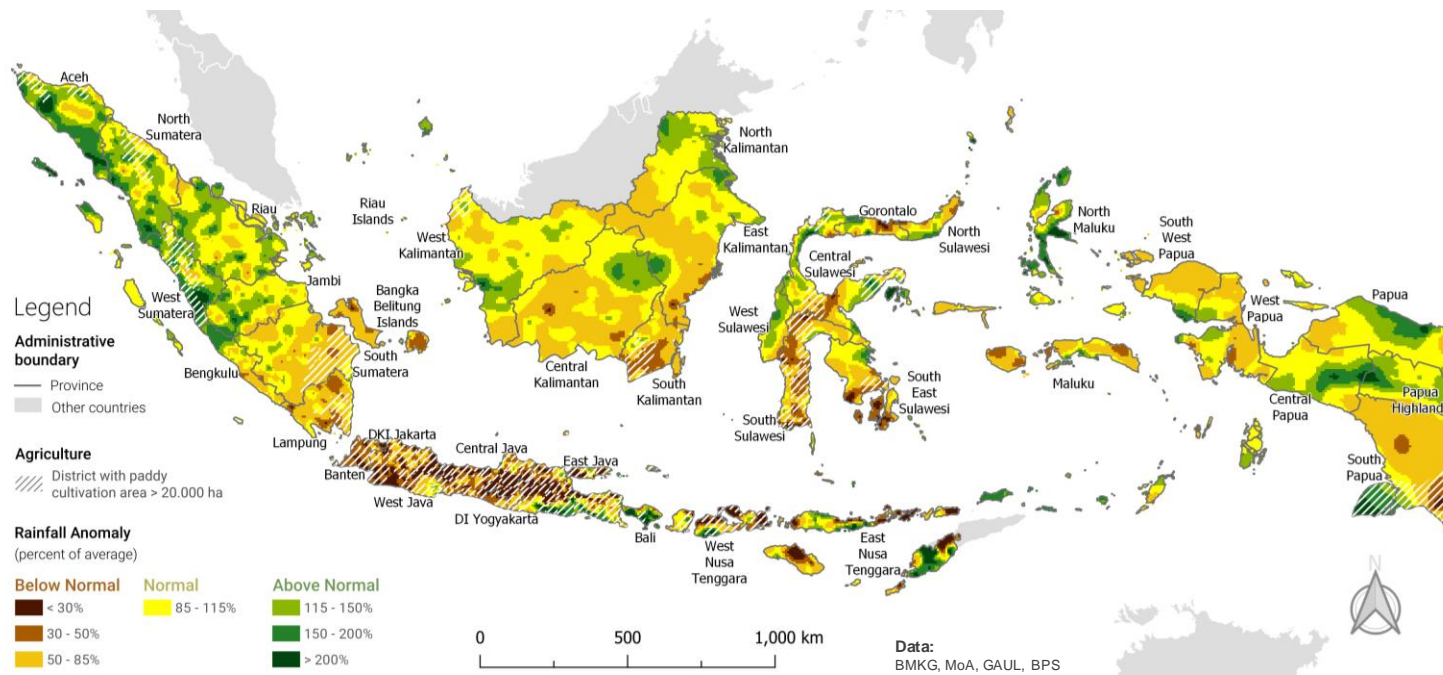
SEASONALITY STATUS

DROUGHT MONITORING

DISASTER MONITORING

Rainfall Analysis: July – September 2023

The accumulation of rainfall in comparison to 30-year average (1991-2020)

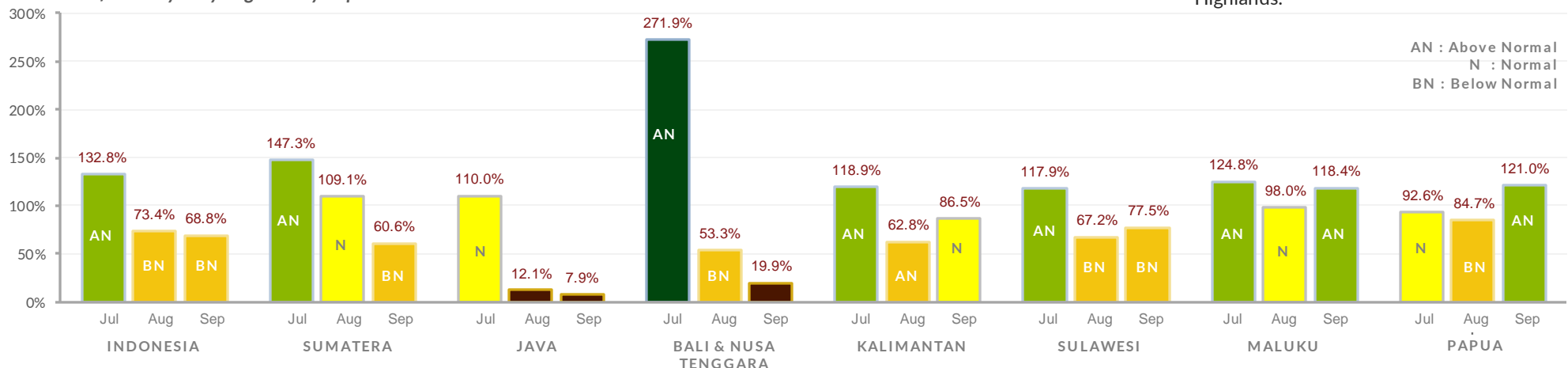


Between July and September 2023, Indonesia experienced drier than normal conditions, with 30 percent less rainfall between August and September when compared to the long-term average.

The most significant decrease in rainfall during July to September was observed along Java, Bali, Nusa Tenggara and Sulawesi. As presented in the graph below, Java received only 8 percent and Bali and Nusa Tenggara 20 percent precipitation in September 2023, compared to the long-term average. Overall, below-normal rainfall was recorded in fifteen provinces: South Sumatera, Bangka Belitung Islands, Lampung, Banten, West Java, D.K.I. Jakarta, Central Java, D.I Yogyakarta, East Java, South Kalimantan, South Sulawesi, South East Sulawesi, West Nusa Tenggara, South Papua, and South West Papua.

On the contrary, above-normal rainfall conditions were experienced in eight (8) provinces: Aceh, North Sumatera, West Sumatera, Riau Islands, Bali, North Maluku, Central Papua, Papua Highlands.

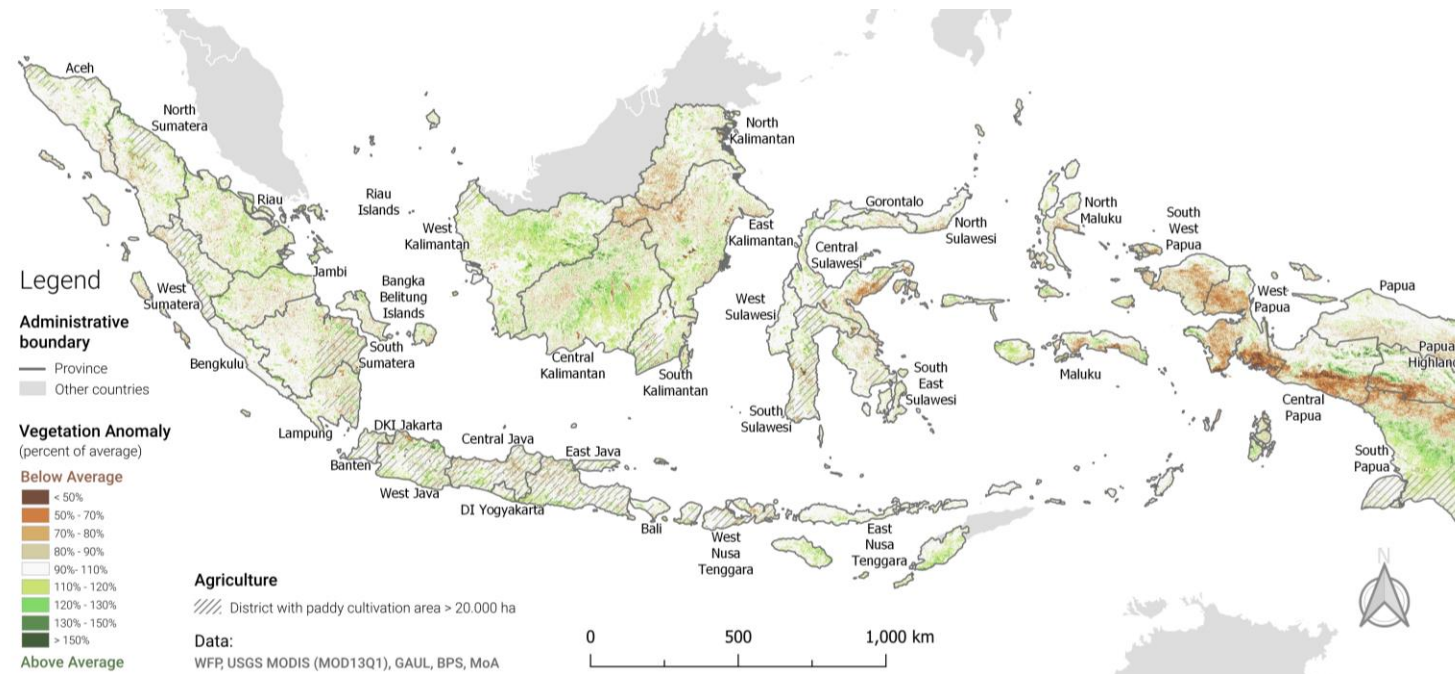
Rainfall Analysis by Region: July-September 2023



Rainfall data source: BMKG

Vegetation Monitoring: July – September 2023

Overall vegetation conditions in comparison to 20-years average (2001-2020)



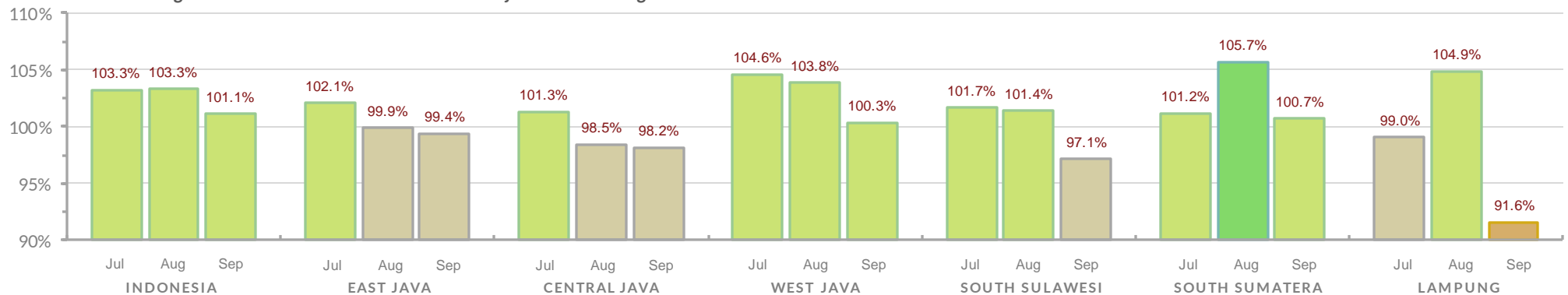
Between July and September 2023, on average, the Vegetation Index (VI) was in line with the long-term trend, however regional differences exist, as presented in the map.

A below-average VI was observed in northern parts of Kalimantan, eastern parts of Sulawesi, and across Papua. An earlier onset of the dry season and below-average rainfall received during the second quarter of this year are likely the key factors contributing to the below-normal VI. Similarly, a decreasing trend of VI was observed from July in major rice producing areas such as East, Central, and West Java, as well as in South Sulawesi.

On the other hand, parts of Indonesia-Sumatera, Java, Kalimantan, and most of Sulawesi had normal to above-average VI.

Note: Above average Vegetation indicates an increase in vegetation greenness, which may correlate to healthy vegetation or crops. In contrast, a below-average indicates lower vegetation density and plant health due to environmental stressors, such as climatic hazards, land usage, and land cover changes.

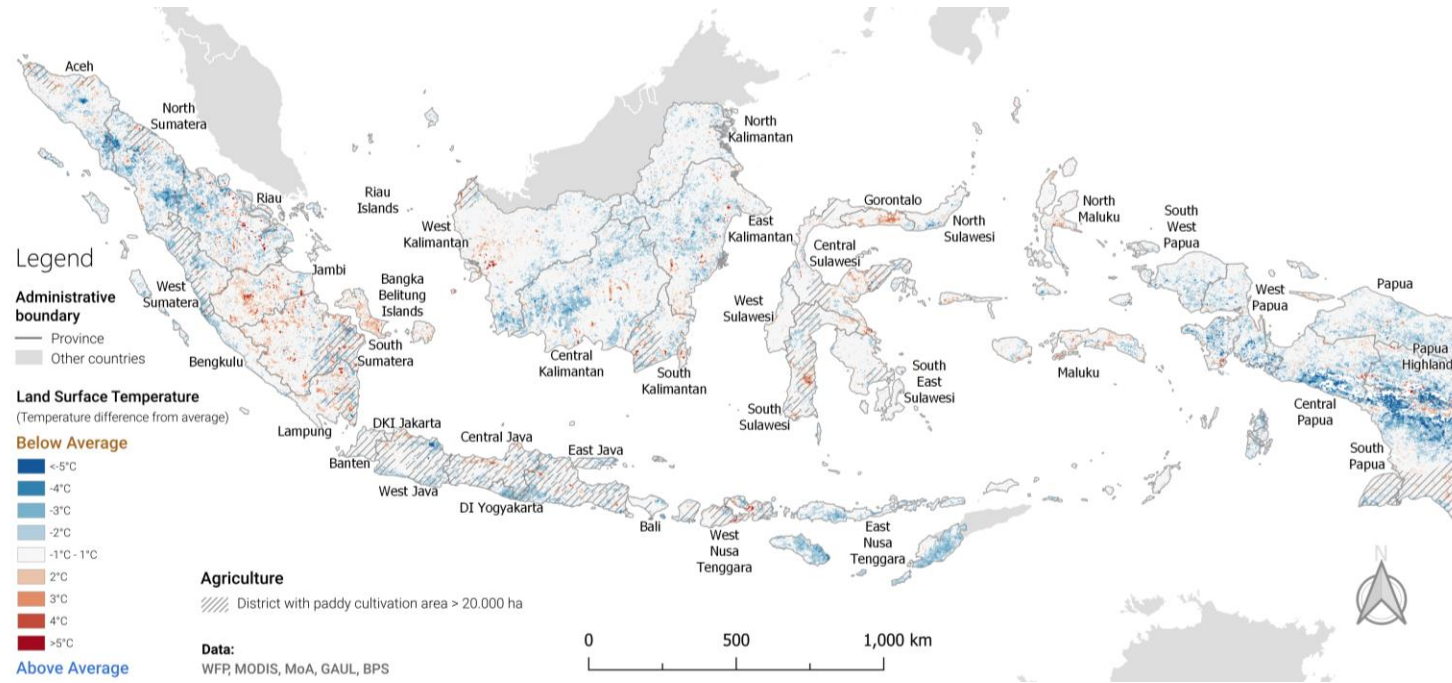
Estimated Vegetation Index in National-level and in Major Rice-Producing Provinces



NDVI data source: <https://pdaac.usgs.gov/products/mod13q1v061/>

Temperature Monitoring: July – September 2023

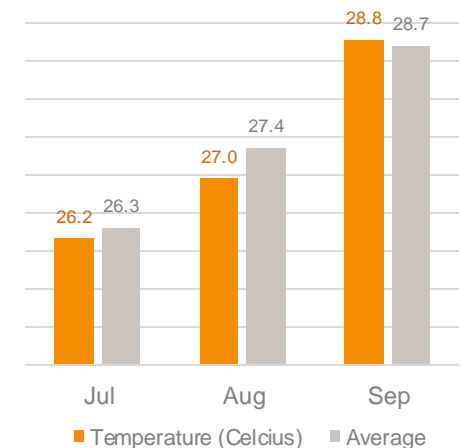
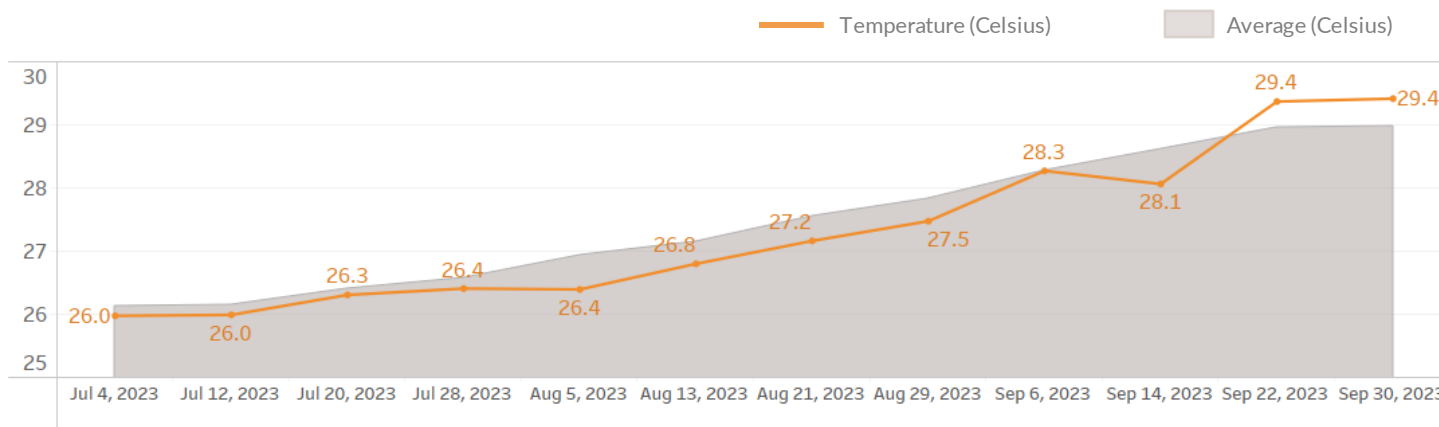
Surface temperature difference in comparison to 20 years of data average (2001-2020)



Throughout the third quarter of 2023, the average land surface temperature over Indonesia deviated slightly compared to long-term average.

The week-to-week variation indicates that the last two weeks of September experienced much higher temperature differences when compared to the long-term average.

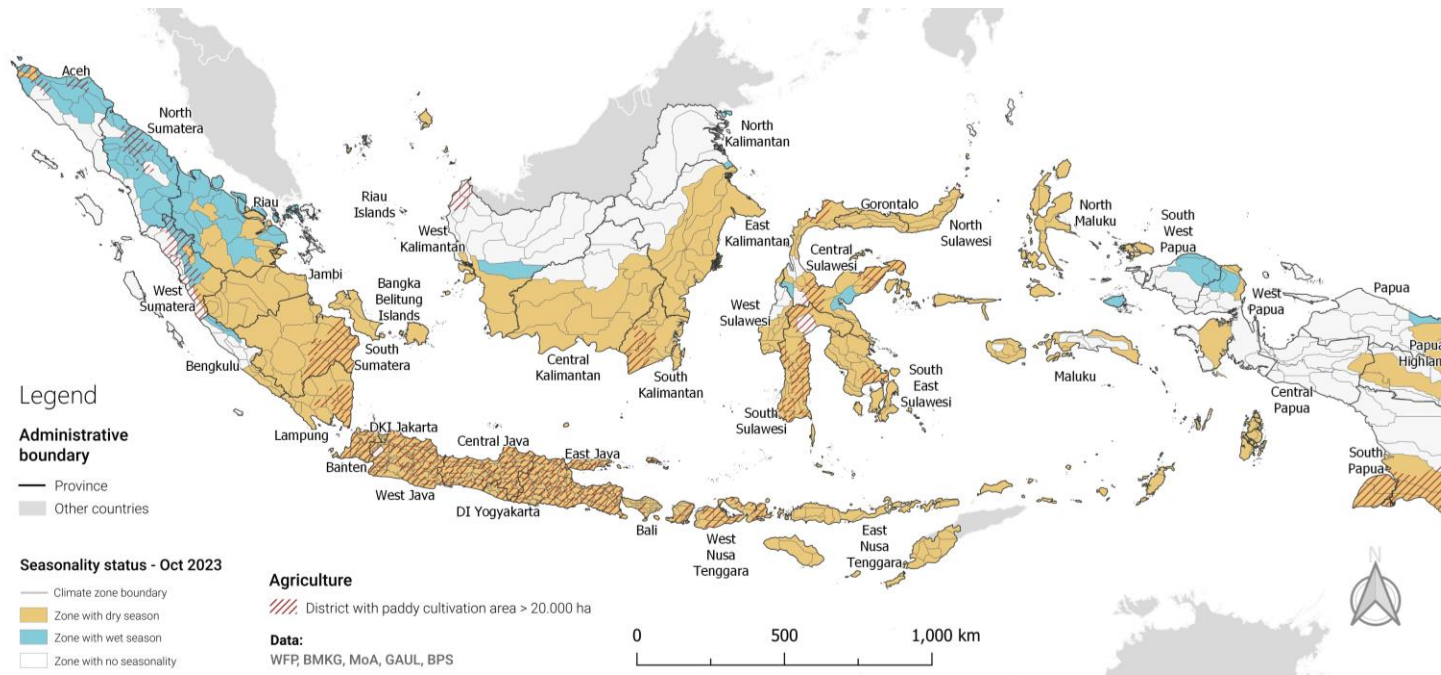
Below-average temperatures were observed in North Sumatera, D.I. Yogyakarta, East Nusa Tenggara, Central Kalimantan, East Kalimantan, Central Papua, South Papua and Papua Highlands. On the contrary, Riau, Jambi, South Sumatera, Gorontalo experienced above-average temperatures.



Surface temperature data source: <https://lpdaac.usgs.gov/products/mod11a2v061/>

Seasonality Status: October 2023

Seasonal zone that currently experience dry or rainy season

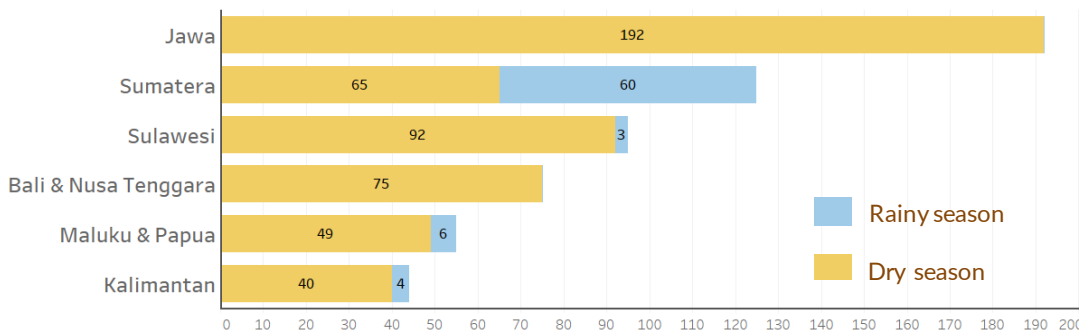


Rainfall patterns in Indonesia can be characterized as monsoonal, equatorial, and local seasonal zones. Rainfall patterns within each seasonal zone can vary based on regional and local factors.

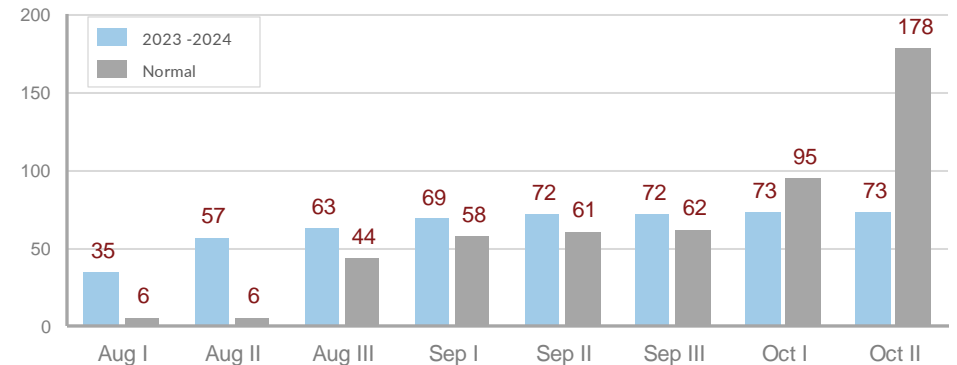
A report from the Meteorological, Climatological, and Geophysical Agency (BMKG) highlighted 513 (73%) out of the total 699 seasonal zones were still in the dry season by October 2023. Java has the maximum number (192) of seasonal zones experiencing dry season, followed by Sulawesi (92), and Bali and Nusa Tenggara (75).

Overall, the onset of rainy season is delayed, as illustrated in the chart below. Most of the seasonal zones, expected to be in the rainy season in mid-October, were still experiencing dry season throughout October.

Seasonality Status: October 2023



Number of seasonal zone with Rainy Season in 2023 compared to normal

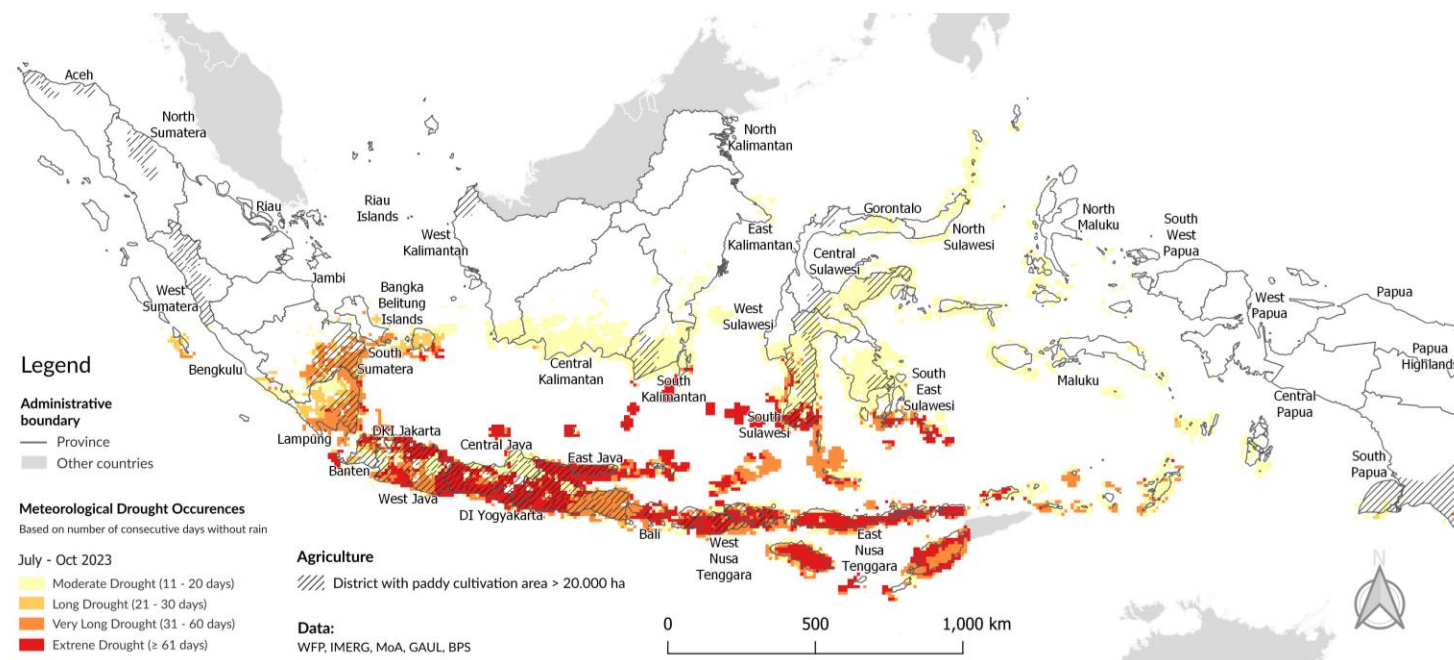


BMKG Seasonality Status: <https://cdn.bmkg.go.id/Web/30.-Dinamika-Atmosfer-Dasarian-II-Oktober-2023.pdf>

Seasonal Zone is an area where the average rainfall pattern has a clear difference between the dry season and the rainy season. Areas where the average rainfall pattern does not have a clear difference between the dry season and the rainy season are called Non Seasonal Zones. The area of a seasonal zone is not always the same as the area of a government administrative area. Thus, one seasonal zone can consist of several districts, and conversely one district area can consist of several seasonal zones.

Drought Monitoring: July – September 2023

Number of consecutive days since the last rainfall (above 1mm per day)



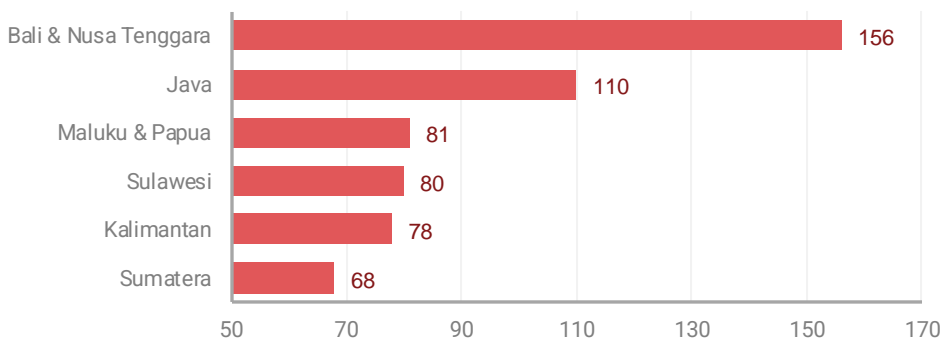
During the third quarter of 2023, satellite observations indicate that Java, Bali, and Nusa Tenggara Islands, southern part of Sumatera and Kalimantan, as well as Sulawesi experienced meteorological drought.

On average, D.I. Yogyakarta, East Nusa Tenggara, West Nusa Tenggara, Bali, and East Java was classified as the area with extreme drought (>60 days without rain). This increases the risk of limited water availability and the threats to rainfed agriculture activities.

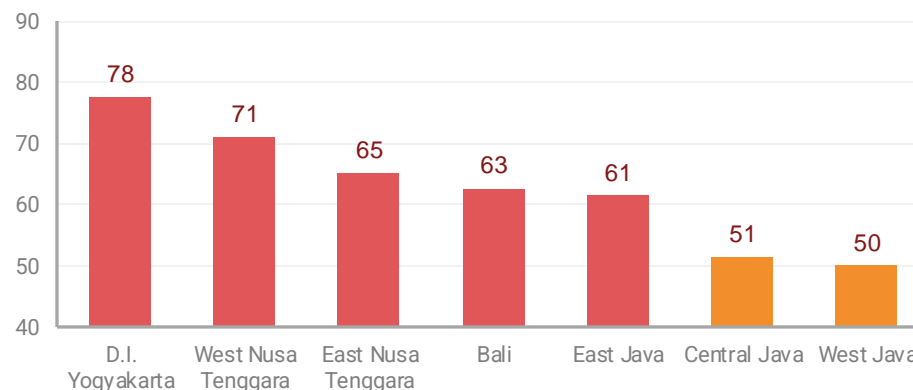
In comparison, Sulawesi, Kalimantan, and Maluku recorded fewer consecutive days without rain, thus facing minimal risk of drought.

Note: The Meteorological, Climatological, and Geophysical Agency (BMKG) uses the number of consecutive days without rain as a proxy indicator of meteorological drought.

Maximum number of consecutive days without rain in each region



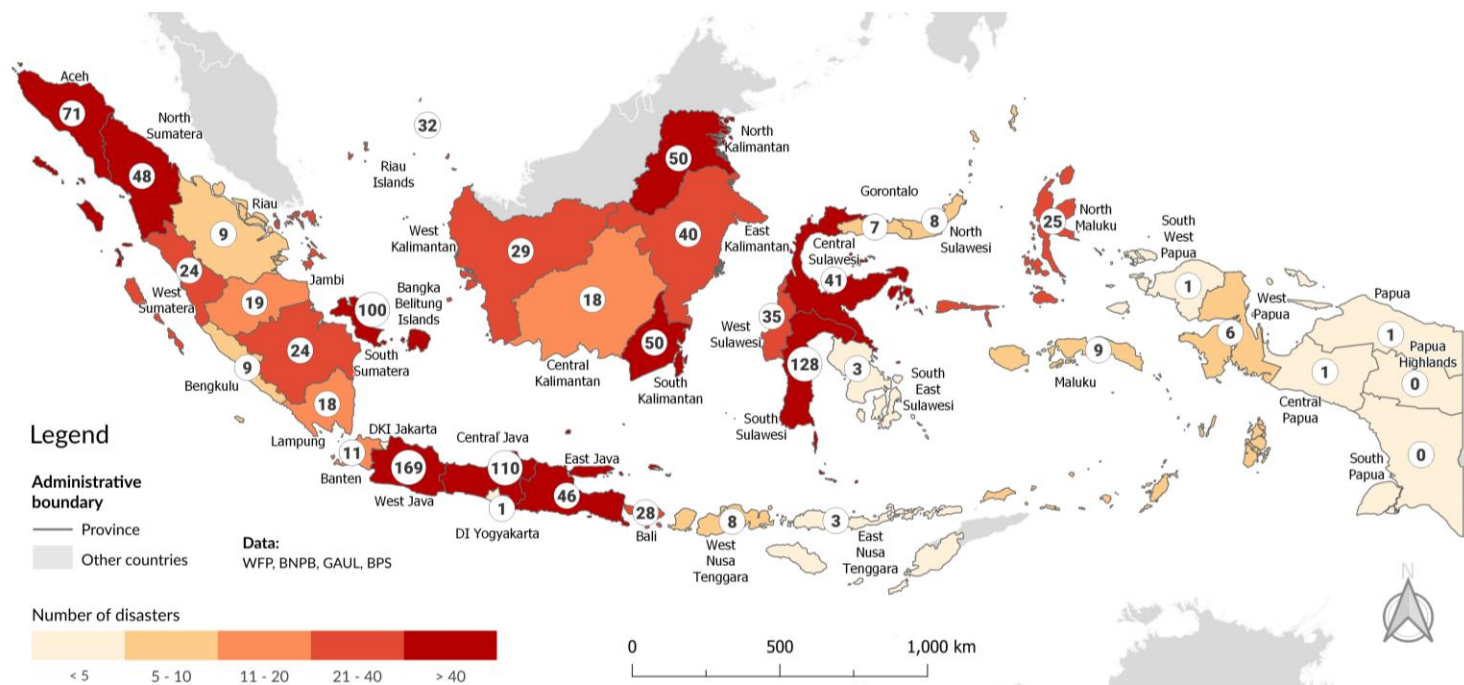
Average number of consecutive days without rain in seven driest provinces



Rainfall data source https://gpm1.gesdisc.eosdis.nasa.gov/data/GPM_L3/GPM_3IMERGDL_06/
 Current drought situation: https://prism.wfp.or.id/app/?hazardL_ayerids=dslr

Disaster Monitoring: July – September 2023

Number of reported disasters by the National Disaster Management Agency



The National Disaster Management Agency reported 1185 disasters between July and September 2023. This represents a 39.5% increase compared to the same period in 2022 (784 disasters). The most affected provinces were West Java and Central Java.

The majority of these disasters were attributed as hydrometeorological (690 out of 1185). The hydrometeorological disasters happened in the third quarter of this year are also higher in comparison to last year within the same time period, particularly for drought.

In comparison to the same period in 2022, the number of people impacted by disasters during this period increased almost three times and there was 28 percent increase in infrastructures damages.



	Flood	Extreme Weather	Landslide	Land & Forest Fire	Tidal Wave & Abrasion	Earthquake	Drought	TOTAL DISASTERS	Damaged Infrastructures	Impacted Population
2023 Jul - Sep	225	243	121	481	6	8	101	1185	5,272	2,353,239
2022 Jul - Sep	287	151	92	141	10	8	3	692	4,127	594,608
	▼ -21.60%	▲ +60.93%	▲ +31.52%	▲ +241.13%	▼ -40%	— 0%	▲ +3266.7%	▲ +71.24%	▲ +28%	▲ +295.76%



FOOD SECURITY AND NUTRITION

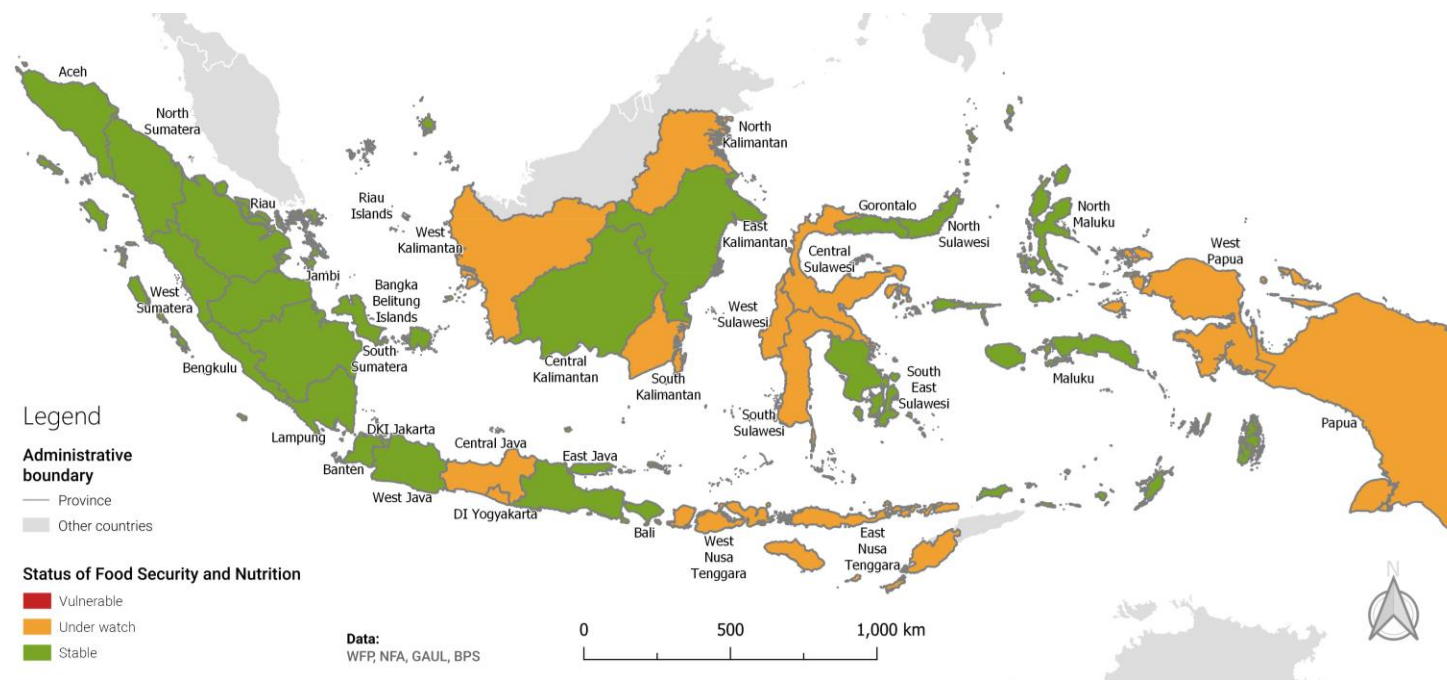
STATUS OF FOOD SECURITY AND NUTRITION

DISTURBANCES TO PADDY CROPS

AGRICULTURAL MONITORING AND FORECAST

Status of Food Security and Nutrition: September 2023

SKPG: Composite Food Security Index Map



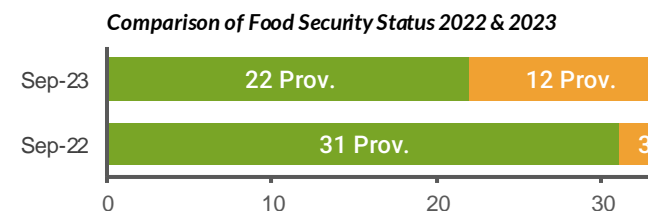
Based on the September 2023 analysis of the Nutrition Surveillance System (SKPG), 12 provinces were categorised in “watch” category for possible degradation of food and nutrition security. This is a four-time increase compared to last year in the same period (September 2022), as presented in the graph below.

Food availability, one of the three pillars of food security, 22 provinces were categories as “Watch” and 1 as “Vulnerable” (Aceh). **Food access** remained stable across all of Indonesia, with an exception of Papua Province.

In terms of **food utilization**, following 4 provinces were categorised as ‘Vulnerable’: West Kalimantan, West Sulawesi, and West Papua and East Nusa Tenggara. Food utilization under “Watch” was recorded in North Kalimantan, East Kalimantan, South Kalimantan, Central Kalimantan, Central Sulawesi, West Nusa Tenggara, and North Maluku.

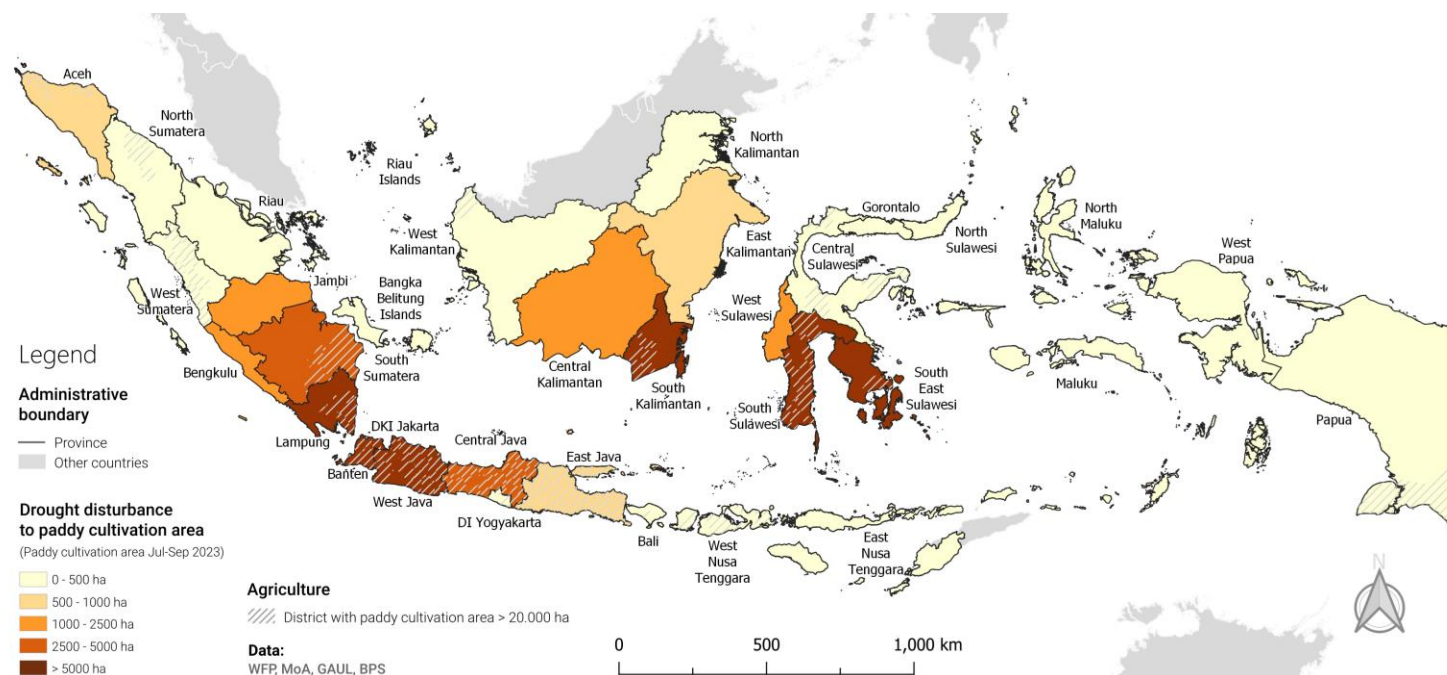
	Food Availability			Food Access	Food Utilization		
Sumatera	4	5	1	10	10		
Java	6			6	5		
Bali & Nusa Tenggara	2	1		3	1	1	1
Kalimantan	1	4		5	4		
Sulawesi	2	4		6	4	1	1
Maluku & Papua	2	2		3	1	2	1

*Statistics by number of provinces, regions are groups for the purpose of the analysis



Disturbances to Paddy Crops: July - September 2023

Impacted paddy cultivation area by droughts

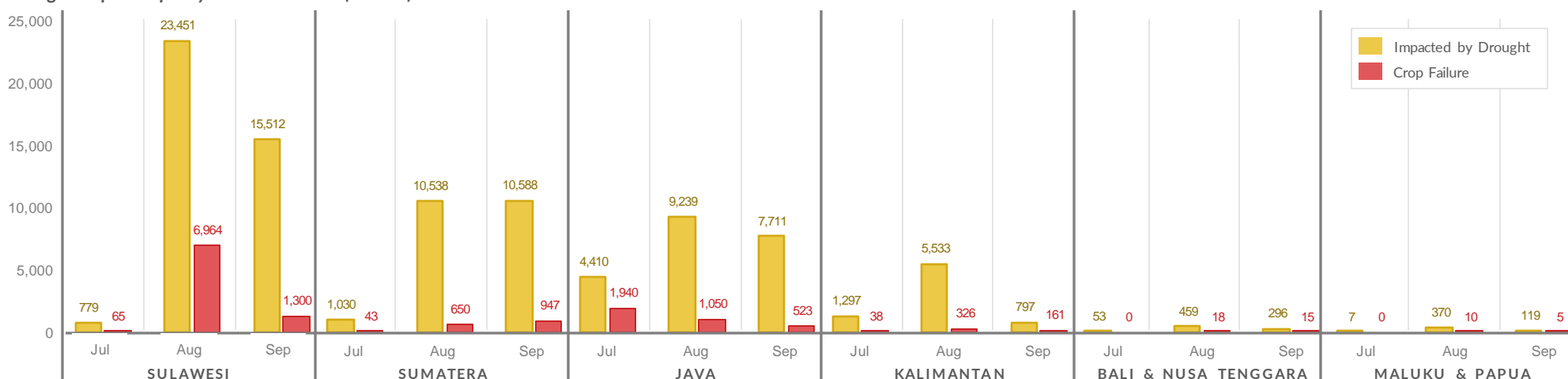


According to the Ministry of Agriculture, the droughts between July and September 2023 caused disturbances to paddy crops growing in several areas across Indonesia. In August 2023, droughts impacted a total of 23,451 hectares of paddy cultivation areas, resulting in 6,964 hectares of harvest failure, equivalent to 15% of the drought-impacted paddy cultivation areas.

39,742 hectares of paddy cultivation area in Sulawesi, 22,156 hectares in Sumatra, and 21,360 hectares in Java Island were affected by drought.

South Sulawesi was the worst affected province, with 31,171 hectares of paddy cultivation areas impacted by drought, resulting in harvest failures covering 6,872 hectares of paddy cultivation areas.

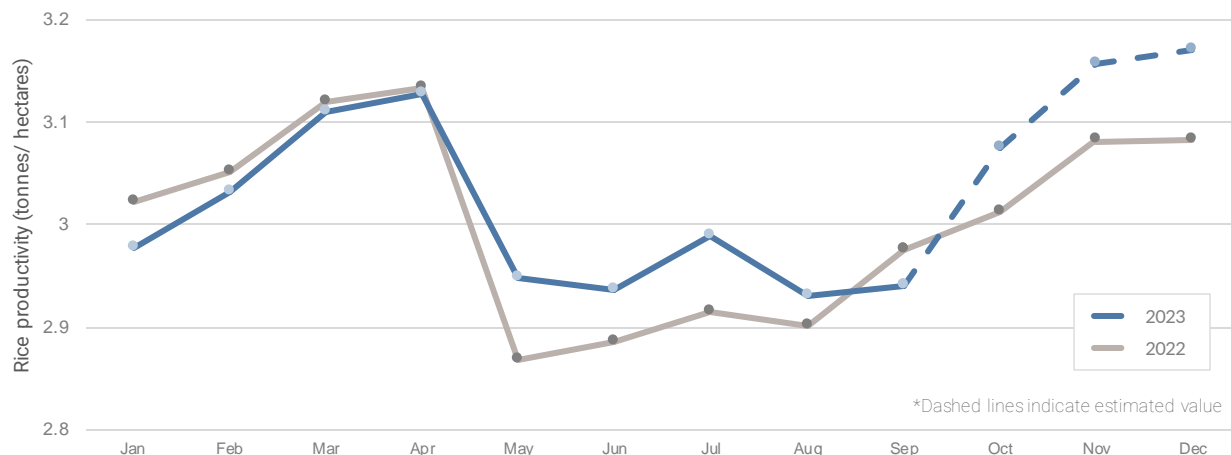
Drought Impacted paddy cultivation area (hectare)



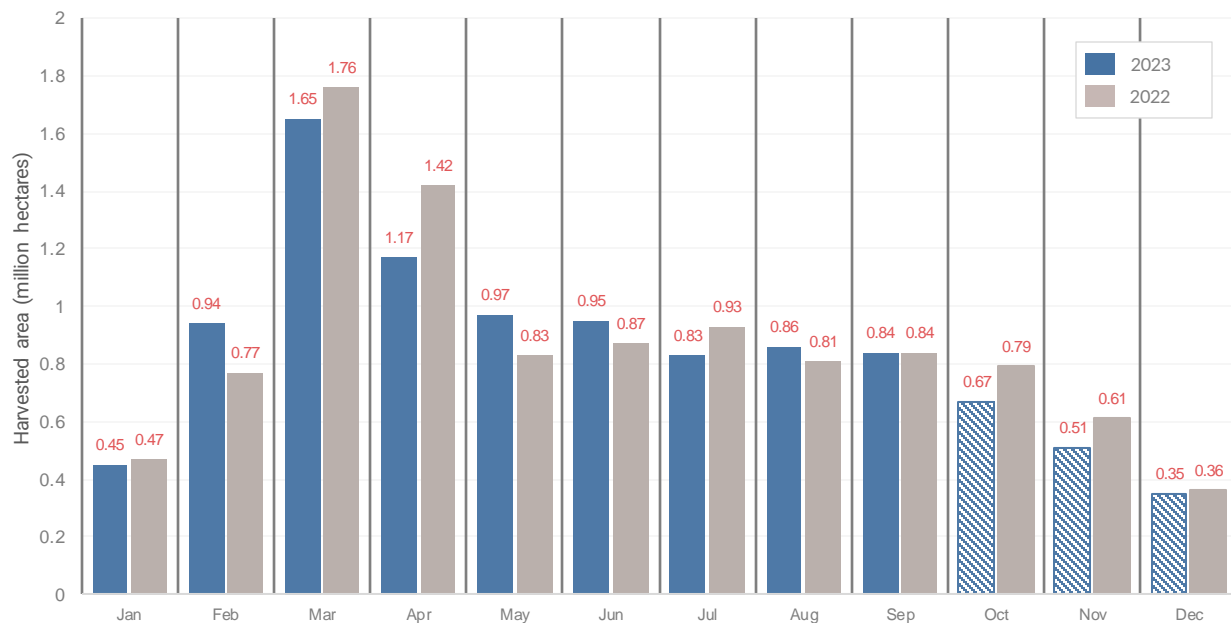
Paddy Crop Monitoring: October 2023

Harvested paddy area and rice production

*Statistics in Oct-Nov 2023 are estimated



*Dashed lines indicate estimated value



*Patterned bars indicate estimated value

Jan – Dec 2023

HARVESTED PADDY AREA

10.20 M ha

(-2.45%)*

RICE PRODUCTION

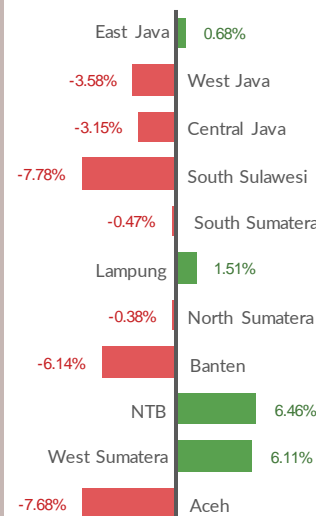
30.90 M tonnes

(-2.05%)*

*Compared to 2022

Changes in top rice-producing provinces

Difference between Jan – Dec 2023 and Jan – Dec 2022



According to the latest figures from Statistics Indonesia (BPS), harvested paddy area in 2023 is anticipated to reach approximately 10.20 million hectares, indicating a decrease of 2.45% or 255.79 thousand hectares compared to the 2022 figure of 10.45 million hectares.

Additionally, BPS also predicts a decline in rice production for 2023, estimating it to be around 30.90 million tonnes. This represents a decrease of 2.05% or 645.09 thousand tonnes compared to the 2022 rice production of 31.54 million tonnes.

Among the top three main rice-producing provinces, there was a decrease of rice production about 3% in both Central Java and West Java. Meanwhile, rice production in East Java remained stable.

Overall, the highest rice production was recorded in Java, with a total of 17.26 million tonnes, contributing to 56% of the national rice production. Followed by Sumatera and Sulawesi which produced 6.47 million tonnes of rice (20.95%) and 4.03 million tonnes of rice (13.04%), respectively.



CLIMATE FORECAST

ENSO OUTLOOK

RAINY SEASON FORECAST: 2023-2024

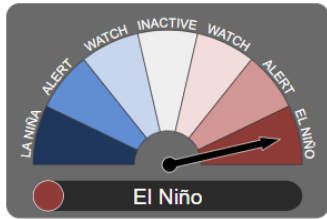
BMKG EARLY WARNING INFORMATION

BMKG RAINFALL FORECAST

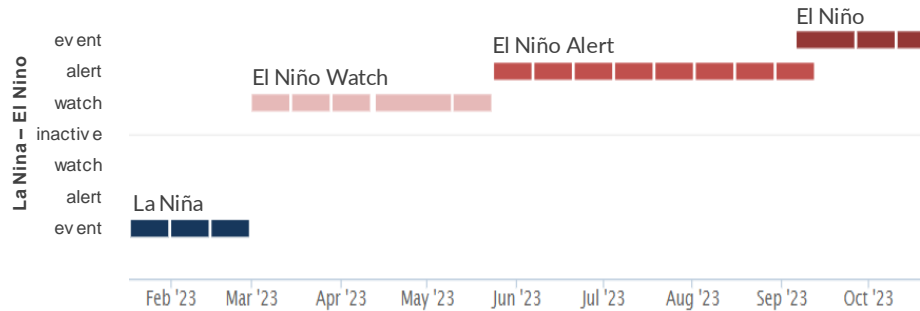
BMKG CLIMATE OUTLOOK

GOVERNMENT RECOMMENDATIONS

ENSO Outlook: October 2023



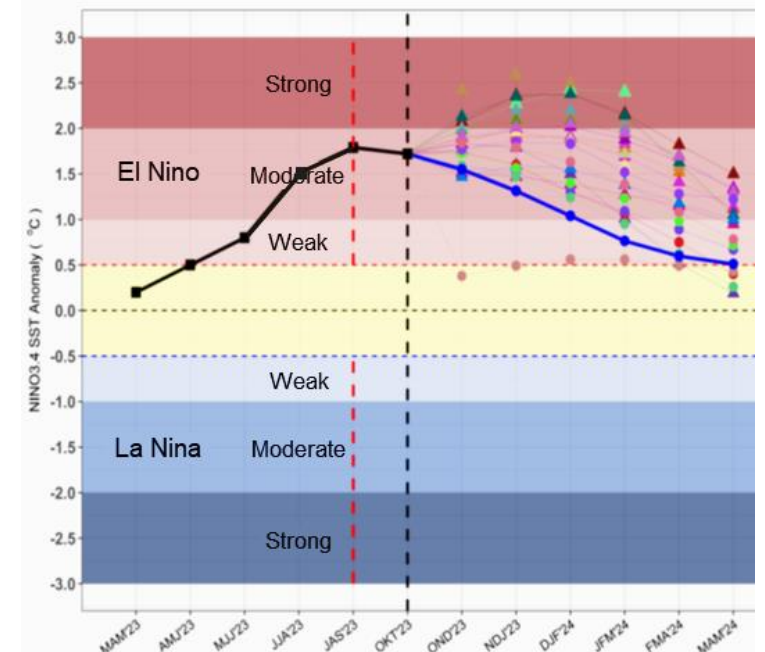
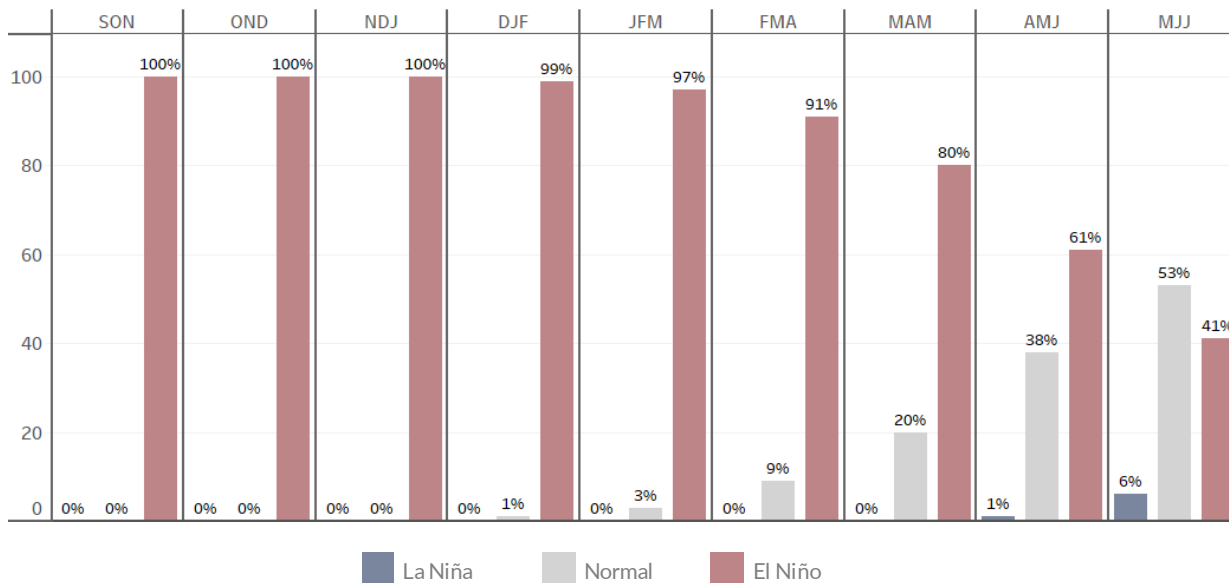
© Copyright Australian Bureau of Meteorology



The El Niño–Southern Oscillation (ENSO) outlook issued in Mid-October indicates the persistence of moderate El Niño. This situation is likely to continue into the first quarter of 2024.

El Niño typically causes drier and warmer conditions across Indonesia, characterized by less rainfall, which can lead to drought conditions. It is important to recognize that the El Niño impact on the amount and distribution of rainfall might vary across different provinces.

ENSO Probabilities (%)



- ▲ AUS-ACCESS
- ▲ BCC_CSM11m
- ▲ CMC CANSIP
- ▲ COLA CCSM4
- ▲ CS-IRI-MM
- ▲ DWD
- ▲ ECMWF
- ▲ GFDL SPEAR
- ▲ IOCAS ICM
- ▲ JMA
- ▲ KMA
- ▲ LDEO
- ▲ MetFRANCE
- ▲ NASA GMAO
- ▲ NCEP CFSv2
- ▲ SINTEX-F
- ▲ UKMO
- ▲ BCC_RZDM
- ▲ CPC CA
- ▲ MRKOV
- CSU CLIPR
- IAP-NN
- UW_PSL-CSLIM
- UCLA-TDC
- BMKG
- Observed

BMKG ENSO & IOD Analysis: <https://cdn.bmkg.go.id/Web/29.-Dinamika-Atmosfer-Dasarian-II-Oktober-2023.pdf>
 Historical ENSO Outlook: <http://www.bom.gov.au/climate/enso/outlook/>
 ENSO Probabilities: https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_plume

Rainy Season Forecast: 2023 - 2024

DELATED RAINY SEASON

Predicted in **446 (64%)** seasonal zones across Indonesia

NORMAL

Predicted in **56 (8%)** seasonal zones across Indonesia

EARLY RAINY SEASON

Predicted in **22 (3%)** seasonal zones across Indonesia

SHORTER DURATION OF RAINY SEASON

Predicted in **439 (63%)** seasonal zones across Indonesia

NORMAL

Predicted in **44 (6%)** seasonal zones across Indonesia

LONGER DURATION OF RAINY SEASON

Predicted in **91 (13%)** seasonal zones across Indonesia

The report from the Meteorological, Climatological, and Geophysical Agency (BMKG) highlighted that rainy season across Indonesia is mostly delayed and will have shortened duration in 2023-2024.

The forecasts indicate that about 446 (64%) out of the total 699 seasonal zones experience delayed rainy season, while only 22 (3%) zones early start of rainy season. Areas that are projected to experience delayed rainy season include southern parts of Sumatera, Java, Bali, Nusa Tenggara, Sulawesi, Maluku, and southern parts of Papua.

Additionally, as per the forecast, 439 (63%) seasonal zones are likely to experience shortened rainy season in 2024, while only about 91 (13%) of seasonal zone longer period of rainy season.

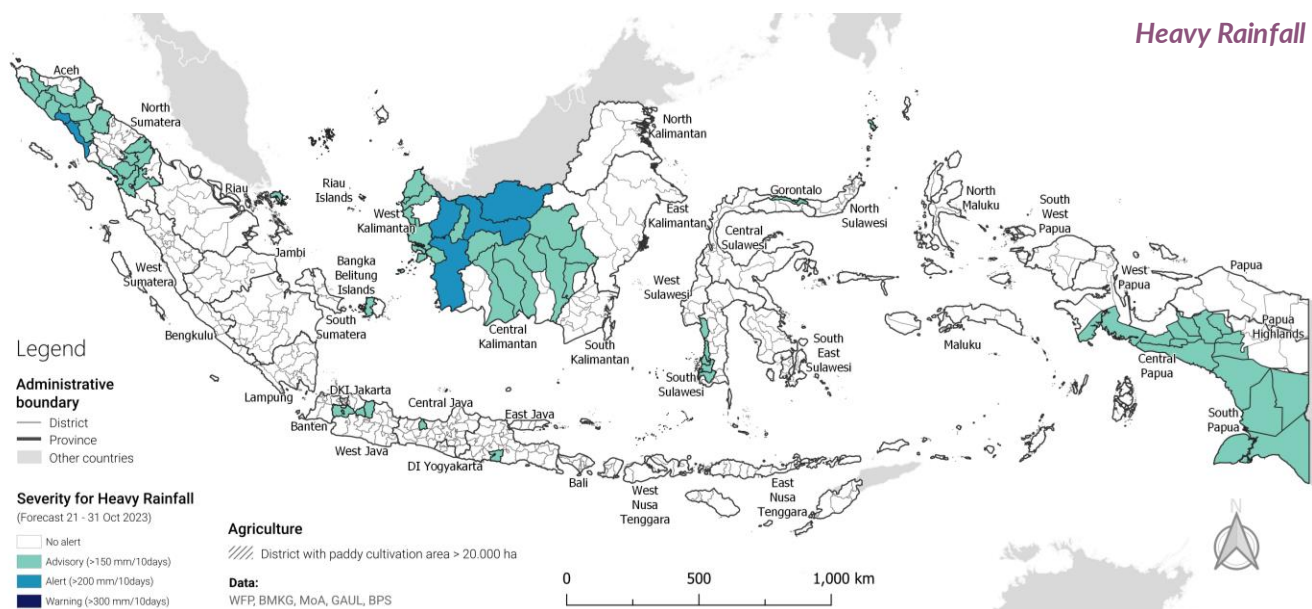
Start of Rainy Season Forecast

SEPTEMBER (Normal)	OCTOBER (Normal-Late)	NOVEMBER (Late)		DECEMBER (Late)
Some parts of West Sumatera Southern parts of Riau	Jambi Northern parts of South Sumatera Southern parts of Central Java Some parts of West Kalimantan Western parts of Central Kalimantan Most of East Kalimantan	South Sumatera Lampung Most of Banten Jakarta West Java Most of Central Java Most of East Java Bali	Small parts of West Nusa Tenggara Small parts of East Nusa Tenggara North Sulawesi Gorontalo Parts of Central Sulawesi Most of South Sulawesi Northern Part of North Maluku Southern part of South Papua	Northern parts of East Java Most of West Nusa Tenggara Most of East Nusa Tenggara Maluku

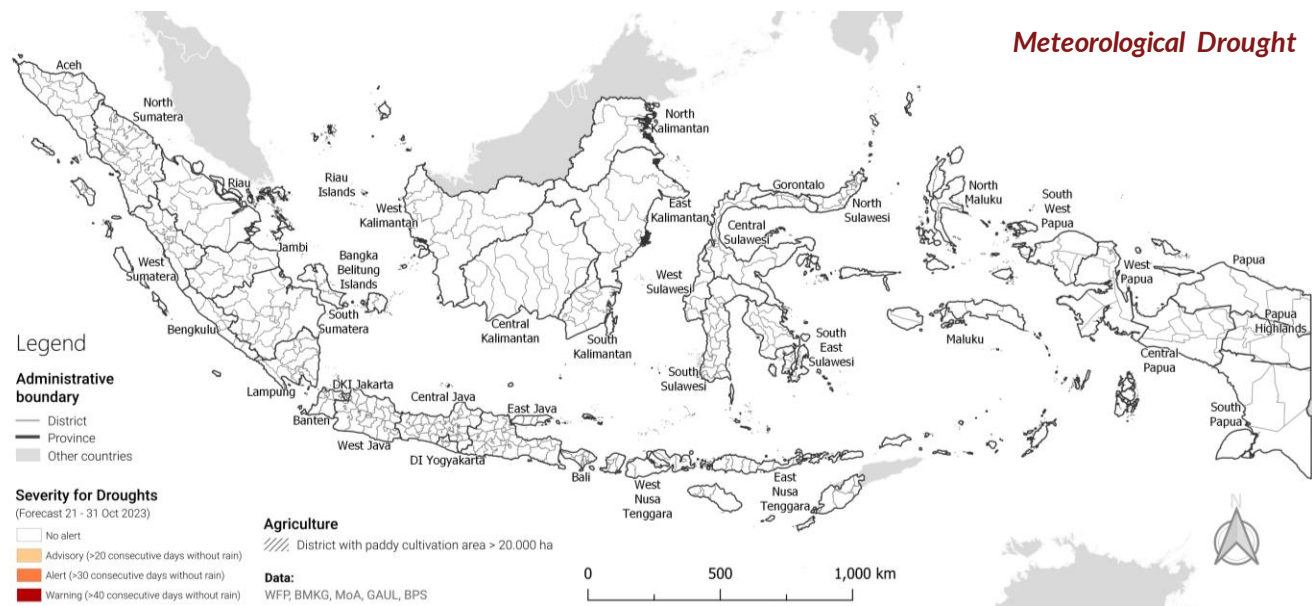
Data source: [BMKG](#)

BMKG Early Warning Information: November 2023

Early warning on meteorological heavy rainfall events and drought



Early warning information published in the last deced of November 2023 from BMKG indicated Advisory level of heavy rainfall was predicted in Aceh, North Sumatera, some parts of West Java, small parts of Central & East Java, West and Central Kalimantan, western parts of South Sulawesi, southern parts of West Papua & Central Papua, and South Papua. Meanwhile, Alert level of heavy rainfall was predicted in southern parts of Aceh, as well as West and Central Kalimantan. The early warnings highlighted the probability of high rainfall, which increase the probability of some hydrometeorological disaster, including flood and landslide.

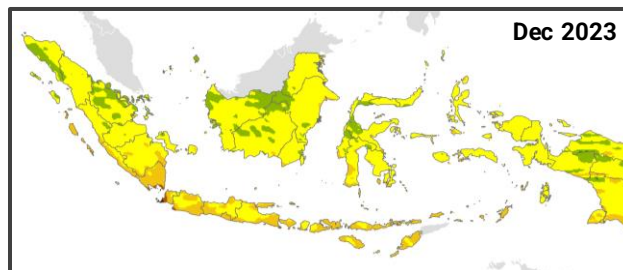
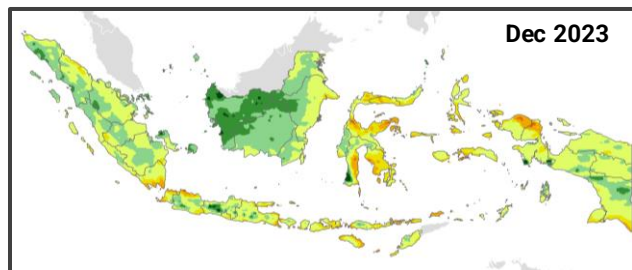


On the other hand, no risk of meteorological drought throughout Indonesia based on BMKG information from last deced of November. In the previous deced (mid of November), Alert level of drought was predicted in eastern parts of East Java, northern parts of Bali, West Nusa Tenggara, some parts of East Nusa Tenggara, and small parts of South Sulawesi, and southern parts of Maluku. Additionally, advisory level of drought was predicted in Mentawai Islands - West Sumatera.

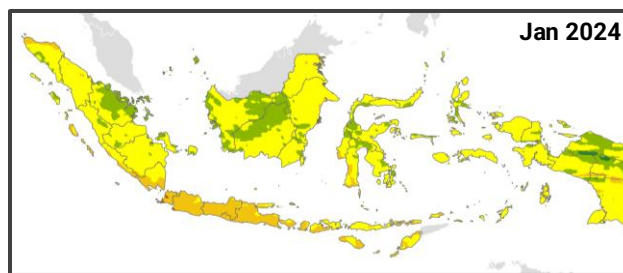
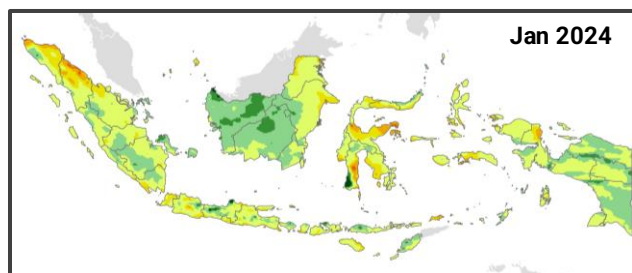
Rainfall Forecast: Dec 2023 – Jan 2024

Monthly rainfall accumulation and anomaly forecasts by BMKG

Dec 23



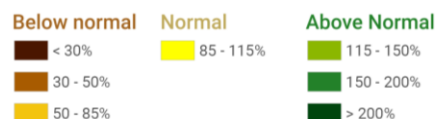
Jan 24



Rainfall (mm/month)



Rainfall anomaly (%)



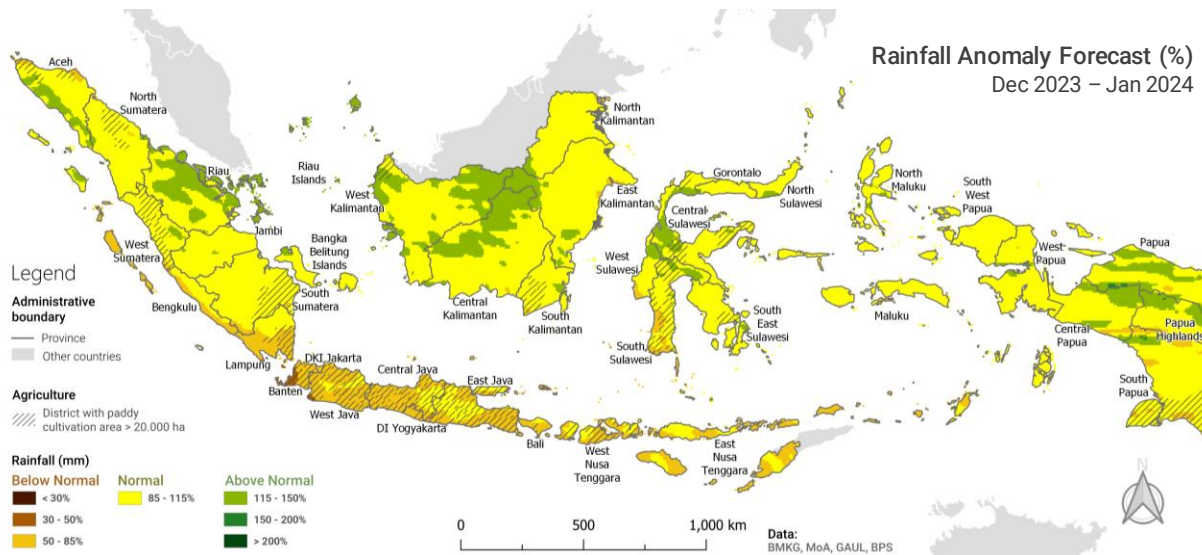
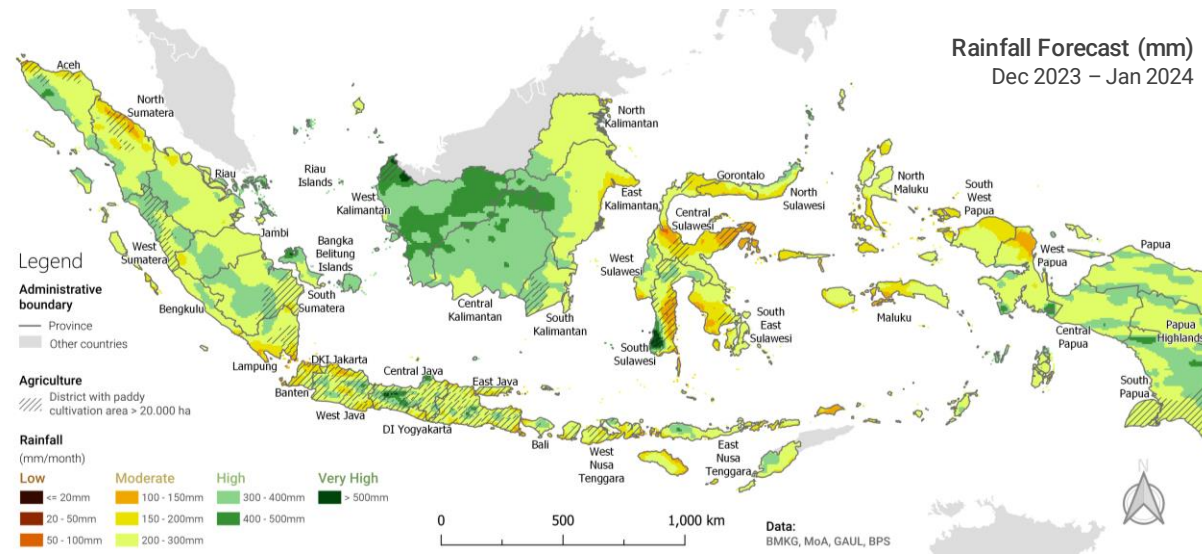
December 2023 - 70% of the total Indonesia's territory are forecasted to experience normal rainfall. Nevertheless, below-normal rainfall is forecasted over parts of Sumatera, Java, Bali, Nusa Tenggara, Sulawesi, and Papua.

January 2024 - More than half of Indonesia are likely to receive moderate to high rainfall. Normal to above average rainfall is expected in Sumatera, Kalimantan, Sulawesi, Maluku, and Papua. Whereas Java and Nusa Tenggara are forecasted to receive below-normal rainfall.

Forecast data source: <https://www.bmkg.go.id/iklim/buletin-iklim.bmkg>

Climate Outlook: Dec 2023 – Jan 2024

Seasonal rainfall anomaly forecast



The two-month seasonal rainfall forecast predicts a moderate to high/very high accumulation of rainfall across Indonesia from December 2023 to January 2024. Kalimantan, parts of South Sulawesi, and parts Central Java are expected to receive high amount of rainfall. Other parts of Indonesia are likely to experience moderate rainfall.

Normal rainfall is anticipated in Sumatera, Kalimantan, Maluku, and parts of Sulawesi and Papua. However, below-normal rainfall is expected in Lampung, Bali, West Nusa Tenggara, East Nusa Tenggara, South Sulawesi, Southeast Sulawesi, South Papua, and all provinces in Java.

The seasonal forecasts provide an indication of likelihood of rainfall amounts/anomaly over the next three months. However, they do not indicate any individual extreme rainfall events, for which weather forecasting products to be referred.



Government Recommendations

In anticipation of delayed rainy season and prolonged drought

BMKG advises the technical ministries, local government, related institutions, and local communities to be prepared for the rainy season that starts gradually from November 2023. The ongoing meteorological conditions will get better with the onset of rainy season. However, the rainy season might trigger hydrometeorological hazards, such as flood, landslide, or extreme weather. Adequate preparations and proactive measures are essential to mitigate the potential impacts during this period.

BRIN highlights the importance of accessing weather and climate information from BMKG and prepare some preventive measures to anticipate the negative impacts of reduced rainfall at the end of 2023, as well as potential extreme weather during 2024 wet season. In agricultural sector, these preventive measures include normalisation of drainage channels to improve the effectivity of water supply, cultivating drought-resistant crop seed varieties, and improving the management for agricultural areas affected by drought, such as implementing an adaptive planting schedule.

NFA predicted rice production deficit until December 2023, which may affect price and inflation. Governments are advised to use this information as a basis to take preventive and mitigative actions.

MoA recommends adopting precise planting arrangements using information from MoA WebGIS, such as Siperditan, Simotandi, and Siscrop. MoA advises local governments to effectively utilize reservoirs and dams for water management in agricultural areas, as well as to prepare drought-resistant seed varieties.

BNPB recommends to prepare preventive/mitigative action plans on drought and flood during the transitional season. These include preparation on supporting logistics and equipment, organising public campaign for effective water usage, cross-coordination between governments to coordinate early response mechanisms for disaster management.



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