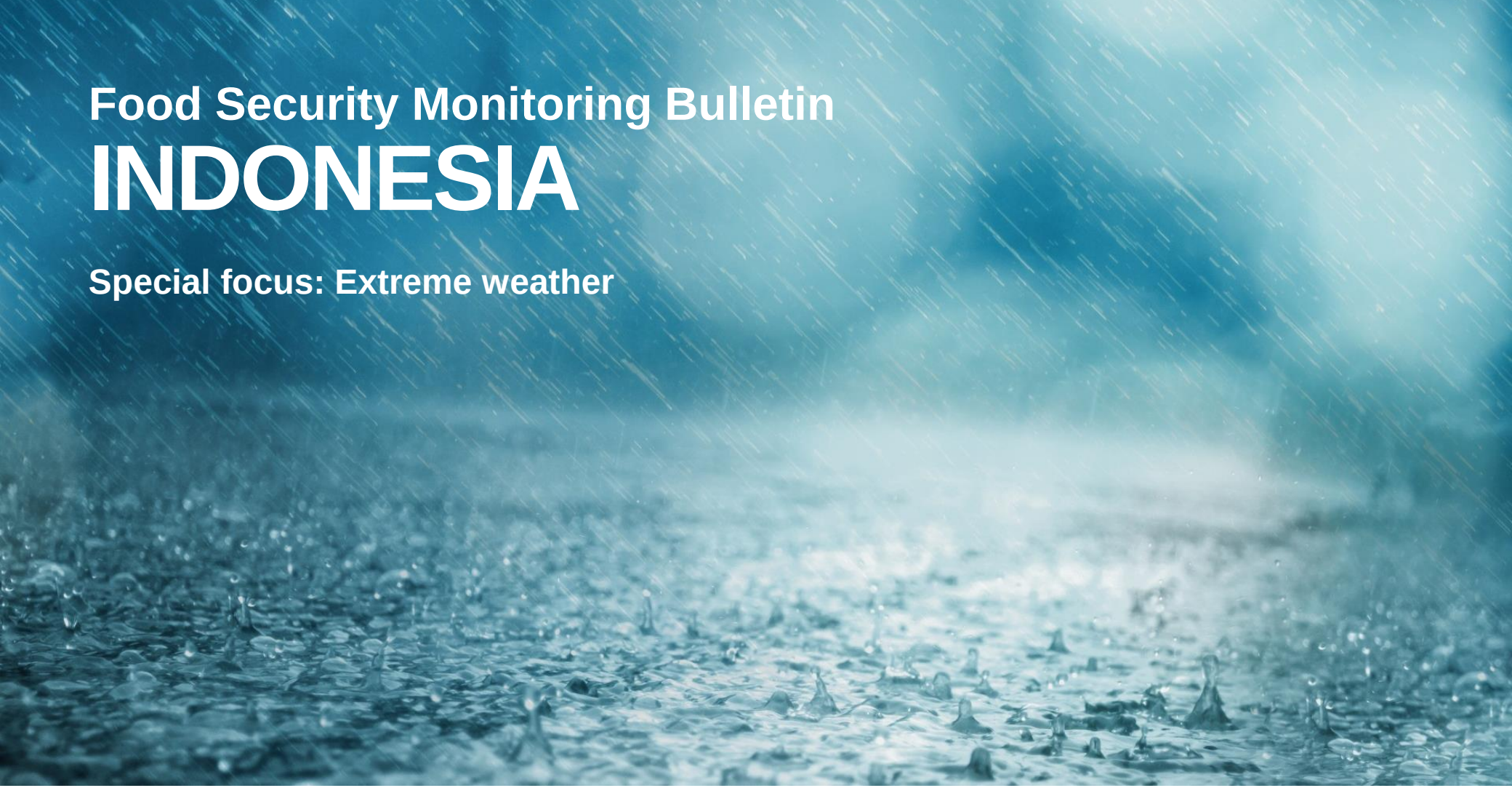


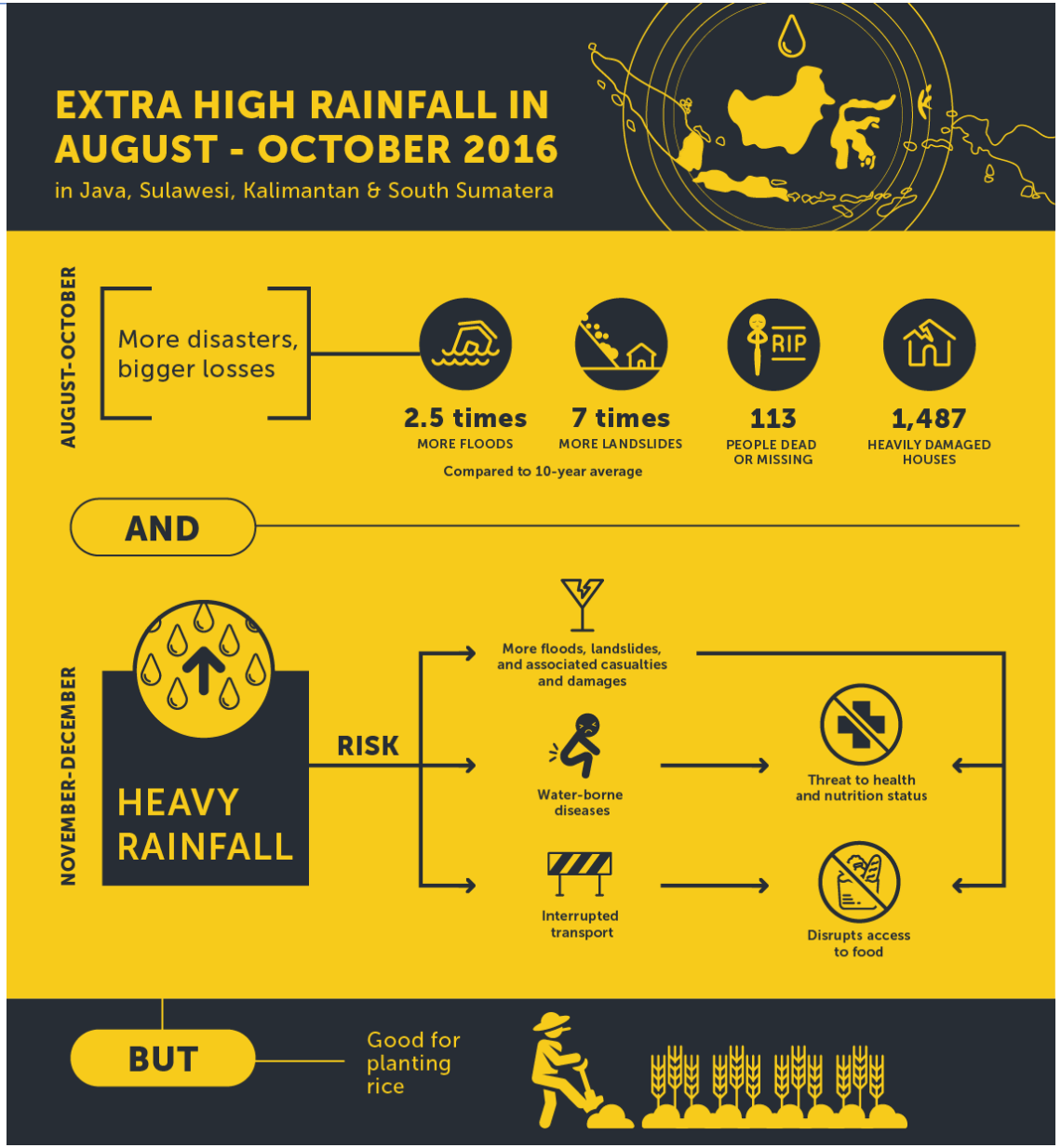
Food Security Monitoring Bulletin

INDONESIA

Special focus: Extreme weather

Volume 4, November 2016

Summary


EXTRA HIGH RAINFALL IN AUGUST - OCTOBER 2016
in Java, Sulawesi, Kalimantan & South Sumatera
AUGUST-OCTOBER
More disasters, bigger losses
2.5 times
MORE FLOODS
7 times
MORE LANDSLIDES
113
PEOPLE DEAD OR MISSING
1,487
HEAVILY DAMAGED HOUSES
Compared to 10-year average
AND
NOVEMBER-DECEMBER
HEAVY RAINFALL
RISK
More floods, landslides, and associated casualties and damages
Water-borne diseases
Interrupted transport
Threat to health and nutrition status
Disrupts access to food
BUT
Good for planting rice

Key messages

Summary

The abnormally-high rainfall across Indonesia between August and October 2016 brought more floods and landslides, and consequently more casualties and damages. On the other hand, high rainfall has provided favorable conditions for timely planting of paddy.

The weather outlook for November and December 2016 shows a combination of below-normal and normal rains in central and western Indonesia, and above-normal in the east of the country. This can lead to more disasters and damage, but also provide good conditions for planting rice.

Recommendations

- Continue monitoring weather patterns and related disasters, its impact on food production, livelihoods, and nutritional and health status in at-risk and affected areas
- Intensify floods and landslides preparedness efforts
- Share weather information and early warnings for floods and landslides to communities at risk
- Provide services for communities at risk :
    - Improve irrigation system for management of excess water
    - Improve management of sanitation facilities

Introduction

This is the fourth of a series of monitoring bulletins on the impact of weather extremes on food security in Indonesia. The bulletins are available online: http://www.bmkg.go.id/iklim/buletin-iklim.bmkg and http://www.wfp.org/content/indonesia-food-security-monitoring-2015

In the first section of this issue, current weather in Indonesia between August and October is examined. A significant portion of the current analysis is derived from the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) and Columbia University's International Research Institute for Climate and Society.

The next section then examines impact of the extreme weather on disaster occurrence and associated damages between August and October.

The following section presents the weather outlook for the next 2 months. Finally, potential impact of the predicted weather on disasters and crop production in November and December 2016 concludes this round of bulletin.

What's inside

Table of contents

List of maps and analyses

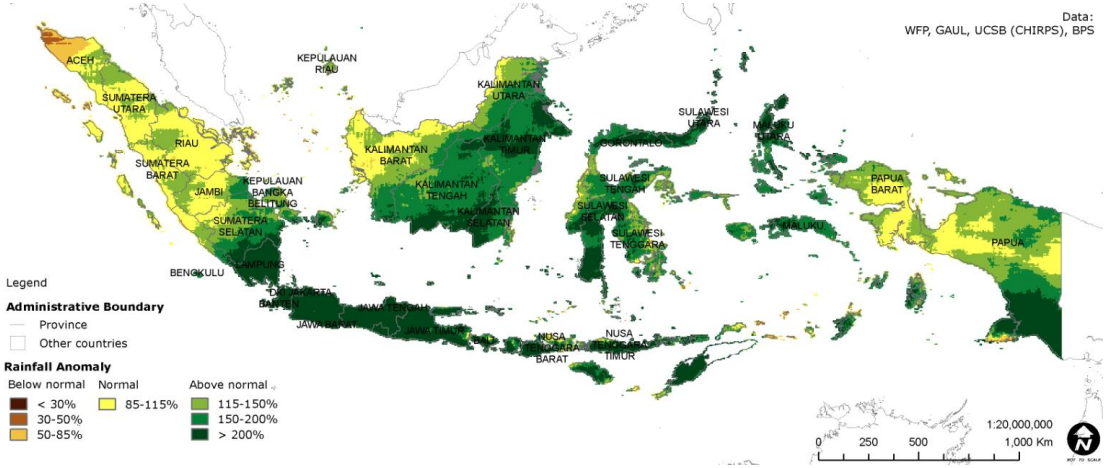
Part 1

Current weather in Indonesia during August-October 2016

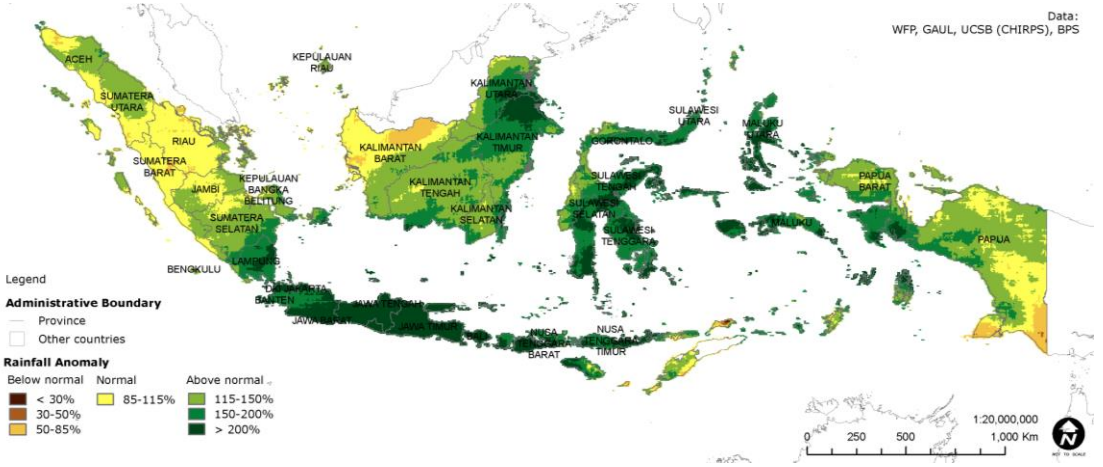
Large parts of Indonesia experienced abnormally high rainfall in the last 3 months.

Central parts of Indonesia received more than double the normal rainfall between August and October. The map on the right illustrates that twice as much rainfall fell in September and October 2016 compared to the same period over the past 30 years.

RAINFALL ANOMALY | Percent of Average, September 2016



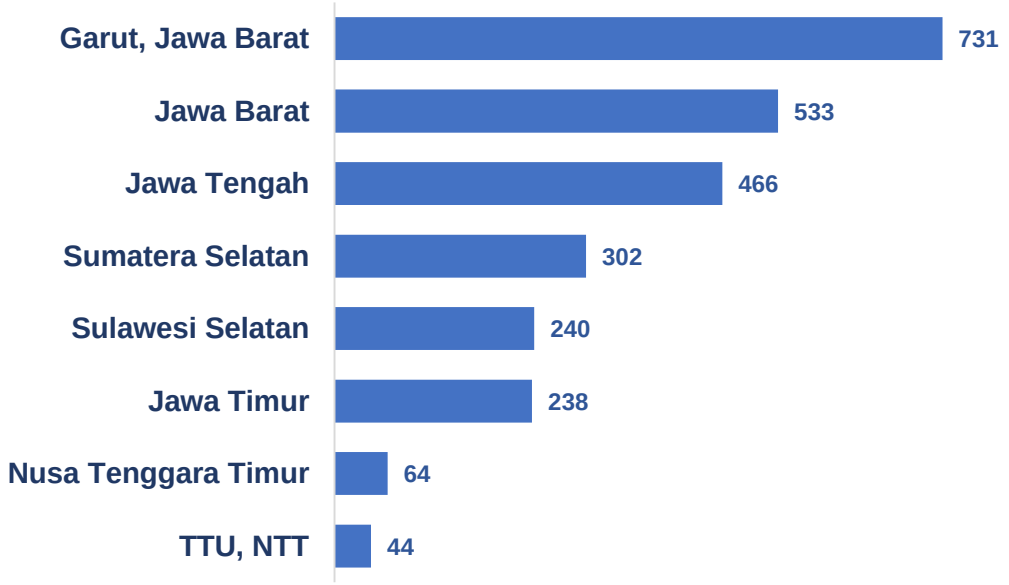
RAINFALL ANOMALY | Percent of Average, October 2016



Translating monthly rainfall anomaly to amount of rains received

In many areas, the precipitation in October doubled compared to the long-term average, however the actual amount of rainfall received varied from 44 to 731 mm in the areas shown on the graph below. This is because normal rainfall varies greatly across Indonesia.

Amount of actual rainfall received in October 2016, in provinces with more than 150% anomaly (in mm)



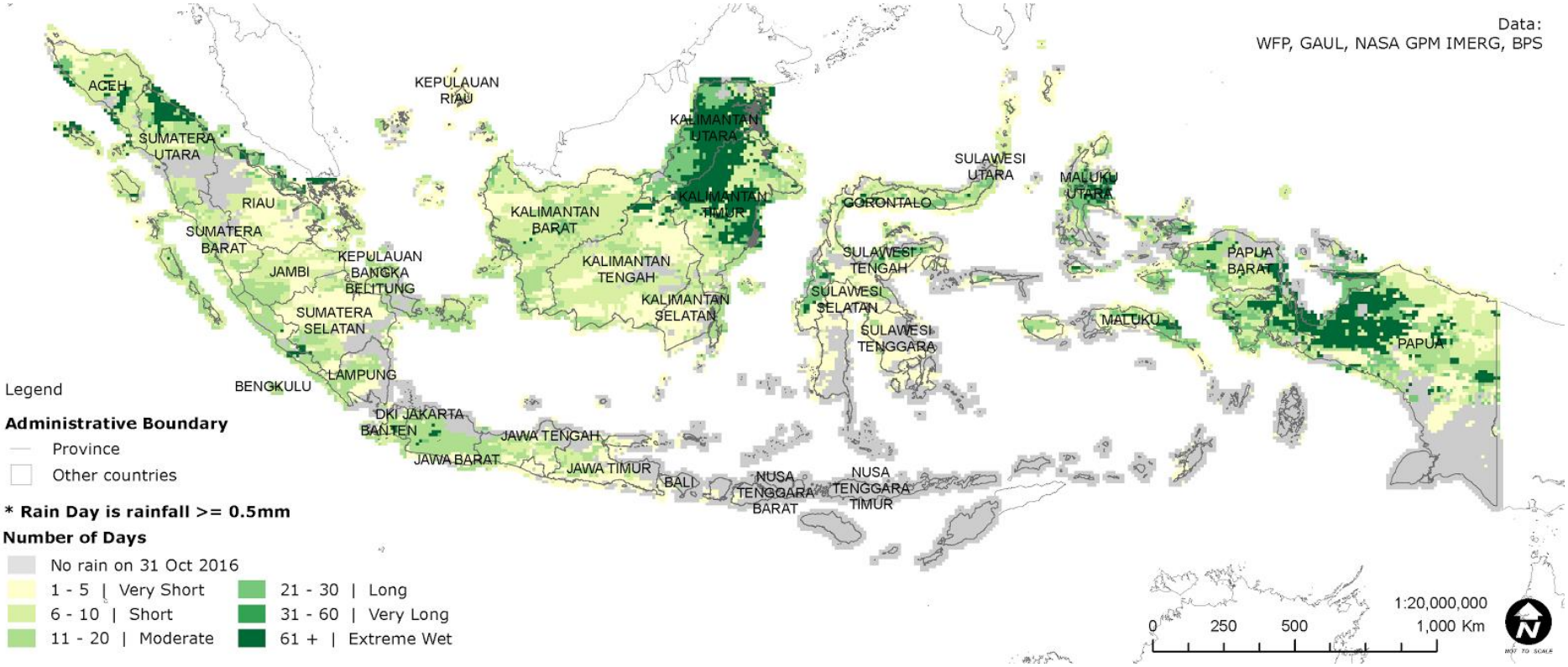
Why should we care about how rainfall is distributed in a month?

Even if monthly rainfall is not very high, uneven distribution of rains over the course of one month can result in potential floods and landslides. The bulk of the monthly rainfall can accumulate over a few days, which can overstretch the surface absorption capacity. Weekly or daily early warnings should be issued and preparedness measures taken to minimize potential damage caused by short periods of heavy rains.

Over the past 3 months, much of Indonesia experienced long and continous periods of rain, with many areas receiveing uninterrupted rainfall for several weeks.

A long period of heavy rains, which is not interrupted by days without rainfall, can increase the risk of floods and landslides. It can also obstruct harvesting and processing of paddy in areas dependent on non-mechanized drying of grains.

NUMBER OF DAYS SINCE LAST DRY-SPELL | In the last 90 days, as of 1 November 2016

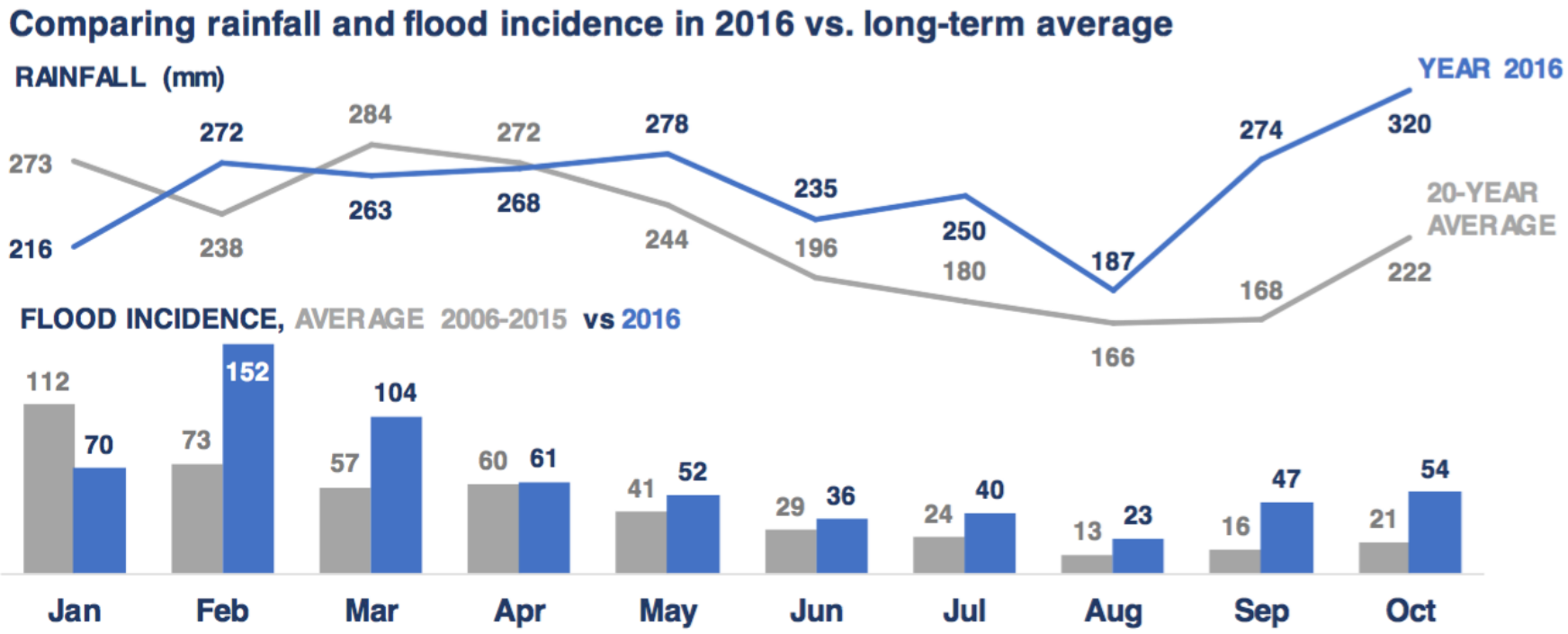


Part 2

Impact of extreme weather

Heavy rainfall led to a significantly worse floods and damage across the country.

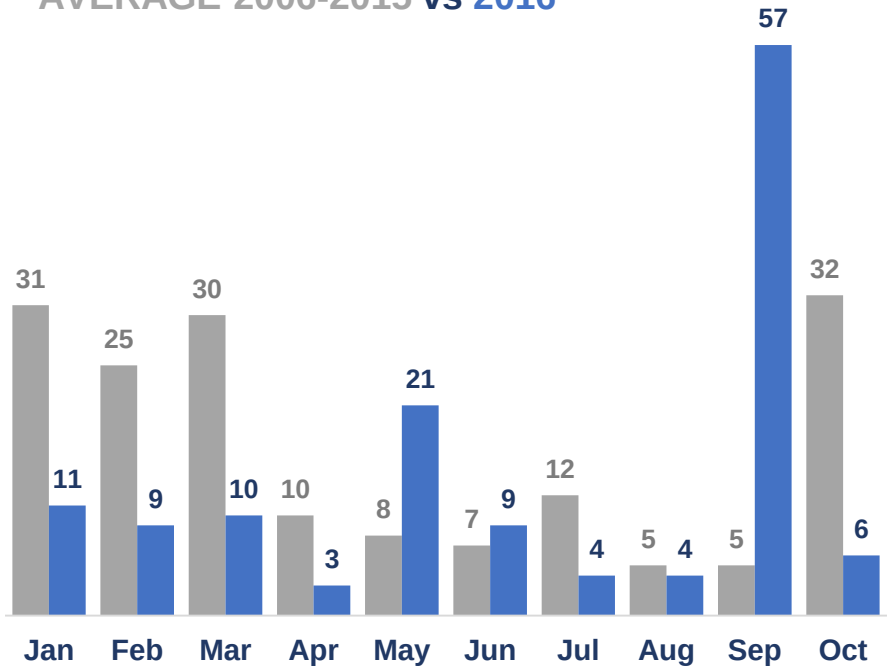
The number of floods from January to October 2016 (639) was already higher than the average number of floods in the last 10 years (555). This high number can partially be attributed to the delayed 2015/2016 rainy season which shifted most of the rains and related disasters from late 2015 to early 2016. Plus the number of floods between August and October 2016 was 2.5 times than the 10-year average.



Casualties and damage were also higher from August to October in 2016 compared to the long-term average. The number of dead and missing was 1.6 times higher. More than 1000 houses were damaged in 2016 while the 10-year average is 477.

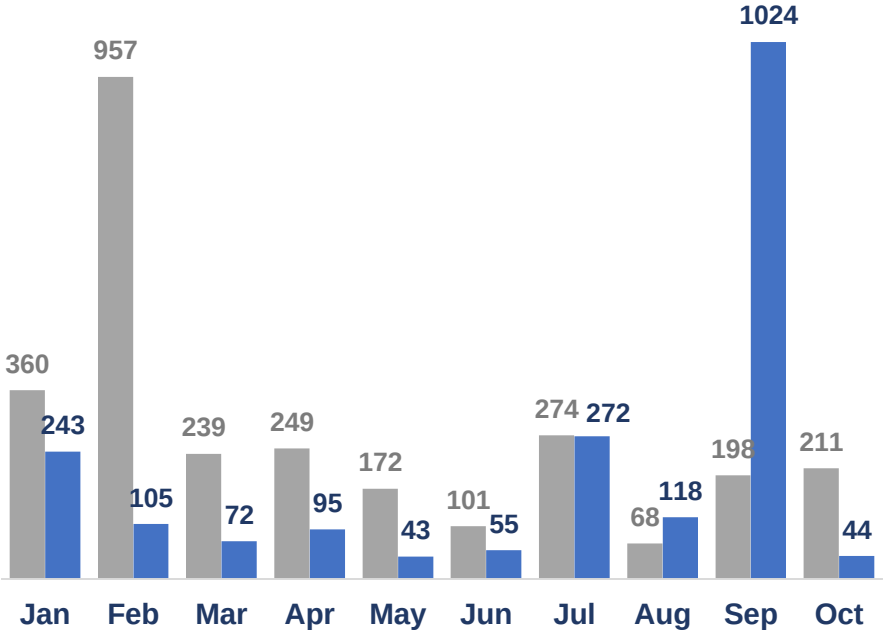
Number of people dead or missing due to floods

AVERAGE 2006-2015 vs 2016



Number of houses heavily damaged due to floods

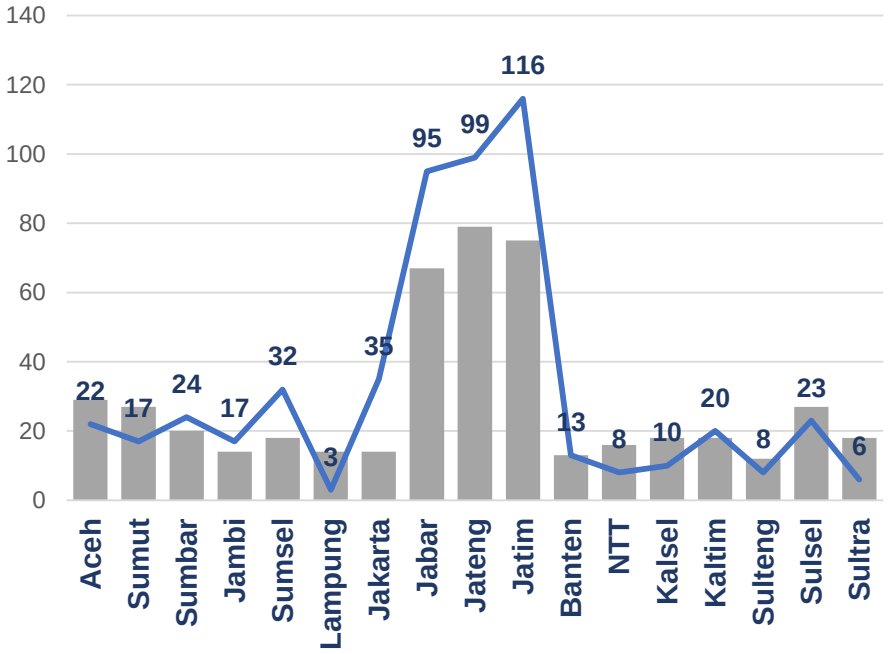
AVERAGE 2006-2015 vs 2016



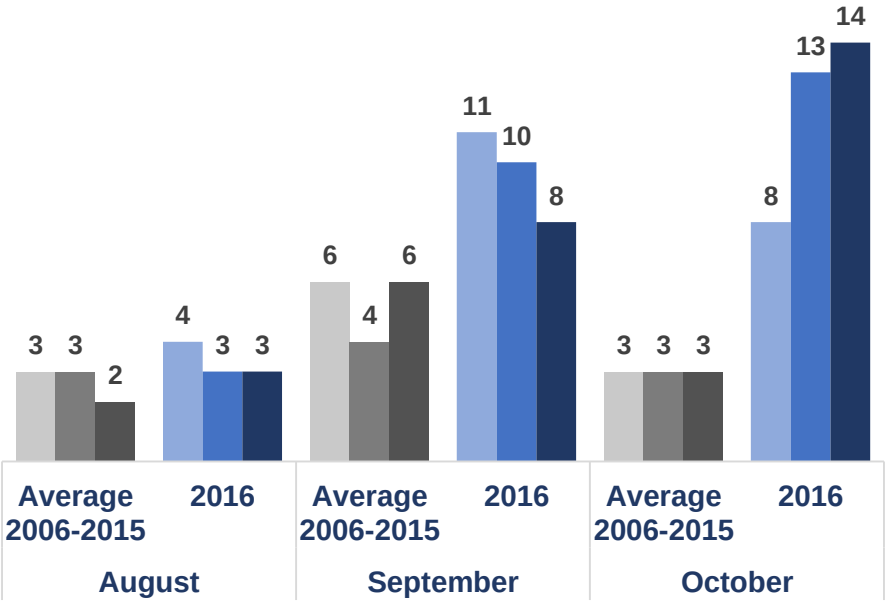
Java is the most affected.

Typically, most floods occur in Jawa Timur, Jawa Barat and Jawa Tengah provinces. This year, they were also amongst the most affected areas. Until October, the 3 provinces experienced around 2 times more floods, compared to the 10-year average for the whole year. Jawa Barat has the highest number of dead and missing people, with 34 dead and 19 missing in Garut district, in September 2016

Floods by provinces with >10 events annually in the last 10 years
AVERAGE 2006-2015 **vs** 2016 (till October 31)



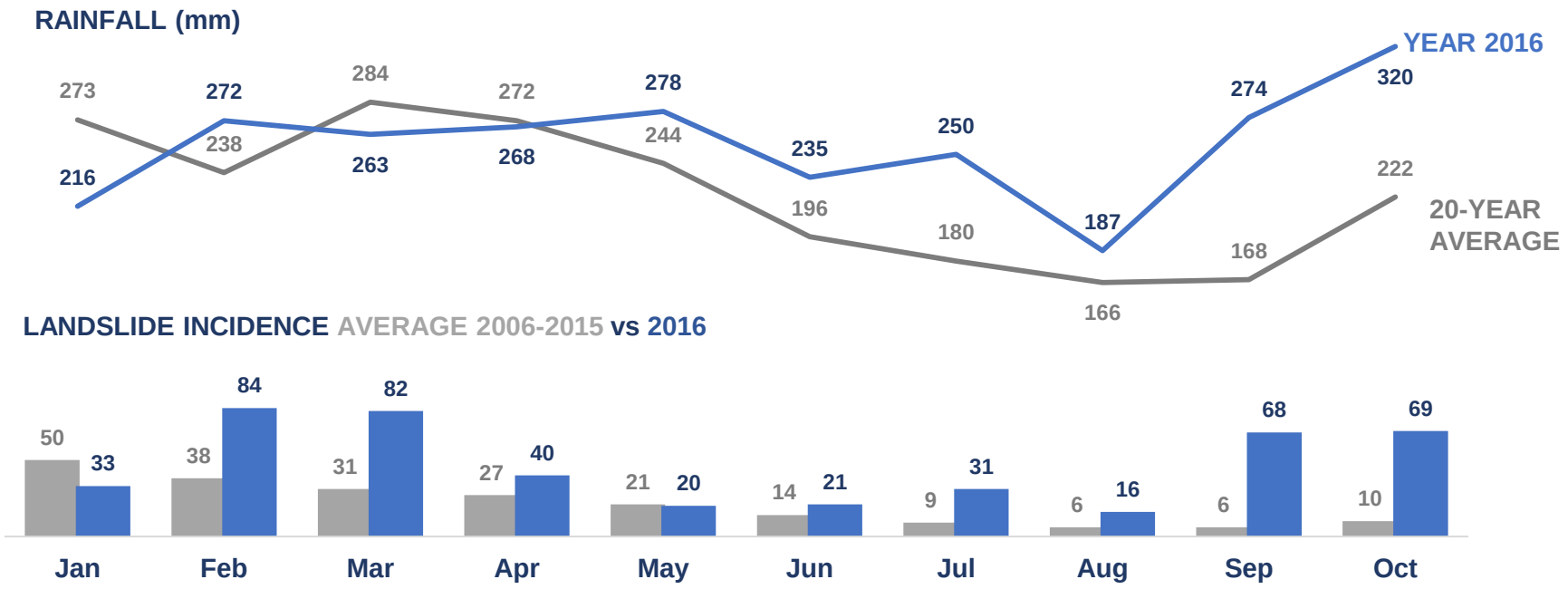
Floods in Jawa Barat, Jawa Tengah, and Jawa Timur in August, September, and October
AVERAGE 2006-2015 **vs 2016**



Wetter-than-normal conditions led to more landslides in 2016.

In the last 10 years, on average 272 landslides occurred annually, while in 2016 it was already 464 in October. Between August and October, the number of landslides this year almost tripled compared to the 10-year average, coinciding with the high rainfall in that period.

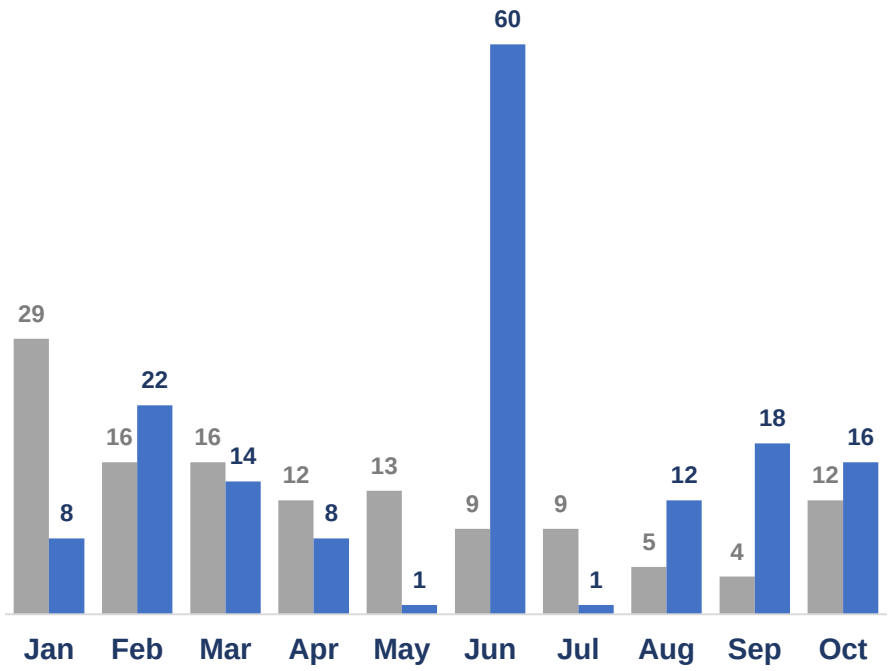
Comparing rainfall and landslides in 2016 vs. long-term average



Between August and October 2016, 46 people lost their life and 301 houses were heavily damaged. Records from the last 10 years show, on average there were 21 casualties and 51 heavily damaged houses within the same time period.

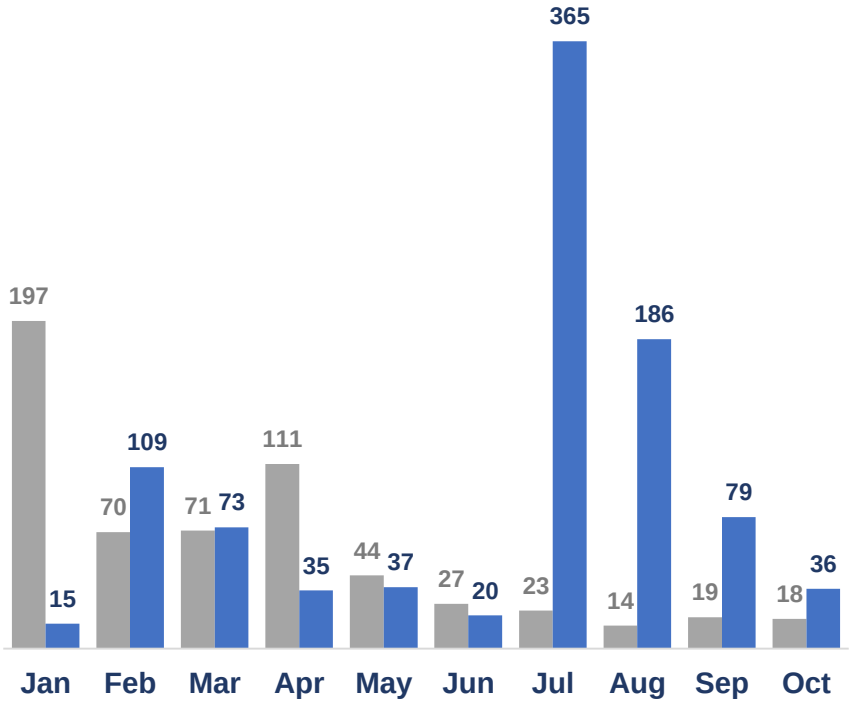
Number of people dead or missing due to landslides

AVERAGE 2006-2015 vs 2016



Number of houses heavily damaged due to landslides

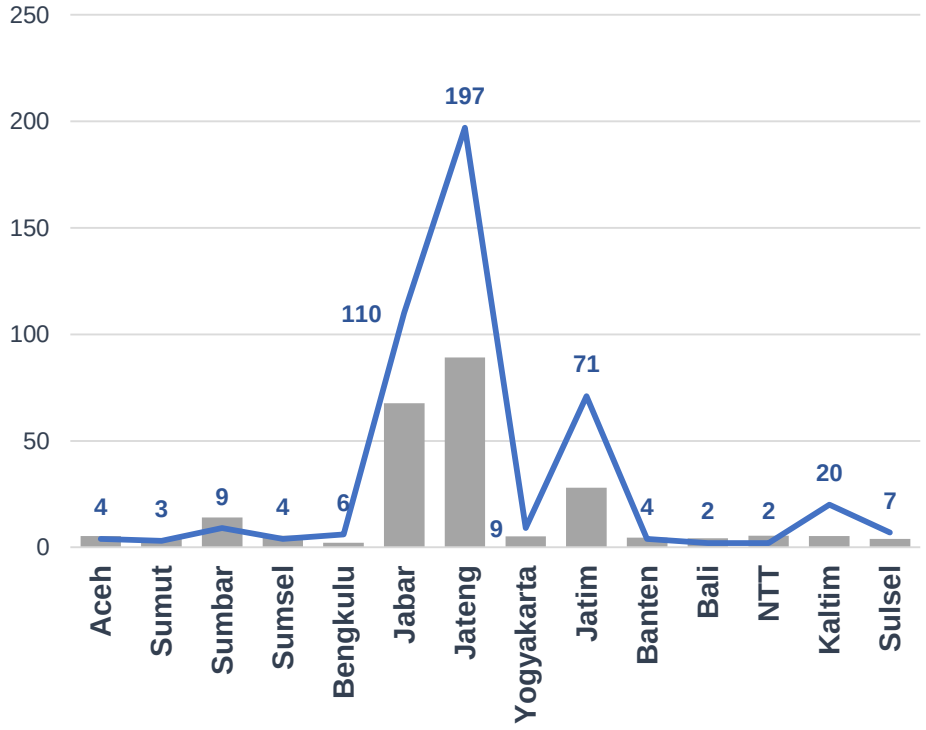
AVERAGE 2006-2015 vs 2016



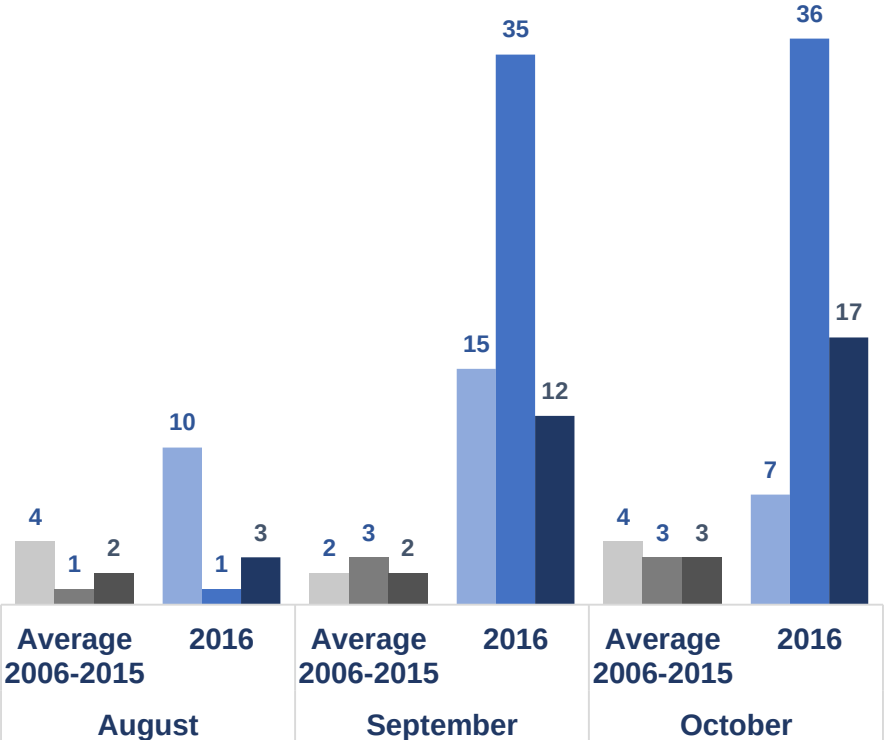
Java is also the most affected.

Highest number of landslides typically occurs across Jawa Timur, Jawa Barat and Jawa Tengah. This year the 3 provinces experienced around 2 times more landslides, compared to the 10-year average for the whole year. The most significant increase occurred from August 2016, as shown on the graph below.

Landslides by provinces with >3 events annually in the last 10 years
AVERAGE 2006-2015 vs 2016 (till October 31)



Landslides in Jawa Barat, Jawa Tengah, and Jawa Timur in August, September, and October
AVERAGE 2006-2015 vs 2016



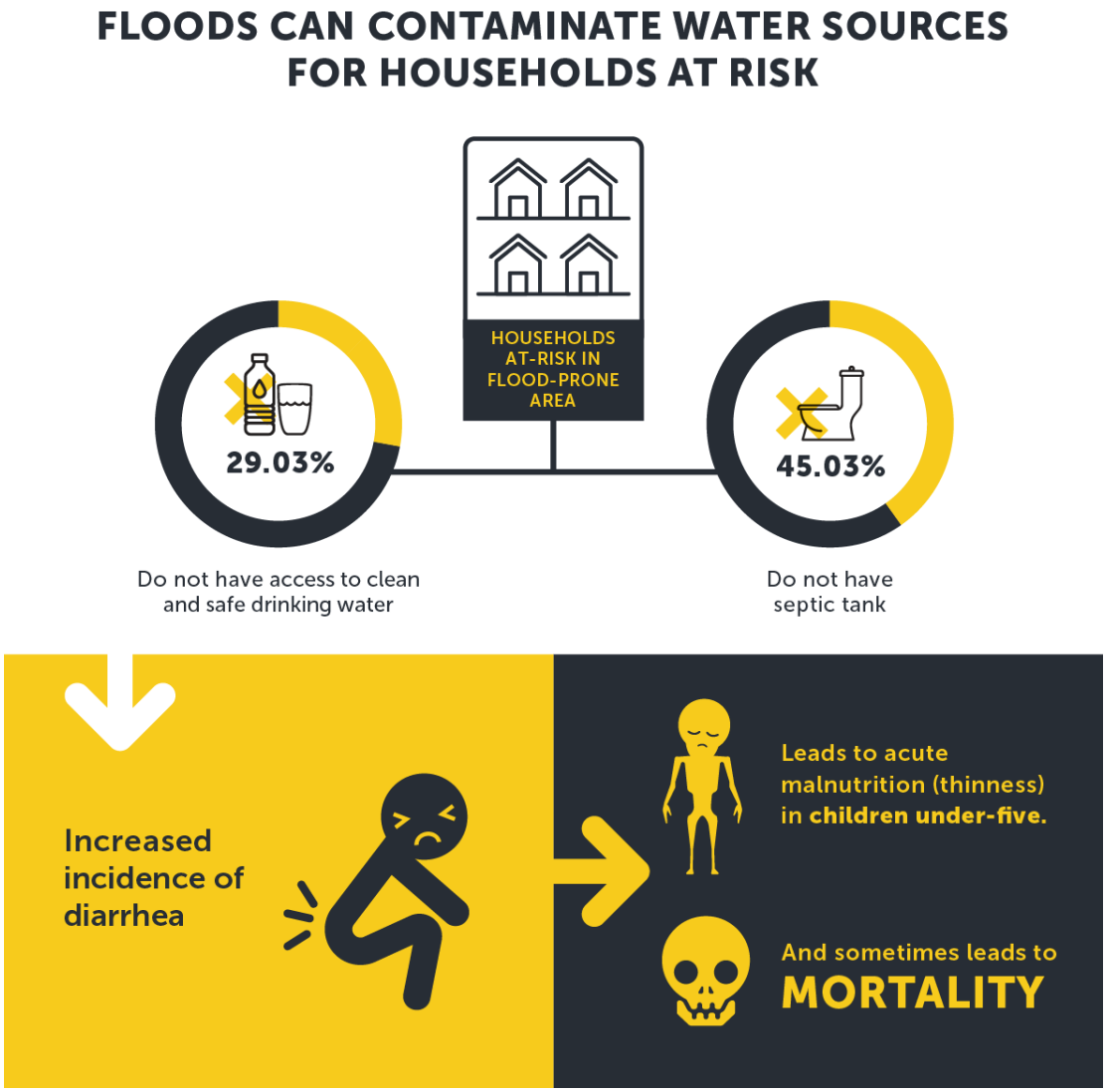
Floods can increase the risk of water-borne diseases.

Floods may lead to an increase in water-borne diseases, such as cholera, typhoid fever or hepatitis A, through contamination of drinking-water facilities. In areas with unprotected water sources and inadequate sanitation system, flood water can spread human waste and thus transmit infectious bacteria to drinking water.

One in three households in Indonesia does not have access to safe drinking water. Around 45% of households does not have a septic tank for safe disposal of human waste.

Water sources in these areas can be contaminated, which increases diarrhea incidence, particularly during floods. Among children under-five, diarrhea is often associated with acute malnutrition and in severe cases may lead to mortality.

High rainfall and potential floods in the coming months may result in outbreaks of water-borne diseases, jeopardizing health and nutrition status of vulnerable groups.



Gender and food security: impact of disasters on household food security

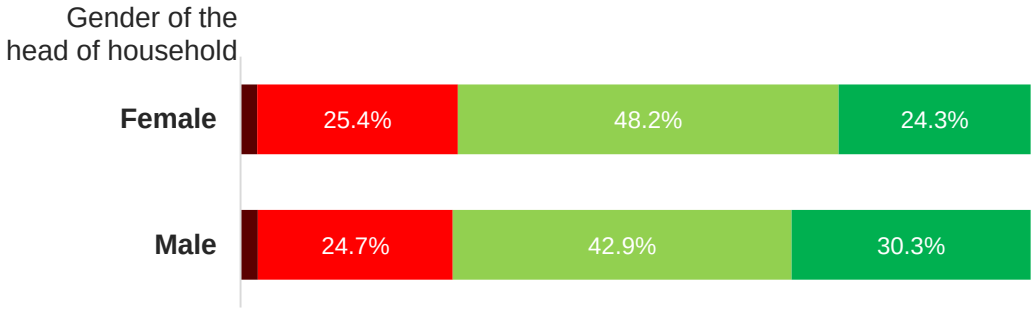
The 2015 El Niño drought case study

In late 2015 and early 2016, Indonesia experienced severe droughts, especially in the eastern part of the country. To better ascertain the impact of drought on vulnerable population, WFP conducted a survey in 7 affected districts with high economic vulnerability in eastern parts of Indonesia.

The study found that there was a slight difference in the impacts of the drought on food security for male and female headed households. Overall, food security situation, including food consumption, and food coping strategies consistently show similar experiences during this drought for male and female headed households.

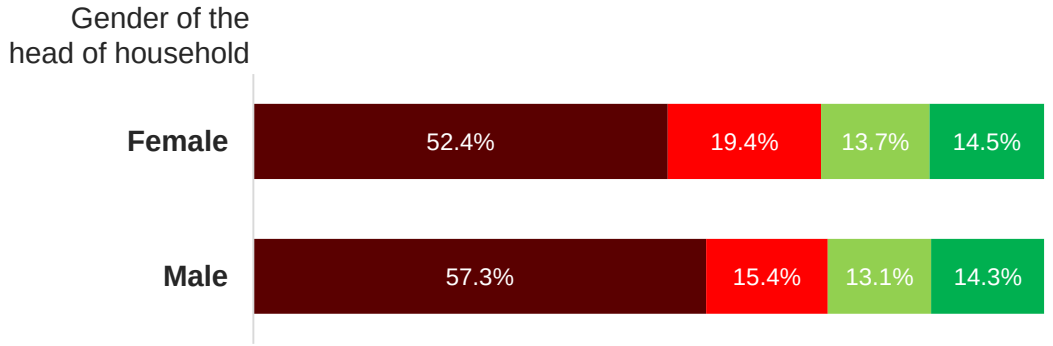
Food security in household in 7 districts during El Nino, 2015

SEVERELY INSECURE | MODERATELY INSECURE | MARGINAL SECURE | SECURE



Household food consumption in 7 districts during El Nino, 2015

NO COPING | LOW COPING | MEDIUM COPING | HIGH COPING



Part 3

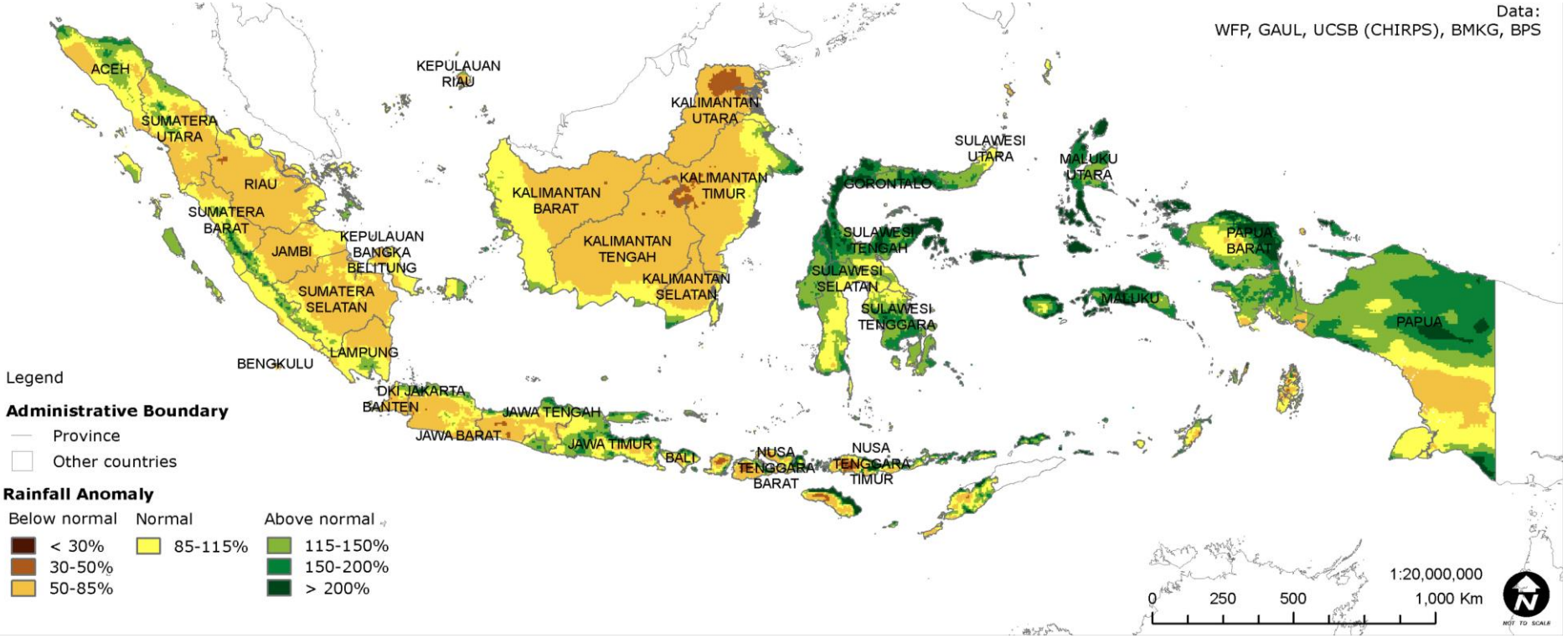
Weather outlook and potential impact of weather in November and December 2016

In November and December, western Indonesia will experience below-normal and normal rainfall, and eastern Indonesia above-normal.

Weather forecast for **November** shows:

- Slightly-below normal weather in Kalimantan, central parts of Sumatra, south and west of Java, and Nusa Tenggara Timur.
- Wetter than normal conditions in northern Sumatra, east and north of Java, Sulawesi, Maluku and Nusa Tenggara Barat, and parts of Papua.
- The amount rains received is expected to vary between 200 to 400 mm for whole of Indonesia, except for NTT with 100-200 mm of rains.

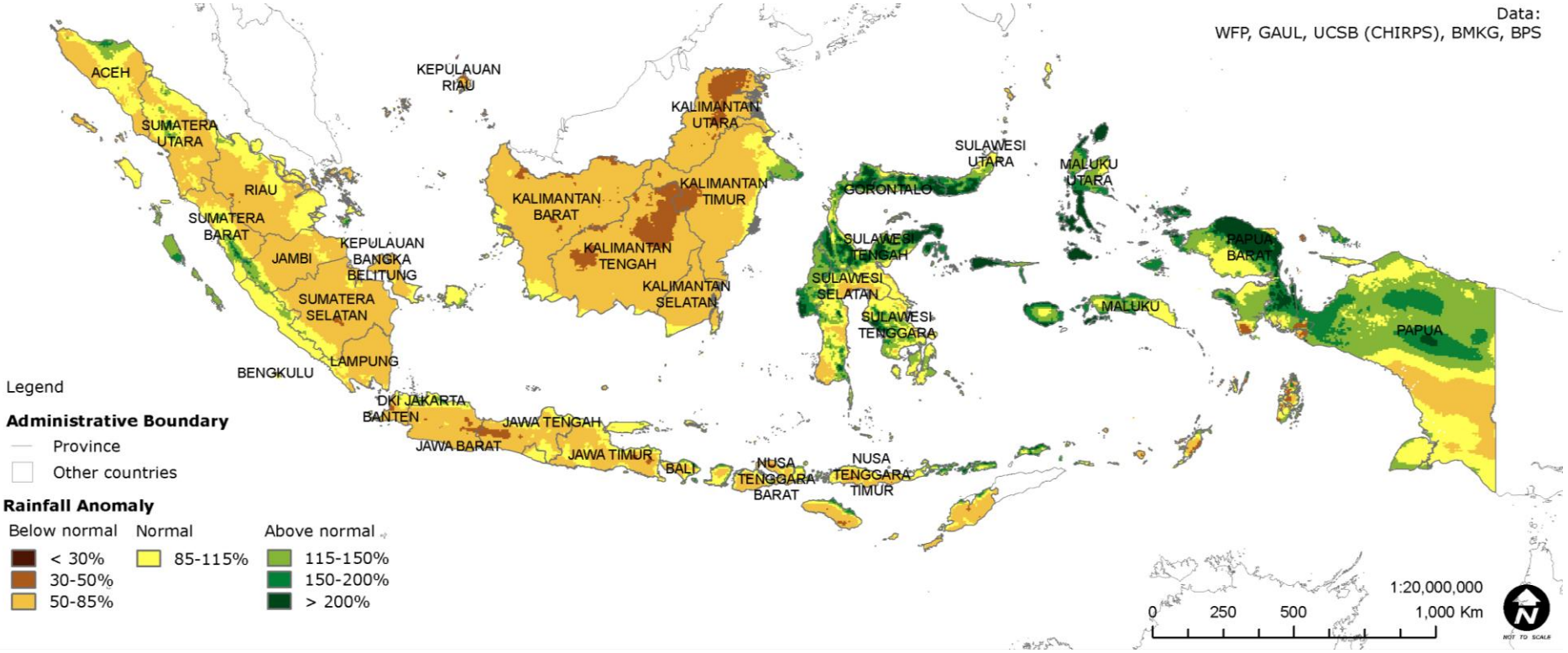
RAINFALL ANOMALY PREDICTION | Percent of Average, November 2016, prediction issued in October 2016



In **December**:

- Below-normal conditions are predicted to prevail across Kalimantan, central parts of Java, central areas in Sumatra and southern parts of Nusa Tenggara Timur.
- Above normal rains are predicted for Sulawesi, Maluku, West Nusa Tenggara, north-east of Nusa Tenggara Timur, and western parts of Papua.

RAINFALL ANOMALY PREDICTION | Percent of Average, December 2016, prediction issued in October 2016

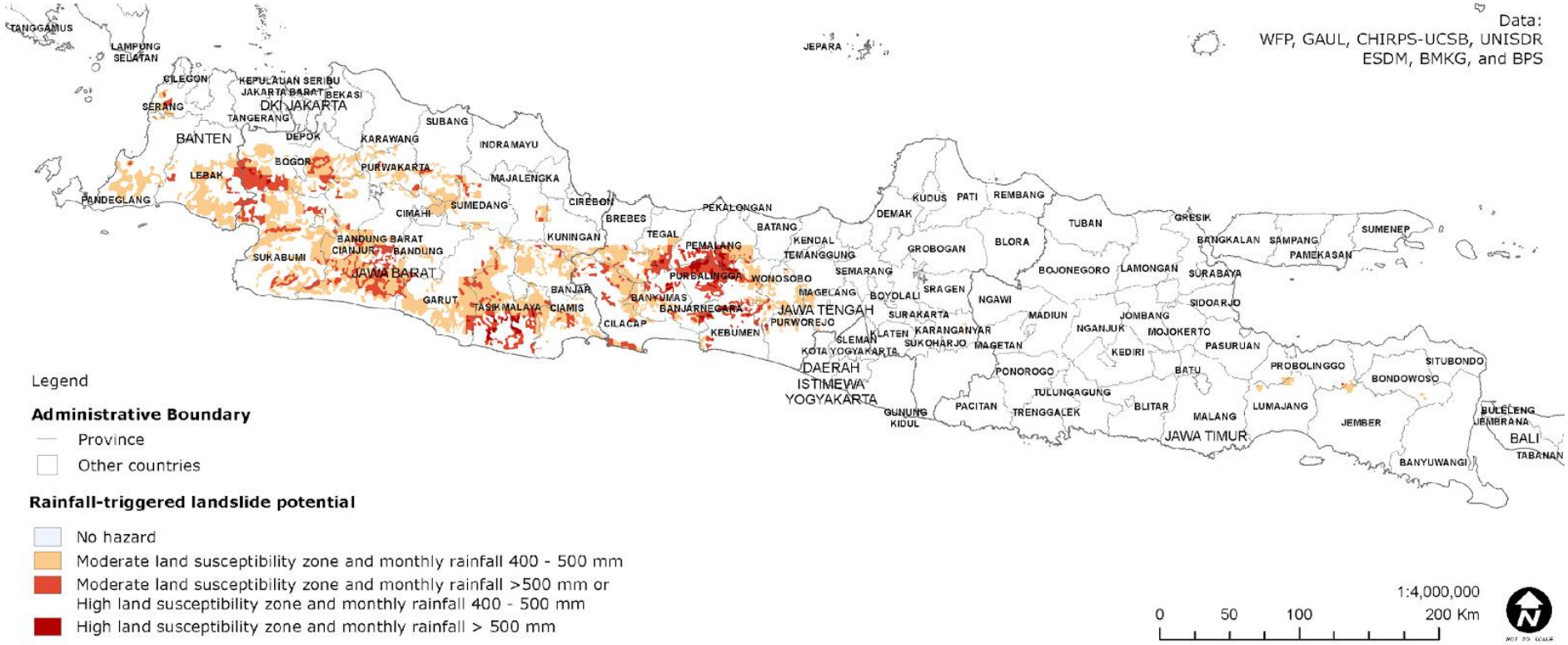


High monthly rainfall can trigger landslides.

Landslides normally occur during periods of heavy rain, especially between October and January.

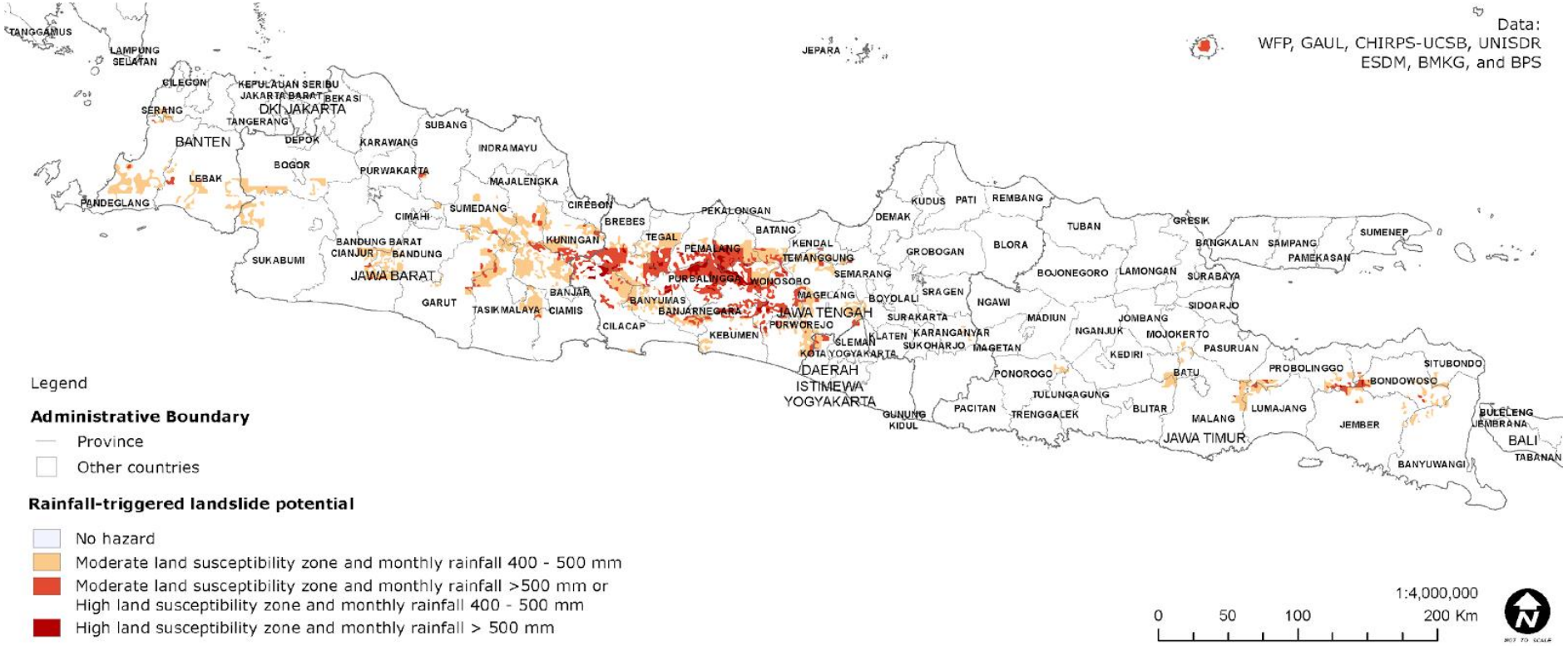
With the high predicted rainfall levels and large landslide-prone areas across parts of Java, there is a high risk of landslides in the next 2 months, particularly in southern part of Jawa Barat and western part of Jawa Tengah.

LANDSLIDE HAZARD | Predicted for November 2016



Districts at high risk of landslides are: Kuningan and Majalengka districts in Jawa Barat; Brebes, Cilacap, Pemalang, Purbalingga, Banyumas, Banjarnegara and Wonosobo district in Jawa Tengah; Probolinggo and Bondowoso districts in Jawa Timur province.

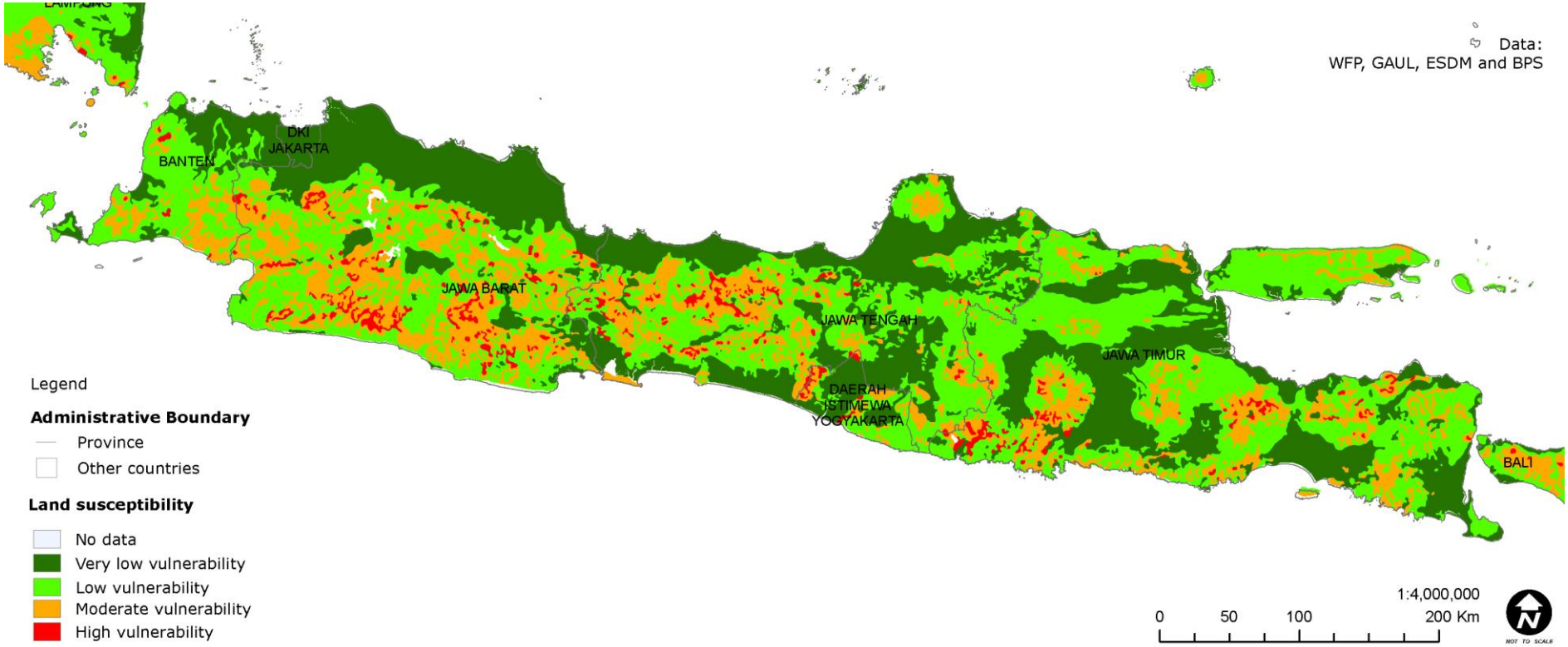
LANDSLIDE HAZARD | Predicted for December 2016



Consecutive days of heavy rains may induce landslides.

In addition to high monthly rainfall, consecutive days of heavy rain can also trigger landslides, even if total monthly rainfall is not very high. The map below shows land susceptible to landslides. Red and orange indicate high risk and green moderate risk. In the coming months, heavy rain may trigger landslides in these areas.

LAND SUSCEPTIBILITY MAP



Favorable planting conditions for paddy are expected in November and December.

November and December are the key months for paddy planting in Indonesia, normally constituting around 30 % of the total paddy area planted.

At national level, based on estimates by the Ministry of Agriculture, November and December planting potential for 2016 is around 890,000 hectares higher compared to the actual planting in the same period in a normal year-2013.

In the identified potential planting areas, local authorities and farmers should prepare agricultural inputs (seeds, tools) and improve irrigation and pest management system.

The table below lists provinces with more than 5,000 hectares of planting potential for paddy in November and December.

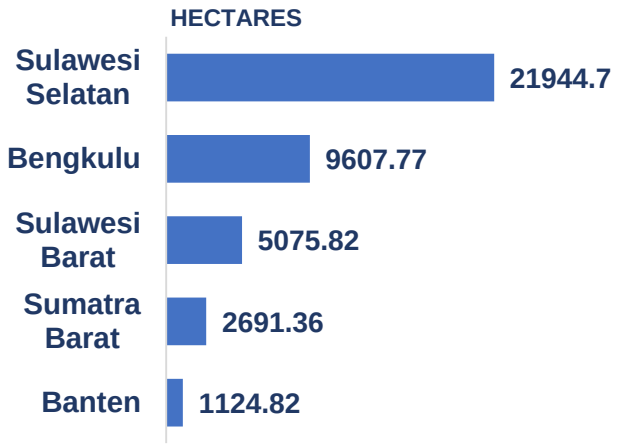
Province	November	December	Total
Aceh	75,007	106,727	181,734
Bengkulu	10,394	24,272	34,667
Jambi	28,496	54,578	83,074
Lampung	71,054	114,415	185,469
Riau	26,150	37,390	63,539
Sumatera Barat	37,315	49,567	86,882
Sumatera Utara	135,751	161,142	296,893
Sumatera Selatan	144,062	230,837	374,899
Banten	54,500	75,893	130,393
Jawa Barat	203,759	370,527	574,287
Jawa Tengah	277,492	411,479	688,971
Jawa Timur	261,523	459,417	720,941
DI Yogyakarta	20,917	25,374	46,291
Bali	25,143	28,264	53,407
Nusa Tenggara Barat	54,594	88,049	142,643
Nusa Tenggara Timur	34,196	56,196	90,392
Kalimantan Barat	86,849	126,185	213,034
Kalimantan Selatan	125,228	170,295	295,523
Kalimantan Tengah	56,200	79,574	135,774
Kalimantan Timur	10,207	15,576	25,783
Kalimantan Utara	4,231	5,668	9,900
Gorontalo	9,055	11,453	20,509
Sulawesi Barat	9,738	18,293	28,031
Sulawesi Selatan	124,967	202,127	327,095
Sulawesi Tengah	26,322	47,840	74,162
Sulawesi Tenggara	16,572	27,908	44,480
Sulawesi Utara	14,535	19,259	33,794
Maluku	3,266	5,950	9,216
Papua	5,154	8,021	13,175
National	**1,959,434**	**3,039,778**	**4,999,213**

Using satellite imagery to estimate risk of flooding in potential planting area in December 2016

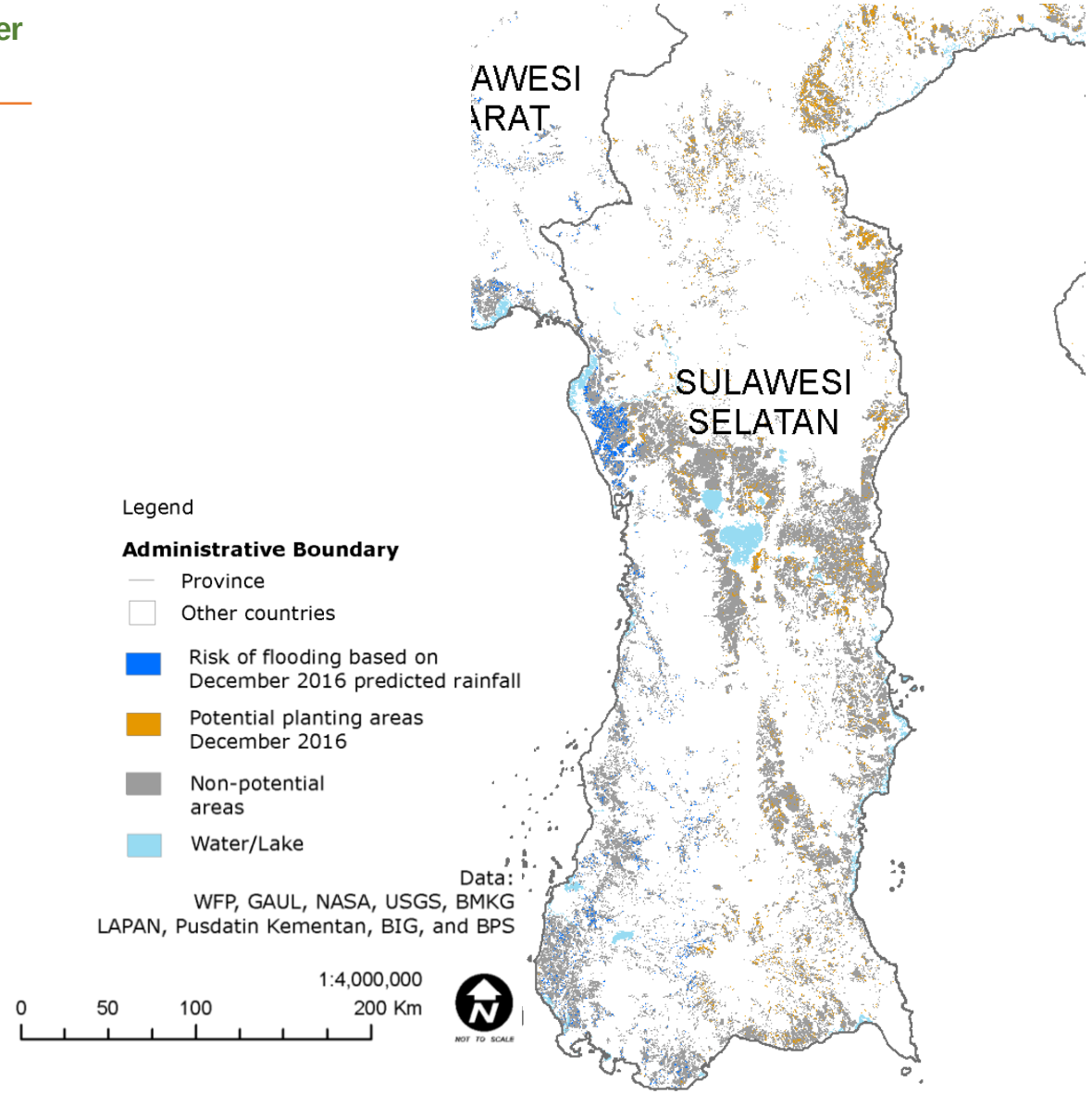
In December, an estimated 41,000 hectares of potential planting area is at risk of floods.

The most-at risk areas are in southern and western Sulawesi, and southern Sumatra. Prepredness efforts, especially around managment of excess water, should be intensified to minimize negative impact in these locations.

Provinces with more than 1000 ha of potential planting area at risk of floods in



POTENTIAL PLANTING AREA AND RISK OF FLOODING IN DECEMBER 2016



Methodology

The maps in this bulletin are largely based on satellite data which is the processed and used to create various indicators relating to weather extremes and rainfall deviations.

Rainfall anomaly is a measure of lack or excess rainfall in a period compared to the average. Data is derived from the University of California, Santa Barbara and used to compute the anomaly. Thresholds for anomaly follow a standard protocol. Data for rainfall anomaly is derived from CHIRPS, a global precipitation dataset with high spatial and temporal resolution acquired through the University of California, Santa Barbara. Rainfall anomaly forecast for November and December 2016 uses BMKG prediction data.

Days since last dry-spell is based on daily rainfall data from NASA GPM IMERG. This data is processed to determine the number of rain days since the last dry-spell, were dry spell refers to one and more days with less than 0.5mm of precipitation accumulated in a single day. The number of days since the dry-spell is determined using a standard classification for days since last rain which is inverted for days since last dry-spell. The number of rain days is not sensitive to the amount of rainfall received- it simply represents areas where more than 0.5 mm of rainfall accumulated in a day over the last 3 months.

To planting potential estimated for November and December is provided by the Ministry of Agriculture. Actual area planted in 2013 is the official release from BPS.

Assessment of flood and landslide events and their impact is a trend analysis and comparison to the current situation using data from National Disaster Management Agency (BNPB) database.

Flood potential for paddy fields in December is estimated by overlaying the potential planting area with rainfall forecast for December 2016. To estimate planting potential in December 2016, harvesting status was combined with rainfall forecast for December 2016 (100mm monthly rainfall) for all of Indonesia. The potential planting area was estimated by extracting phenological stages of rice from Landsat for the period between August and September 2016. The maximum vegetative stage was used to estimate potential harvesting and subsequently land available for planting after the harvest. The rainfall layer for floods risk uses data for more than 70% probability of minimum 300 mm monthly precipitation. Rainfall forecast data is derived from BMKG predictions.

Landslides hazard analysis for November and December combines the predicted monthly rainfall and land susceptible to landslide. To identify areas at risk of landslides, land with moderate and high landslides susceptibility is overlaid with more than 300 mm of predicted precipitation. Landslide susceptibility map, which combines a number of indicators relevant for land erosion, is the official source from the Ministry of Energy and Mineral Resources (ESDM).

Household food security illustrates the overall food security status of the surveyd households during the 2015 drought. It combines the adequacy of households' current food consumption, based on the food consumption score, and the livelihood coping capacity through asset ownership and asset depletion. Household food consumption is a composite score based on the dietary diversity, food frequency, and relative nutritional importance of various food groups consumed by a household. It is calculated by multiplying frequency by each food group weight, and then summing these scores into one composite score. Household food coping strategy is a measure of household stress due to a lack of food or money to buy food and their capacity to respond.It is calculated by multiplying the frequency of each strategy (days per week) by the weight and summing the total. 2400 households were surveyd in following districts: Probolingo, Sampang, Lombok Tengah, Lombok Utara, Kupang, Timor Tengah Selatan, Sumba Tengah, Meraku. Analysis in this bulletin excludes Merauke due to data quality.

Contributors

This bulletin is produced by a technical working group led by the Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) and consisting of the Ministry of Agriculture (Food Security Agency, Food Crops Department, Indonesian Agency for Agricultural Research and Development, Information and Data Center, Horticulture Department), the National Institute of Aeronautics and Space (LAPAN), National Disaster Management Authority (BNPB) and the Central Bureau of Statistics (BPS).

The bulletin is directed by Professor Rizaldi Boer of the Bogor Agricultural University (IPB). The World Food Programme and Food and Agriculture Organization of the United Nations provide technical support, including the generation of maps and data analysis.

All content within this bulletin is based upon the most current available data. Weather conditions are a dynamic situation, hence the current realities may differ from what is depicted in this document.

The cover picture is by George Hodan.

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