Climate Services Division

ENSO Update

Cool ENSO neutral conditions persist

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Fiji Meteorological Service

Content

In Brief

- *El Niño Southern Oscillation (ENSO) conditions are currently in cool neutral range;*
- *More than 60% of the climate models are favouring development of a weak La Niña in the coming months;*
- *Rainfall is predicted to be average or above average over most places, however, high variation in rainfall form one month to another could be anticipated;*
- *Despite significant rainfall in August, majority of the climate monitoring stations are in meteorological drought on 3 to 12 months timescales;*
- *The air temperatures are anticipated to vary around normal through both September to November 2016 and December 2016 to February 2017 periods;*
- *Sea surface temperatures in the Fiji region are predicted to be normal during September to November 2016 period.*

History and Current Situation

History

The strong 2015/16 El Niño event ended in May 2016. Since then, ENSO indicators have generally remained within neutral levels. However, some indicators are now approaching La Niña thresholds or have surpassed them.

Current Situation

The sea surface temperatures in the east-central equatorial Pacific region have passed La Niña thresholds during the past month. However, this cool anomalies have to be maintained to for a sustained La Niña event to develop. Supporting the cool anomalies on the surface is a large volume of cooler than normal waters in the sub-surface of the central and eastern equatorial Pacific.

The atmosphere indicators are not coherent with a fully couple La Niña. The Trade winds have remained close to average, while the cloudiness near the Date Line was below average for most of August. The South Pacific Convergence Zone after being displaced further north of its usual location since May 2016, shifted back to normal position during August 2016. The Southern Oscillation Index (SOI) for August was +5.3, with the 5 month running mean of –0.8. The SOI has risen sharply in recent weeks with the latest 30-days average of +12.1 (September 24).

ENSO Outlook

Recent climate observations indicate that a weak La Niña could develop in the coming months. More than 60% of the international climate models predict development of weak La Niña with less than 40% indicating persistence of neutral ENSO conditions. If La Niña does develop, models suggest it will be weak, potentially short lived and well below the strength of the significant 201-12 event. Nevertheless, some La Niña like effects can still occur even if a fully coupled event does not develop.

The ENSO Diagnostic Discussion from the National Oceanic and Atmospheric Administration (NOAA - USA: September 15, 2016) states that there is about 62% of weak La Niña from September to November 2016 period through December 2016 to February 2017 periods. No model predicts re-development of El Niño from now until first quarter of 2017.

The Australian Bureau of Meteorology's assessment in the ENSO Wrap-up of September 13, 2016 has a La Niña watch in place, with their assessment of climate models indicating a late and a weak La Niña is still possible.

Observations of Climate Anomalies

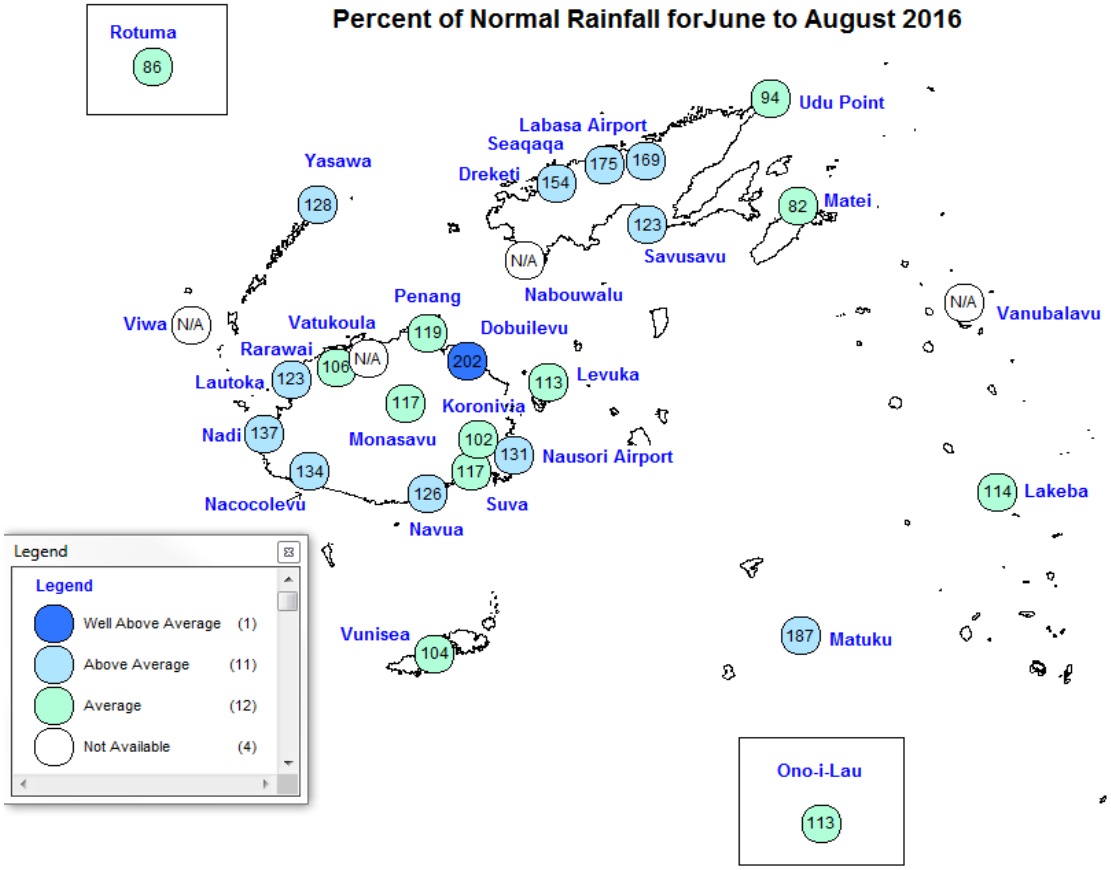
Rainfall producing systems over Fiji have generally been displaced further to the north of its normal position during June and July 2016. However, August 2016 was a wet month due to slow moving troughs of low pressure.

The dryness during June and July 2016 was particularly notable over the Western Division and northern parts of Vanua Levu with extended periods of without any rainfall. However, during August 2016, abnormally high rainfall was received with greater than two thirds of the rainfall monitoring sites receiving more than twice the *normal* rainfall. Out of these, 5 recorded more than thrice the *normal* rainfall and 4 stations recorded more than four times the *normal*.

Accumulated rainfall over the past three months (June to August) ranged from *normal* to *above normal* across the country, with Dobuilevu recording *well above normal* rainfall (Figure 1). It should be noted that August rainfall has been the major contributor towards the *normal* to *well above normal* rainfall for the June to August 2016 period. During June and July, most of the sites recorded *below normal* to *well below normal* rainfall.

Despite significant rainfall in August, majority of the sites continue to be in meteorological drought on 3, 6 and 12 months timescale (Table 2).

Figure 1: Percent of Normal Rainfall from June to August 2016



Rainfall and Temperature Outlook

The statistical model (SCOPIC) used by FMS for seasonal predictions favoured *normal* to *above normal* rainfall over the Fiji Group through the September to November 2016 and December 2016 to February 2017 periods. The global climate models on average favour *normal* or *below normal* rainfall in the Fiji region over the September to November 2016 period.

Considering the presence of neutral conditions and the transition from dry to wet season, high variability in Fiji's rainfall is anticipated from one month to another over the coming three months.

The air temperatures, both the maximum and minimum, are likely to be *near normal* through both September to November 2016 and December 2016 to February 2017 periods. The sea surface temperature in the Fiji region is favoured to be *normal* during the September to November 2016 period.

Table 1: Rainfall Distribution for June to August 2016

Stations	June Rainfall (mm)	July Rainfall (mm)	August Rainfall (mm)	June to August 2016 Total Rainfall (mm)
Nadi Airport	28.1	13.4	197.0	238.5
Laucala Bay, Suva	50.3	78.8	407.5	536.6
Nacocolevu, Nadroga	40.4	28.5	244.7	313.6
Rotuma	168.0	68.8	348.8	585.6
Udu Point	47.6	89.6	136.6	273.8
Savusavu Airfield	31.4	73.0	303.1	407.5
Labasa Airport	45.9	28.8	210.2	284.9
Nabouwalu	M	46.5	366.0	412.5
Dreketi	44.0	9.5	199.0	252.5
Seaqaqa	39.5	15.5	243.5	298.5
Koronivia	75.9	61.2	320.7	457.8
Tokotoko, Navua	103.6	168.5	463.1	735.2
Nausori Airport	92.7	61.2	387.7	541.6
Monasavu	113.1	251.9	463.4	828.4
Penang Mill	56.9	13.5	200.8	271.2
Rarawai Mill, Ba	29.5	11.8	163.9	205.2
Lautoka Mill	18.9	6.4	21.0	46.3
Dobuilevu	98.5	23.5	359.0	481
Yasawa-i-Rara	80.0	8.8	167.4	256.2
Vatukoula	51.8	0.6	Missing	Missing
Matei Airfield, Taveuni	46.7	17.9	223.8	288.4
Vunisea, Kadavu	92.5	62.5	226.9	381.9
Lakeba	92.3	21.0	187.9	301.2
Matuku	140.5	68.6	351.5	560.6
Ono-i-Lau	97.3	226.1	212.5	535.9

Explanatory Note - El Niño and La Niña

ENSO is an irregular cycle of persistent warming and cooling of SSTs in the tropical Pacific Ocean. The warm extreme is known as El Niño and cold extreme, La Niña.

The term El Niño was given to a warming of the ocean near the Peruvian coast in South America that appears around Christmas. Scientists now refer to an El Niño event as sustained warming over a large part of central and eastern equatorial Pacific Ocean. This warming is usually accompanied by persistent negative values of Southern Oscillation Index (SOI), a decrease in the strength or reversal of the trade winds, increase in cloudiness near Dateline in the equatorial Pacific and a reduction in rainfall over most of Fiji (not immediate effect as there is a lag period) which can, especially during moderate to strong events, lead to drought.

La Niña is a sustained cooling of the central and eastern equatorial Pacific Ocean. The cooling is usually accompanied by persistent positive values of SOI, an increase in strength of the equatorial trade winds, decrease in cloudiness near the Dateline in the equatorial Pacific and higher than average rainfall for most of Fiji (not immediate effects as there is a lag period), with frequent and sometimes severe flooding, especially during the wet season (November to April).

Table 2: Drought Monitor

Timescale	Sites currently under Meteorological Drought	Sites currently under Meteorological Drought Warning Status	Sites currently under Meteorological Drought Watch
3 month	Dreketi, Koronivia, Labasa Airport, Lautoka, Matei, Nacocolevu, Nadi Airport, Navua, Penang, Rarawai, Rotuma, Savusavu, Suva, Udu Point, Vunisea and Yasawa	Ono-i-Lau, Nausori Airport and Monasavu	-
6 month	Koronivia, Lakeba, Nausori, Navua, Rotuma, Savusavu, Suva, Udu Point, and Yasawa	Vunisea	-
12 month	Dreketi, Koronivia, Labasa, Lakeba, Lautoka, Nausori, Navua, Ono-i-lau, Penang, Rarawai Mill, Rotuma, Savusavu, Suva, Udu Point and Yasawa	-	Nacocolevu

Background Information on Drought Monitor

FMS currently uses the Standardized Precipitation Index (SPI) for monitoring monthly rainfall variability in Fiji. The selection of the SPI method follows extensive research into its suitability for Fiji conditions in comparison with other notable indices by both the Fiji Meteorological Service and Australian Bureau of Meteorology (via the AusAID Pacific Islands Climate Prediction Project). The SPI was developed in 1993 at the Colorado State University in the United States of America to be a relatively simple, year-round index, applicable to the water supply conditions in the United States. Since then, it has become the most widely used index for operational drought monitoring.

The SPI is widely accepted because of its special characteristic of being able to be normalized to a location and in time. Rainfall data needs to be normalized, as statistically, rainfall is not normally distributed. Rainfall is zero bounded and no rainfall days outnumber rainfall days. Fiji rainfall is also positively skewed. This standardization technique allows the SPI to determine the rarity of a current drought event, as well as the probability of the rainfall necessary to end the current drought. It allows the SPI to be computed at any location and at any number of time scales, depending on the impacts of interest to the user. Because SPI values fit a typical normal distribution, one can expect these values to be within one standard deviation approximately 68% of the time, within two standard deviations 95% of the time and within three standard deviations 99% of the time. A related interpretation would be that moderate drought occurs 16 times in 100 years, severe drought occurs two or three times in 100 years, and extreme drought occurs once in approximately 200 years. The fundamental strength of the SPI is that it can be calculated for a variety of time scales. This versatility allows the SPI to monitor short-term water supplies, such as soil moisture, important for agricultural production, and longer-term water resources such as groundwater supplies, stream flow and reservoir storage.

Drought status for 24 sites are provided in Table 2. FMS monitors rainfall deficiencies (drought status) at three time-scales that are indicators of meteorological and as well as applied to agricultural and hydrological drought conditions:

- *3-months – most shallow rooted agricultural crops, small streams and small water tanks;*
- *6-months – most deep rooted agricultural crops, fruit trees, small rivers and reservoirs; and*
- *12-months – medium to large rivers, medium to large reservoirs, shallow wells, dam storages.*

For more information, contact:
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All correspondences must be addressed to the Director of Meteorology.