Climate Services Division

ENSO Update

Weak La Niña conditions favoured

ISO 9001:2008 certified Climate Services

Volume 10 : Issue 05
September 29, 2017

Fiji Meteorological Service

Content

In Brief

- *The El Niño-Southern Oscillation (ENSO) remains in a neutral state, but on the cooler side;*
- *Climate models are favouring further cooling of the tropical Pacific Ocean towards a weak La Niña like conditions;*
- *The September to November 2017 rainfall outlooks show almost equal chances of below average, average and above average rainfall at most of the places in Fiji. This means that there is no strong climate driver pushing Fiji towards significantly wetter or drier conditions;*
- *However, rainfall outlooks may begin to favour average or above average rainfall in the next issue of this update if the cool anomalies in the equatorial Pacific Ocean is sustained or strengthened;*
- *At the end of August 2017, majority of the Western Division continue to be in meteorological drought state affecting grasslands, shallow rooted plants and small water bodies;*
- *Noting that the peak period for Dry Season in Fiji is usually from June to August, and the country now heading towards the Wet Season (beginning November 2017), rainfall deficiencies in the Western Division is likely to progressively ease over the coming months.*

History and Current Situation

History

From the beginning of 2017, the sea surface temperatures (SSTs) gradually warmed in the equatorial Pacific Ocean, with record warmth in the far eastern Pacific Ocean, near the coast of Peru, experienced around February and March, prompting some scientists to call it a coastal El Niño. The warm anomalies in the central and eastern equatorial Pacific Ocean peaked in May close to weak El Niño thresholds, but the warming was not sustained long enough for it to be classified as an El Niño event. Since then, the equatorial Pacific Ocean have gradually cooled, with negative anomalies evident on the surface by August 2017.

Current Situation

SSTs have steadily cooled over the central and eastern tropical Pacific for the past two months, but remain within the ENSO-neutral range. Cool anomalies, leaning towards a weak La Niña like conditions, are presently persisting in the eastern equatorial Pacific Ocean. The waters below the surface of the equatorial Pacific Ocean further cooled during the past month, with cool anomalies presently evident in the central and eastern regions from surface to the depth of 200m.

The atmospheric indicators of the ENSO are generally at neutral levels. Trade winds along the central and eastern tropical Pacific have been near average, but slightly stronger than average Trade winds were present in the western equatorial Pacific in the most recent week. Cloudiness near the Date Line has fluctuated around average values since mid-April, but has generally been below average during September. The latest 30-day average Southern Oscillation Index (SOI) to September 27th is +4.9, which is within ENSO neutral range.

ENSO Outlook

Most of the climate models are now favouring for weak La Niña conditions to develop by the end of the year, but this is closely followed by ENSO-neutral conditions to persist. As of mid-September, about 50 to 60% of the models predict La Niña conditions from September to November 2017 season through December 2017 to February 2018. During this period, about 40 to 50% of models predict neutral conditions, while no models predicts El Niño conditions. If a La-Nina event does develop, it is expected to be weak and short lived.

The Australian Bureau of Meteorology's latest ENSO Wrap-Up (26th September) states that the cooling of the tropical Pacific Ocean is likely to continue. The outlook from Climate Prediction Centre/International Research Institute of USA stated there is an increasing chances of La Niña developing during the Southern Hemisphere spring and summer 2017-18.

Weak La Niña conditions favoured

Observations of Previous Three Months

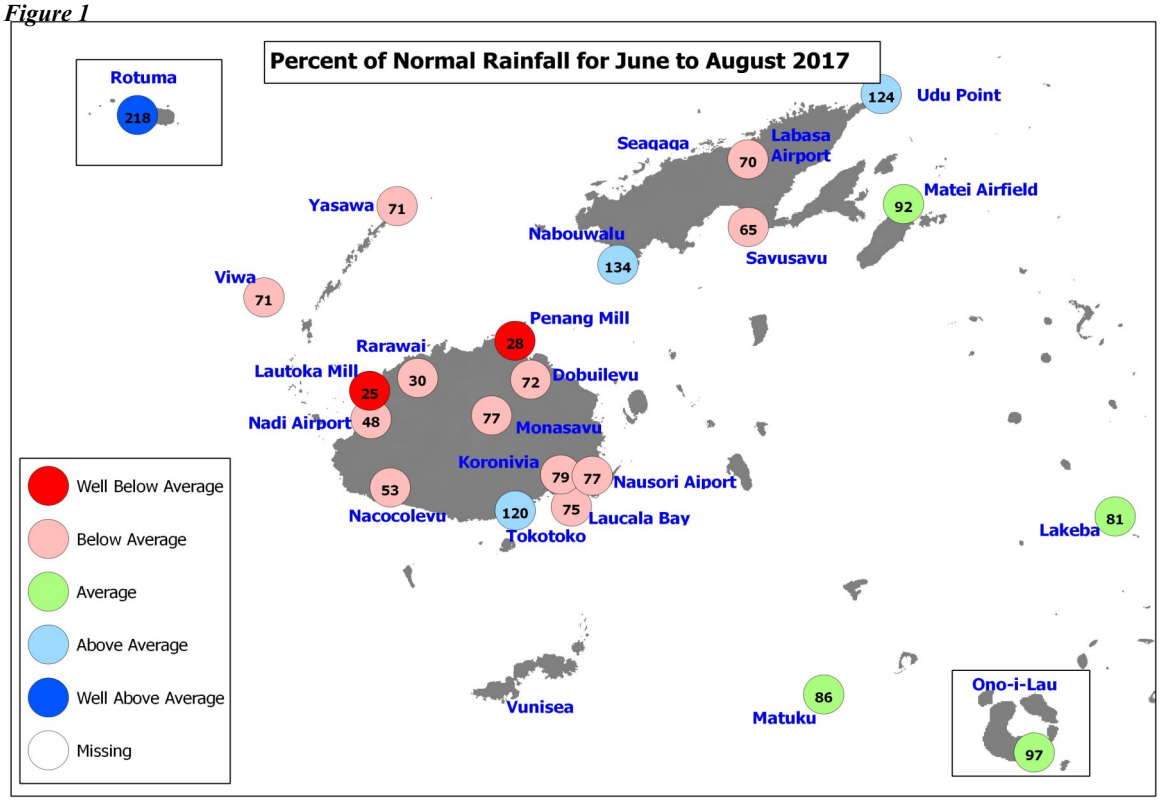
Rainfall producing systems over Fiji have generally been displaced further north of its normal position during June and July as drier than normal conditions were experienced. Some relieving rainfall was received in August due to broad southeast Trade winds and troughs of low pressure systems. However, rainfall received was not sufficient to overcome the rainfall deficiencies in most parts of the country.

The accumulated rainfall over the past three months (June to August 2017) was *below average* at most of the stations. Out of the 22 rainfall monitoring sites, 2 stations recorded *well below average* rainfall, 12 *below average*, 4 *average,* 3 *above average* rainfall, while Rotuma recorded *well above average* rainfall.

The Western Division has been experiencing drier than *normal* conditions since April 2017. Drier than *normal* trend continued to persist across the Western Division during June and July 2017 with less than half the *average* rainfall recorded across the Division during these months.

August brought some relief as about 70% of the sites recorded *normal* to *above normal* rainfall. However, this was not significant enough to overcome the existing dry conditions. Consequently, majority of the sites are still experiencing meteorological drought conditions affecting shallow rooted plants and small water bodies, such as, creeks and streams.

Figure 1



Rainfall and Temperature Outlook

The September to November 2017 rainfall outlook shows almost *equal chances* of *below average*, *average* and *above average* rainfall at most of the places in Fiji. This means that there is no strong climate driver pushing Fiji's climate towards significantly wetter or drier conditions. However, the global climate models are already favoring *average* or *above average* rainfall in the Fiji region through the September to November 2017 period.

As Fiji transitions from Dry to Wet Season, the current rainfall deficiencies, that are being experienced especially in the Western and Northern Divisions, are likely to gradually ease over the course of next couple of months.

Air temperatures are expected to fluctuate around *normal* across the Fiji Group during both September to November 2017 and December 2017 to February 2018 periods. Occasionally hot and humid conditions could be expected over December 2017 and February 2018. The sea surface temperatures in the Fiji region is likely to be *near normal* during September to November 2017 period.

Table 1: Rainfall Distribution for June to August 2017

Stations	June 2017 Rainfall (mm)	July 2017 Rainfall (mm)	August 2017 Rainfall (mm)	June to August 2017 Total Rainfall (mm)
Nadi Airport	2.4	20.5	60.6	83.5
Nacocolevu, Nadroga	19.9	46.7	57.3	123.9
Lautoka Mill	24.0	10.2	28.7	62.9
Viwa	20.0	15.8	93.5	129.3
Yasawa-i-Rara	12.3	3.7	127.0	143.0
Dobuilevu	57.5	19.5	94.0	171.0
Rarawai Mill, Ba	14.1	3.0	40.0	57.1
Penang Mill	12.5	1.4	48.7	62.6
Monasavu	111.7	86.7	203.7	402.1
Nabouwalu	131.2	20.8	102.5	254.5
Dreketi	Missing	Missing	Missing	Missing
Seaqaqa	49.0	Missing	42.0	Missing
Labasa Airfield	23.2	20.3	80.2	123.7
Udu Point	104.1	68.1	142.4	314.6
Savusavu Airport	91.1	17.0	86.8	194.9
Matei, Taveuni	98.6	31.2	187.2	317.0
Tokotoko, Navua	161.3	146.5	149.6	457.4
Koronivia	128.9	62.5	193.1	384.5
Laucala Bay, Suva	109.8	85.1	149.8	344.7
Nausori Airport	80.0	76.9	169.4	326.3
Lakeba	22.0	26.6	81.6	130.2
Ono-I-Lau	39.0	20.1	214.4	273.5
Matuku	78.2	71.1	103.5	252.8
Vunisea	45.7	Missing	122.9	Missing
Vanuabalavu	Missing	Missing	Missing	Missing
Rotuma	316.9	434.6	220.8	972.3

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	Nadi Airport, Lautoka Mill, Rarawai Mill, Penang Mill, Yasawa-i-Rara, Savusavu Airfield, Lakeba and Ono-i-Lau	Nacocolevu, Tokotoko, Nausori Airport, Labasa Airport and Matuku	Tavua, Dobuilevu, Laucala Bay, Koronivia, Matei Airfield, Udu Point and Rotuma
6-month	Dobuilevu, Lakeba and Savusavu Airfield	Nausor i Airpor t, Nacocolevu, Lautoka Mill, Penang Mill, Yasawa-i-Rara, Matuku and Ono-i-Lau	Rarawai Mill and Matei Airfield
12-month	-	-	Udu Point, Matei Airport and Savusavu

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.