Climate Services Division

ENSO Update

ENSO–neutral conditions favoured to continue

ISO 9001:2008 certified Climate Services

Volume 10 : Issue 04
July 25, 2017

Fiji Meteorological Service

Content

In Brief

- *ENSO-neutral (that is, neither El Niño nor La Niña) conditions currently persist in the tropical Pacific, but oceanic conditions are leaning towards El Niño thresholds;*
- *Climate models are favouring for the continuation of ENSO-neutral conditions through the second half of 2017;*
- *Even if the tropical Pacific Ocean does not surpass El Niño thresholds but remains warmer than average, then some El Niño-like effects on Fiji's climate are still possible;*
- *At the end of June 2017, majority of the Western Division reached meteorological drought state affecting grasslands, shallow rooted plants and small water bodies;*
- *Below average rainfall is expected over most places through the July to September 2017 period;*
- *Considering the current ENSO situation, high rainfall deficiency in the past several months and the forecasted below average rainfall trend during the dry season in progress, parts of the country, especially the Western and Northern Divisions and small islands that depend on rainfall harvesting, are likely to continue to facing severe rainfall deficiencies in the coming months.*

History and Current Situation

History

From the beginning of 2017, the sea surface temperatures 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. These anomalies were not sustained and since late April, the sea surface temperature anomalies in the east-central equatorial Pacific have been near +0.5˚C, approaching the threshold of El Niño conditions. However, the atmospheric patterns did not respond positively to the ocean warming.

Current Situation

The sea surface temperatures in the equatorial Pacific Ocean are slightly above normal and leaning towards El Niño thresholds. The waters below the surface of the equatorial Pacific Ocean are also slightly warmer than normal up to a depth of 150m.

The atmospheric indicators of the ENSO are generally at neutral levels, with near normal cloudiness near the Dateline and close to average Trade winds along most of the equatorial Pacific. The latest 30-day average Southern Oscillation Index (SOI) to July 22nd was +6.1.

The oceanic and atmospheric conditions mentioned above indicate no coherent coupling to re-inforce warm ocean conditions and it is concluded that ENSO-neutral conditions are currently persisting.

ENSO Outlook

Most of the climate models are now favouring for the continuation of ENSO-neutral conditions through the second half of 2017 with more than 60% likelihood. This is followed by the chances of an El Niño developing with probabilities for it reaching a maximum of 30-40%. A La Niña event is least likely for 2017 with none of the models anticipating its development at the present time. This is in contrast to model outlooks from earlier in the year that suggested an increase in chance of El Niño developing in 2017. The easing away from El Niño thresholds in the models is due to weaker than expected coupling between the Pacific Ocean and overlying atmosphere at the end of March and April period. If the tropical Pacific remains warmer than average, then some El Niño-like effects on Fiji's climate are still possible.

The Australian Bureau of Meteorology's latest ENSO Wrap-Up states that ENSO-neutral to stay for 2017. The outlook from Climate Prediction Centre/International Research Institute from USA and World Meteorological Organisation also favour continuation of ENSO-neutral conditions throughout 2017.

ENSO–neutral conditions favoured to continue

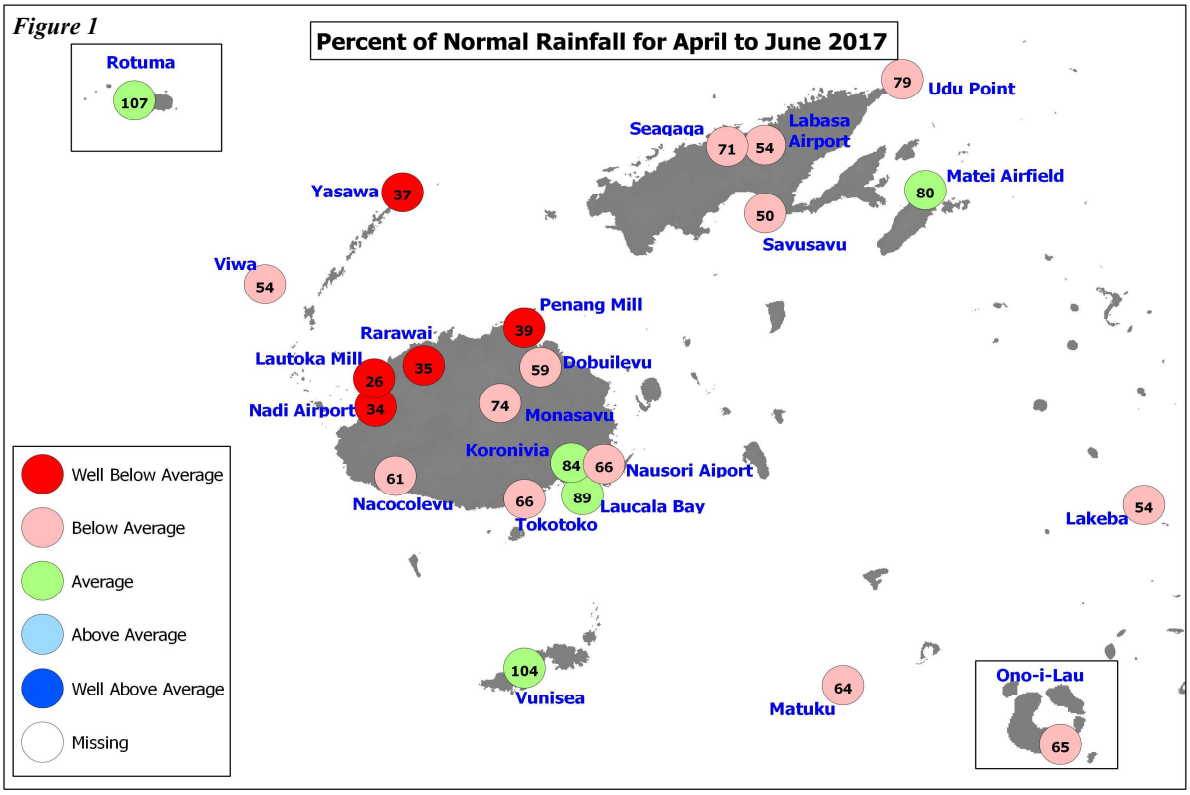
Observations of Previous Three Months

Rainfall producing systems over Fiji have generally been weak and inactive since April 2017 with the South Pacific Convergence Zone displaced further northwards from the country.

The accumulated rainfall over the past three months (April to June 2017) was *below average* at most of the stations. Out of the 23 rainfall monitoring sites, 5 recorded *average* rainfall, 13 *below average* rainfall, while 5 registered *well below average* rainfall, which were all in the Western Division.

The Western Division has been experiencing significantly drier than *normal* conditions since April 2017. Over a century old low total monthly rainfall record for April was broken at Lautoka Mill during April 2017, with lowest total monthly rainfall record also established at Penang Mill. The dry conditions continued during May 2017 with Nadi Airport, Momi, Lautoka Mill and Tavua recording 5 or less rain days. Significantly drier than *normal* trend continued to persist across the Western Division during June 2017 with less than half the *average* rainfall recorded across the Division. Consequently, at the end of June 2017, majority of the Western Division reached meteorological drought state affecting grasslands, shallow rooted plants and small water bodies. The trend of suppressed rainfall has continued thus far in July 2017. The dryness is again most pronounced in the Western Division with no rainfall recorded at Momi, Nadi Airport, Lautoka Mill, Rarawai Mill, Tavua, Yaqara and Yasawa-i-Rara in the first 23 days of July 2017.

Figure 1



Rainfall and Temperature Outlook

The SCOPIC model (the seasonal rainfall guidance tool used by FMS) favours *below average* rainfall over most parts of the country during the July to September 2017 period. The confidence in the SCOPIC predictions at this time of the year are generally *low*. The global climate models favors *near average* rainfall in Fiji for the same period.

Fiji is now into mid 'Dry Season', therefore, *below average* rainfall could potentially result in severe rainfall deficiencies in the coming months, especially in the Western & Northern Divisions and rainfall dependent small islands in the maritime zone. The driest months are June, July and August, however under the current climate conditions, there is a possibility that September could be drier than the usual.

The day and night time temperatures are likely to be *below normal* during the July to September period, while *near normal* temperatures are expected during the October to December 2017 period. The sea surface temperatures in the Fiji region is favoured to be *near normal* through the July to September 2017 period.

Table 1: Rainfall Distribution for April to June 2017

Stations	April 2017 Rainfall (mm)	May 2017 Rainfall (mm)	June 2017 Rainfall (mm)	April to June 2017 Total Rainfall (mm)
Nadi Airport	48.7	55.2	2.4	106.3
Laucala Bay, Suva	317.9	285.2	109.8	712.9
Nacocolevu, Nadroga	68.2	105.6	19.9	193.7
Udu Point	164.9	169.5	104.1	438.5
Nabouwalu	71.8	Missing	131.2	Missing
Dreketi	69.0	Missing	Missing	Missing
Seaqaqa	141.0	135.5	49.0	325.5
Koronivia	215.9	312.2	128.9	657.0
Tokotoko, Navua	187.5	262.8	161.3	611.6
Nausori Airport	175.4	248.9	80.0	504.3
Monasavu	163.8	534.1	111.7	809.6
Penang Mill	32.4	162.5	12.5	207.4
Rarawai Mill, Ba	76.8	46.4	14.1	137.3
Lautoka Mill	15.2	65.8	24.0	105.0
Dobuilevu	58.0	193.0	57.5	308.5
Viwa	63.2	137.0	20.0	220.2
Matei Airfield, Taveuni	215.8	213.0	98.6	527.4
Vunisea, Kadavu	273.9	246.4	45.7	566.0
Lakeba	21.8	183.3	22.0	227.1
Matuku	82.8	117.2	78.2	278.2
Ono-i-Lau	44.4	142.3	39.0	225.7

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	Dobuilevu, Penang Mill, Rarawai Mill, Lautoka Mill, Nadi Airport, Yasawa-i-Rara, Savusavu Airfield, Lakeba and Ono-i-Lau	Nausori Airport, Totkotoko (Navua), Nacocolevu, Labasa Airport and Matuku	Seaqaqa, Udu Point, Matei Airfield and Rotuma
6-month	-	Savusavu Airfield	Matei Airfield, Nausori Airport and Penang Mill
12-month	-	Matei Airfield	Udu Point

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:
Fiji Meteorological Service, Private Mail Bag NAP0351, Nadi Airport, Fiji. Phone : 6724888, Fax : 6724050. Visit website at http:/www.met.gov.fj for other products and services. Email: climate@met.gov.fj or fms@met.gov.fj.
All correspondences must be addressed to the Director of Meteorology.