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Fiji Climate Summary

March 2020



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1. IN BRIEF

The El-Niño Southern Oscillation status was neutral during March, that is neither El-Niño nor La-Niña. Series of troughs of low pressure system, together with moist north-easterly wind flow resulted in significant rainfall in parts of the country during the month.

A number of places in Viti Levu recorded flash floods between 17th to 21st. This was mainly due to lingering trough of low pressure over Fiji. Prior to this trough affecting the group, wet weather prevailed across country thus the soil was considerably saturated.

Nabukaluka registered 332mm of rainfall on the 18th, followed by Koronivia with 269mm, Naqali with 230mm, Navolau and Koronivia with both 213mm, Nausori Airport with 199mm and Nasinu with 173mm, all on the same day. Furthermore, Koronivia, Nausori Airport, Nasinu and Tokotoko received 374mm, 285mm, 267mm and 221mm of rainfall, respectively, over a 48-hour period between 18th and 19th. This heavy rainfall then later shifted to the Western Division, with Nadi Airport registering 214mm of rainfall between 20th and 21st, followed by Momi with 173mm and Lautoka Mill with 164mm on those same days.

Due to prolonged wet weather, a major landslide occurred at the Namosi Quarry towards Mau Road, Navua on the 20th, which resulted in the unfortunate loss of three lives. There were reports of the loss of two more lives during these rainfall events, with drowning in swollen creeks in separate incidents at Teidamu, Lautoka and Togovere, Tavua.

More than twice the *normal* total rainfall was registered at Nadi Airport, Lautoka Mill, Viwa, Nausori Airport and Koronivia. Furthermore, 11 other stations recorded *above normal* rainfall, while 9 received *near normal* rainfall. On the other hand, Lakeba and Savusavu Airfield registered *below normal* rainfall.

The total monthly rainfall at Koronivia during the month ranked as the wettest March on record since observations began in 1950.

2. WEATHER PATTERNS

The weather in March was mostly dominated by troughs of low pressure system together with the moist north-easterly winds.

An easterly wind flow prevailed over Fiji from the 1st till the 4th with brief showers over the interior and eastern parts of the main islands whereas fine apart from isolated afternoon showers elsewhere. On the 5th, a trough of low pressure approached Fiji from the northwest, gradually moved over and cleared the group on the 7th. Cloudy periods with some showers were observed over most places during this period.

On the 8th, another trough of low pressure approached Fiji from the north and gradually moved over the country. It lingered around and fizzled out on the 12th. Occasional showers were observed over most places.

Later on the 13th, another trough of low pressure lies slow moving to the south of Fiji and a northerly wind flow prevailed over the group. Occasional showers and thunderstorms were experienced around the country till the 14th.

The northerly wind flow continued to prevail over Fiji till the 16th with cloudy periods and some showers over the interior and eastern parts of the larger islands, fine apart from isolated afternoon showers elsewhere.

On the 17th, an active trough of low pressure affected Fiji from the west. It gradually moved over the group, lingered and cleared on the 22nd. Continuous heavy rain, thunderstorms, flash floods and land slides observed during this period.

A northerly wind flow prevailed over Fiji from 23rd till the 24th. Some showers observed over most places. On the 25th, the wind flow over Fiji changed to an east to south-east direction till the 28th with mostly fine weather apart from brief showers observed around the country.

On the 29th, a trough of low pressure approached Fiji from the west and affected the country with occasional showers till the 31st.

Rotuma's weather during the month was affected by a series of troughs of low pressures with clouds and showers.

3. RAINFALL

Most of the stations recorded *near normal* to *well above normal* rainfall during the month. Out of the 27 stations, 5 stations recorded *well above normal* rainfall, 11 *above normal*, 9 *near normal*, while Savusavu Airfield and Lakeba recorded *below average* rainfall (Table 2).

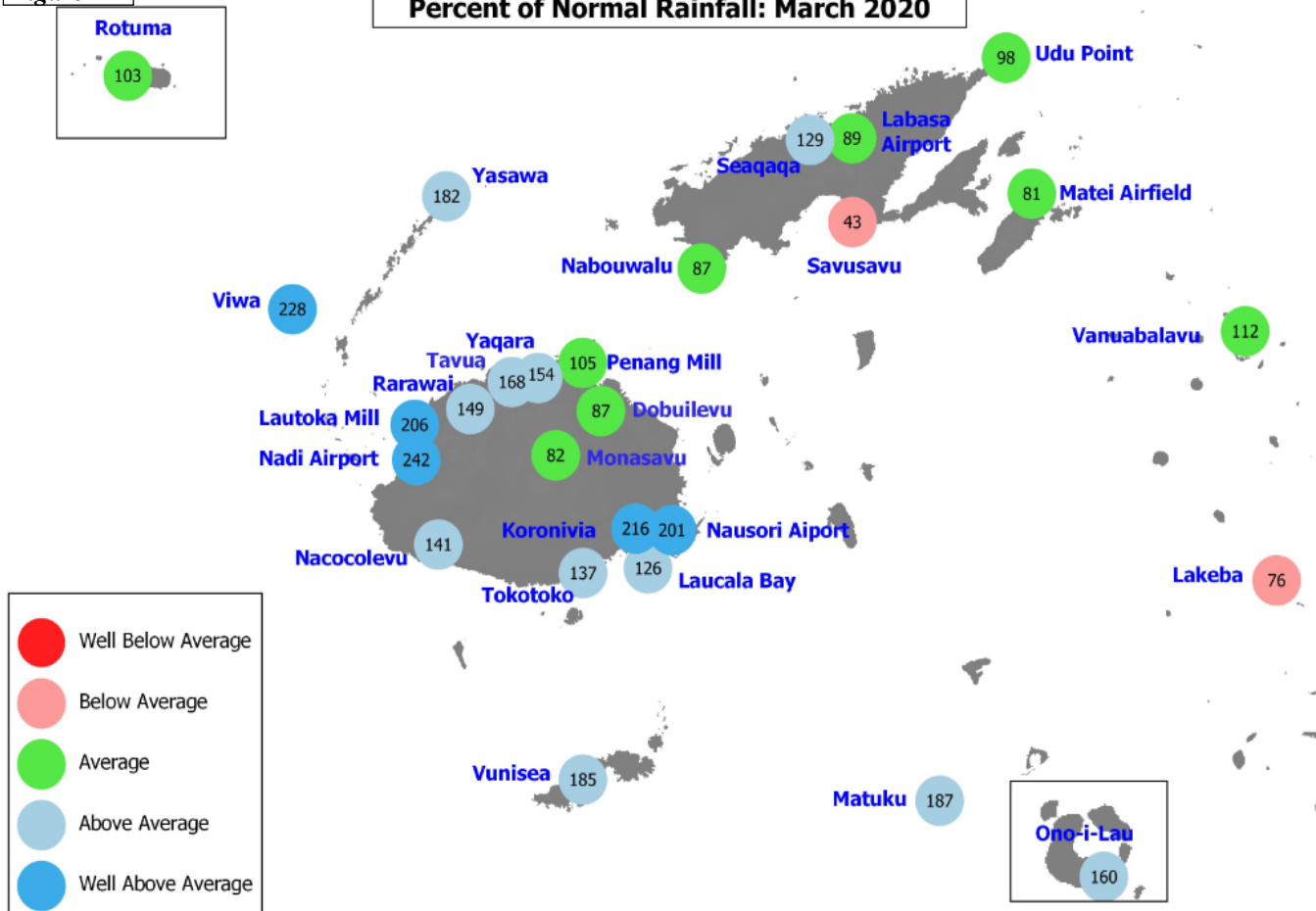
The highest total monthly rainfall during the month was recorded at Nadarivatu with 935mm, followed by Koronivia with 798mm, Nadi Airport with 785mm, Nausori Airport with 717mm and Momi with 679mm. On the contrary, the lowest total monthly rainfall was received at Savusavu Airfield with 102mm, followed by Lakeba with 209mm, Matei Airfield with 233mm, Saqani with 244mm and Vanuabalavu with 247mm.

Koronivia recorded its highest ever March total monthly rainfall during the month since observations started in 1950.

It rained on almost every day at Keiyasi and Nadarivatu with 29 rain days (rainfall $\geq 0.1\text{mm}$) registered during the month, followed by Koronivia, Vunisea and Saqani with 28 rain days, and Laucala Bay, Nausori Airport, Penang Mill and Monasavu with 27 rain days. On the other hand, the Savusavu Airfield recorded the least number of rain days with 16 rain days, followed by Vanuabalavu with 18 rain days, Labasa Airport and Nacocolevu with 21 rain days.

A number of very significant rainfall events were registered during the month, especially between 16th to 21st. The highest 24-hour rainfall during the month was recorded at Nabukaluka with 332mm on the 18th, followed by Koronivia with 269mm on the 18th, Naqali with 230mm on the 18th, Navolau and Korovou with both 213mm on the 18th, RKS with 213mm on the 19th, Nausori Airport with 199mm on the 18th and Nadarivatu with 176mm on the 16th. Furthermore, significant 48-hour rainfall was registered at Koronivia, Nausori Airport, Nasinu and Tokotoko with 374mm, 285mm, 267mm and 221mm of rainfall, respectively, between 18th and 19th. Consequently, flash floods were recorded at several places on Viti Levu including land slides.

Figure 1



Normal: Long term average from 1981 to 2010
 Well Below Average: Rainfall less than 40% of normal
 Below Average: Rainfall between 40 to 79%
 Rain Day: Rainfall $\geq 0.1\text{mm}$
 Average: Rainfall between 80 to 119%
 Above Average: Rainfall between 120 to 199%
 Well Above Average: Rainfall greater than or equal to 200% of normal

4. AIR TEMPERATURES

A. Maximum Daytime Air Temperatures

Generally normal to above normal mean monthly maximum air temperatures were recorded at most of the places during the month. Of the 22 climate stations, 14 reported near normal (anomalies within $\pm 0.5^{\circ}\text{C}$) temperatures, 6 above normal ($\geq +0.5^{\circ}\text{C}$), while Nadi Airport and Rarawai Mill (Ba) registered below normal ($\leq -0.5^{\circ}\text{C}$) temperatures (Table 2 & Figures 2-5).

The warmest days on average was recorded at Seaqaqa with 32.6°C , followed by Yasawa-i-Rara with 32.5°C , Koro Island with 32.4°C and Labasa Airport with 32.3°C . On the other hand, the coolest monthly average daytime temperature was recorded at Nadarivatu with 25.1°C , followed by Monasavu with 25.9°C , Rakiraki with 29.7°C and Ono-i-Lau with 30.3°C .

The highest daily maximum air temperature during the month was reported at Yasawa-i-Rara with 37.1°C on the 1st, followed by Tokotoko (Navua) with 35.8°C on the 15th and Keiyasi with 35.3°C on the 4th. A period of cool daytime temperatures were recorded across the country between 18th and 21st. The coolest daytime temperature was registered at Nadarivatu with 21.2°C , followed by Monasavu with 22.4°C and Rarawai Mill with 25.0°C , all on the 21st.

Tokotoko (Navua) and Lakeba recorded their new highest daily day-time temperature for March during the month with the observations at these stations beginning in 1992 and 1928, respectively. Furthermore, a new high mean monthly maximum air temperature for March was established at Tokotoko (Navua) during the month (Table 1).

B. Minimum Night-time Air Temperatures

Normal to above normal night-time temperatures were recorded at most places during the month. Out of the 21 stations, 12 recorded anomalies within $\pm 0.5^{\circ}\text{C}$, 7 stations $\geq +0.5^{\circ}\text{C}$, while Yasawa-i-Rara and Ono-i-Lau were the only two stations that had anomalies $\leq -0.5^{\circ}\text{C}$.

The coolest monthly average night-time temperature was recorded at Nadarivatu with 19.0°C , followed by Monasavu with 19.8°C , Vaturekuka (Labasa) with 22.6°C , and Nacocolevu and Labasa Airport with both 22.7°C . On the other hand, the warmest monthly average night-time temperature was recorded at Rotuma with 25.5°C , followed by Nabouwalu and Matei Airfield with both 25.0°C , and Udu Point with 24.9°C .

The lowest night-time temperature was recorded at Nadarivatu with 15.6°C on the 1st, followed by Monasavu with 17.0°C also on the 1st, Nacocolevu with 19.0°C on the 3rd and Lautoka Mill with 20.5°C on the 21st. In contrast, the warmest minimum air temperature during the month was recorded at Rotuma with 27.5°C on the 16th, followed by Viwa with 27.3°C on the 16th and Vunisea (Kadavu) with 27.1°C on the 16th.

Tokotoko (Navua) recorded a record high daily minimum air temperature for March during the month since observations began in 1992 (Table 1).

TABLE 1. CLIMATE RECORDS ESTABLISHED IN MARCH 2020

<u>Element</u>	<u>Station</u>	<u>Observed (record)</u>	<u>On</u>	<u>Rank</u>	<u>Previous (record)</u>	<u>Year</u>	<u>Records Began</u>
Total Monthly Rainfall	Koronivia	798.0mm	-	New High	733.0mm	1969	1950
Daily Maximum Temperature	Tokotoko (Navua)	35.8°C	15 th	New High	34.5°C	2018	1992
Daily Maximum Temperature	Lakeba	33.6°C	11 th	New High	33.3°C	1992	1928
Mean Monthly Max Temperature	Tokotoko (Navua)	31.5°C	-	New High	31.3°C	2018	1992
Daily Minimum Temperature	Tokotoko (Navua)	27.0°C	24 th	New High	26.5°C	2010	1992

Note: All comparisons in this summary are with respect to "Climatic Normals". This is defined to be the average climate condition over a 30-year period. Fiji uses 1981-2010 period as its "climatic normal" period.

TABLE 2. DAILY CLIMATE REPORTING SITES: SUMMARY FOR MARCH 2020

	RAINFALL				AIR TEMPERATURES								SUNSHINE		
	TOTAL	RAIN		MAX.	AVERAGE DAILY				EXTREME		TOTAL				
	MM	* DAYS	%	FALL	MAX.	#	MIN.	#	MAX.	MIN.	HRS	*			
		+		MM ON	C	C	C	C	C	ON	C	ON		%	
NADI AIRPORT	785	242	24	109	21	30.6	-0.7	23.7	0.6	32.7	2	22.5	1	117	60
SUVA/LAUCALA BAY	436	126	27	100	19	31.5	0.2	24.5	0.3	34.2	15	23.0	7	115	64
NACOCOLEVU	337	141	21	45	28	U/S		22.7	0.0	U/S		19.0	3	84	50
ROTUMA	352	103	22	58	16	31.6	0.7	25.5	0.7	32.6	3	23.9	17	183	108
VIWA	522	228	25	91	13	31.8	0.4	24.7	-0.4	34.8	4	21.7	26		
UDU POINT	295	98	21	61	8	30.7	-0.3	24.9	0.3	32.2	30	22.7	22		
SAVUSAVU AIRFIELD	102	43	16	18	9	31.1	0.2	24.4	0.6	33.4	17	23.2	8		
LABASA AIRFIELD	299	89	21	53	16	32.3	0.8	22.7	0.2	34.0	27	21.0	12		
NABOUWALU	275	87	24	67	26	31.7	0.0	25.0	0.4	33.6	17	22.6	22		
KORONIVIA	798	216	28	269	18	30.7	-0.1	23.7	0.3	32.2	27	22.3	4		
NAUSORI AIRPORT	717	201	27	199	18	31.1	0.3	23.6	0.2	33.1	15	22.0	4		
NAVUA/TOKOTOKO	524	137	22	117	19	31.5	0.6	23.1	0.9	35.8	15	21.0	16		
MONASAVU	488	82	27	81	16	25.9	0.2	19.8	0.4	28.8	25	17.0	1		
LAUTOKA AES	594	206	25	102	21	31.1	-0.2	23.9	-0.1	33.5	1	20.5	21		
BA/RARAWAI MILL	526	149	24	78	16	31.4	-0.7	23.2	0.7	34.0	1	21.2	1		
PENANG MILL	447	105	27	54	22	31.1	0.1	23.9	0.2	32.8	27	22.7	8		
MATEI AIRFIELD	233	81	24	34	8	30.9	0.4	25.0	0.7	32.2	17	23.5	9		
VANUABALAVU	247	112	18	45	9	31.0	0.4	U/S		32.0	4	U/S			
LAKEBA	209	76	23	64	18	31.4	1.1	24.2	0.0	33.6	11	22.0	3		
YASAWA	434	182	24	67	20	32.5	2.0	24.0	-0.6	37.1	1	21.3	6		
VUNISEA	575	185	28	103	21	30.6	0.2	24.6	0.9	33.2	14	23.0	7		
MATUKU	418	187	26	72	28	30.9	0.4	U/S		34.0	14	U/S			
ONO-I-LAU	364	160	24	56	14	30.3	0.5	23.1	-1.4	32.4	7	21.0	22		
YAQARA AWS	464	154	26	92	22	31.9		23.9		34.5	1	22.5	22		
LEVUKA AWS	484		26	129	19			24.8				22.9	22		
KEIYASI AWS	524		29	66	6			23.1		35.3	4	21.0	4		
LOMAIVUNA AWS	U/S					U/S		U/S		U/S		U/S			
NADARIVATU AWS	935		29	176	16	25.1		19.0		28.0	6	15.6	1		
RKS LODONI AWS	618		26	213	19	30.8		23.3		32.8	1	21.3	29		
MOMI AWS	679		24	108	21	30.6		24.3		34.0	2	22.2	31		
KOROLEVU AWS	U/S					U/S		U/S		U/S		U/S			
KORO ISLAND AWS	U/S					32.4		24.5		34.1	16	22.4	29		
SIGATOKA AWS	302		22	98	18	30.9		23.2		33.8	15	21.2	4		
RAKIRAKI AWS	636		24	87	28	29.7		23.4		31.3	28	22.2	23		
WAINIKORO AWS	388		24	63	10	31.8		23.1		33.8	4	21.5	2		
SAQANI AWS	244		28	30	15	32.1		24.8		34.1	22	23.4	23		
VATUREKUKA AWS	467		24	85	1	30.6		22.6		32.3	5	20.9	2		
KUBULAU AWS	317		24	56	14	30.6		23.2		32.0	16	21.8	4		
SEAQAQA AWS	472	129	25	69	16	32.6		24.5		34.9	1	22.1	4		
DOBUILEVU TB3	339	87	24	53	22										
NASINU TB3	538		25	173	18										
TAVUA TB3	487	168	25	79	16										

	TEMPERATURE (C)		HUMIDITY		WIND	SUN	RAD
	MEAN		DRY	WET			
	(AVERAGE AT 9AM)		RH%	VP			
					KT	POS	MJ/SQ.M
NADI AIRPORT	27.2	27.5	25.0	82	29.7	5.6	30 12.2
SUVA/LAUCALA BAY	28.0	28.4	25.9	81	31.5		30 18\$
NACOCOLEVU	U/S	27.3	25.6	87	31.5		23 16\$
ROTUMA	28.5	29.3	26.5	80	32.3		48 20\$
VIWA	28.2	29.0	26.7	84	33.2		
UDU POINT	27.8	28.8	26.3	81	32.2		
SAVUSAVU AIRFIELD	27.8	28.5	25.9	81	31.4		
LABASA AIRFIELD	27.5	28.3	25.6	80	30.6		
NABOUWALU	28.4	29.1	26.0	78	31.1		
KORONIVIA	27.2	27.9	25.8	84	31.6		
NAUSORI AIRPORT	27.4	27.7	25.8	85	31.6	2.4	
NAVUA/TOKOTOKO	27.3	28.6	26.6	85	33.1		
MONASAVU	22.9	23.0	21.6	88	24.6		
LAUTOKA AES	27.5	28.7	26.2	82	32.0		
BA/RARAWAI MILL	27.3	27.2	25.2	85	30.5		
PENANG MILL	27.5	27.7	25.9	86	32.1		
MATEI AIRFIELD	28.0	29.1	26.2	79	31.8		
VANUABALAVU	26.2	28.3	25.7	80	30.8		
LAKEBA	27.8	29.1	26.1	79	31.6		
YASAWA	28.2	28.8	26.4	83	32.7		
VUNISEA	27.6	27.4	25.6	86	31.4		
MATUKU	28.1	28.2	25.6	80	30.7		
ONO-I-LAU	26.7	28.1	26.3	87	33.0		

MEAN TEMPERATURE IS (MAX+MIN)/2; WIND IS MEAN SPEED AT 06,12,18,24 HOURS.
 \$: SOLAR RADIATION CALCULATED FROM SUNSHINE DURATION. # : DEPARTURE FROM LONG-TERM AVERAGES (1971-2000). + : NUMBER OF DAYS WITH 0.1 MM OR MORE RAIN. * : PERCENT OF LONG-TERM AVERAGES.
 BLUE FONT: MISSING RECORDS OF LESS THAN OR EQUAL TO 5 DAYS. U/S: UNSERVICEABLE

Figure 2

**Nadi Airport - Temperature & Rainfall for the last 13 Months
(March, 2019 - March, 2020)**

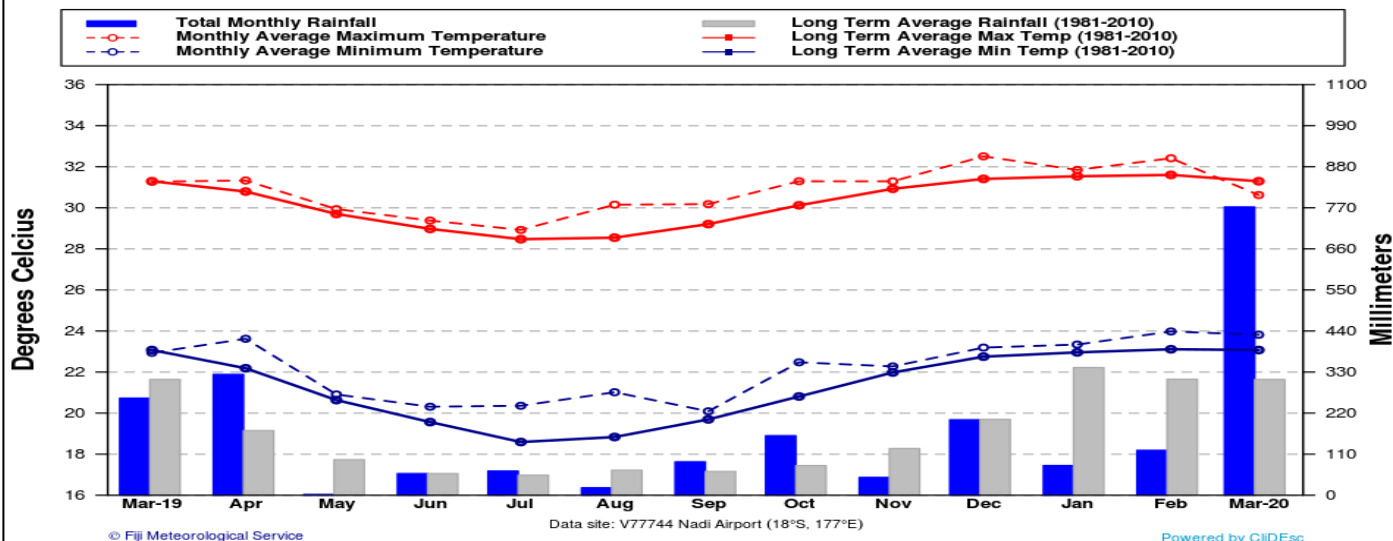


Figure 3

**Laucala Bay - Temperature & Rainfall for the last 13 Months
(March, 2019 - March, 2020)**

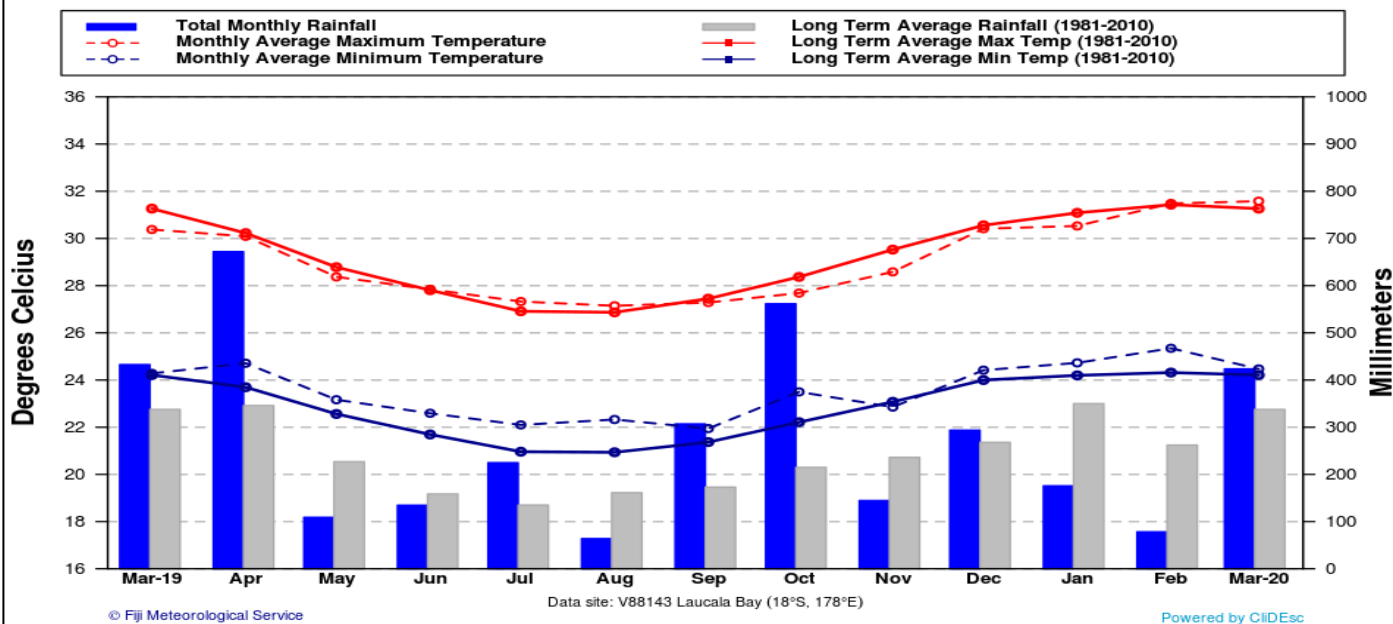


Figure 4

**Labasa Airfield - Temperature & Rainfall for the last 13 Months
(March, 2019 - March, 2020)**

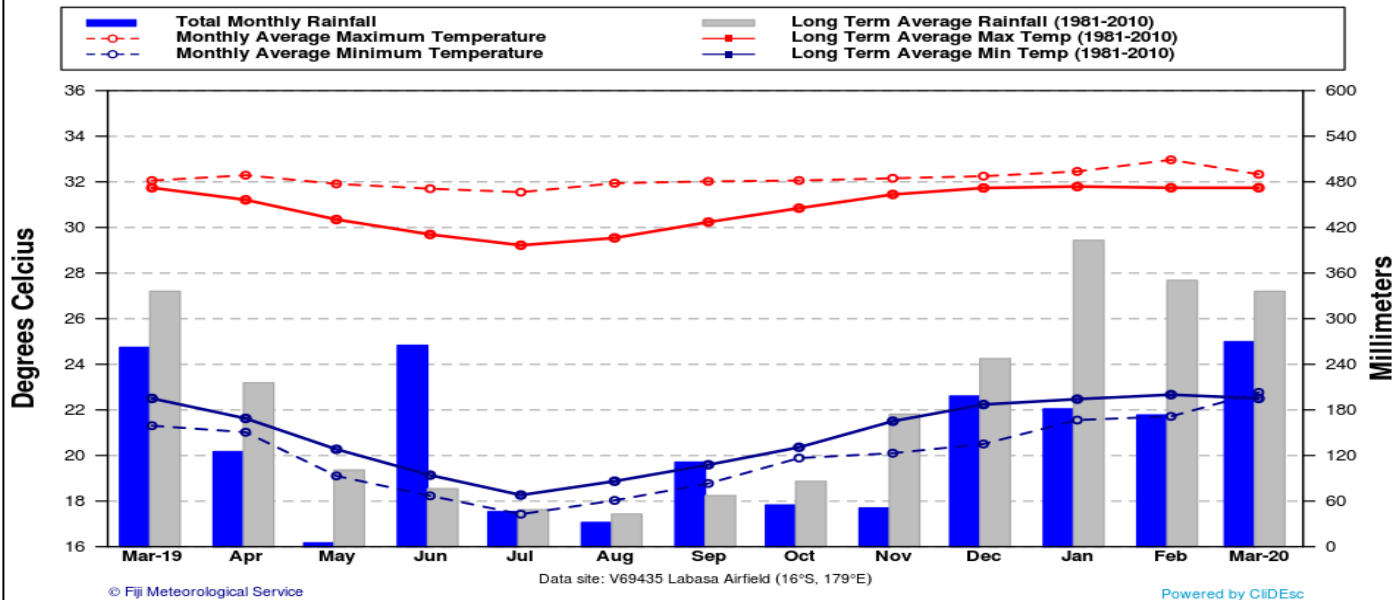
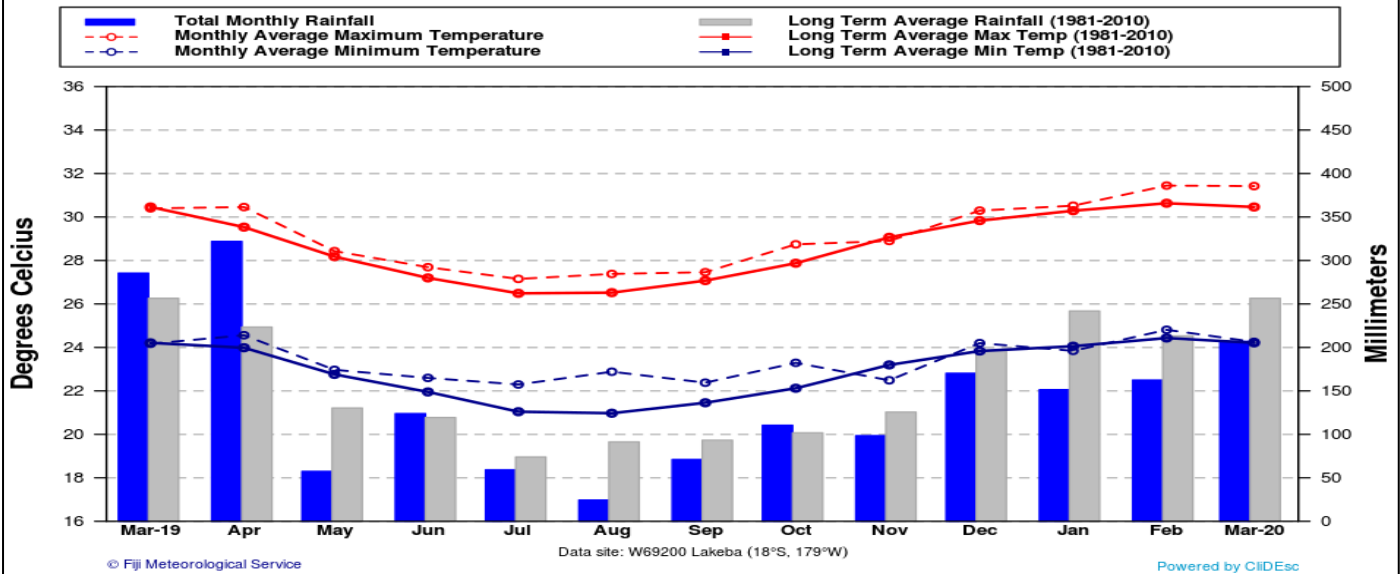


Figure 5 Lakeba - Temperature & Rainfall for the last 13 Months (March, 2019 - March, 2020)



5. DAILY RAISED PAN EVAPORATION

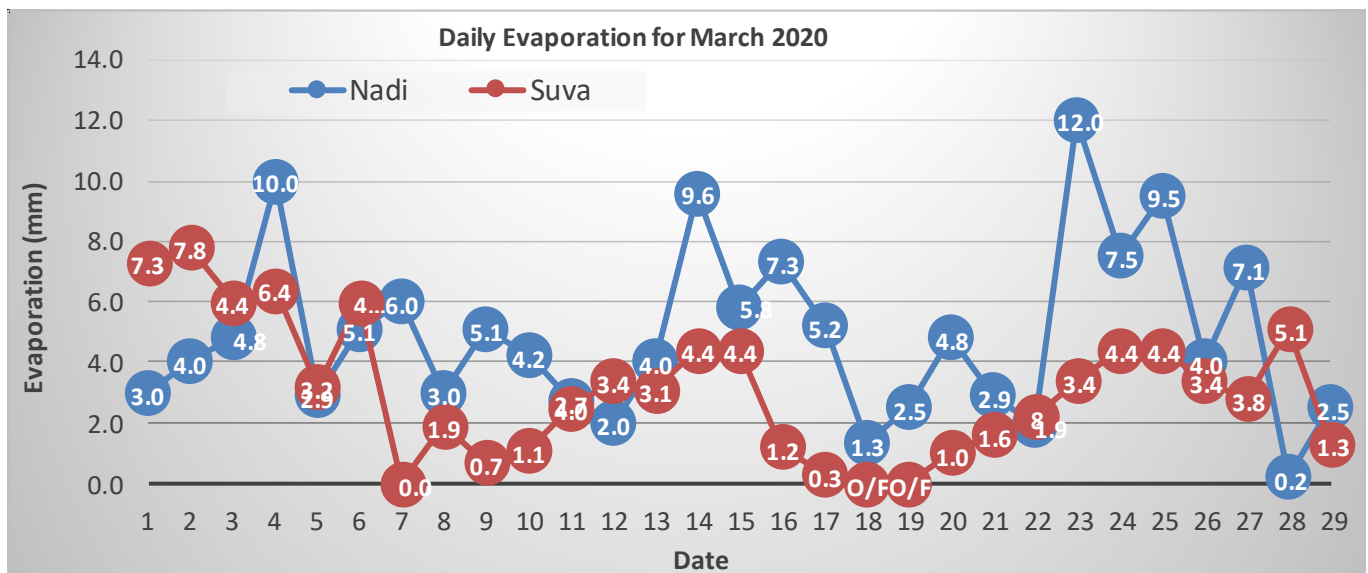


Figure 6: The total monthly raised pan evaporation at Nadi Airport was 145.4mm, with the highest daily evaporation of 12.0mm recorded on the 23rd. Laucala Bay (Suva) recorded total monthly raised pan evaporation of 91.7mm, with the highest daily evaporation of 7.8mm on the 2nd.

6. SOLAR RADIATION

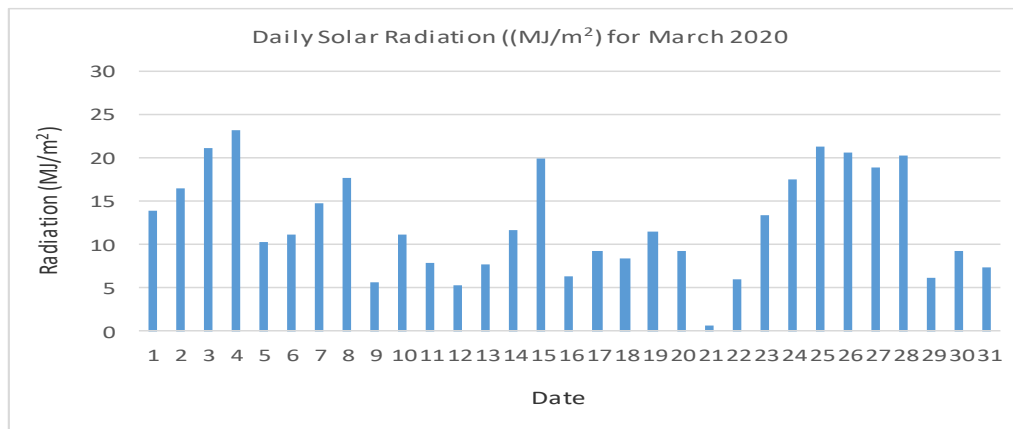


Figure 7:

The mean daily solar radiation at Nadi Airport during March 2020 was 12.4MJ/m² compared to 18.7MJ/m² over 30 year average (1981-2010).

7. WIND SUMMARY

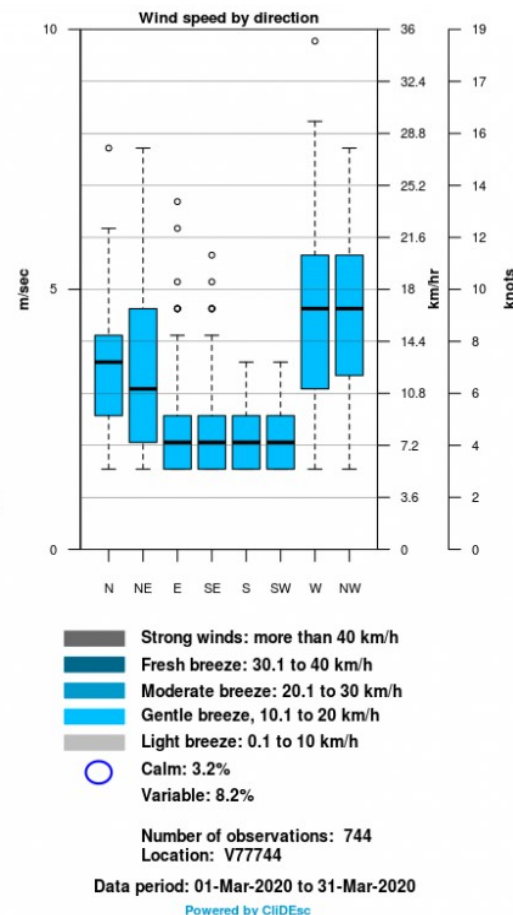
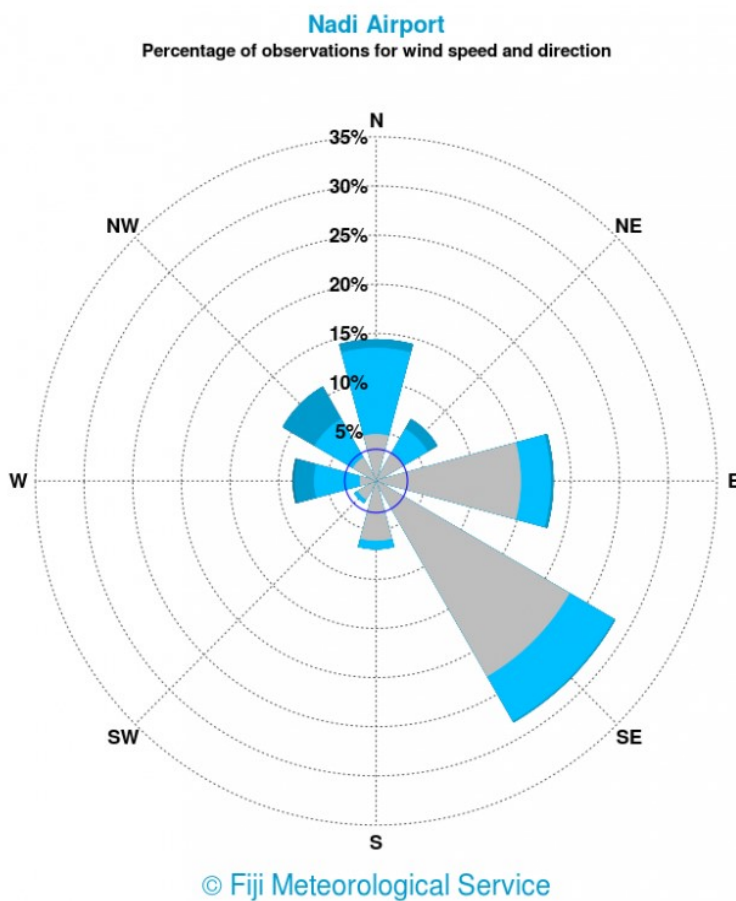


Figure 8: The hourly wind observations at Nadi Airport during the month showed winds from southeast were most dominant, followed by winds from east and north. The wind strength were light to fresh at Nadi Airport during the month.

8. SEA SURFACE TEMPERATURE (SST)

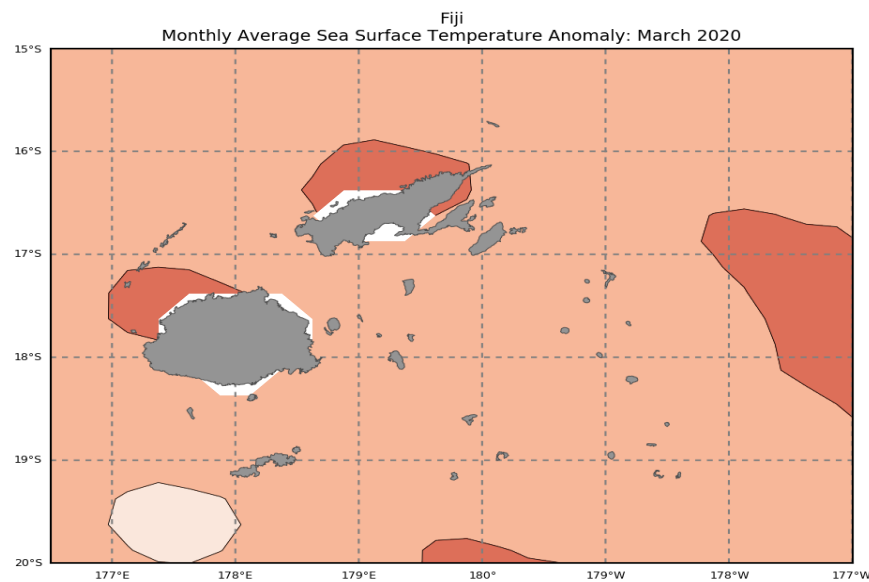


Figure 9:

SSTs were *above normal* in the Fiji Waters during the month. While anomalies between +0.5°C to +1.0°C were present in most of the Fiji Waters, same areas had anomalies greater than +1.0°C.

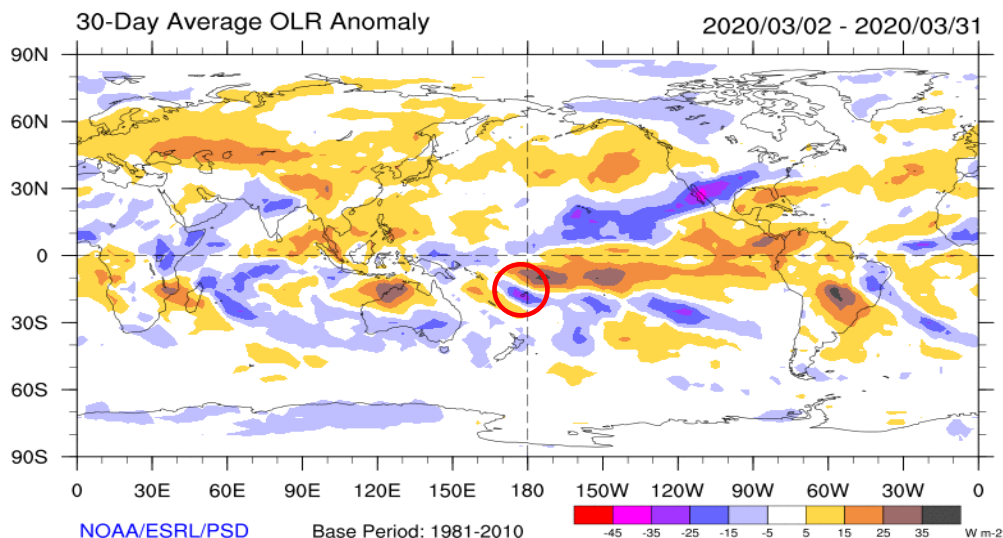
Source: <http://oceanportal.spc.int/portal/app.html#climate>

9. CLOUD COVER

Figure 10:

Above normal cloud cover were present over the Fiji region during the month (Fiji in red circle).

Source: <http://www.esrl.noaa.gov/psd/map/clim/olr.shtml>

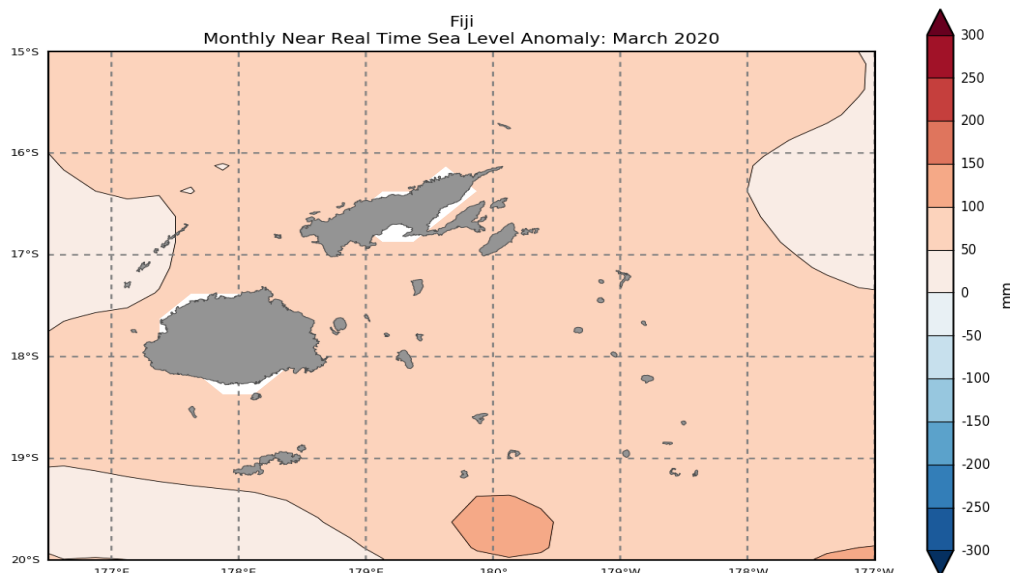


10. SEA LEVEL

Figure 11:

Sea levels were above normal in most of the Fiji waters with anomalies of around 5cm to 10cm.

Source: <http://oceanportal.spc.int/portal/app.html#sealevel>

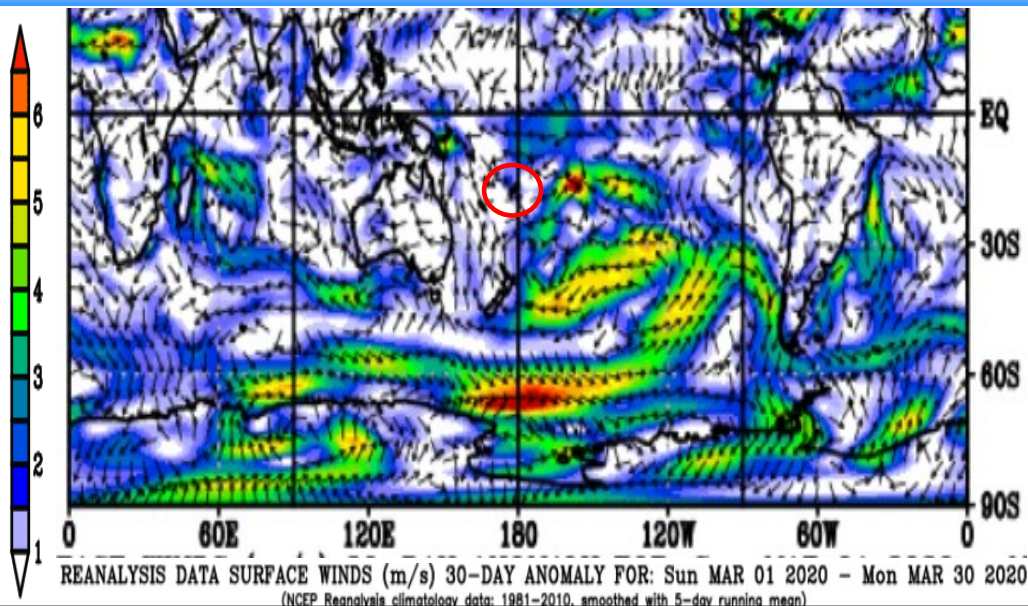


11. WIND ANOMALIES

Figure 12:

North easterly wind anomalies of up to 2m/s were recorded in the Fiji region during the month (base period: 1981-2010) (Fiji in red circle).

Source: https://www.esrl.noaa.gov/psd/map/images/rnl/sfcwnd_30b.rnl.html



12. FLASH FLOOD EVENT: March 17 to 21

A number of places in Viti Levu recorded flash floods between 17th to 21st. This was mainly due to lingering trough of low pressure over the Group. Prior to this trough affecting the Group, wet weather prevailed across Fiji thus the soil was considerably saturated. It should be noted that no major flooding was reported during this event.

On the 16th, significant rainfall was received in Ba, Tavua and Rakiraki which resulted in flash flooding of low lying areas with number of low lying crossings and roads closed. Accumulated 24-hour rainfall (9am on 16th to 9am on 17th) of 175.5mm was recorded at Nadarivatu, 145.5mm at Wai-kubukubu, 83mm was at the Vatukaceveva station in the upper Nakauvadra ranges, while 89mm and 80mm was recorded at Toge and Nanoko in Ba, respectively. High intensity rainfall of 44mm/hr was recorded at Vatukaceveva, and 38mm/hr was recorded at Toge station on the 16th. The water level at the Vatukaceveva station surpassed its alert level at around 6.30am and surpassed its warning level at round 7.30am peaking at 3.61m on the 17th.

Intermittent rainfall continued to affect the Western Division with second episode of significant falls experienced across the Western Division. Accumulated 24-hour rainfall of 86.5mm was recorded at Tubenasolo and 81mm at Natawa on the 20th, while 89mm at Toge, 74mm at Nagado, 56mm at both Bukuya and Emuri stations was recorded on the



Figure 13: Flooding in parts of Rakiraki town on 17th at around 7.30am.

21st. This also resulted in flash flooding in parts of Sigatoka, Nadi, Lautoka, Ba, Tavua and Rakiraki areas. The rivers swelled drastically downstream of major rivers in the Western Division surpassing their warning thresholds. Nadi Town station surpassed its warning threshold of 3.5m at around 9pm on the 20th reaching peak at 3.86m. Emuri station also surpassed its warning threshold at around 9pm on the 20th.



Figure 14: Flooded Vusiya Road, Nausori on the 19th.

station which was 1.52m above alert level and 6.19m recorded at Waimanu station which was 1.19m above warning threshold. This resulted in flooding of low lying areas along and downstream of Rewa Catchment. A number of roads and low lying crossings were closed to traffic due to flooding.

The water level in the Navua catchment also rose significantly but remained below warning threshold at Nabukelevu and Navua Bridge stations. Both the stations surpassed their alert threshold in the early hours of 20th. Low lying areas of Navua were also flooded.

Due to prolonged wet weather, a major landslide occurred at the Namosi Quarry towards Mau Road, Navua on the 20th, which resulted in the unfortunate loss of three lives. There were reports of loss of two more lives due to drowning in swollen creeks in separate incidents at Teidamu, Lautoka and Togovere, Tavua.

In the Central Division, rainfall slowly started to pick up from 18th with significant rainfall recorded on the 19th. Accumulated rainfall over the 24-hour period from 9am on 18th to 9am on 19th was 332mm at Nabukaluka, 229.5mm at Naqali, 213.0mm at Navolau, 212.5mm at Korovou, 143mm at Waimanu and 121mm at Nairukuruku. The water level peaked in the rivers on the 20th with 6.02m recorded at Navoalu station, which was 0.2m above alert threshold, 6.52m recorded at Nayavu



Figure 15: Landslide at Namosi Quarry site on the 20th.