

# Weather Summary for Fiji Islands – March 2003 Rainfall Outlook till June 2003

## *FIJI METEOROLOGICAL SERVICE*

### **In Brief**

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Rainfall in March varied considerably across the country. In most of the Western and Central Division rainfall was above average which brought considerable relief considering the dry conditions in the last five months. Most of the rainfall was due to the passage Tropical Cyclone *Eseta*. The Northern Division excluding the western portion was however much drier and a new record low of 104.4mm set at Savusavu Airport. Rainfall was below average to average in the Eastern Division.

Both day and night-time air temperatures were average to above average across the

### **Weather Patterns**

The weather in March was dominated by troughs of low pressure causing significant rainfall over most of the Group. The most significant of them was the trough associated with TC *Eseta* that produced widespread rain across the country for about a week.

March began with a trough associated with a weak low pressure system approaching the Group from the west and producing very heavy rain about the western parts of Fiji. The weak low pressure system noted above developed into a Tropical Depression (TD11F). Meanwhile another trough developed over the Group and produced rain about the eastern parts of Viti Levu until the end of first week.

Another Disturbance was located near Rotuma and later developed into TD12F by the 9<sup>th</sup>. By this time TD12F was still located to the northwest of the country and a strong wind warning was issued for the western parts of the country. Accompanied this depression-Rain and gusty winds began affecting the western parts of Fiji from the 9<sup>th</sup>. By early 11<sup>th</sup>, the TD12F developed into TC *Eseta*.

TC *Eseta* initially moved southwest, then south, while continuing to develop rapidly. Later it curved southeast and passed south of Ono-I-Lau on 13<sup>th</sup>. Strong and gusty winds and accompanied by rain continued over the

Group. Two new high day-time temperatures were recorded this month, the first at Nausori Airport and the other at Tokotoko (Navua).

There were numerous media reports of flooding in the Western Division. In Nadi, the Qeleloa bridge was under 1.5m water leaving many people stranded on the 13<sup>th</sup>.

The total sunshine hours were above average across the country.

group till the 14<sup>th</sup>. The maximum sustained winds of 31 knots was reported by Yasawa-I-Rara on the 10<sup>th</sup> while Nadi Airport reported 27 knots with gusts up to 43 knots on the 12<sup>th</sup>. At Ono-I-Lau gale force winds of 35 knots was reported around 9a. m. on the 13<sup>th</sup> as *Eseta* was located to the southwest of the island. No severe casualties were reported apart from some damage to crops and floods in some parts of western Viti Levu.

The trough associated with TC *Erica* remained slow-moving and lingered in the vicinity of the group, producing general rain in the southern parts of the country from the 20 to 25<sup>th</sup> and thunderstorms spreading over Viti Levu on the 25<sup>th</sup>.

Fine weather dominated over most of the country except for some trade showers in the during the last week of the month.

Rotuma experienced showers almost everyday. A series of troughs remained slow moving in the vicinity of the island for most of the month. The TD12F was one of them which produced significant rain, strong and gusty northwesterly winds over the island from the 9<sup>th</sup> to the 11<sup>th</sup>.

#### **Further Information:**

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**TABLE 1: Rainfall from January to March 2003**

<u>Station</u>	<u>Actual Rainfall (mm)</u>	<u>Has rainfall in the last three months been below average, average or above average?</u>	<u>No. of Rain days in Jan. (% of total rain)</u>	<u>No. of Rain days in Feb (% of total rain)</u>	<u>No. of Rain days in Mar (% of total rain)</u>
Penang Mill	761.0	Below Average	13 (22)	10 (08)	21 (70)
Monasavu	1374.1	Below Average	26 (25)	21 (34)	27 (41)
Vatukoula Mine	825.1*	Most Likely Below Average	14	13	24
Rarawai Mill, Ba	1043.5	Average	13 (12)	10 (20)	15 (68)
Yasawa-I-Rara	NA	NA	NA	NA	NA
Viwa Island	NA	NA	NA	NA	NA
Lautoka	734.3	Below Average	13 (19)	10 (12)	17 (69)
Nadi Airport	618.5	Below Average	14 (24)	12 (10)	18 (66)
Nacocolevu	691.7	Below Average	13 (35)	10 (12)	19 (53)
Navua	737.6	Below Average	25 (35)	18 (23)	23 (42)
Laulala Bay, Suva	985.6	Average	28 (41)	24 (12)	24 (47)
Nausori Airport	919.2	Average	24 (22)	22 (27)	21 (48)
Nabouwalu	939.8	Average	24 (46)	12 (13)	21 (41)
Labasa Airport	1017.6*	Average but could be Above	16*	09	20
Savusavu Airport	348.8*	Below but could be Average	09*	09	14
Udu Point	NA	NA	NA	NA	NA
Matei Airport	352.3*	Below but could be Average	07*	15	18
Lakeba	662.5*	Average but could be Above	14	09	21
Matuku	NA	NA	237.4mm	103.2mm	NA
Ono-I-Lau	696.7*	Above Average	09*	09	15
Vunisea, Kadavu	527.4	Below Average	22 (28)	13 (18)	25 (54)
Rotuma	691.9	Below Average	18 (28)	21 (44)	22 (28)

\* Due to Cyclone *Ami*, rainfall records at Labasa Airport (13-18th), Matei (13-25th), and Ono-I-Lau (14th, 16th and 22nd to 24th ) January 2003 are not available. No data was recorded at Vatukoula on 7th and 26th of March.

## Rainfall in the last three months

### Rainfall in March

Rainfall in March varied considerably across the country. All of the Western and Central Division received above average rainfall (115-194% of normal) except for Monsavu (average) and Navua (below average). Rainfall in the Northern Division ranged from above average in Nabouwalu (116%) to average at Labasa Airport (108%) and below average in Savusavu and Matei (37 and 42% of normal respectively). The Eastern Division received below average to average rainfall ranging from 57-105% of normal rainfall. Rotuma received below average (52%).

### Rainfall in the three-months from January to March

The Rainfall forecast for period from January to March in the

December Fiji Islands Weather Summary was for rainfall to be below average to average across the country. The skill level of the forecast for the above period was moderate.

With a considerable amount of rainfall data missing due to Cyclone *Ami* it isn't possible to fully verify the forecast. But for areas where data is available the forecast was successful except for parts of the Northern and Eastern Divisions which received above average rainfall (mostly cyclone related rainfall).

There currently aren't any stations in the table above that have received rainfall in the well below average category (<40%) of their three month total from January to March.

Figure A

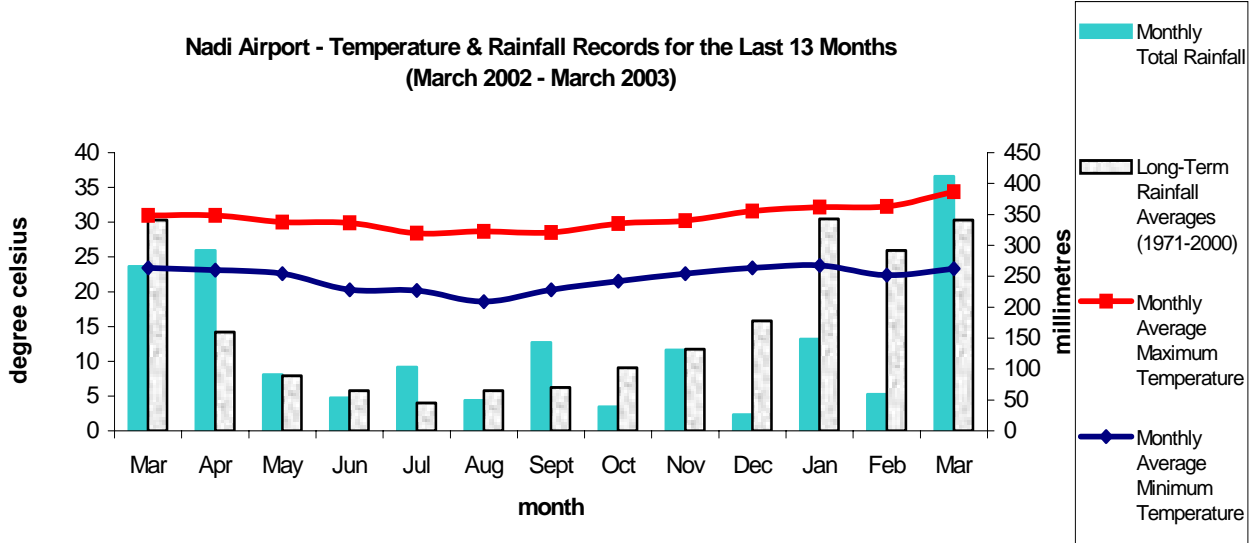


Figure B

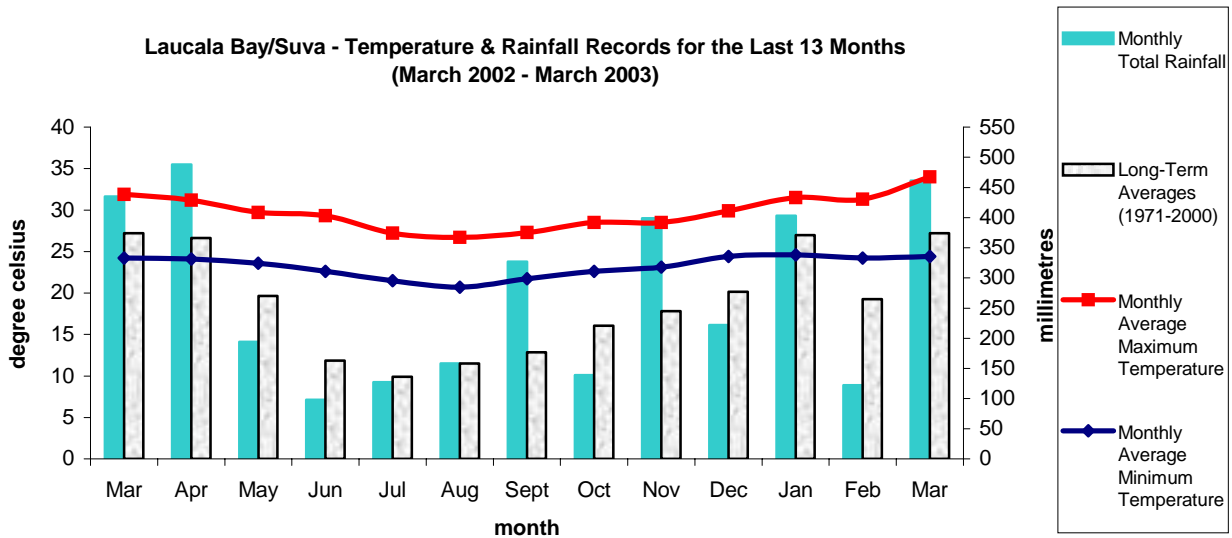
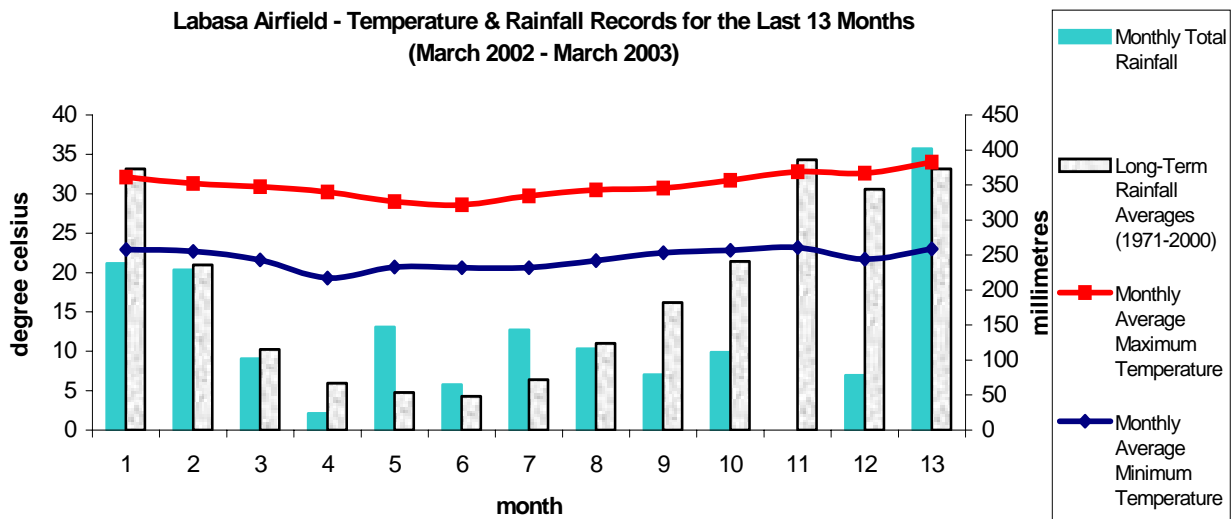


Figure C



## Climate in March

### Mean Day-time and Night-time Air Temperatures and 0900 hrs Relative Humidity

Day-time temperatures in March were average to above average across the country. The greatest positive departures from normal were observed at Rotuma, Nabouwalu and Nausori Airport which recorded monthly averages 1.4, 1.3 and 1.2°C respectively above normal. The greatest negative departure of -0.4°C from normal was observed at Vatukoula.

Night-time temperatures also varied around average to above average across the country this month. The greatest positive departures from normal were observed at Savusavu Airfield and Lakeba which recorded 1.4°C and

1.2°C above average respectively. Penang Mill recorded the greatest negative departure from normal of -0.6°C.

The coolest nights were generally occurring on the 1st, 10-14th, 18-19th and 23-24th. The warmest days were generally between the 5-7th, 14-19th and 26-30th.

Relative Humidity (RH) at 0900hrs were average to above average across the country with Navua recording the highest negative departure of -3% and Ono-I-Lau recording the highest positive of 9% from normal.

### Soil Moisture and Runoffs

Soil moisture conditions ranged from excessive to ample throughout the month in the Central Division and Monasavu.

In the Western Division, conditions were ample to moderate in the first week and then excessive to ample in the second week. For the rest of the month the conditions remained moderate to dry except for Nacocolevu where conditions were moderate to dry in the first, then excessive to ample for the rest of the month.

In the Northern Division soil moisture ranged from ample

to moderate in the first third, then excessive to ample and then moderate to dry in the last third of the month except for Labasa where moderate conditions till 8th and then excessive to ample up to 22nd and returning to moderate conditions.

Ample to moderate conditions prevailed at Ono-I-lau and Vunisea. Rotuma had excessive to ample for the first half and then ample to moderate in the second half of the month.

There were significant runoffs at Rarawai (482.0mm), Monasavu (400.1mm) and Penang (363.7mm) in March.

### Sunshine, Radiation & Winds

Total sunshine hours were above average at Nadi Airport, Laucala Bay, Nacocolevu and Rotuma.

Solar Radiation recorded at Nadi Airport and Laucala Bay

was 101% and 88% of average respectively.

Average wind speed this month was above average at Nadi and Nausori Airport. Below average wind speeds were recorded at Rotuma, Nabouwalu and Vunisea.

### Records set in March 2003

<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>
Max Temp	Tokotoko, Navua	34.0	15th	New High	33.9	1995	1992
Max Temp	Nausori	34.6	15th	New High	34.0	1980	1956
Rainfall	Savusavu	104.4	-	New Low	124	1958	1956

### November to April 2002/03 Tropical Cyclone Season

The South Pacific Tropical Cyclone Season officially began on the 1st of November 2002 and will continue till 30th April 2003.

Historical analysis of tropical cyclones affecting Fiji show that during an El Niño seasons there is a higher chance of being affected by a Tropical Cyclone then during La Nina seasons such as 1998/99, 1999/00, 2000/01, but the chances are slightly lower than during a 'Neutral' season.

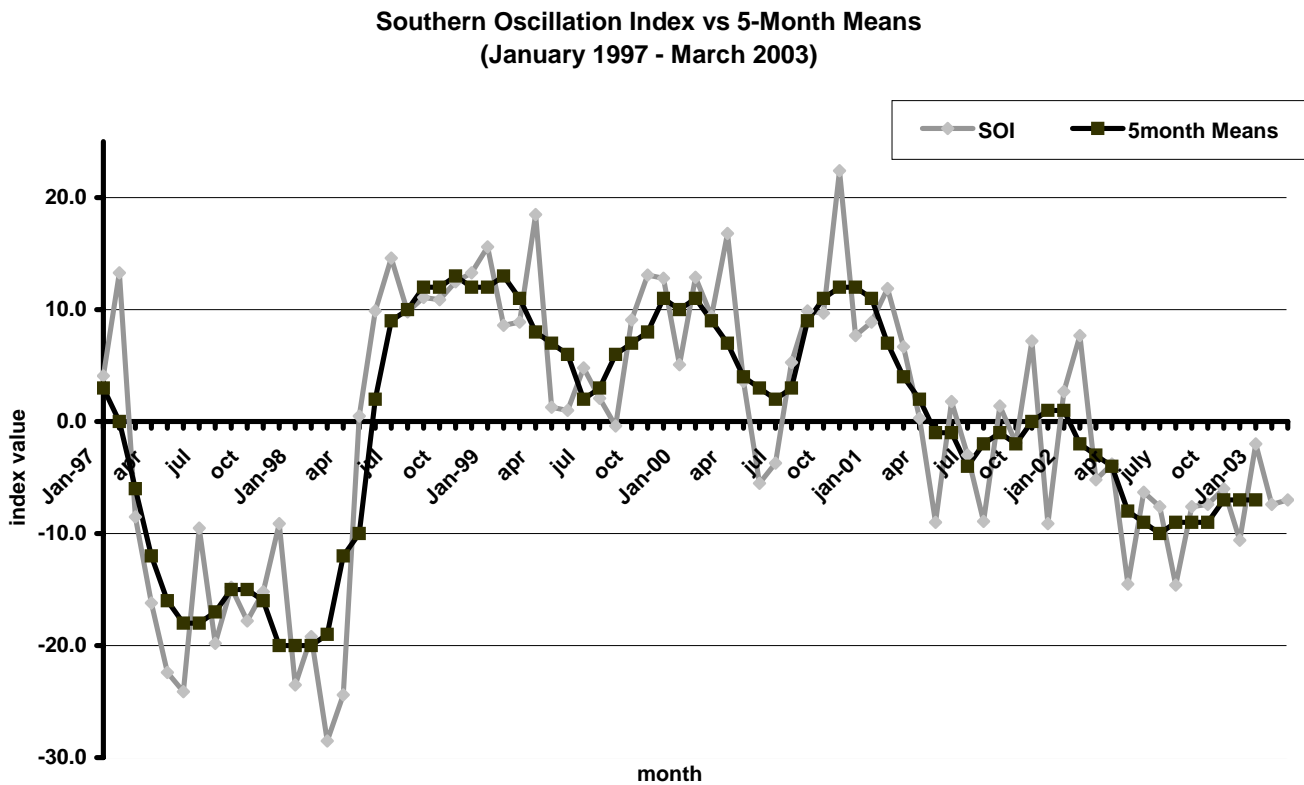
Based on past events, the highest chance of being affected by a tropical cyclone is in January followed by March,

cyclones that have affecting Fiji in April. The years were 1973, 74, 75, 80, 86, 89 and 2000. One of these cyclones reached hurricane intensity (1985).

Fiji has been directly affected by one cyclone this season (*Ami*) with three others (*Zoe*, *Cilla* and *Eseta*) brushing past Fiji. *Zoe* had marginal effects on Yasawa-I-Rara while *Eseta* produced significant rain and strong winds.

During a cyclone regular updates will be provided on the Fiji Meteorological Service <http://www.met.gov.fj> website and through the media.

Figure D



### ENSO status and Rainfall Outlook to April 2003

**Southern Oscillation Index:** The Southern Oscillation Index (SOI) for March was -6.8 (February was -7.4) with the five-month running mean of -7 centred on January (December was -7) (Figure D).

Most indicators continue to show that the El Niño is almost finished. Whilst a regeneration of El Niño cannot be ruled out entirely, this is much less likely than either neutral or La Niña conditions. The main indicators continue to show signs of weakening. There has been cooling over the entire tropical Pacific with most areas now close to average. The subsurface ocean temperature anomaly shows no sign of El Niño regeneration. The Trade Winds were generally close to average while cloudiness around the dateline continues to fluctuate. The SOI for the last 30-days remains weakly negative. Most computer predictions continue to indicate neutral conditions in the Pacific by the middle of the year.

(The ENSO Update and SOI are provided by of the National Climate Centre, Australian Bureau of Meteorology and can be found at <http://www.bom.gov.au>)

**FMS Rainfall Prediction Model:** This model is based on schemes, which have run successfully at the Australian Bureau of Meteorology's National Climate Centre. These a statistical scheme based on the relationship between SOI and subsequent three-month rainfall totals. In each case the probability of low, medium or high rainfall in the oncoming three-month period is provided. The scheme uses the SOI averaged over the most recent three-month period. The reliability of the model is high during the wet season (Nov-Mar) but decreases during the dry season (May-Sept) and during the transitions months, April and October.

The model forecasts rainfall to be below average in most parts of the Western Division, northern and western Vanua Levu, Rotuma, Matei, Lakeba and Ono-I-Lau. For the remaining areas rainfall is predicted to be average to below average (Figure E).

**Australian Rainman:** This is a Rainfall Prediction Model was created from joint efforts between Australia Meteorological and Agricultural Agencies. The model incorporates the use of SOI to test its effects on the probability of rainfall in upcoming months. It shows the relationship between ENSO (El Niño - Southern Oscillation) events and rainfall. Due to public demand this model is currently used to present the probability of receiving rainfall in the coming individual months over a three-month period. Please note that the reliability of forecast for one month is lower than for a combined three month period.

The model predicts 'variable' rainfall across the country in the next three months (Table. 2).

### Outlook for April to June 2003:

**Based on the model predictions and current climatic conditions, Fiji's rainfall is likely to be variable, with most sites still predicted to receive below average to average rainfall.**

**NOTE:** The confidence level in the outlook is 'low' due to the forecast period co-insiding with the transition period from Wet to Dry Season.

**Preliminary Climatological Summary for March 2003**

	RAINFALL				AIR TEMPERATURES								SUNSHINE		
	TOTAL	RAIN	MAX.		AVERAGE DAILY				EXTREME				TOTAL	*	
	* DAYS		FALL		MAX.	#	MIN.	#	MAX.	MIN.			HRS	%	
	MM	%	+	MM ON	C	C	C	C	C	ON	C	ON			
NADI AIRPORT	412	121	18	95	11	31.3	0.0	23.3	0.5	34.4	7	21.8	23	209	109
SUVA/LAUCALA BAY	461	123	24	74	27	31.8	0.9	24.4	0.5	34.0	15	20.9	1	219	129
NACOCOLEVU	366	133	19	101	12	32.1	1.0	23.3	0.8	34.5	5	22.0	1	166	109
ROTUMA	191	52	22	32	2	32.0	1.4	25.6	0.9	33.5	18	24.2	10	201	122
*VIWA	faulty aws														
*UDU POINT	faulty aws														
LABASA AIRFIELD	402	108	20	74	9	32.2	0.7	23.0	0.7	34.0	28	21.5	26		
NABOUWALU	387	116	21	80	27	31.4	1.3	25.0	0.7	33.5	17	22.7	28		
SAVUSAVU AIRFIELD	104	37	14	34	10	31.3	0.7	25.0	1.4	33.9	16	24.0	12		
MATEI AIRFIELD	158	42	18	30	11	31.2	0.9	25.0	0.8	32.3	14	22.9	14		
*YASAWA-I-RARA	faulty aws														
VATUKOULA	594	155	24	88	12	31.2	-0.4	23.3	1.1	34.0	29	21.4	23		
MONASAVU	568	81	27	105	12	26.5	0.9	20.0	0.7	28.9	5	17.6	24		
NAUSORI AIRPORT	440	115	21	71	27	31.7	1.2	23.7	0.5	34.6	15	22.0	19		
NAVUA/TOKOTOKO	312	78	23	65	24	30.7	0.5	23.5	0.4	34.0	15	22.0	18		
LAKEBA	168	57	21	37	23	30.6	0.3	25.2	1.2	32.0	19	22.4	24		
*MATUKU	faulty aws														
VUNISEA	288	95	25	59	27	30.7	0.7	23.8	0.3	32.9	21	21.7	13		
ONO-I-LAU	266	105	15	59	20	29.5	0.2	24.1	-0.3	32.6	1	21.7	11		
BA/RARAWAI MILL	708	194	15	116	2	32.3	0.3	23.3	1.0	34.6	30	21.0	23		
LAUTOKA AES	507	165	17	108	9	31.1	0.1	24.4	0.6	32.5	7	22.8	23		
PENANG MILL	535	126	21	107	2	31.0	0.5	23.2	-0.6	33.0	26	20.0	23		

	PE .1MM	WATER BALANCE (MM)				TEMPERATURE ( C)				HUMIDITY RH% VP	WIND KT	SUN RAD %OF MJ/ POS SQ.M				
		MAX.	LAST	DEF	NO	RO	NO	DLY	DRY				WET			
		DS	ON	DS	DYS	DYS	DYS	MEAN	(AVERAGE				AT 9AM)			
NADI AIRPORT	51	71	7	65	0	0	243	8	27.3	28.2	25.6	81	30.8	5.6	53	19.0
SUVA/LAUCALA BAY	48	24	23	11	0	0	298	11	28.1	28.3	25.9	83	31.7		56	15.5
NACOCOLEVU	49	75	5	15	3	1	157	9	27.7	28.1	26.1	85	32.1		43	20
ROTUMA	50	58	31	58	0	0	88	10	28.8	29.8	26.1	74	31.1	4.7	53	21
*VIWA	faulty aws															
*UDU POINT	faulty aws															
LABASA AIRFIELD	49	52	7	52	0	0	227	9	27.6	28.5	25.8	80	31.1			
NABOUWALU	48	34	26	2	0	0	204	13	28.2	29.1	26.5	81	32.7	2.6		
SAVUSAVU AIRFIELD	48	75	26	73	17	4	0	0	28.1	28.8	25.9	79	31.2			
MATEI AIRFIELD	48	54	30	38	0	0	31	3	28.1	29.0	26.4	81	32.4			
*YASAWA-I-RARA	faulty aws															
VATUKOULA	51	41	27	20	0	0	381	10	27.2	28.4	25.4	79	30.2			
MONASAVU	38	38	1	4	0	0	400	17	23.3	23.2	21.5	86	24.4			
NAUSORI AIRPORT	47	31	5	11	0	0	279	11	27.7	27.9	26.0	86	32.2	4.1		
NAVUA/TOKOTOKO	46	24	4	13	0	0	152	8	27.1	28.2	25.7	81	31.0			
LAKEBA	48	75	4	40	16	7	0	0	27.9	29.1	26.3	79	31.9			
*MATUKU	faulty aws															
VUNISEA	48	70	10	15	0	0	105	4	27.2	28.2	25.9	83	31.6	2.8		
ONO-I-LAU	48	75	1	48	3	1	93	6	26.8	27.0	25.5	89	31.5			
BA/RARAWAI MILL	52	75	1	5	5	1	482	8	27.8	28.0	25.5	82	30.8			
LAUTOKA AES	51	61	29	59	0	0	333	10	27.8	28.8	25.9	79	31.1			
PENANG MILL	51	62	31	62	0	0	364	11	27.1	26.8	25.3	89	31.2			

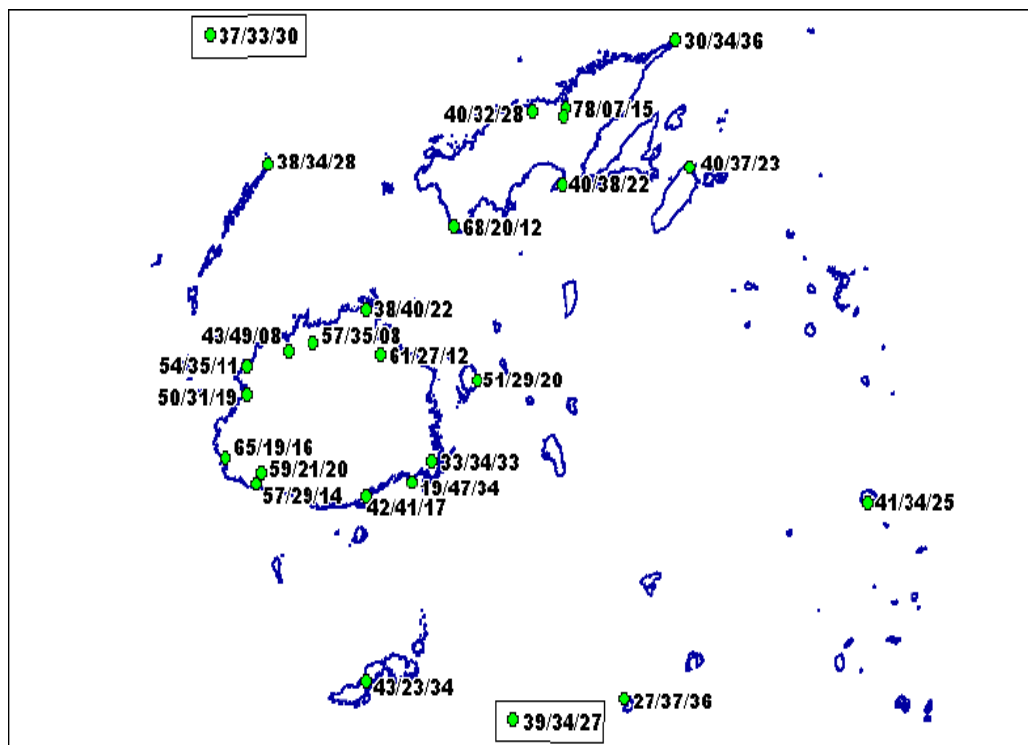
DS IS SOIL MOISTURE DEFICIT, LIMIT 75 MM; RO IS WATER SURPLUS (INDEX OF RUNOFF)  
 DEF (AE-PE) IS EVAPOTRANSPIRATION DEFICIT (INDEX OF IRRIGATION WATER NEEDED).  
 PE IS LONG TERM MEAN PENMAN POTENTIAL EVAPOTRANSPIRATION (CALCULATED OR ESTIMATED).  
 MEAN TEMPERATURE IS (MAX+MIN)/2; WIND IS MEAN SPEED AT 06,12,18,24 HOURS.  
 \$ :SOLAR RADIATION CALCULATED FROM SUNSHINE DURATION. # :DEPARTURE FROM NORMAL.  
 + :NUMBER OF DAYS WITH 0.1 MM OR MORE RAIN. \* :PERCENT OF NORMAL.

**Note:** This summary is prepared for rapid dissemination as soon as possible following the end of the month. The quantitative data are obtained daily on the phone or radiotelephone from a network of climate stations reporting 9 am observations; these data must be treated as provisional. Water balance calculations are approximate and are intended for guidance purposes only. Also, FMS does not guarantee accuracy and reliability of the forecast information presented in this summary but the Department should be sought for expert advice, any clarification or additional information. Any person wishing to re-print any information provided in this summary must seek permission from the Director of Meteorology.

### Three Month Rainfall Outlook Probabilities for April to June 2003

The forecast probabilities are presented as

FIGURE E: Three Month Forecast for Selected Stations in Fiji using the Fiji Meteorological Services Rainfall Prediction Model



Please note that the probabilities are listed beside of the corresponding station marker or dot.

#### DRY/NORMAL/WET

'DRY' range refers to rainfall less than 33rd percentile.

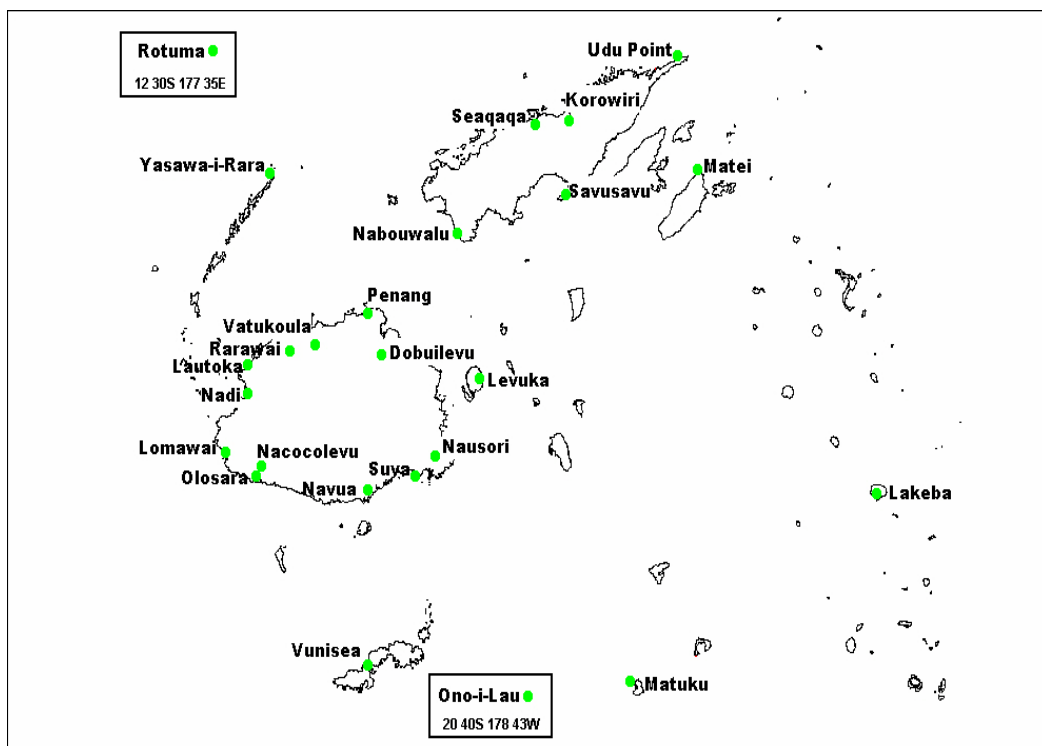
'NORMAL' (average) range refers to rainfall between 33rd and 67th percentiles.

'WET' range refers to rainfall above 67th percentile.

Reference Table for 33rd and 67th Percentile

Station	33% (mm)	67% (mm)
<b>Western Division</b>		
Dobuilevu	435	635
Vatukoula	301	433
Rarawai	280	434
Penang	343	497
Lautoka	273	393
Nadi	256	372
Lomawai	258	355
Nacocolevu	274	399
Olosara	260	542
Yasawa	270	431
<b>Central Division</b>		
Navua	779	1003
Suva	678	847
Nausori	634	777
<b>Eastern Division</b>		
Levuka	497	757
Lakeba	330	523
Matuku	347	458
Ono-I-Lau	274	454
Vunisea	437	598
<b>Northern Division</b>		
Labasa Mill	328	543
Seaqaqa	310	478
Nabouwalu	473	659
Savusavu	391	629
Udu Point	400	553
Matei	528	716
<b>Rotuma</b>	<b>744</b>	<b>925</b>

FIGURE F: Reference Map of selected Climate/Rainfall sites in Fiji



**TABLE 3: Monthly Rainfall Outlook Probabilities for April to June 2003**

Station Name	April		May		June	
	Average*	Probability <sup>#</sup>	Average*	Probability <sup>#</sup>	Average*	Probability <sup>#</sup>
<b>Western Division</b>						
Dobuilevu	286	<b>63</b>	130	<b>51</b>	98	<b>50</b>
Vatukoula	221	<b>45</b>	78	<b>48</b>	73	<b>39</b>
Rarawai	207	<b>25</b>	95	<b>25</b>	89	<b>30</b>
Penang	269	<b>37</b>	161	<b>26</b>	99	<b>30</b>
Lautoka	187	<b>35</b>	84	<b>53</b>	72	<b>32</b>
Nadi	160	<b>34</b>	89	<b>52</b>	65	<b>50</b>
Lomawai	169	<b>28</b>	90	<b>50</b>	72	<b>34</b>
Olosara	166	<b>45</b>	99	<b>64</b>	90	<b>33</b>
Nacocolevu	155	<b>34</b>	85	<b>68</b>	75	<b>33</b>
Yasawa-I-Rara	209	<b>52</b>	85	<b>50</b>	82	<b>75</b>
<b>Central Division</b>						
Navua - Tamanoa	448	<b>57</b>	287	<b>60</b>	196	<b>51</b>
Suva	366	<b>78</b>	270	<b>34</b>	163	<b>33</b>
Nausori	356	<b>61</b>	248	<b>38</b>	150	<b>50</b>
<b>Eastern Division</b>						
Lakeba	206	<b>54</b>	136	<b>62</b>	78	<b>50</b>
Ono-I-Lau	157	<b>50</b>	103	<b>38</b>	89	<b>31</b>
<b>Northern Division</b>						
Korowiri	251	<b>49</b>	116	<b>41</b>	73	<b>23</b>
Seaqaqa	269	<b>46</b>	125	<b>43</b>	63	<b>50</b>
Nabouwalu	300	<b>57</b>	171	<b>58</b>	98	<b>40</b>
Savusavu	261	<b>55</b>	196	<b>75</b>	117	<b>50</b>
Udu Point	276	<b>45</b>	167	<b>50</b>	116	<b>50</b>
<b>Rotuma</b>	294	<b>54</b>	296	<b>71</b>	234	<b>60</b>

*Please note that the above figures should be used with caution, as there is some degree of uncertainty associated with them, and particularly the reliability of the model is low during the transition months and the dry season.*

\* 'Long-term Average' for the 30 year period from 1971-2000.

# Probability of expecting at least normal rainfall.