Volume 3: Issue: 11
November 2003

Fiji Islands Weather Summary November 2003 Rainfall Outlook till February 2004

FIJI METEOROLOGICAL SERVICE

Inside this issue:

In Brief

The weather in November displayed a delayed transition month from *Dry* to *Wet* Season. Rainfall was highly variable ranging from well below average to above average. Occasional afternoon showers in the Western and Northern Division also began this month. These are expected to become more frequent as we progress further into the *Wet* season.

Meteorological drought conditions remain with 19 out 20 of reporting stations receiving below average rainfall in the last three months. Although many sites recorded below average rainfall, the amount of rainfall and number of rain days have increased lately. Drought conditions still exist in certain places but are easing.

Sea surface temperatures in the equatorial western Pacific continued to be warmer than average in November. Atmospheric conditions remained *Neutral*. Overall, conditions are expected to remain near *Neutral* throughout the Southern Hemisphere summer.

Rainfall in Fiji Islands in the next three months is expected to vary around average. This means most sites are likely to receive average rainfall, while a few may receive below average or above average rainfall.

Both night and day-time air temperatures varied around average. A new day-time high temperature record of 32.5°C was set at Vunisea. Relative humidity also varied around average.

Total sunshine hours were average for Nadi Airport, Nacocolevu, Laucala Bay, Suva and Rotuma.

Weather Patterns

November was noticeably wet compared to the previous month. It was also markedly hot and humid. Occasional afternoon showers in the interior and western parts of the main islands were observed. Over the east, showers were frequent.

In the first four days of the month, a ridge of high pressure dominated our weather bringing relatively dry air over the Group. A trough located to the north moved south over Fiji. Associated showers affected most parts of the group till the 6th. The trough later moved north on the 7th. Till the 9th a cold front became slow moving to the southwest of the Group. Associated moist easterlies helped enhance afternoon showers and thunderstorms especially about the main islands.

On the 10th, the trough to the north moved south and associated showers spread over most parts of the country till the 11th. The trough moved to the north on the 12th but a weak Cold front from the southwest moved over the Group on the same day inducing afternoon showers and thunderstorms over the main islands till the 14th. A ridge of high pressure extended over the group from the southwest on the 15th and brought fine weather over most places till the 17th.

On the 18th, a trough to the north of the Group began moving south bringing rain over most places till the 23rd. Afternoon showers and thunderstorms dominated the interior and western parts of the mains islands while trade showers continued about the eastern parts from 24th till the 29th. A cold front to the southwest of the Group caused showers about Mamanuca group and Kadavu on the 28th. Till the 30th a ridge of high pressure extended over the Group bringing relatively fine weather over most places.

Rotuma received showers on a number of occasions when the South Pacific Convergence Zone was located close to the island.

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TABLE 1: Rainfall from September to November 2003

Station	Actual Rainfall (mm)	Has rainfall in the last three months been below average, average or above average?	No. of Rain days in September (% of total rain)	No. of Rain days in October (% of total rain)	No. of Rain days in November (% of total rain)
Penang Mill	134.2	Below Average	02 (05)	02 (34)	11 (61)
Monasavu Dam	574.4	Below Average	05 (07)	16 (48)	19 (45)
Vatukoula Mine	111.8	Well Below Average	04 (05)	03 (59)	09 (36)
Rarawai Mill, Ba	128.3	Below Average	02 (01)	02 (49)	09 (50)
Yasawa-I-Rara	-	-	-	-	-
Viwa Is.	126.3	Below Average	01 (01)	03 (30)	11 (69)
Lautoka Mill(Research)	134.4	Below Average	03 (04)	05 (57)	09 (39)
Nadi Airport	130.8	Below Average	02 (02)	03 (30)	10 (68)
Nacocolevu, Sigatoka	154.8	Below Average	01 (03)	05 (62)	06 (35)
Tokotoko, Navua	453.5	Below Average	09 (11)	12 (43)	20 (46)
Laucala Bay, Suva	294.0	Below Average	07 (15)	13 (57)	21 (28)
Nausori Airport	252.2	Well Below Average	05 (13)	13 (52)	18 (35)
Nabouwalu	387.6	Average	10 (11)	11 (16)	24 (73)
Labasa Airport	162.3	Below Average	02 (04)	09 (25)	10 (71)
Savusavu Airport	307.5	Below Average	09 (16)	08 (32)	14 (52)
Udu Point	-	-	-	-	-
Matei Airport	165.6	Below Average	06 (32)	09 (22)	14 (46)
Lakeba Is.	131.4	Below Average	03 (05)	06 (41)	06 (54)
Matuku Is.	-	-	-	-	-
Ono-I-Lau Is.	152.5	Below Average	05 (10)	03 (26)	08 (64)
Vunisea, Kadavu	193.7	Below Average	04 (04)	09 (66)	11 (30)
Rotuma	640.2	Below Average	19 (19)	16 (34)	23 (47)

Rainfall in the last three months

Rainfall in November

Parts of the country received average to above average rainfall in November however most sites continued to receive below average rainfall. In the Western Division rainfall was well below average to average (38-82%), well below average to above average was received in the Northern Division (32-162%), well below average to average in the Eastern Division (39-82%) and well below average to below average in the Central Division (34-74%).

Rainfall in the 3-months from September to November

The Rainfall forecast for the period September to November in the August Fiji Islands Weather Summary was for rainfall to be below average to average. The confidence level of the forecast was moderate.

Of the nineteen sites that reported in time for this summary, two sites reported well below average, sixteen sites below average and one site average rainfall.

A number of sites across the country continue to receive three consecutive month rainfall (Aug-Nov 2003) within the lowest 10% on record. Matei, Taveuni for a second month in a row received its lowest three consecutive month rainfall. The previous record was 244.3mm (1987).

Rainfall at Nausori Airport was the second lowest on record, Monasavu received the 3rd lowest, Labasa Airport and Lautoka 4th lowest and Nadi Airport 5th lowest on record.

Figure A

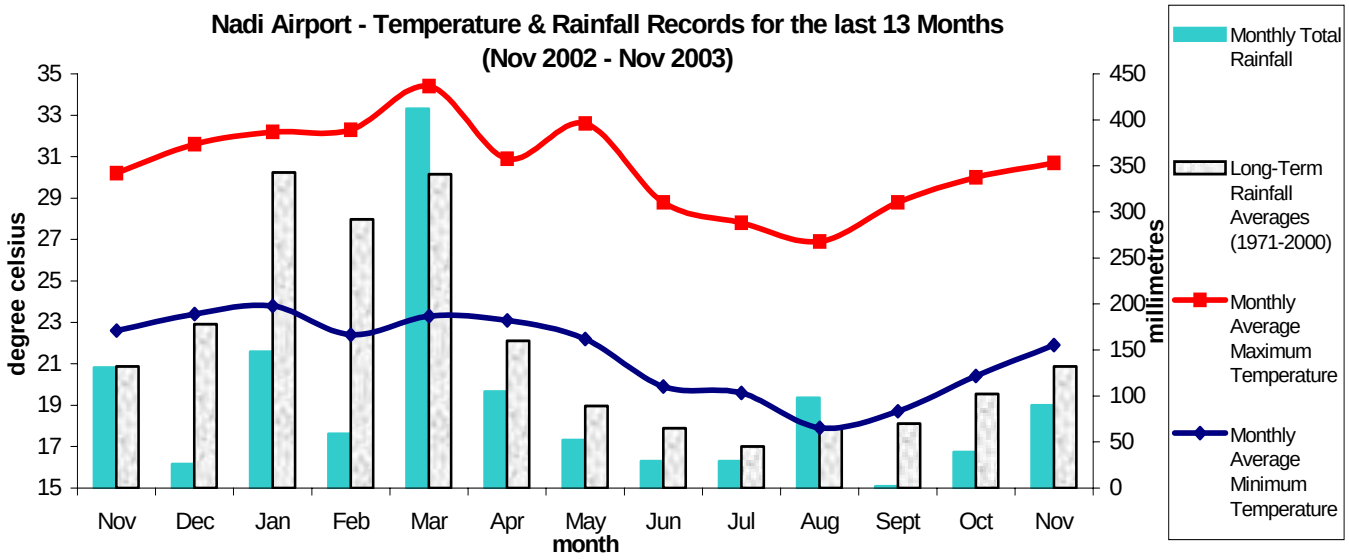


Figure B

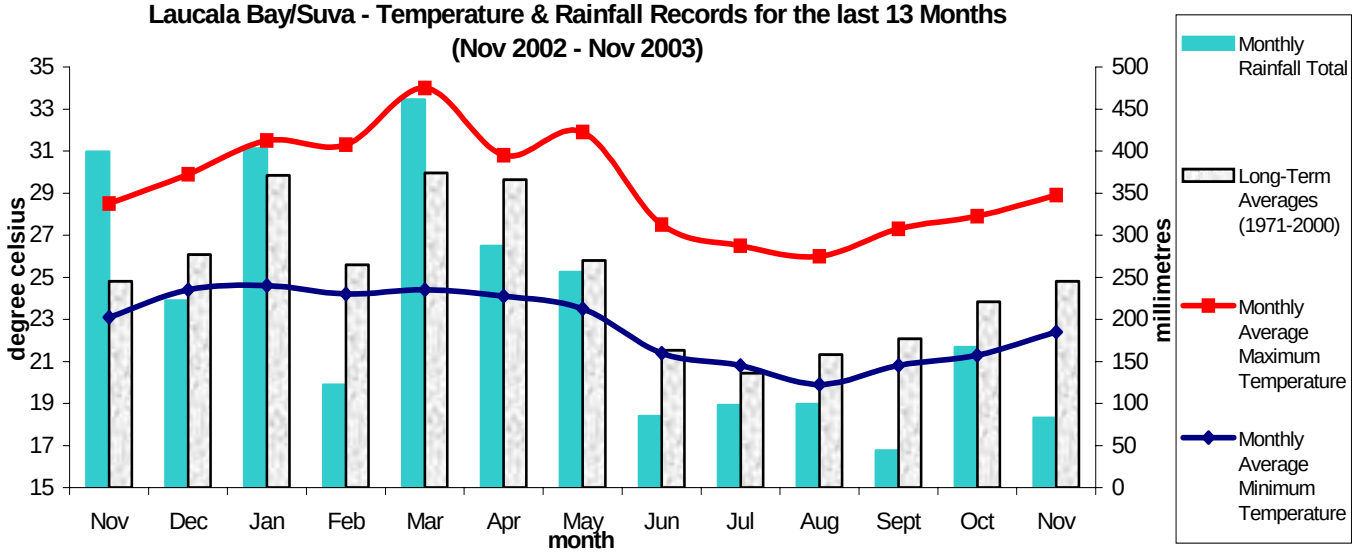
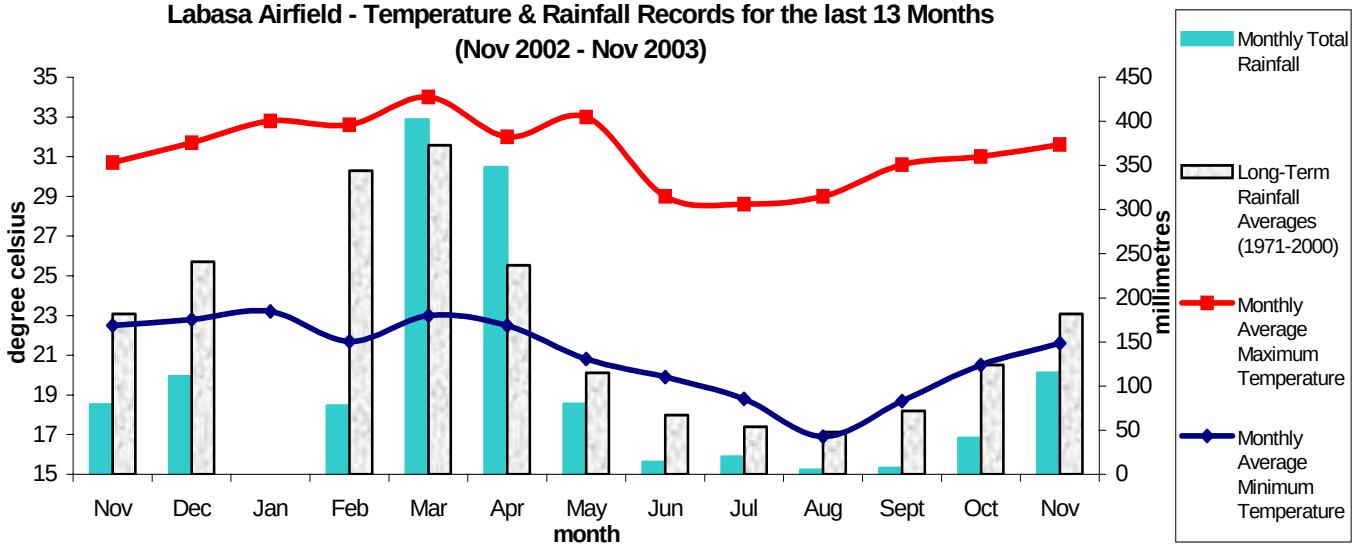


Figure C



Climate in November

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

Day-time temperatures varied around average across the country. The greatest positive departures were recorded at Rotuma, and Viwa/Rarawai Mill which recorded 0.7 and 0.4°C respectively above normal. The greatest negative departures were recorded at Navua and Savusavu Airfield which recorded 0.9 and 0.8°C below normal.

Night-time temperatures also varied around average across the country. The greatest positive departures from normal were recorded at Savusavu Airfield and Vatukoula which recorded 1.2 and 0.7°C respectively above normal. The greatest negative departures were at Penang Mill and Navua which recorded 1.1 and 0.8°C respectively below normal.

Relative Humidity (RH) at 0900hrs varied around average. The greatest positive departure was 14% observed at Ono-I-Lau. The greatest negative departures were recorded at Penang Mill 9%, Labasa Airport 6% and Rarawai Mill 5%.

Soil Moisture and Runoffs

Soil moisture conditions varied considerably throughout the month and across the country.

In the Western Division and northern Vanua Levu conditions were limiting to dry except for Monasavu where conditions were moderate to ample in the first two weeks then ample to excess.

In the Central Division conditions ranged from moderate to limiting/dry.

In the southern parts of the Northern Division the month began with dry conditions then moderate then ample towards the end of the month.

In the Eastern Division (including Matei) conditions were limiting to dry throughout the month

Rotuma recorded ample to moderate conditions for the first two weeks then ample to excessive for the rest of the month.

Significant runoffs were recorded at Monasavu (136.7mm), Rotuma (119.2mm) and Nabouwalu (97.0mm).

Sunshine, Radiation & Winds

Total sunshine hours were around average. Nadi Airport recorded 95%, Laucala Bay/Suva, 99%, Nacocolevu 82% and Rotuma 95% of normal.

Global Solar Radiation recorded at Nadi Airport was 19.2MJ/ M^2 (90%) and 18.6MJ/M^2 (98%) at Laucala Bay.

Wind speed were above average at Nabouwalu, average at Nadi Airport and below average at Rotuma and Vunisea.

Records set in November 2003

Element	Station	Observed (record)	On	Rank	Previous (record)	Year	Records Began
Max Temp	Vunisea	32.5	28th	New High	32.4	1949	1947

November to April 2003/04 Tropical Cyclone Season

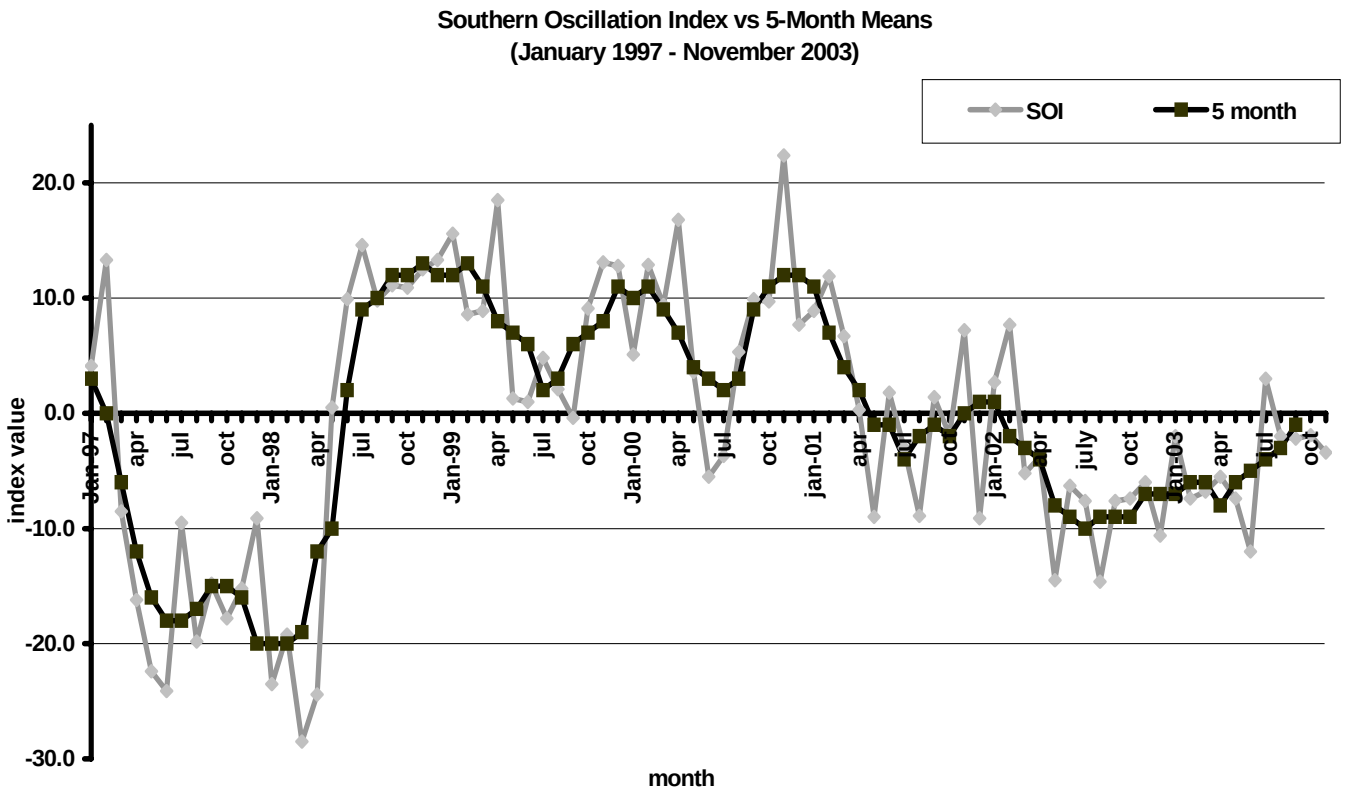
The South Pacific Tropical Cyclone Season officially began on 1st November and will continue till 30th April 2004.

The chances of cyclone activity in the Fiji region this season are slightly higher than normal based on the prediction that *Neutral* conditions will continue through the season. The average number of cyclones that have affected Fiji (including pre-season events) since 1969/70 is 1 to 2. However, there have been as many as six events such as in 1996/97.

Historical records of tropical cyclones affecting Fiji since the 1969/70 show that ten cyclones have affected Fiji in December with two of them causing severe damage. The years were 1970, 73, 77, 78, 87, 88, 92 (3 Events) and 1998.

Prior to and during a cyclone information on the event and regular updates will be provided on the Fiji Met Service *http://www.met.gov.fj* website, via *Poll fax* and the media.

Figure D



ENSO status and Rainfall Outlook to February 2004

The Southern Oscillation Index (SOI) for November was -3.4 (October was -1.9) with the five-month running mean of -1 centred on September (August was -3) (Figure D).

Neutral El Niño-Southern-Oscillation conditions persist in the tropical Pacific Ocean. The largest area of ocean surface in excess of 1°C above average remains in the western equatorial Pacific, and nearly all of the equatorial Pacific is warmer than average. The warming trend that was apparent across the tropical Pacific up until a few weeks ago, has reversed slightly during the past fortnight in all but the far eastern Pacific.

The NINO4 index is above the threshold that is associated with El Niño conditions, but crucially, all other El Niño indicators (SOI, winds, cloud patterns and sub-surface temperatures) continue to indicate neutral conditions at this time. Furthermore, computer models are unanimously in favour of a continuation of a somewhat warm but neutral situation during the next five months.

Although transitions to El Niño late in the year are rare, they're not unheard of. Furthermore we know from the "classical" El Niño life cycle that summer is the season when the influence from El Niño begins to weaken.

(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. <u>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.</u>*

For most sites the model predicts rainfall to be below average to average or average. Average to above average rainfall is predicted for Udu Point (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 a 35-80% chance (depending on location) of receiving average rainfall across Fiji in next three months (Table. 2).

<u>Outlook for December 2003 to February 2004:</u>
Based on the model predictions and 'neutral' conditions, Fiji's rainfall is expected to vary around average across the country.
NOTE: The confidence level in the outlook is 'moderate'.

Preliminary Climatological Summary for November 2004

PRELIMINARY CLIMATOLOGICAL DATA FOR MONTH 11 , 2003 : SUMMARY FOR DAYS 1 TO 30

	RAINFALL					AIR TEMPERATURES								SUNSHINE	
	TOTAL		RAIN *	MAX. FALL		AVERAGE DAILY MAX.	#	MIN.	#	EXTREME MAX.		EXTREME MIN.		TOTAL HRS	*
	MM	%	DAYS +	MM	ON	C	C	C	C	C	ON	C	ON		
NADI AIRPORT	90	68	10	29	9	30.7	-0.4	21.9	0.1	33.5	27	19.1	24	213	95
SUVA/LAUCALA BAY	83	34	21	19	20	28.9	-0.4	22.4	-0.4	32.3	28	19.0	28	166	99
NACOCOLEVU	54	40	6	30	30	30.5	0.1	20.7	-0.2	35.0	26	17.9	3	177	95
ROTUMA	297	105	23	51	18	31.0	0.7	24.5	0.0	32.5	12	22.2	1	161	82
VIWA	87	83	11	28	20	30.7	0.4	24.0	-0.4	31.5	2	16.0	30		
*UDU POINT	Insufficient Data														
LABASA AIRFIELD	115	63	10	69	5	31.6	0.2	21.6	0.4	34.5	2	17.4	1		
NABOUWALU	282	162	24	75	5	28.6	-0.3	23.3	-0.1	31.4	28	20.2	17		
SAVUSAVU AIRFIELD	161	85	14	47	30	28.6	-0.8	23.8	1.2	32.5	27	21.0	1		
MATEI AIRFIELD	77	32	14	24	7	29.0	0.2	23.4	0.3	30.5	5	20.6	24		
*YASAWA-I-RARA	Faulty AWS														
VATUKOULA	40	27	9	11	19	31.6	-0.1	21.3	0.7	34.7	29	18.6	24		
MONASAVU	269	60	20	61	10	24.2	0.2	16.9	-0.6	28.4	2	13.5	17		
NAUSORI AIRPORT	90	37	18	21	20	28.4	-0.4	21.2	-0.6	31.5	28	17.0	18		
NAVUA/TOKOTOKO	226	79	21	38	7	27.6	-0.9	20.9	-0.8	31.0	27	18.0	1		
LAKEBA	72	51	6	35	23	28.5	-0.3	23.2	0.1	31.5	28	20.0	1		
*MATUKU	Faulty AWS														
VUNISEA	57	39	11	19	28	27.8	-0.6	22.3	0.3	32.5	28	19.8	1		
ONO-I-LAU	98	82	8	49	7	27.3	-0.3	22.3	-0.3	29.8	26	20.0	8		
BA/RARAWAI MILL	64	45	9	25	19	31.9	0.0	20.9	0.1	34.8	29	18.3	24		
LAUTOKA AES	52	38	9	20	19	30.0	-0.6	22.4	-0.3	32.6	15	19.0	18		
PENANG MILL	82	51	11	36	9	30.1	0.4	21.9	-1.1	33.0	28	19.3	20		

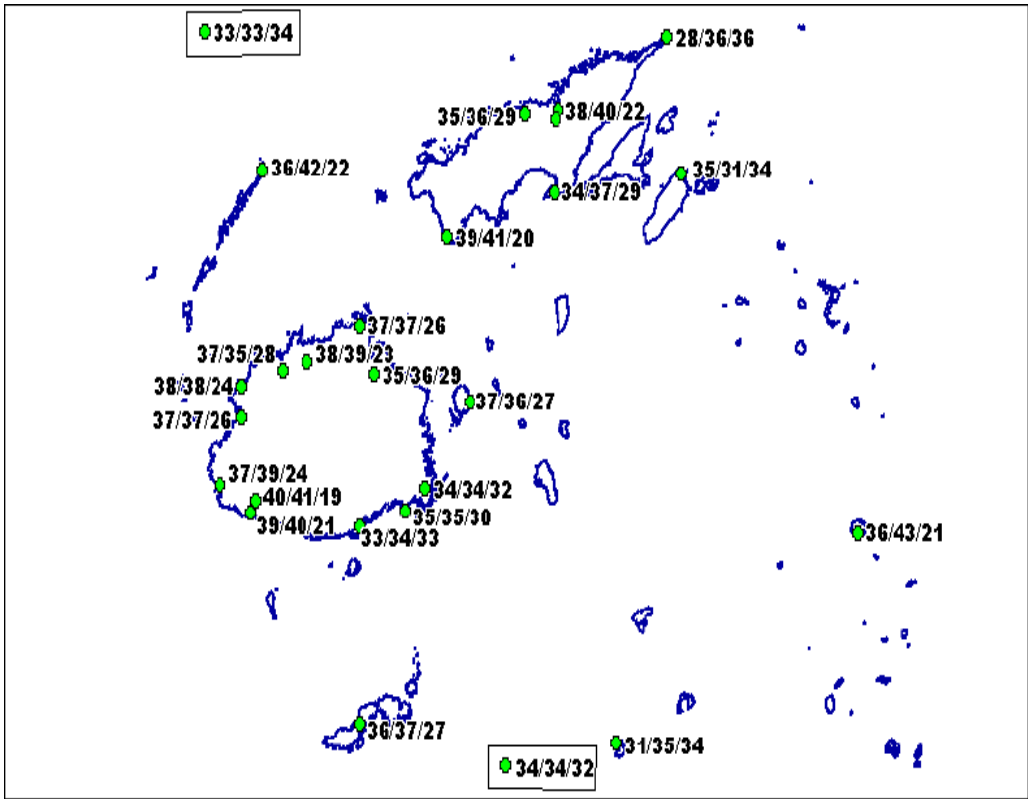
	PE	WATER BALANCE(MM)						TEMPERATURE(C)			HUMIDITY		WIND	SUN	RAD
		MAX.	LAST	DEF	NO	RO	NO	DLY	DRY	WET	RH%	VP		%OF	MJ/
	.1MM	DS	ON	DS	DYS	DYS		MEAN	(AVERAGE AT 9AM)				KT	POS	SQ.M
NADI AIRPORT	53	75	4	75	53	12	0	0	26.3	27.7	23.0	66	24.4	6.1	57	19.2
SUVA/LAUCALA BAY	47	75	13	74	18	5	0	0	25.7	26.2	23.4	78	26.7		44	18.6
NACOCOLEVU	49	75	1	50	118	27	0	0	25.6	26.8	23.3	73	25.9		52	21
ROTUMA	52	37	12	4	0	0	119	8	27.8	29.0	25.9	78	31.1	2.7	45	20
VIWA	54	75	2	75	68	15	0	0	27.3	27.9	23.9	71	26.6			
*UDU POINT	Insufficient Data															
LABASA AIRFIELD	50	75	1	75	36	8	0	0	26.6	28.4	23.4	65	24.9			
NABOUWALU	49	75	1	19	19	4	97	3	25.9	26.4	23.6	78	27.0	13.3		
SAVUSAVU AIRFIELD	46	75	1	11	42	10	0	0	26.2	26.5	23.8	78	27.3			
MATEI AIRFIELD	49	75	1	65	81	19	0	0	26.2	27.1	24.4	79	28.4			
*YASAWA-I-RARA	Faulty AWS															
VATUKOULA	53	75	1	75	119	25	0	0	26.5	28.4	22.5	59	22.8			
MONASAVU	35	40	4	0	0	0	137	13	20.6	20.4	18.5	83	19.9			
NAUSORI AIRPORT	45	75	13	70	22	6	0	0	24.8	26.0	22.9	76	25.6	5.3		
NAVUA/TOKOTOKO	45	53	3	0	0	0	51	9	24.3	25.6	22.9	80	26.0			
LAKEBA	47	75	1	71	73	17	0	0	25.9	26.6	23.5	76	26.5			
*MATUKU	Faulty AWS															
VUNISEA	47	75	1	70	89	22	0	0	25.0	25.9	22.7	75	25.2	7.3		
ONO-I-LAU	47	75	1	74	44	11	0	0	24.8	24.9	23.6	89	28.1			
BA/RARAWAI MILL	53	75	2	69	95	21	0	0	26.4	28.4	23.1	63	24.1			
LAUTOKA AES	53	75	10	75	72	15	0	0	26.2	27.5	23.1	68	24.9			
PENANG MILL	53	75	1	75	77	18	0	0	26.0	26.3	22.8	73	25.1			

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.

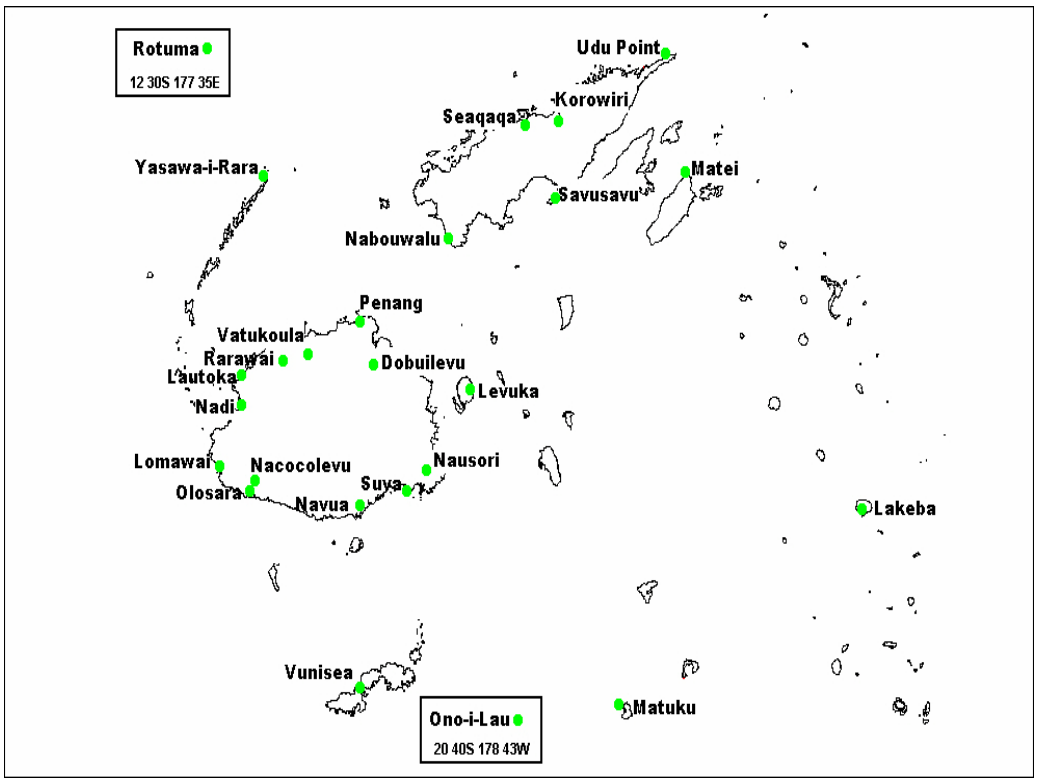
Three Month Rainfall Outlook Probabilities for December 2003 to February 2004

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.

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



The forecast probabilities are presented as

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)
Western Division		
Dobuilevu	915	1133
Vatukoula	809	1189
Rarawai	719	1107
Penang	730	1047
Lautoka	657	890
Nadi	694	873
Lomawai	585	876
Nacocolevu	597	793
Olosara	542	744
Yasawa	530	742
Central Division		
Navua	875	1141
Suva	771	970
Nausori	786	944
Eastern Division		
Levuka	619	840
Lakeba	506	736
Matuku	501	619
Ono-I-Lau	407	590
Vunisea	512	723
Northern Division		
Labasa Mill	832	1085
Seaqaqa	919	1226
Nabouwalu	776	1015
Savusavu	650	851
Udu Point	736	997
Matei	808	1008
Rotuma	883	1098

TABLE 3: Monthly Rainfall Outlook Probabilities for December 2003 to February 2004

	December 2003		January 2004		February 2004		Dec 2003 to Feb 2004 combined	
Station Name	**Average***	**Probability#**	**Average***	**Probability#**	**Average***	**Probability#**	**Average***	**Probability#**
Western Division								
Dobuilevu	272	**30**	393	**57**	334	**38**	999	**35**
Vatukoula	239	**15**	398	**43**	386	**51**	1023	**65**
Rarawai	226	**24**	402	**42**	347	**37**	975	**48**
Penang	264	**24**	396	**43**	336	**37**	996	**47**
Lautoka	193	**29**	371	**50**	301	**33**	865	**52**
Nadi	178	**32**	343	**57**	292	**27**	813	**58**
Lomawai	198	**19**	337	**31**	250	**21**	785	**28**
Olosara	158	**37**	283	**43**	215	**49**	656	**52**
Nacocolevu	190	**21**	276	**43**	234	**42**	700	**50**
Yasawa-I-Rara	152	**48**	235	**56**	240	**40**	627	**80**
Central Division								
Navua - Tamanoa	348	**25**	395	**42**	283	**39**	1026	**57**
Suva	277	**32**	371	**48**	265	**54**	913	**57**
Nausori	366	**11**	365	**45**	268	**46**	999	**66**
Eastern Division								
Lakeba	179	**32**	245	**66**	226	**22**	650	**63**
Ono-I-Lau	149	**27**	179	**48**	194	**54**	522	**50**
Northern Division								
Korowiri	264	**34**	395	**39**	365	**48**	1024	**45**
Seaqaqa	304	**35**	419	**48**	389	**35**	1112	**46**
Nabouwalu	255	**37**	312	**63**	276	**68**	843	**68**
Savusavu	258	**18**	275	**51**	244	**46**	777	**68**
Udu Point	263	**40**	313	**62**	249	**35**	825	**44**
Rotuma	285	**55**	355	**37**	322	**55**	962	**68**

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.

The probabilities in the three-month combined column are not an average of the three individual months. The model in this case has been re-run for three combined months. There is a higher degree of skill association with predicting rainfall for three combined months compared to three individual months.

** 'Long-term Average' for the 30 year period from 1971-2000.*
 # Probability of expecting at least normal rainfall.