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# The Island Climate Update

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UK Met Office

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## December's climate

- Moderate El Niño persisted in the Southwest Pacific
- Active Intertropical Convergence Zone (ITCZ) north of the equator
- Suppressed convection over Tokelau and the Northern Cook Islands
- Very low rainfall throughout much of New Caledonia
- Warmer than normal in Tuvalu and much of French Polynesia, cooler in New Caledonia

## El Niño/Southern Oscillation (ENSO) and seasonal rainfall forecasts

- El Niño is expected to weaken during the next 3-month period
- Below average rainfall likely for Vanuatu and New Caledonia
- Above average rainfall expected over Western and Eastern Kiribati, the Solomon Islands, Tuvalu, and Tokelau



## Climate developments in December 2006

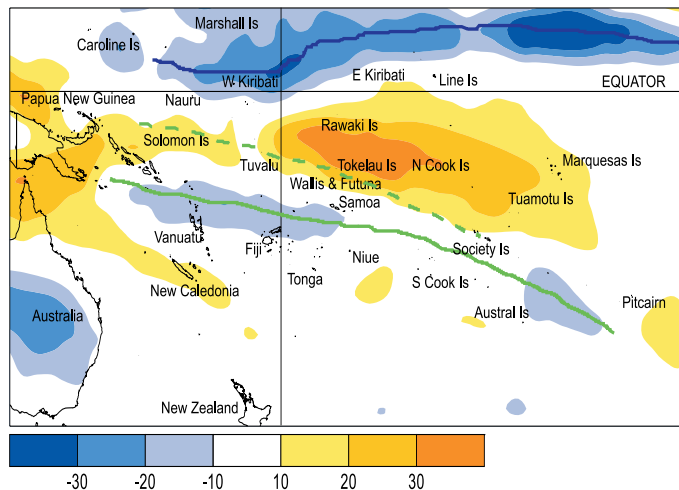
Weakly enhanced convection occurred in the Southwest Pacific during December, from the north of Vanuatu east to Northern Tonga, including parts of Fiji. A large region of suppressed convection existed in the east, particularly between Tokelau and the Northern Cook Islands, extending towards Northern French Polynesia. Convection was weakly suppressed over Papua New Guinea, and parts of the Solomon Islands and New Caledonia. The Intertropical Convergence Zone (ITCZ) was rather active north of the Equator. The South Pacific Convergence Zone (SPCZ) was south of its normal location.

Very low rainfall for the time of year, totalling only 10% of less of normal, occurred throughout much of New Caledonia in December. Rainfall was also relatively low, being 50% or less of normal in the northwest of Fiji's Viti Levu Island, as well as parts of the Northern Cook Islands, and northern and southern French Polynesia. In contrast, rainfall was above average (at least 150% of normal) on Fiji's Rotuma Island and the southeast of Viti Levu Island, and in parts of Tonga. Suva recorded 272 mm in 24 hours about the middle of the month.

Rainfall in New Caledonia has been about 50% of normal during the past 7 month period, which is very unusual.

December mean air temperatures were about 1.0 °C above average in Tuvalu, 0.5 °C or more above average throughout much of French Polynesia, and 0.5 °C below average in New Caledonia.

Tropical Southwest Pacific mean sea-level pressures were above average over the southern half of Australia, extending northeast to Southern Tonga. Pressures tended to be below average in equatorial areas east of the Date Line.

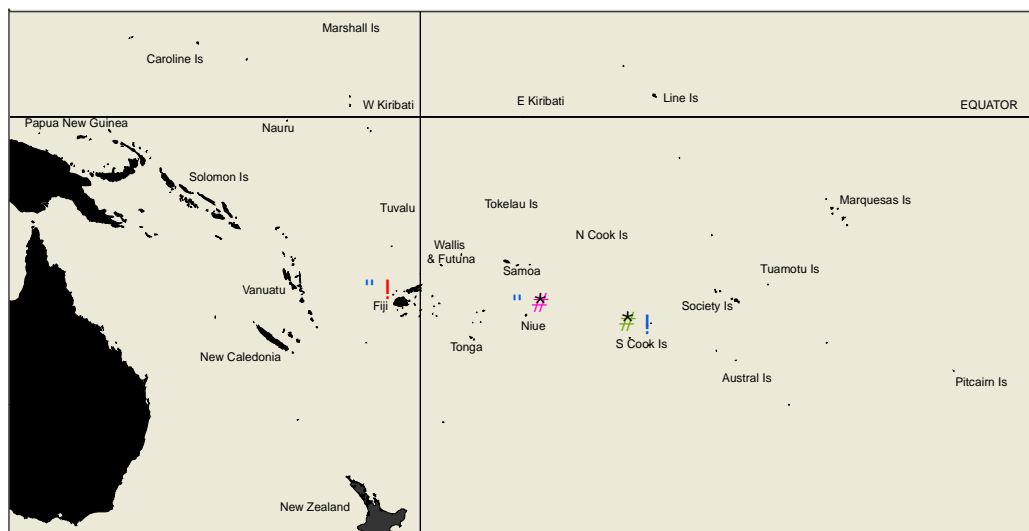


Outgoing Long-wave Radiation (OLR) anomalies, in  $Wm^{-2}$  (blue equals high rainfall and yellow equals low rainfall). The December 2006 position of the SPCZ, as identified from total rainfall, is indicated by the solid blue line. The average position of the SPCZ is identified by the dashed green line. The December 2006 ITCZ is identified by the solid green line.

Equatorial surface westerlies weakened in December, occurring in about 20% of observations at Tarawa, 15% less than November, and about 30% less than October.

Country	Location	Rainfall (mm)	% of average	Comments
French Polynesia	Hiva Hoa, Atuona	11	11	Well below normal
New Caledonia	Koumac	2	2	Extremely low
New Caledonia	Ouanaham	6	4	Extremely low
New Caledonia	La Tountouta	3	4	Extremely low
Cook Islands	Penrhyn	39	12	Well below normal

## Soil moisture in December 2006



### December 2006

- ! Dry
- ! Wet
- \* Moderate

### December 2005

- " Dry
- " Wet
- \* Moderate

Estimated soil moisture conditions at the end of December 2006, using monthly rainfall data.

Estimates of soil moisture shown in the map (above) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model. It is planned to include more stations in the future.

The information displayed is based on a simple water balance technique to determine soil moisture levels. Addition of moisture to available water already in the soil comes from rainfall with losses via evapotranspiration. Monthly rainfall and evapotranspiration are used to determine the soil moisture level and its changes.

Please note that these soil moisture calculations are made at the end of the month. For practical purposes, generalisations were made about the available water capacity of the soils at each site.

At the end of December 2006, Nadi soils were relatively dry soil while Rarotonga soils were at field capacity (full). Hanan soil moisture levels were moderate.

## El Niño/Southern Oscillation (ENSO)

Although the tropical Pacific atmosphere and ocean are in a moderate El Niño state, evidence suggests that the current episode has peaked.

Sea surface temperature anomalies near the Date Line and in the eastern Pacific peaked in early December. Sea surface temperature anomalies in the subtropical South West Pacific are cooler than normal, and the typical “horse shoe” pattern, associated with an El Niño in the subtropics has fragmented. The NINO3 and NINO4 anomalies were +1.5°C and +1.3°C respectively in December, with the respective 3-month means +1.4°C and +1.3°C.

Westerly wind anomalies continued weakening during December, with easterly trade winds developing to near normal strength at the Date Line by the end of the month. The sub-surface warming along the Equatorial thermocline eased during December and moved east with areas above +4°C at 100m now east of 140°W, whilst there is a strengthening of the cool signal at depth further west.

The SOI remained steady during December averaging -0.5, with the 3-month mean -0.8. Although OLR and tropical rainfall anomalies still show the El Niño-like pattern, this has weakened.

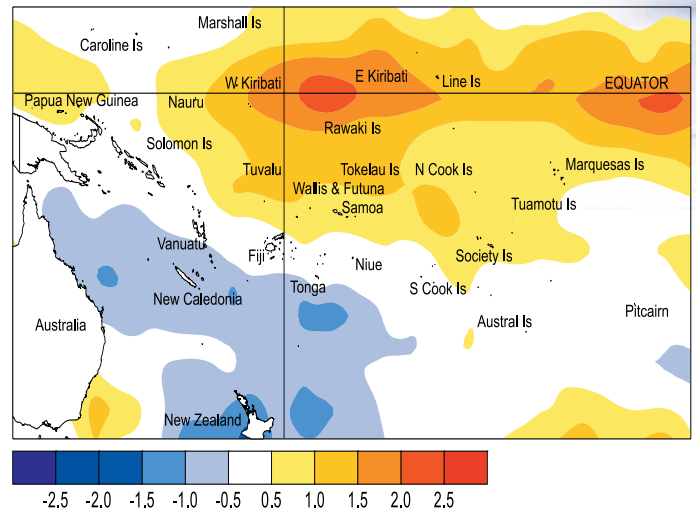
Suppressed convection occurred over Indonesia/northern Australia south east into the subtropical South Pacific, and enhanced convection at 5°N from just west of the Date Line into the central Pacific during December.

The Madden-Julian Oscillation (MJO) is currently active over Indonesian/Australian longitudes, and this is expected to propagate to the Date Line by mid January. The South Pacific Convergence Zone was weaker and further south than normal, whilst the Intertropical Convergence Zone (ITCZ) north of the equator was particularly active in December.

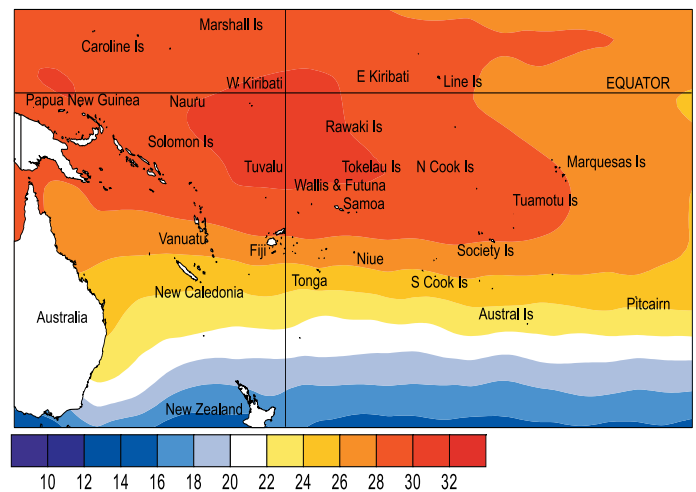
Many models show an El Niño state, observations and models have retained their consensus of El Niño conditions peaking December 2007, weakening during Southern Hemisphere autumn 2007. Seven out of the eleven models predict an easing to neutral for the April–June 2007 period: the remaining four models retain El Niño conditions into late Southern Hemisphere autumn.

## Forecast validation: October to December 2006

Rainfall patterns consistent with a developing El Niño were expected. Enhanced convection with above average rainfall was expected over Western and Eastern Kiribati, and Tuvalu, with average or above average rainfall in Tokelau, the northern Cook Islands, and Pitcairn Island. Suppressed convection with below average rainfall was expected over New Caledonia, with average or below average rainfall over Papua New Guinea, Vanuatu, Fiji, Tonga, Niue, and the Marquesas Islands. Near average rainfall was expected elsewhere in the region.



Sea surface temperature anomalies (°C) for December 2006.



Mean sea surface temperatures (°C) for December 2006.

The IRI give a 95% chance of maintaining El Niño conditions through to February 2007, with a less than 10% chance of becoming neutral during that time. NCEP predict a continuation of El Niño conditions through to May 2007. The World Meteorological Organization update forecast the El Niño event as expected to continue until at least the first quarter of 2007.

Enhanced convection and/or above average rainfall affected the region west of the Date Line between Western Kiribati and Vanuatu, and parts of Eastern Kiribati north of the Equator. Suppressed convection and/or below average rainfall occurred over Papua New Guinea, and also from the Northern Cook Islands to Northern French Polynesia. Rainfall was well below average in New Caledonia. Seasonal rainfall anomalies turned out as forecast for many Islands. Rainfall was higher than expected in the Solomon Islands, and lower than expected in Tuvalu. The ‘hit’ rate for the October–December 2006 outlook was about 75%.

## Tropical cyclones

So far, only two named tropical cyclones have occurred in the Southwest Pacific this season; being 'Xavier' in October and 'Yani' in November, occurring over the seas between the Solomon Islands and Fiji. However, at least several more tropical cyclones are likely over the period from January through March, when the season normally reaches its peak.

The characteristics of the El Niño conditions presently affecting in the Pacific mean that we are still likely to see above average numbers of tropical cyclones in several parts of the South Pacific near and east of the Date Line this season, with a normal rate of occurrence in Islands west of the Date Line.

Future issues of the ICU will provide updates on information relating to further occurrences of tropical cyclones in the region.

## Tropical Pacific rainfall – December 2006

Territory and station name	December 2006 rainfall total (mm)	December 2006 percent of average
<b>Australia</b>		
Cairns Airport	94.6	51
Townsville Airport	55.6	42
Brisbane Airport	76.0	60
Sydney Airport	70.0	92
<b>Cook Islands</b>		
Penrhyn	38.8	12
Rarotonga Airport	199.5	106
Rarotonga EWS	110.6	59
<b>Fiji</b>		
Rotuma	446.6	157
Udu Point	224.7	85
Nadi	88.1	49
Nausori	404.7	152
Ono-I-Lau	79.7	53
<b>French Polynesia</b>		
Hiva Hoa, Atuona	10.6	11
Bora Bora Motu	247.4	91
Tahiti - Faa'a	276.0	78
Tuamotu, Takaroa	196.8	90
Gambier, Rikitea	77.8	37
Tubuai	83.4	46
Rapa	139.2	66

Territory and station name	December 2006 rainfall total (mm)	December 2006 percent of average
<b>New Zealand</b>		
Kaitia	55.9	58
Whangarei Airport	50.6	56
Auckland Airport	47.0	57
<b>Niue</b>		
Liku	84.0	
Hanan	126.5	75
<b>New Caledonia</b>		
Ile Art, Belep	30.0	23
Koumac	2.2	2
Ouloup	12.3	9
Ouanaham	6.2	4
Poindimie	64.0	28
La Roche	16.6	9
La Tontouta	3.2	4
Noumea	18.0	23
Moue	14.2	10
<b>North Tasman</b>		
Lord Howe Island	59.2	49
Norfolk Island	82.4	100
Raoul Island	87.0	64
<b>Tuvalu</b>		
Funafuti	317.5	81
Nuilakita	134.3	44

Rainfall totalling 200 percent or more is considered well above average. Totals of 40 percent or less are normally well below average. **Highlighted values are new records.**

Data are published as received and may be subject to change after undergoing quality control checks.



## Tropical rainfall outlook: January to March 2007

Enhanced convection with above average rainfall is likely in the equatorial region of Western and Eastern Kiribati extending to about 10°S to include the Solomon Islands, Tuvalu, and Tokelau.

A large region of near or above average rainfall is expected from Wallis and Futuna east-southeast to the Pitcairn Island including, the Northern and Southern Cook Islands, and French Polynesia.

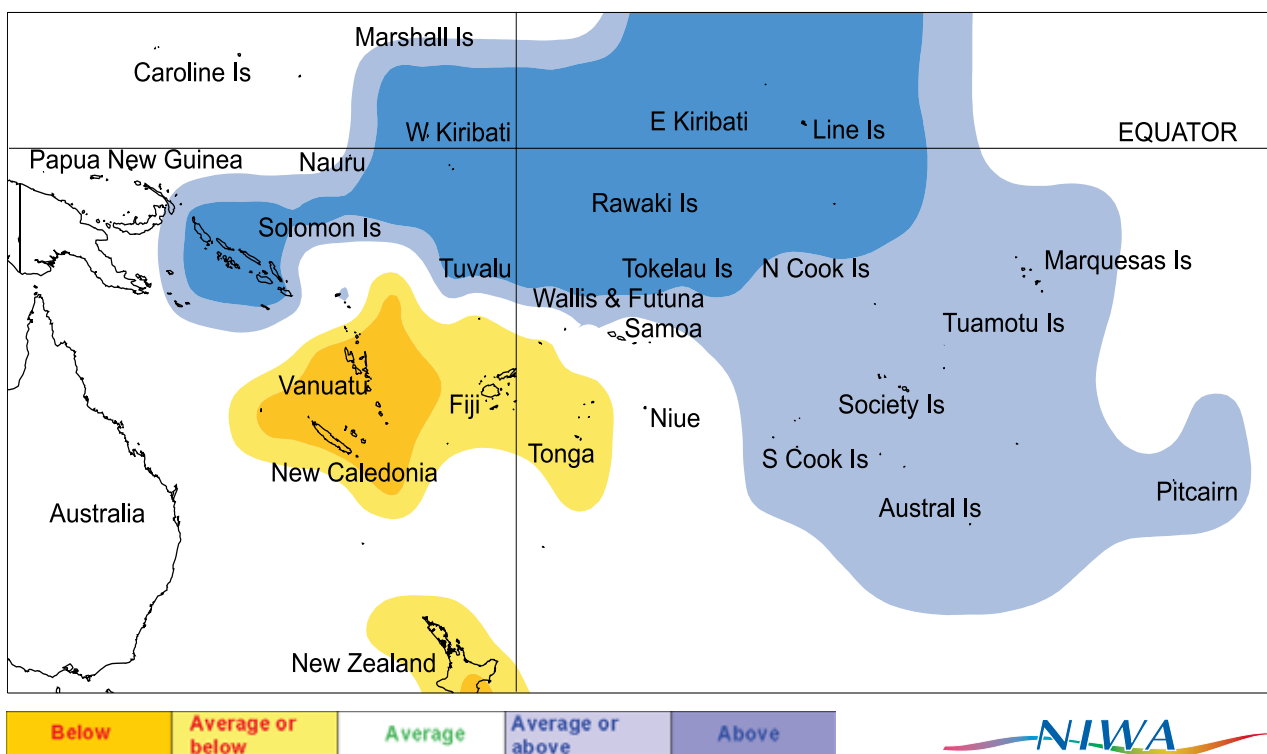
Suppressed convection is likely over Vanuatu and New Caledonia where rainfall is expected to be below average.

Near or below average rainfall is forecast for Fiji and Tonga.

Forecast model skills for this time of the year are around moderate to high for most countries in the region.

Island group	Rainfall outlook	Outlook confidence
Western Kiribati	25:25:50 (Above)	Moderate – high
Eastern Kiribati	25:25:50 (Above)	Moderate – high
Solomon Islands	25:30:45 (Above)	Moderate – high
Tuvalu	25:25:50 (Above)	Moderate – high
Tokelau	25:25:50 (Above)	Moderate
Wallis and Futuna	20:40:40 (Average or above)	Moderate
Northern Cook Islands	20:40:40 (Average or above)	Moderate – high
Southern Cook Islands	20:40:40 (Average or above)	Moderate – high
Society Islands	20:40:40 (Average or above)	Moderate – high
Austral Islands	20:40:40 (Average or above)	Moderate – high
Tuamotu Islands	20:40:40 (Average or above)	Moderate
Marquesas Islands	20:40:40 (Average or above)	Moderate
Pitcairn Island	20:40:40 (Average or above)	Moderate
Papua New Guinea	20:45:35 (Near average)	Moderate
Samoa	30:40:30 (Near average)	Moderate
Niue	35:45:20 (Near average)	Moderate
Fiji	45:40:15 (Average or below)	Moderate
Tonga	40:40:20 (Average or below)	Moderate – high
Vanuatu	45:30:25 (Below)	Moderate – high
New Caledonia	45:35:20 (Below)	Moderate

NOTE: Rainfall estimates for Pacific Islands for the next three months are given in the table. The tercile probabilities (e.g., 20:30:50) are derived from the interpretation of several global climate models. They correspond to the odds of the observed rainfall being in the lowest (driest) one third of the rainfall distribution, the middle one third, or the highest (wettest) one third of the distribution. On the long-term average, rainfall is equally likely (33% chance) in any tercile.



Rainfall outlook map for January to March 2007.

# Disaster Risk Reduction and Disaster Management Framework for Action 2005-2015

## Building the resilience of nations and communities to disasters

The ongoing and increasing vulnerability of Pacific Island nations and communities to the impacts of disasters has led to increased national and regional commitments to disaster risk reduction and disaster management on an 'all hazards' basis in support of sustainable development. These commitments have recently been articulated in the Pacific Plan and the Pacific Regional Framework for Action for Building Safer and more Resilient Nations and Communities to Disasters 2005 – 2015.

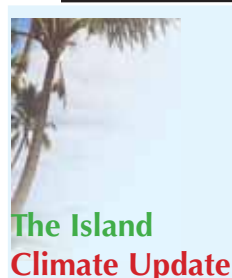
The Regional Framework complements other relevant international and regional frameworks, declarations and policies including those relating to climate change, ocean resources, freshwater, health, HIV/AIDS and agriculture.

The focus of the Regional Framework is to build safer, more resilient Pacific islands nations and communities to disasters, so that Pacific peoples may achieve sustainable livelihoods and lead free and worthwhile lives.

<p><b>THEME 1</b> <b>Governance – Organisational, Institutional, Policy and Decision Making Frameworks</b></p> <p>Expected outcomes by 2015:</p> <ul style="list-style-type: none"> <li>a) Disaster risk reduction and disaster management mainstreamed into national policies, planning processes, plans and decision-making at all levels and across all sectors.</li> <li>b) Partnerships and organizational arrangements with and between government agencies, civil society, development partners, communities and other stakeholders strengthened.</li> <li>c) CROP agency partnerships coordinated, harmonised and strengthened to ensure country- and outcome-focused delivery of services.</li> <li>d) Good governance by all stakeholders in disaster risk reduction and disaster management at regional, national and local levels strengthened.</li> </ul>	<p><b>THEME 2</b> <b>Knowledge, Information, Public Awareness and Education.</b></p> <p>Expected outcomes by 2015:</p> <ul style="list-style-type: none"> <li>a) Better informed and more resilient communities as a result of quality public awareness and education programmes.</li> <li>b) Sustainable, user-friendly information management networks in use at national and regional levels.</li> <li>c) Improved knowledge of social, economic and environmental impacts of disasters in Pacific island nations and communities to monitor the effectiveness of disaster risk reduction and disaster management measures.</li> <li>d) Disaster risk reduction and disaster management training programmes institutionalised at national and regional levels.</li> <li>e) Accredited and recognised qualifications in disaster risk reduction and disaster management.</li> </ul>	<p><b>THEME 3</b> <b>Analysis and Evaluation of Hazards, Vulnerabilities and Elements at Risk.</b></p> <p>Expected outcomes by 2015:</p> <ul style="list-style-type: none"> <li>a) An integrated framework for disaster risk reduction planning developed and implemented in Pacific island nations and communities.</li> <li>b) Estimates of disaster risk and vulnerability that will enable informed decisions regarding the impact of disasters on physical infrastructure, social, economic and environmental conditions in Pacific island nations and communities.</li> <li>c) Data and statistical information on disaster occurrence and impacts available for the region.</li> <li>d) Implementation of a comprehensive scientific and technical regional database enabling spatial analysis of hazard prone areas, and establishment of magnitude frequency relationships and loss functions.</li> </ul>
<p><b>THEME 4</b> <b>Planning for effective Preparedness, Response and Recovery</b></p> <p>Expected outcomes by 2015:</p> <ul style="list-style-type: none"> <li>a) Disaster preparedness, and the capacity for effective and timely response and recovery, strengthened in all Pacific island nations and communities;</li> <li>b) Funds and resources made available to achieve an effective model of disaster management;</li> <li>c) Emergency communication systems established and operating effectively;</li> <li>d) Public awareness programmes addressing all known hazards;</li> <li>e) Emergency response organizations and systems strengthened, including at the regional level.</li> </ul>	<p><b>THEME 5</b> <b>Effective, Integrated and People-Focused Early Warning Systems.</b></p> <p>Expected outcomes by 2015:</p> <ul style="list-style-type: none"> <li>a) Robust, effective national and regional monitoring and early warning systems established and strengthened for all hazards incorporating traditional knowledge and appropriate technology and tools.</li> <li>b) Community, national and regional warning systems integrated into the global network supporting early warning and vice-versa to improve safety and security to disasters</li> <li>c) Effective communication and awareness raising in place as part of these community-focused early warning systems</li> </ul>	<p><b>THEME 6</b> <b>Reduction of Underlying Risk Factors.</b></p> <p>Expected outcomes by 2015:</p> <ul style="list-style-type: none"> <li>a) Active steps are taken to address underlying risk factors such as poverty and population trends that negatively impact on community resilience.</li> <li>b) Adoption of risk assessment, codes of practice and design standards by key sectors such as private sector, health, transport, communication, construction, and agriculture for improving their resilience.</li> <li>c) Disaster risk reduction measures for major infrastructure, industries and projects are covered by planning processes.</li> <li>d) Resource-use policies and practices incorporate risk reduction measures.</li> </ul>

In response to the call by the Pacific Leaders for regional organisations to assist member countries to develop national action plans consistent with the Regional Framework SOPAC has coordinated the formation of a regional disaster risk management partnership network and through the support of this network is assisting countries to develop their national action plans.

For further information, please contact [director@sopac.org](mailto:director@sopac.org) or (679) 338 1377.



### The Island Climate Update

Cover Photo:  
Wendy St George,  
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**Sources of South Pacific rainfall data**  
This bulletin is a multi-national project, with important collaboration from the following Meteorological Services:

**American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Kiribati, New Caledonia, New Zealand, Niue, Papua New Guinea, Pitcairn Island, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna**

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This summary is prepared as soon as possible following the end of the month, once the data and information are received from the Pacific Island National Meteorological Services (NMHS). Delays in data collection and communication occasionally arise. While every effort is made to verify observational data, NIWA does not guarantee the accuracy and reliability of the analysis and forecast information presented, and accepts no liability for any losses incurred through the use of this bulletin and its content.

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Requests for Pacific Island climate data should be directed to the Meteorological Services concerned.