



What are believed to be earthquake fracture zones. EHFZ corresponds to the Extension of the Hunter Fracture Zone; FFZ for the Fiji Fracture Zone.

Earthquake zones in the Fiji Region. The highest magnitudes recorded in each region are note, e.g., M7.0 for the Northeastern Zone.

WHAT TO DO ABOUT EARTHQUAKES

BEFORE THE EARTHQUAKE

Build expertly to with stand earthquakes and hurricanes. Remember, earthquakes can cause landslides.

Attach heavy items such as stoves, refrigerators, and tall furniture, to the wall or floors to prevent toppling.

Select a place to shelter during the earthquake, such as under a table, bed, bench, or in a suitable doorway, to avoid being by any falling items, hot water, broken glass and heavy furniture.

DURING THE EARTHQUAKE

DON'T PANIC.

The earth's shaking is frightening but does not hurt you.

IF YOU ARE INDOORS, STAY THERE and take cover under selected shelters - tables, bed, etc.

IF OUTSIDE, move quickly away from buildings, tall trees, coconut, palms, and electricity wires.

DON'T RUN NEAR OR THROUGH BUILDINGS. The greatest danger is from heavy objects falling off of outside walls.

IF YOU ARE IN A CAR, stop the car and stay there.

AFTER THE SHAKING STOPS

Check for fire. Check electricity and water suppliers, and turn off power or water suppliers if necessary.

Look for fallen power lines. Check danger from structural damage, especially stairways.

Stay off the telephone unless there is an emergency

Do not go sight-seeing, and stay away from damaged buildings and landslip areas. Aftershocks may occur.

Should you be close to the sea, head for high ground in case a tsunami (sea wave) is generated.

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MINISTRY OF LANDS AND MINERAL RESOURCES

FIJI



EARTHQUAKE



MINERAL RESOURCES DEPARTMENT

EARTHQUAKES IN FIJI

Earthquakes occur throughout the world but certain areas are more prone to them than others. Unfortunately, Fiji is within the Pacific Ring of Fire", the zone of earthquakes and volcanoes which surrounds the Pacific Ocean. Although there are no volcanoes in Fiji and the number of earthquakes is somewhat less than for the most active areas around the Pacific such as Japan, Alaska, Chile and nearby Tonga, Vanuatu and Papua New Guinea, the risk from earthquakes is similar to that in New Zealand, which is relatively high by world standards.

The first known historical earthquake report describes an earthquake at Kadavu in about 1850. It states: "a recent earthquake had been felt throughout the greater part of Feeje, but was so tremendous in Kantavu that the earth opened in several parts and destroyed a great number of people. In one part it shook down a large cave and buried thirty or forty women who had taken shelter for the night, having been on a fishing excursion! Details of other severe earthquakes, such as those which were reported in 1869 (upper Rewa River), 1884 (Macuata), 1902 (Yasawas), 1919 (Rabi), 1932 (Rabi and Koro), 1953 (Suva), 1979 (Taveuni) and 1998 (Kadavu) are given in the Table and their locations are shown in the earthquake map overleaf.

What are Earthquakes

Earthquakes are caused by the failure of rocks under stress. Sometimes rocks are able to adjust by folding, but if the stress is applied rapidly enough they will fracture and form a geological fault, which is usually too deep in the earth's crust to be seen. The fracturing along the fault causes vibrations or seismic waves which travel outwards in all directions from the fault, and if the earthquake is large enough, the waves are recorded on sensitive seismographs around the world and the ground can shake strongly close to the fault. Naturally, shallow earthquakes (depths less than 40km) cause the most damage because the Earth's surface is close to the earthquake fault.

Magnitude and Intensity

The magnitude of an earthquake is calculated from the recordings by seismographs and is a measure of its size, or the energy released by the earthquake. It is stated accordingly to the Richter Scale, which is logarithmic: thus a magnitude of 6, for example, represents a disturbance with a ground motion 10 times greater than for one with a magnitude 5, and an energy release amounting to about 30 times greater than that for a magnitude-5 earthquake. Generally, an earthquake with a magnitude of 6 or more will cause major damage to buildings near the epicenter.

In Fiji, since 1918 when reliable recording began, a potentially dangerous earthquake of magnitude 6 or more has occurred on an average of once every three years.

When an earthquake is recorded by distant overseas seismograph stations, another magnitude, Ms, similar to the "Richter" magnitude, is determined by many of the stations. Ms is given in the Table of important earthquakes.

Intensity is expressed using the Modified Mercalli (MM) intensity scale, which is a subject expression of how severely the earthquake was felt at a particular place. It is measured in terms of the effects the earthquake produces, such as the degree of ground vibration, the damage done to man-made structures, and the occurrence of severe landsliding.

The Zones of Earthquake Activity

Earthquakes occur in several zones which are outlined in the map inset. Offshore activity occurs to the northeast and east of Vanua Levu and Taveuni, north of the Yasawas and Vanua Levu, to the west of Viti Levu and around Kadavu. Southeastern Viti Levu shows activity and another belt of seismicity which is not clear definable possibly extends from near southwestern Vanua Levu through Koro than arcs around to the southwest to south of Kadavu. The magnitude of the largest earthquake known to have occurred in each zone is given in the inset.

The northern east zone is the most active in Fiji and the largest earthquakes have taken place here. The magnitude-7.0 quakes in the 1928 and 1949 (see map) are the largest known to have occurred in Fiji. The area of Rabi and northern Taveuni was severely shaken (intensity MM8) by the 1919, 1932 and 1979 earthquakes, causing severe landslides, mud volcanoes, changes to natural water supplies and severe damage to buildings. The church built of stone at Napuka was badly damaged on each occasion.

The northern zone is the second most active one and earthquakes in 1884 and 1902 caused damage in northern Vanua Levu and the Yasawa Group respectively. Larger quakes in this zone are frequently felt in northern Vanua Levu, the Yasawas, the Nadi-Lautoka-Ba area and occasionally in Suva. The 2001 M6.0 earthquake at the Yadua Trough was felt strongly in Suva and caused a lot of alarm for occupants in high rise buildings.

The western zone. Although earthquakes in this zone are felt occasionally in western Viti Levu, the only one to cause concern was in 1921 when the M6.7 quake shook the above area with an intensity MM5.6. Notable damage has not resulted from earthquakes in this area.

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The Kadavu zone. The earthquake hazard in Kadavu is *average*, and similar to that for Taveuni, Rabi and eastern Vanua Levu. The zone is not clearly defined, but the pattern of smaller earthquakes indicates that Kadavu is included in it. The 1950 M6.5 earthquake was felt clearly in Suva and Navua and caused landslides in Kadavu. Had the earthquake focus been beneath Kadavu instead of offshore the quake could have been disastrous. A magnitude M6.0 earthquake in 1998 caused severe landslides and damage to the infrastructure at Nabukdelevu-i-a.

Southeastern Viti Levu. Scattered minor seismicity has been detected since a seismograph network centered on Suva was installed in 1979 and, for instance, Navua, Suva and Ovalau are often shaken by minor tremors in their vicinities. However, intensities of MM7 or more have been reported only for quakes in 1869 and 1953.

The M6.8/1953 "Suva" earthquake, which caused damage costing about £500,000 (1953 values) and eight deaths, is remembered by everyone in Suva and surrounding areas because of the high earthquake intensities at the time. A spectacular tsunami following the earthquake hit Suva Harbour and Nakasaka Bay (Kadavu) causing five of the earthquake's eight fatalities.

Zone through Koro. The zoning is uncertain. The only damaging earthquake in the zone is the 1932 Koro earthquake with M6.5. A report indicated that a landslide had taken part of a village into the sea and tilted the lighthouse and put it out of action.

Rotuma and the Lau Group are not in recognisable earthquake zones. Rare reports of minor tremors come from the Lau Group. Several earthquake reports have originated from Rotuma and a weakly active zone could exist near the island.

TSUNAMIS

Tsunamis (sea waves) have been reported after two earthquakes in Fiji, namely one off the coast of Vanua Levu in about 1881 and the 1953 Suva Earthquake. The Vanua Levu tsunami was reported to be about 1.8 m in height and did not cause concern. However, in Suva the tsunami waves were from 1.8 to 4.5 m above low-tide level and caused great concern along water frontages.

One notable tsunami resulting from a distant earthquake occurred at Savusavu in 1877, where several 2.0-m high waves were noted approximately 18 hours after a major Chilean earthquake.

FURTHER READING

Reports of earthquakes felt in Fiji, 1850-1940, by I. B. Everingham MRD Report 48, 1983.

The 1953 suva earthquake and tsunami by R. E. Houtz. Bulletin of the Seismological Society of America, vol. 52 No.1 Pages 1-12, 1962.

Date	Place Felt	Epicenter Lat °S Long •	Mag MS	I• MI
(local)				
About 1850	Kadavu	19 178E	6.5?	8
1869 OCT 02	Upper Rewa River	17.8 178.3E	5-6	7
1884 JAN	Naduri (Macuata)	16 179E	6.8?	7
1902 AUG 03	Yasawas	16.7 177.2 E	6.8?	7
	Ba		6	
1919 OCT 03	Rabi, Tunuloka	16.4 180.0E	6.9	8
1921 SEP 30	Lautoka, Nadainivatu	17.0 176.5E	6.7	5
1928 JUN 21	Taveuni	17.0 179.5 W	7.0	6
1932 FEB 17	Rabi, Tunuloka	16.2 179.7 W	6.6	7
1932 MAR 09	Koro, Ovalau	17.5 179.6E	6.5	7
	Savusavu		6.0	
1950 MAR 13	Kadavu	18.9 177.8E	6.5	6
1953 SEP 14	Suva, Navua	18.25 178.25 E	6.8	7
1957 JAN 03	Taveuni	16.70 179.80 E	5.0	7
1979 NOV 17	Taveuni	16.50 179.75 W	6.9	8
1983 JUL 19	Kadavu	19.06 177.77 E	4.8	6
1984 OCT 13	Yasawas	16.79 177.30 E	6.1	6
1998 NOV 02	Kadavu	19.4 177.5 E	6.0	7
2001 FEB 14	Kadavu	19.0 177.4E	5.8	6
2001 SEP 03	Bua, Labasa, Yasawa, Suva	16.2 178.3E	6.0	6