

# THUNDERSTORMS

## Your Guide

### 1. Characteristics

Thunderstorms are generally localised weather phenomena that form out of cumulonimbus cloud. They do not usually affect wide areas as tropical cyclones do, so their damaging potential is often underestimated. A well developed thunderstorm is typically characterised by intense *lightning* and *thunder* which can be extremely hazardous.

### 2. Occurrences

Thunderstorms can occur anywhere in Fiji and do so more frequently than any other major natural hazard. Their occurrence can also be at any time of the year, though the chance is low during the country's cool and dry season. Usually, thunderstorms strike from November to April, when energy, especially from the sun, is most abundant. At other times, they are embedded in low pressure troughs and fronts moving across Fiji.

### 3. Causes

Almost all thunderstorms develop under atmospheric conditions of low static stability, with abundant heat and moisture at low levels. The formation begins when dense (sinking) cold air overlies less dense, warm and moist (rising) air. Development is greatly enhanced when a catalyst such as strong heating and/or a trough is present. Strong up-draughts then gradually form and the heat energy in the air and water vapour gets converted to wind and electrical energy. When the atmosphere is sufficiently unstable

and the immediate surrounding promotes continuous contribution of energy into a growing cloud, a severe thunderstorm then develops, Strong up- and down-draughts characterise a well-developed thunderstorm.

### 4. Associated Weather

#### (a) Lightning and Thunder

Lightning is the discharge produced when differences between ground and atmospheric electrical charge are large enough (several hundred thousand or even million volts) to overcome the insulating effect of the air. There are usually three types of lightning strokes; within the cloud, between clouds and between clouds and the ground. An average thunderstorm can release several hundred megawatts of electrical power.

Thunder is the sound emitted by the explosive expansion of air heated by the lightning stroke to a local temperature of the order of 10,000°C



**(b) Gusts/Squalls**

In a well-developed thunderstorm, the momentum of falling rain and ice crystals effectively drags the surrounding air downwards. In addition, evaporation of raindrops cools the immediate surrounding air, thus enhancing the downward draught. Upon reaching the ground, this strong down-draught spreads out, producing cool and gusty winds which can cause damage.

A squall is a severe local storm, accompanied by threatening cloud, precipitation (often heavy), thunder and lightning, and having a duration of the order of minutes.

**(c) Flash Floods**

When raindrops become too large to be supported within a cloud, they fall, but the intense up-draught of a severe thunderstorm can hold huge amounts of rain in the cloud before releasing it onto the ground, in a deluge. This is exacerbated when storms move slowly, thus ensuring a small area receives most of the rain. Drainage and ground run-off characteristics also control where the greatest impact occurs.

**(d) Hail**

Hail stones form in a thunderstorm when raindrops freeze at high levels and then allowed to grow in size as they are recycled through the strong up-and down-draughts, before falling to the ground.

## 5. Protection Against Lightning Strikes

**(a) Outdoors**

- Seek shelter in a 'hard-top' vehicle or building – avoid small structures, fabric tents and isolated or small groups of trees.
- If in the open, away from shelter, crouch down (singly), preferably in a hollow, with feet together and remove any metal objects from head and body. Do not lie down, but avoid being the highest object in the vicinity.

- If your hair stands on end or you hear buzzing from nearby rocks, fences etc, move away to a new position immediately.
- Do not handle long or metallic objects like umbrellas or golf clubs in the open.
- Do not touch or move close to metal structures, wire fences or metal clothes line.
- Do not ride horses, cycles or drive in open vehicles.
- If driving, slow down or park away from trees, power lines etc. Stay inside metal bodied (hard top) vehicles or caravans but do not touch or lean against metal body components.
- If swimming or surfing, leave the water immediately and seek shelter.
- If boating etc, get ashore as soon as possible. If unsafe to do so, seek protection beneath a high structure such as a bridge.
- Be sure the mast and stays of a sailing boat are adequately 'grounded' to the water.

**(b) Indoors**

- Keep clear of windows, electrical appliances, pipes and other metal fixtures.
- Avoid use of telephones. If an emergency call is required, make it brief.
- Before the storm arrives, disconnect external aerial and power leads to radio and TV sets. Disconnect computer modems and power sources, then stay away from electrical appliances.

**(c) First-Aid**

- Apply immediate heart massage and mouth-to-mouth resuscitation to lightning victims continuously until medical help arrives.

*Produced by :*

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Director of Meteorology.*