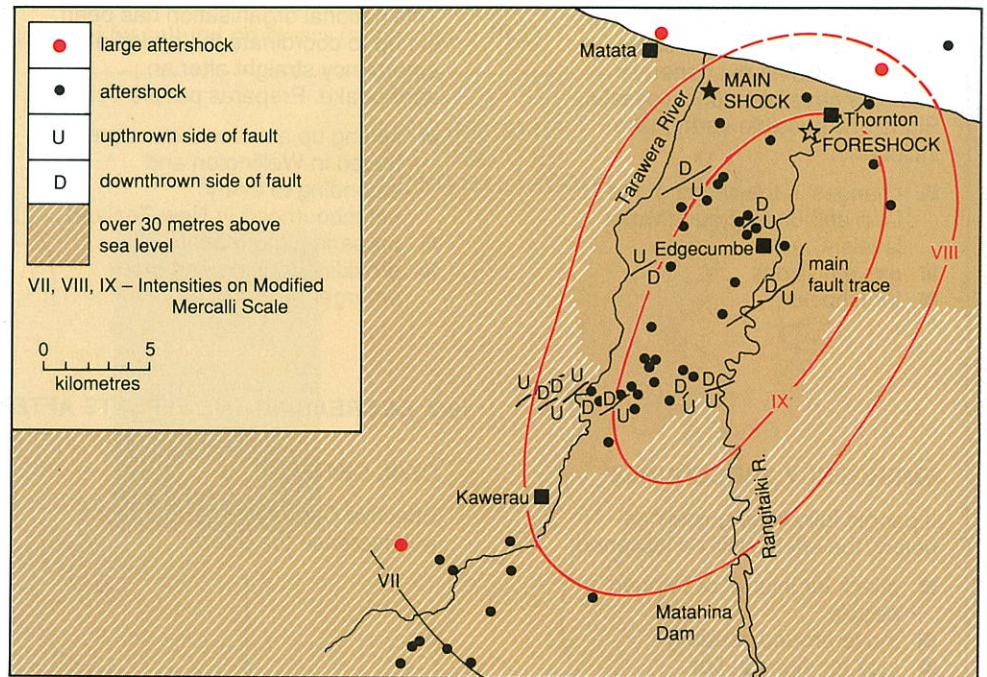


## PROCESSES CAUSING THE EARTHQUAKE

From the volcanoes of the central North Island to the Bay of Plenty, the crust of the Indo-Australasian Plate is being stretched. A sudden release of energy from rock that had been overstrained occurred near Edgecumbe at 1.42 pm on the 2nd of March, 1987. The focus of the earthquake was 8 km below the surface with an epicentre just north of Edgecumbe. It had a magnitude of 6.3 on the Richter Scale.

## 20.1 LOCATION OF THE EDGECUMBE EARTHQUAKE



## ACTIVITIES

- Using resource 20.1, draw a model of the Edgecumbe earthquake using resource 1 on page 42.
- Calculate:
  - the compass direction of the main shock from Edgecumbe.
  - the distance from the main shock to Edgecumbe.
- 3a Copy resource 20.1. Draw on to it one trend line of aftershocks.
  - What is the likely relationship between this trend line and the location of faults? (See also resource 15.5.)
- Construct a flow diagram of the sequence of events listed on page 60 based on resource 16.1.

## PHYSICAL CHANGES

## horizontal movement

- a giant fissure up to 3 metres wide, 3–4 metres deep and 7 km long opened in the Rangitaiki Plains. It was later called the Edgecumbe Fault (see resource 20.2).
- the whole area twisted slightly resulting in the hills to the east of the Rangitaiki Plains moving 0.6 metres southwards away from the hills to the west.

## vertical movement

- the land on the northwest side of the Edgecumbe Fault dropped by up to 2 metres.
- land dropped 1 metre on the northwest side of the Awaitei Fault.
- much of the Rangitaiki Plains dropped.
- ancient tree stumps were thrust above the Rangitaiki River's water level.

## liquefaction

- this was common along river banks and in some paddocks. The ground shaking brought sand to the surface creating sand blows.

## landslides

- ground shaking caused **landslides** and slumps in the hills.

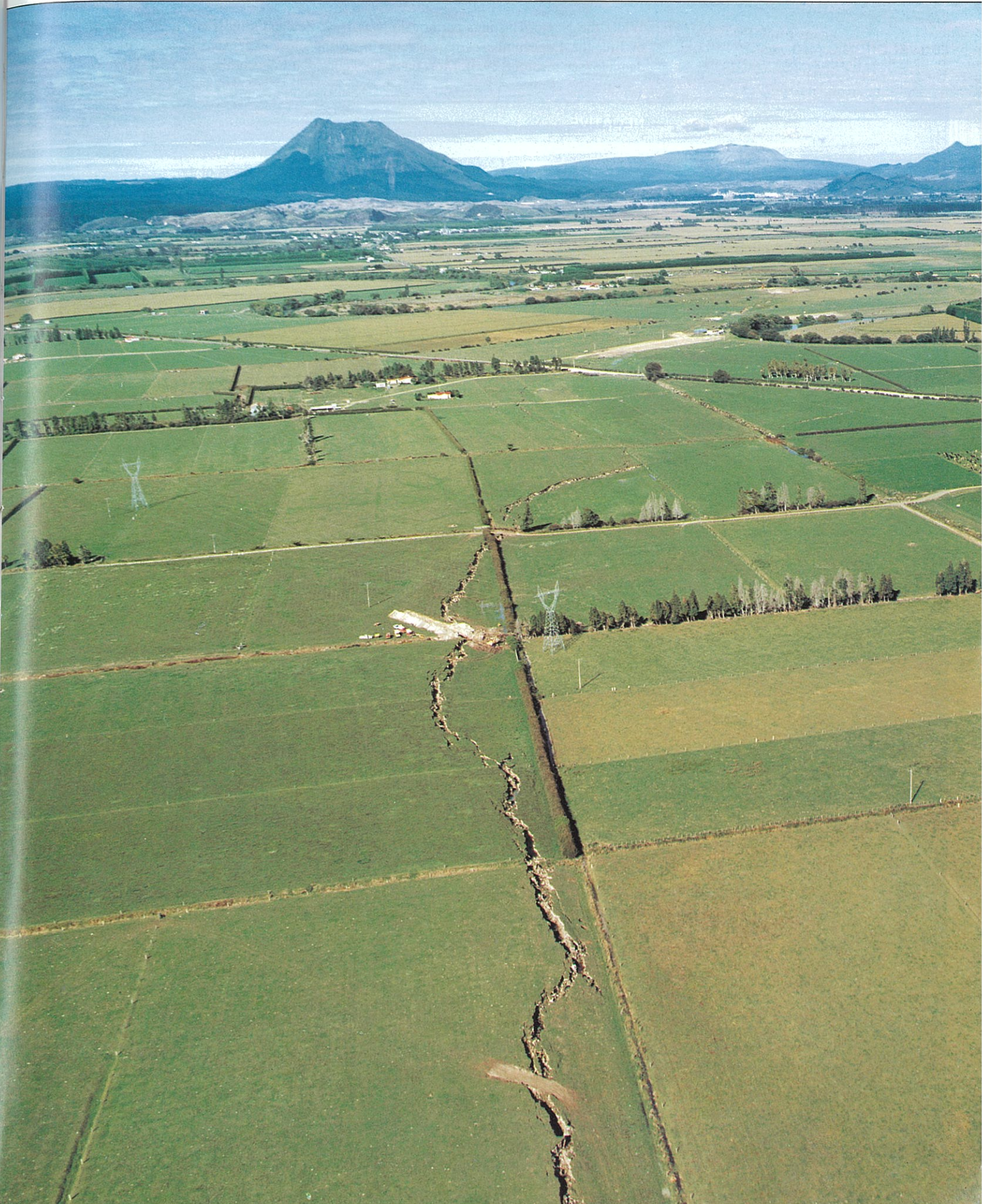
## ACTIVITIES

Draw a precis sketch of resource 20.2. It is an oblique view so choose the correct frame shape.

Show on your precis sketch:

- Mt. Edgecumbe
- the hill country to the west
- the Edgecumbe Fault
- the road which is intersected by the fault.









## EFFECTS ON PEOPLE

While the Napier/Hastings earthquake was New Zealand's most costly in terms of loss of life, the Edgcumbe earthquake has been the most expensive in terms of property damage (see resource 20.3). Most damage occurred at Edgcumbe and Te Teko.

### 20.3 ECONOMIC AND SOCIAL EFFECTS

	NEGATIVE	POSITIVE
<b>ECONOMIC</b>	<p><b>Commerce</b></p> <ul style="list-style-type: none"> <li>■ damage to commercial buildings.</li> <li>■ destruction of a lot of stock in shops.</li> </ul> <p><b>Farming</b></p> <ul style="list-style-type: none"> <li>■ damage to stopbanks threatening farmland.</li> <li>■ farmland ruined by fissures and liquefaction.</li> <li>■ forestry production stopped for a while with mills being out of action.</li> </ul> <p><b>Manufacturing</b></p> <ul style="list-style-type: none"> <li>■ a number of factories became inoperable, for example NZ Forest Products' mill at Whakatane; Tasman Pulp and Paper mill at Kawerau and the Caxton Paper mill at Kawerau.</li> <li>■ some factory sites needed rebuilding such as Bay Milk Products at Edgcumbe.</li> </ul> <p><b>Services</b></p> <ul style="list-style-type: none"> <li>■ power, water, sewerage and telephones were cut in many areas.</li> <li>■ the Matahina Dam was slightly damaged.</li> <li>■ the Whakatane Hospital was damaged resulting in the evacuation of some patients.</li> </ul> <p><b>Communications</b></p> <ul style="list-style-type: none"> <li>■ roads and bridges around Edgcumbe were badly damaged.</li> <li>■ landslips blocked some roads.</li> <li>■ railway lines buckled with 30 km of line badly damaged.</li> </ul> <p><b>Houses</b></p> <ul style="list-style-type: none"> <li>■ about 2500 chimneys were damaged.</li> <li>■ contents of houses were severely damaged over a large area.</li> <li>■ about 50 houses were uninhabitable.</li> <li>■ many houses lost roof tiles and brick cladding.</li> <li>■ nearly all swimming pools in Edgcumbe were damaged.</li> </ul>	<p>Damage to all the aspects of the economy has provided the Edgcumbe area with an opportunity to rebuild its economy on a very modern basis using the most up-to-date technology.</p> <p>Employment was created by the need for labour in the rebuilding programme.</p>  
<b>SOCIAL</b>	<p><b>Social disruption</b></p> <ul style="list-style-type: none"> <li>■ coping without power, telephone, water and toilets.</li> <li>■ coping with evacuation and temporary relocation.</li> <li>■ schools were closed in the Whakatane District for 15 days.</li> <li>■ a total of 3180 employees were affected by the sudden shutdown of damaged factories.</li> </ul> <p><b>Mental stress</b></p> <ul style="list-style-type: none"> <li>■ coping with the dramatic change of lifestyle.</li> <li>■ coping with fear, particularly triggered by aftershocks (see resource 20.6).</li> <li>■ coping with the discomfort of heavy rain following on from the earthquake.</li> </ul>	<p>Community spirit and cooperation were generated, for example:</p> <ul style="list-style-type: none"> <li>■ Hahuru Marae became a refuge</li> <li>■ an activities centre for children was set up in Edgcumbe</li> <li>■ college students set up a computer database at the Disaster Recovery Centre at Edgcumbe</li> <li>■ the Whakatane Fraternity of Clergy gave spiritual help particularly to the elderly, sick and alone.</li> </ul>



## 20.4 PERSONAL ACCOUNTS OF STRESS

Ron Russell site manager at Bay Milk Products Ltd, vividly remembers the horrendous noises as the earthquake struck his factory. The overall rumbling of the earthquake was accompanied by a cacophony of crashing pipes and collapsing silos, and a large-diameter steam pipe fractured and "went off like a canon". Workers ran around confused or they clustered in groups for mutual security.

Charmaine Baker escaped from her house during the earthquake to find the house torn from its base, twisted from its supports, almost brickless and devastated internally. She had escaped unharmed but new horrors awaited to alarm her. Cracks 30 to 40 cm wide were opening and closing across the lawn and the car was moving down a slope away from her.

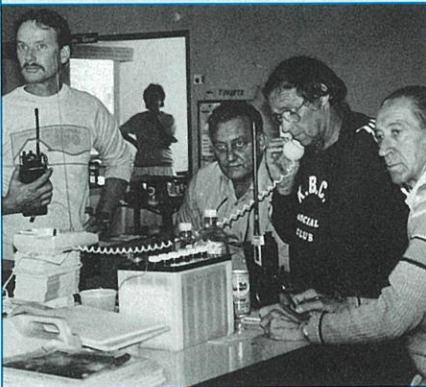
## THE INFLUENCE OF PEOPLE

- People could have done nothing to prevent the earthquake from happening. However because they had chosen to live and work in the area, the likelihood of an earthquake being hazardous to people and property was high.
- The effects of the earthquake were decreased by actions taken before the earthquake occurred and after it (see resource 20.5).

## 20.5 DECREASING THE EFFECTS

### BEFORE THE EARTHQUAKE

- many households were covered by insurance.
- building regulations meant many houses were earthquake-resistant.
- many schools had recently practised earthquake drills.
- Civil Defence was reasonably well-organised in the region.



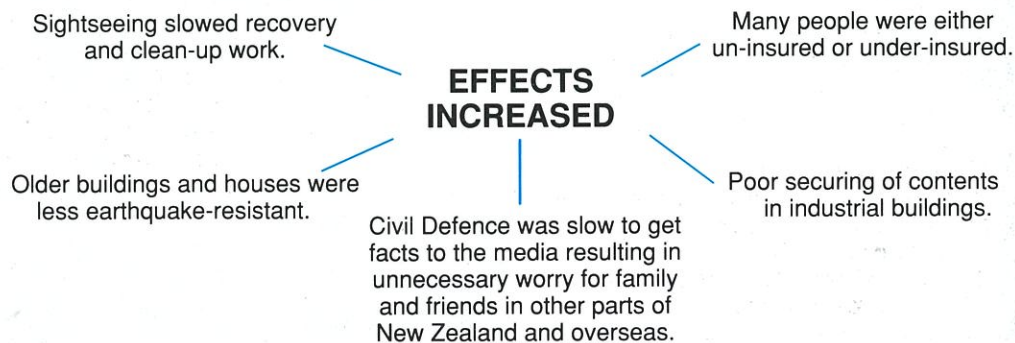
### AFTER THE EARTHQUAKE

- many agencies responded quickly to provide assistance, examples: Social Welfare, volunteer organisations, NZ Fire Service, Police, Department of Health, armed forces. These were all coordinated by Civil Defence.
- the danger of disease was averted by prompt disposal of refuse; use of portable toilets; information on safe water and food preparation; and provision of water in tankers.
- prompt restoration of power.
- emergency benefits from Social Welfare and compensation from insurance companies and the Earthquake and War Damage Commission.
- the cooperation of the community.

⇒ **EFFECTS DECREASED** ⇐

## 20.6 INCREASING THE EFFECTS

- The actions of some people before and after the earthquake caused the effects to be worse than they need have been (see resource 20.6).





## SEQUENCE OF EVENTS, 1987

**22 Feb – 2 March** – Many small earthquakes are felt in the area.

**2 March 1.35 pm** – Immediate foreshock of 5.2 felt. Power is cut in some areas. Many people go outside, some schools are evacuated.

**1.42 pm** – The main shock hits with a magnitude of 6.3. The experience terrifies most people. Luckily human casualties are very light.

**1.51 pm** – An aftershock of 5.6 is felt. Three more aftershocks of magnitude greater than 5 occur in the next 6 hours. Smaller aftershocks are felt in the following days.

**3.00 pm** – A state of Regional Civil Defence Emergency is declared in the whole Bay of Plenty area. National Civil Defence Head Quarters in Wellington is activated.

**late afternoon** – Many people voluntarily leave town for safer places. Many camp out in paddocks or shelter in schools and halls. The Mahuru Marae at Onepu shelters 1000 people on the first night of the disaster.

Civil Defence evacuate 40 houses in Kawerau due to the danger of a landslip. Residents of Te Mahoe village are evacuated due to the danger of flooding should the Matahina Hydro Dam collapse.

**2–5 March** – Evacuation centres are established. Emergency services are established (water, power, sewerage). Some isolated rural areas are contacted for the first time.

**5 March** – Areas outside the Whakatane District are largely stabilised. Civil Defence Emergency is lifted in these areas. A 'Disaster Recovery Centre' is established in Edgumbe.

**13 March** – Temporary essential services are established in Edgumbe and most people have returned to their homes. The state of Civil Defence Emergency is lifted in the Whakatane District.

Longterm repair and recovery begins. Major damage takes many months to repair or rebuild.

