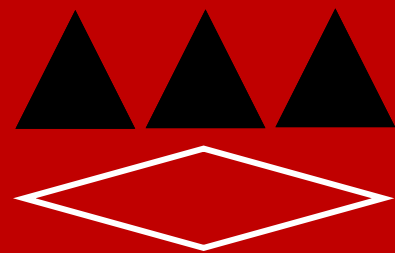


# TARAWERA

## TE MAUNGA TAPU



**DIGITAL  
RESOURCE**  
Science /  
Social Science



**ROTORUA  
museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



**ROTORUA  
LIBRARY**

TE AKA MAURI

**ROTORUA  
LAKES COUNCIL**



# Tarawera - Te Maunga Tapu

Online Resource

Introduction & Contents



This resource provides an overview of the Tarawera story.

It presents some of the people, places and wonders from before and after the eruption of June 10, 1886.

## Contents:

### Social Studies Focus:

- Introduction & A Century of Change
- The Terraces of Rotomahana
- Tourism at the Terraces
- By Steamer, Boat and Canoe
- Hinemihi of the Golden Eyes
- Warnings and the Ghost Canoe
- Sudden Fire
- Worst of all
- Devastation and Death at the Rotomahana Hotel. Refuge and Loss
- Treasures Lost Forever
- Leaving the Land

### Science Focus:

- Tectonic Plates / Taupo Volcanic Zone
- Okataina Volcanic Centre
- Types of Volcanoes
- Eruptions of Mt. Tarawera
- How the Terraces Were Made
- The Heat Beneath (Geothermal)

### Resources:

- Internet Sites
- Recommended Reading
- Double Bubble Map
- Pre and post visit activities



Image courtesy of Tourism Rotorua

## Introduction

For generations, two important groups (iwi) of the Arawa people lived near Tarawera Mountain.

Over many years battles were fought for control of the land. The Ngati Rangitihi people of Te Arawa controlled the north-eastern sides of Tarawera Mountain, including the mountain's central peak,

Ruawahia. Meanwhile the Tūhourangi, also of Te Arawa, held power over the Tarawera lakes district, including the terraces of Rotomahana. In time the sacredness of Tarawera Mountain increased as each generation laid the bones of their dead in secret places on its upper slopes.

Cover image: Charles Blomfield, Mt Tarawera in Eruption June 10 1886 (detail). Collection of Rotorua Museum



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE

# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



## A Century of Change:

The Maori people who lived near Tarawera Mountain faced many changes during the nineteenth century. Early in the century missionaries came to spread the message of Christianity.

Pioneer missionary Seymour Mills Spencer, and his wife Ellen, built a mission station at Kariri (Galilee) in 1843, later moving to the more fertile valley of Te Wairoa where a village was laid out along English lines. Early visitors to the Pink and White Terraces stayed with missionaries. Governor Grey's visit in 1849 helped spread the fame of the terraces and the "thermal wonderland" to the far-away Victorian world.



Unknown, Joseph McRae (Te Wairoa), Collection of Rotorua Museum



Josiah Martin, Wairoa township, c.1885. Collection of Rotorua Museum

Te Wairoa was the tourist hub or gateway to the terraces. Much of the village was destroyed and there were many deaths in the area (approximately 120) due to the eruption

Before the eruption, Joseph McRae's Rotomahana hotel housed many tourists on their way to see the terraces. He was regarded as a hero for his actions on the night of the eruption. He managed to get many people out of his collapsing hotel to the safety of Guide Sophia's whare.



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



## The Terraces of Rotomahana:

People from all over the world came to see what was known as the 'Eighth Wonder of the World,' the natural phenomenon called the Pink and White Terraces.



Charles Blomfield, View of the Pink Terrace, 1887.  
Rotorua Energy Charitable Trust Heritage Collection



George Valentine, Sophia Hinerangi on the Terraces at Rotomahana, Collection of Rotorua Museum

### Te Tarata – the White Terraces

Te Tarata, which means the 'tattooed rock', covered three hundred hectares and tumbled to the lake from a height of 30 metres, fanning to a frontage of 240 metres.

At the base, where the terraces disappeared into the lake, the height and distance between the platforms could be measured in millimetres.

The higher up the greater the distance

between them, those near the top being around 3.5 metres high.



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE

# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



## The Terraces of Rotomahana:

### Ōtukupuarangi – The Pink Terraces:

Ōtukupuarangi, which means 'fountain of the clouded sky', was slightly smaller. The steps gradually rose to the crater platform where three one metre deep basins were filled with warm, clear blue water making superb bathing places. The Pink Terrace was wider at the top than the White Terrace, narrowing to 23 metres on the lakeshore.



Charles Pulman, Ōtukupuarangi - Pink Terrace. Collection of Rotorua Museum

## Tourism at the Terraces:

During the 1850s a growing feeling of unrest erupted into warfare that divided the country for more than ten years. Tourism was put aside during this time of conflict. The New Zealand wars drew to a close around 1870 and tourists again began to visit the area. The scene was set for a tourist boom as the fame of the area spread far and wide. A visit by the Duke of Edinburgh (who signed his name on the terraces) aided the area's popularity.



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus

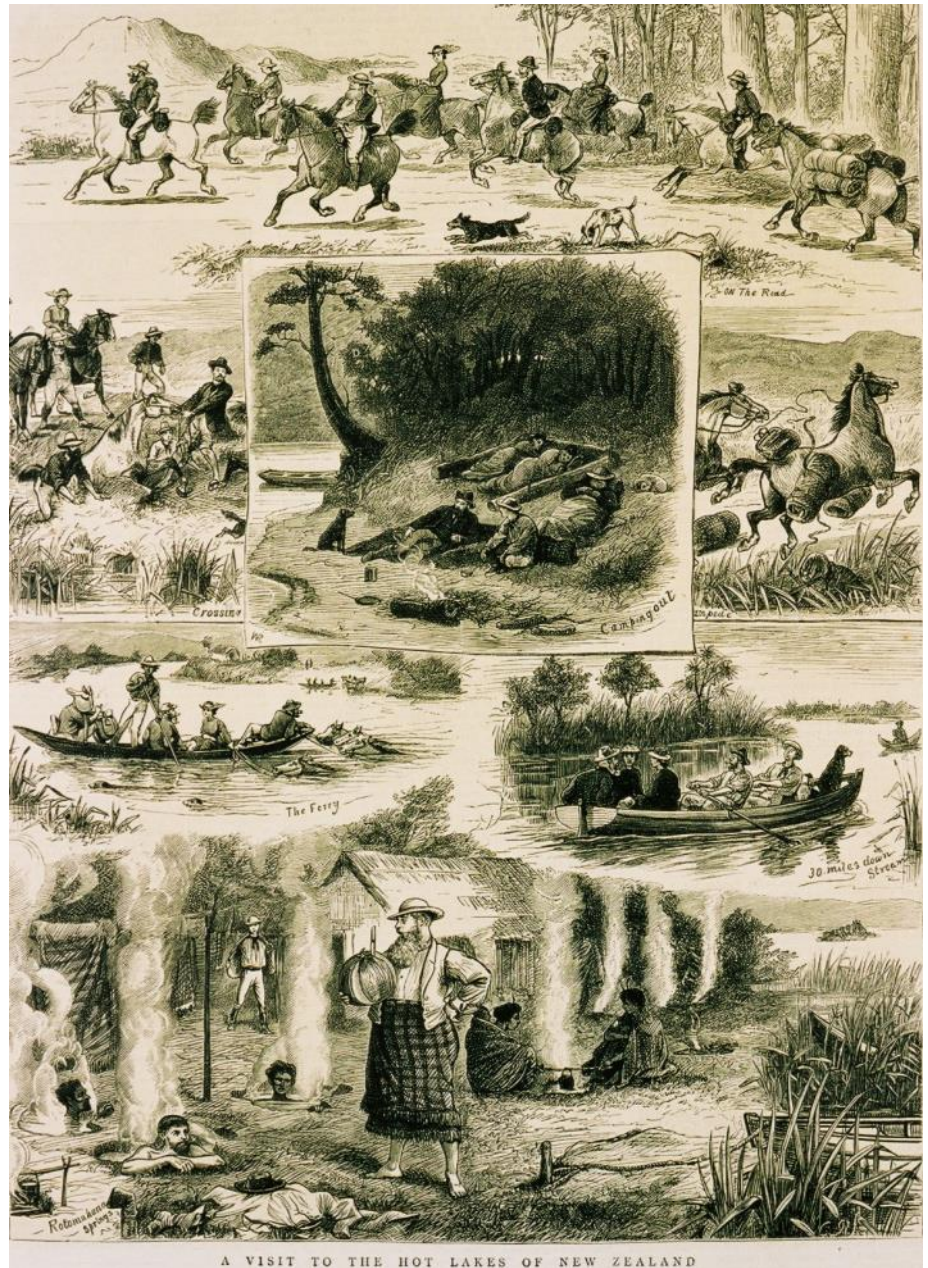


Before roads were built, the long and difficult journey from Auckland to the “Hot Lakes” district could take many days. Early visitors came to the area on foot along Maori trails.

## **By Steamer, Boat and Canoe:**

By the 1870s there were several routes to the terraces, the most popular being a steamer trip from Auckland to Tauranga, then a journey inland by coach to Ohinemutu, the large Ngati Whakaue pa on the shores of Lake Rotorua.

By 1873 three hotels had been built there to accommodate visitors. In 1883 a road for coaches was made through the bush over the Mamaku plateau, and from 1876 tourists could travel the final 16 kilometres to Te Wairoa by buggy.



The Graphic (active 1880). A visit to the Hot Lakes of New Zealand, 1880. Collection of Rotorua Museum



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



## Hinemihi of the Golden Eyes:

Visitors were willing to pay a high price to visit the terraces. Annual income for village residents was said to reach up to £4,000 each. The eyes of carvings on the wharenui Hinemihi, where tourists were entertained with an extended haka, were decorated with gold sovereigns instead of paua shell.

Arrangements for a trip to the terraces were made in the evening. One of the guides, possibly Kate Middlemass or Sophia Hinerangi, would then take charge of the whaleboat and canoe journey the next morning.



Burton Brothers. Hinemihi Meeting House, Te Wairoa. Alexander Turnbull Library National Library of New Zealand, Te Puna Mātauranga o Aotearoa



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



## Warnings and The Ghost Canoe:

The wealth that came with tourism also had a dark side. The wealth was easily spent and illness and alcohol took a heavy toll on the Maori people.

Tuhoto Ariki, an old priest of great power and wisdom, warned the Tuhourangi people that to forget the ways of their ancestors would bring disaster.



Kennett Watkins, *The phantom canoe, Lake Tarawera*. Collection of Rotorua Museum

Ten days before the eruption, on May 31 1886, Guide Sophia on her way to the terraces with a group of six European visitors, saw a mysterious canoe on Lake Tarawera.

Both European and Maori statements about the strange sitting have been recorded. The canoe appeared to be racing and was sufficiently close for the group to see the flash of paddles.

When the tourist boat turned Moura point to enter the Te Ariki arm of Lake Tarawera, the canoe passed from their view.

To the Maori onlookers the meaning was clear – it was a waka wairua, a spirit canoe. An event such as this foretold many deaths among the people.

There were other signs of disturbance.

Wairoa creek dried but, as people

watched, the water returned with “a crying sound all along the shores of the lake.” Then the water rushed away again, exposing the muddy creek bed.

Much later, Guide Sophia remembered another event. The old chief Rangihueua had offered “Tapu” honey collected on Tarawera Mountain to her. Knowing it was tapu (sacred), she had instantly refused. Everyone who ate the honey died in the eruption, including the chief.



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



## Sudden Fire:

Without warning on June 10 1886 Tarawera Mountain woke and rumbled into life. At 12:30am the first earthquakes were felt. People throughout the area were jolted awake as earthquakes became increasingly powerful. A rumbling noise began and by 2:30am Tarawera Mountain had ripped open across the summit domes. This fissure or hole began to erupt scoria and ash and an eruption cloud reached 9.5 km into the night sky. Destructive, hurricane force winds developed as the eruption columns sucked in air from the surrounding countryside. Violent electrical storms above the eruption columns blasted into the night sky, with water vapours poured out by the eruption causing torrential rains. The final length of the craters was a massive 16-km long. What a night!



Charles Blomfield, Mt Tarawera in Eruption June 10 1886. Collection of Rotorua Museum



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



## Worst of all...

The eruption spread southwards into lake Rotomahana around 3:20am. The erupting lava under Rotomahana reacted violently with water in the lake and the geothermal system beneath it. Imagine flicking drops of water into a fire. Water drops explode to steam very violently, expanding in volume by 1000 times.

This was the exact reaction occurring, not just with a drop of water, but in part of Lake Rotomahana! The boiling steam mixed with fine fragments of solid material from beneath the lakebed. This combination of steam and mud killed most of the people that died that fateful night.



George Wilson, Rescue party at Lake Tarawera with whale boat after Tarawera eruption, Collection of Rotorua Museum



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



## Devastation and Death at the Rotomahana Hotel:

Fascination at the awe-inspiring sight of the mountain erupting soon turned to terror for the people spending the night in the Rotomahana Hotel. Amongst those who watched the spectacle from the hill near the church were hotel proprietor Joseph McRae and his guest Edwin Bainbridge. They saw the black cloud grow, brilliantly lit by electrical charges. It seemed as if three columns of fire were shooting skywards. A violent wind arose, veering in every direction, and hot stones and scoria rained down.



Josiah Martin, Rotomahana Hotel, McRae and group. Collection of Rotorua Museum

## Refuge and Loss:

In comparison to the detailed accounts by Europeans who lived through the eruption, little has been recorded of the experiences of the more than 120 Maori villagers and visitors who survived at Te Wairoa.

The most complete description is that provided by guide Sophia. During the terrible night Taiawhio, Sophia's husband, shouted: "Haere mai, e Tai, kei te werā te ao" – "Come and see, the world is going to be burnt." Soon people started to arrive at the whare, groping and crawling, some in haste and terror with no clothes.



Charles Spencer, Ruins of Rotomahana Hotel. Alexander Turnbull Library National Library of New Zealand, Te Puna Mātauranga o Aotearoa



**ROTORUA**  
museum  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus

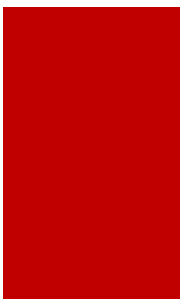


## Refuge and Loss:

Sophia estimated later that 62 people had survived the night in her whare. Across the road, people made their way to the European-style house of Wi Keepa Te Rangipuawhe. When it started to collapse the chief advised others to flee towards Whakarewarewa, going some distance himself before taking refuge in a whare. It is estimated that around 40 people sheltered in Hinemihi meeting house.



Burton Brothers, Hinemihi - post eruption. Collection of Rotorua Museum



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



## Treasures Lost Forever:

Tiny seasonal villages dotted the shores and islands of marshy Lake Rotomahana as the Maori people learned to live with the geothermal activity. Whare (houses) such as those on Puia island became favoured places to stay in winter. Chief Rangiheuea and around twelve others were camping there at the time of the eruption. The hot ground and pools nearby eased aches and ailments. In late summer people gathered to catch waterfowl which swarmed in the warm waters of the lake. They were cooked and preserved in their own fat.



Charles Spencer, Settlement after eruption and Dr Hector's rescue party. Collection of Rotorua Museum



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Social Sciences Focus



Unknown, Houses under mud. Collection of Rotorua Museum

## Leaving the Land:

At Ohinemutu, Tamatekapua meeting house was readied for the arrival of hundreds of Maori people who came to share the terrible loss.

Ngāti Rangitihi people from the Rangitaiki and Tarawera river areas congregated at Matata. Their animals were starving and potato pits were lost. Some of these people were not resettled until 1905, 18 years after the eruption.

Most of the Tūhourangi homeless eventually settled at Whakarewarewa and nearby Ngāpuna, although some moved further afield to parts of Bay of Plenty and Coromandel.

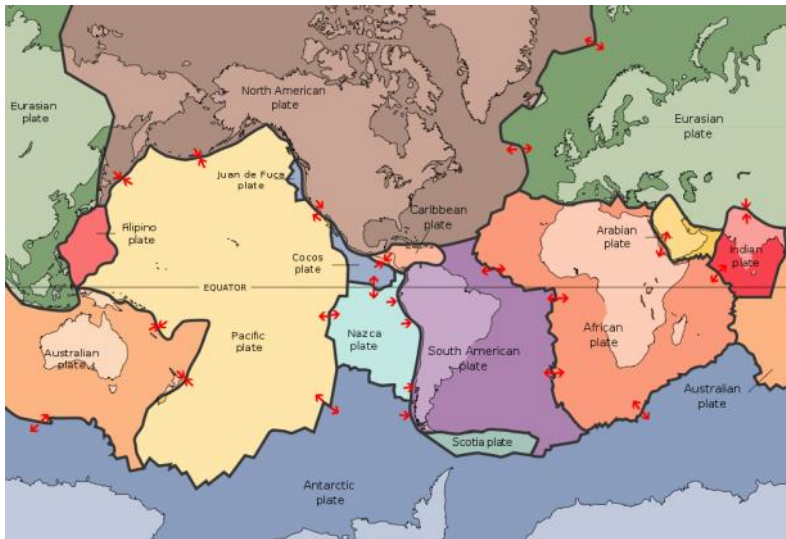


**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Science Focus



Map courtesy of U.S. Geological Survey

The earth is made of layers. The CRUST or earth's surface is made of sections that move called PLATES. These move against each other over millions of years.

When plates meet they move and push against each other like rugby players in a scrum. Rotorua and Tarawera Mountain are very close to the area where the Australian and Pacific Plates

meet. Right under us in the central North Island, the Pacific Plate is being pushed beneath the Indo-Australian plate. The buried crust is melting and then rising back to the surface, breaking through as volcanic eruptions. Our land here in the Rotorua area has been moving for millions of years.



Image courtesy of NASA

Tarawera Mountain has a fiery history. It belongs to an area known as the Ōkataina Volcanic Centre, which erupted four times before any people settled in the area. These four eruptions built up huge piles of lava and pumice made from a rock called rhyolite. These piles of rhyolite formed the basic dome shape of Tarawera many hundreds of years ago. The Maori people treated Tarawera mountain as sacred or tapu. In Maori its name translates as 'burnt peak'. Perhaps they sensed its restless nature?

To see the images in better resolution they can be found here:

1. [http://en.wikipedia.org/wiki/File:Plates\\_tect2\\_en.svg](http://en.wikipedia.org/wiki/File:Plates_tect2_en.svg)
2. <http://en.wikipedia.org/wiki/File:Taupo.Volcanic.Zone.North.Island.NZ.JPG>

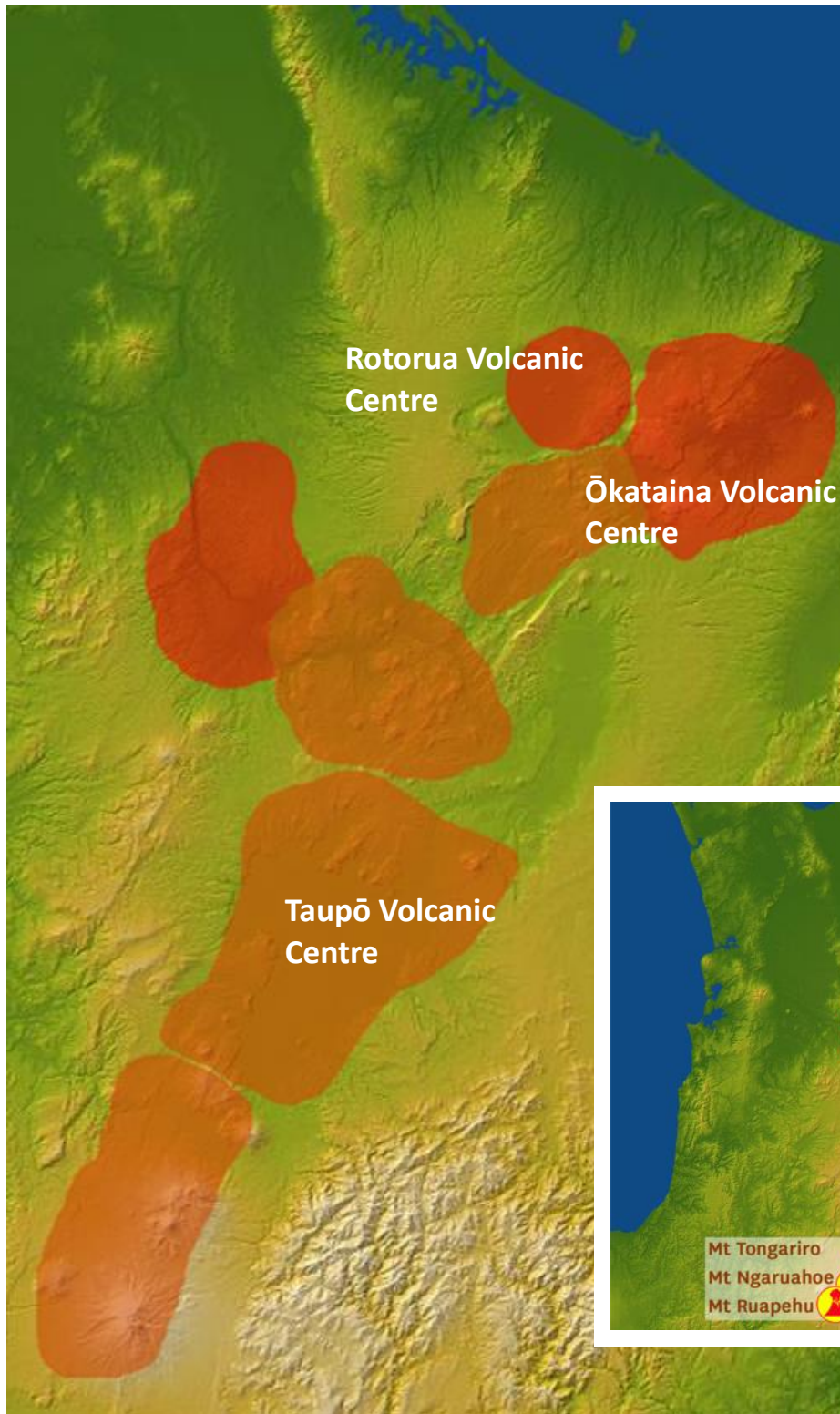


**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

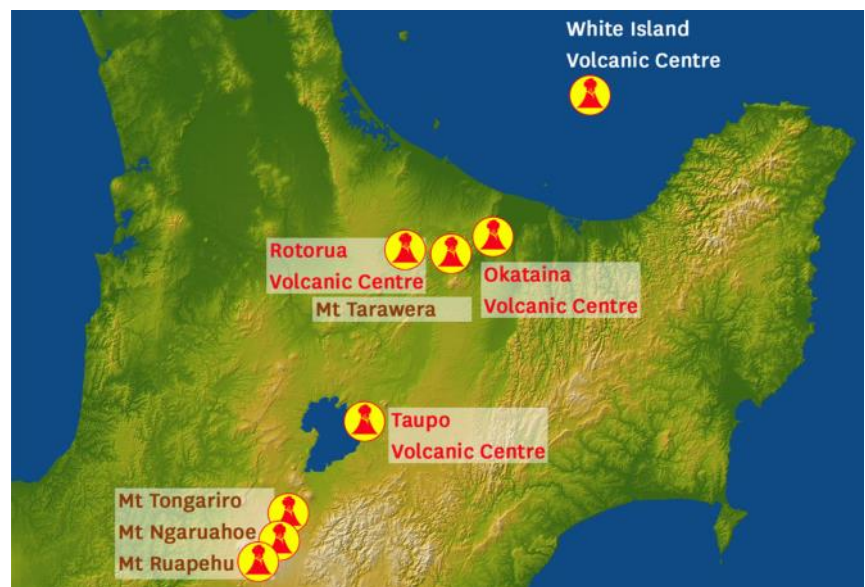
Online Resource  
Science Focus



Tarawera Mountain is only one volcano within the Ōkātina Volcanic Centre.

There will almost certainly be further eruptions from this area.

In the past 20,000 years the Ōkātina volcanic Centre has erupted about once every 2,000 years either from Haroharo/Makatiti or Tarawera, so at some time in the future an eruption is likely.



Key:   Magma chambers



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



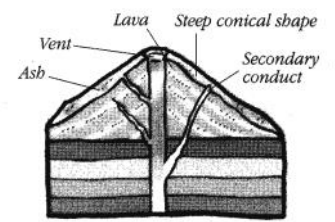
# Tarawera - Te Maunga Tapu

Online Resource  
Science Focus



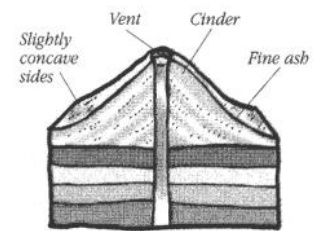
On June 10 1886 Tarawera Mountain erupted a molten rock called basalt. This marked a significant change in the history of the mountain. Previously it had erupted a rock called rhyolite. The reason for its significance is that basalt behaves very differently from rhyolite.

Basalt is a red or black rock which, when molten, is very free flowing, usually forming shield volcanoes such as the large island of Hawaii. When basalt magma rose near the surface of Tarawera, gases in the magma expanded as the underground pressure dropped. Eventually the mountain "blew its top". Basalt and gases were erupted producing scoria and ash.



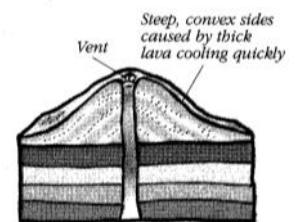
**STRATO VOLCANO**

Mt Pinatubo, Mt Ruapehu, Mt Taranaki



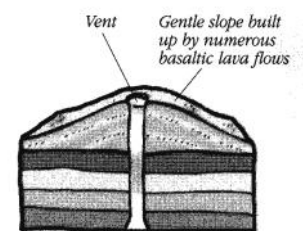
**SCORIA CONE VOLCANO**

Auckland, Whangarei & Kaikohe Lava Fields



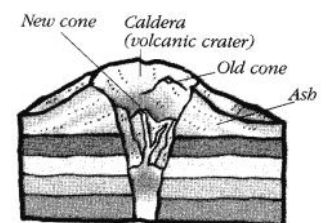
**LAVA DOME VOLCANO**

Mt Ngongotaha, Mt Tarawera, Mauao



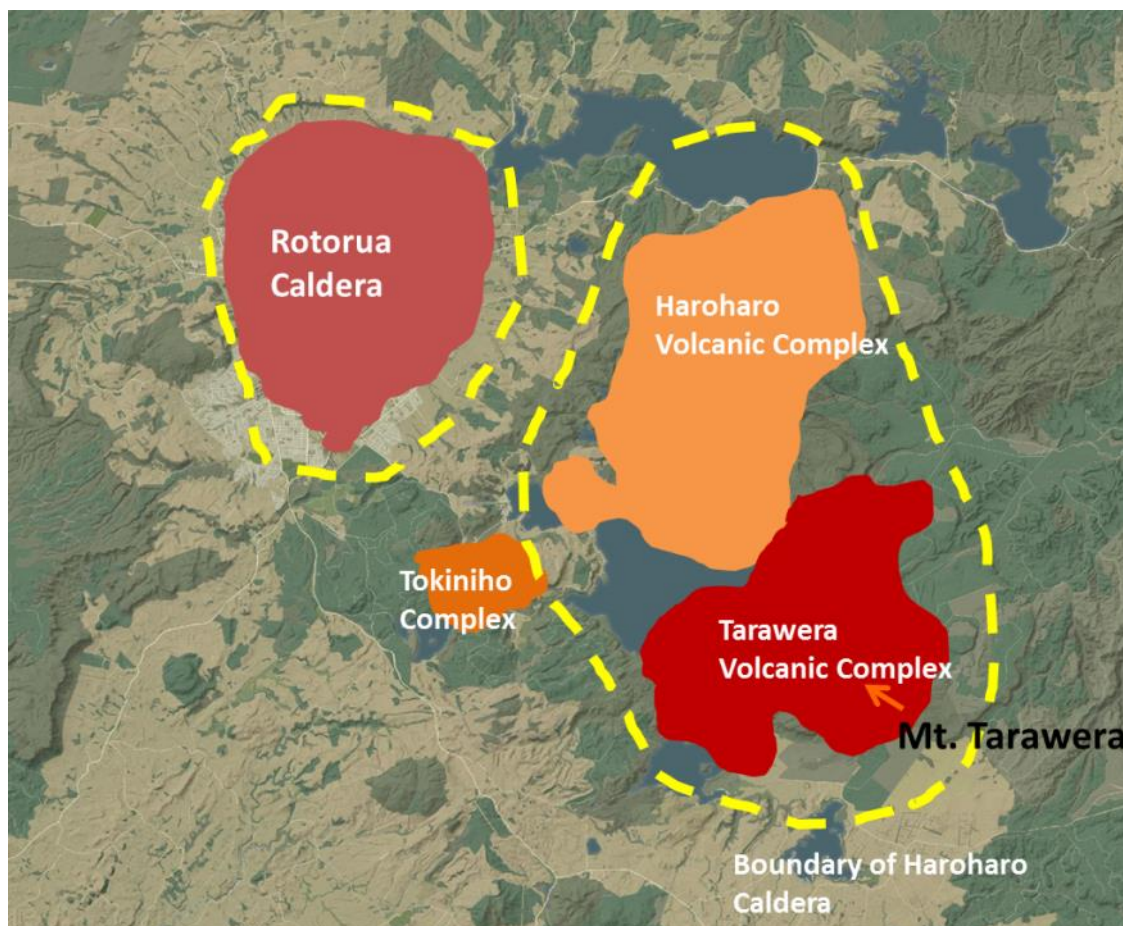
**SHIELD VOLCANO**

Hawaii, Rangitoto



**CALDERA VOLCANO**

Lake Taupo, Lake Rotorua



**ROTORUA**  
**museum**

Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Science Focus



Before the eruption of Tarawera Mountain, enormous pressure was building up at shallow depths in the Earth's crust. The strain increased as rising magma forced an upward passage towards the surface with every twist and turn of the Earth's crust. Something had to give.



Charles Spencer, Hot Water Cups, White Terraces. Collection of Rotorua Museum

On the night of June 10 1886, this pressure was violently released. Magma and gases mixed with the water underneath and within Lake Rotomahana to make an explosive cocktail of STEAM, MUD AND LAVA, a lethal mix. The mud from this part of the eruption caused most of the damage and nearly all of the deaths at Te Wairoa, Te Arika, Moura and other smaller settlements.

Basalt magma and small amounts of gas = scoria basalt magma + lots of gas = ash.

Today, vast quantities of basalt can be seen as scoria on Tarawera Mountain. The

Tarawera eruption age	Magma volume (kms)	Eruption type
Tarawera 18,000 years ago	7	Rhyolite
Tarawera 15,000 years ago	5	Rhyolite
Tarawera 11,000 years ago	10	Rhyolite
Tarawera 800 years ago	5	Rhyolite
Tarawera/Rotomahana 1886	1	<b>BASALT</b>

pumice seen is a frothy form of rhyolite, the type of lava produced in the past eruptions, before 1886.

1.km= (a cubic kilometre) is equivalent to 1000 million cubic metres, **sufficient to fill 50 million large trucks**. Imagine how many truckloads of magma were produced in past eruptions of Tarawera Mountain!



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Science Focus



George Valentine, Pink Terrace, c.1885. Collection of Rotorua Museum

As water soaks through the Earth into the ground around Rotorua it is heated up by residual magma from past eruptions in this area. This heated water dissolves minerals out of rocks that it contacts, including a mineral called silica. As the water flows out to the surface of the earth and cools, it deposits some of the dissolved minerals including silica. **This deposit is called sinter. This siliceous SINTER formed the Pink and White Terraces.** The remains of plants are often found in sinters. A visitor to the White Terrace in 1868 found "many insects such as beetles and dragon flies as well as some feathers of a lark and the whole body of a hawk" encrusted in sinter. Souvenir items such as the baby's shoes and hat on display were deliberately "petrified" for sale to tourists.

## Why was the Pink terrace pink?

In 1988 DSIR determined that a chemical called stibnite, or antimony sulphide caused the pink colour. Today the surrounds of the Pōhutu geyser also have the same colour, perhaps due to the presence of that same chemical.



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Science Focus



## The Heat Beneath

There are two kinds of geothermal activity.  
Both are found around this district.

**1 GEYSERS & HOT SPRINGS**  
occur when geothermal water rises quickly to the surface along a weak area such as a fault.

ROCK CAP  
MAY LEAK  
AT FAULTS

FRACTURED ROCK  
WHERE STORED  
WATER IS HEATED  
BY HOT ROCK AND  
RISES TO THE SURFACE

**2 MUD POOLS, FUMARoles  
& MUD VOLCANOES**

occur when water comes close to the surface but then is trapped by a non porous layer. Steam and gas escape to the surface either through vents or they react with surface water and soil.

HOT ROCK FROM  
COOLING MAGMA

MAGMA IS THE  
HEAT SOURCE

GEOTHERMAL ACTIVITY NEEDS  
Heat  
Water  
Rapid passage to the surface

### What is a geyser?

This is a boiling spring, which has a shallow storage chamber, and which may be only a few metres deep below its vent. The spring flow gradually fills this container, then heats it. Finally it gets so hot it begins to boil. As the steam bubbles increase in number the average density of the boiling fluid decreases. This allows more violent boiling and the contents of the basin are ejected - sometimes as a jet, and sometimes in a series of great splashes. When the basin and reservoir are depleted the eruption ceases. The chamber then waits to fill up again, until it can begin its next boiling and eruption process.

### What is a fumerole?

A fumerole is a dry steam vent, with no geothermal water present. These vents are like chimneys for the geothermal boiling water below. Around Tarawera fumeroles would have been present. Many fumeroles are present around the Rotorua area today.

### What is a mud pool?

A mud pool is a place where escaping steam and gases gently react with the surrounding ground (soil). These acid gases attack and break down the ground minerals leaving a chemical called silica, which is often coloured grey or black. Water discharged by hot springs is typically alkaline. It is called CHLORIDE WATER by geochemists because it contains a variety of chemicals including the element chlorine, much in the form of common salt. It also contains SILICA.



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Science Focus



*"The basins rise one above the other in unbroken succession, the surface level of one basin forming the base for the wall of the next. Hundreds of these lovely reservoirs, of the most bewildering variety, go to form the terrace – no one the exact pattern of its neighbour..."*

Alex Wilson describes the White Terrace in 1884.

*"Not the violet, not the hare-bell, nearest in its tint to heaven of all nature's flowers; not the turquoise, not the sapphire, not the unfathomable aether itself could convey to one who had not looked on it a sense of that supernatural loveliness."*

J A Froude describes the Pink Terrace

In early February 2011 scientists from GNS made a surprising discovery on the lake bed of Lake Rotomahana. There they found crescent-shaped terraced structures in about 60m of water where the Pink Terraces were located before 1886.

As part of a survey mission with the Woods Hole Institute the brief was to map the lake floor and investigate the extensive geothermal system under Lake Rotomahana. Two Remus 100 autonomous underwater vehicles (AUVs) were sent to the bottom of the lake to collect side-scan sonar information and bathymetric data. Up until now it had been assumed that there were no remnants of the terraces at all.

Scientists have concluded that what they have found and what is indicated on their data are the lower two tiers of Ōtukupuarangi - Pink Terrace.

"The rest of the Pink Terraces were either destroyed during the eruption, or are still concealed under thick sediment not able to be penetrated by the side-scan sonar signal" said project leader Cornel de Ronde, of GNS Science.

It is most likely given the new findings, that a deeper scan will one day be undertaken to see. Scientists however have not found any remains of the White Terrace where they were thought to have been.

As at the time of making this resource results and findings were still being analysed. Please use the suggested weblink below to learn more of this fascinating find:

<http://juliansrockandiceblog.blogspot.com/2011/02/final.html>

Julian is the educational outreach facilitator at GNS Science. His job is to pass on some of the amazing scientific information that comes from the earth science research done at GNS Science.



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Science Focus



## Recommended Reading

**Andrews, P.** (1995). Tarawera and the Terraces.

**Ansell, Rebecca, Taber, John.** (1996).

Caught in the Crunch, Earthquakes and Volcanoes in New Zealand. Harper Collins

**Crowell, C.** (1996). Our Amazing Planet Earth Science Book. Educational Design. New York.

**Department of Conservation.**

The Restless Land. Stories of Tongariro National Park World Heritage area. Te Papa Atawhai.

**Gallop, A.** (1998). The House with the Golden Eyes. Running Horse Ltd. England.

**Hayward B.W & Gill, B.J.** (editors). (1994). Volcanoes and Giants. Auckland Institute and Museum.

**Keam, R.F.** (1988). Tarawera: The Volcanic Eruption of 10 June 1886.

**Locke, L.E.** (1984). Canoe in the Mist. Cape Publishers. London.

**Nairn, I.A.** (1989). Geology of Mount Tarawera. New Zealand Geological Survey. Lower Hutt.

**Nairn, I.A.** (1991). Volcanic Hazards of Okataina Volcanic Centre.

**Scott, Bradley** (1992). Waimangu: A Volcanic Encounter.

**Houghton, Bruce & Scott Bradley** (2002).

GEYSERLAND: A guide to the Volcanoes and Geothermal Areas of Rotorua

Geological Society of New Zealand. Guidebook No 13.

**Rogerson, G** (2005). Explore North Island Volcanoes New Holland Publishers

**Hicks, G & Campbell, H** (1998). Awesome Forces Te Papa Press

**Te Ara - The Encyclopaedia of NZ** (2009). Life on the Edge David Bateman Ltd.

## Concept Design:

© Rotorua Museum Te Whare Taonga o Te Arawa. 2019

## Resource Development & Management:

© Crown Copyright. Ministry of Education. 2011

Reproduction of any part of this resource can only be done with the permission of Rotorua Museum.

Images within this resource are from the photographic collections of :  
The Alexander Turnbull Library, National Library, and have been referenced accordingly.

All other photographs in this resource are just a few from the photographic collection of Rotorua Museum of Art and History. To view more or to order copies of photographs please contact [researchenquiries@rdc.govt.nz](mailto:researchenquiries@rdc.govt.nz).



**ROTORUA**  
**museum**  
Te Whare Taonga o Te Arawa  
ART | CULTURE | HERITAGE



# Tarawera - Te Maunga Tapu

Online Resource  
Science Focus



## Resources

### ROTORUA MUSEUM - TE WHARE TAONGA O TE ARAWA.

Experience the dynamic Tarawera education programme.

## Books - General

**Atiken J.J.** (1997). Hot Stuff to Cold stone. Institute of Geological and Nuclear Science.

**Atiken, J.J.** (1996). Plate Tectonics for curious Kiwis. Institute of Geological and Nuclear Sciences.

**Brochure 5.** Tarawera and Okataina Volcanoes. Institute of Geological and Nuclear Sciences.

**Ell, Gordon.** (1986). Discover New Zealand: Volcanic Places. Bush Press. Auckland.

**Houghton, B.F.** (1982). Geyserland: Volcanoes and Geothermal areas of Rotorua. Guidebook 4. Geological Society of New Zealand.

**Scott, B.J.** Nairn, I.A. (1989). Tarawera Volcano. Institute of Geological and Nuclear Sciences.

**Scott, B.J.** Waimangu – A volcanic Encounter. Institute of Geological and Nuclear Sciences.

## Online

[www.whatstheplanstan.govt.nz/teachers](http://www.whatstheplanstan.govt.nz/teachers)

What's the Plan Stan is an initiative which aims to support teachers to develop their students' knowledge, skills and attitudes to respond to and prepare for an emergency.

## Children's Books

**Branley, Franklin.** (1988) Volcanoes. (Mt St Helens). New York: Harper & Row.

**Butterfield, Moira.** (1992). 1001 facts about the Earth. Grieswood & Dempsey Ltd. Britain.

**Byam, M.** (Series Editor). (1993). Planet Earth a Visual Fact finder. Grieswood & Dempsey. Spain

**Clark, John.** (1992). Earthquakes to Volcanoes. London: Gloucester.

**Cox, Geoffrey, J.** (1989).

Slumbering Giants: The Volcanoes and Thermal Regions of the Central North Island. Auckland: Collins.

**Dixon, Dougal.** (1992). The Changing Earth. Hove, East Sussex: Wayland.

**Ell, Gordon.** (1986). Volcanic Places. Auckland: The Bush Press.

**Geoffrey, J.** (1989). Fountains of Fire: The story of Auckland's Volcanoes. Auckland: Collins.

**Kevin.** (1990). The Tarawera Eruption. Petone: Nelson. Price Milburn.

**Parker, Steve.** (1989). The Earth and how it works. London: Dorling Kinderley.

**Pau, J. (Project Editor).** (1995). The Visual Dictionary of the Earth. Dorling Kindersley Ltd. Great Britain.

**Searle, E.J. and Davidson, Janet.** (1973).

A Picture Guide to the Volcanic Cones of Auckland. Auckland Institute and Museum.



**Emma Liley**  
*Education Manager*



**Kristina Joyce**  
*Education Assistant*



**Taupopoki  
George McLeod**  
*Education Coordinator*



**Rebecca Moore**  
*Education Coordinator  
Visual Arts*



**Jessica Wilkes**  
*Digital Technology  
Educator*

Please feel free to discuss details of our programmes or to make a booking:  
[www.rotoruamuseum.co.nz/education](http://www.rotoruamuseum.co.nz/education)



**ROTORUA  
museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE

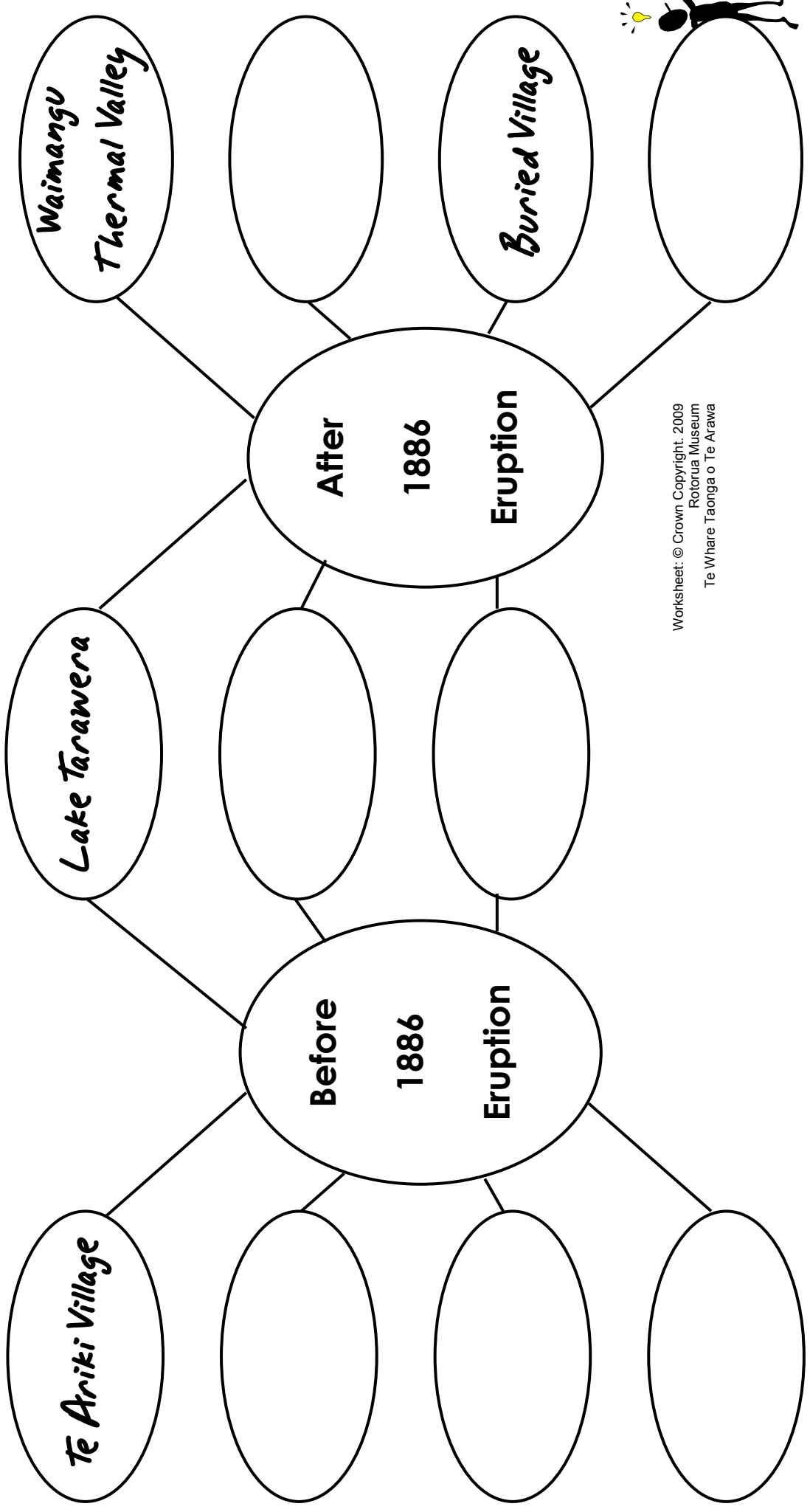


Show on the Double Bubble Map the changes to Mount Tarawera and it's surrounding environment before and after the 1886 eruption.

Only there before  
the eruption

There before and  
after the eruption

Only there after the  
eruption







In this section you will find suggestions of possible pre and post visit activities. They are aimed to enrich and enhance students, knowledge, understanding and skills. All tasks are designed to complement classroom teaching and learning. These will depend on your specific learning outcomes and the age of your students.



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- Predict what do you think would happen to Rotorua if Mt Tarawera erupted now.



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- What if a volcano near you was going to erupt? Write down some ideas explaining what you would do.



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- List attributes of early tourists to Rotorua.



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- List the disadvantages of living at Te Wairoa in 1886 compared to living there today. (Technology, transport, buildings etc ).



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- Compare the 2 different reasoning's behind Tarawera's eruption (Traditional Maori/Scientific)



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE





- List the disadvantages of living at Te Wairoa in 1886 compared to living there today. (Technology, transport, buildings etc ).



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- Alphabetically list all things connected with Tarawera's eruption in 1886. (A-Z)



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- The answer is volcano, write 10 questions.



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- Design an eruption survival kit. What would it need? Why?
- Order the items from most important to least.



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- Invent an exploding toy volcano and explain how it works.



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



- Predict the future of Mount Tarawera.  
A) Will never erupt again B) Might erupt C) Will definitely erupt
- How do we know?



**ROTORUA**  
**museum**  
*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE





Mt Tarawera - Te Maunga Tapu - Focus linked to De Bono's hats.

**Green hat:** Create, draw, construct, or design an example of what happened to the Mount Tarawera on June 10th 1886.



**ROTORUA**  
museum

*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



Mt Tarawera - Te Maunga Tapu - Focus linked to De Bono's hats.

**Red hat:** How do you feel about the eruption happening and why?



**ROTORUA**  
museum

*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



contd.

How would these people feel about the eruption and why?

- |                          |                                 |
|--------------------------|---------------------------------|
| 1) Scientists            | 2) Te Arawa people then and now |
| 3) Tourists then and now | 4) Farmers                      |



**ROTORUA**  
museum

*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



Mt Tarawera - Te Maunga Tapu - Focus linked to De Bono's hats.

**Black hat :** What were the negative consequences of the eruption?



**ROTORUA**  
museum

*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



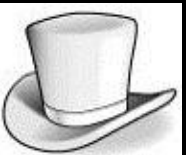
Mt Tarawera - Te Maunga Tapu - Focus linked to De Bono's hats.

**Yellow hat:** What were the positive consequences of the eruption?



**ROTORUA**  
museum

*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE



Mt Tarawera - Te Maunga Tapu - Focus linked to De Bono's hats.

**White hat:** What are some facts about the eruption?



**ROTORUA**  
museum

*Te Whare Taonga o Te Arawa*  
ART | CULTURE | HERITAGE