

SECTION 4



LEARNING IN TONGARIRO NATIONAL PARK



Photos: Alpine coral fern. *Alan Cressler*. Red Crater. *Nir Ketaru*

Tongariro shrouded in alpine mists, its gnarled and battle-scarred majesty reaching to the sky. Ancient stories of epic bygone battles, thunder and lightning relive the time when the Great Mountains fought for the hand of the beautiful Pihanga. Tongariro emerged victorious. A story of love and devotion that has spanned millennia, from before the ancient mists of time, from a time where the mountains ruled upon the land.

This is the world of Ngāti Hikairo ki Tongariro. These are the stories of Ngāti Tuwharetoa and, more importantly, these are memories of our mountains, of our Gods and of our tribal history and identity. They are carried on each mountain breath, every facet of the landscape reflects this epic past, each shadow holds a story, each breeze carries the whispers of yesterday. Tongariro the spring of passion, Tongariro the devoted lover, Tongariro the source of life-giving waters, Tongariro the Warrior Mountain, Tongariro the soul of Tuwharetoa.

We the Tangata Whenua – The People of the Land – welcome you to our world. It is a world of reciprocity and respect, of guardianship and devotion, of stunning landscapes and epic stories, of deep reverence and spirituality. May the guardians of our mountains keep you safe, may the memory of this experience lie warm in your hearts forever.

Ko Ngāti Tuwharetoa te Iwi
Ngāti Tuwharetoa is the tribe

Ko Ngāti Hikairo ki Tongariro te Hapū
Ngāti Hikairo ki Tongariro is the sub-tribe

Te Ngaehe Wanikau
*(on behalf of Te Rūnanganui o
Ngāti Hikairo ki Tongariro)*

In time there will be further kōrero from Ngāti Rangī about their story.
www.tkm.govt.nz/iwi/ngati-rangi/



A DUAL WORLD HERITAGE SITE

What is a World Heritage site?

World heritage sites are recognised by UNESCO as having outstanding natural, cultural, scientific or historical significance and value, and are legally protected by international treaties. New Zealand has three large World Heritage sites; Tongariro National Park, Te Wāhipounamu – South West New Zealand, and the Subantarctic Islands.

Tongariro National Park

Tongariro was nominated for both natural and cultural World Heritage status in 1990, and was inscribed on the heritage list that year for its natural values.

The World Heritage Committee added an additional criteria for associative cultural values, and in 1993 Tongariro National Park became the first property to be inscribed on the World Heritage List under the revised criteria describing cultural landscapes.

This means Tongariro has dual World Heritage status which recognises the park's important Māori cultural and spiritual associations as well as its outstanding volcanic features.

To find out more about Tongariro as a dual World Heritage site, visit the UNESCO site at <http://whc.unesco.org/en/list/421> or the DOC website at www.doc.govt.nz/about-tongariro.

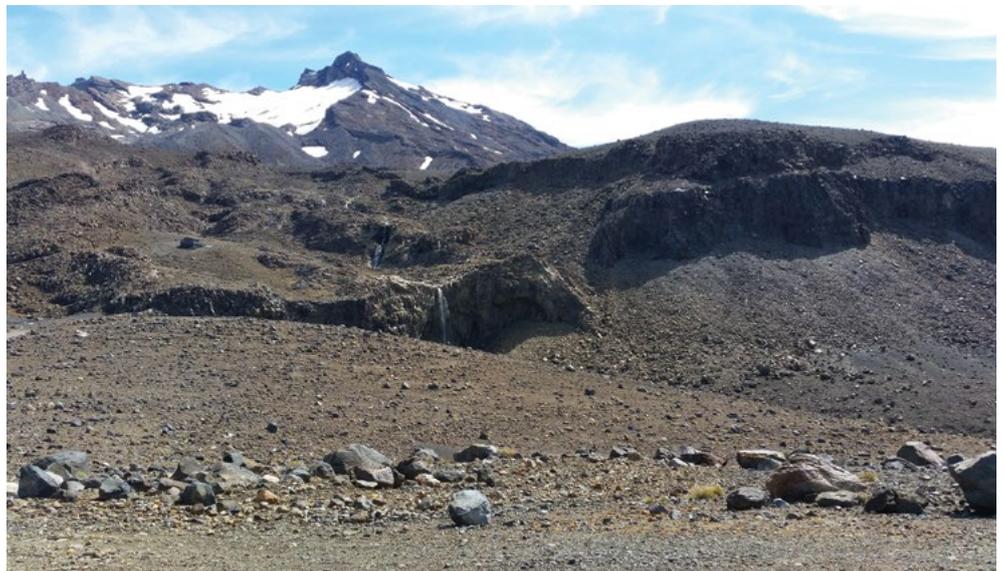
Weathering and erosion – today's view

The park today is the result of several thousand years of eruption, weathering and erosion.

The slopes of Ruapehu and Tongariro show layers of ash and blocks of eroded lava flows. Weathering (rain, wind and temperature), erosion, earthquakes, eruptions and lahars have exposed surfaces and formed landscapes.

Now retreated glaciers from past ice ages have eroded and moved large quantities of rock down the mountain sides, leaving fields of rock and distinctive valleys.

The elevation of Ruapehu means its glaciers, seasonal snow and ice are still actively shifting rock down the mountain through mountain streams.



Rugged eroded landscape at Tukino, Tongariro National Park. Photo: M. McDonald

The different rocks found on Ruapehu and Tongariro provide homes for plants that colonise the post-eruptive material, adding to the erosion.

Future eruptions will continue this cycle of burial, weathering, erosion and exposure, making this a harsh and incredibly dynamic landscape to call home.



Layers of ash and scoria in different colours eroded by wind and water on the road up to Tukino Skifield.
Photo: C. Young

Ecology and climate – shaping a landscape

New Zealand is a narrow and mountainous country. Geographical isolation makes it very exposed to the anticyclones and low-pressure troughs which continually move across the Tasman Sea.

The moist westerly airstreams are forced over the mountain ranges losing their moisture, creating both snow and rain. New Zealand is also exposed to occasional air masses from Antarctica, the southern oceans and tropical regions moving across the country.

For more information on weather in Tongariro check out this page on the DOC website:
www.doc.govt.nz/tongariro-weather.

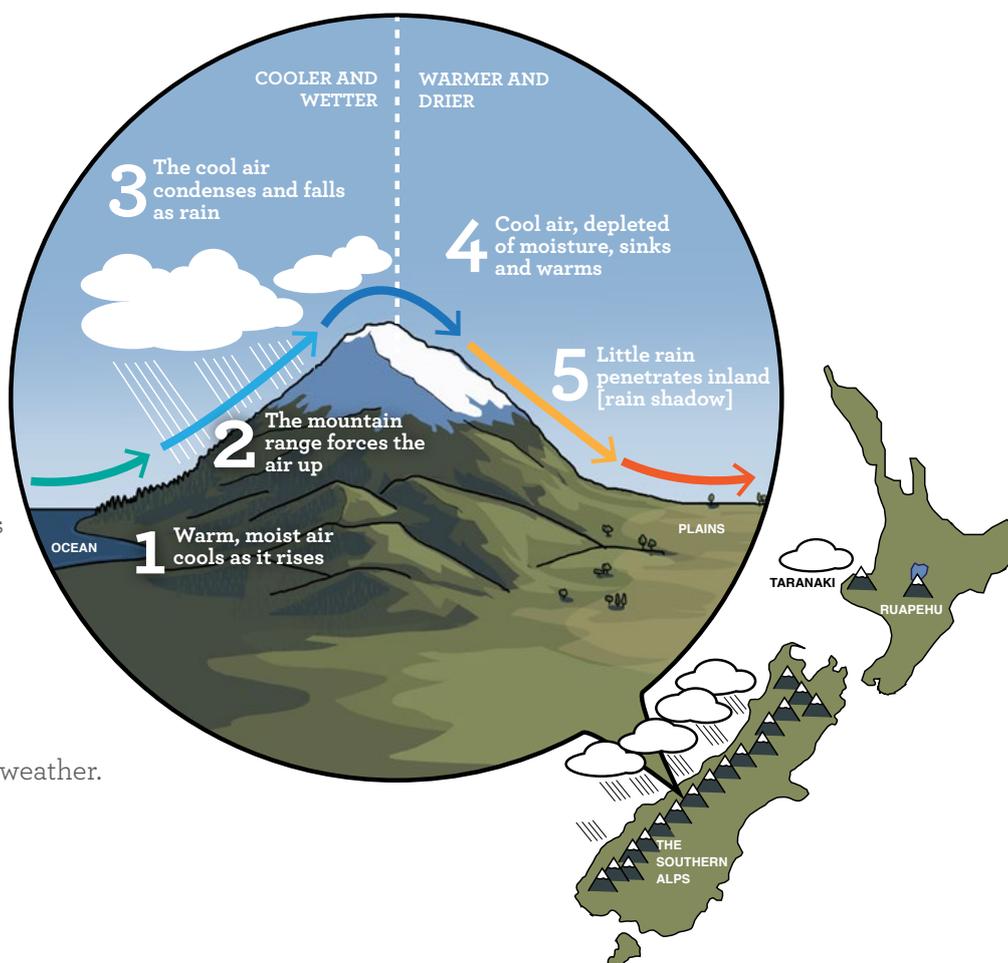


Figure 1: The orographic precipitation model showing the prevailing rainfall cycle across New Zealand.

Treasures of Tongariro National Park

Find out about the unique alpine flora and fauna of Tongariro National Park here:
www.doc.govt.nz/tongariro-flora-and-fauna.

Examples of our special flora and fauna include the following.

Whio or blue duck are a key species found in the Tongariro National Park and an endemic species classified as Nationally Vulnerable. They are a taonga (treasured) species that Māori have a strong cultural, spiritual, and historic connection with. Their Māori name is 'whio' in the North Island or 'ko whio whio' in the South Island, which depicts the call of the male bird.

Genesis Energy is partnering with DOC on a national level to support the whio. Follow this link to the Genesis Energy Whio Recovery Programme at
www.doc.govt.nz/genesiswhiopartnership.

Find out more about whio here: <http://www.doc.govt.nz/whio>.

If you are interested in teaching an inquiry unit about the whio, see www.doc.govt.nz/education-whio.



Whio. Photo: © Bernard Spragg

Brown kiwi call the Tongariro National Park home. For more information on kiwi in the park and in general, see:

www.kiwisforkiwi.org/about-kiwi

www.doc.govt.nz/kiwi.

The Tongariro Forest Kiwi Sanctuary is a 20,000-hectare forest that aims to protect the western brown kiwi. Find out more here www.kiwisforkiwi.org/what-we-do/who-are-kiwis-for-kiwi/kiwi-sanctuaries/tongariro/.



North Island brown kiwi.
Photo: Andrew Walmsley

The **New Zealand mistletoe** (Loranthaceae) family is made up of nine species. Of these endemic species red, white, yellow and scarlet are found in the Tongariro National Park.

Mistletoes are a special class of plant that carry out photosynthesis while also extracting nutrients and water from their hosts' stems through specialised roots. This life strategy is called *stem hemiparasitism*. Mistletoe also have a mutualistic relationship with birds: birds rely on mistletoe for nectar and fruit while mistletoe rely on birds for pollination and germination.

To find out more about New Zealand mistletoe and DOC's work on possum control and translocating plants, visit: www.doc.govt.nz/mistletoe.



New Zealand mistletoe.
Photo: M. McDonald

Dactylanthus or **wood rose** is New Zealand's only indigenous parasitic flowering plant. It has no leaves or roots of its own, has separate male and female plants and is pollinated by the short-tailed bat.

More information and photos can be found here:

www.doc.govt.nz/dactylanthus.

Pipit/pīhoihoi are small- to medium-sized songbirds. They are predominantly streaked grey-brown above and white below and their habitats range from alpine to sea level.

For more information on the pipit, visit:

www.nzbirds.com/birds/nzpipit.html

<http://nzbirdsonline.org.nz/species/new-zealand-pipit>

For more general information on alpine geology, ecology, geography and sustainability, see Section 5: Understanding alpine environments.

Planning a field trip to Tongariro National Park

For information on walks in and around Tongariro National Park, visit:

<http://www.doc.govt.nz/tongariro> (the PDF can be accessed under 'Brochures' on this page).

For up to date information about park activities and safety information, visit www.doc.govt.nz/tongariro.

Travelling to Tongariro National Park

Visitors to the national park can approach from the north through Whakapapa Village

<http://www.doc.govt.nz/whakapapa-village> and check into the Tongariro National Park Visitor Centre

www.doc.govt.nz/tongarirovisitorcentre or from the south through Ohakune and check into the

Ohakune Visitor Centre www.doc.govt.nz/visitorcentres.

Accommodation

Most schools that visit the park will need to organise accommodation for students at the following locations; Whakapapa, National Park or Ohakune. Check out these sites for a range of options:

- www.hillaryoutdoors.co.nz
- www.bluemountainadventure.org.nz
- www.nationalpark.co.nz/accommodation
- www.mtruapehu.com/winter/accommodation.

Registering your visit

Register your visit to the Tongariro National Park on the DOC website at www.doc.govt.nz/education-alpine. When you have registered you will receive a confirmation of your booking via email. Please read the details in the email. If you have any further questions or need to amend your booking, please email tongarirovc@doc.govt.nz.



New Zealand bat enjoying dactylanthus or wood rose. *Photo: D. Mudge*



Pipit/pīhoihoi. *Photo: M. McDonald*

Study transects

DOC have set up multiple 20 m x 20 m plots across the park to aid teaching in the park and lower the impact of multiple visits. The allocated plots include 1 m² quadrat or transect lines for students to use. Within Tongariro National Park there are several sites located from high alpine to forest areas and landscapes that are modified or unmodified by human activity. Most sites are easily accessible by bus and have parking and toilets nearby.

You need to book the use of these sites when registering your visit on the DOC website at www.doc.govt.nz/education-alpine.

Check out the map below for location of plots in the Tongariro National Park.

- 1** Plot sites
-  DOC visitor centre
-  Toilets
- 1. Mangatepopo
- 2. Whakapapanui Walk
- 3. Round the Mountain
- 4. Happy Valley
- 5. Meads Wall
- 6. Manawatu Ski Lodge
- 7. NZAC Ski Lodge
(Note: only for experienced people off track)
- 8. Mangawhero Forest Walk (small track by Ohakune DOC)
- 9. Ohakune Mountain Road near Massey University Alpine hut
- 10. Alpine Flush (limited numbers)
- 11. Just off State Highway 1 turnoff to Tukino Skifield

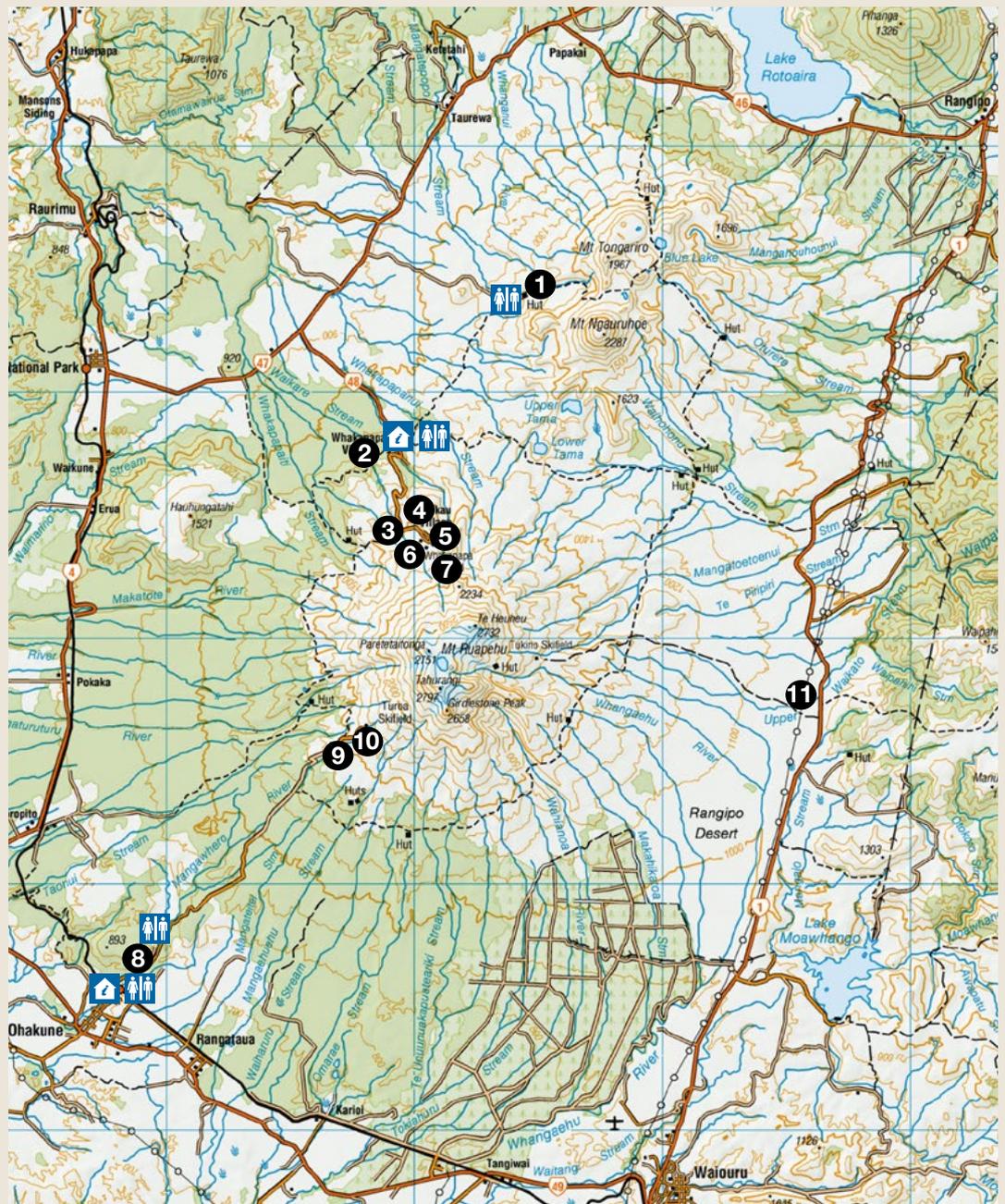


Figure 2: Map showing transects in Tongariro National Park.

Resource kits available

Resource kits are available to borrow from the two visitor centres in the national park. You can book a kit online at www.doc.govt.nz/education-alpine.

Book well in advance to ensure there is a kit available for your visit.

Kit content:

- 10 high-vis vests
- 1 GPS
- 1 set of transect location maps including instructions
- 1 tape measure
- 5 GSNZ Pocket Field Guides
- 1 copy of *Which Native Forest Plant* penguin.co.nz/books/which-native-forest-plant-9780143009016
- 1 copy of *Which Native Tree* penguin.co.nz/books/which-native-tree-9780143008996
- 1 copy of *Which New Zealand Insect* penguin.co.nz/books/which-new-zealand-insect-9780141006369

Checklist – before your visit

- Check your school policy on trips away from school, particularly if your visit will involve an overnight stay. Many schools require approval for such visits several months in advance.
- If possible, do a pre-visit to the park yourself. Visit one of the DOC visitor centres to find out more about the study transects.
- Register your visit to the park and book a resource kit.
- Book accommodation.
- Check the DOC website for up-to-date activity and park safety information at www.doc.govt.nz/tongariro
- Fill in a risk assessment form for your visit (see health and safety information below).
- Brief your students on what they will need to bring – suitable clothing and footwear (remember conditions can change rapidly on a mountain, so warm and waterproof gear is needed), food and drink, bedding and overnight gear if needed. The following site may be helpful: www.mountainsafety.org.nz/resources/toolbox/survival-essentials.
- As a class, develop a safety plan for your trip.
Remind the students that the park is a very busy place – over 2000 visitors can be on the Tongariro track in one day. Be considerate of other park users and accept they may often have to queue for facilities.
- Brief the parents/helpers on their responsibilities. Make sure phone numbers are shared.

Checklist – at Tongariro

- Check into the DOC Tongariro Visitor Centre to let them know you have arrived and confirm your plans for the day(s) of your visit. Pick up a resource kit if you have booked one.
- If students are coming into a Visitor Centre, ensure they move around in small groups, respect other visitors and the displays, don't eat or drink inside and leave the brochures for customers.
- At the end of your trip – check out of the DOC Visitor Centre, and return all contents of the resource kit as you received it.

Health and safety considerations

It is vital that you and your group remain safe at all times when working in the national park. Below find information on different aspects of keeping you and your students safe in the park.

- EOTC Guidelines – education outside the classroom – TKI eotc.tki.org.nz/EOTC-home/EOTC-guidelines.

The updated guidelines contain a selection of sample forms and templates that reflect current good practice and procedures for EOTC safety.

- www.doc.govt.nz/get-involved/conservation-activities/meet-the-locals-videos/third-series/tongariro
This video is particularly useful if you are working around or tramping the Tongariro Crossing.
- www.sportnz.org.nz/assets/Uploads/attachments/managing-sport/Recreation/Outdoor-Activities-Guidelines-for-Leaders.pdf
This is a useful resource, particularly if your visit includes recreation activities.
- www.whatstheplanstan.govt.nz
This resource has been prepared by the Ministry of Civil Defence and Emergency Planning to help schools prepare for emergencies. It could also be used with students before a trip.

Volcanic alarm systems

Ruapehu, Tongariro and Ngauruhoe are all active volcanoes and real care must be taken on the mountains. Students should be aware of the signs for safe places and be ready to respond if the sirens sound an alarm.

Information on volcanic risk can be found in full detail here, including volcanic hazard maps and what to do in an emergency: www.doc.govt.nz/volcanicrisk.

More information on past eruptions and present levels of activity can be found here: www.geonet.org.nz.

If a volcanic eruption does occur at Whakapapa, an audio alarm will sound from a series of speakers located around the ski area, and at the same time a message will be sent to a pager kept with the Ski Area Manager.

In the event of a volcanic eruption, immediately move to higher ground and out of valleys. Stay in a safe zone until you receive further instructions from Ruapehu Alpine Lifts Ltd staff or DOC officers.

Observation activity

When approaching Whakapapa Village, ask if your students can answer the following:

- Is it clear that you are on an active volcano?
- Can you find signs telling you about eruption, lahar or avalanche danger?
- Can you find signs telling you about warning sirens and what to do?

Monitoring of volcanic hazards

Activity is monitored by GeoNet <https://www.geonet.org.nz/about/volcano/val> using various volcanic surveillance techniques. Data from many science disciplines are collected, analysed and cross-referenced, to help understand the behaviour of volcanoes and offer an insight into future eruptions.

What GeoNet do to monitor volcanoes:

	Tongariro	Ruapehu	Ngauruhoe
Visual Observations	2 web cameras facing the northern flank and Te Māri Crater.	2 web cameras facing the north-west and north-east flanks.	2 web cameras facing the south-west and south-east flanks.
Seismic Monitoring	5 seismographs and 3 microphones to detect volcanic explosions.	10 seismographs and 6 microphones to detect volcanic explosions.	5 seismographs and 3 microphones to detect volcanic explosions.
Ground Deformation	5 continuous GPS (cGPS) stations.	8 continuous GPS (cGPS) stations.	5 continuous GPS (cGPS) stations.
Chemical Analysis	Water and gas chemistry, and both airborne and vehicle-based gas measurements.	Water chemistry and airborne gas measurements.	Gas chemistry and airborne gas measurements.

Practical learning activities in Tongariro National Park

There's so much that can be covered in this natural laboratory. This section gives you a few ideas of what could be covered when teaching in the national park.

Don't forget that for any of the sites highlighted below, you will need to book your visit through the DOC website at www.doc.govt.nz/education-register-tongariro-visit to ensure the site has not been booked by others.

Ideas for using the study transects

- Students can compare the vegetation between several sites at different elevations and those modified and unmodified by human activity.
- Students can look at and compare the rock stratigraphy between several sites.
- Students can look at and compare algae, lichen, moss and plants visible in the plot site, surrounding parking areas and on the north- and south-facing slopes.
- Students can look at and compare counts of animals' present – insects and lizards.



Transect use near Massey University Hut. Photo: M. McDonald

- Students can look for the relationships between organisms. For example, which plants live within the shelter of the tussocks or Raoulia (vegetable sheep)? How does the size and shape of plants change with altitude?
- Students can enter their findings later using iNaturalist <https://www.inaturalist.org/> or NatureWatch <http://naturewatch.org.nz/> on a mobile device or on a computer.

Geological studies

Many of the geology-based learning and assessment activities are possible at the same site. Numerous sites have a variety of rocks and geological formations for students to identify and explain. Examples include basalt, scoria and scoria flats, andesite, lava flows of different types and ages, volcanic bombs, ash layers, water and snow erosion features and lahar pathways.

Activity idea

To encourage students to learn about geology and rock types, try learning activity **What rocks what?** on page 10 in Section 2.

Geology walking tip

Just 5 km below the Tongariro Visitor Centre in Whakapapa village is the Mounds Walk www.doc.govt.nz/whakapapashortwalks. From the top of the walk you get a great view of the volcanoes and surrounding landscape. Check out the information board at the visitor centre for an explanation of how they were formed.



Fly pollination on a hebe on the Mounds Walk.



Butterflies on flax on the Mounds Walk.



One of the views on the Mounds Walk.
Photos: K. Hartle

Native bush studies

Native bush studies can be done near Ohakune on the Mangawhero Forest Walk and near Whakapapa Village on the Whakapapanui Walk (2 hr return). Don't confuse this track with the Whakapapaiti Track, which is a more challenging tramping track.

The Mangawhero Forest Walk (1 hr return) and Rimu Walk (15 min return) begin at the bottom of the Ohakune Mountain Road.

These sites are great places for students to explore river-formed stratification patterns, areas of full light and areas covered by a heavy canopy cover.

Activity idea

Before heading to the field site, use the learning activity **What am I?** on page 8 in Section 2 to introduce students to the study sites.

Stream studies

These can be done at three sites:

- Ohakune on the Rimu Walk. There is camping at Mangawhero campsite www.doc.govt.nz/mangawhero-campsite with toilets and large covered open areas for cooking.
- Mangahua Campsite www.doc.govt.nz/mangahua-campsite, which has toilets and tables for students to work on
- Whakapapanui Stream, which is accessed on the Whakapapanui Walk www.doc.govt.nz/whakapapatracks.

Analysing signage in the park

Have students make a study of the signs in the park. Below is a list of ideas for discussions on signage in the park:

- What can you find out about Tongariro National Park before you reach the Visitor Centre?
- What tells you that you are on an active volcano?
- What can you not bring into the park?
- What can you take from within the park?
- What activities are allowed within the park?
- How effective are the signs for non-speakers of English or English as a second language?

As a follow up to this analysis, students could consider the following questions as part of an action project:

- What signs would they recommend changing or adding?
- What signage can you find in your local environment related to conservation compared to the park?
- What areas can you find where more signs would be helpful?

Activity idea

For ideas on how to present these findings and ideas for action, see **Digital tools** activities on page 3 in Section 2.

Observing human impacts

Examples of observation questions:

- Look for evidence of the impact of tourism in Whakapapa and Iwikau villages.
- What forms of transport are visible?
- What forms of accommodation are visible?
- What services are available for tourists/visitors?
- What activities are visitors doing at the time of your visit? How does this change through the year?
- What signs are there of visitor impact on the mountain?

Activity idea

To extend students learning about human impact and the role of people in the park, see learning activity **People and alpine environments** – examining different values and perspectives in Section 2 on page 9.

Finding out about the main walks

The main walks in the park (e.g. the Tongariro Alpine Crossing) are growing in popularity every year. Below is a list of ideas on maintaining the natural state of the walks in the park for students to investigate while at the DOC Visitor Centre.

- Find out how DOC manages this walk – providing facilities, guides, transport, etc.
- How could the issue of too many walkers taking too many cars to the start of the track be addressed?
- What other walks are the most popular?
- How do walkers cope with the need to bring all their waste out of the park with them – including bodily waste.