



STATEMENT ABOUT CURRICULUM LINKS AND THE KITS

Because this kit is site-based and most kit users will visit the site, the main curriculum objectives will be based around an **environmental theme**.

The strongest links will probably be with the **science, social studies** and **health and physical education** documents, although aspects of the **technology** and the **art** curriculums are important in getting the best value from a visit.

Of course the **English** document is always the basis of any study as the other documents continually feed in material that develop students' learning in oral, written and visual language. Similarly, good opportunities exist at all sites to explore many ideas in all of the mathematics strands.

The best summary of links for the seven curriculum areas can be found in: **Ministry of Education. 1999. *Guidelines for Environmental Education in N.Z. Schools*. Ministry of Education. Wellington . New Zealand.**



1. SOCIAL STUDIES



Social Studies education aims to enable students to participate in a changing society as informed, confident and responsible students.

Pirongia Forest Park visits and projects offer opportunities for students, at appropriate levels, to develop concepts in each of the five strands:

- 1a. Social Organisation
- 1b. Culture and Heritage
- 1c. Place and Environment
- 1d. Time, Continuity and Change
- 1e. Resources and Economic Activity

1a. Social Organisation:

- How people organise themselves to visit the park.
- What type of groups of people are they?
- How groups organise themselves to respond to park management issues.
- How DoC organises staff to manage the park.
- The nature of the group that manages the Lodge.



1b. Culture and Heritage:

- Aspects of Tainui tradition associated with the park.
- The traditional use of the park by family, tramping, community, educational and hunting groups.
- The park as a significant landmark and dominant landscape feature for Waikato people.

1c. Place and Environment:

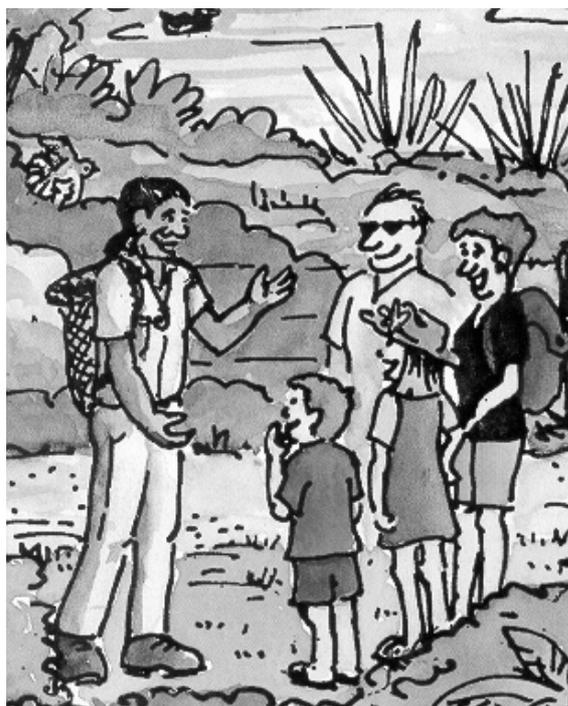
- Why the park is a significant environment for people.
- How people's activities influence the park environment.
- How and why people's perceptions of the park are reinforced or changed by information or experience.
- How and why people seek to resolve differences over how places and environments should be used.
- How people express a sense of belonging to the park.
- The importance of the place and environment for recreation.

1d. Time, Continuity and Change:

- How past management decisions change the nature of the park.
- How beliefs and ideas in society change and how this has impact on the park.
- How the process of change over time is used as a tool for park management.
- How Maori use of the park has changed over the centuries.

1e. Resources and Economic Activities:

- How Maori used the area as a resource in the past.
- The park as a resource for timber millers in the past and more recently for possum hunters.
- The Lodge as an economic resource.
- Hut fees and maintenance.





2. SCIENCE

Learning in science is fundamental to understanding the world in which we live and work. It helps people to clarify ideas, to ask questions, to test explanations through measurement and observation, and to use their findings to establish the worth of an idea. (Science in the N.Z. Curriculum p.7).

Of the four contextual strands:

- 3a. Planet Earth and Beyond,
- 3b. The Living World,
- 3c. The Physical World, and
- 3d. The Material World

Pirongia Forest Park studies will particularly enhance development of knowledge, understanding, skills and attitudes in **3a. planet earth and beyond** and **3b. the living world** strands.

3a. Planet Earth and Beyond:

Achievements in Aims One and Two (Science Curriculum p.106) lead to achievement of Aim Four: investigate how people's decisions and activities change the physical environment, and develop a responsibility for the guardianship of the planet and its resources. Any achievement in this aim through studies in the Park is probably the most important of any in the entire N.Z. Curriculum Framework.

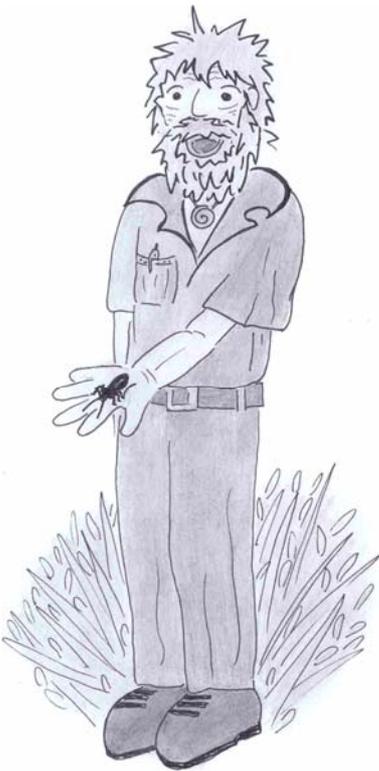
Research of published guides and signage in the Park will give an interpretation and understanding of the history and structure of Pirongia, the volcano. A hand lens examination of a stone 'borrowed' from the banks of the Kaniwhaniwha Stream near the carpark and cracked open to reveal the mineral and crystal structure will confirm the volcanic origin.

Interpretation of the extensive views of the surrounding landscape, however elementary, from the many vantage points, can help to cement important '**our land, our place, our guardianship**' values and attitudes in students of all ages.

Investigations of the aims and objectives of the management plans for the Park will give important insights into the environmental guardianship role given to the Department of Conservation by government policy.

3b. The Living World:

Development of concepts in all of the four achievement aims (science curriculum p.52) could be attained during a park project with the first three aims culminating in an enhanced understanding of the all important Aim Four. This can be achieved through appropriate activities at any level from one to eight.





3. TECHNOLOGY

Learning in technology implies becoming confident in using a variety of means to address needs and opportunities and solve practical problems within society.

Technology education explores choice and the factors that influence choice, including culture and society, costs and benefits, aesthetics, and fitness for purpose. It seeks to empower students to make informed choices in the use of technology and in their response to technological change (Technology in the N.Z. Curriculum, p.8)

A wide range of opportunities exist through a park visit within the contexts of the three strands:

- 3a. Technological Knowledge and Understanding
- 3b. Technological Capability
- 3c. Technology and Society

Examples would include the technologies involved in:

- Animal, plant and pest monitoring and control in the park.
- The development of facilities for park users such as:
 - ❖ tracks
 - ❖ track structures
 - ❖ signage
 - ❖ toilets
 - ❖ shelters
 - ❖ vehicle access
- Aspects of the school trip to the park such as choices of
 - ❖ clothing
 - ❖ food
 - ❖ drink
 - ❖ personal accessories





4. HEALTH AND PHYSICAL EDUCATION

Pirongia Forest Park visits and projects offer opportunities for students, at appropriate levels, to develop concepts in each of the four strands:

- 4a. Personal Health and Physical Development
- 4b. Movement Concepts and Motor Skills
- 4c. Relationships with other people
- 4d. Healthy Communities and Environments

4a. Personal Health and Physical Development:

- Identify and use safe practices and risk management in the park environment.
- Share ideas and beliefs about how the use of the park environment enhances person health.

4b. Movement Concepts and Motor Skills:

- All achievement objectives in this strand could be met through the development of concepts relating to safe and efficient tramping skills in a group situation.

4c. Relationships with other People:

- Development of skills relating to planning safe and enjoyable experiences in the park with class or family groups.
- Develop skills in relating to other group members while in the Park - to maximise enjoyment and positive learning experience outcomes.

4d. Healthy Communities and Environments:

- Share ideas to identify factors that relate to park use and community mental and physical health.
- Identify concepts that are used in the management of the park environment that enhance the wellbeing of the plants and animals (ecosystem).





5. GENERAL STUDY TOPICS

Corcoran Road and Grey Road Sites

5a. Signage:

Both **technology** and **social studies** projects could study the design and construction of sign messages about conservation.

5b. Toilets:

Applicable to both **technology** and **social studies** projects. For example, a project could be developed on the 'evolution' of the long-drop. Why are today's versions more 'user friendly'?

5c. Track Structures

Topics students could look at include the following:

- The design of:
 - ❖ Tracks
 - ❖ Shelters
 - ❖ Gates
 - ❖ Steps
 - ❖ Bridges
- The needs of park users versus user impact.
- Costs of maintenance.

5d. Weeds

The control of weeds is an important management goal. Common weeds include:

- Gorse
- Thistles
- Ragwort
- Grasses

Look for different weed types at the Corcoran Road picnic area and from the grass area by the Grey Road toilet.

Activities for children could include:

- Draw the different weeds - how many types are there?
- Identify weeds
- Suggest different methods of eradication.

Corcoran Road picnic area

Excellent study site. Good for sketching the views of the Waikato through to the Kaimai Ranges beyond. Trees that can be drawn include rimu and totara growing on the forest edge. This is a good site for a microclimate study.

Mangakara Nature Walk

Use the *Mangakara Nature Walk* Guide (available from www.doc.govt.nz or DOC office) which has a host of interesting information. Choose three or four stations for detailed study.





TEACHER STUDY SHEETS

I. SOCIAL STUDIES

Back at School

Debating

During discussions about the place the Department of Conservation has in preserving our natural heritage students will realise that people hold different opinions on that role.

Encourage them to talk to their families, parents, friends, etc, to find out what they consider should be done.

Use the media - for example TV, the newspaper (the free local edition, or the Education Page in newspapers), magazines (if your school subscribes).

Use Web pages for information or write to organisations that are involved in environmental issues, such as Forest and Bird or Federated Farmers.

Find out about Resource Consents.

These findings can then be used to form debates on issues such as:

- Should the Park boundary be extended?
- How should pests be controlled?
- Should the public pay to use the Park?
- Who should make decisions about management of the Park?
- If gold was discovered in the Park - should it be mined?

Role playing could cover the same issues.

Surveys

The issues raised in the debating topics could be used to develop surveys to find out other peoples views.

Surveys could be developed using criteria such as

- age
- gender
- culture

Collate information as graphs, percentages etc.

Results could be presented:

- in the school newsletter
- at assembly
- in the local newspaper, or
- shared with other schools

II. AUDIO AND VISUAL ARTS

This worksheet is designed to give you ideas that you can develop with students of any age group. The suggestions may be developed individually or could become a major, integrated unit of work, linking many curriculum areas.

Music

The forest provides a wonderful symphony of sound. This could be taken back to the classroom, either by using a tape recorder, and/or having sound one of the objectives students focus on during the visit. For example:

- Identify and note down the different sounds heard (in what form students record this is to be discussed before the visit).
- Record these sounds in written form.
- Take a tape recorder and record as many different sounds as possible.
- Elect groups to study specific areas. For example:
 - ❖ Natural - air, water, land
 - ❖ 'Man-made' - air, water, land

Back at School

- Discuss the different sounds heard and recorded.
- Record as many sounds as possible in written form to produce a score of music.
- Using voice and instruments produce a piece of music that represents the 'Voices of Pirongia'.

Plays

The forest also portrays never-ending activities by the creatures in their habitat. These provide wonderful opportunities for students to develop their imagination. If you choose to develop this concept, you will need to prepare students before your visit to observe closely all the activities on site. These could then become the objectives on which to base your unit.

- Observe and record the movements and areas creatures are seen and how they move.
- Record the creatures responses to their environment. What would their response be if you could understand their language?
- Discuss the effect people have on their environment.

Back at School

- Collate this information into a play for presentation (e.g., at school assembly), or make a movie using a video camera.
- Portray the characters using costumes, masks etc.
- Maori legends of the area can also be acted out – or make up a legend of your own.

Art

To develop an understanding of Pirongia Park, students' attention needs to be directed towards the colour, texture and form of the environment.

- Feeling the different textures and recording (using crayon and newsprint):
 - ❖ Bark
 - ❖ Vegetation





- ❖ Stones
- ❖ Undergrowth
- ❖ Leaves

- Observe the colours - above, around and below (a camera will help to record).
- Look at form of trees, plants, birds, fish, animals, water and the landscape.

Back at School

- Develop the above points individually using a variety of media and discuss the need to look and record them individually.
- When developing form use pencil/charcoal sketching as a starting point.
- Combine the three elements of colour, form and texture to produce a picture. This can be developed with multi-media and as a group activity.
- Incorporate local Maori art into your artwork. Visit your local marae to find out more about their artwork and what its significance.

III. EARTH SCIENCE

A variety of projects can be developed depending on the site visited, but much can be done pre and post – visit. For example:

- the shape of Pirongia volcano
- investigating mineral crystals in stones collected
- observing landscapes from the Park.

Rock Study

The examination of a small stone 'borrowed' from the Kaniwhaniwha stream or the Mangakara stream, will reveal many secrets of the geohistory of Pirongia the volcano. Break the stone into many pieces by striking it with a hammer (wear glasses to protect eyes from stone chips), to expose a fresh section.

What to do

1. Collect your rock sample – choose smaller flatter rocks.
2. Put on a pair of safety glasses.
3. Wedge the rock between other rocks to stop rock fragments from flying off.
4. Strike the rock with a rock hammer.
5. Use a 3-D viewer or Waltex magnifier (8x magnification), holding the viewer close to the eye and the rock close to the end. View the rock in the sun if possible, so you can see the crystals sparkling.
6. Sketch or write down what you see.

Don't forget to return your rock fragments to the area you collected them from.

What you can expect to see

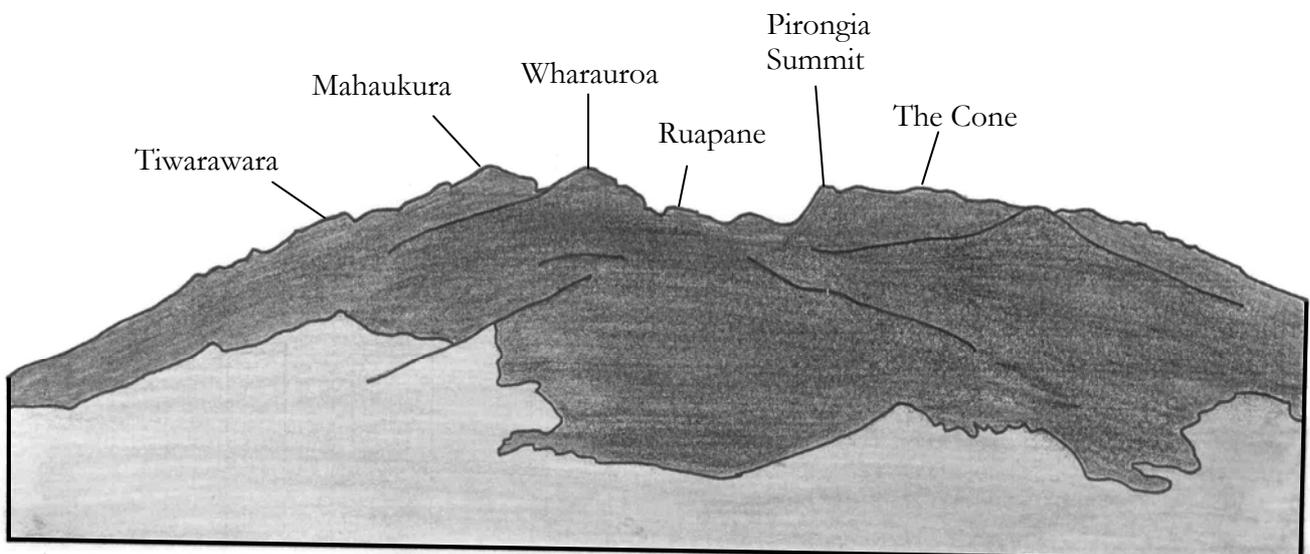
The black crystals are augite crystals, the white ones are feldspar crystals and the green or red/brown ones are olivine crystals. There will be others but



these ones and their size tell us that the volcano's lava flows that formed Pirongia were basalt, and that they cooled fairly slowly (the crystals had time to grow large enough to be easily seen).

- There was no volcano here before 2.5 million years ago. When it began to form the main mountain building process was molten rock flowing from vents with occasional explosive episodes of ash and boulders.
- Over the one million year period it was active, it managed with layer upon layer of lava flows (some over 100m thick), from at least three vents (all within the park boundary), to build the familiar shape we see today, only bigger.
- The last activity about 1.5 million years ago probably saw fire fountain scoria cones being built to give a total height of nearly 1300 metres.
- Rock weathering and erosion since that time has whittled the mountain down to its present highest peak of 959 metres.
- Sketch Pirongia from your school or nearby hill; add to your sketch by drawing in the original top showing an active scoria fire fountain (research what a scoria fire fountain is).
- Look at the horizon and identify the prominent hills and ranges using a compass with a topographical map.
- While sketching, elicit ideas on what earth processes were involved in the creation of the scene.

Profile of Pirongia Mountain from the Hamilton-Pirongia Road





IV. MICROCLIMATE PROJECT

In managing a forest it is important to keep the condition of the edge as stable as possible so that the different climate conditions on the outside do not penetrate too far into the interior and disturb the fragile nature of the forest ecosystem.

Researchers have found that light intensity, wind speed and temperature vary along a gradient from immediately outside the forest to about 80m into the interior of a forest. Key findings from such studies are listed below:

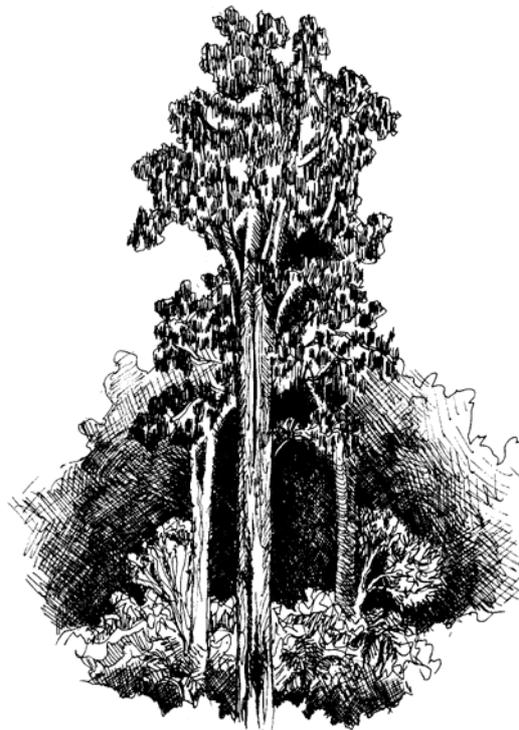
- At a point 80m into the forest from the edge, light available for photosynthesis was only c. 0.7% and wind speed c. 20% of that in the open.
- The gradient was less steep for wind speed and air temperature, with at least 40m being required to stabilise these variables when wind was blowing directly into the forest.
- These findings suggest that forest edge buffer zones of at least 40m may be needed to protect forest reserves and streams from climatic exposure.
- There are at least five variables, which together characterise the microclimate:
 - ❖ sunlight exposure
 - ❖ wind exposure (magnitude and direction)
 - ❖ precipitation
 - ❖ temperature (of air and soil)
 - ❖ moisture content (of air and soil).
- The research suggested that contrasts between forest and pasture conditions are most marked in the early afternoon.
- There is also a higher species richness at the edge than in the interior, and a shift in composition towards high light 'pioneer' plants similar to those found in treefall gaps in the interior.
- The growth of plants near the edge in response to the high light exposure has tended to seal the edge, creating an 'edge canopy'.
- Climbers, notably rata and lawyer, seem to be particularly important in the edge canopy formation.

Microclimate contrast - forest versus pasture

- The near floor environment of the forest is very much shadier, much less windy, and fluctuates less markedly through the day in temperature and moisture than in the open.
- The forest is cooler and more moist during the day and, to a lesser extent, warmer and drier at night than pasture environments.
- Gradients of microclimate are of greatest significance on sunny and windy days.

Implications

- The edge effects on microclimate extend at least 40m into native New Zealand rain forests. This has implications for both conservation of interior forest environments and for riparian buffers to protect streams.
- Forest buffers of 40m wide may be needed on both sides of small streams to protect riparian ecology where the surrounding land use is open pasture or cropland.





- Choose a suitable site. At Grey Road the grass area by the toilet would be a suitable starting point. The second could be by the track signs and a third site 80m up and off the Mahaukura Track.
- Start 5m from the forest edge, run the tape at a right angle to the edge of the forest and straight into the interior - of course you may have to step around trees.
- Record the light level, temperature and wind strength at the beginning point, 5m or so inside the edge and then at regular intervals along the tape or line. You may choose to do 10m or 20m intervals.
- Work in a team with one person recording the findings at each spot.

Back at School

- Decide how the data can be presented and analysed. A graph something like the one below may be the choice, together with written summaries.
- Discuss why there are microclimate differences and what effect this can have on forest health.

