

CLAUDELANDS BUSH LEARNING RESOURCE

ALSO KNOWN AS JUBILEE PARK BUSH AND TE PAPANUI





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ABOUT THIS RESOURCE

This resource has been developed to assist teachers in the planning and implementation of an integrated, experiential learning opportunity for primary aged students using the context of Jubilee Park, Claudelands Bush, Hamilton. It was originally developed by Michelle White and Katherine Hay in 2005, and adapted from "Claudelands Bush: and historical and environmental study" published by Waikato Art Museum, 1987. Subsequent use in the classroom combined with changes to the NZ Curriculum has meant adjustments have been made in 2009 by Michelle White and Robyn Irving.

Claudelands Bush can be seen as an open-air museum of living organisms that reflects changes resulting from development within Hamilton city and the surrounding region. Opportunities created by this natural environment encourage meaningful education. The design of this resource fosters enquiry-based learning through an "action learning cycle" as developed and modelled by Enviroschools. This resource is sequential and cross-curricular. It provides opportunities for experimental experiences and facilitation of student problem solving while exploring the interconnectedness of their local environment.

The resource is designed and may be adapted for Achievement Objectives Levels 1 - 3 of the New Zealand Curriculum.

The activities promote and support the key dimensions of Environmental Education - **in, about** and **for** the environment while addressing the key concepts of **Interdependence, Sustainability, Biodiversity** and **Personal and Social Responsibility** that underlie Education for sustainability. Student directed learning and the multi-disciplinary approach of this resource assists in developing the aims of Environmental Education; knowledge, awareness, attitudes, values and skills that will enable students to contribute towards maintaining and improving the quality of their school and local environment.

AIMS OF THE RESOURCE

- To foster an appreciation for native forest at Jubilee Park, Claudelands Bush.
- To explore the many components that make Claudelands Bush what it is today, in particular its history and remnant forest type.
- To develop an understanding of the impact past actions have had on, in particular vegetation and flora in Hamilton.
- Empower students with knowledge and skills to be able to design and implement an "environmental action plan" based on their exploration of scientific and social science issues of the Claudelands area.
- To provide teachers with a sequential and cross-curricular unit of work linked to the New Zealand Curriculum.

CURRICULUM LINKS LEVEL 1 AND 3

Using this resource provides links to many areas of the New Zealand Curriculum. To keep the assessment tasks manageable, teachers may choose to assess just one or two of the curriculum strands within core areas.

Key Competencies: This resource will help provide students with opportunities to clarify and articulate their understandings about the five key competencies identified in the NZ curriculum, thinking, using language, symbols and texts, managing self, relating to others and participating and contributing through authentic contexts.

SOCIAL SCIENCES

Students will gain knowledge, skills and experience to:

Level 2 - develop an understanding of how places influence people and people influence places

Level 3 - demonstrate knowledge and understanding how people make decisions about access to and use of resources

SCIENCE

Students will explore and act on issues and questions that link their science learning to their daily living by: Living world

Level 1-2 - Recognise that living things are suited to their particular habitat

Level 3 - Explain how living things are suited to their particular habitat and how they respond to environmental changes both natural and human-induced.

ENGLISH

Speaking, Writing and Presenting -

Level 1 - Students will acquire and begin to use sources of information, processes and strategies to identify, form and express ideas. By using these processes and strategies when speaking, writing or presenting, students will:

- Recognise how to shape texts for a purpose and an audience.
- Use language features, showing some recognition of their effects.

Level 2

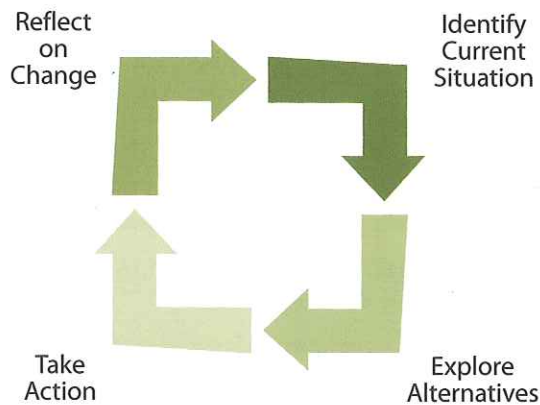
- Select, form and express ideas on a range of topics.
- Use language features appropriately, showing some understanding of their effects.



ASSESSMENT

Poster
Collective action

THE ACTION LEARNING CYCLE



The design of the 'action learning cycle' is to encourage students to become actively engaged in enquiry-based learning to explore and problem solve an environmental issue. The cycle in this resource starts with introducing the site, recognising prior knowledge and then focusing on influences of the past (reflecting on change). The process is then followed through each of the quadrants and finishes on reflection.

Activities begin at school and continue during the visit to Claudelands Bush. Once a foundation of exploration has begun, students explore possible actions. By comparing past remnant forest with the current situation, information gathered by students will be considered as they collectively decide on what actions to take. A plan will be formed that addresses an issue on which students feel action needs to be taken.

On completion of their plan and action, students reflect on what has been achieved, what they have learned and what they believe should happen next. This process helps build personal responsibility and gives meaning and purpose for learning. This reflective, repeat action learning cycle continues, and will initiate changes within school environments and the wider community.

Note:

This resource does not attempt to cover all aspects of a dynamic forest ecosystem. It was written to meet a specific interest and need for providing a means of delivering a fun and interactive study on particular aspects of Claudelands Bush (in particular the past and how this has impacted on the vegetation and flora of the reserve). There is a lot of scope to expand this to include further study on the interrelatedness of plants, animals and the elements of this fragmented bush. This could include bats, bird life, spiders and insects, and pests. Useful material for further exploration can be gained from the EnviroSchools kit, Te Kauri Education resources, the Department of Conservation and Environment Waikato.

RESOURCE FRAMEWORK

INTRODUCTION

- Students will develop an understanding of special places.

INFLUENCES OF THE PAST - CLAUDELANDS

- Students will explore different perspectives of the history of Hamilton landscape.
- Students will research and discuss the extent of Hamilton forest ecosystems in the past.
- Students will study how people use and value land and forest in different ways, historical events specific to the Claudelands area (Hamilton) and how people have changed the land cover of years.

CURRENT SITUATION

- Students will develop their scientific understanding, observation and classification skills when exploring the native and exotic flora of Claudelands Bush and develop an understanding of the interrelatedness of a forest community.
- Students will study how plants classified in one of the three main groups will show the same reproductive structures, although there will be individual variation in the appearance of these.
- Students will explore the concept of a weed is and understand how a weed can affect the health of a natural ecosystem.
- Students will experience an urban forest remnant (trip). Through activities and observations they will be able to identify forest layers and discuss different growth habits and leaf shapes.

EXPLORING ALTERNATIVES

- Students will review their understanding of the health and value of Claudelands bush and investigate what ways they could become actively involved in caring for a natural special place.

TAKING ACTION

- Students will plan and take action for the environment.

REFLECT ON CHANGE

- Students will use a range of strategies to reflect on their learning and action.
- Students will celebrate their successes and plan for the future.



CLAUDELANDS BUSH A SPECIAL PLACE

INTRODUCTION TO CLAUDELANDS BUSH

Students will develop an understanding of special places.

- Discuss the idea of a special place and how people view and feel differently about places.
- Invite students to close their eyes and imagine being in a place that they feel happy or peaceful or safe in.
- Discuss what the features of such a place might be.
- Where are special places in our school to you?

Using a school map showing boundaries and physical features such as paths, entrances, steps, gardens, grassed areas, trees and contours. Shade the living and non-living (natural and built) areas on your map in two different colours. Record damp areas, dry areas and other defining characteristics of the school environment. Explore the school environment to locate where students identify their special place. Add these special places to the school map.

(Note: The website Measuring Change has an activity which guides students through a more in depth process of defining their current school landscape.

<http://www.measuringchange.org.nz/resources/living-landscapes>)



Students create an invitation to their Special Place on a coloured card with a map on the back (from classroom to special place). Half of the students then put their cards into a hat and the other half draw out a card. The person whose card has been drawn takes lucky dip partner to their Special Place, explaining what they like about this particular place. Reverse sharing roles.

Record on the map of the school, qualities of the school environment or feelings students have in different parts of the school (include the identified special places) eg: noisy, peaceful, fun, relaxing, boring.

Ask the question "What special places are there in our Hamilton area?" Expand on this by asking where there are natural areas.

Introduce Claudelands Bush as your focus of study.

With a current map of Hamilton (or a map that shows your school location to Claudelands Bush) students locate the following - school, home, Claudelands Bush/Jubilee Park, the Waikato River and Claudelands Bridge. Students record the most direct route to Claudelands Bush from school. Are there any alternative routes? Estimate and then calculate the distance from school to Claudelands Bush. What are some well-known places near Claudelands Bush that help you remember its location?

http://maps.google.co.nz/maps?hl=en&source=hp&q=map+claudelands+Hamilton&cr=countryNZ&um=1&ie=UTF-8&split=0&gl=nz&ei=3N6aSoeoEpPU7AOWI-C_BA&sa=X&oi=geocode_result&ct=title&resnum=1



Design and carry out an opinion poll. What different attitudes do people have about forests/bush and their protection?

Is there a range of views?

What are the implications of your findings?
OR

Get the children to place themselves on a 'values line' - how valuable is the bush to them: e.g. Really Special, Very Important, Important, of no particular importance.

Use terminology to suit the age level of your class, stress that it is each individual's opinion and therefore they cannot be wrong, it's just how they feel about the bush at this present time.



Main Assessment Task:

Introduce the format for a "Tree of Knowledge" poster on Claudelands Bush.

This project will be built upon as the students increase their knowledge and experience, so students will need to start gathering information and taking notes but will not be in a position to start the final poster till after the trip to the bush. The presentation may include:- introduction to forest remnants including attitudes and values, a map, the history of Claudelands, a plant study (e.g. the chosen plant species, its botanical name, common name, Maori name, a picture or sketch, description, details of leaf shape, reproductive method, growth characteristics, preferred environment, where they are found, special features, significance to the Maori people and their medicinal uses and its abundance and location in Claudelands Bush), threats and issues facing Claudelands Bush or other fragments, recommendations, your own special place and the similarities and differences to Claudelands Bush, planning and design for action and reflection on this.

Additional information will be added when their action plan and reflection has been completed. Students might want to use a tree image to build their work onto.

INFLUENCES OF THE PAST CLAUDELANDS

Establishing the pool of knowledge:

- What knowledge do students have already of Claudelands Bush?
- Check with the group who has visited it before and what they can share with the rest of the class.

Students will explore different perspectives of the history of Hamilton landscape.



Share the Maori Legend "The River Which Ran Away" Retold by Katerina Mataira. (reproduced in the EnviroSchools kit [EnviroSchools can find and abridged version of this and other river stories and activities based around it in the Healthy Water theme resource] and Te Kauri resource <http://www.tekauri.org.nz/education.html>) This legend tells, from the Maori perspective, the beginning of the Waikato River and its changing flow path.

Using a map of the North Island, students locate the main geographical points as they follow the flow of the Waikato River. Using a different colour, students mark the change of river flow across the Hauraki Plains and back to Port Waikato. Using crayon and dye, children create images that retell this legend.



Claudelands was once part of the Waikato floodplains with the Waikato River flowing through and shaping it. The river had changed its course frequently until the last 5000 years. The Waikato flood plains developed as sand, silt and gravel deposited by the Waikato River during the formation of the floodplain blocked smaller streams running into the Waikato River. Water unable to reach the Waikato River created the floodplains with lakes and swamps. Below the silt and clay loams were the poorly drained gley soils which contribute to poor drainage and the creation of the swamps on which the lowland semi-swamp forest grew. Claudelands Bush is a tiny remnant of this, typical of kahikatea swamps with waterholes 1-2 meters deep common in the past. The Waikato River continued to travel on to Port Waikato where it met the sea.

Students will research and discuss the extent of Hamilton forest ecosystems in the past.

Using a "Noisy-round-Robin" or similar strategy, get groups of students to rotate around a series of questions such as: What is a forest? What plants would you expect in a forest? What is a bush? What is a swamp? What is a shrub-land? What is an ecosystem? What is a community?

The indigenous vegetation of Hamilton Ecological District is described by Clarkson et al.

http://cber.bio.waikato.ac.nz/PDFs/CBER_58_Hamiltonbasincomposition2007.pdf

They describe 12 vegetation types that once covered the Waikato. These descriptions are based on landforms, knowledge of remnant vegetation, historical records and extrapolation.



On the hills were:

- Rimu/tawa forest
- Kauri-hard beech forest
- Pukatea-kahikatea forest

In the gullies were:

- Totara-matai-kowhai forest
- Kahikatea-pukatea-swamp maire forest

On the alluvial plains were:

- Mixed conifer-broadleaved forest
- Kahikatea semi-swamp forest
- Totara-matai-kowhai forest

On the peatlands were:

- Submerged and marginal herbaceous vegetation
- Swamp forest and shrubland
- Shrub sedgeland
- Restiad "rushland"

Many of these vegetation types no longer exist in the Waikato or are only represented by small remnants.

Where are the remnants now?

People have made enormous changes to land in the Waikato region over the last 160 years. In 1840, nearly the entire region was covered in *native vegetation*. Today, only 26 per cent of the native vegetation remains.

- Find out more about *forest fragments* and *scrub* in our region (Environment Waikato website).
- Check with students where they know there is still native forest (It doesn't have to be in the Hamilton area. Students may have visited Pirongia, Te Kauri, Hakarimata, Taupiri, Pukemokemoke, Maungatautari, Kakepuku, Yarndley's Bush, Tongariro). Locate some of these fragments on a map.

Students will study how people use and value land and forest in different ways, historical events specific to the Claudelands area (Hamilton) and how people have changed the land cover over years.

Use a range of sources to research the history of Hamilton City (Kirikiriroa). Before embarking on this journey consider who might be able to help (community members, local iwi, Museum staff, librarians), where you might go to get this information (internet, library, museum), and why some information differs from other.

As a class discuss some key aspects of Hamilton history (see background notes for suggestions). Carry out an inquiry into the history of the Claudelands area. Create a class timeline to show significant events that have taken place.

Consider:

- Who were the first group of people to come to Claudelands? When? Where did they stay?
- What influence did tangata whenua have on the vegetation? How did they use different plants? Why? (e.g. food, shelter, medicine, tools)
- What was the first group of European people to come there? What were they doing?
- When did the military come? How did this shape Claudelands?
- Who believed they were "in control of the land" during the 1700's and the later in the 1860's?
- What social issues arose?
- Students discuss and list the features they would expect to see or not see before any people came to live in the Waikato area. Introduce historic photographs (class sets could be made up so that students work in groups of 5-6) to generate discussions about lifestyles in the Waikato region in the past. Teachers might choose to use strategies such as "silent card shuffles" with a combination of photos and words to tell a story.
- Discuss the advertisement below regarding who got land and how much land each person got. Was this fair to everyone? Who was involved in make the decision? Carry out a P.N.I. on land allocation this way. (See Appendix Pg. 16).

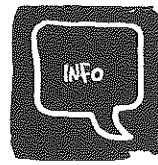


"The Government decided that land confiscated, should be settled by men who would be able to defend it in case of future hostilities.

For this purpose, a special regiment of militia was recruited from Melbourne and Sydney in Australia."

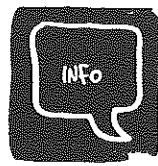
Advertisement appeared in the Australian Gazette, dated 3rd August 1863.

- What is land subdivision? When did this first take place at Claudelands? What might it have looked like then?
- Who was Francis Claude?



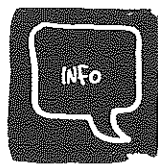
Francis Claude arrived in the Waikato district not long after the 4th Waikato Army Regiment in 1864. In 1876 he took over the 400 acres originally granted to Captain Moule. Early in 1878 Claude began to subdivide the land and by the time he had left Hamilton in 1878 he had sold much of it in varying sizes. In the late 1870's Claude gave some of his land for the building of a new road from the Kirikiriroa Railway Station at Claudesland (Claudelands) through to Hokonui Road (Hukanui Road) in exchange for a roadway that had been closed and was part of his estate.

- How was the land being used in the late 1800's and early 1900's? How would that have impacted on the forest? (Discuss with students drainage of the swamps, why this occurred and the affect on swamp vegetation and flora).



To remain healthy, lowland kahikatea swamp forests require plenty of water and swampy conditions. The moisture sensitive seedlings are subject to premature death in the dry summer months.

- Using the statements below identify describing words that tell us about the land and vegetation during these times.



"After passing through Claude's Bush the train emerges on the vast swamp property of the Waikato Land Association, and now a dreary ride through the veritable waste commences.... The swamp is about 11 miles long."

"Horse races were a regular event of the 1870's. In 1877, the Waikato Turf club became the South Auckland Racing Club and made its headquarters at the Claudelands site, adjoining the bush. After the first A. & P. Show show it was recorded that, "the ground was not very suitable, as it was mostly covered in cabbage trees and scrub, but there was a clear area adequate for the occasion"

"1902 Claudelands was too wet for a Spring show."



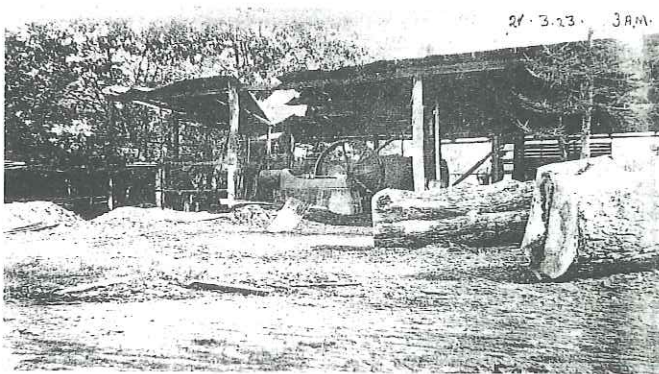
Review:

What are significant events or actions that have influenced change to Claudelands Bush?

Working in groups, students place the jumbled time segments in order and place them on a large kahikatea tree shape to retell some of the history of the Claudelands area (see appendix). Discuss with students the earliest times 19,000 years ago and 5,000 years ago, before they move on to actual dates. Ensure the children have an understanding of the terms Maori, iwi, hapu, tangata whenua, pakeha, European, British sovereignty, Land wars and 'foundation of a city' (see appendix).



1893 Claudelands 'HCL_11073' - tree felling Reed Family Collection Waikato Museum of Art and History (held by Hamilton Libraries).



'Saw Mill' 'HCL_06912'



Council horses used for mowing lawns, Jubilee Park, 1938

'The Horses' 'HCL_00970' 'Council horses used for mowing parks [photographed at] Jubilee Park between Claudelands and Five Crossroads'. Photographer: 'D G Begg Auckland 20/4/1938'



'Military Camp' 'HCL_02133'



'Morris's Store' - 'HCL_11163' - [NB. the caption on this one is incomplete however it is probably the 1920s and the store is on the corner of Peachgrove Road and Hukunui Road (later Hukunui Street). The name 'Brooklyn Road' came into use c.1960.] This photo was lent to the museum by E.P.Morris.

CURRENT SITUATION

Check your pool of knowledge.

What do students already know about Claudelands bush?

Class brainstorm.

Check understanding through a reflective technique such as bus stopping questions below:

- Where is Claudelands Bush? What are the roads and other significant land marks near it?
- What names is it called and why?
- How big is it?
- What has influenced the size and shape of the remnant bush?
- What is there?
- Why is it so significant?



The Hamilton Ecological District (159 376 ha) in northern North Island is one of the most **modified** districts in New Zealand with only 1.6% of the **indigenous** vegetation remaining (Leathwick et al. 1995). At least 20% of its indigenous flora is **threatened** or **extinct** and more than one-half of its indigenous bird species have gone. Hamilton City (9427 ha), in the centre of this transformed landscape, has only a few tiny remnants of the former indigenous forest cover, perhaps less than 20 ha in total of high quality indigenous **habitat**. The largest **remnant** is Jubilee Park (Claudelands Bush), a 5.2-ha reserve comprising kahikatea (*Dacrycarpus dacrydioides*) forest (Whaley et al. 1997). Another important remnant is Hammond Bush which has semi-swamp forest dominated by pukatea (*Laurelia novaezelandiae*).

As a class read the above quote from Bruce D. Clarkson 2003 "Ecological restoration in Hamilton City".

- Find definitions for the words in bold.
- Discuss the meaning and significance of the statement. Using a Metre ruler to represent all of Hamilton talk about what 1.6% looks like. Create a pie graph to show this. Use a satellite map on computer to view remnant bush in Hamilton. Discuss what you see. Where are the green areas? Look along the river and the gully systems. Just because they are green does this mean that they are healthy ecosystems? What might affect this?

Students will develop their scientific understanding, observation and classification skills when exploring the native and exotic flora of Claudelands Bush and develop

an understanding of the interrelatedness of a healthy forest community.

FOREST ECOSYSTEMS

- Revisit students understanding of forest ecosystems with the following questions. What might a healthy forest community or ecosystem look, feel, sound, smell like (x chart - variation on a Y chart)
- What plants and animals might be part of a healthy forest ecosystem in Hamilton?
- Discuss what the difference between a native plant and an introduced (exotic) plant is. Ask the class to name as many plants as they can. Write each of these onto a separate piece of paper and sort them into native and introduced. Carry out the activity "build a tree" (Adapted from DOC- Exploring the Forest, see appendix) and discuss an ecosystem and interconnectedness of forest life. Discuss with students the native plants they know. What introduced plants do they know?

Use "Restoring Waikato's Indigenous Biodiversity" (2006) and Clarkson, Clarkson and Downs 2007 quotes to explore the idea of a healthy ecosystem and what might affect it.



"Restoring Waikato's Indigenous Biodiversity" (2006)

A healthy ecosystem has the following features: a typical structure (e.g. height, density, layers, zonation patterns) and a typical composition (mix) of species occurring in a relatively predictable proportion or abundance. A healthy ecosystem also functions (works) correctly for instance: the water, food and gas cycles are working normally, animals can move between them, plants are able to regenerate, native animals and plants are able to reproduce, species food chains and relationships are intact, the system has the ability to withstand or recover from stress or damage.



The Claudelands bush forest type is described in Clarkson, Clarkson and Downs 2007 as:

" Semi-swamp forest dominated by kahikatea grew on the poorly drained shallow depressions. Several other species were present in varying amounts, including rimu, matai, pukatea, swamp maire, tawa, pokaka, and occasional cabbage tree. Prominent in the understorey were silver fern, mapou, hangehange, Coprosma areolata, and turepo, and tangles of kiekie and supplejack. The ground cover was dominated by ferns, herbs, grasses, and sedges including *Hymenophyllum demissum*, hen and chicken fern, *Astelia fragrans*, *A. grandis*, and *Microlaena avenacea*."



Use plant identification books and websites such as www.forestflora.co.nz to familiarise yourself with what kahikatea trees (*Dacrycarpus dacrydioides*) look like.

Describe the leaves, fruit, root system and how tall these trees can grow. How are the seeds spread? Students choose one other species to research (as part of their assessment poster project).

Possible choices include:-

- Canopy trees - tawa, pukatea, titoki, cabbage tree (te kouki), rewarewa.
- Sub canopy - mahoe,
- Understorey - pate, mapou, ponga, hangehange
- Climbers - kiekie, white rata, moki
- Epiphytes (Perching plants), kahakaha and kokaha
- Ground Layer - Bush rice grass, *Carex dissita*



CLASSIFICATION

Students will study how plants classified in one of the three main groups will show the same reproductive structures, although there will be individual variation in the appearance of these.

Discuss the concept of classification as a process of making groups that fit predetermined criteria and that scientists have their own criteria for classifying living things. You could play some sorting games here using a series of cards or objects so that students understand that a classification system is about sorting plants or animals into groups based on specific criteria (similarities). (Students could sort themselves into categories determined by toothbrush colour, family car colour, eye colour, hair colour.....)

Discuss the criteria scientists use to classify plants into groups through the introduction of the concept of different reproductive types: spores, cones and flower-bearing plants. Use plant identification books to help research different determining features.

Share pictures or real examples of the 3 plant reproductive systems with the class and discuss how to recognise these three main types (spores, cones, flowers). Each system is not always seen at all times of the year but they are clearly different in each species. Make a recording of samples of each of the three reproductive types.

Explore the school grounds on a "plant hunt" to search for and observe the three main types of plants identified by their reproductive systems.

Debate the question, "Could you ever find a fern with flowers or a tree with spores?"

Discuss additional means of plant classification by looking for common ways of grouping plants using other features that could be used to make sub groups within each major group. Challenge students to describe all the ways that the leaves of a flower bearing plant might look different from each other. Record a list of the identified features.

Introduce the idea that Scientists use special names to describe different shapes of leaves when they are classifying plants. Students match leaf samples to an outlined shape in order to name the shape of their leaf (see appendix 20). Where possible, use species found at Claudelands Bush eg: kahikatea, pukatea, mahoe, titoki, ponga, astelia etc. Discuss the idea that different leaf shapes can help when working out or using identification keys.



Students will develop the knowledge and understanding of forest structure.

Share and discuss the analogy of a large house to help children understand the structure of a forest.

- The "roof" is made up of canopy trees.
- The "furniture" is the sub-canopy and shrub layer.
- The "decorations" are the perching plants (epiphytes) and climbers.
- The "carpet" is the forest floor plants and leaf litter.
- The "foundations" are the soil and rock.

Using this information children create "The Forest as a House" as a class collage. When complete, also discuss the ways a forest is not like a house.



The structure of the forest can be crudely divided into 3 main layers, the canopy, the shrub layer and the forest floor. However nature is rarely simple and there are many other aspects of the forests such as tall emerging trees, subcanopy trees (ones that live just under the canopy) climbers and epiphytes. To complicate these factors, the forest structure will change if there is a canopy tree fall. Some of the smaller, younger plants will take advantage of the gap and grow more quickly towards the light (and become the canopy). The healthy forest is a changing, dynamic place.

Each plant species grows in its particular habitat because of adaptations. Ferns and forest grasses can survive in low light levels. Often the leaves of juvenile canopy trees are different (generally larger) than those on a mature tree in full sun. This gives them more surface area for photosynthesis. Epiphytes have adapted to cling to the upper parts of the host trees so that they are closer to the light source.

(Note: The study of photosynthesis has not been covered in this resource but try http://www.biology4kids.com/files/plants_photosynthesis.html or <http://www.realtrees4kids.org/sixeight/letseat.htm> for further support)



"Forest Layers" activity, (adapted from "Native Bush...Naturally", Sharon McGaffin)

Students secretly choose a role within the forest system (canopy, sub-canopy or forest floor). On a given signal, each child poses as a plant in one of the layers. Repeat for different layer experiences.

Discuss the effects of sun, rain and wind on the plants in each different layer. Students in their layer position show the effects on plants under these conditions by moving their plant body parts.

Discuss the effect of removing one of the layers of the forest.

Discuss the difference the effects of natural elements would be on a tree in the middle of the forest compared to one on the edge of a small fragment like Claudelands Bush.

Share the Maori Legend of the Kahikatea Tree, retold from "Children of Tane" by Mona Gordon

Learn the waiata "E tu Kahikatea". Discuss what the message in the waiata is about. How might this help us in the way we look after our environment?

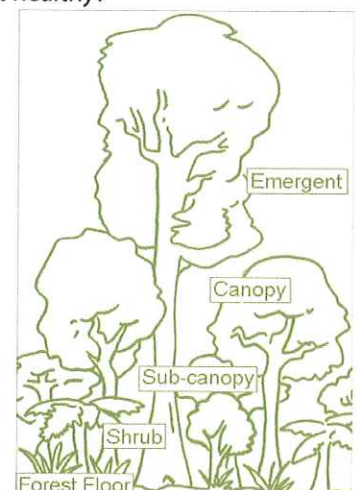
Life Cycle of a Tree (Adapted from Cornell, 1988, see Appendix)

Share and discuss information from 'The Maori and the forest', From Elsdon Best "Forest Lore of the Maori" (See Appendix)

After discussing the formal use of language and its interpretations, students compile a list or pictorial presentation of the ways in which Maori used the forest for their long-term survival.

How could you find out about local stories about the forest? Who could you ask?

What is in our school and local community? Note any vegetation in your school that is typical of the original vegetation for your area. Is it planted or has it grown naturally? What is the history of it? Is it healthy?



WEEDS

Students will explore what a weed is and understand how a weed can affect the health of a natural ecosystem.

<http://www.landcareresearch.co.nz/education/weeds/>
http://weedbusters.co.nz/weed_info/index.asp

Discuss with the students the meaning of 'native' and 'exotic'. Students devise a description of each term to compare with a scientific one. Why do we have exotic plants in New Zealand?

Further discuss "exotic" in relation to weeds. What is a weed? Return to the time line to search for the first mention of weed problems at Jubilee Bush. Which weed has and is still causing the most concern? (*Tradescantia* - Wandering Jew) If possible display a sample of this common but destructive weed.

Pose the question:

- Why are weeds like Wandering Jew so successful?
- Students list possible reasons.



Weeds replace native plants.

Play game "Grab it!" This activity demonstrates competition for resources, showing how weeds are successful when competing with native plants. Weeds are often better at getting resources from the environment than native plants.

Using wrapped lollies placed in the centre of a circle. One child is a native tree (one hand behind his back) another is the weed (able to use two hands). The lollies are resources of sunlight, soil, water and nutrients. The two students attempt to gather in the resources they need to grow. Discuss why the weed was so successful. What could this mean for our native bush environments? What would weeds be better at than native plants? (competing for water, light and soil).

Try the above activity with 2 native tree people or 2 weed people etc. Finish by eating the resources of water, light and soil space.

Weed population explosions.

Discuss and list factors that keep plant population numbers from exploding? Natural factors e.g.: fire, disease, predators, parasites and human barriers - e.g.: collecting, harvesting, habitat destruction.

Pose the question

- How do weeds spread?
- Students list possible ways. (seeds and vegetative reproduction e.g. garden waste dumped, seeds on animals, birds, wind).

Seeds in the soil.

Take soil samples (5cm deep) from different area of the school. Make sure the amount of soil is the same. Using magnifying glasses, students sort through the soil to look for seeds. Using a white tray for the soil and dispersing the soil with water is another means of separating seeds from the soil. Students sketch different seeds types and record how many there are of each type.

Structures of seed and their function.

Look at seeds under a microscope or magnifying glass. Are there any attachment devices? eg: dandelions. Sketch different seed varieties found.

Prepare weeds seeds for germination trials.

Fill an ice-cream container (holes in the bottom) with seed raising or potting mix (no weeds will be in these mixtures). Press down firmly, water and spread weed seeds on top and cover lightly with seed raising mix. Water again.

Research to date has shown that far fewer native animals are associated with exotic plants than with native plants. Native plants generally provide better food and habitat, especially for more specialised native animals that have specific requirements. E.g.: tui and native insects are important flower pollinators. Kereru are important dispersers of large seeds.



There are an estimated 1.9 million species worldwide of vascular plants (they have a system of 'tubes' that connect all parts of the plant, roots, shoots and leaves, to transport water and nutrients from one part of the plant to another), and approximately 2352 indigenous species in New Zealand.

http://www.nzpcn.org.nz/vascular_plants/index.asp

There are over 24,700 introduced plants growing in gardens and nurseries in New Zealand; 10% (or 2470 species) of these will naturalise (establish in the wild), and 10% of these will become serious pests. Already the Department of Conservation lists over 300 species as seriously invasive weeds.

http://weedbusters.co.nz/weed_info/index.asp

144 new weed species arrive each year.

One new weed plant species is recorded every 2-3 days. Approximately \$350 million each year is spent on controlling weeds in New Zealand.

Students predict and record through graphing:

- How many more weed species there will be in 1, 3, 5 and 10 years.
http://weeds.massey.ac.nz/plant_id_quiz2.asp
- How did weeds get to N.Z. in the first place?



Settlers to N.Z. from England and other countries missed the familiar animals and plants of their homelands, so they brought some of these with them. Some seeds came in accidentally eg: in the stuffing of mattresses or stuck on clothing. The environmental conditions in N.Z were ideal for these plants resulting in the plants growing bigger and faster than in their homeland.

Pose the following question:

- Are there any good things about weeds? (Soil stabilisation, habitat and food for wildlife, nectar and pollen for honeybees and food like blackberry pies).
- Student record or dramatise the scenario of weeds taking over a native forest area.
- Where are there weeds in the school and community? (Local areas? Road sides? Railway lines? Parks?)

Interconnectedness of the food chain - Food Web Tug (Adapted from DOC Exploring the Forest - See Appendix 26) or Web of Life from the EnviroSchools Kit.

Students will experience an urban forest remnant. Through activities and observations they will be able to identify forest layers and discuss different growth habits and leaf shapes.

Preparing for the trip to Claudelands bush:



People are encouraged to visit the special area of Claudelands Bush to view and feel the majesty of a remnant section of a past expansive lowland Kahikatea forest. Claudelands Bush is like a living Museum. It is a special place, not in a building but outside in the open air. Just as artefacts tell a story of how people lived hundreds of years ago, Claudelands Bush gives us a living picture of the ancient forests.

Before visiting the bush, conduct a class meeting to design "Living Museum code of conduct". Things to consider include, staying on the track, keeping noise to a minimum so others can listen for bush noises, taking out what you bring in and not picking plant samples (collections of leaf litter from the board walk is acceptable – see appendix for worksheet adapted from DOC Exploring the Forest).

Talk about the boardwalk and the places where it goes out onto the street. Discuss expectations for safe walking.

Normally collecting material from the bush is prohibited. The best practice is to "Take only photos, leave only footprints". Using a recent map, discuss where cars or buses will park and where students will initially congregate. The new carpark by the Grandstand (off Claudelands Road) provides a safe place for this and is adjacent to the platform that students can gather on before entering the bush.

Check school "best practice" policies for Outside the Classroom trips. For extra support for learning outside the classroom go to:
http://leotc.tki.org.nz/for_teachers/learning_stories/learning_story_template

Send a letter to families about the trip, transport arrangements / requests and appropriate clothing, footwear, and permission slip.

Each student will need a pencil, blank paper for sketching, a book or note paper for recording, magnifying glass.

Each group of students will need an identification book. You might also like to have a camera.

Your trip programme content will be influenced by time of year, weather and how long you intend to be at the bush. Be realistic. Try not to "fill" the programme, and allow students to get a feeling for the bush.

The following is a collection of **possible activities during the trip.**

- On arrival revisit rules and expectations.
- Invite students to say a mihi/ prayer/ blessing to the forest.
- Individuals view the forest from the Grandstand side of the park. Sketch the shapes of the canopy. Discuss what students see, the different colours and trees, and the size of the forest fragment.
- Gather the class together on the platform just outside the bush and discuss the drainage system installed to re-direct the storm water. Why was this done and what affect might it have on the health of the bush? (PNI see Pg.13)
- Enter the bush being as quiet as possible. Stop about 20 metres in and listen. Ask students to listen for 1 minute and raise a finger every time they hear a natural sound (birds, wind, trees creaking). Repeat this exercise with manmade noises (cars, people etc). Discuss noises heard. How did these noises make you feel? Did you notice the sounds in the city before? Complete a second sound log closer to the middle of the bush for later comparison.
- Move further into the bush and ask students to talk to each other about the different smells they notice. Record using describing words.
- Move along a bit further and suggest that students lie down on their backs and look up at the canopy layer. Spend some time discussing what they see. Talk about the kahikatea trees and pukatea trees that make up the canopy.

- Students may find it difficult to identify very tall trees because their leaves are so far away. You can easily locate a pukatea as its roots spread out in a buttress shape. The kahikatea roots are spread out and often twisted. Look at the leaves or fruit fallen to the ground. Depending on the season, large fruit, similar to an olive from the tawa tree may be found on the boardwalk. This fruit is eaten by the kereru (wood pigeon), being the only native bird with a beak big enough to eat this seed. Collect bark rubbings from different tree trunks. Discuss patterns you observe. What is the kahikatea tree bark like? How is it different from the pukatea or tawa?
- Forest Cover Scale Map activity (see Appendix).
- How old are these trees? Get students to look for large trees and to talk about how the oldest tree there is about 200 years old. Check for seedlings on the forest floor the see if they can identify saplings and then young trees.
- Picture frames (Adapted from DOC, Peel Forest). Using a cardboard cut picture frame, or a cardboard tube, students view a scene within the bush. Taking time to turn to different scenes looking through the frame students select a scene that their eye is particularly drawn to. Sitting on the boardwalk, students draw what is seen through their frame.
- Human camera (Adapted from Cornell, 1998). As pairs, one person is the 'camera' (eyes closed), and the other is the photographer. The photographer has 5-10 minutes to take the camera along the boardwalk, to three different locations to take photographic shots (squeezing shoulders to indicate the shot). Swap roles. On completion, each 'camera' develops their favourite 'photo' by drawing a picture to represent it.
- Look and look again (Adapted from DOC (kauri forest). In pairs, one person closes their eyes while the other counts to 5. They open their eyes and say the first 5 things they see. Swap roles.
- Spend time sketching and recording features of the kahikatea tree and one other chosen species (for the poster)
- Find evidence of weeds in the bush. Can you find Wandering Jew? Sketch it. How much is there?
- Travel around the boardwalk track at least 2 times.
- Check that all students have been shown/ had help identifying 5 species within the bush. Adults may need to support this learning and check that the correct identification has taken place.
- Have fun.

Back at school:

Use an **x chart** for students to individually focus on their experience. A forest:

- Feels like....
 - Looks like....
 - Smells like....
 - Sounds like....
 - Compare to previous **x chart** from Healthy Ecosystems
- or

Record on a large sheet of paper a **focused class conversation** around the experience of the trip:

- What did you observe? (the facts - sight, smell, sounds, textures) What was it like in the middle of the forest? How was this different to the edge?
- How did you feel? What was the best part? What concerns did you have? What did you dislike?
- How did this trip help you to know about forests? How has it influenced your opinion about forest remnants?
- What was your impression of how healthy the bush was?
- What would you like to learn more about?

Students will review their knowledge of what a forest remnant is and what part their chosen plant species play in this. They will compile their poster display.



EXPLORING ALTERNATIVES

Students will review their understanding of the health and value of Claudelands bush and investigate what ways they could become actively involved in caring for a natural special place.

Students stand on the values line again and explain their previous position in relation to their current position. Discuss value changes and reasons for change or no change. Reiterate that this is a personal thing and that there is no right or wrong.

Return to the school map of special places. Students list all the people who look after the school (including students) and what they do to look after it. Compare this to who looks after Claudelands Bush.

Consider:

- Who looks after Claudelands Bush?
- What other bush remnants are in Hamilton City?
- What groups of people are involved (volunteers, landcare groups?)
- What are some of the tasks that the people carry out to protect and restore the forest?

Find out what is happening locally. How can children become involved? What has your school been involved in in the past? What have children done in other schools and communities?

(Note: there are case studies in the Enviroschools Kit, school journals and often articles in local newspapers. Landcare groups are listed on Environment Waikato website and Landcare Trust has information on theirs. QE II trust also has information about bush management as does Department of Conservation. Kiwi Conservation Club provides ways for kids to get involved and learn more alongside others.

<http://www.landcare.org.nz/>

<http://www.ew.govt.nz/>

<http://www.kcc.org.nz/>

<http://www.openspace.org.nz/>

<http://www.doc.govt.nz/>



Recipe for a Forest (Adapted from DOC Exploring the Forest).

Give each student an imaginary deed to 8 hectares of land. On this bare plot, each student or group of students will be free to create their own bush remnant with whatever they believe is necessary. As well as a pictorial presentation, students include speech bubbles that include important phrases for protection and long-term sustainability. One speech bubble will be required to address an introduced plant pest and devise rules for people coming to your bush. What other dangers might your forest face and how will you keep it safe.

The key element when assessing this is whether their bush is sustainable. Can the bush continue as they have drawn it year after year?



P.N.I. Using a table format, students record a list of the positive features about Claudelands Bush (P), the conditions that are causing negative implications for Claudelands Bush (N) and interesting aspects about Claudelands Bush (I). Discuss ways that the negatives could be turned into positives or interesting by planned actions.



TAKING ACTION

Students will plan and take action for the environment.

What can be done in our school environment?
What actions could we take to make a difference to local forest? (Class brainstorm).
How can we work with the community?
What actions will help bring about the changes that we want?
Discuss ideas and prioritise. Make a class decision.

Using an action planner (see appendices) work through what needs to be considered in order to take action.

What tasks need to be carried out? Who will do each task?
When? Who else will be involved? How often will we meet to keep the momentum going? How will you know if you have succeeded?

Implement your plan. Take photos or video to record different stages of the process. Record change.

Possibilities for action:

- Weed brochure, weeding with the local Jubilee Bush care group.
- Growing native plants at school.
- Adopting a forest fragment to care for, maintaining an existing native area at school.
- Developing a native area at school.
- Write an article about attitudes to and values of your local forest remnants.
- Increase public awareness of weed problems by creating a brochure.

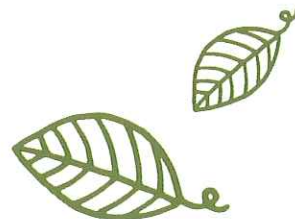


REFLECT ON CHANGE

Students will use a range of strategies to reflect on their learning and action.

Students will celebrate their successes and plan for the future.

Use an H form or other reflection technique to assess the success of the action taken. What have you achieved? How are you going to share this with the rest of the school/ community? How can you celebrate? Did it turn out the way that you had thought? What went well? What didn't go so well? What might you change? Where to from here?



APPENDICES

BACKGROUND INFORMATION

(Please note the information below is a collation of information made available during study and is not considered a definitive history of the Claudelands area. For further information consult with local people, the Waikato Museum and Hamilton City Libraries)

GEOLOGICAL

Claudelands Bush is located in the Hamilton Ecological District on a floodplain bisected by the Waikato River. Sands, silt and gravel deposited by the Waikato River during the formation of the floodplain dammed tributary streams creating lakes and swamps over the past 19000 years. The river has changed its course frequently until the last 5000 years.

Below the silt and clay loams are poorly drained gley soils which contribute to poor drainage and creation of the swamps on which the lowland semi-swamp forest grew, of which Claudelands Bush is but a tiny remnant.

WEATHER

Mean annual rainfall at nearby Ruakura is 1200mm with a maximum in winter and minimum in summer.

Average temperatures

Air temperature averages 13 C throughout the year, with summer average 18C and winter average of 9C.

HISTORICAL

What makes our forest unique (Adapted from DOC, Our Native Bush)

About 250 million years ago, New Zealand was part Gondwanaland, a large landmass that included South America, Africa, India, Antarctica and Australia. The ancestors of some of our native trees, such as rimu, kahikatea and kauri were around at that time. Our ancient animals like tuatara, weta, and native frogs were here 150 million years ago when dinosaurs roamed the land - that is why they are sometimes known as 'living fossils'. New Zealand forests are as close as you can get to the dinosaur forests of Gondwanaland.

About 80 million years ago, the New Zealand islands split from Gondwanaland. For the plants and animals on board, the islands became an isolated world of their own. The separation by oceans meant that creatures living here are unique to New Zealand; 80% of our plants are found nowhere else in the world. Because this separation happened before mammals developed, we have no land mammals, except two species of bat.

With few land mammals, the birds took over their places, such as weta, which do the same job as mice in other forests, and grazing birds developed like the moa. There were even bigger birds, Haast's eagle, now extinct, who preyed on the moa, and other birds adapted to living on the ground such as the kakapo and the kiwi.

EARLIEST PEOPLE

The earliest Polynesians to occupy the "Waikato" region were the Nga Iwi people, with Maori from the Tainui canoe arriving in the Kirikiriroa, now known as Hamilton over 400 years ago. The sites around the city were occupied by hapu that are related to or closely associated with Ngaati Wairere, including Ngaati Haanui and Ngaati Koura. The closest pa site to Claudelands Bush is that of Miropiko, which was built by Ngaati Haanui, part of which can be visited in River Road.

In pre-European times the Waikato River and its streams provided access and transport for timber, trade and resource gathering. The alluvial soils along the banks of the river provided fertile land for growing food crops such as kumara, taro and hue, and to the east were the vast forest stands of towering kahikatea, tawa and pukatea, providing food in the form of birds which feasted on the berries, of which Claudelands Bush is a tiny remnant.

EUROPEAN ARRIVAL

From the 1830's Europeans slowly started to arrive in the Waikato. Traders sailed up river from the Waikato entrance (Port Waikato) and or crossed the bar into Raglan Harbour to barter iron goods, blankets and textiles for flax fibre and timber. These traders visited Kirikiriroa and other Maori settlements in the Waikato.

In 1840, British sovereignty in New Zealand was proclaimed and the capital was established in Auckland. Maori however continued to control intercultural contact with the growing numbers of Europeans visiting. Sometime after 1840, tourists, hunters and missionaries visited. The missionaries taught Maori new farming techniques, with the result that large areas of wheat were grown and milled for flour, fruit trees yielded well, and potato patches produced good crops. The river was busy as canoes swept downstream carrying potatoes, kumara, corn, onions, pumpkins, peaches, wheat, apples, figs, pigs, goats, chickens, and ducks from the Waikato. There were however still very few Europeans who actually settled in the Waikato, partly due to the difficulty in getting to the inland region, as apart from the tracks through the manuka swamp or bracken, the only highway was the river, dominated by native canoes.

THE WAIKATO LAND WARS (1863-1864)

Towards 1859, Auckland business men recognised the economic potential of the Waikato, and were keen to gain control of the river lands. At the same time the move to create a Maori King began. Meetings throughout the North Island were held. Selection finally fell on Potatau Te Wherowhero, in 1858, but he died only two years later, to be succeeded by Tawhaio. He took on the task of King at a time of increased tension between Maori and Pakeha. He hoped for peaceful co-existence but was determined that administration of local affairs remain in Maori hands. From the European viewpoint the King Movement was rebellion, and used as a justification for the invasion of the Waikato in July 1863 by General Duncan Cameron and his Imperial Troops. By Dec 1863, the troops reached Ngaruawahia, which by then had been abandoned by King Tawhaio. The pa was already deserted when the militia arrived in Kirikiriroa. War continued on into 1864.

In 1863 the Government had passed the New Zealand Settlement Act allowing the Crown to confiscate 1.2 million acres of land in the Waikato. The process of Raupatu (confiscation) was an attempt to destroy the economic wealth and political strengths of Kingitanga. During this time the rich agricultural resources were removed, control of the river system overridden and waahi tapu desecrated. The Waikato tribes were forced to move from their tribal lands to other areas where in some instances they lived in impoverished circumstances.

EUROPEAN SETTLEMENT

The Government decided that the land confiscated should be settled by men who would be able to defend it in case of future hostilities. For this purpose a special regiment of militia was recruited from Melbourne and Sydney in Australia.

A Gazette notice of 3 August 1863 set out the terms under which grants of land were made to settlers: the militiaman had to be "not above 40 years of age, have to be able to produce certificates of good character, good health, and general fitness for service as required."

Terms of enlistment in the Waikato Regiment were as follows:

Free grants of land were made according to rank:

Field Officer	400 acres
Captain	300
Surgeon	250
Subaltern	250
Sergeant	80
Corporal	60
Private	50

In addition each man was allocated a town section and 1000 feet of timber to build a house. For their first year, until they received their land, they were given rations. It was anticipated that by the end of the first year they would be able to live off the land.

Captain Steele's company, the 4th consisted of about 100 men, and was part of the Fourth Waikato Regiment, commanded by Colonel William Moule.

The 4th Regiment arrived at Kirikiriroa on August 24, 1864 on the 'Rangiriri'. Colonel Moule called the new town Hamilton. Hamilton East and West were quickly surveyed, and lots allocated to the soldiers. The military settlers had to build redoubts, bridges, and cultivate crops in miserable conditions.

The census of December 1864:

Males 836	Females 660	Livestock 287
Garden-orchard 136 acres		

By 1868 there were 250 people in the two Hamilton settlements on both sides of the river. Within 10 years the population expanded.

1874	666
1878	1243

During the 1880s New Zealand suffered from a long depression, and the population did not grow for the next 20 years. The quality of the farm land was cause of great dissatisfaction. Much of it had difficult access, steep gullies, and was swampy. The farm lots were some distance from the town.

The Claudelands bush area, allotted to Captain Moule, was marked on the early maps as "high manuka and scrub, very swampy". The kahikatea forest stood on the east side of the present Claudelands.

1868 James Woolley is said to have purchased the land.

1869 Francis Claude and Woolley were operating a flax mill on the East bank opposite Waitawhiriwhiri stream.

1876 Francis Claude took over the 400 acres originally granted to Moule. Two years later he began to subdivide the land, and when he left Hamilton in 1878 he had sold much in lots of varying sizes. In the late 1870's Claude gave land for the building of a new road from the Kirikiriroa Railway Station at Claudelands through to Hukanui Road, in exchange for a roadway which had been closed.

1884 the Railway to Morrinsville was opened which passed through Claude's Bush before emerging on a vast swamp property and continuing through what was described as a "veritable waste". The swamp was about 11 miles across.

1877 the South Auckland Racing Club made its headquarters at the Claudelands site adjoining the bush.

1892 the First Waikato Agricultural and Pastoral Association Show took place. "The ground was not very suitable, as it was mostly covered in cabbage trees and scrub, but there was a clear area adequate for the occasion."
P.J. Gibbons, 1977 "Astride the River"

In 1902, some members wanted the show moved to Cambridge as the ground was too wet for a Spring show, but the vote was lost.

1928 The A & P Assn gifted Claudelands Bush to the Hamilton Borough as the only remaining extensive Kahikatea stand.

Large Kahikatea, rimu and matai trees had been logged out of the bush since 1864. Cattle were allowed in the bush from 1864 until 1927, causing damage to vegetation and compacting the soil.

What remains today is only 2% of the original Claude's Bush.



Hamilton has little to remind it of its relatively recent history. Waikato Times contributor Mr L. B. Sandford, a Waikato Historical Society life member, reflects on what the city has preserved.

Even at 118, Hamilton is still a young city. It has little to remind us of the reasonably distant past.

For its first forty years it struggled along as an unimportant village, striving hard not to lose ground, its potential not recognized.

It was a place that took a long time to "take off". When it did and it came into its own, the other secondary cities and towns of New Zealand, from Whangarei to Invercargill, were left far behind. Once upon a time, of course, Invercargill, Wanganui, Palmerston North and Napier were much larger than Hamilton. Since 1945, when city status was attained, population has quadrupled.

But what is old here?

Very little, to be frank.

European associations certainly go back those 118 years to Cameron's small garrison and those military settlers in 1864, but of nineteenth century reminders there is hardly a sign. Take away the old Bank of New Zealand building on the corner of Victoria and Hood Sts, and Lake House, the old stationmaster's house, Beale's Cottage, and one or two other structures, and what have we left?

That plaque on the Public Trust building does remind the passer-by of the Maori village of Kirikiriroa, abandoned not long before Steel's party arrived. And sundry mounds and depressions within the city boundary are pointed out to the curious as evidence of the existence of several Maori pas.

It is doubtful if any of the old wells remain. There was one near Howell's Ave, at Hillcrest some years ago. The new suburbs have flooded over the vacant paddocks bordering the older Hamilton and such things as historic wells and inconvenient trees and similar hindrances have gone.

Above the surface about the only really old living things surviving are the indigenous trees, especially the kahikatea — the white pine, once popular for house building and butter boxes.

There aren't very many old white pines still standing in Hamilton but those left are worth cherishing and protecting. This swamp-loving podocarp was dominant when the first European infiltrated the Waikato and to the early settlers was a common sight on the outskirts of the infant settlement.

Today few of the older trees survive but fortunately a patch of this type of native forest was preserved. Claudelands Bush, only 5ha in area, has become a precious living relic not two kilometres from the Central Post Office and separated by the

Butter box survivors live on ...

river from city and factory fumes and impurities.

The late Michael Gudex, botanist supreme and Loder Cup winner for his contribution to horticulture, made this reserve his special concern. When the pernicious Wandering Jew weed threatened to choke the paths and undergrowth, it was Dr Gudex who took the initiative in having it eradicated. The former Hamilton High School master was very conscious of the value to the city of this remnant of what had once been quite extensive forest in the swamp-plagued Waikato.

And that indefatigable local historian and researcher, the late Geoffrey Roche, author of numerous newspaper articles dealing with the early days, constantly drew attention to the need to preserve the isolated patch of native bush. He and others estimated that some of the larger kahikatea there were more than 500 years old. They'd have been growing when Columbus discovered America.

The Claudelands Bush forms a pleasant northern backdrop to the 30ha property of the Waikato Show Trust Board which is a popular venue for such diverse attractions as Winter and Summer Shows, trotting meetings, polo carnivals, bloodstock and other sales, conventions, and even wedding receptions. The board's facilities are now in such demand that no week passes without some form of activity in the buildings and grounds.

Just about every commentator on scenic and historic bus and other city and suburban tours makes a point of drawing attention to Jubilee Park — Claudelands Bush to the uninitiated.

But the city has other veteran kahikatea trees. Somehow they survived axe and saw when their timber was used for houses and butter boxes. Geoffrey Roche himself lived in such a house in First St. It was demolished after he moved to Manurewa.

New Zealand's tallest native tree, the white pine will grow to 80m — the Scott property eucalypts at Newstead are considerably higher.

Hamilton's veterans are, however, not particularly tall. They include some good sturdy specimens, notably in Claudelands and on the far side of Hillcrest. One fine clump in the vicinity of Flynn's Rd at Hillcrest was the victim of a subdivision some years ago after the rugby union decided not to form a new ground there.

Church developers at Temple View, just outside the city boundary, wisely spared the old kahikateas growing on the site. Today these trees enhance the pleasing prospect greeting the eyes of the thousands of visitors to one of Hamilton's tourist attractions.

Professor J. T. Salmon states in his superb book, *The Native Trees of New Zealand*, that only a few stands of pure kahikatea forest remain today, mainly on the west coast of the South Island.

In its juvenile form the tree is shapely and attractive. It can be seen at its best in the Gordonston district. In this form it is easily recognisable at a distance but with age it loses much of its charm when the branches straggle and the trunk becomes uneven. Like most natives it is very slow growing.

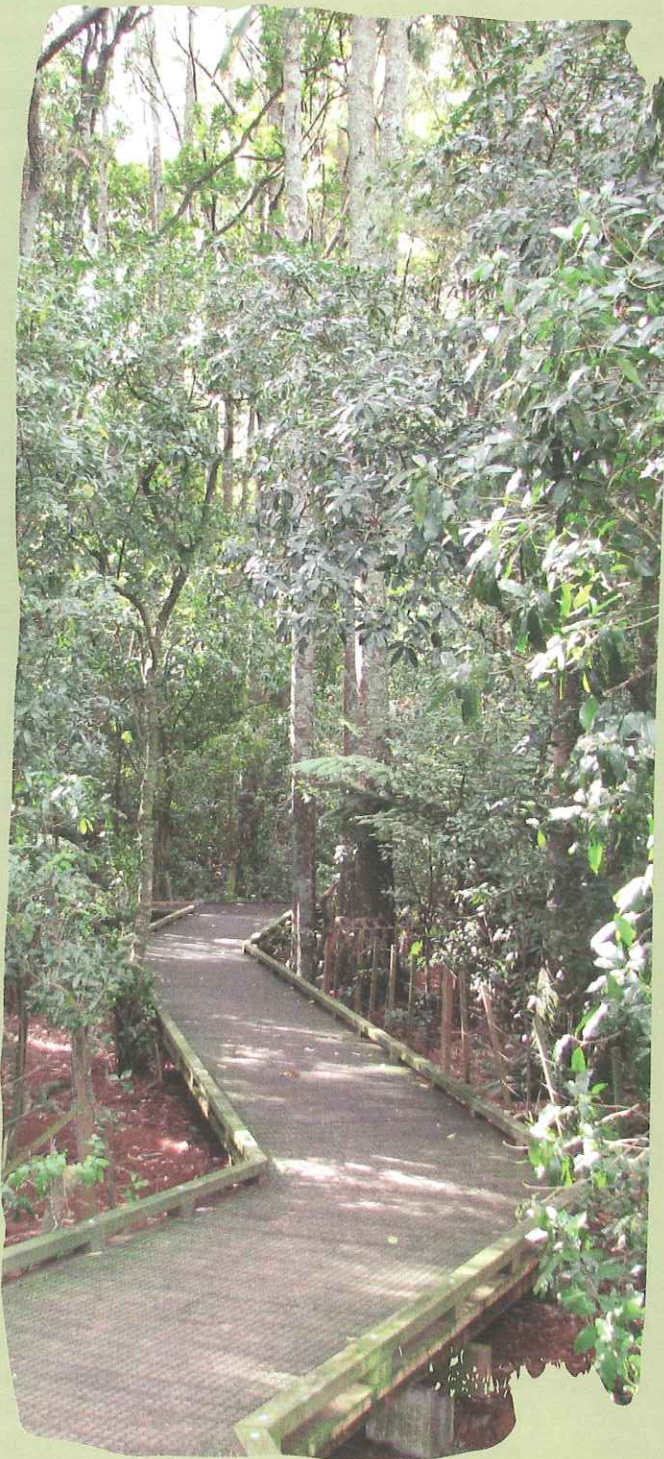
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TIME LINE FOR JUBILEE PARK/CLAUDELANDS BUSH AREA

19000 years ago	The Waikato River changed it's course many times, creating lakes and swamps in the Waikato Basin. The climate became colder and frostier.
5000 years ago	The Maori originating from Polynesia settled in the Waikato, living along the river.
About 1350	The canoe, 'Tainui 'arrived and the Maori tribes settled in the Waikato. They used the surrounding bush for food and medicinal resources.
About 1700	The largest kahikatea trees in the New Zealand bush now, were seedlings.
1830 - 1860	Europeans arrived. New crops were introduced and grown like wheat, maize and potatoes. British sovereignty in New Zealand was declared.
1863 - 1864	Waikato land wars between the Maori and the English were fought.
1864	<ul style="list-style-type: none"> - Claudelands Bush was grazed by cattle from this time, until 1927. - Hamilton City was founded. Land was allotted to Captain Moule. - Milling of the forest began. Most of the large kahikatea, matai and rimu trees were felled. Claudelands bush was part of 800 acres of forest.
1870	Francis Claude subdivided most of the land he owned in Claudelands Bush.
1886	The swamps and bogs of Claudelands Bush were drained.
1890's	Hukanui/Peachgrove Road was formed on the south-western edge of Claudelands Bush.
1902 - 1903	Boundary Road was built. Parts of Claudelands Bush were cleared and houses built.
1923	Flax was planted as a windbreak along the south-west edge of Claudelands Bush.
1928	122 native plant species recorded in Claudelands Bush.
1933	The first plant survey was completed.
1952	The second plant survey completed. 125 plant species. The forest floor was drier, large kahikatea dying back, possums present and ferns increased where there are no introduced weed species like Tradescantia.
1954	Weed Tradescantia dominant ground cover.
1964	Smothering weeds continue to dominate the bush. At this time there was very little community interest in the bush but vandalism was frequently occurring.
1980	Most of the forest floor was covered with Tradescantia. A plant survey showed that 52 plant species had been lost since 1952; mostly ferns and shrubs.

TIME LINE FOR JUBILEE PARK/CLAUDELANDS BUSH AREA

1989	Smothering weeds removed. The edges of Claudelands Bush and pathway were fenced.
1993	<ul style="list-style-type: none">- A plant survey showed kahikatea were the most dominant tree, followed by pukatea and tawa.- The board walk was built through Claudelands Bush.
2004	A Weedbusters group was formed to voluntarily weed the Tradescantia on regular basis. 81 species of native plants surviving in Cludelands Bush.



CULTURAL AWARENESS AND ENVIRONMENTAL EDUCATION

To assist you in including a Māori cultural perspective as part of your trip, we have included this section, an awareness of Māori culture and heritage is a fundamental part of education in the environment in this country. It is also an opportunity to introduce students to the concept of the interdependence of all parts of the environment.

NGĀ ATUA KAITIAKI: THE GUARDIAN GODS

On the following pages, we describe seven of the Atua, the Guardian Gods. They are the children of Ranginui, the Sky Father, and Papatūānuku, the Earth Mother, and they are constantly interacting with one another. An understanding of the sibling rivalry between the Atua will assist students to see how everything is connected to everything else in the environment. Their interactions help to explain environmental features and processes such as volcanoes, forests, and erosion.

Tāne: the Atua of the Forests

Tāne was the son who separated Ranginui and Papatūānuku. He looks after the trees, the forests, the birds and the insects.

Tangaroa: the Atua of Water

Tangaroa is the rivers, the sea, the lakes, and the glaciers: he is all forms of water. His fingers reach into the land from the sea as rivers and glaciers. He interacts with Tāne as a river tears down trees along its banks.

Tāwhirimātea: the Atua of the Elements or the Weather

Tāwhirimātea objected to the separation of his parents and elected to stay with his father, Ranginui, in the sky. He is the wind, the rain, the snow and the storms. He is in constant battle with his siblings and we see the evidence everyday. For example, when trees are blown down in a storm, this is Tāwhirimātea interacting with Tāne, the Atua of the forests.

Rongo mā Tāne: the Atua of the Kūmara and Cultivated Plants

Rongo mā Tāne is the family peacemaker. He looks after cultivated plants and gardens and is associated with the whare, the home.

Haumietiketike: the Atua of the Foods of the Forest

Haumietiketike is responsible for the food that we find, rather than the food that we cultivate; for example, berries and roots of the aruhe/bracken fern.

Tūmatauenga: the Atua of Warfare and Battles

To overcome his brothers, Tūmatauenga works through humans. He uses humans to take trees and other plants from Tāne. We humans then use the trees to make waka to go to sea and take fish from Tangaroa. We also eat kūmara and the fruits of the forests, so in this way Tūmatauenga is able to battle with Rongo mā Tāne and Haumietiketike. It is interesting to note however, that Tūmatauenga has not been able to overcome Tāwhirimātea and so we are always at risk from the weather!

Ruaumoko: the Atua of Land Formation

Ruaumoko is the unborn child of Papatūānuku. To keep Ruaumoko warm in his mother's body, he was given fire. We can see his presence in the form of volcanoes, earthquakes, mountain building, hot springs, and folding and faulting.

Including Ngā Atua Kaitiaki in your Visit

There are many ways in which you could approach this, depending on your class. We suggest that if your class is not already familiar with these Atua, you could spend some time working on the themes before your trip.

Once you have introduced the Atua Kaitiaki to your class, reinforce the learning by taking your group into the schoolyard or taking a look out of the window for evidence of their actions in the environment. Students might see Ruaumoko in the hills and mountains. They could see Tāwhirimātea as the wind in the trees (tormenting Tāne!) or Tangaroa as the sea.

On your trip, you could integrate this theme as an introduction to the area and to raise students awareness of the new environment. As you begin your activities or walks, ask students to find evidence of the Atua Kaitiaki. See if they can find examples of the Atua Kaitiaki.

TRADITIONAL USE OF PLANTS

Imagine there are no shops. How would you do if you injured yourself?

Maori developed many traditional medicines from their surroundings. This knowledge was handed down by word of mouth from the learned tohunga (priest). Jubilee bush contains some of the plants used by Maori for curing ills. There were also the problems of lighting fires - what do you do if you do not have matches?

Recipe for bruises:

Kahikatea bark was boiled up with a handful of leaves from kawakawa, ramarama leaves and ngaio, stem of poroporo.

A good tonic:

Kahikatea chips infused in boiling water are a good tonic medicine. Kahikatea leaves were boiled and drunk to correct urinary and other internal complaints.

Tattooing:

Charcoal from kahikatea wood was used for tattooing, mixed with sap from either mahoe or hinau, or the ti kouka (cabbage tree). The berries of mahoe were also used to make a liquid mixed with kahikatea soot.

Lighting fires:

The trees used for lighting fires are hinahina - ie. in the North Island mahoe, kaikomako, totara, kahikatea and makomako. This is the trickery which Maui is said to have put fire at the disposal of man, able to be aroused at will. The old Maori firemaking process involved a rubbing stick, preferable one of kaikomako which burns well, to be applied to a piece of soft wood such as mahoe which burns slowly. The stick was rubbed at ever-increasing speed along the mahoe wood until a groove was formed and the particles formed eventually ignited, sometimes aided by the addition of dry moss at the

end of the groove.

To carry fire, smouldering pieces of mahoe were placed in a stone container and they just needed to be taken out and shaken on arrival at a new place.

Titoki

Seeds oil was extracted and used externally for:

Sores, wounds, bruises, rheumatic joints, sore eyes and ears, babies tender skin.

The leaves were bruised and boiled, and used as an insecticide, against sandflies. Stings were also treated with the juice from a bruised leaf. (Riley 2003)

Hair oil - titoki oil is known to be the finest of oil, but it was available in small quantities and kept in gourds (taha hinu)

Ponga

The pith was used as a bandage for sores, and also as a poultice for boils. In the 1940s, people in Taranaki used ponga pith to draw sharp boxhorn thorns from the hooves of horses.

(Acknowledging West Coast Tai Poutini Conservancy - Dept of Conservation - & Kiwi Outdoors Pgs 8/9)



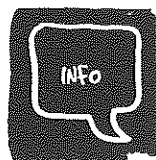
The Maori and The forest From Elsdon Best "Forest Lore of the Maori"
Te wao tapu nui a Tane -The great sacred forest of Tane

Tane, the God of the forest, represented birds and trees. There was a mystical relationship between the Maori and the forest, and in it he felt at home among his own kin. It provided protection, shelter and a source of food,

The presence of Tane himself, who provided the forest as a clothing for the Earth Mother and Papa, was the spiritual force governing all activities there. Respect for the forest that Tane had created ensured that birds and fruits were conserved and multiplied.

"About fifty-five years ago (1874) an old Maori held for to certain hearers in the following strain: "Our forests were to us a rich possession, such trees as the totara, miro, matai, rimu, rata, maire, tawa, kahikatea, karaka, hinau and others were invaluable to us as they provided both man and bird with food, and also man with materials wherefrom were fashioned canoes, houses, defensive stockades and a great variety of implements."

So it was that care was taken to prevent damage of forests by fire, lest such valuable trees be destroyed. In the past times birds were exceedingly numerous, but they have now almost passed away. Europeans brought hither rats, and dogs, and honeybees, and these have destroyed birds. Alas those Europeans have destroyed much valuable forest and so have driven the birds afar off"



Kahikatea, White Pine

From "Children of Tane" by Mona Gordon.

According to old lore, the white pine is said to be the child of Tane and Hine waoriki. There is also a tradition that it is the child of Tane and Kuraki. The legend of the Kahikatea, according to the Ngati Potiki people, relates the arrival of the Kahikatea in New Zealand Pourangahua, who was a man of great mana, travelled extensively, but longed for his own home, Aotearoa. The people of Hawaiki were kind and hospitable but Aotearoa was the place he belonged to. Pourangahui's canoe had been broken so he persuaded his host, Ruakapanga, if he could borrow the great bird, Tawhaitari to fly him home. Rua reluctantly agreed and also gave Pou two baskets of seed kumara as a gift.

They flew over vast oceans, and at last, looking down he saw the black rocks, green shores and blue mountains. The waves were tumbling along the coast, foaming on to the sand.

Full of joy at arriving home, the chief reached down and pulled a handful of feathers from under the wings of the bird. He threw them into the sea. Soon a tall tree rose, bearing fruit in the midst of the waters. These fruit were the blue-black nuts and the red berries the Kereru love to eat.

A branch of fruit was washed ashore, and from it came the kahikatea forests of New Zealand.

BUILD A TREE EXPERIENTIAL ACTIVITY

Aim: For children to gain understanding of how a tree works. This game should help them work together as a group.

Preparation: Find a suitable open space and scan the area for any unwanted items!

Equipment: Use Narration notes.

Restrictions: Avoid wet/muddy areas. Adapt game if weather is bad. Consider the number of children available before building the tree, they can always be added later!

Teacher Notes: Each child will help to build the various parts of a tree: the taproot, lateral roots, heartwood, sapwood, phloem/cambium, and bark. The game uses drama to act out the roles played by each part of the tree.

Listed below is how you build the tree and in italics the statement you can make:

Narration notes:

Heartwood

Choose two or three tall strong people and ask them to stand with their backs together.

You are called the Heartwood. You are the inner core of the tree.

You are what gives it its strength and your role is to keep the trunk upright so that the leaves can get energy from the sun.

You have been around along time, you are the most preserved part of the tree but you are dead. You were previously alive but as you grew your tubes blocked up with resin and pith.

You were previously alive but as you grew your tubes blocked up with resin and pith.

Tell the heartwood to stand tall and strong. Ask them to repeat this statement back to you.

Taproots

Choose several people to be the taproots. They should sit facing outwards with their backs to the heartwood.

You are very long roots and are called Taproots! Your role is to get water from deep into the ground. You act as an anchor to the tree. You are one of many Taproots on this tree but you are not on all trees eg. redwoods.

You are one of many Taproots on this tree but you are not on all trees eg. redwoods.

Lateral Roots

Choose people with long hair and ask them if they wouldn't mind lying on the ground.

They should lie with their feet against the trunk but leave enough space for the Sapwood and Cambium.

There are hundreds of you. You grow outward like branches all around the tree but underground. You help to keep the tree upright. Each root has tiny hairs (ask the roots to spread out their hair). You have thousands of these hairs to absorb water and nutrients. You will grow in the direction of sources of water.

You will grow in the direction of sources of water.

You will grow in the direction of sources of water.

Tell the Lateral roots and Taproots to try slurping. Ask them to say 'slurp'!



Sapwood

Choose enough people to form a complete circle around the Heartwood. They should circle the Heartwood holding hands and facing inwards! Ask them to be careful of the roots.

You are called the Sapwood or Xylem. You draw water up to the highest branches and you are the most efficient pump in the world. You can soak up about 1400 litres of water a day!

Tell the Sapwood to practice drawing the water up. Ask them to go 'Wheeee!' and to lift their arms up. Ask the roots to slurp again and then the Sapwood to bring the water up.

Cambium/Phloem

Choose enough people to create a complete circle around the Sapwood. They should circle the Sapwood holding hands and facing outwards!

You are the Cambium and the Phloem. The Cambium is the growing part of the tree, you add new layers to the Sapwood and Phloem each year (Tree rings), and to the bark.

Explain that trees do not grow like human hair. Trees grew outwards where as hair grows from the scalp and not from the ends. Ask them to practice saying 'we grow outwards'.

Near the outside of the tree you are the Phloem. Your role is to carry the food manufactured by the leaves and roots and to distribute it around the tree.

Ask the people to stretch out their hands and to flutter their hands to create branches and their leaves. Ask some to say 'our leaves make food' and others to say 'we bring the food down and around'.

Bark

Using the last remaining people create the bark. Create a circle around all the layers.

You are the bark. Your role is to stop the tree from drying out and to protect the flow of food in the Phloem. You also protect the tree from insects, fungi and pests. Humans can damage you if they pull you away from the tree. As you get older you keep growing but crack and stretch.

Ask the bark to practice saying 'we protect'. The Phloem should put their arms through the bark to show branches and leaves.

Recap

Ask the people in turns to give their sound and/or action when you say their name.

For example:

Ask the heartwood to say 'stand tall & strong'!

Ask the Lateral roots and Taproots to say 'slurp'!

Ask the Sapwood to go 'Wheeee!' and lift their arms up.

Ask the Cambium to say 'we grow outwards'!

Ask the Phloem to stretch out their hands and to flutter their hands to create branches and their leaves. Ask some to say 'are leaves make food' and others to say 'we bring the food down and around'!

Ask the bark to say 'we protect'!

Repeat but only give the commands and not the names of the tree parts. When you finish ask everybody to give each other a round of applause and to help the roots off the ground.

There are several adaptations of this game around including in the Enviroschools Kit, Department of Conservation Supersite resources. This one was adapted from:

http://Inr.cambridge.gov.uk/uploads/build_a_tree_game.pdf

LIFE CYCLE OF A TREE (adapted from Cornall 1998)

Invite students to crouch with their heads tucked down, then act out each stage of in the tree's life.

You are a seed lying amongst the forest leaf litter. It is damp and soft and dark and quiet. You feel the stirrings of life within and you find yourself germinating, slowly extending a small root and then a shoot. A pair of leaves form, they turn upwards but it is still dark on the forest floor as the other trees block the light. You wait and wait.

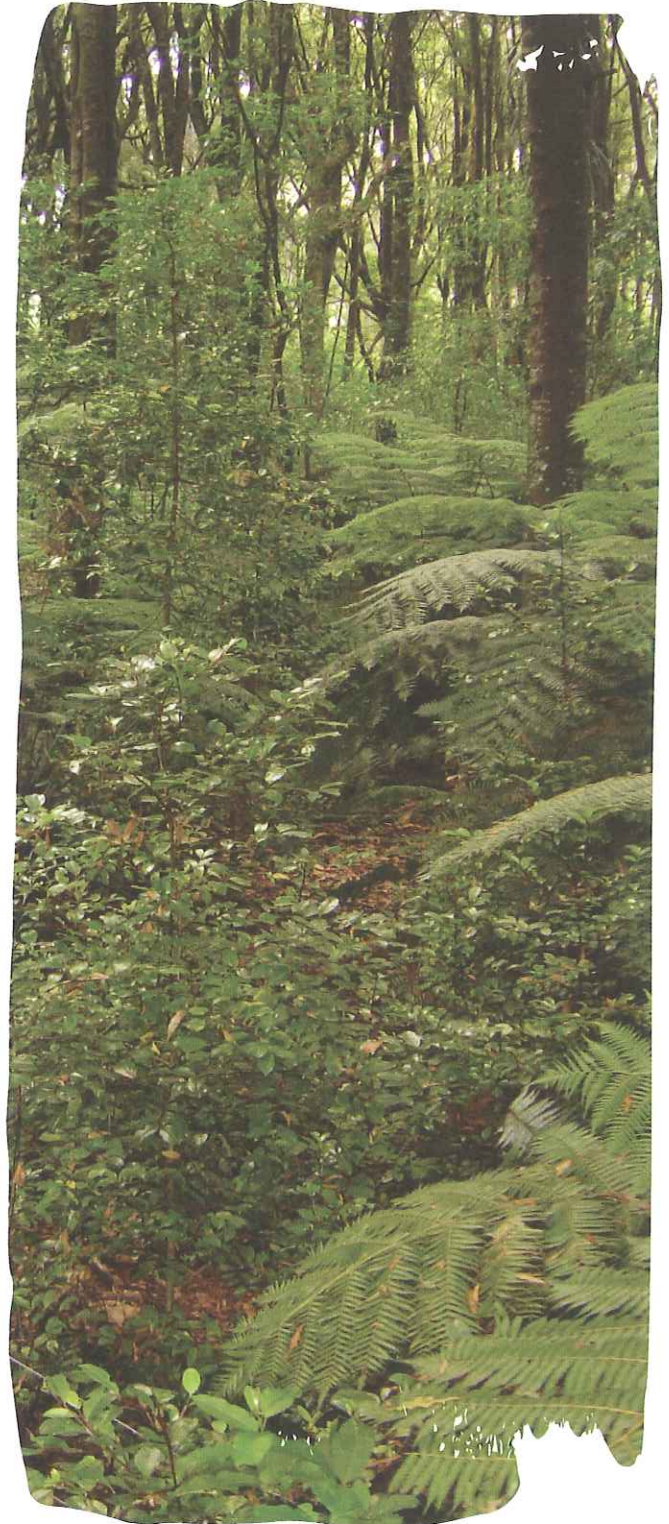
One day the wind is strong and with a gust blows down a giant tree. It crashes to the ground, swoosh! And suddenly there is light hitting your leaves. You feel the warmth of the sun and the energy helping you to slowly grow. Your roots suck in water from the ground. Nutrients from the rotting leaves, logs and insects come into you roots with the moisture. Hmm, just the right mixture to help you grow.

You grow from a seedling to a sapling up and up into a large tree. You stretch up towards the sun, growing stronger and taller and broader. You take your place with the other tall trees in the canopy. There isn't much room up there but you find a space in the sun and your leaves and twigs grow quickly to fill it up. Now you are a tall tree. You can feel the insects crawling on you. Other plants come to perch on you. A vine makes its way creeping up your trunk. A snail crawls over your roots. Now at the tip of your branches you feel buds forming and breaking open into flowers. The flowers are visited by moths at night and these pollinate them. The petals fall to the forest floor but small fruits start to form swelling and ripening in the sun.

There is a whooshing sound an a large kereru lands on one of your branches. It has come to eat the berries and pecks and swallows until it is full. The kereru flies off with seeds in its tummy. That night it roosts in another tree and the seed drops out of the kereru in a lovely dollop of manure to lie on the forest floor.



Today Hamilton City has only 1.6% of native remnant bush left. Hamilton has one of the most changed city environments in New Zealand. Because of this we rarely have native birds like the Tui or the Wood Pigeon visiting our city. This is a problem for dispersal of native plant seeds because some fruits are so large that only the woodpigeon can fit them in their mouth. This means that in many cases, our older native trees are the only survivors. Many native species are now locally rare, close to endangered.



ACTION PLANNER

VISION

SKILLS NEEDED

WHO COULD INFLUENCE THE DECISION?

REALITY CHECK (will these decisions lead to your action?)

WHAT WE ARE GOING TO DO

EVALUATION (Did our actions result in movement towards our decision?)

HOW WILL WE FIND OUT WHAT PEOPLE THINK AND FEEL?

HOW WILL WE MAKE PEOPLE MORE AWARE OF THIS ISSUE?

WHERE WILL WE FIND MORE INFORMATION?

USEFUL LINKS

http://rsnz.natlib.govt.nz/volume/rsnz_83/rsnz_83_02_004880.pdf

<http://www.infonews.co.nz/news.cfm?l=1&t=97&id=36833>

http://www.rnzih.org.nz/pages/2003_Conference_Proceedings_PDFs/11_Bruce_D_Clarkson.pdf

http://cber.bio.waikato.ac.nz/images/Ecological_restoration_in_Hamilton_City,_New_Zealand.pdf

<http://www.ew.govt.nz/environmental-information/Land-and-soil/Native-plants-and-animals/Forest-fragments/Kahikatea-forest-fragments/>

<http://www.doc.govt.nz/>

<http://www.doc.govt.nz/upload/documents/getting-involved/students-and-teachers/activities/forest-structure-activity.pdf>



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http://www.rnzih.org.nz/pages/2003_conference_proceedings_PDFs/11_Bruce_D_Clarkson.pdf

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http://cber.bio.waikato.ac.nz/PDFs/CBER_58_Hamiltonbasincomposition2007.PDF

Restoring Waikato's Indigenous Biodiversity: Ecological Priorities and Opportunities, 2006. Waikato Biodiversity Forum.

http://www.waikotobiodiversity.org.nz/biodiversity_information/restoring_waikato_s_indigenous_b/





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