Sixtus Lodge Area
Ruahine Forest Park

Nau Mai! Piki mai! Haere mai!

SAFETY

Hundreds of school children enjoy this area safely and happily each year but remember the **Ruahine Ranges are rugged and exposed to extreme weather**.

Getting lost and hypothermia (exposure) must be considered in your risk analysis especially if you take on a more adventurous challenge (see notes on safety).

Be prepared for rapid changes in the weather. Ensure that your party has clothing to cope with cold wind and rain. Carry spare food and dry clothing.

PRE-VISIT

Physical Challenges in the Big Outdoors

For many young people a trip to this area will provide physical challenges that are beyond their normal experience. The terrain could be totally unfamiliar and it may even cause anxiety. On the other hand it will provide a sense of achievement if they meet challenges that are set at the appropriate level. Building up fitness for the trip should make it a more enjoyable and satisfying experience.

- Brainstorm the ideas that students already have about the site. Group their ideas under headings such as biodiversity (the variety of life), earth science, recreation, human impacts, etc. according to the objectives for your trip.
- Design an outdoor safety code. Appoint class members to help apply it on the day.
- Visiting outdoor areas usually requires special gear. Have students list the clothing and other gear they think they will need on the trip. Discuss a brief for, and then design, a special item of clothing that would be ideal for this trip.
- Locate the site on a map. Work out its distance from the school and how long it will take to get there. Talk about how people would have travelled there in the past.
- Find out who the local iwi in your rohe are. Where are their marae? Who are the kaumätua? What stories can they tell you about the place you are going to visit?
- Find out what the students know about DOC. Is there a DOC office in their area? What sorts of things does a DOC ranger do? Check out the DOC web site, www.doc.govt.nz
- Practise examining rocks listing their qualities under headings like hardness, colour, crystals, shapes of broken surfaces.
- List all the life that exists in a typical home. Include the people and pets but also the uninvited guests. What are the different places they live in? What do they need each day? Prepare a chart to fill in the same type of list for the area you are visiting.

- Use maps and other resources to gather information about the geology and geography of the area.
- Examine key ideas related to the history of the site - e.g. its location and strategic importance; evidence of past occupation and uses. Which groups of people have lived in or used the area in the past, and for what purposes?
- Explore New Zealand's responsibilities under global conventions such as the Rio Convention on Biodiversity. Use the DOC web site to find out about the New Zealand Biodiversity Strategy. How do the goals and actions in the strategy relate to the site you are visiting?
- Examine the meanings of the words exotic, endemic and native. Consider which exotic plant and animal species could get into the reserve unaided. How could they get there? What could their impact be?
- Make a chart of your own daily and annual routines (circadian and seasonal patterns). Compare it to those of animals that you are familiar with like your cat. What time and season will you be making your trip?
- Find out if there is anything that you can do to help look after the environment when you are on your visit.
- Divide the class into teams so that each can research and then look for certain things when they get there. For example a fungi group, a ferns group, a bird calls group, a spider webs group, a flowers and fruits group. They would all find much to fill a report.

POST-VISIT

- Make a forest display along a wall of the classroom with teams working on tree trunks and foliage, shrubs, lianes and epiphytes. Add pictures or models of birds. Make silhouettes of birds in flight to adorn the ceiling
- Find out about the use of plants as *rongoa* or traditional medicines. Ask your local kaumätua or check books in the library. Try some tea made from kawakawa leaves.
- Choose a picture of a bird like the ruru/morepork and identify its special features e.g. nocturnal eyes with third eyelid, grasping clawed toes, acute hearing, soft feather tips. Add labels for these adaptations (features) and say how each helps the bird survive.
- Make a "wanted" poster for an introduced mammal pest. Describe the damage that the pest is doing and suggest an ecological reward for its elimination.
- Calculate the weight of forest that possums destroy in New Zealand. There are about 70 million of them and each can eat between 800g and 1 kg per night. Work this out per night and per year. Then consider the effects on their favourite food species and on the other native plant eaters.
- Make a poster about *Native Fish: The Well-kept Secret of our Streams and Swamps*. Add eels, mudfish and bullies. Find out why they become rare when streams are polluted, dammed and stripped of surrounding trees.

- Draw plants and animals that make a food chain and/or cut them out. Arrange them into a food chain or, for more advanced students, build up a food web.
- Techno-Road Challenge: You have been given the design brief to replace the present highway with one that is safer and less prone to blockage by rock falls. The development has a large budget but it should not interfere with the vegetation or natural beauty of the gorge. Design/model it and then evaluate your plan for its impacts on the gorge as well as the convenience for people.
- Find out about three weeds that have established in the area you visited. Why are they weeds? How were they brought to New Zealand?
- Produce cards describing the aims of interest groups involved with the reserve - e.g. local iwi, neighbouring farmer, possum hunter, tourism company, Forest & Bird Protection Society. Distribute the cards and conduct a debate on what should go in the management plan for the reserve.
- Recreate the debate in Parliament about the Conservation Act that set up the Department of Conservation in 1987. Have speakers for and against - including some who would like more of New Zealand's land and sea to be protected. What would be the advantages and disadvantages of each argument?
- Discuss the difficulties local people have, in places like the valley leading to Mt. Everest in Nepal, with all the litter left there by tourists. Sir Edmund Hillary went back to Everest several times to give something back to the environment where he achieved fame. A New Zealand school made a special trip to Nepal that included carting out some of the rubbish. What can you do for your environment?

ACCESS

Access across farmland is clearly indicated from the Limestone Road end where there is a useful interpretation sign.

SIXTUS LODGE

This modern well-equipped lodge is only 1km from the road end and can accommodate 50 people. It is run by a non-profit trust and many schools already take advantage of the facilities. For further information write to Sixtus Lodge Trust Board, PO Box 1987 Palmerston North or phone (06) 358-0926.

TEACHER NOTES, SIXTUS LODGE AREA

The following notes are aimed at providing the teacher with some background information. Refer to the activities appended for more ideas for students.

Earth science. How old are the hills?

The ranges before you at Sixtus Lodge are a product of the North Island lying on top of a collision between two of the earth's crust plates. Like bits of skin on top of a slowly heated porridge, crust plates are added to, crumpled up and folded back under.

Driven by heat sources in the mantle this **plate tectonics** activity affects New Zealand like a lot of countries on the edge of the Pacific. To put it another way, "We seriously rock". Like up to 8 plus on the Richter scale.

Our island is part of the **Indo-Australian plate** which is riding up on its neighbour the **Pacific plate** but it is also buckling from the stress. Compare it to a blanket being pushed up a slope and starting to crumple along crease lines.

In our lifetimes this movement, which is about as fast as fingernail growth, will trouble us with a few earthquakes. Some of these may move the land by centimetres. On the scale of millennia, however the result is a mountain building **orogeny**.

The "riding over" part of the collision is what the scientists believe caused the Maui feat of lifting the North Island out of the sea- something that we can prove by finding marine fossils all over the island including in this range.

In the last two million years the buckling upward forces have built up to a good orogeny thereby giving birth to the Tararua- Ruahine Ranges. Geologists tell us we are still in the midst of this "Kaikoura" orogeny so keep your eyes open for growth spurts in the ranges! They will be accompanied by a loud noise and a lot of shaking.

Where the land has but recently emerged near the coast, it is made of very young **sedimentary rock** with fossils of animals very similar to what we see on the beach today. Here however the land has been above sea level for much longer and so water and wind have been eroding the ranges for millions of years. The latest uplift has accelerated the process and the rivers are full of the resulting rock and rubble. So how old are oldest rocks that erosion has uncovered? They go back to the **Jurassic** period (190-136 million years ago) when dinosaurs were strutting on the land and their cousins were chasing sharks in the ocean. Beneath those waves, sediment from another eroding land was building up on the sea floor. That sediment hardened and uplifted is now our mountain range.

But this is not the end of the process, the recycling continues. The rock in the rivers is being turned into sand and silt which is carried along the Pohangina River to the Manawatu and then out to sea where it will add to the sediment being deposited off shore. Time and deep burial will cement it into new rock to once again rise in the distant future. If this is starting to sound like recycling then it would explain why geologists talk about a **rock cycle**! *(Activity 1: Check your rocks)*

Mostly the rock that is found is very old sedimentary **greywacke**. If you can find any layers they are likely to be alternating layers of finer textured **argillite** and coarser **sandstone**.

Double the mountains, double the fun

Although this is the Ruahine Forest Park the range before you is not actually the Ruahine, it is in fact the Ngamoko. The Ruahines in this stretch are a bit shorter than they are further to the north and south and they lie between this Ngamoko Range and Hawkes Bay. In effect there is a double crease in the crust with the headwaters of the Pohangina River in between.

The track

From the carpark, cross the farmland as indicated and follow the track around to the stream. Look in the cuttings of the bank. The smooth round boulders indicate that the

bank has been built up by rivers tumbling rocks and sand into the area. *(Activity 2: In the bank)*

As you sidle around to the stream look out for large old beech trees. The stream that you cross is the Makiekie or Coal Creek. It eventually joins the Pohangina River which in turn flows into the Manawatu. It is worth reflecting at this point on the effect that rainfall in this catchment in the mountains can have on the plains below. *(Activity 3: Reflections on the river)*

Much of the original reason for a park in these hills was to protect the water catchment. If people took all the vegetation off the steep slopes there would be no slowing of the huge rainfall dumps that occur quite regularly.

The effects of logging and forest destruction by pest animals soon became obvious to the people of the plains below as they saw floods getting worse and worse.

On the other hand, when rain had not come for a while the rivers dried up too quickly because there was less forest slowly releasing the vital water.

So the park was created, deer cullers were employed to shoot the excessive numbers of deer and there were some planting efforts.

At first glance, the stream looks quite lifeless. There will probably be fish such as eels and the adult forms of whitebait (inanga, kokopu etc) hiding in the banks or rocks. You could come back and spotlight for these at night but even if you can't find them you can get a good look at some lovely little creatures that are a bit lower down the food chain. *(Activity 4: Life in the stream)*

This activity could be extended to gather information for a food chain study. The little invertebrates are feeding on algae that grow on the rocks. The next steps in the food chain relying on these animals include fish and the people who eat them. Another possible consumer of the larvae is the blue duck which is a rare inhabitant of mountain streams. It is a unique **endemic** bird which dives into turbulent water to feed.

From the stream, the track continues around to the right through obviously disturbed forest. These foothills were heavily logged and browsed and now a continual effort to control browsing animals will be required for the forest to come back to its former quality. *(Activity 5: Quality forest)*

When you reach the sign for the Deerford Track follow this. There is quite a scramble of low growth here. Bush lawyer (**tataramoa**) with its prickly stems is ready to tangle anything that tangles with it. The thorns are double value to the plant because as well as providing some protection from browsing animals they also help the plant to cling onto the trees it uses to raise its leaves up into the light. *(Activity 6: Bush lawyer)*

Te Ngahere a Tane

This lovely short track was set up in the 1970s and has been well used since. The following notes are to update the originals which are still worth obtaining from the Sixtus Lodge Trust.

Go to the right after you enter the track which is a loop. Follow the pegs in an anticlockwise direction. If you have a large group, split them up and space them around the track because large groups of children will increase the width of trampled area. *(Activity 7: On track)*

Station One draws attention to epiphytes such as the Astelias in the tree above. Like all the other plants in the forest they rely on light for their energy. Down on the forest

floor this is in short supply so using tree branches is attractive provided that there is enough rainfall to survive up there. *(Activity 8: Epiphyte fight)*

Walk past some lovely filmy ferns and some prickly looking **mingimingi** to **Station Two** where there is a good example of **tawhai** (**red beech**). Forests are often named after the dominant tree species and so this is a beech forest because of giants like this one. *(Activity 9: At the beech)*

On the next section of walk and at **Station Three** there are examples of trees growing out of the decomposing remains of other trees. Mature rainforests are restricted by the supply of minerals that they can get because the high rainfall washes a lot of them away (leeching of the soil). When a tree falls, its supply of nutrients is like gold and as soon as the decomposers (mainly fungi) start releasing the nitrogen, phosphate, potassium etc. roots will be waiting to mop them up. *(Activity 10: Recycle everything)*

Station Four has some nice young podocarp trees in the area. Rimu with its characteristic droopy foliage and miro will eventually join the canopy but there are probably too many of them here for all of them to survive the thousand years or so that they are capable of.

Both of these are **podocarps**. Although their heritage goes back to the Jurassic, podocarps are far from past their use by date. They still dominate our lowland forests and produce huge quantities of fruit for the animals living there. They belong among the conifers (cone-bearing trees) but their fruit is quite different from a pinecone. In rimu, totara and kahikatea, the small seed is perched on a fleshy foot (that is what podocarp means, "foot seed") but miro and matai have more conventional looking fruits. *(Activity 11: Rimu rising)*

As you move on keep an eye out for the lovely mosses and filmy ferns on the way to **Station Five**. At this point there is an old kamahi. *(Activity 12: Kamahi)*

Station Six is a good place to look at some tree ferns. These ones are called **katote**, often the common variety in mountainous regions. *(Activity 13: Tree ferns in skirts)*

Station Seven is among some of the trees that make up the sub-canopy of the forest. In this case a variety of horopito is the main representative. *(Activity 14: Understorey story)*

At **Station Eight** there is a large patch of **crown fern** making up a dense forest floor layer. Like other hard ferns from the *Blechnum* genus, these ferns have two different types of frond, a normal one for gathering light and another darker, thinner type that carries spores.

Now that you have looked at different layers of the forest, try putting it together. Look around in this part of the forest and see the full picture of a multi-layered forest. *(Activity 15: Stratification - the layered look, Activity 16: Crown ferns)*

Poking through are some horopito easily recognised by the red blotches and edges on wavy-edged leaves. If you are clear on its identification you could offer a piece of leaf for a volunteer to taste. It would be fair to warn them that the taste gives the plant its other common name of pepper tree.

After station eight you leave the loop track and have the choice to continue on through a variety of forest in various states of self-repair. **Station Nine** was set up as a soil profile study because there was an exposed bank, but the plants have covered over the features that were once visible here. You could make a teaching point of that or just

stop to listen to the sounds around and try to attract some birds. *(Activity 17: Sound compass)*

Some birds are attracted to your movement - most noticeably fantails have learnt that people disturb insects they can chase and catch on the wing. In many other cases, the birds that know their area better than you, will have hidden before you get to see them because they have heard your loud noises. Try to move quietly and stop every now and then to look around and listen. In many cases the birds will reappear to get on with their business. Scientists doing even quick bird surveys stop for at least 5 minutes at a time. *(Activity 18: Bring on the singing birds)*

We may like to think that the birds sing to share their joy with us but in reality a lot of the song probably translates as, "This is my patch, *#$% off". Birds of many types rely on their voice to hold a territory so that they can get enough food to raise their chicks. Fighting would be risky so they compete with their voices. You are likely to see or hear **fantails** (piwakawaka), **grey warblers** (riroriro), **tomtits** (miromiro), **tui**, **bellbirds** (korimako), **kereru** (wood pigeons) and **harrier hawks** (kahu). The two native cuckoos, **pipiwharauroa** (shining) and **koea** (long-tailed) also visit in summer to use the nests of unwitting hosts.

Watch out for the nettles in this area. If you have been talking about protection against herbivores to the students then this plant is great example of a little chemical warrior.

A bit further along the path there is a lovely vista at **Station Ten** of a large rimu tree (see activity 11). Normally it is hard to see an individual tree exposed like this as they usually form a connected canopy to gain mutual protection from storms.

10m back along the track is an attractive **miro** with its hammered bark. These trees are a favourite of the kereru when their attractive red fruit is ripe. *(Activity 19: Mighty miro)*

Station Eleven is a bit further on toward the river but it is a pleasant spot to look at some of the plants that flourish when there is a damp spot with reasonable light levels. *(Activity 20: Magic carpet)*

Longer walks available from this road end can provide challenges at varying levels.

You can continue on the **Deerford Track** from the end of the walk just described and make it a loop by returning down **Short's Track** after you reach their junction. This includes quite a climb and takes in some changes of vegetation as the soils become shallower and the forest becomes more exposed. Allow two hours walking time for the loop.

Really adventurous and well-prepared groups could consider following either Short's or **Knight's Ridge Track** to the top of the Toka peak (1526m). This would be a day trip involving a challenge for even fit students.

Another possibility is just to take your group as far as they are able to comfortably travel up one of these tracks, perhaps aiming to reach the tree line to see the types of plants that grow at the level. **NOTE** Re-read the safety notes at the start of this guide if you are aiming to take on one of these bigger challenges.

The following activities can be added if you are looking for more challenges for your students on a longer walk. *(Activity 21: Who ate it?, Activity 22: Comparing the environments, Activity 23: Spider patrol, Activity 24: Fruit display, Activity 25: Who would eat the fruit?, Activity 26: Fernland, Activity 27: Feel the forest)*

ON SITE ACTIVITIES SECTION

Note: It is not suggested that your class does all of these activities. Choose ones that suit your aims and modify them to your class level.

Activity 1 Check your rocks

Wherever there are rock exposures take the time to examine the rock (see the pre visit activities). Mostly the rock is **greywacke**. What colours can you see if you look closely?

Can you see any crystals in it? Does it vary from site to site? Can you find any rocks that have bands of different colour or texture?

Activity 2 In the bank

After you have crossed the farmland and before you reach the stream, look at the cuttings made for this track in the side of the hill What shape are the rocks in this bank here?

New rock-falls usually have rocks with sharp edges because they break off along cracks. What has made the rocks in this bank into the shape they are now?

How would the steams in these valleys be pushed into new courses?

Activity 3 Reflections on the river

Before you cross the stream, think about the importance of this mountain water.

How long ago was it since there was good rainfall in the area? Why does water keep flowing in these streams even months after it stops raining? Where will the water from this stream end up? Who will use the water from this river when it goes out onto the plains?

Rainfall can be very heavy in these ranges because they stand in the path of weather systems crossing the North Island. What would happen here if there was a big down pour in the hills?

What would happen after such a storm to the Manawatu River which collects water from hundreds of creeks such as this?

What effect would it have on streams like this if we lost all the trees on the ranges and they were just bare smooth rock?

Activity 4 Life in the stream

Lift rocks carefully from the bottom of the stream. What little animals can you find underneath? Try to identify them from the diagrams provided in the resource kit. Place them into a small container so that you can draw them before returning them to the stream. Some of the life forms will not be found so easily but if you hold a net downstream from where you are lifting the rocks and disturb the area some more with your hand or foot you will be able to collect more types. Draw as many as you can find.

These creatures are very important. What animals could they provide food for?

Activity 5 Quality forest

Quality forest in the hills is valuable because it leaks clean water slowly into streams and keeps the catchment much safer from flooding. It also provides habitat for the great variety of life that we call our biodiversity. But how can we tell quality forest. Here are some measures. Try the following measures in three different places.

How tall are the trees you can see in this area?

How many different types of trees can you see from this point?

How many layers are there between the top most leaves and the forest floor?

What is the undergrowth like?

Describe and/or measure the environment recording temperature, light, humidity, and soil depth.

Activity 6 Bush lawyer (Tataramoa)

Take a closer look at the bush lawyer vine that scrambles over many of the plants in this area. Why does it grow on top of the other plants?

Draw a sketch of the shape of the thorns.

How does this shape help them to be so successful in their lifestyle?

Describe any other vines that you see on your travels and say how they get their leaves up into the light.

Activity 7 On track

Many visitors comment on the beauty of the forest floor in our alpine forest. It is a special living carpet!

How many different types of ground cover plant can you see within a metre either side of the track?

Can you see places where people have gone off the main track and worn away new tracks?

What would happen if increasing numbers of visitors kept doing this?

Why doesn't grass fill in the gaps between the trees here like it does in town?

Activity 8 Epiphyte fight

Find a tree with a heavy burden of epiphytes.

How many different plants are growing on the bark of this tree?

Why are they growing up there on another tree where there is no soil and where it must sometimes dry out badly?

What defences do some trees have that keep them relatively clear of the epiphytes?

Activity 9 *At the beech*

This is a tawhai or red beech tree.

Describe the bark of this tree or put a sheet of paper on it and rub over with the flat surface of a crayon.

When you are looking up you are seeing the canopy of leaves that it creates. Is it an open canopy letting in a lot of light, or is it quite dense making the forest floor very dark?

Draw a sketch of the base of this tree. How would having these buttresses help a big tree survive the severest storms? It would have had to endure many of these in the hundreds of years it has been alive.

Activity 10 *Recycle everything*

Look at the trees that are growing on fallen logs.

Where do their roots grow?

Do you think these trees will fall over when the logs they are on are completely rotted away? Why?

Activity 11 *Rimu rising*

At **Post 4** look for the young rimu. It is the tree with drooping branches.

Does rimu have leaves like other trees?

How does its foliage feel?

What does the bark look like on these young rimu?

Activity 12 *Kamahi*

Post 5 marks an old kamahi tree. Do your bark rubbing or drawing again for this tree. How many other types of plant life is this tree supporting?

Possums like to eat kamahi leaves. What would happen to a kamahi forest if the new leaves were continually eaten off?

Like many old trees, this one has started to hollow out as some of its old wood rots. What animals could live in such hollows?

Activity 13 *Tree ferns in skirts*

These tree ferns are **katote**.

Which part of the tree makes up its skirt?

How is the trunk of a tree fern different from those of the other trees that you have looked at?

Activity 14 *Understorey story*

Not all the trees of the forest can make it up into the top layer or canopy of the forest. Here you can see some shiny-leafed horopito trees that seem to be growing quite well under the taller trees. They make up the subcanopy when they get above the forest floor. What would be the advantages of living in the subcanopy? What would subcanopy trees be short of compared to those in the canopy?

Activity 15 *Stratification - the layered look*

Look at the layers of life in this forest. Draw a sketch of the different plants that you can see from your viewpoint and then compare them to the diagram of forest layers.

Find some foliage that has fallen from the canopy or emergents and compare it to the leaves of trees in the shrub or ground layer. What do you think has caused the differences?

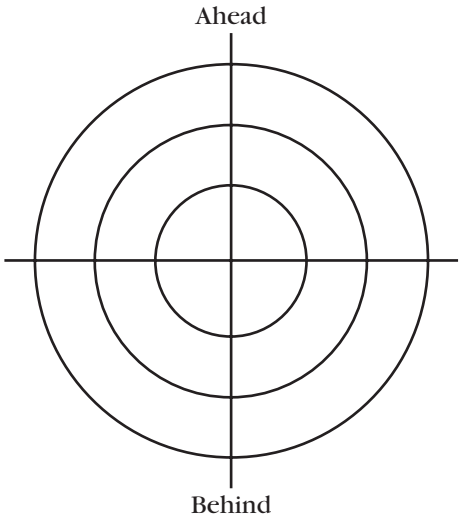
Activity 16 *Crown ferns*

Why do you think these attractive ground ferns are called crown ferns?

Like the pepper tasting horopito which is also common around here, the crown fern is disliked by some animals from overseas that have been brought into our forests. Name two of these animals. What will happen to the forest if the browsing animals keep eating just their favourite plants?

Activity 17 *Sound compass*

Make up sheets like this:



Now spread out and sit by yourself for five minutes in the forest. Record every sound that you hear by naming or describing it. Put the nearby sounds in the inner circle, the further away ones further out in your diagram.

Share your records when you get back and try to work out how many different life forms the class has heard altogether.

Activity 18 *Bring on the singing birds*

Make a list of the birds you happen to see on the walk.

Do any of the birds seem to be attracted to your presence?

If you want to be more of an ornithologist (bird investigator) stop at several points and keep still for 5 minutes listening carefully for birds. Birds that were disturbed by your approach may reappear.

A more active method is to rub some polystyrene or cork on glass to produce the high pitched squeaks that the small insect-eaters such as tomtits, fantails and grey warblers use. This will make the right sounds to bring them out to see who the strangers are.

Do the birds "counter-sing" to your noises (answer back)? This is their main way of holding territory to live in. Singing beats fighting!

We may like to think that the birds sing to share their joy with us but in reality a lot of the song probably translates as, "This is my patch *#$% off". Birds of many types rely on their voice to hold a territory so that they can get enough food to raise their chicks, fighting would be risky so they compete with their voices.

Activity 19 *Mighty miro*

Look at the miro tree. What has it got in common with the rimu that you have just seen?

How would you describe the differences?

The bark of miro looks hammered because it peels off in small flakes. Think of an advantage that this might give a tree in a rainforest where plants grow all over each other.

Activity 20 *Magic carpet*

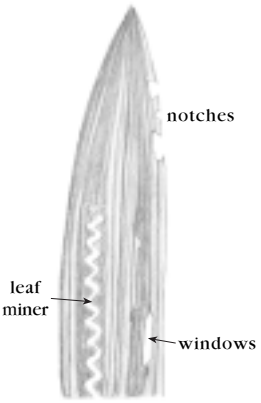
Many visitors comment on the beauty of the floor-covering plants in our rainforest. It is a special living carpet. Why is this area especially moist?

How many different types of plant can you see on the ground here?

The plants forming spongy clumps are called mosses. What is each clump made up of?

If you are carrying on for another walk try some of the following activities

Activity 21 *Who ate it?*



Look at the way that some leaves are being eaten. All the animal life in the park gets its energy directly or indirectly from plants, so it is not surprising that there is a lot of evidence that herbivores have been at work. Draw five leaves that have been nibbled, chewed, sucked or mined. Can you find any of the animals responsible? If not, where are they? Use the diagram to help you identify the culprits.

How do plants fight back? Make a list of their adaptations to avoid being eaten (consider how leaves like horopito taste very strong and then look at leaf shapes, coverings etc.) Look for evidence of healing and colour changes around the damage. In many cases this is where the plant is loading chemicals to repel the herbivores.

Activity 22 Comparing the environments

Stop in four places which seem quite different.

Record the aspect or lie of the land (how steep and whether it faces north or east for instance).

Describe and/or measure the environment recording temperature, light, humidity, and soil depth.

Now describe the life that you see around in this area. What type of trees can you see? How tall are they? Are there layers of plants? What is the undergrowth like?

Activity 23 Spider patrol

Keep a look out on your journey for evidence of spiders. Even if you don't see any, you will find some of their web material. Not all will be classic sticky orb webs. Others are made up of threads running down to a trampoline-like platform. These webs aren't sticky but they cause flying insects to crash and be caught by the fast running spider on the platform below.

Activity 24 Fruit display

Write a marketing report for the fruiting trees. The trees are in a way offering payment to the birds i.e. the food value they put into their fruit for a seed spreading service. If the birds don't find or eat the fruit then the tree will not get its seeds spread. Some fruit uses colour in the advertising and others use display arrangements. Do you think you could improve on the marketing strategies the trees are using?

Activity 25 Who would eat the fruit?

Fruit is an interesting part of the forest ecology. Take a closer look and fill out the following table. The second table gives you information on **gape sizes** (maximum amount that an animal can open its mouth).

TYPE OF TREE NAME OR DESCRIPTION	FRUIT COLOUR	HOW IT IS DISPLAYED (CLUSTERS, SINGLY, STALKED ETC)	POSSIBLE CONSUMER

NAME OF ANIMAL (E)= EXTINCT (N)= NOT NOW IN PARK	WEIGHT	GAPE (HOW WIDE THEY CAN OPEN THEIR MOUTH)
Moa (e)	Up to 250kg	Over 50mm
Kaka (n)	475g	20mm
Kereru (native pigeon)	650g	14mm
Tui	120g	9mm
Bellbird/korimako	34g	6mm
Whitehead/popokatea	18.5g	5mm
Silvereye	13g	5mm
Green gecko	60g	10mm

Activity 26 Fernland

New Zealand has been called 'fernland' because we have over 160 species of fern and they are a real feature of our forests.

Turn fern fronds over and look for the brown dots called *sori*. These are where the fern spores come from. Draw the layout of the sori and look more closely at their structure. Look also for the hairs or scales on the coiled fronds or koru and on the trunks (if present) of ferns. Mammals have hairs to keep warm. Why do ferns have them?

Gently feel the different textures of fern leaves. Why are some leaves so tough?

Activity 27 Feel the forest

Record your thoughts and feelings about this very different looking forest. How does it smell and feel to you?

It has been called lowland forest, rainforest, native forest, the bush and the realm of Tane. What name would you give to it?

If you were given the money to make a film here, what would you choose to do?