Trees
for the
Environment

This unit of work highlights
the value of trees in our environment

Taranaki Regional Council

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Curriculum links

The topic of trees lends itself well to all curriculum areas. Below are some curriculum objectives which apply to the science and social studies curriculum. Also included are ideas to fulfil English, maths, art, technology and social studies objectives.

Science

Making Sense of Planet Earth and Beyond

Achievement objectives:

Level 1

- Share their ideas about some easily observable features and patterns that occur in their physical environment and how some of the features may be protected.
- Suggest ways that their immediate physical environment was different in the past, eg. the school playing fields, land use, river channels

Level 2

- Investigate easily observable physical features and patterns and consider how the features are affected by people.

Level 3

- Justify their personal involvement in a school or class initiated local environmental project, eg. a school tree-planting project.

Level 4

- Investigate a local environmental issue and explain the reasons for the community's involvement, eg, replanting a cleared hillside.

Making Sense of the Living World

Achievement objectives:

Level 1

- Share their experiences relating to the living world, and group the living world according to some of its attributes, eg, living, non-living, plant, animal.
- Observe and identify parts of common animals and plants.
- Investigate and describe the changes in a particular plant or animal over a period of time.

Level 2

- Investigate and understand the general functions of the main parts of animals and plants, eg, seeds, roots, flowers, cones.

Level 3

- Distinguish between living things within broad groups on the basis of differences established by investigating external characteristics eg, pohutukawa, rewarewa, kowhai.
- Investigate special features of common animals and plants and describe how these help them to stay alive, eg, roots, leaves.
- Research and describe how some species have become extinct or are endangered, eg, moa, dinosaurs, cabbage tree, kokako, kauri, snail, kakapo.

Level 4

- Investigate and classify closely related living things on the basis of easily observable features, eg, rata, pohutukawa.
- Investigate and describe special features of animals or plants that help survival into the next generation.

Other activities could include:

- Find out about the growth rings of trees.
- Make a time line of a tree's growth.
- Investigate the:
  - water cycle

  - carbon cycle
  - food chains/webs in trees/forest/bush
  - trees as a habitat/community
  - seasonal changes
  - the recycling of nutrients (animals/leaves)
  - forest layers
- Design and carry out experiments to show how trees help to prevent erosion.
- Find out about the dangers to trees. Rank these in order of severity.
- Complete a study of a dead tree.
- Complete an information chart about photosynthesis (leaves as energy converters).
- Complete a native tree identification chart (or game). Include as many Maori names as possible.
- Make a mobile showing all the ways trees help to improve the environment.
- Collect a file of fascinating facts.
- Grow some tree seedlings. Plant them out, watch them grow, care for them.
- Explore leaf litter. Devise experiments to test moisture, temperature, light etc
- Describe the features and growth stages of a native tree, eg, lancewood.
- Explore trees in the environment to find examples of:
  - insects using leaves as their habitat
  - plants using bark as their habitat
  - animals using branches of trees as their habitat
  - plants using branches of trees as their habitat.

Social Studies

Resources and economic activities

Achievement objectives:

Level 1

- Demonstrate understandings of …
    - what resources are and why people need them
    - ways people make a living in their community.

Level 2

- Demonstrate understandings of …
    - how and why a group of people has developed a resource within a community
    - how and why people produce and consume goods and services.

Level 3

- Demonstrate understandings of …
    - how and why different cultural groups value and use a resource
    - relationships that develop between producers and consumers

Level 4

- Demonstrate understandings of …
    - the implications of the various decisions people make about the use of resources.

Place and Environment

Achievement objectives:

Level 1

- Demonstrate understandings of …
    - places that are important to them, and the reasons why they are important

- how a natural feature and a cultural feature in the local area affect people, and how people affect these features

Level 2

- Demonstrate understandings of …
  - how and why people perceive their local area differently
  - how natural and cultural features of an environment affect people's lives and how people affect these features.

Level 3

- Demonstrate understandings of …
  - people's perceptions of different environments and the reasons for these perceptions
  - how and why people in the past have interacted with their environments.

Level 4

- Demonstrate understandings of …
  - how and why people's perceptions of place and environment change over time
  - how and why the interactions between people and the environment change over time.

Activities could include:

- Investigate the use of forest and bush areas.
- Draw a map of New Zealand and show where the regional and national parks and reserves are located.
- Tourism and trees - write about it!
- Explore conservation issues ... stating opinions and justifying them.
- Look at logging history and the uses of wood in the past, present and future.
- Find out about people who live in forests – today and in the past.
- Follow the journey of a log and the energy used in processing it.
- Find out what a sustainable forest is.
- Discuss how the New Zealand forest has changed since people arrived here and how it could change in the future. (Help develop atlas skills during this process).
- Consult the local historic society, older people, old photos to find out where the bush was growing in particular areas in the past. Present the findings on a timeline.

English

A number of Achievement Aims and Objectives from *English In the New Zealand Curriculum* could become a focus for teaching and assessment on the topic of trees.

For example

Written Language; Reading and Writing

Achievement Aims: Students should be able to:

- engage with and enjoy written language in all its varieties
- understand, respond to, and use written language effectively in a range of contexts.

Activities could include:

- Gather a list of words about the topic
- Make up a word find or a crossword puzzle based on the topic
- Keep a reading list as the topic is explored
- Write instructions about how to climb a tree
- Write poems, descriptions, personal experiences involving trees
- Write a shape poem or a haiku or cinquain
- Write newspaper articles about tree issues, eg, the logging of native trees on private property
- Write letters of support to conservation groups
- Read for information – develop skills of skimming, scanning, note taking
- Retell myths and legends related to trees
- Interview ‘experts’ to gain information

Other curriculum-based activities

Maths

- Sort and measure leaves
- Measure the girth of trees. Graph the results
- Measure the size of the shade of a tree at different times of the day
- Keep a tally of the number of birds flying in and out of a tree at different times of the day. Graph the results
- Estimate the height and ages of trees
- Compare and contrast sizes, species of trees
- Complete surveys of the variety of trees in the school/home environment
- In cubic metres work out the approximate value of a range of trees in the school grounds
- Make up a location map of trees in the school ground – make use of coordinates

Music

- Compose a rap or a song
- Make up a melody using wooden blocks
- Use instruments to imitate the sounds of a forest area
- Make up rhythms and chants using the names of native trees
- Complete a study of instruments made from wood
- Movement and drama
    - The growth of a tree
    - falling leaves
    - tree felling

Art

- Sketch a tree from 30 metres, 10 metres, 2 metres. Sketch details, shape, outlines, leaves, roots, lichens, mosses
- Collect bark rubbings
- Complete collage using natural materials
- Charcoal drawings of trees

- Paint with twigs, bark, fibres
- Use twigs for weaving
- Use natural materials (twigs, flax) to complete Taniko (decorative weaving)
- Design a Tukutuku panel
- Make leaf prints and imprints
- Design a poster with a conservation message
- Make paper
- Use traditional Maori designs to create a picture of Tane Mahuta (eg, Koru)
- Paint/crayon/pastel trees experimenting with shades of green and brown. Capture autumn changes.

Technology

- Using only twigs and twine, design and make a model raft, a whare, a frame for a kite
- Design a trap to stop possums from getting into our trees
- Design a costume for camouflage in the forest. You can use only natural materials
- Collect different samples of wood – hardwoods, softwoods, balsa, ones with interesting grains etc. Design experiments to find out about their properties and why different woods are used for specific purposes
- Invite a builder to come and talk to the class about making/using wood for construction
- Design and carry out experiments which test the effectiveness of glues, joins, nails in construction
- Try changing paper to pulp and then to a solid material. Experiment with making paper with fibres straight from a tree. Try different methods in breaking them down
- Design and construct a strong structure out of paper. Which shape is the strongest for construction
- Design ways of moving large logs out of a forest. Compare past technologies with current methods.

Introduction

I think that I shall never see
A poem lovely as a tree.

[*Trees – Joyce Kilmer, 1888-1918]*

Trees are a wonderful natural resource that contribute to the health of the environment in so many ways.

Trees:

- provide us with the oxygen we breathe
- play a role in the water cycle
- bind the soil protecting it from erosion
- provide shelter and a barrier to wind, noise, light and fumes
- provide habitat and nutrition for birds, animals and plants
- provide material for houses, furniture
- provide natural products such as rubber, cork, gums
- filter run-off from land entering rivers
- beautify our environment.

Of course they have many other features which enhance our life here on earth.

Public interest in the benefits of trees is increasing as the media informs us of issues such as the demise of the world's rain forests and the possible effects on the earth's climate. People are becoming more aware of the benefits trees provide to our environment.

This unit of work focuses on the New Zealand scene. We have a large amount of endemic (found only in New Zealand) trees due to our isolation. We also have a range of exotic (introduced) trees which also contribute positively to our environment.

This unit champions the tree and raises the awareness of how trees can benefit our environment. The information provided and activities suggested will only cover a small range of the possibilities available for a tree study and will largely concentrate on how trees are used by the Taranaki Regional Council to enhance the environment.

Introductory activities

Go for a walk in a bush area. See if you can identify any native or introduced trees.

Sketch the foliage of a tree you like or do bark or leaf rubbings. Complete the following sentence: Trees are important because …

Look for seedlings growing in your bush area. Look for evidence of damage from people and animals. Write down six things you know about trees. Write some things you would like to know.

See if you can identify these natives

1. My droopy leaves are prickly to touch and I can grow to over 50 m high (rimu)
2. My name means yellow in Maori and birds love my nectar (kowhai)
3. I grow particularly well near the beach and I have brilliant red flowers at Christmas time. (pohutukawa)
4. I am a small growing fern that is a national symbol of New Zealand.(silver fern)
5. I am a famous NZ tree with an enormous trunk. I provided gum for New Zealand's early settlers. (kauri)
6. I grow tall and thin with sword-like leathery leaves up high. (lancewood)
7. I have very small leaves and small white flowers. People have used me for firewood, brooms and brewing tea. (manuka).

Study 1

How trees live and breathe

Trees and animals have a wonderful relationship. We need them and they need us. Trees take in carbon dioxide and give off oxygen.

Trees make energy through a process called photosynthesis using the energy in the sun. The light from the sun is absorbed and with water and carbon dioxide in the cells of the leaves, sugar is produced which helps the tree to grow.

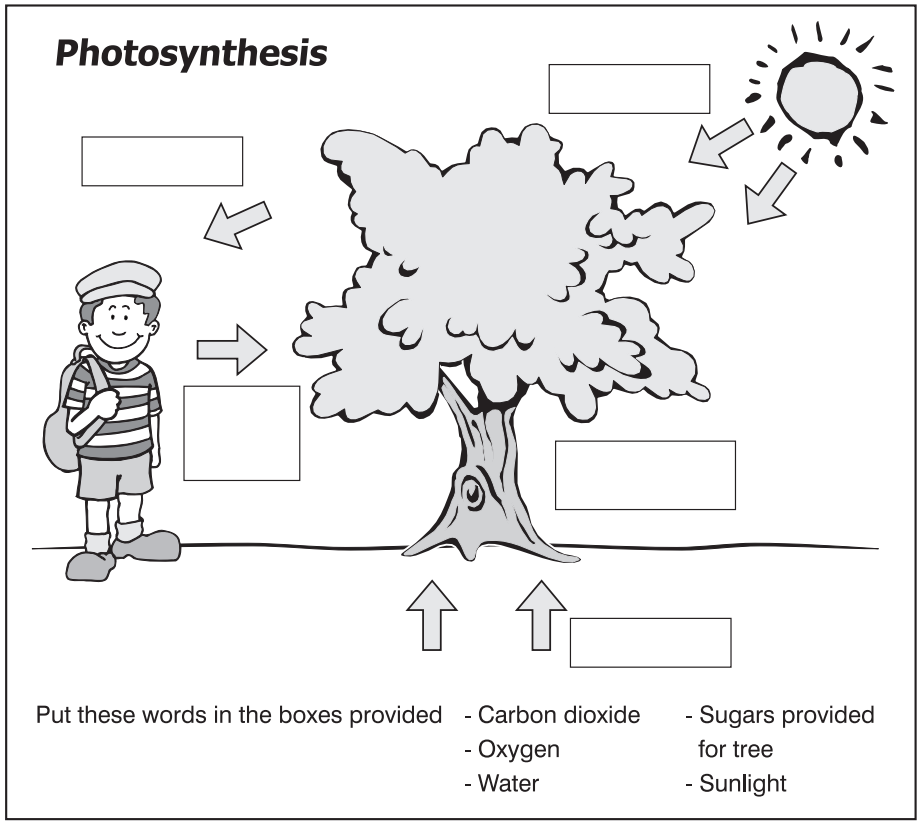
This process called photosynthesis also produces oxygen as a by-product. This by-product is used by us humans and other animals to keep us alive. Trees also use water, taking it from the ground through their root systems and giving it out into the atmosphere through their leaves.

Respiration also takes place where the sugars produced by photosynthesis are broken down releasing energy for the plant to live and grow. This uses oxygen and carbon dioxide is given out. During daylight more oxygen is given out through photosynthesis than is used by respiration. At night, no photosynthesis takes place.

Photosynthesis energy + sunlight + water + carbon dioxide → sugar and oxygen**.**

Respiration sugar + oxygen → energy + carbon dioxide + water

Activity 1 Using the diagram below fill in the words to show the process of photosynthesis.



Activity 2 Use the following shapes to draw oxygen, carbon dioxide and water molecules.

Oxygen = □	Carbon = ○	Hydrogen = △
Oxygen (O_2)	Carbon dioxide (CO_2)	Water (H_2O)
For example	□○□ = CO_2	

Activity 3 Place a plastic bag over a pot plant. After a few hours you will notice moisture on the inside of the bag. This shows how plants give off water**.**

Activity 4 The amount of CO_2 in the atmosphere is a concern for the environment. A build-up of CO_2 is said to cause global warming.

This happens when heat from the sun's rays is reflected off the earth and trapped in the layer of CO_2 gas in the atmosphere. This trapping of gas is important to provide protection from extreme temperatures but if too much CO_2 builds up, the layer traps too much heat and warms up the earth, a bit like what happens in a greenhouse.

Things that are making this worse include people burning too much fossil fuel like oil and gas and burning down forests which puts extra carbon dioxide into the air.

Trees give off oxygen and use carbon dioxide so they help reduce the amount of CO_2 in the air and help prevent global warming.

Write about how we need to plant more trees to benefit the environment by using up CO_2.

Study 2

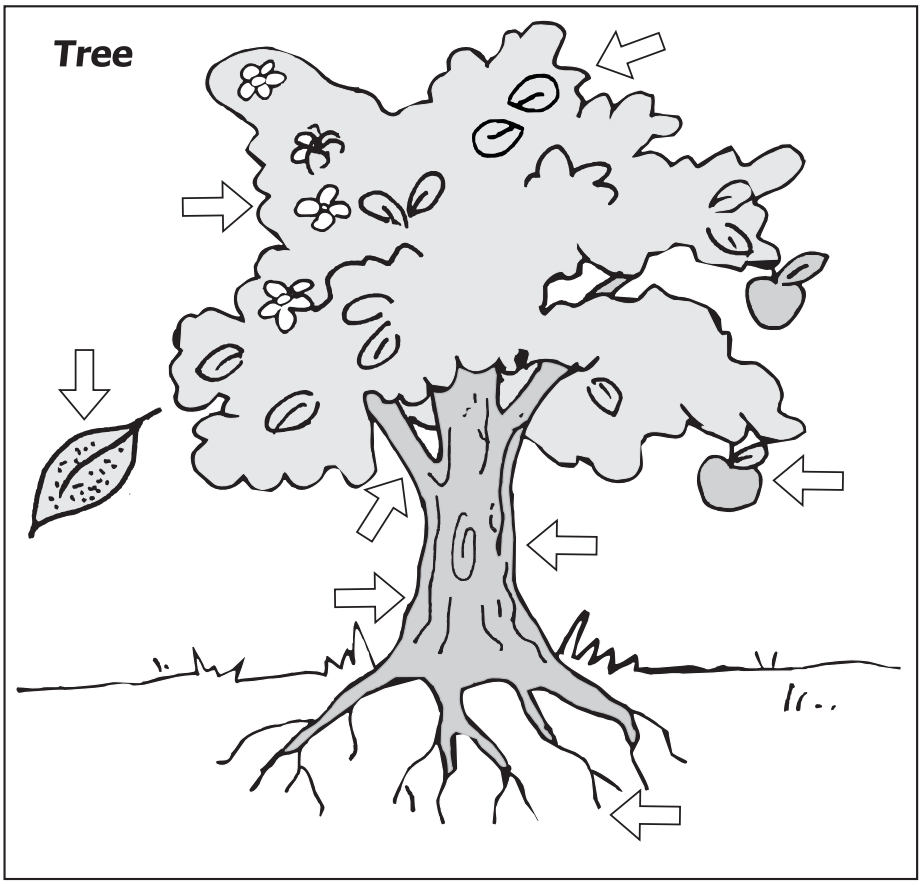
Parts of a tree

A tree is a wonderful work of nature that is made up of many parts which work to make the whole tree function.

Activity 1 Match the part of the tree to the correct definition.

Bark	-	help protect the seeds while they develop and grow
Stomata	-	provides strength and structure for the tree
Branches	-	make food for the tree through photosynthesis
Roots	-	the outer protective layer of wood
Flowers	-	help spread the leaves out so they can reach the light
Leaves	-	attract insects and birds to help with pollination
Trunk	-	tiny holes on the surface of leaves giving off water vapour
Fruit	-	hold the tree up and bring water and nutrients from the ground

Activity 2 Draw a tree or use the tree below and label the parts saying what function each part serves.



Study 3

Trees and habitat

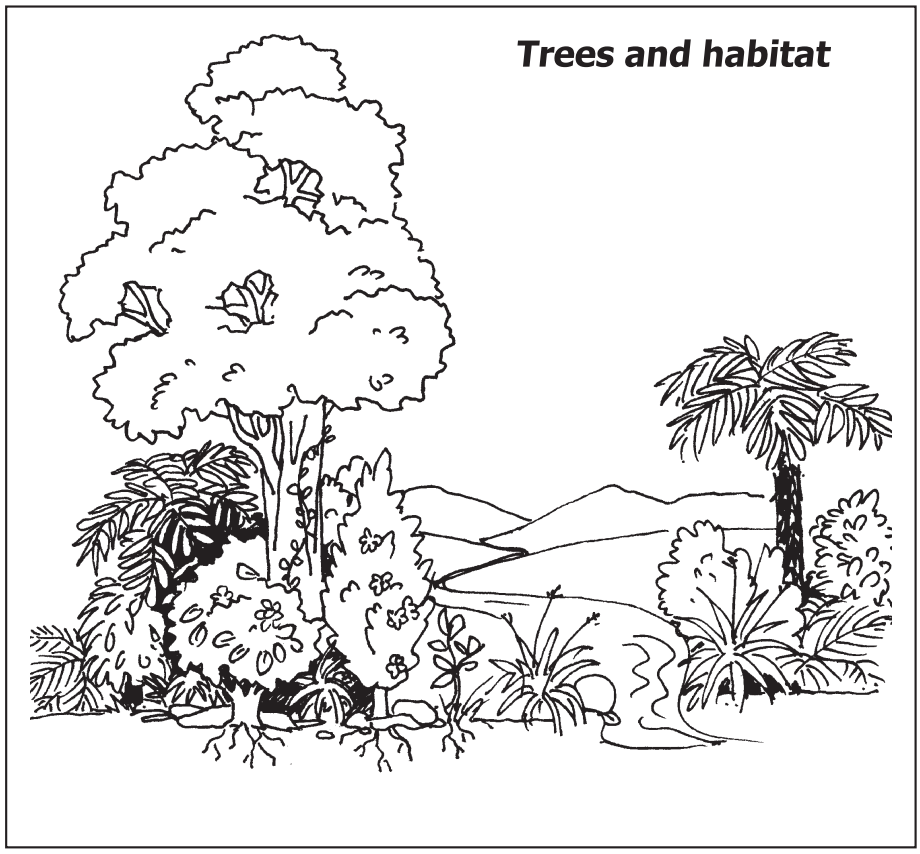
Habitat is the place where creatures or plants can live, in other words the home of a plant or animal. Trees provide habitat for many animals and other plants and provide a source of food.

- Birds build nests in the branches
- Bees collect nectar from flowers
- Caterpillars eat the young leaves
- Spiders hide under the bark and build webs between branches
- Worms, wetas, live in the leaf-litter under a tree
- Fish can live around the roots when trees are near waterways
- Kiwis and kakapo and other flightless birds live around the roots
- Perching plants live between branches
- Climbing vines twist around the trunk
- Mosses and lichens live on the bark
- Ferns live around the base of the tree.

Activity

On the drawing of the bush, label where plants and animals can live.

Write about why trees are important from a habitat point of view.



Study 4

Tree adaptations

Trees have many ways of adapting to the environments they live in and this allows them to survive and ensure that their species live on.

Some examples of trees adapting to living in certain environments include:

Kahikatea (white pine) can live in a swampy environment and has buttressed roots which help stabilise it. The roots are shallow which are also suited to swampy conditions as the top layers are not so waterlogged. The kahikatea is tall, so it can reach the light. It produces a lot of berries which are attractive to birds ensuring that the seeds are spread. The berries turn bright red. This colour is very visible to birds. The seeds aren't digested by the birds so they are dispersed in bird droppings.

Manuka (tea tree) grows fast to avoid competition. It produces a large number of light seeds that spread easily by wind. The seeds are hardy and can survive forest fires. Fire actually ruptures the seed capsule giving it a head start over other plants. Manuka are very tolerant of many soil and climatic conditions, allowing them to grow in most locations. The bark peels, preventing other plants growing on the trunk. The manuka flowers prolifically, attracting creatures to ensure pollination.

Kauri young and adult kauri trees are shaped differently to maximise the use of sunlight and space. The side branches prune themselves to prevent damage to the tree. The large trunk provides strength and stability for the branches to spread. The leaves of the young tree are different to the adult, to make use of the different conditions. The bark on the kauri tree sheds to keep the trunk clear of climbing plants or vines. This also creates a rich layer of humus around the tree roots. Large amounts of gum are exuded from the tree to heal wounds and repel timber boring insects. The kauri has winged seeds which help it disperse in the wind and because so many seeds are produced there is an increased chance of finding a suitable place to land. The ripe female cones shatter easily, ensuring dispersal. A large amount of pollen is produced to assist pollination of the cone.

Northern Rata produces large amounts of wind-blown seeds. It grows high up in the sunny canopy so it can receive plenty of light. Because if often begins life in a host tree it sends down aerial roots to help it outlive its host. The rata has bright red flowers to attract birds, geckos and insects for pollination.

Activity Use the information above to make notes (using bullet points) about each tree and its adaptation to its environment.

For example

Kahikatea

- buttressed roots keep it stable in swamp
- shallow roots avoid water-logged soil
- tall to receive best light
- bright fruit visible to birds.

Find out about other trees and their adaptations to living in their particular environment.

Study 5

Rivers love trees

Riparian margins are the strips of land next to waterways (streams, rivers or lakes).

When trees and other plants are planted in this riparian zone they benefit this part of the environment in many ways including:

- **keeping the water cool**

  Fish and other creatures living in water prefer cooler water to live in. During summer fish sometimes die because of the stress caused by warm water.

  Cool water also carries more oxygen than warm water. This oxygen is essential for life.

  Cool shaded water is also less likely to have moss and algae growing in it.

- **preventing streambank erosion**

  The roots of trees help hold up the banks and stop the soil breaking and going into the waterway.

  This saves land and also stops the water becoming turbid (dirty looking).

- **filtering run-off from paddocks**

  Trees and their roots filter off pollutants from the land such as fertilisers, pesticides etc, and stop them entering the river when it rains. This keeps those pollutants from entering the waterway and possibly killing life in the stream.

- **providing habitat**

  Animals, including birds and fish are provided with a place to live by the trees and plants living next to a waterway.

- **keeping stock out of the water**

  Farm animals can damage streambanks and spoil the quality of the water in our rivers. By having a fenced riparian area, farm animals are kept out.

- **making the streamside an attractive area**

Activity

Compare the two photos and discuss the improvement riparian planting makes to a waterway.

Key questions (possible answers bracketed)

Photo One:

1. What is happening here? (stock are wandering into the waterway)
2. What harm is it causing to the environment (the banks are falling in, the water will get dirty and will have bacteria in it from stock waste)
3. How will it affect the farmer? (The farmer is losing land, water quality is poor, some animals could die in the water).

Photo Two:

1. What is happening here? (There are plants along the waterway)
2. What benefits are there for the environment? (The river is shaded, cooling the water. The water is being kept clean as the plants filter run-off of fertilisers etc)
3. What benefits are there for the farmer? (The fence is keeping stock safe. The water quality is better, the land will be stable, shelter is also being provided).

Photo 1

Photo 2

Study 6

Erosion

Erosion is the wearing away and loss of land by the action of water or wind. In Taranaki we have some erosion problems.

- Erosion sometimes occurs in Taranaki when trees and other plants have been cleared off steep hill country. This causes slips when waterlogged soil falls off the solid base.

  Solution: plant trees to hold the soil together, and soften the rain falling on the land. The roots also bring the water from the ground and send it back to the atmosphere through the leaves.

- When riparian (streamside) trees and other plants have been removed causing banks to erode.

  Solution: plant trees and other plants in riparian areas to hold the stream banks and keep them stable.

- When sandy soil, especially on the coast is blown away by strong winds.

  Solution: plant trees and other sand binding plants to bind the sandy soil and prevent it from blowing away.

- When soil is disturbed by roading, pipeline trenches, subdivision and other earthworks.

  Solution: plant trees and other plants to stabilise the soil that has been disturbed by the earthworks.

Activity-experiment

Take a square of soil with grass on it (turf) out of the ground. Tip water from a watering can over the turf first with the grass side facing up then with the soil facing up.

When does the most soil erode away?

What does this tell us about the effect of trees and other plants in helping to stop erosion?

Other experiments could include putting soil on a piece of board and lifting one end and seeing at what angle the soil slips off. Try the same after adding a little water.

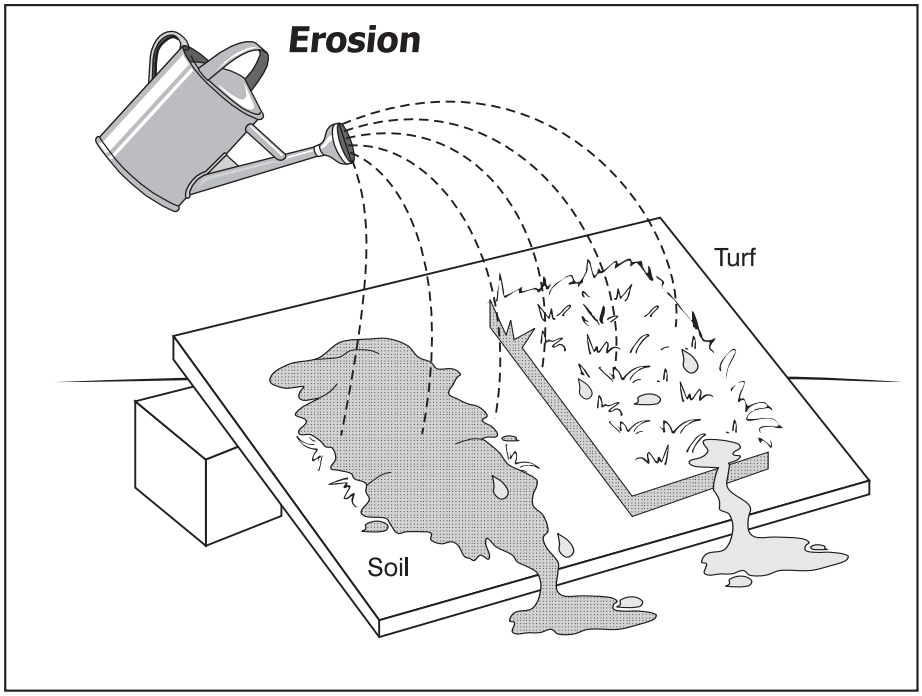


Photo interpretation (use photo 3)

Key question/discussion (answers bracketed)

1. Describe the photo (some land has been fenced and planted in trees, some flatter land is not planted)
2. What has happened to the land in the past? (there is some evidence of erosion)
3. What effect would this have had? (soil being lost, waterways silted)
4. How will the trees benefit the environment? (hold the land, lessen the impact of rain)
5. How can the farmer make a living from this land? (selling the trees, grazing sheep underneath)

Photo 3

Study 7

Traditional Maori use of trees

From the Sky Father, Ranginui and the Earth Mother Papatuanuku came the god of the forest and birds Tane Mahuta.

Maori legend Maori have many legends to explain the way plants grow in the forest. One example is the relationship between the harakeke (flax) and the kie kie (the flax-like plant we see perching in trees). Legend has it that they were brothers who parted company. The flax was the favourite of Wainui, the Mother of the Waters and hence the flax likes to live by the fringes of her swamps and streams. Kie kie however, preferred to be with Tane, the Father of the forest and kie kie today may be seen clinging like a child to the greatest trees of the forest.

Activity Read the story Rata's Canoe - School Journal Part 1 No 4 1981 and answer these question (answers bracketed):

What did Rata want to build? (a canoe)

What happened to the tree in the night? (birds and insects put the tree back up)

Why were the birds and insects upset?(because Rata didn't ask Tane for permission to cut the tree)

What happened after Rata asked for forgiveness? (the birds and insects made the canoe for him)

What is the message in this story? (respect the forest and use it wisely)

Extra: Retell this story in your own words and illustrate.

Traditional Maori use of plants and trees

Below are just some of the uses Maori found for native trees.

Kowhai

- Maori used to plant potatoes when the kowhai flowered as this signalled the end of winter
- kowhai inner bark soaked in boiling water was used to bathe bruises. The boiled bark was also drunk as a remedy for colds and sore throats

Manuka

- wood used for canoe decking and poles, fish hooks and rods, eel pots and weapons
- inner bark used for waterproofing roofs
- bark, shoots and seeds used for medicine

Kauri

- used for making canoes
- soot from burnt gum used for tattooing
- torches were made from kauri gum

Kawakawa

- leaves and bark used to heal cuts and wounds
- leaves chewed to freshen breath
- leaves and branches placed in kumara plantations and burned to repel insects

Kahikatea

- gum resin was applied to burns

Pate

- wood was used as tinder in the kindling of fire
- leaves placed between lips and used by hunters to attract birds

Pukatea

- buttresses of the trunk were used for carving elaborate figureheads on canoes
- bark used as a remedy for toothache

Ti kouka (cabbage tree)

- roots were sun-dried and made into a porridge
- sap from the roots used to heal wounds

Miro

- bark was used for water containers
- oil used as a body perfume

Totara

- used for canoes
- used to produce fire when a pointed stick was scraped across a slab of other wood like mahoe.

Activity Using the information above and any other information about uses of native trees.

Write a story imagining you are a Maori living in pre-European times. Explain how you would live and describe your daily routine using some of the trees.

For example I woke up and fetched some water from the well using our bark containers from the miro tree. After a breakfast of Ti kouka root porridge, I helped my uncle light the fire using sharpened totara sticks …

Study 8

Life cycle of trees

Although trees reproduce in a variety of ways, the basic outline below gives us an idea of how this reproduction happens.

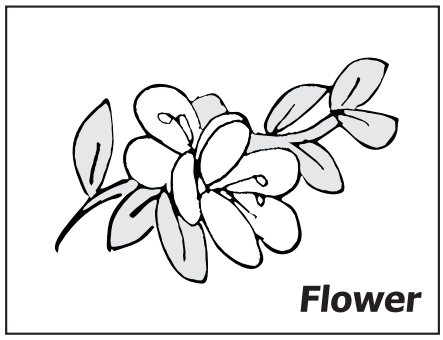
Many trees produce flowers. These flowers are pollinated by insects, birds and other animals and the wind. The pollination leads to the development of seeds and fruit, from the flower.

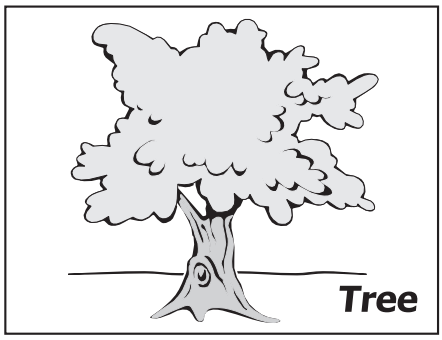
Different fruits distribute seeds differently. Some fruits are winged and are carried by the wind. Some fruits throw their seeds out several metres. Some fruits are eaten by animals and the seeds fall to the ground, sometimes great distances away after passing through the animals.

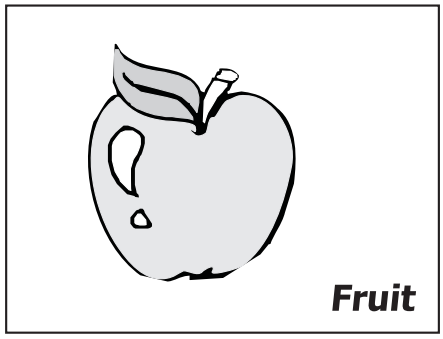
From the seed comes the seedling and the tree grows to maturity.

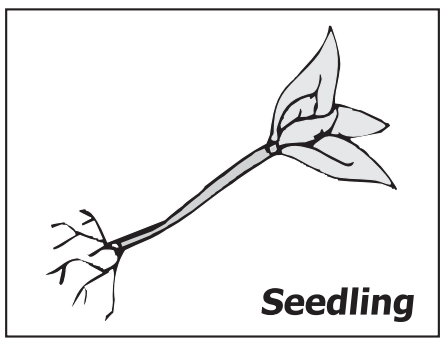
Activity: Life cycle of a plant

Cut out the drawings below and put them in order with arrows between to show the life cycle.









Questions:

1. Name two ways pollen can travel from one tree to another? (*wind, insects*)
2. Why are some tree flowers attractive to look at? (*to attract animals*)
3. Why do some flowers have nectar? (*to attract birds, bees*)
4. What purpose does a fruit serve? (*houses the seed, eaten by animals and excreted*)
5. How would seeds that are distributed by wind look? (*thin, light, winged*)

Activity

Explain how the following seeds would be distributed:

Seeds with spikes and hooks

Seeds that are light

Seeds with wings

Seeds with juicy coverings

Seeds with sticky coats

Seeds that float

Study 9

Collecting seeds and growing trees

Collecting and growing seeds is fun and when you grow trees you are helping the environment.

Below are some steps for successfully growing seeds into trees.

Collect your seeds

Different tree seeds are available at different times of the year. Usually you can collect them from under the tree.

Hints for collecting and preparing seeds

1. Small seeds contained in pods. - Pick the pod before it opens and store it in a paper bag.
2. Hard seeds like kowhai. - Soak in boiling water overnight before sowing.
3. Seeds with fleshy covering. - Soak in cold water overnight then rub flesh off.

Sow the seeds

Using potting mix, plant the seeds in a depth equal to the size of the seed.

Larger seeds can be grown in yoghurt-type containers.

Fine seeds can be sown in a flat container and when the seeds germinate they can be pricked out and put into larger containers.

Seeds can be kept in a warm dark place until they germinate. They can be placed in a sunny place under a piece of glass and a sheet of paper or in a hot water cupboard.

Pricking out

Once the seed has germinated take the glass off and allow the seedling to grow in a warm sunny place.

When the seedling is a few centimetres high it can be pricked out and put into a larger container. You may have to change containers more than once.

Hardening off

Once the seedling has reached a height of about 30 centimetres it can be put outside in a sheltered place for a few weeks. This helps the plant to get used to outdoor conditions and is called hardening off.

Once the plant is hardened off it can be planted in a suitable area.

A site needs to be chosen that is suitable for that plant and weeds will need to be kept away from the plant. Staking the plant will help it survive in windy conditions.

Activity – plant a kōwhai tree

Kowhai is an excellent tree to plant as it grows in all parts of the region. Its nectar is eaten by bees, tui and bellbird. Kereru (wood pigeon) enjoy the leaves and petals.

It is an attractive tree to grow in school grounds and is an easy one to propagate.

Step 1 Collect seed pods, this is best done in the months from July to October. Look under kowhai trees for long seed pods.

Step 2 Take the seeds out of the pods and place them in boiling water over night.

Step 3 Plant the seeds in a seed tray in moist potting mix. Plant about 2-5 mm deep.

Step 4 Place seeds in a hot water cupboard or in a warm area under glass and a piece of paper.

Step 5 Once the seedlings emerge leave them in a sunny place inside.

Step 6 After a month when they are about 8 cm high, prick out. This involves putting a knife under the roots and transferring the plant to a bigger container like a yoghurt container.

Step 7 After the plants are about 30 cm high, put them in larger bags, with a stake. They can be put outside in a sheltered area to harden them off.

Step 8 After about six months the kowhai will be about 75 cm high. It will be ready to plant in a suitable area. Kowhai can handle frost and slightly swampy conditions. They can grow to about ten metres in height.

Study 10

Trees in danger

Trees in New Zealand have suffered since the arrival of us humans, bringing animal and plant pests and generally upsetting the natural environment.

Animal and plant pests

Introduced species such as possums and old man's beard are eating and replacing vegetation at an alarming rate.

Goats and deer

Goats and deer browse the forest floor, destroying undergrowth and opening up the forest, allowing the possums to move in easily and destroy the forest canopy.

Possums

Possums eat native trees. They were introduced in 1837 from Australia. They have no natural enemies and have done very well in New Zealand. We now have a population of around 70 million and they eat an estimated 21 000 tonnes of New Zealand vegetation every night.

Old man's beard

Old man's beard is an introduced plant that forms a tangled mass over trees and shrubs. It kills the supporting plant and can produce 100 000 seeds per year.

Wild ginger

Wild ginger can smother and replace indigenous forest communities. It spreads rapidly forming a solid web over large areas.

Wandering Willy – a weed

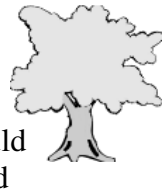
Wandering Willy is a plant that completely covers the ground and spreads rapidly. This harms trees because it doesn't allow seedlings to grow and young trees to develop and keep the forest going.

Native bird depletion – kereru case study

Trees and birds have a great relationship helping each other to survive.

The kereru or New Zealand pigeon is an example of a bird that helps native trees.

The kereru is the only bird in the bush that can swallow large berries such as karaka and tawa. The kereru eats the berries. The seeds are not digested



and fall to the ground in bird droppings. If there were no kereru there would be no more karaka, tawa or taraire. The kereru needs the trees for food and the trees need the kereru to spread their seeds.

Kereru are in danger from many animal pests such as rats, stoats and possums that eat the eggs and chicks. Possums also compete with adult birds for food and destroy the trees that provide food for the kereru.

Stoats and cats can catch and eat young and adult kereru.

How people affect the forest

People who cut down areas of bush reduce the numbers of birds like kereru by taking away their food and shelter.

People can also spoil the forest by being careless in the forested areas, doing activities such as walking off the main tracks and disturbing young seedlings, taking native plants away that should remain in the forest area and by allowing pets to roam in the bush.

When we cut down too much native bush we also cut down the chances of more trees reproducing. Many trees are reliant on other trees of different sex to allow pollination to occur. The distance between trees of the same species often makes this pollination difficult.

What we can do?

By knowing a little about what threatens our trees and doing something about it we can take some action for our environment.

We can also:

- grow and plant native plants
- get rid of plant pests from our gardens and areas of bush
- take good care of our pets and become involved in eradicating animal pests.

Activity

Design a poster to make the public aware of an issue that affects our trees. Your poster should highlight a problem and offer some practical advice for people to take.

Write a letter about an issue you feel strongly about. For example the effect of possums and stoats on our environment – or a special area you think should be protected or planted.

Useful words

Below are some of the words used in this unit and some other words related to trees which will help you with your understanding of the topic.

adapt – to change to fit a particular environment

canopy – the leaves and branches of trees that provide a roof over a forest

carbon dioxide – a gas that trees need to live

conifer – kinds of trees with needles and cones

conservation – looking after natural resources such as trees, water, soil, etc for future generations.

deciduous – the trees that lose their leaves, usually in autumn

erosion – the loss of soil or land from a place

evergreen – trees having foliage throughout the year

habitat – the natural home of a plant or animal

nutrients – the chemicals and minerals that are used by plants to grow

oxygen – gas given off by trees that people need to live

photosynthesis – how gases, chemicals and the sun's energy are combined to create food for plants.

respiration – how energy stored in sugars in plants is released to be used

riparian – an area alongside a waterway

seedling – a young plant that has grown from a seed.

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