Water is precious — every drop counts!

Water is precious — every drop counts! is a programme about water use and water conservation for use in Year 5 and 6 classes on the Kāpiti Coast.

Introduction

On the Kāpiti Coast, everyone recognises water is a resource we must use wisely. We need to make sure that we, and future generations, have a reliable, quality water supply, as well as healthy streams, rivers and lakes.

Since 2011, the Kāpiti Coast District Council has been working with iwi and educators to develop water education programmes for young people.

The Water Education Facilitator (WEF), who can be contacted at works with Early Child Education (ECE) teachers and teachers to develop and implement water education programmes for young people and to assist centres and schools to be efficient users of water. They can be contacted on watered@kapiticoast.govt.nz

A series of learning programmes that focus on water use on the Kāpiti Coast has been developed for ECE to Year 9. Each learning programme is stand-alone and is intended to be adapted by ECE educators or teachers to meet the needs of their children or students. Collectively, the series of resources provide sequential learning for young people as they develop an understanding of water issues on the Coast and actions they and their families can take to use water wisely.

Learning intention

Students understand that water is precious and that we all need to use water safely and wisely.

Activities are provided so students can investigate water and practise using water safely and wisely.

Key questions that are addressed in the learning programme are:

- What is water?
- Where is water found?
- Why do we need water?
- How do we capture, treat and use water?
- How do we conserve water or use water wisely?

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Overview of *Water is precious — every drop counts!*

Water is precious —every drop counts! **is a programme about water for use in Year 5 and 6 classes at primary schools on the Kāpiti Coast. It is a cross-curricula resource that can meet level 1, 2, 3 and 4 Achievement Objectives in English, Science, Social Studies, Health and The Arts curricula.**

The learning programme is in six sections:

1. Water is precious
An introduction to the concept that water is precious, an exploration of what your students know about water and want to find out about water. Students briefly explore the cultural significance of water for themselves and for local iwi.

2. What is water?
An investigation of the physical properties of water with science experiments. Students investigate the water cycle.

3. We need water to live
An investigation into why all animals and plants need water to live and how plants and animals take water in and lose water. An investigation of what happens in communities that do not have an adequate supply of clean water.

4. Three waters – drinking water, stormwater and wastewater
An investigation of the provision of safe drinking water, and stormwater and wastewater systems on the Kāpiti Coast and an exploration of water issues on the Kāpiti Coast.

5. Being waterwise and conserving water
An investigation of ways to use water wisely and not waste water at home and at school.

6. Taking action to conserve or value water
Students taking action at home and/ or school to conserve or value water, with a focus on school gardens that use water efficiently.

It is not expected that a school will use all the activities provided but teachers will select amongst the activities to build a programme that meets the identified needs of their students, their families and your school and your local area.

Curriculum links

Values highlighted in this unit	How students will be encouraged to develop the selected value or values during the unit
Respect Community Innovation, enquiry and curiosity Care Integrity	Students will be learning to respect, value and care for water, to use water safely and to conserve water as they carry out a range of activities. Students will carry out a range of experiments and investigations into water, the water cycle, and water use.

Excellence – aiming high, persevering **Innovation**, enquiry and curiosity **Diversity** – culture, language, heritage **Respect** – for themselves and others **Equity** – fairness and social justice **Community** and participation for the common good **Care** for the environment **Integrity** – accountability, honesty, acting ethically

Key competencies highlighted in this unit	How students will be encouraged to develop the selected competency or competencies during the unit
Managing self Thinking Participating and Contributing Using Language, Symbols and texts	Students take responsibility for their own actions to use water wisely and conserve water, especially in the summer months. Students can work together to take action to reduce water use at school and in the school gardens. Students interpret statistical and other data to make meaning of water issues on the Coast and persuade others to reduce water use.

Managing self – self-motivation, personal goals, appropriate behaviour, resourcefulness, sense of self and importance of heritage **Relating to others** – listen actively, recognise different points of view, negotiate, share ideas **Participating and contributing** – balancing rights, roles and responsibilities, and responding appropriately as a group member. **Thinking** – using creative, critical, metacognitive and reflective processes, drawing on personal knowledge and intuitions. **Using language, symbols, and texts** – interpreting language and symbols, using ICT, recognising how choices of language and symbols affect people's understanding.

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Modelling water-wise behaviour

Before your class or your school begins this learning programme about water use and water conservation, your staff may want to discuss:

- how your school values water
- ways the school currently conserves water
- any infrastructure issues your school has that impacts on how the school uses and conserves water
- a whole school approach to valuing and conserving water
- how the staff currently model water-wise behaviour and valuing water
- what type and level of social action your students may take at home and school after they have completed their learning about the value of water and the need to conserve water.

Involving parents and caregivers

This work involves your students thinking about how they use, value and conserve water at school and in their homes.

Your students will be discussing their learning at home and doing some simple investigations at home. You may want to:

- inform parents about the intent of the learning programme and indicate that your students will be investigating how water is used at home
- invite parents to come to the school to see and hear about what the students have learnt
- attend a talk with speakers from the Kāpiti Coast District Council that describes ways to conserve water, use energy efficiently and minimise waste.

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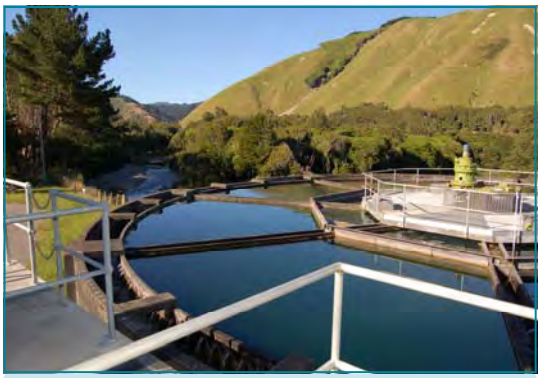
Provision of water services

The Kāpiti Coast District Council is responsible for providing:

- a supply of safe drinking water
- stormwater systems removing water after heavy rain
- wastewater removal and treatment systems.

Kāpiti Coast residents pay for these services when they pay their rates. Different water services are provided in different areas on the Coast**.**



The Waikanae Water Treatment Plant

Water issues on the Kāpiti Coast

Teachers are invited to read *Water Issue on the Kāpiti Coast* on page 24 of the Year 7 and 8 *Water is precious* learning programme as background before they teach this *Water is precious* learning programme.

Partnership with local iwi

The Council is proud of its relationship with the tāngata whenua. A Memorandum of Partnership between the three iwi (Ngāti Raukawa, Āti Awa ki Whakarongotai and Ngāti Toa) and the Council has been in place since 1994. The Memorandum guides the relationship between Council and tāngata whenua. The goal of the Memorandum is to forge a relationship of mutual benefit between the Council and tāngata whenua and create an effective and meaningful partnership.

Background information for teachers and students

The Kāpiti Coast District Council website www.kapiticoast.govt.nz contains useful information for teachers and students.

If teachers have specific questions, requests for loan resources or want to discuss their *Water is precious* learning programme they can contact the Water Education Facilitator at watered@kapitcoast.govt.nz

Acknowledgements

The Kāpiti Coast District Council would like to thank everyone who has been involved in the development of the *Water is precious* learning programmes.

This learning programme was written by Anne Brunt. Photographs were provided by Anne Brunt, Nicola Easthope, Kapanui School, Liz Stretton, Billie Taylor, The Greater Wellington Regional Council and Raumati South School.

A number of territorial authorities in New Zealand and Australia have developed educational programmes about water. Over time a number of activities have been created and modified for use and it is no longer possible to acknowledge authorship of specific activities .The Kāpiti Coast District Council would like to acknowledge the co-operation of local and regional Councils that has allowed the free exchange and use of material so we can all create quality educational programmes suited to our local areas.

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Assistance from the Kāpiti Coast District Council Green Team

Members of the Green Team can come to your centre and offer FREE advice about using resources sustainably.

The Green Team can work with your staff to:

- complete a review of how efficiently your centre uses water and practical ways to reduce water usage.
  (via the Water Conservation Adviser)
- complete an energy efficiency review and practical ways your centre to be more energy efficient, reduce heating costs and be warmer, drier and healthier (via the Eco-design Adviser)
- develop sustainable gardens (via the Green Gardener)
- become an enviroschool (via the Enviroschools Facilitator)
- implement a water education programme (Water Education Facilitator)
- develop and implement a waste minimisation programme (Waste Minimisation Officer).

If you centre would like the services of the Green Team, the Water Education Facilitator can organise a visit or you can go to www.kapiticoast.govt.nz/greenservices to find out more.

Free services for families

Families can access the services of the Green Gardener, the Water Conservation Adviser and the Eco-design Adviser.

The Water Education Facilitator will provide brochures that outline these FREE services for families.

Families can also go to Council website (www.kapiticoast.govt.nz/greenservices)

Talks for parents and caregivers

Staff from Kāpiti Coast District Council's Green Team can come to your centre to deliver a presentation and a question and answer session that provides:

- an explanation of how our drinking water is treated (DVD)
- a discussion about water issues in Kāpiti and Council initiatives to encourage people to conserve water
- tips on how to use water efficiently and conserve water
- advice on how to make homes warmer, drier and healthier
- advice on how to minimise and dispose of household waste.

In terms 1 and 4, schools will be contacted by the Water Education Facilitator to ask if they want to invite their parents and carers to attend a talk that provides tips on how to use water efficiently and conserve water, as well as advice on how to make homes warmer, drier and healthier.

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Journal stories and Connections

Water, the river and the water cycle

The story of Rangi and Papa
by M. Roberts
SJ, Pt. 1, No. 5, 1994
Pages 18 – 23 (RA 8 – 9)

The shapes of water
by G. Shannon
SJ, Pt. 1, No. 4, 1995
pages 17 – 19 (RA 9 – 10)

An interview with a glass of water
by J. James
CN, No. 2, 2002
pages 2 - 5

The water cycle
by W. Rea
CN, No. 2, 2002
pages 6 – 9

Tāwhirimātea
by N.Takao
CN, No. 1, 2004
Pages 26 – 32

A closer look
Play by P Werry
SJ l2
Aug 2011

Awa
Poem by G O'Connell
SJ L2 Aug 2012

Animals

He kōrero mo te pīngao
by B. Meads
SJ, Pt. 1, No. 2, 2001
pages 14 – 19 (RA 8 – 9)

Huhu escape
by J. Maguiness
SJ, Pt. 1, No. 1, 2002
pages 10 – 11 (RA < 8)

Te pūpū harakeke
by S. Waitai-Cherrington
SJ, Pt. 2, No. 3, 2003
pages 26 – 29 (RA 10 – 12

Wetas with backpacks
by P. Quinn
JJ, No. 13, 1995
pages 22 – 25 (< 8)

Counting koura
By B. Gore
CN, No. 1, 2007 1
pages 8 - 25

Walking on water – the grass waterspider
by D. Noonan
SJ, Pt. 4, No. 3, 1994
pages 38 – 42 (RA 11-13

Fish and fishing

Four eeling tales
by E. Collier
SJ, Pt. 3, No. 3, 1993
pages 60 – 64 (RA 8.5 – 9.5)

Queen of the river
by K. Wehipeihana
SJ, Pt. 1, No. 1, 1999
pages 13 – 17 (RA 8.5 – 9.5)

The tame eels of Anatoki
by A. Belcher
SJ, Pt. 1, No. 4, 2003
pages 22 – 25 (RA 8 – 9)

The puru tuna
by M. Waiomio
SJ, Pt. 4, No. 2, 2001
pages 30– 32 (RA 9.5 – 10.5)

Granny's puna
by I. Toia
SJ, PT. 3, No. 4, 2003
Pages 8 – 11 (RA 9 – 10)

Whitebaiting
by J. Trafford
SJ, Pt. 1, No. 4, 2004
pages 2 – 7 (RA 8 – 9)

Hinaki
by J. Trafford
SL No. 4, 2000
pages 2 – 16

Kutai
Article by R Calman
SJ L2 Aug 2012

Kutai fritters
Story by C Mataio
SJ L2 Aug 2012

Human impacts and water conservation

Where my ancestors walked
by R. Ahipene - Mercer
SJ, Pt. 4, No. 2, 1990
pages 2 – 7 (RA 12 – 14)

Don't waste the water
by J. MacGregor
SJ, Pt. 3, No. 3, 1999
pages 24-27 (RA 8.5 – 9.5)

Pest fish
by D. Somerset
SJ, Pt. 2, No. 4, 2005
pages 7 - 10 (RA 8.5 – 9.5)

Water power
by S. Carrod
SJ, Pt. 2, No. 4, 2005
pages 11 - 15 (RA 9 – 10)

World's water running out
by P. Werry
SJ, Pt. 2, No.1, 2007
pages 18 – 20 (RA 9.5 – 10.5)

Plastic fantastic
by P. Werry
SJ, Pt. 3, No. 3, 2007
pages 2 – 9 (RA 10 – 12)

Easy as child's play
by P. Werry
CN, No. 2, 2002

Wonderful water
by P. Werry
CN, No. 3, 2004
pages 20 – 27

Shifting sands
by A. Crowe
SJ, Pt. 4, No. 2, 1996
pages 28 – 34 (RA 10 – 12)

Trees for birds
by W. Cowley
SJ, Pt. 2, No. 4, 1997
pages 25 – 31 (RA 8.5 – 9.5)
Pages 15 -18

Seeds for birds
by S. Gibbison
SJ, Pt. 2, No. 4, 2007
pages 7 – 13 (RA 8.5 – 9.5)

Operation flax
by D. Noonan
SJ, Pt. 3, No. 1, 2008
Pages 22 – 27 (RA 9 -10)

Water wardens
by A. Bagnall
CN, No. 2, 2002
pages 10 - 14

Eco – friendly inventions
by R. Huber
CN, No. 3, 2004
pages 28 – 32

Our Pātaka
By H. Bell
CN, No. 3, 2005
pages 2 – 9

A new life for old machines
by R. Hipkins
CN, No. 3, 2007

Taking the bait
Article K Potter
CN No4 2012

Voyage of Discovery
E Chisholm
CN No4 2012

Journal stories and Connections ctd.

Weather

Hard ice, soft ice
by B. O'Brien
CN No. 2, 2004
pages 18 – 21

Rain
Poem by H Tuwhare
SJ L3 Feb 2012

What makes the weather
E Brenstrum
CN No 3 2012

A piece of paradise
L Thorpe
SJ L3 June 2012

The Evil drinking fountain
L Thorpe
SJ L3 Feb 2012

Making puddles
S Averil
CN 1 2000

Severe Weather
S Wilcox
SL No 1 2012

Our Safe Drinking Water

Your school has a copy of the DVD *Our Safe Drinking Water* produced for use in schools by the Kāpiti Coast District Council.

This DVD shows students visiting the Waikanae Water Treatment Plant.

If your school needs a replacement copy of the DVD, contact the Water Education Facilitator.

Resources that support Water is precious – every drop counts!

These resources are referred to and intended to be used with this learning programme.

Turning on the Tap, a greater Wellington Regional Council resource available on line at www.gw.govt.nz/turning-on-the-tap

Take Action for Water a greater Wellington Regional Council resource available on line at www.gw.govt.nz/take-action-for-water

Sources of reference material

The Kāpiti Coast District Council website, especially the water supply section contains reference material for teachers and students. The Water Education Facilitator can provide other reference material on request.

World Vision New Zealand website and UN World Water Day websites provide information on global water issues that has been prepared for young people.

Enviroschools will have access to resource material in the Water is Life theme area booklet.

The Kāpiti libraries hold a number of fiction and non-fiction books about water and books can be borrowed from the National Library Curriculum Services.

Section 1: Water is precious

This section introduces the concept that water is precious and explores what your students know about water and want to find out about water. Activities are provided to explore the cultural significance of water for your students, their families and local iwi.

Introducing water is precious - he tāonga te wai

Equipment

- **a class gift of a large 4 litre bottle of water wrapped up in gift paper**
- **copies of the letter for students to discuss in groups**

- Explain that the class has been given the most amazing gift and have selected students open the gift.
- Have your students work in groups and discuss the letter that comes with the gift. The letter is provided on the next pages.

Shaping your learning programme

Find out what your students know about water and what they want to find out about water and build your learning programme around this. You could use a KLM chart to do this.

The learning programme that is outlined here has a Science and English focus to differentiate it from learning programmes developed for Years 3 and 4 and Years 7 and 8.

You can extend this programme using material from *Turning on the tap,* a resource created by the Greater Wellington Regional Council, available on line at www.gw.govt.nz/turning-on-the-tap.

Big ideas

Water is a precious resource.

Water is a finite resource – the earth has a limited amount of water.

Actions people take can affect the quality and quantity of water.

vocabulary

precious
treasure
river
lake
sea

kupu

tāonga	treasure
wai	water
awa	river
roto	lake
moana	sea

A water letter

Dear students

Were you surprised or maybe even disappointed that this amazing gift was a bottle of clean, drinkable water?

Water is an amazing gift created by planet earth. Without water, there would be no plants and animals on earth. If all the water on earth dried up this minute you could not live for more than three or four days without drinking water. Our bodies are 70% water.

Water is amazing, but we take it for granted. It's always there. We drink it, we use it, we have fun in it but sometimes we forget how important and amazing water is.

In the next few weeks you are going to investigate water and investigate why water is precious, he tāonga te wai.

Here is a first amazing fact, you could be drinking the same water dinosaurs drank! Water is a finite resource.

There is only a certain amount of water on earth and it is cycled around and used again and again.

Ko te wai te ora ngā mea katoa
Water is the life giver of all things

There's a lot of water on Earth!

Roughly 1,260,000,000,000,000,000,000 litres (12,60 million trillion litres) can be found on our planet.

Ninety-eight percent of the water on the planet is in the oceans, and therefore is currently mostly unusable for drinking because of the salt.

About 2 percent of the planet's water is fresh water, but 1.6 percent of the planet's fresh water is locked up in the polar ice caps and glaciers or underground in aquifers and wells.

Less than half of one per cent of the planet's total water supply is found in lakes and rivers and is available for use.

The photograph on the left shows where Council takes water from the Waikanae River for the public water supply.

What would happen if we took out too much water from the river?

Actions people take can affect the amount of water we have and the quality of the water.

If you were a fish, could you live here?

These are photographs of local waterways.

Work out what substances people have let get into the water.

WANTED!

WATER AMBASSADORS

Investigate water and become a Water Ambassador

Take action to use water wisely.

Tell people our water is precious — he tāonga te wai, and every drop counts.

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Water is precious — every drop counts!

Exploring the cultural significance of water

Valuing and respecting water is important in many cultures.

This section encourages you to explore how valuing water is significant to local tangata whenua and to families with children in your class or school.

Value of water to Māori

- The Water Education Facilitator can organise contact with a representative from your local iwi. You could have them visit your school or visit a local stream or river with your students and discuss the importance of water and local water environments to Māori. The iwi representative can explain the names of local areas, streams and rivers. They will explain the concept of kaitiakitanga or guardianship of water ways.
- Show your students the section of the DVD *Our safe drinking water* at *3* minutes 35 where Kāpiti Coast District Council kaumatua Koro Don Te Maipi discusses the Māori perspective on water.

In a Māori world view, life began with the separation of Ranginui (sky father) and Papatūānuku (earth mother). From them emerged the various atua (gods).

In a Māori world view, the Earth is a living entity. Papatūānuku is both our ancestor and our provider. People are descended from her through the atua (Māori 'gods').

The atua are the environment and as descendants of the atua, people are part of the environment. Water being part of that environment, we are water and water is us. As part of this living system, water has its own mauri, energy, or life-force.

- Read your students the story of Ranginui and Papatūānuku and explain how, in the Māori world view, the water on earth was created and water is valued.

Big ideas

Water is regarded as a treasure or tāonga by Māori.

Being kaitiaki or guardians or stewards of our waterways is important to Māori and our local iwi.

Water has significance for many cultures.

kupu

kaitiaki guardians
iwi tribe
mauri life force
atua gods

Ranginui and Papatūānuku

In a Māori world view, life began with the separation of Ranginui (the sky father) and Papatūānuku (the earth mother). Here is their story.

In the beginning there was Te Korekore, the nothingness. All was dark and still. There was no light, no life, but there was potential for life. Slowly the darkness gave way to light and the first parents, Ranginui and Papatūānuku emerged.

Ranginui and Papatūānuku clung to each other in a strong, loving embrace. They created many children, the atua, who lived in the cramped, dimly lit space between them. The children were unhappy living in the dark and decided to separate their parents so they could live in light. They tried to separate their parents several times but their embrace was too strong. Tānemahuta had an idea. He lay down with his back against his mother Papatūānuku and pushed his feet up against his father Ranginui. With great strength he pushed against his parents until finally their embrace was broken.

The separation of Ranginui and Papatūānuku created the universe. Papatūānuku became our earth with it's rugged mountains, deep valleys and flat plains. Ranginui became the sky, allowing Papatūānuku's body to be enveloped in light, warmth and air.

Ranginui and Papatūānuku were heartbroken about their separation and often cried as they looked at each other. Their tears covered much of the land and formed the sea. The children were concerned that the crying would flood the earth so they turned Papatūānuku on her side, making it difficult for the grieving parents to look at each other.

The children thrived in the new light filled world. Their mauri, their lifeforce, developed and they brought new life into the world. Tānemahuta became atua of the forests and created the plants, birds and insects, while Tangaroa became atua of the water and created the fish and other animals that dwell there. Life flourished on Papatūānuku.

However, Tāwhirimatea, who disagreed with the separation of his parents, went to live with his father and became atua of wind and storms. To this day he is still angry with his brothers and shakes the forests of Tānemahuta with fierce storms, breaking branches and crashing trees to the ground. He whips up the seas with gales and casts some of Tangaroa's children on to the shore.

While the agony of the initial separation has eased, Papatūānuku and Ranginui still long for each other and often weep. Papatūānuku's tears bubble up from the earth in the form of fresh water springs and her sighs for Ranginui are seen as the soft mist that lingers over her valleys. Ranginui's tears fall as rain and they merge with the tears of Papatūānuku creating streams and rivers that flow to the sea. Where the mountain peaks seem to touch the sky, the separated parents are closest to each other. Being so close to his beloved, Ranginui sometimes cries and his tears create a veil of mist over the mountain peaks.

So it was, that water was created by the grief of the separated parents. Aotearoa became a land filled with fresh, clean waters that flowed from the rugged mountains to the sea. The streams, rivers and lakes contain their own mauri, their own life giving energy, essential for sustaining life on Papatūānuku.

Respecting water

People from many cultures value, respect and treasure water. There are many cultural practices that involve water and demonstrate just how important water is in our lives.

- Have your class use a map of the local area to identify different areas of water e.g. sea, lakes, rivers, streams. Make headings for each different type of waterway and have the students brainstorm activities that occur in, on or near that type of waterway. You may be able to use photographs of activities occurring in or at the waterway now or in the past.
- Classify these activities and include activities that involve caring for the waterway or respecting it for its aesthetic features or cultural heritage.
- Divide your class into groups and have them select one activity and consider:
  - ◊ actions people can take doing that activity that respect the water and the plants and animals that live in, on or near the water
  - ◊ actions people can take doing that activity that DO NOT respect the water and the plants and animals that live in, on or near the water
  - ◊ any cultural practices or customs the people might observe while doing the activity e.g. saying a prayer or karakia before starting the activity, and on completing it, or before going in a boat; returning the first fish caught to the waterway; or using water to bless a boat on launching.

- Ask your students to think about any ceremonies of festivals in their culture that involve water e.g. baptism, visiting cemeteries or urupa, festivals like Diwali or waka ama competitions. Discuss how water is used in these cultural events. Ask questions like these:
  - ◊ Why is it important to think about water being special or precious during these activities?
  - ◊ What would happen to these events if there was little or no water?

Big ideas

Water is regarded as a tāonga or treasure in many cultures.

Water is involved in many cultural ceremonies.

We use and value our lakes, stream, rivers and the sea in many ways.

kupu

taonga	treasure
wai	water
awa	river
roto	lake
moana	sea
urupa	cemetery

Section 2: What is water?

This section has a range of activities that has students investigate some of the physical properties of water and concludes with the students developing an understanding of the natural water cycle.

Exploring water as a liquid

This section has been set up as four experiments that students can complete in groups. It is anticipated that a classroom would have eight experiment stations and students would complete all four experiments.

Ideally the following science equipment will be used but teachers will be able to substitute with a number of household items if your school does not have the science equipment: measuring cylinder, beakers, thermometers, scales, filter funnel, filter paper, petri dish.

The list of equipment needed for each experiment is listed within the experiment.

A safety note: One of the experiments has students measure the temperature of boiling water so you will need to set up a safe process for this to occur.

The experiments have a focus on student prediction and observation. They have students:

- test their own ideas and predictions
- take and record accurate measurements
- draw and describe what they observe happening.

In each experiment the relevant Science facts are briefly outlined, and an example of how the physical property of water being investigated affects our lives is provided.

Each experiment is set up so that students can write up their experiment under these headings:

- **The aim of the experiment** (what they wanted to test)
- **A prediction** they made
- **The method** (what they did — this may involve a diagram)
- **The results** (what happened — this may involve a diagram)
- **A conclusion** (what the experiment proved — this could include how accurate the students' prediction was).

However, each of the stations has more than one experiment, so you can select which experiment you want your students to write up in detail.

Big ideas

Water has unique properties.

The unique nature of water impacts on many aspects of our lives.

Relevant Science Concept books

*TKI Science Concepts Book 15 Where's the weather? (*evaporation and condensation at L1 and 2)

TKI Science Concepts Book 58 Ice: melting and freezing.
(L1 and 2)

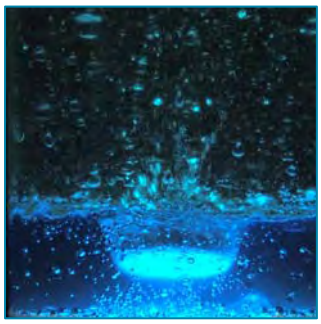
TKI Science Concepts Book 31: The Water Cycle and the Atmosphere.
(L3 and 4)

Water and Oil

What happens when you put oil and water together?

Equipment:

- cooking oil
- food colouring
- tap water
- four clear sealable containers like a bottle or jar with a lid
- an alka seltzer or some sodium bicarbonate



- Predict what you think will happen when you put oil and water in the same container.
- Fill each bottle or jar a third full of water and add some drops of food colouring. Observe what happens and then shake them
- Add cooking oil to make the bottle or jar two thirds full. Observe what happens, then close the bottles or jars and shake them.
- Draw what you see and describe what you see.

The Science
There are two separate solutions in each container, oil and water. The molecules in water are attracted to other water molecules so they stay together as a water solution.

The water molecules do not join up with oil molecules. The oil molecules are attracted to other oil molecules.

Adding fizz

What do you think might happen if you put some alka seltzer or some bicarbonate of soda in your containers?

Add pieces of alka seltzer or small amounts of sodium bicarbonate to one container.

The Science
The alka seltza has a chemical reaction with the water and makes bubbles of carbon dioxide. The bubbles attach themselves to blobs of coloured water and they float up to the surface of the water.

When the bubbles pop, the color blobs sink back to the bottom of the container.

What happens if we freeze our mixture of oil and water?

Something strange happens if we put our container into the freezer for a few hours. What do you think could happen?

Put one container of the oil and water mixture in the freezer for a few hours and then compare it with another mixture.

The Science
Oil floats on the surface because water is heavier than oil. Scientists say the water is more dense than the oil.

When water freezes it changes in density and oil becomes heavier than the water. The water comes to the top of the container.

Can we make the oil and the water mix together?

Can you think of a time when you might want oil and water to mix. What about cleaning a plate that has fat or oil on it?

Add some detergent to one of your mixtures of oil and water and make sure the lid is on firmly, then shake it vigorously and observe what happens.

The Science
Molecules of the detergent join onto the water molecules. They also join onto the oil molecules. The water and the detergent make something scientists call an emulsion. The emulsion can be washed away to clean the plate.

Solids and liquids

Do all solids dissolve in water ?

Equipment:

- four beakers
- four teaspoons
- containers of flour, salt, sugar, instant coffee, sand
- tap water
- hot water
- measuring cylinder
- filter funnel
- filter paper
- petri dish or saucer

- Look at the flour, sugar, salt and instant coffee and predict which of these solids will dissolve in water.
- Discuss any information you have that helped you make a prediction.
- Set up these experiments to test your prediction.
- Use a measuring cylinder to fill each beaker with 100 mls of tap water.
- Put four teaspoons of flour into the first beaker and stir.
- Make a diagram and use words to explain what happens.
- Do the same thing with the salt, sugar, coffee and sand and compare the results with your prediction.

The Science

Some substances, but not all substances, dissolve in water.

The particles of the solid are dissolved or broken down and form a liquid with the water.

Why do you think we are often asked to shake the bottle before use?

How much of one substance can dissolve in water?

- Use a measuring cylinder to fill a beaker with 100 mls of tap water.
- Add salt teaspoon by teaspoon, stirring after you add each teaspoon.
- Keep adding teaspoons of salt until something different happens.
- Draw and describe what happens.

Can anyone suggest how you could get more salt to dissolve in 100mls of water? Try this:

- Use a measuring cylinder to fill each beaker with 100 mls of hot tap water.
- Put the same amount of salt as you used in the last experiment into the hot water and see what happens.
- Keep adding teaspoons of salt into the hot water until no more salt will dissolve in the water.

The Science

More solid can dissolve in hot water than in cold water. In hot water, the water particles or molecules move faster and the sugar particles are dissolved or broken down faster.

What has this picture got to do with our experiment?

Solids and liquids continued

Can we get the solid back?

Do you think you can get the flour, salt, sugar, coffee, sand back out of your beakers?

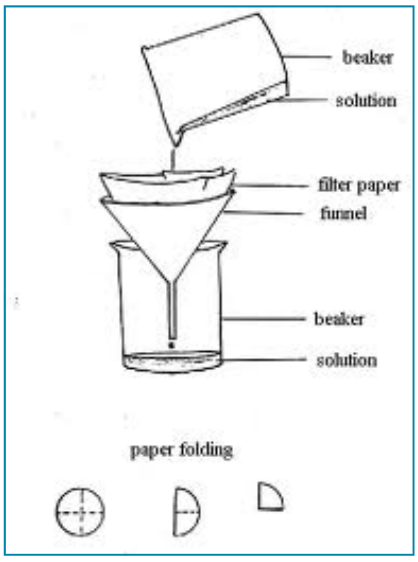
Which of the solids do you think it would be easier to get back?

We can get the solids back that have not dissolved back using a process called filtration.

We can get the sugar, salt and coffee back if we heat the solution and evaporate all the water.

Filtration

- Fold your filter paper into quarters and open it out like a flower.
- Put the filter paper into a clean filter funnel and place the funnel into a clean beaker.
- Slowly pour your beaker of flour or sand mixture through the filter funnel. DO NOT LET THE LIQUID GET ABOVE THE TOP OF YOUR FILTER PAPER.
- Repeat with the other sand or flour mixture.
- Make a diagram of what you did and explain what happened.



The Science

The flour and water and the sand and water are mixtures. Filtration separated the two parts of the mixture.

The filter paper lets the liquid molecules of water through but it traps all the molecules of the solid.

Evaporation

- Measure out 20 mls of your hot water salt solution and put it into a petri dish or saucer.
- Leave the saucer in the sun or a warm place (or in a water bath) in your classroom and observe what happens.

The Science

The heat causes water molecules to evaporate into the air. Eventually all the water evaporates and only the salt crystals are left.

There is a salt works in New Zealand at Lake Grassmere near Blenheim. There are large ponds of salt water. The heat from the sun is used to evaporate the water and the salt is collected and processed to make it safe to use. Most of the salt has the chemical iodine added as we need iodine to be healthy and New Zealand soils are iodine deficient.

Water and temperature

Measuring the temperature of ice, water and boiling water

What do you think the temperature of ice, tap water and boiling water is? Make predictions based on any prior knowledge you have.

- Test your predictions by using a Celsius thermometer and measuring the temperature of ice cubes just as they melt into icy water, water at room temperature, and boiling water.
- Record your results.

The Science

We measure temperature using a Celsius scale that is based on water, with water freezing at 0 ºC and boiling at 100 ºC

Based on these results, predict the temperature of:

- a cup of Milo when you drink it
- the local swimming pool
- water coming out of your hot tap at home.

What is your body temperature? Check your predictions with the answers on the next page.

Hot and cold water

Equipment:

- two beakers
- hot water around 70 ºC
- food colouring

In this experiment you are going to put the same number of drops of food colouring into the centre of two beakers three quarters full of water.

One of the beakers will contain cold water, the other water at 70 ºC.

- Predict what will happen.
- Write a set of instructions for the experiment. Remember you want the two beakers of water to be exactly the same except for the temperature.
- Experiment instructions start with verbs like ‘put’ or ‘measure ‘
- Carry out the experiment and make a diagram of what you did and explain what happened.

The science

The food colouring disperses or spreads out faster in the beaker of hot water because the water molecules are moving faster in the hot water than in the cold water. They move the food colouring molecules about faster.

An ice trick

Can you lift an iceblock without touching the iceblock, using string? Try this fun experiment then show your friends and family.

Equipment

- ice block
- string
- salt

- Use a wide glass and a good sized ice cube and put the ice cube into the glass and fill it with water.
- Wet a piece of string long enough to go over the ice cube and let you pick it up without touching the ice cube.
- Place the string over the ice cube, making sure it is in contact with the surface of the ice cube.
- Sprinkle salt on the ice cube where the string makes contact with it.
- Lift the string after a minute or two.

The Science

The salt is the secret ingredient. It lowers the freezing temperature of water, so it easily melts ice. That's why people in cold climates spread it on the road after a snowfall — and why the ocean rarely freezes.

When you sprinkle the salt on the ice, some of the ice melts back into water, which is absorbed by the string.

Seconds later, the water in the string refreezes (the ice underneath the string never touches the salt, so it doesn't melt).

The string is frozen to the cube, allowing you to pick it up.

What about those temperatures?

Most of us would find our Milo too hot at 70 ºC and too cold at 60 ºC.

At 60 ºC, water in a hot water cylinder is hot enough to kill bacteria but not hot enough to burn anyone who puts their hand under the tap.

Pools operate at temperatures between 27 ºC and 32ºC.

Our body temperature when we are healthy is 37ºC.

If we have a fever, our body temperature can rise but we will die if it exceeds 41ºC.

If we get hypothermia, our body temperature falls quickly and we will die if our body temperature falls below 35ºC.

Not all animals have a constant body temperature. The temperature of reptiles like lizards and snakes is dependent on the air temperature. These animals will move more slowly in the early morning and at night than in the middle of the day when it is warmer.

Bouyancy

What is bouyancy ?

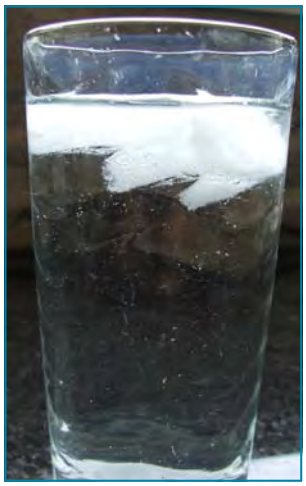
Equipment:

- **beaker**
- **block of wood**
- **scales**
- **water**

In this experiment you are going to learn about a scientific principle called Archimedes Principle.

- Fill a beaker to the top with water. Weigh the beaker and write down your results.
- Carefully place the piece of wood into the water. Some of the water will spill out of the container as the wood displaces the water.
- Weigh the container a second time, and note the results. The two recorded weights should be the same.

The Science
The water that spills out of the beaker weighs the same amount as the piece of wood. This is because an object placed into water will lose as much weight as the weight of the water it displaces.



This is known as buoyancy, and is why you feel so much lighter in a pool than you do on dry land.

Buoyancy – ice is lighter or less dense than liquid water so it floats on the top of the water.

Exploring buoyancy

Equipment:

- **hot water**
- **cold water**
- **beaker**
- **a range of small objects of various weights like a small rubber ball, a marble, a table tennis ball a disk of polystyrene**
- **water**
- **vinegar**
- **canola or other oil**
- **a water bath**
- **a thermometer**

What floats in water?

In this experiment you are going to find out which of the objects will float in the three liquids.

- Look at the objects and predict which ones are likely to float in water and give reasons for your prediction.
- Test your predictions using cold water.

Buoyancy and water temperature

- Use the objects that have enough buoyancy to float in water and design an experiment to observe whether there is any difference in the way they float in water at OºC, 25 ºC and 70ºC.
- Carry out the experiment, observe what happens and draw and describe what you did and what happened.

The Science
Heat affects the buoyancy of an object.

Buoyancy in other liquids

- Use the objects that have enough buoyancy to float in water and design an experiment to observe whether there is any difference in the way they float in vinegar or in oil.
- Carry out the experiment and observe what happens

Draw and describe what you did and what happened.

Floating eggs

Equipment:

- **a beaker wide enough to float an egg in**
- **salt**
- **spoon**
- **water**
- **an egg**

Will an egg float in water? Make a prediction and then try to float the egg in water.

Here is a way to make the egg float.

- Fill the beaker about halfway with water and add a lot of salt. Stir well until you have cloudy, very salty water.
- Slowly add more water until the container is nearly full. Make sure to slowly pour the fresh water into the beaker, over the back of a spoon, so that the salt water and fresh water do not mix.
- Carefully lower an egg into the water and see what happens

The Science

The egg is heavier than the fresh tap water, but lighter than the salt water. Because of this, the egg sinks down through the fresh water, but floats on the salt water.

Boats - Why do they float?

How does a boat or ship carrying heavy cargo float while that same cargo would sink to the bottom of the ocean if dumped overboard?

The answer is the boat is pushing down on the water and the water is pushing up. The water pushes up harder than the boat pushes down and so the boat floats.

Even though a ship is very big and very, very heavy, it is not as heavy as the water it pushes away. That is why a big ship made of steal and full of cargo can float.

A boat hull is lighter than the total amount of water that the boat's hull pushes away, or displaces.

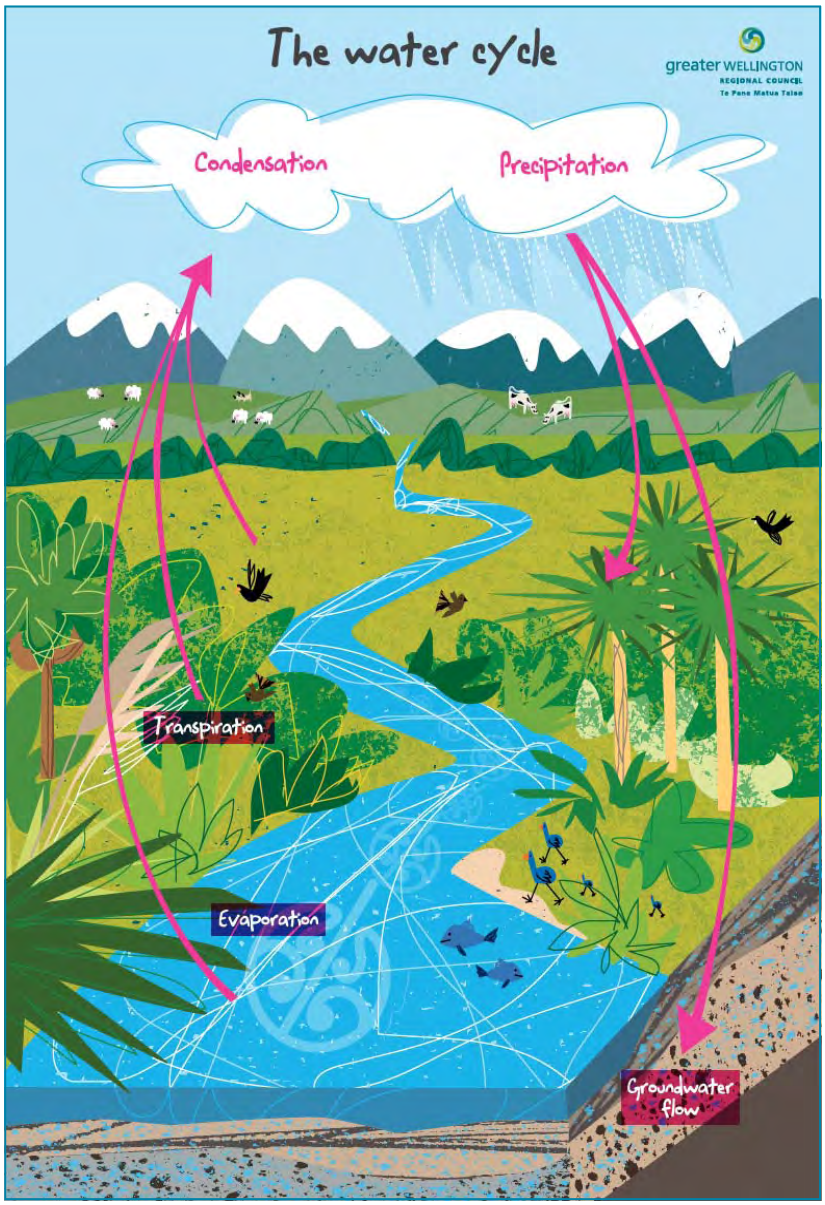
Imagine the boat making a hole in the water. So long as the boat weighs less than the weight of the water it would take to fill that hole, it can float.

So, a boat floats when it has displaced just enough water to equal its own original weight – a principle called buoyancy.

The water cycle

These activities provide an introduction to the water cycle.

Use this illustration and the explanation that follows on the next page to explain the water cycle to your students.



Big ideas

Water is cycled around the earth in a water cycle.

No new water can be created.

vocabulary

water cycle
evaporation
condensation
precipitation
transpiration

kupu

mataora wai
water cycle

wai	water
awa	river
roto	lake
moana	sea

Water is precious — every drop counts!

The natural water cycle

Water falls out of the clouds as rain, hail or snow.

Plants, animals and people use some of the rainwater. Some of the rainwater flows into the creeks and then into our rivers. The water flows into lakes or into the ocean. Some of the water soaks into the earth, creating groundwater.

The sun heats up water in rivers, lakes or the ocean and turns it into vapour or steam. The water vapour or steam leaves the river, lake or ocean and goes into the air.

When it gets cold, water vapour in the air gets cold and changes back into liquid, forming clouds. When so much water is stored in the clouds and they cannot hold it any more, the water falls back to earth as rain, hail, sleet or snow.

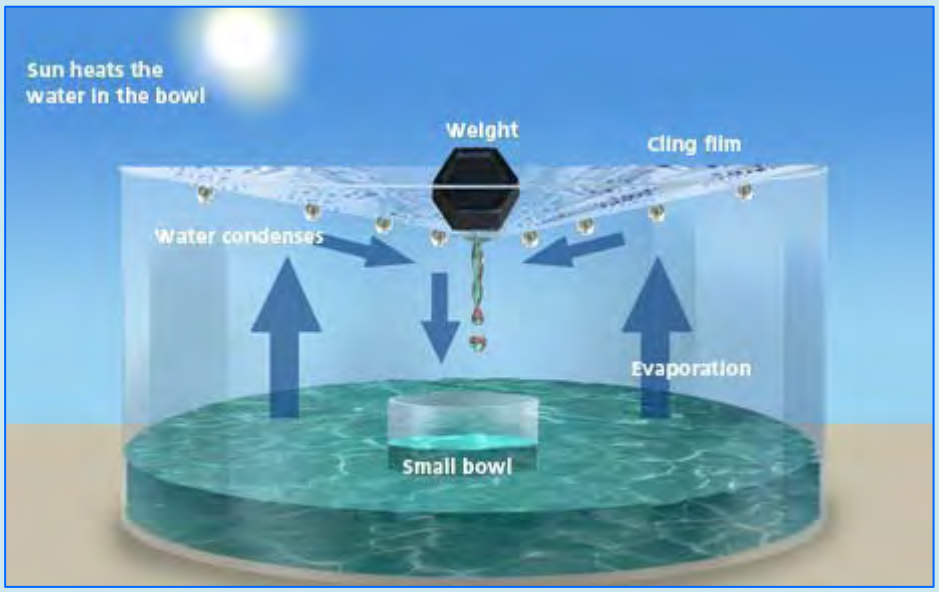
This means that water is constantly cycled around the earth.

Other resources

You Tube has some animated songs about the water cycle you can use to explain the water cycle.

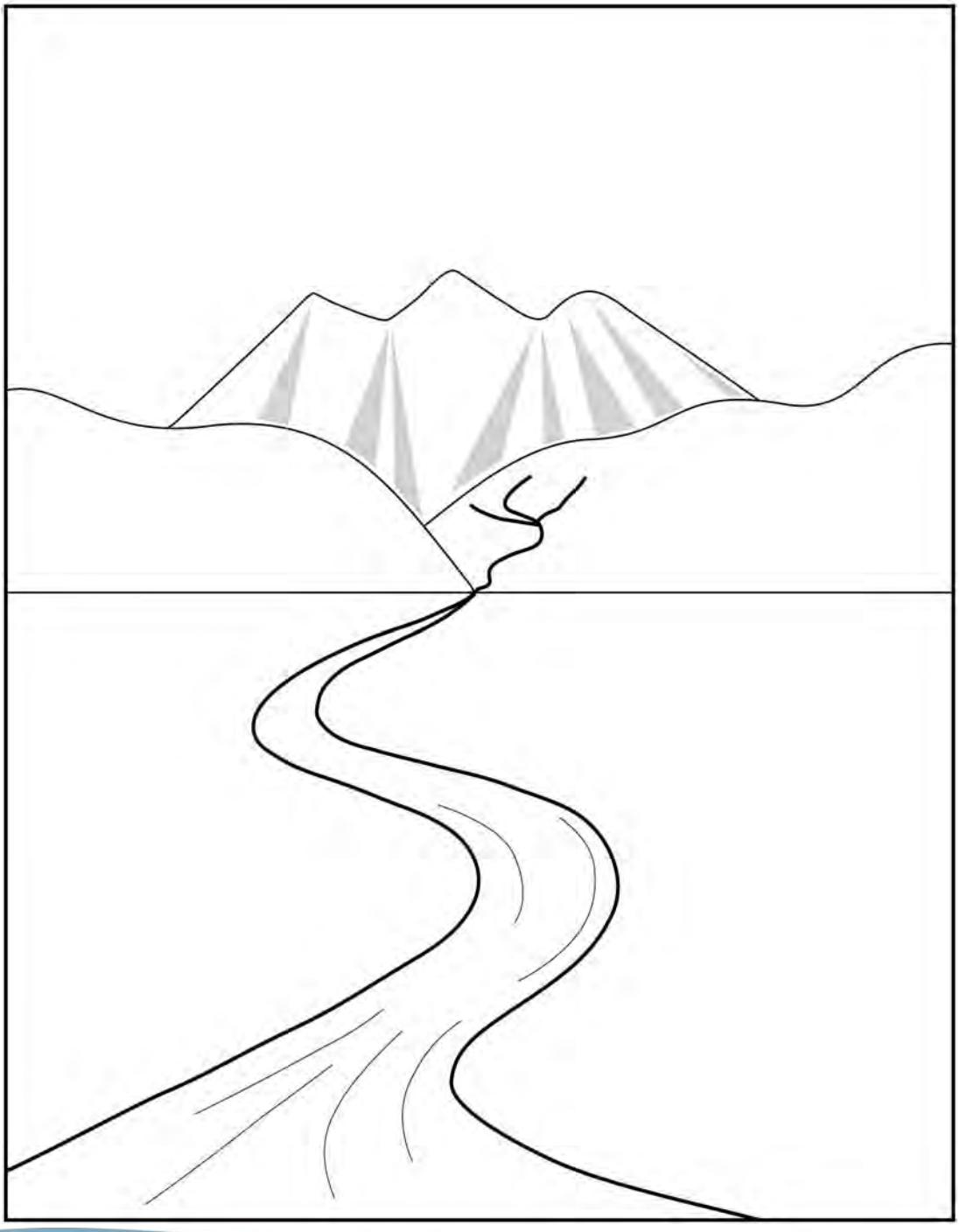
Make your own water cycle

- Put some water into the large glass bowl.
- Place the small bowl in the middle of the large bowl.
- Cover the top of the large bowl with plastic wrap so there are no gaps. Don't pull the plastic wrap too tightly.
- Place the stone in the centre of the plastic wrap so it sags in the middle over the small bowl.
- Place the bowl in the sunlight and leave it for a few hours.
- Explain what you see happening.



The natural water cycle

Complete this diagram to create a water cycle. Refer to the water cycle poster if you need to.



Section 3: We need water to live

In this section students explore the idea that all animals and plants need water to live.

How do we use water?

Equipment:

- wave pages
- classification headings
- art materials
- felt tips

- Give each student a wave page and explain that they need to create three situations to finish the sentence *I needed water when ……*
  As the answers will be displayed, have your students write in colours suited to their idea.

  Their responses can be funny or serious but they want to create a word picture for the reader. Explain with examples like these:

  I needed water when...
  - my dog rolled in something very smelly and it took three of us to give him a bath.
  - I experimented with my sister's make up.
  - our soccer match was a mudbath.
  - I painted my jersey, not my artwork.
  - my Dad got us lost and an hour's walk turned into four hot, thirsty hours.
- Have your students join in groups of four and look at everybody's ideas, then select three ideas and prepare three mimes that they can present to the class. The class must guess what the situation is and how the water is being used.
- Use the provided headings and have your students work in pairs and discuss the class's answers and classify each one under the most appropriate heading. Some answers may fit under a number of headings. Add some more ideas under headings that have few ideas.
- Make a 3 dimensional installation of all the student's' ideas.
- Have your students write an illustrated story based on one of the ways somebody used water in a funny, serious or unusual way.

Big ideas

We can use water:

- **to drink**
- **to wash ourselves and keep us and our animals healthy**
- **to put fires out**
- **to grow plants**
- **to cook things**
- **to clean things**
- **for plants and animals to live in**
- **for recreation or for activities in, on or under water**
- **to appreciate**
- **for cultural ceremonies.**
- **for spiritual value.**

Water is precious — every drop counts!

Produced by Kāpiti Coast District Council.
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Water is precious — every drop counts!

Water is precious — every drop counts!

for spiritual value	to drink
to wash ourselves and our animals to keep us and our animals healthy	to put fires out
to cook things	to clean things
for plants and animals to live in	for recreation - fun activities in, on or under the water
to appreciate	for cultural ceremonies
to grow things	

Animals need water to live

In this activity students imagine they are an animal living in water and the ideas they generate are used to create illustrated poems.

Creating the poems

The poems:

- should use the technique of 'personification' or giving non-human things human qualities
- are not a 'who am I ' riddle
- do not need to rhyme
- could be a shape poem where the shape of the text suggests the shape of the animal or suggests something about the animal living or moving in water
- Should feature sense bound language and describe what the animal sees, hears, feels, smells and tastes.

The activity

- Give groups of students one of the pictures of a native animal that is found in our local lakes and river e.g. a hermit crab or a freshwater fish.
- Ask the students to imagine they are this animal living in or near water and describe what it is like.
- Have the students write as the animal describing their life in or near water and why water is important to them.

  They could include what could happen if their water environment:
  - was flooded after a storm
  - began to dry up in the summer or
  - was polluted with silt, paint, oil or toilet wastes.
- Have the students turn their ideas into an illustrated poem.
- Create the atmosphere of living in water by playing water music as your students create their poem. You can borrow a CD from the Water Education Facilitator that has sounds of rivers, waterfalls and the ocean. Alternatively you can purchase a CD of water sounds.

Big ideas

Water is essential to animal life.

Some animals are adapted or suited to living in or near aquatic (water) environments.
like streams, rivers, lakes and the sea.

The quality of the water that aquatic animals live in is Important to their survival.

Actions people take can affect the environment that aquatic animals live in.

The native animals in the photographs are:

- a long finned eel
- pukeko
- a hermit crab
- a giant dragonfly
- scaup or diving ducks
- oystercatchers
- a water spider
- an inanga or adult whitebait.

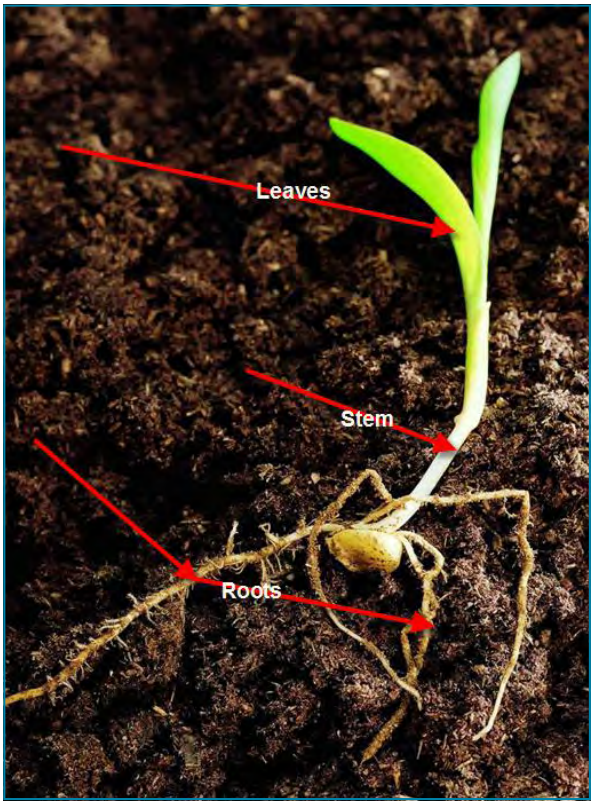
Information about these animals can be found on *Te Ara* www.teara.govt.nz/

Animals that live in or near water


S.C. Moore

Plants need water

Have your students conduct some research to and then describe how plants take in, use and lose water.



Big ideas

Plats need water to live.

Plants take in water through their leaves.

The process of transpiration helps plants stay upright.

No new water can be created.

Water is precious — every drop counts!

Does everyone have enough water?

In this activity students briefly consider the effect of a shortage of clean water on young people in different parts of the world. This is a single activity because the global water shortage is a feature of the *Water is precious* learning programmes at years 3 and 4 and years 7 and 8.

- Explain to your students that in many parts of the world families cannot turn on a tap and get safe water to drink and use. There may be a shortage of water, and women and children may have to carry water a long way for the family to use. The water may be dirty or contain disease-causing organisms that can make people, especially small children, sick.
- Have your students go to the 2010 World Water day website www.unwater.org/wwd10/flash/g1/gallery1.html and view photographs from the gallery under these headings:
  - ◊ Water quality global issues
  - ◊ Water quality — what is at stake?
  - ◊ The best of your photographs, Part 1 and 2.
- Have each student select and print one photograph and make a poster that highlights an aspect of water supply or water quality for a community in that country.

Big ideas

Water is a finite resource.

Not everyone in the world has easy access to a supply of clean water.

As the earth's population grows, there will be a greater need for us to manage how we use and care for water.

Every drop counts.

Is the well running dry?

Thomas Fuller, who lived from 1608 to 1661, wrote 'We never know the worth of water until the well is dry.'

In 2011, our world population reached six billion. By 2025 the world population is expected to reach eight billion, yet the planet cannot produce more fresh water.

Ask your students what they think will need to happen by 2025 for everyone to have an adequate supply of safe drinking water.

Section 4: Three waters – drinking water, stormwater and wastewater

In this section students explore drinking water, stormwater and wastewater.

Where does our water come from?

Equipment:

- DVD *Our safe drinking water*

- Turn on the tap and fill up a glass of water and ask your students where they think the water comes from and how they know it is safe to drink.

- Explain that on the Kāpiti Coast, our water is treated differently on different parts of the coast. An explanation is provided on the next page.
- Show your students the DVD and discuss how your area gets a supply of drinking water and why we know it is safe to drink.
- Discuss:
  - what a resource consent is and why there is a limit on the amount of water that can be taken out of the Waikanae River
  - why people who use the river catchment area need to take action to make sure they do not put animal wastes, human wastes, soil, oil or chemicals into the water
  - why there are large reservoirs (*So we have stored water in an emergency).*
  - why reservoirs are on the tops of hills (*Water is pumped to the reservoir but gravity carries the water down into our pipes and provides water pressure in our taps).*
  - why samples of water from places like school are regularly tested for water quality *(To make sure the water in the pipes maintains its quality).*

Big ideas

Water is treated at a water treatment plant so it is safe to drink.

Water is stored in large reservoirs on the tops of hills.

Water is piped to our homes.

Water is precious — every drop counts!

Where does our water come from?

Rain falls on the land and it goes into streams and rivers. Some goes under the ground.

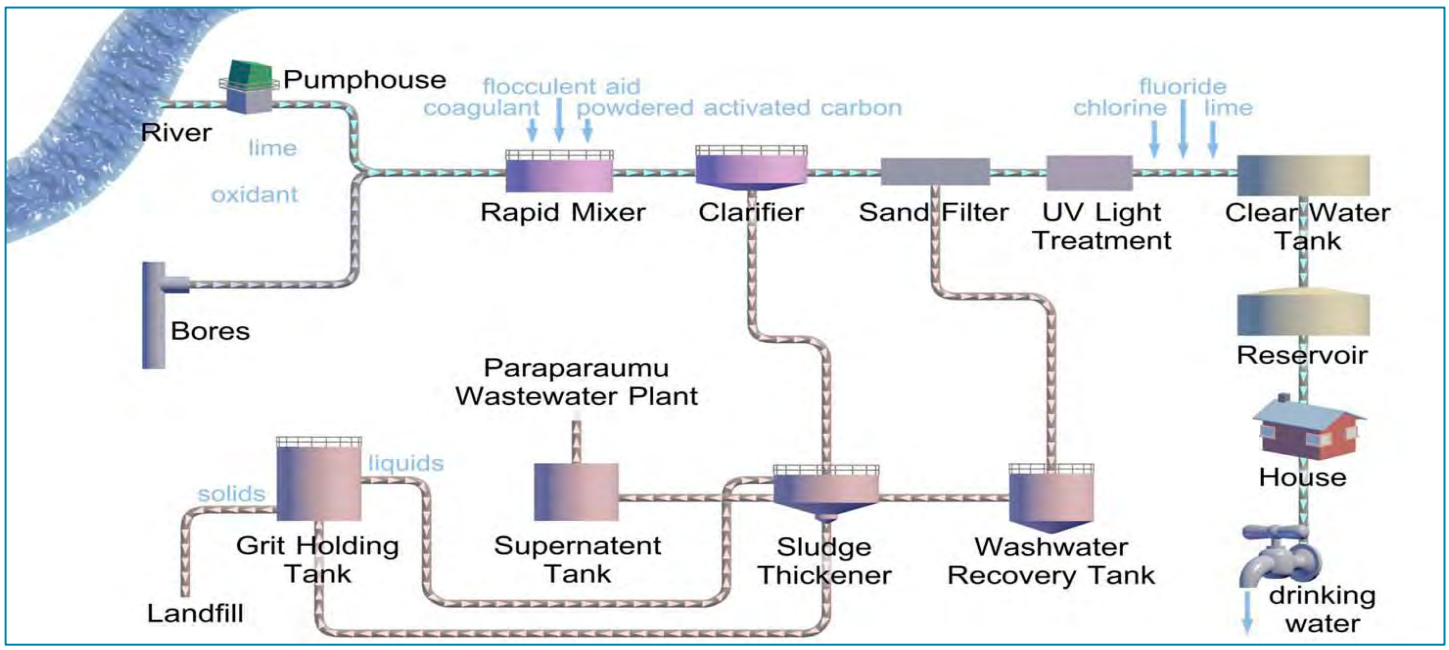
In Waikanae, we take water out of the river and treat it at the Waikanae Treatment Plant to make it safe to drink. The water is piped to reservoirs or large tanks where it is stored. Then the water is piped into our houses. We turn on the tap and drink safe water.

Some summers we need to use ground water as well as river water. We leave water in the river so that plants and animals can live there and people can use and enjoy the river. The river flows into the ocean.

In Paekākāriki, the water we drink comes from a stream and from under the ground. It is treated before we drink it.

In Ōtaki, the water comes from under the ground. It is treated before we drink it.

Testing water at the Waikanae Water Treatment Plant intake



Three waters — drinking water, stormwater and wastewater

In this activity students briefly consider the three sorts of water that go into or leave a house. This is a single activity as stormwater and wastewater are considered in more depth in the Year 5 and 6 and Year 7 and 8 programmes. However if you want to carry out other investigations use the Greater Wellington Regional Council resource *Turning on the tap* at www.gw.govt.nz/turning-on-the-tap

Stormwater, wastewater and greywater

- Have your students work in groups and read through the provided information sheet.
- Ask your students to go home and determine what happens to the stormwater and wastewater from their house.
- Find out if any families in your class collect the rainwater that falls on the roof and use it to water their gardens.
- If a student's family has tank rainwater have them describe how the system works. They may be able to use a smartphone to make a video about it or take digital photographs you can display in your classroom.
- Ask if your students know what greywater is and give them a definition of greywater. Discuss:
  - ◊ where greywater can be used
  - ◊ what you should not use it for
  - ◊ why toilet wastes (and often dishwater) is not included in a greywater system. *Toilet wastes can carry disease-causing organisms. Water from cleaning food utensils is likely to contain fat and chemicals in the detergent. Refer to the emulsifying experiment.*
- If a student's family uses a greywater system, have them describe how the system works.
- Some families may have a bore and collect water from underground aquifers. If a student's family has a bore have them describe how the system works and what they use the bore water for.

Big ideas

Stormwater is water that falls to the ground in a big storm.

We have stormwater systems (drains and pipes) to make sure that stormwater can be collected and returned to rivers, lakes and seas.

Stormwater that is returned to waterways is untreated water so it can be polluted with chemicals and be harmful to plants and animals.

Greywater is wastewater generated from domestic activities such as laundry and bathing.

Greywater can be recycled for uses such as landscape irrigation and in constructed wetlands.

Greywater does not contain toilet or kitchen water.

Stormwater and wastewater

Installing stormwater pipes under a road

What do you think happens to:

- water that falls onto your house in a rainstorm
- water that goes down the plughole
- toilet wastes that are flushed away?

Stormwater

Stormwater is the water that is created after a storm. The water may go into gutters and then into a drain that connects with stormwater pipes. The untreated stormwater is then released into waterways like open drains and streams and finds its way to the sea.

The Kāpiti Coast has over 8,000 stormwater pipelines that have a total length of more than 210km. There are over 3,300 manholes or places where Council workers can get into the pipes to fix them or clean them out or pump water in an emergency. The stormwater system must be built to carry water if there was a very large storm, like the biggest storm we could have in 100 years. Some of the old stormwater pipes are being replaced to make sure they can carry enough water in a large storm.

An open stormwater drain

However, stormwater from some houses does not go into the stormwater system. If your street does not have a footpath, it is likely that your house is not connected to stormwater pipes. You are likely to have a large soakpit that gathers all the stormwater from your house and lets it drain into the soil over time.

The water level here can rise after a large storm.

A roadside stormwater drain with rubbish

Water is precious — every drop counts!

This pipe releases stormwater to the sea and carries a warning

Stormwater drains are not places for children to play in or near because they may drown and because the untreated water may be carrying some disease - causing organisms.

This wetland is a habitat for native birds and other animals. It has been created to collect stormwater.

Estuaries are where streams reach the sea. The streams may contain stormwater. Sometimes after heavy rain, discoloured water can be seen in the stream and in the sea near the stream mouth.

Kāpiti has many created lakes that act as reservoirs for stormwater after big storms.

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www.kapiticoast.govt.nz

Three stormwater pollutants — paint, soil and oil

When there is too much water for the stormwater system. The Paekākāriki floods of October 2003

Treating wastewater

Wastewater including sewage from Waikanae, Paraparaumu and Raumati is treated at the Paraparaumu Wastewater Treatment Plant. Clean water is returned to the local waterway and makes its way to the sea.

Ōtaki wastewater and sewage is treated at the Ōtaki Wastewater Treatment Plant and the clean water is returned to the land.

People in Paekākāriki and in rural areas use septic tanks.

The Paraparaumu Wastewater Treatment Plant

Section 5: Being waterwise and conserving water

In this section your students explore ways to be waterwise and conserve water at home.

The activity to conserve water at school is focused on conserving water in the school gardens.

Big ideas

We use more water in the summer than in the winter.

Outdoor water use rises significantly in the summer.

Most of the outdoor water use is in watering lawns and gardens.

We need to reduce our water use especially in the summer.

We can all take Every drop counts.

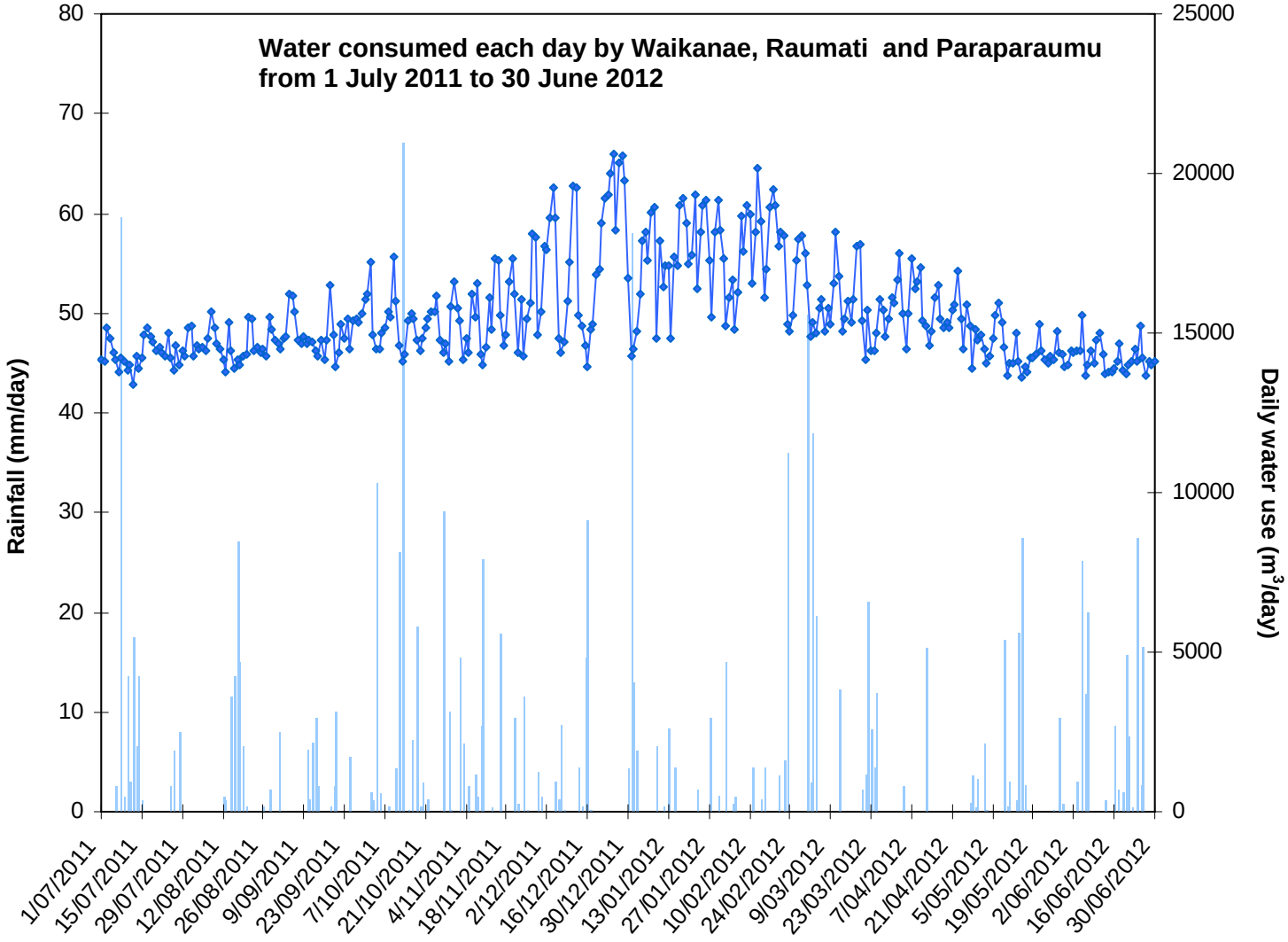
Start small, do it every day, and make it a life-long water saving habit.

Water use on the Kāpiti Coast

- Explain to your students that you are going to look at some statistics to see how we use our water and then they are going to investigate how they and their families use water.

  Three pages of statistics are provided. It is suggested that you display the first graph and discuss it with your students and then give them a copy of the sheets *How we use our water in the summer and in the winter, How do we use our water at home* and *Using water in the home.*
- Work through the statistics with your students and set them up to investigate their water use at home. Parents could find the information on all three sheets useful as they review how they use water, especially in the summer.
- After the students have completed their investigation into water use at home, have the students select one or two actions they are going to take that will reduce their water use.
- Have your students work in pairs, select their 'top' action and discuss:
  - ◊ what will encourage them to keep on doing the action and save water
  - ◊ what might discourage them from doing it and how you can reduce the chances of this happening
  - ◊ whether a visual chart or tick box would help to keep them on track and if so what it would look like
  - ◊ whether a poster or sign would be good to remind them
  - ◊ if a weekly review with a friend would be encouraging
  - ◊ what else would help when it might be easy to forget to save water.
- Have your students plan to begin their action by creating monitoring charts, signs to put above the basin or by the shower etc.

An example of how water use on the Kāpiti Coast changes over the year



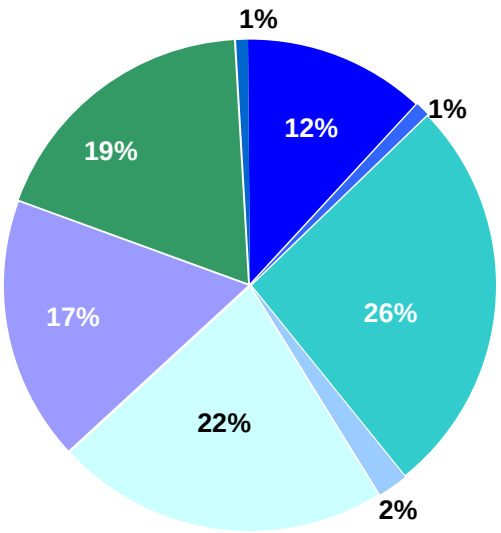
This graph shows how daily water use changes over a year when the communities of Raumati, Paraparaumu and Waikanae use water. The water use is the dark blue line. The daily rainfall is the light blue columns.

- Compare the water use over the summer and the winter and have the students reach a conclusion.
- Discuss what might make the daily fluctuations, e.g. weather, and what people are using use the water for. Can you see any evidence that water use goes up on weekends or in holiday periods?

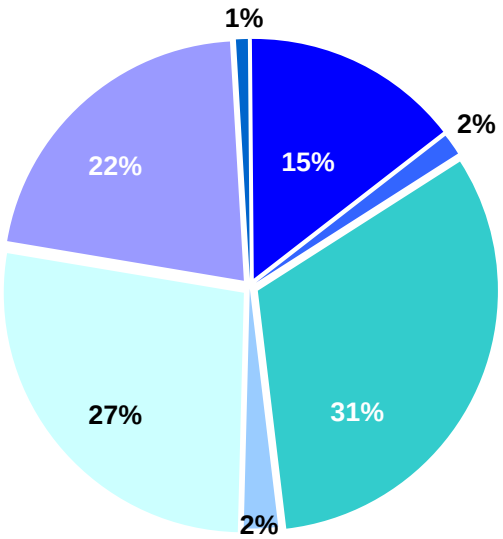
Water is precious — every drop counts!

How we use our water in the summer and in the winter

Summer



Winter



Taps
Dishwasher
Shower
Bath tub
Washing machine
Toilet
Outdoor
Miscellaneous

Compare these two pie charts and work out what changes occur between summer and winter.

- What uses 20% or more of the water?
- What is the increase in outdoor water use in summer (in percent)?
- What do you think people do to increase their outdoor water use in summer?.

One local family found out that they had a major leak in their pipes and they were wasting 30,000 litres of water a day!

If you run a tap for a minute you can let 15 or more litres of water run down the drain.

So if you run the tap for a minute twice a day when you brush your teeth, that's 30 litres of water a day going down the drain.

In countries where there is a shortage of water a person may only have 10 litres of water to use each day.

A dripping tap can waste 1,000 litres of water a year.

Water is precious — every drop counts!

How do we use water at home?

DAILY WATER USE SURVEY

= 10 litres

In 2007, BRANZ conducted a survey on water use in Kapiti homes. This table shows where the 12 surveyed households used their water. It breaks down how many litres on average, **each person** in these households used per day. The graphics below illustrate this in buckets. One bucket contains approx 10 litres of water.

RUNNING A TAP
Households used their taps around 12 times a day, for 27 seconds a time
= 7.5 litres a day

HAVING A SHOWER
People showered 0.7 times a day for 6.9 minutes at a time
= 54.3 litres a day

FLUSHING THE TOILET
People used the toilet 5.1 times a day and each flush used 6.2 litres of water on average
= 31.2 litres a day

WASHING THE CLOTHES
Households washed clothes 0.8 times a day.
= 41 litres a day

WATERING THE LAWN
Households watered their lawns on average 4hrs/week.
= 204 litres a day

Add these figures to find out how much water an person, on average, is using on the Kāpiti Coast per day.

How does this compare with an average family living in a country without an adequate water supply?

It's time to consider how you and your family use water

In the Bathroom

Brushing your teeth

Do you let the water run? Time how long you have the tap running when you clean your teeth. You use 15 litres for every minute you run the water.
Do you want to change anything about how you clean your teeth?

Taking a shower

Are you a long showerer or a short showerer? Time your shower. You could use 6 to 8 litres of water a minute as you shower.
Do you want to change the length of time you spend in the shower?

A home water use check or audit

Take the *Using water in the home* information sheet and talk about it with your family. See if your family can make some changes in how they use water to be more waterwise and save water.

Water is precious — every drop counts!

Using water in the home

Water use area	How much does the average home use?	What can we do to reduce our use?
	Garden hose hand held up to 900 litres per hour. Garden hose sprinkler up to 1,300 litres per hour Garden hose, uncontrolled up to 2,000 litres per hour.	• Water early morning or late at night to avoid evaporation. • Mulch your garden. • Avoid overwatering. • Use greywater and/or rainwater to water your garden. • Use a soaker hose.
	Shower at 6 litres per minute for 5 minutes uses 30 litres . Shower at 18 litres per minute for 5 minutes uses 90 litres.	• Take shorter showers. • Change your showerhead to one that produces a lower flow rate.
	A full load in a top loader uses 130 litres or more. A full load in a front loader uses approximately 50 to 70 litres.	• Wash with a full load or use economy settings for part loads. • Buy a washing machine with at least a four star WELS rating.
	The average single flush toilet uses 11 litres per full flush. Modern dual flushing toilets use only 3 to 6 litres per flush.	• Use the dual flush appropriately. • Install a dual flush toilet. • If you have a single flush toilet install a Council supplied lead weight to manage the flush.
	A tap that loses 2 drips per second can lose 380 litres per month send 15 to 30 litres of water down the drain every minute.	• Fix dripping taps. • Don't leave the tap running when you clean your teeth. • Don't leave the tap running to rinse the dishes or when you peel vegetables.
	A dishwasher uses approximately 28 to 40 litres per wash cycle. The kitchen sink holds 14 litres.	• Run the dishwasher with a full load of dishes. • Buy a dishwasher with an AAA water conservation rating. • Wash the dishes in a half full sink instead.
	A bath uses 80 to 200 litres of water depending on size.	• Consider showering instead of taking a bath. • Use less water in the bath.

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Water is precious — every drop counts!

Gardening wisely and conserving water

This activity focuses on a visit from the Green Gardener.

The Green Gardener will talk to your students about how to develop and maintain gardens that are suited to our local growing conditions and climate and that use water efficiently over the summer. The visit will include a practical component in your school garden or looking at an ornamental garden at your school.

The Water Education Facilitator can organise a visit from the Green Gardener. You will have the opportunity to speak with the Green Gardener prior to the visit to ensure the presentation addresses any practical questions your students have about your school gardens.

- Remind your students that in the summer most of our water is used outdoors watering lawns and gardens, however, great gardens are a feature of our local area.
- Ask the students:
  - ◊ what the problems are when you garden in the summer
  - ◊ how they think you can be smart and garden to save water
  - ◊ how you garden to save water in your school garden.
- Use this discussion to develop some questions to ask the Green Gardener when they visit.
- After the visit have your students design a garden suited to the Kāpiti Coast.

Kapanui School students in their school garden.

Big ideas

We can conserve water in gardens at school or at home by:

- **creating gardens that don't require a lot of watering**
- **growing plants suited to our soil and our climate and don't need a lot of water**
- **mulching**
- **watering effectively e.g. using soakhoses to get water into the soil**
- **installing rainwater barrels and using the water collected to water the garden**
- **using greywater to water gardens (not vegetables).**

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Section 6: Taking action to use water wisely

In this section your students focus on what they and their families can do to be waterwise and conserve water.

Big ideas

We can all save water.

Every drop counts.

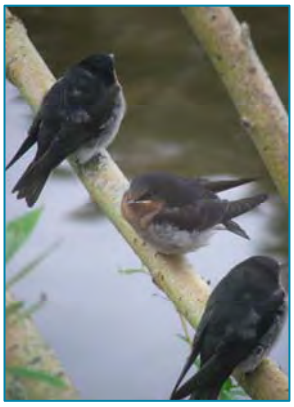
We can act as water ambassadors or guardians of water and encourage people to save water .

Becoming a water ambassador or water guardian

At the beginning of this learning programme students were invited to become water ambassadors or a guardians of water. This section has students reflect on their learning. It contains activities that can be used as individual or group assessments.

Speaking up

- Explain to your students that now they are water use experts they may want to talk with adults or young people when they see or hear them not using water wisely. The students will need to work out good ways of getting their message across so that they will listen and want to change their behaviour.
- Discuss with your students how they check out that it is a good (and safe) time to have the conversation.
- Have your students work in groups and role play what they would say to people in one or more of the situations outlined on the next page.



Being a Water Ambassador and a Guardian of Water

- **Hand a small bottle of tap water around as a 'talking stick' and have the students give one reason why we should value or conserve water.**
- **Ask the students if they want to be Water Ambassadors or Guardians of Water and what this might involve. Indicate that this starts with us taking personal action to value and conserve water and then can lead to us encouraging other people to value and conserve water.**
- **Have your students complete A3 versions of the *Water Ambassador* sheets as a way of reflecting on what they do to value and conserve water.**

Water is precious — every drop counts!

What would you say to someone who says ….

‘When I paint the outside of the house I always wash the brushes with the hose and let the water run into the drain. It means I don’t risk spilling the paint inside.’

What would you say to someone who says ….

‘I like to do the laundry every day so it’s not a big job but some days the washer is not very full.’

What would you say to someone who says ….

‘Lets run the water while we go to the toilet so that no-one can hear us go.’

What would you say to someone who says ….

‘I love a green lawn in summer. It’s out the back so I use a sprinkler cause no-one can see.’

What would you say to someone who says ….

‘If I have a shorter shower it only saves a little bit of water, not enough to make a difference. So why bother?’

What would you say to someone who says ….

‘Conserving water is for adults, us kids don’t have to worry about that.’

What would you say to someone who says ….

‘I love long showers and baths.’

What would you say to someone who says ….

‘That tap has been leaking for weeks, I just haven’t found time to fix it yet.’

What would you say to someone who says ….

‘It seems like too much effort to mulch my garden.’

What would you say to someone who says ….

‘We can use as much water as we like, there is plenty to go around. The rivers here are full of water and it rains a lot even in summer.’

What would you say to someone who says ….

‘I like to water my garden well every day in the summer.’

What would you say to someone who says ….

‘Let’s leave the rubbish here it will break down or wash away.’

What would you say to someone who says ….

‘Only people in other countries like African countries need to worry about water shortages and having clean water to drink. Our water is good to drink.’

Speaking on behalf of water

- Have your students work in groups and make a group presentation that they can present to parents or another target audience e.g. a school assembly. The presentation makes the argument that water is a precious and finite resource that we need to value and conserve.

  This is an opportunity to create a presentation that makes a strong impact on the audience. The presentation could:

  - ◊ use drama freeze frame snapshot moments.
  - ◊ if students have access to video cameras or smartphones, include pre-recorded drama sequences or other sequences filmed outside the school
  - ◊ be a rap or a song or a dance sequence to selected music
  - ◊ be a Powerpoint presentation using photographs or artworks created by the students.

  There is a CD of water music available on loan from the Water Education Facilitator could provide useful music to this presentation.
- Have your students present their learning to parents and caregivers. If you families are interested, work with the Water Education Facilitator to include a Green Team presentation about how families can conserve water, make homes more energy efficient and reduce waste.

Big ideas

We can all save water.

Every drop counts.

The Be Waterwise Garden Competition

Your students may want to create a garden for the Waterwise School Garden Competition that is part of Sustainable Home and Garden show each March. The Water Educati9n Facilitator has entry forms for this competition.

Raumati School's 2012 waterwise garden

Water is precious — every drop counts!

I am a Water Ambassador or Water Guardian when I use water wisely or encourage my family and friends to conserve water.

I make sure every drop counts.

Actions I and/or my family take at home to conserve water:

Actions I and my friends take at school to conserve water:

Water is precious — every drop counts!

We are Water Ambassadors or Water Guardians when we value water and recognise that water is precious — he tāonga te wai

Ways we value water at home:

Ways we value water at school:

Ways we value water in our local area:

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