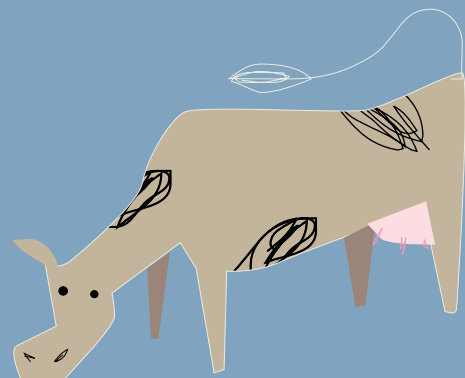
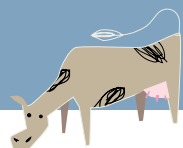


SECTION ONE:

Water as a resource

This section examines the students' knowledge and experiences with water. Students gain an understanding that water is a precious resource. Differences in water use around the world are also investigated.





Section 1: Water as a resource

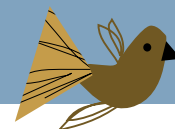
The purpose of this section is to help students to:

- Understand that water is a precious resource (taonga) that we all must look after for the future
- Explore how they interact with water in their daily lives and learn how others use water
- Be motivated to learn about water conservation and the global water situation

Overarching concepts for Section One:

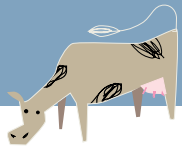
- Fresh water is a limited resource
- Water is important to everyone in lots of different ways
- How we choose to use water has an effect on the world we live in

Section 1: Water as a resource



Learning experiences – Section One

Learning experiences	Learning intentions Students will . . .	Curriculum links (Achievement objectives)	Content
1. Water: a precious taonga	<ul style="list-style-type: none"> Understand that fresh water is a precious natural resource 	<p>Science: Level 3 and 4 Planet Earth and Beyond: <i>Earth systems</i> Develop an understanding that water, air, rocks and soil, and life forms make up our planet and recognise that these are also Earth's resources</p>	Slideshow about the importance of water as a taonga (precious treasure)
2. Water in pictures	<ul style="list-style-type: none"> Identify the different ways that people view and use water Recognise that water resources can be found in nature in a variety of forms 	<p>Science: Level 3 and 4 Planet Earth and Beyond: <i>Earth systems</i> Develop an understanding that water, air, rocks and soil, and life forms make up our planet and recognise that these are also Earth's resources</p> <p>Social Sciences: Level 3 Understand how people view and use places differently</p>	View a set of photos about water use and water in the environment. Discuss and group them according to subject
3. Water in our lives	<ul style="list-style-type: none"> Recognise that in different situations, people use and think about water differently Understand that as water consumers, we all have a responsibility to use water carefully 	<p>Social Sciences: Level 3 Understand how people make decisions about access to and use of resources</p> <p>Social Sciences: Level 4 Understand how producers and consumers exercise their rights and meet their responsibilities</p> <p>English: Level 4 Listening, Reading and Viewing <i>Processes and strategies</i> Integrate sources of information, processes, and strategies confidently to identify, form and express ideas</p>	Read a series of case studies about how children from other countries use water and compare to their own water use
4. Water everywhere	<ul style="list-style-type: none"> Recognise that there are limited resources of fresh water on earth Understand that only a small proportion of fresh water on earth is easily available for us to drink 	<p>Science: Level 3 and 4 Planet Earth and Beyond: <i>Earth systems</i> Develop an understanding that water, air, rocks and soil, and life forms make up our planet and recognise that these are also Earth's resources</p> <p>Science: Level 3 and 4 Planet Earth and Beyond: <i>Interacting systems</i> Investigate the water cycle and its effect on climate, landforms and life</p>	Demonstration of fresh water as a proportion of water on earth



1:1 Water: a precious taonga – teacher notes

Curriculum links

Science: Level 3

Planet Earth and

Beyond: Earth systems:

Appreciate that air, water, rocks, soil and life forms make up our planet and recognise that these are also Earth's resources

Other curriculum links:

L 3 and 4

English *Listening, Reading and Viewing Processes and strategies*



Education for sustainability concepts

Interdependence/

Whanaungatanga:

Everything and everyone in our world is connected

Responsibility for Action/

Kaitiakitanga:

If we want to use taonga, we must look after that taonga

Background knowledge

Water is a limited resource that we often take for granted here in New Zealand. Even though we have a relatively plentiful supply of water, it is often not used as wisely as it should be. This slideshow aims to express the importance of water in our lives and the value of water to all of us.

Water is a renewable resource. It replenishes with rainfall and is cleansed by the processes it goes through in the water cycle. Competition for the surface water available to us increases as time goes on.

In a Māori world view, the Earth is a living entity. Papatūānuku (the earth mother) 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 (this is also true in a scientific world view where humans are 70% water).

Tangaroa

Tangaroa is one of the descendants of Papatūānuku (the earth mother) and Ranginui (the sky father). He is one of the atua. Tangaroa is the atua of the sea, rivers, lakes and all life within them. Water is Tangaroa's domain.

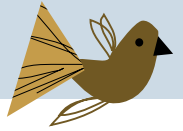
Mauri

As part of this living system, water has its own mauri, energy, or life-force. Some students may have witnessed this energy in a fast flowing river or in the tranquil beauty of a deep pool.

Taonga

A taonga is a heartfelt treasure of immense value. There are times when a taonga can be an item, for example, something handed down through generations (taonga tuku iho), but a taonga can also be an idea or sometimes a person. A taonga is viewed and valued by others in a special way. If we respect and value water, and feel our connection with it as a part of the environment, then we must be responsible to care for it. We need to look after earth's resources in a sustainable way to ensure her gifts remain for future generations. We need to think of water (and earth's other gifts) as taonga.

1:1 Water: a precious taonga – learning experience



Learning experience

- Share the learning intention and success criteria
- Ask the students if they understand what is meant by a 'taonga'. Explain that a taonga is a 'heartfelt treasure of immeasurable value'. Water is very important and has many functions in our environment. Explain that water is seen by Māori as a taonga that must be looked after and respected
- View the slideshow: '*Water: a precious taonga*'. Ask students to record their ideas about the slides as they are displayed during the slideshow. This could be done using a **KWL chart** – **K** = what you already **know** about water? **W** = what you **want** to know? and **L** = what did you **learn** during the slideshow?
- After discussing the student's own ideas about water, use *BLM 1a: Water: a precious taonga – slideshow notes* to read out the text accompanying each slide. *The numbers are indicative of the slide number the notes belong to.* Allow time for discussion and questions
- After the slideshow, share ideas about why water is a precious taonga/natural resource. This could be a discussion or students could produce a piece of artwork to reflect their thoughts and feelings

As an extension, students could create their own PowerPoint presentations about water.

Reflection questions

- Why is fresh water important to people?
We need to drink water to survive
- What do you think it might mean to say that water has 'mauri'?
(see teacher notes)
- Why should we use fresh water wisely?
It is necessary to have a continuous supply for our survival

Vocabulary

- taonga
- Tangaroa
- Papatūānuku
- mauri
- immeasurable

Learning intentions

Students will:

Understand that water is a precious natural resource

Success criteria

Students can:

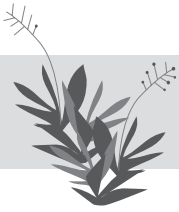
Express their understanding of why water is a precious resource

Resources

Slideshow –

Water: A precious taonga

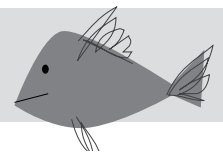
BLM 1a Water:
a precious taonga –
slideshow notes



BLM 1a: Water: a precious taonga - slideshow notes

1. Title page – Water: a precious resource
2. Water is our lifeblood... the key ingredient for life
3. Without it, we would not survive
4. Earth is covered with water, but a very small amount of this water is fresh, or suitable for drinking
5. Every year, the amount of fresh, clean water gets smaller and the population of the world gets bigger
6. In the future, water will be more of a concern than it is today. It will become even more precious than it is now
7. Water was here before us, before all life. Before there were people, plants or animals, there was water
8. It is thought that water is where the first life began
9. Water has its own energy called 'mauri' or life force. It can be a mighty wall of destruction...
10. Or a gentle, quiet pond of stillness
11. In Te Ao Māori (the world of Māori) water is a sacred taonga to be looked after
12. Water is a taonga, to be valued, used with respect, and handed on in an equally good condition to the next generation
13. Water is the realm of Tangaroa, atua of the seas, lakes and rivers and everything in them. Tangaroa is a child of Ranginui and Papatūānuku, the sky father and the earth mother
14. Wherever there is water, Tangaroa is there; in hot springs, ponds and rolling seas
15. The footsteps of Tangaroa can be seen in the rolling waves, the churning oceans and the ebb and flow of the tides
16. Tangaroa's children are the fish and animals that make their home in the water
17. Papatūānuku, (the earth mother of Tangaroa) forms our land. Her body is the mountains and the earth, her veins and arteries are the waterways and streams
18. The rivers and streams carry the impurities from the land and wash them away out to sea. Streams feed into rivers and rivers flow into the sea



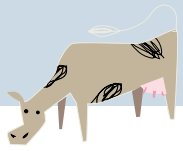


19. Here in New Zealand, we have water all around us. Our islands have many streams and rivers and are surrounded by the ocean
20. Demand for water is high in New Zealand homes and it keeps climbing
21. It seems as if fresh drinking water should be easily available here, but as time goes on it gets more difficult to get new unpolluted water sources
22. Water suitable for drinking, free from disease and impurities, is hard to come by
23. Before being piped to our homes, water from our rivers and catchments is treated and filtered
24. It takes a lot of time, energy and money to collect and treat drinking water. Clean, safe drinking water is not free!
25. People in the Wellington region use about 240 litres, or 2 bathtubs full every day¹
26. Other countries are not so fortunate. In India, people use about 140L (one bathtub full) per day²
27. In parts of Ethiopia, people survive on only about 15L (one bucket) per day³
28. Every day in New Zealand, people, households and businesses use huge amounts of water and often water is not used carefully
29. But it is not just us humans who need water. Every living thing depends on water for its survival
30. Without water there would be no plants, animals or food for us
31. When we take water out of the ecosystem it was meant for, it has an impact on the life in that environment
32. We collect our food from the sea and rivers. We want our food baskets to be free from pollution and other problems
33. We all have a responsibility to look after our fresh water, for future generations and for the animals that depend on it for their survival
34. It is up to every one of us to use water wisely. If we waste water or pollute it, then our environment will suffer
35. We must all do our part to protect our lakes, rivers, streams and oceans
36. We must protect the realm of Tangaroa and protect his children

1 Greater Wellington Regional Council Water Supply Annual Report for the year ended 30 June 2010. pg 5

2 http://www.data360.org/dsg.aspx?Data_Set_Group_Id=757#

3 http://www.data360.org/dsg.aspx?Data_Set_Group_Id=757#



Water: A precious taonga – slideshow outline



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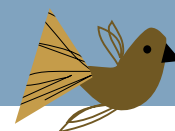


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1:2 Water in pictures – teacher notes



Background knowledge

These pictures depict water in the natural environment and people's interaction with water. We all interact with water daily, in a variety of ways. This activity aims to enable students to reflect on their own experiences with water and to share them with others.

Description of the *Water in pictures* photocards

Photo No.	Description	Possible grouping*
1	Snow	1
2	Cow drinking	4
3	Swamp forest	1
4	Waterfall	1
5	Waterskiing	2
6	Drinking fountain	4
7	Mist	1
8	Bottled water	4
9	Water droplet/rain	1
10	Rainwater tank	4
11	Water slide	2
12	Girl in pool	2
13	Cuba Mall bucket fountain	2
14	Kayaks on Hutt River	2
15	Fishing	2
16	Dishwasher	3
17	Washing machine	3
18	Toilet	3
19	Sprinkler watering garden	3
20	Cleaning teeth	3
21	Washing hands	3
22	Bell bird with water trough	5
23	Longfin eel	5
24	Dam	1

*These possible groups are a guide only and are not intended to be the only way to group the photocards. Encourage your students to have their own grouping and to be able to justify their choices.

Photos may be sorted into groups which may include some of the following categories:

1. Water in nature/water as a natural resource
2. Water for recreation
3. Water uses in the home e.g. cleaning, washing
4. Water for drinking
5. Water for plants and animals

Curriculum links

Science: Level 3

Understand how people view and use places differently

Science: Level 3

Planet Earth and

Beyond: *Earth systems:* Appreciate that air, water, rocks, soil and life forms make up our planet and recognise that these are also Earth's resources

Other curriculum links: **L 3 and 4**

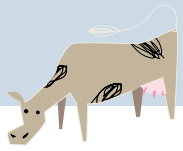
English: *Listening, Reading and Viewing Processes and strategies*



Education for sustainability concepts

Responsibility for Action/ Kaitiakitanga: If we want to use taonga, we must look after that taonga

Sustainability/Hauora: The choices we make today affect choices we will be able to make in the future



1:2 Water in pictures – picture cards



1. Snow



2. Cow drinking



3. Swamp forest



4. Waterfall



5. Waterskiing



6. Drinking fountain



7. Mist



8. Bottled water



9. Water droplet/rain



10. Rainwater tank



11. Water slide



12. Grl in pool



13. Bucket fountain



14. Kayaks



15. Fishing



16. Dishwasher



17. Washing machine



18. Toilet



19. Sprinkler in garden



20. Cleaning teeth



21. Washing hands



22. Bellbird on water trough

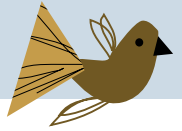


23. Longfin eel



24. Dam

1:2 Water in pictures – learning experience



Learning experience

This activity can be done as a whole class or in groups

- Distribute photocards to students. Students without photocards can be the group leaders. Discuss the learning intentions and suggest that the grouping should include both water in nature and the ways that people use water
- Group leaders can invent a title for a category after looking at the photocards. When each group leader has a different category title, each card can be discussed one by one, and grouped (together as a class) into categories
- Students with a photocard can come to the front of the classroom. They can share which category they believe their card belongs to and give reasons. The rest of the class can agree or give alternatives
- Display cards along with category titles
- Discuss how students have seen people/animals use water in the photos. Students can then share their own experiences of water use and compare them to the people depicted in the photo cards
- As a class, use the previous discussions to create some generalised statements about how people use water, acknowledging how water is important to different people in different ways. Record ideas
- Start a list of questions students have about what they have seen in the photos. These questions could lead to an inquiry if you prefer this approach

Alternatively, you could allow small groups to sort cards themselves and assign categories, while the others work on an alternate task.

Reflection questions

- What ideas about water were there in the photos that you had not thought about before?
- What things did other people notice that didn't initially stand out for you? Why do you think this is?
- How do you use water differently to your classmates?

Vocabulary

Start a vocabulary list of interesting words and concepts that come up during the discussion.

Learning intentions

Students will:

Identify the different ways that people view and use water

Recognise that water resources can be found in nature in a variety of forms

Success criteria

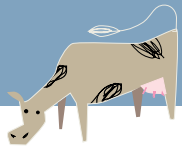
Students can:

Describe and categorise how people are using water in the photos

Describe water resources in nature

Resources

Set of 24 *Water in pictures* photocards



1:3 Water in our lives – teacher notes

Curriculum links

Science: Level 3

Understand how people make decisions about access to and use of resources

Science: Level 4

Understand how producers and consumers exercise their rights and meet their responsibilities

Other curriculum links: L 3 and 4

English *Listening, Reading and Viewing Processes and strategies*



Education for sustainability concepts

Interdependence/ Whanaungatanga:
Everything and everyone in our world is connected

Sustainability/Hauora:
The choices we make today affect choices we will be able to make in the future

Equity: respect for all life, social justice, intergenerational equity, finite resources

Background knowledge

The global situation

Over the last 300 years, the world's population has increased by seven times, but the amount of water we use has increased 35 times⁴. We use fresh water for more things than ever before. This has meant that fresh water supplies are becoming depleted in many parts of the world.

One in every eight people in the world lack access to clean water⁵. Often there is adequate rainfall or other water sources to provide water for the people of these countries but they lack the infrastructure to get the water to the people.

Water in the Wellington region

In the Wellington area, we are lucky that we usually have a steady supply of water to meet demands, but even we can have water shortages. Our councils are starting to consider building a new dam (2010).

People in the Wellington region use an estimated 240 litres per person per day (L/p/d)⁶. This is a very large amount compared to people in other countries.

Gross vs net water use per person

Figures about our water use can vary according to the source. Our *net* water use (water used at home) is estimated to be about 240 L/p/d but *gross* water use is about 380 L/p/d⁷. Gross water use includes domestic, commercial and industrial water use, fire fighting, pipe maintenance and leakage from pipes. Net figures are based on water use *in homes only*.

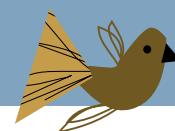
Our net water use can only be estimated as homes in the Wellington region are not metered.

4 <http://telstar.ote.cmu.edu/enviro/m3/s4/cycleHydro.shtml>

5 <http://water.org/learn-about-the-water-crisis/facts/>

6 Greater Wellington Regional Council Water Supply Annual Report for the year ended 30 June 2010. pg 5

7 Greater Wellington Regional Council Water Supply Annual Report for the year ended 30 June 2010. pg 4



Country	Average water used per person per day	Case study synopsis	Reading age (two different methods have been used)
Ethiopia BLM 1d	15L /day ⁸	Ayana lives in southern Ethiopia. There is no water supply for her family so they source their water from wells and ponds.	8-9 yrs ⁺ or 10-11 yrs*
Israel BLM 1e	135L/day ⁹	Ori lives in Jerusalem, Israel. He is very careful with water and uses it wisely.	7.5-8.5 yrs ⁺ or 12-13 yrs*
Australia BLM 1c	220L/day ¹⁰	Oliver lives in Brisbane, Australia. He and his family have ongoing water restrictions which mean they must be careful with their water.	8.5-9.5 yrs ⁺ or 12-13 yrs*
Samoa SJ 3:3:99 pg 25	230L/day ¹¹	<i>(Article: School Journal Part 3 number 3, 1999)</i> Elisapeta lives on Manolo island, Samoa. She has to collect water in buckets for her family.	8.5-9.5 yrs

8 http://www.data360.org/dsg.aspx?Data_Set_Group_Id=757#

9 <http://www.okwaterwise.ca/learn-go.html>

10 <http://www.nwc.gov.au/www/html/236-water-use-in-australia.asp>

11 http://www.pacificwater.org/userfiles/file/GEF%20IWRM%20Final%20Docs/SOPAC%20Samoa%20IWRM%20Diagnostic%20Report%202022_10_07.pdf (p28)

+ Assessing the Difficulty of Reading Materials: The Noun Frequency Method. Warwick B Elley and A.Cedric Croft. 1989 edition.

* **Estimated** reading age based on fry readability formula



1:3 Water in our lives – learning experience

Learning intentions



Students will:

Recognise that in different situations, people use and think about water differently

Understand that as water consumers, we all have a responsibility to use water carefully

Success criteria



Students can:

Compare their water use with people from other countries and give reasons for any differences

Give reasons why we have a responsibility to use water wisely

Learning experience

This activity is based on the English and Social Sciences curriculum. It could be completed during a reading session.

- Share the learning intentions and success criteria
- View pictures or a slideshow about how children from elsewhere in the world use water
E.g. Nsomah in Ghana: http://www.wateraid.org/uk/learn_zone/teachers/primary/water_around_the_world/6385.asp
- Explain that students will now read case studies of how other children around the world collect and use water
- Hand out copies of the different case studies (*BLM 1c, 1d and 1e and School Journal 3:3:1999*) to the students
- Ask the students, working in pairs or groups, to read the story they have been given and complete *BLM 1b: Water use in different countries*. Ask them to be prepared to summarise their case study for others
- When they have completed *BLM 1b*, invite individual students or pairs to join with others who read a different case study. Ask each person/group to summarise the case study they read for the other group and compare their answers for each question
- Discuss their findings as a class

As an extension, students could take on the role of the child in their case study and present a brief role play about water use in that country.

Visit <http://my.water.org/> or <http://watermatters.worldvision.org.nz/> for more extension ideas

Resources



BLM 1b Water use in different countries

BLM 1c Water use: Brisbane, Australia

BLM 1d Water use: Southern Ethiopia

BLM 1e Water use: Jerusalem, Israel

School Journal Part 3, number 3, 1999, pg 25
“Don’t waste the water!”
by Jill Macgregor

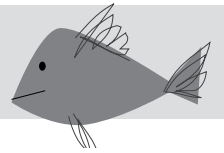
Reflection questions

- Of the four situations shown in these case studies, who had to be most careful with water? Why? *Ayana in Ethiopia, because water was the hardest to come by*
- In each case, how much water do you think the family in the story use compared to your family? *Answers will vary*
- Do you think that people in Wellington use a lot of water compared to people in other countries? *Reveal the statistics on water use in each country from teacher notes*

Vocabulary

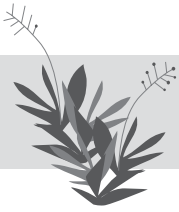
- waterhole
- responsibility
- consumer
- showerhead
- efficient
- conserve

BLM 1b: Water use in different countries



Questions	Country: Israel/Ethiopia/Australia/Samoa (circle which case study you read)
1. How did people in the case study get the water they used?	
2. How did people in the case study use water in their homes?	
3. Explain how these people use water in the same ways that you do in your home	
4. How do people in the case study save fresh water?	
5. Do people in this country value water? Why/why not?	
6. Do we have a responsibility to use water wisely? Why/why not?	





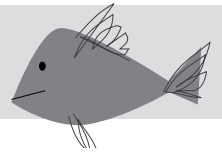
BLM 1b: Example responses



Questions	Israel	Ethiopia	Australia	Samoa
1. How did people in the case study get the water they used?	From their taps. It is piped from Lake Kinneret	From a waterhole, pond or well	From their taps	From a well (vai'eli)
2. How did people in the case study use water in their homes?	<p><i>Drinking</i></p> <p><i>Cooking</i></p> <p><i>Washing hands:</i> by pouring water over hands using a cup</p> <p><i>Brushing teeth:</i> using a cup to hold the water</p> <p><i>Washing dishes:</i> using a cloth to wipe the dishes before they wash them</p>	<p><i>Drinking</i></p> <p><i>Cooking</i></p> <p><i>Washing dishes</i></p>	<p><i>Drinking</i></p> <p><i>Cooking</i></p> <p><i>Washing dishes</i></p> <p><i>Washing clothes</i></p> <p><i>Showering</i></p> <p><i>Flushing the toilet</i></p>	<p>Fresh water:</p> <p><i>Drinking</i></p> <p><i>Cooking</i></p> <p>Sea water:</p> <p><i>Cleaning teeth</i></p> <p><i>Scrubbing fish</i></p> <p><i>Scrubbing vegetables</i></p> <p><i>Boiling eggs</i></p> <p><i>Washing dishes</i></p>
3. Explain how these people use water in the same ways that you do in your home	Answers will vary, but generally; drinking and cooking		Also possibly washing dishes/showering	→
4. How do people in the case study save fresh water?	<p><i>Showering:</i> Water efficient shower head. They soap themselves while the water is off</p> <p>They use water in a cup for brushing teeth and washing hands</p> <p>They have tap aerators</p> <p>No baths</p> <p>Water garden with recycled water</p>	<p><i>Cleaning themselves:</i> instead of showering they wipe themselves with a cloth</p> <p><i>Brushing teeth:</i> They used a stick so that it didn't use water (not recommended for NZ students)</p> <p>They mixed water with milk for drinking to make it go further</p>	<p><i>Showering:</i> They had 4 minute showers with a timer</p> <p>Water efficient appliances and shower head</p> <p>Greywater recycling</p> <p>Scraped plates and soaked pots before washing dishes</p> <p>Use the half flush on the toilet</p> <p>Fix leaks</p>	<p>Elisapeta is careful not to spill any water when she collects it</p> <p>They only use fresh water for drinking and cooking. Sea water is used for many things</p>
5. Do people in this country value water? Why/why not?	Water is very precious to people in Israel. They have much less rain than NZ so they are very careful with water	Very little water is used or wasted because it is so hard to get	People in Australia are generally very careful with water because they have frequent droughts and restrictions	Very little water is used or wasted because it is difficult to come by in this part of Samoa
6. Do we have a responsibility to use water wisely? Why/why not?	Yes we do. Because water is a limited, valuable resource. It takes time, energy and money to bring water from water collection areas to our taps so we should use it carefully and thoughtfully			



BLM 1c: Water use 1



Brisbane, Australia; Oliver and his family



Getting their water

Oliver lives in Brisbane, Australia. There are taps in several rooms in Oliver's house and water is freely available to him when he needs it. He has water delivered to his house through a network of pipes. The water comes from several dams. It is treated and then pipes deliver the water to people in the city. Water is easy for Oliver to get, but he is very careful with it.

Water conservation

Oliver's family understand that water is not to be taken for granted because in the last few years there have been several droughts in Brisbane and water had to be carefully conserved. Everyone had to stop and think about how they used water. They have made many changes to their lifestyle to save water. After the last drought they bought a water efficient washing machine. They wait until the washing machine is full to do a load of washing so that water is used efficiently.

Saving water at home

The family time their showers with an egg timer. When Oliver gets in the shower he sets the timer for four minutes. When the timer goes off he gets out.

They have a water recycling system which collects the wastewater that is discharged from the laundry, bath, shower, and hand basins. This 'greywater' is treated and then used to flush the toilet and water the garden.

Their toilet has a dual flush system. Oliver uses the half flush button because it uses less water. When they are doing the dishes, the family scrape dirty plates and soak pots instead of rinsing them with water. They wait until the dishwasher is full before turning it on.

Water shortages

When the weather is dry, the water levels in the dams drop and the council informs the public how they can use water and how much they are allowed to use. Water use per person, per day is measured and reported every day in the newspaper.

Because people in Brisbane never know when the next big downpour of rain will come, they are careful with water. By doing small things to save water, they work together and make sure there is enough water for everyone.





BLM 1d: Water use 2

Southern Ethiopia; Ayana and her family



Water is difficult to come by in parts of Ethiopia for most of the year. In the dry season from October to February, there is very little rainfall. In small villages like the one that Ayana lives in there is no way of storing fresh water or treating it to keep it fresh. Everyone in the community spends many hours a day getting the water they need for their daily lives.

Collecting water

Ayana and her mother start the day early and walk to the waterhole an hour and a half away. They carry the water back home using donkeys. They use the water they collect for washing and cooking. They go to the waterhole again in the afternoon, to collect more water. They must line up for water when they get to the well and people who live nearby get the first priority.

Sometimes Ayana and her mother take so long to get their water that she doesn't make it to school. When she is able to go to school, Ayana finds it difficult to keep up because she is away so much. Other girls in the class are in the same situation.

Most men and boys are responsible for getting water for the animals from ponds. Some boys get to go to school every day.

Using water at home

There are no showers where Ayana lives, so to clean herself she uses some water to wipe her body with a cloth. She brushes her teeth with a special stick. Ayana is very careful with water and doesn't use much.

Ayana likes to add cow's milk to water and drink it. The water that she drinks must be boiled first. She cooks maize every day with her mother. It is difficult to grow any food because there is so little rain. So instead of growing food, they buy corn to eat.

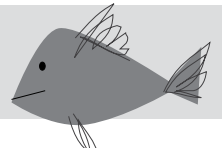
Water shortages

In the dry season, water is even harder to find. There are deep wells, far away, for getting water when the ponds dry up. People bring the water up from the wells and fill troughs and buckets. It takes many people and a lot of effort.

In the rainy season, water falls in ponds closer to their house and life is easier.



BLM 1e: Water use 3



Jerusalem, Israel; Ori and his family



Ori lives in Jerusalem, Israel. Israel is a dry country, with very little rain and few water resources.

Getting their water

The water in homes in Jerusalem is piped from a great lake in the north called Lake Kinneret. It doesn't often rain in Israel, and there is no rain at all in the hottest months of the year. For this reason, Ori and his community respect and value the water that they are given and are very careful with water.

Using water at home

Ori's family have special attachments on their taps to add air to the water to make it go further. When they wash their dishes they spray each dish with water and then cover them with detergent. They then rinse the detergent off. This saves a lot of water.

Cleaning and bathing

Washing hands is done with a special cup which they use to pour water over their hands instead of using a tap. Using this method, very little water is wasted. Ori brushes his teeth with water from another cup. Ori's family have a small garden which is watered with the water they have recycled from their laundry waste water.

When Ori has a shower, he wets himself with water, and then soaps himself while the water is off. Then he turns the shower on again to rinse off the soap. His shower has a special water efficient showerhead which uses less water than a normal one. Ori never has a bath; in fact there is no bath in his house!

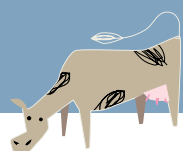
Drinking water

The water which comes from the tap is usually clean, but Ori's family buy bottled water to drink. The house has a water meter which is checked regularly. If the family use more water than they are allowed, they have to pay a lot of money. Everyone in the family does their part to save water.

Water shortages

When there is no rain people start to worry. Crops start to fail and the lake level drops. People start praying for rain. People in Jerusalem seldom waste water. Water is very precious to them.





1:4 Water everywhere – teacher notes

Curriculum links

Science: Level 3 and 4 Planet Earth and Beyond:

Earth systems: Develop an understanding that water, air, rocks and soil, and life forms make up our planet and recognise that these are also Earth's resources

Science: Level 3 and 4 Planet Earth and Beyond:

Interacting systems: Investigate the water cycle and its effects on climate, landforms and life



Education for sustainability concepts

Responsibility for action: If we want to use taonga, we must look after taonga

Sustainability/Hauora: The choices we make today affect choices we will be able to make in the future

Background knowledge

Water resources on Earth

Water is everywhere in our world, but only a tiny proportion of this is fresh water, suitable for drinking.

Of all the water on earth, 97% is stored as salt water in the world's oceans. Salt water makes us sick if we drink it. Only 3% of the total water on earth is fresh water. Unfortunately, not all fresh water is easy to access. The fresh water that comes to mind for most of us is surface water, such as lakes, rivers and wetlands. But surface water makes up less than 1% of the fresh water on earth. The majority of fresh water is in places that are very difficult to access, for example, underground (30%), in icecaps and glaciers (68%) and in water vapour (1%).

This fresh, available water is needed not just for humans but for all the plants and animals that live on earth. One in eight people in the world do not have access to fresh water.

Why not use desalination to get fresh water from salt water?

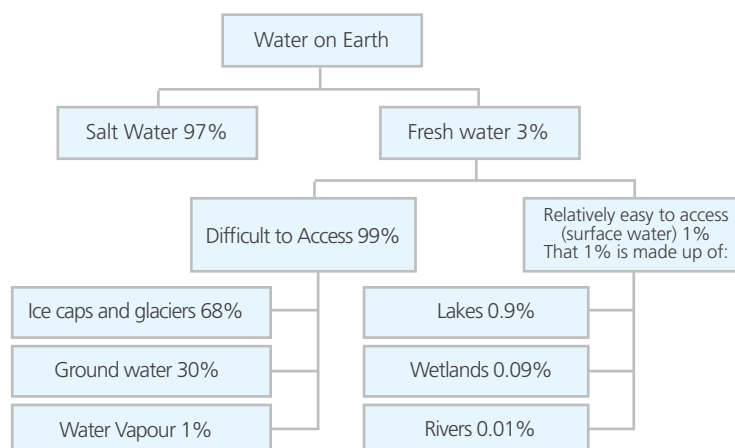
Desalination (removing the salt from sea water for drinking) currently requires huge amounts of energy and is relatively more expensive than other systems. Intakes of water in the ocean often have negative effects on marine life. Desalination plants reduce important marine habitat for all kinds of animals.

The energy required to power a desalination plant also often causes greenhouse gas emissions and air pollution.

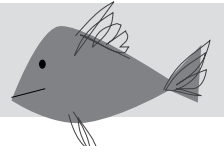
Salt is produced as a by-product of desalination and safe disposal of this is also a concern.

Information for diagram below has been adapted from:
<http://ga.water.usgs.gov/edu/earthwherewater.html>

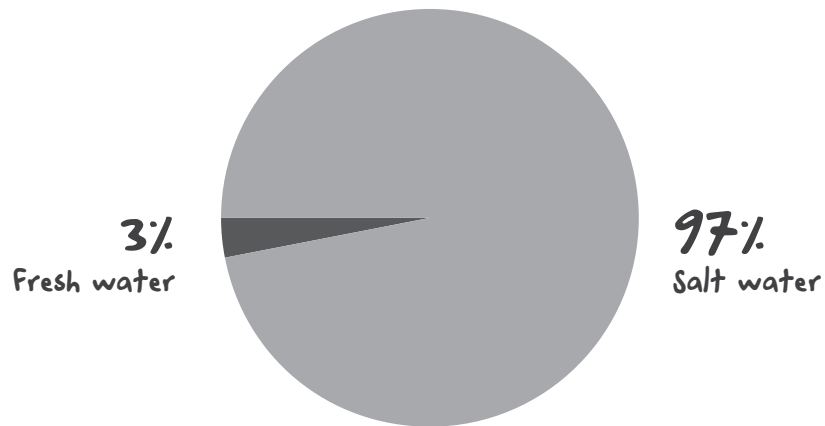
For further information see:
 NIWA National Institute of Water and Atmospheric Research
<http://www.niwa.co.nz/>



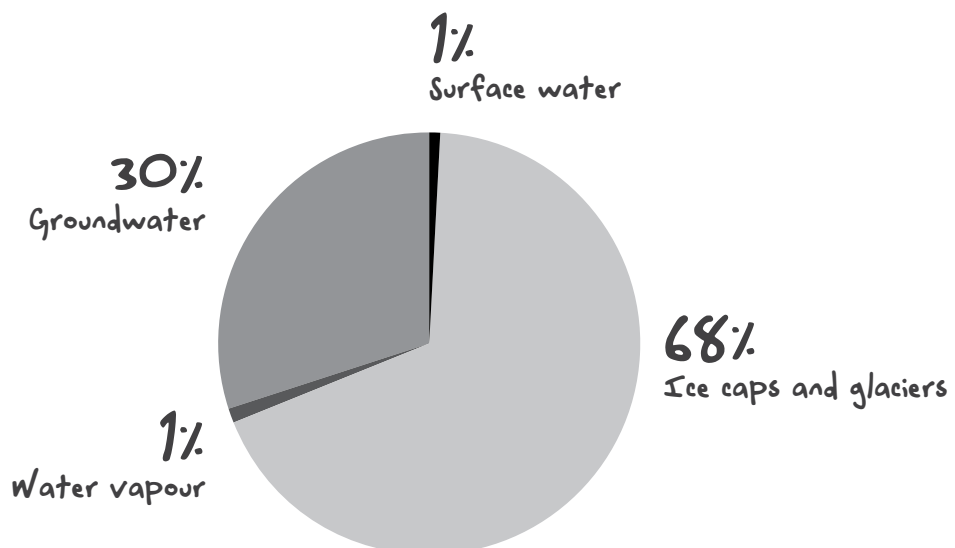
BLM 1f: Water on earth



Proportion of fresh water on earth



The fresh water on earth





1:4 Water everywhere – learning experience

Learning intentions

Students will:

Recognise that there are limited resources of fresh water on earth

Understand that only a small proportion of fresh water on earth is easily available for us to drink

Success criteria

Students can:

Describe the proportions of the different types of water on Earth

Display the proportions of fresh water that are on earth and describe which are easily available for drinking



Learning experience

- Introduce the learning intentions and success criteria
- Show students a globe of the earth. Ask students how much of the planet is covered by water. Explain that water covers approximately 70-75% of our planet
- Ask students how much fresh water there is compared to salt water on earth. Encourage discussion. Reveal that 97% of the water on earth is salt water and around 3% is fresh water
- Work as a class to make a list of the places on earth where fresh water is found (rivers, lakes, wetlands, snow, ice, glaciers, groundwater)
- Working in small groups, students could order these places from the one that holds the most fresh water to the one that holds the least
- Explain to the students that not all of this fresh water is readily available for drinking. As a class, brainstorm the sources of water that are readily available for drinking (surface water in rivers, lakes and wetlands). Discuss the sources that are not available for drinking, for example, salty water (the sea) or water that is difficult to access (snow, ice, glacier water, underground water). Now carry out the following demonstration to indicate the true proportions of drinkable water:

Demonstration: Water proportions on Earth

	Action	Description
1.	Fill a bucket with water	This is all the water on Earth (including water in the air as rain or mist)
2.	Ask a volunteer to take a small cup of water from the bucket. Add salt to the water in the bucket and stir	The water in the cup represents all the <i>fresh</i> water on earth. The water left in the bucket represents the <i>salt</i> water that is in the oceans
3.	Ask a student to take a teaspoon of water from the cup	The water left in the cup represents <i>fresh water</i> that is difficult to get at (e.g. underground water or water frozen in glaciers/ice caps). The water in the teaspoon represents the remaining <i>surface</i> water and other fresh water
4.	Examine the water in the teaspoon	Water left on the teaspoon represents fresh water that is easier to get at – water found in lakes, rivers, streams, or in the ground and underground. But some of this water is still very difficult for us to access – ice and snow, swamps and marshes, water in soil and air

Resources

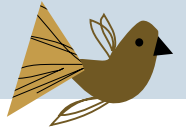
BLM 1f Water on Earth

A bucket or 10L container

A small cup (approx 200mls)

1 teaspoon (5 mL)





- Explain that the amount of water used in the activity must be multiplied many millions of times to get the actual amounts involved
- Hand out copies of *BLM 1f: Water on Earth* to share in small groups. Discuss the proportions of fresh water in different places on Earth
- Explain that the surface water is the rivers, lakes, wetlands and streams and that this water is the only water that relatively easy for us to access and use
- Ask what this available fresh water is used for? Discuss. Refer to the previous learning experience (1:3 Water in our lives). We use water for making things, growing food, cleaning, washing, and drinking etc. As well as servicing people, this fresh water must also meet the needs of all plants and animals on Earth

As an extension, students could represent the information in BLM 1f: Water on Earth in a different format, for example, as pictograms or bar graphs.

Reflection questions

- Do you think that we have an unlimited supply of fresh water? *Explain that there is a limited amount of fresh water to meet the needs of all life on Earth; plants, animals and humans*

Vocabulary

- proportions
- access/accessible
- inaccessible
- surface water