Are we living sustainably?

year 4 Science

For the Australian Curriculum

Water: Learn it for life!

Great state. Great opportunity.

waterwise Queensland

Queensland Government

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Are we living sustainably?

Introduction

Environmental sustainability is about finding a way for humans to interact with each other and the environment in a balanced way—a way where patterns of living meet current needs as well as the needs of future generations. Actions to improve sustainability are both individual and collective, and are shared across local and global communities.

In a lower primary context, the 'Are we living sustainably' unit allows students to understand the concept of sustainability and to consider sustainable water use. Through an inquiry-based process, they investigate this element and how it is used within their local and global communities. Students develop a sense of individual responsibility for the earth's future and use strategies to educate their local community about reducing water use in an attempt to work collaboratively towards a sustainable future.

Australian Curriculum: Science 2011 **defines education for sustainability:**

> Education for sustainability develops the knowledge, skills, values and world views necessary for people to act in ways that contribute to more sustainable patterns of living. It enables individuals and communities to reflect on ways of interpreting and engaging with the world. Sustainability education is futures-oriented, focusing on protecting environments and creating a more ecologically and socially just world through informed action. Actions that support more sustainable patterns of living require consideration of environmental, social, cultural and economic systems and their interdependence.

Students are encouraged to *engage with issues of sustainability, by learning how to live while taking sustainable actions to make a difference to their local and global environments. In doing this, students reduce environmental damage and encourage others to live and act in a sustainable way. Students will focus on the water theme, and will develop a calendar to be distributed to promote sustainable living in the school and local community,* as education for sustainability should occur across a range of settings, including school, work and home.

This unit can be adapted to include a tourism-based campaign. Students would design elements of their advertising campaign for a non-English speaking audience. Teachers could also extend the lesson sequence to focus on the elements of energy and waste; all of which are relevant when teaching about a sustainable future.

Key concepts

Water is a precious, non-renewable resource.

There are many things that we—as individuals and as a local and global community—can do to conserve water and energy, and reduce waste.

Individual actions make a difference on both local and global scales.

This unit poses the question 'Are we living sustainably?'

Looking at some of the resources used by society today, school children would find that the answer to this question is 'no'. This unit investigates why this is the case, looking at sustainable water consumption. This should then lead students to consider how they can change their own, as well as community, actions to foster a more sustainable lifestyle, promoting inter-generational equity as well as socio-political stability, e.g. prevent potential future food and water wars.

The concept of an individual's ecological footprint (covered in this unit) shows that we Australians are currently not living sustainably. For example, if everyone on Earth lived like the average Queenslander we would require over four planets, but we only have one. Much of this consumption is due to transport, shelter, food and energy-using products, much of which we can reduce.

'It suddenly struck me that that tiny pea, pretty and blue, was the Earth. I put up my thumb and shut one eye, and my thumb blotted out the planet Earth. I didn't feel like a giant. I felt very, very small.' - Neil Armstrong

An example is that water is used in the production of most goods and services, in particular the production of food and fibres. A water footprint assessment shows that it takes 8000L of water to produce a pair of leather shoes and 5000L to produce a kilogram of cheese. As Australia exports much of its food production, we are effectively supporting a population of about 67 million at our high levels of consumption through food and fibre exports (Water: Science and solutions for Australia. CSIRO 2011). So although we have a large water footprint, it extends beyond our country due to this export.

Population

The underlying driver of direct human impacts on the environment is human consumption. This impact is reduced by not only using less, but by also making the full cycle of production, use and disposal more sustainable.

A key driver of this is population growth. It is estimated that the world population reached one billion for the first time in 1804. It was another 123 years before it reached two billion in 1927, but it took only 33 years to reach three billion in 1960. Thereafter, the global population reached four billion in 1974, five billion in 1987, six billion in 1999 and, according to the United States Census Bureau, seven billion in March 2012. The world's population is forecast to be between 7.5 and 10.5 billion people by 2050.

Water

Currently 35% of international water use is unsustainable; drawing on diminishing aquifers and reducing flows of major rivers. The International Water Management Institute (IWMI, 2007) estimates that 1.2 billion people live in regions with insufficient water to meet human needs. It is also estimated that 1.6 billion people live in water scarce river basins with inadequate financial and human capacity to develop future water resources.

From 1961 to 2001 water demand doubled: agriculture use increased by 75%, industrial use by more than 200% and domestic use by more than 400%. Global water demand is forecast to increase by 55% between 2000 and 2050, with the largest increases coming from manufacturing, electricity and domestic use (OECD, 2012b). (Our future world – Global megatrends that will change the way we live. Hajkowicz, Cook, and Littleboy. CSIRO 2012)

Australia has a moderately plentiful water resource per person (because we have a small population) and we consume a smaller percentage of our resource than other countries. In fact we use only 6% of the available renewable water (surface run-off and groundwater

recharge). This compares to consumption of 62% of the available water in Central Asia (mostly for irrigated agriculture), 56% in Middle East, 12.6% in Western and Central Europe and 10% in North America. Our usage is however higher than South America 1.3%, Africa 5.5% and the islands of the Pacific 2.8% (Water: Science and solutions for Australia. CSIRO 2011).

Much of Australia's water use occurs in areas of irrigated agriculture or in the catchments of cities and large towns (Water: Science and solutions for Australia. CSIRO 2011). In Queensland, while 65% of the state's population live in the south-east corner, only 4% of renewable water occurs in this region. About 41% of the state's river run-off flows into the Gulf of Carpentaria where very few people live. This area has no large dams and so almost all of this water is currently unused (Water in Queensland. DERM 2012).

It is estimated that humans are using 40–50% of the total globally available freshwater. Of this amount 70% is used for agriculture, 22% for industry and 8% for domestic purposes. (Wikipedia: sustainability). In Australia the breakdown of water usage is similar: 68% for agriculture, 23% for industry and 9% for domestic purposes (Water: Science and solutions for Australia. CSIRO 2011).

Australian curriculum links

This Year 4 unit aligns with the Australian Curriculum: Science which can be viewed at ‹www.australiancurriculum.edu.au/Science/Curriculum/F-10›.

Science—Year 4

» Science as a Human Endeavour

Nature and development of science

- Science involves making predictions and describing patterns and relationships.

Use and influence of science

- Science knowledge helps people to understand the effect of their actions.

» Science Understanding

Chemical sciences

- Natural and processed materials have a range of physical properties; these properties can influence their use.

Biological sciences

- Living things, including plants and animals, depend on each other and the environment to survive.

General capabilities

- Literacy
- Numeracy
- Critical and creative thinking
- Ethical behaviour

» Science Inquiry Skills

Planning and conducting

- Suggest ways to plan and conduct investigations to find answers to questions.

Processing and analysing data and information

- Use a range of methods, including tables and simple column graphs, to represent data and to identify patterns and trends.

Communicating

- Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports.

Cross-curriculum priority: sustainability

This unit provides a rich opportunity to develop the knowledge, skills and values necessary for people to act in ways that contribute to more sustainable patterns of living. Actions to improve sustainability are both individual and collective endeavours shared across local and global communities.

Assessment overview

» Year 4 Achievement Standard

Students:

- discuss how natural and human processes cause changes to the Earth's surface
- describe relationships that assist the survival of living things
- describe situations where science understanding can influence their own and others' actions
- use provided tables and simple column graphs to organise their data and identify patterns in data
- suggest explanations for observations and compare their findings with their predictions.

Opportunities for assessment

Linking locally

Contact local experts to gather locally relevant information about sustainability and how resources, particularly water in this instance, are used in your area. Invite them to speak to your class about their work. These experts could include:

- council catchment or water resource management officers
- members of Landcare or catchment groups
- staff from the Department of Natural Resources and Mines (DNRM), the Department of Energy and Water Supply (DEWS) or a regional natural resource management (NRM) body.

Bibliography

Australian Curriculum Assessment and Reporting Authority. 2012. The Australian Curriculum Science. ACARA. ‹www.australiancurriculum.edu.au/Science/Curriculum/F–10› (accessed January 2012).

Useful websites

Bobbie Bigfoot ‹http://files.earthday.net/bobbybigfoot›

Eco-footprint quiz ‹http://www.earthday.org/footprint-calculator›

Ollie's World ‹http://www.olliesworld.com/›

Queensland Sustainable Schools ‹http://www.sustainableschools.qld.edu.au/Default.aspx?tabid=921›

School Waste Minimisation Program

‹http://www.ehp.qld.gov.au/waste/recycling/schools_project.html›

Wetlandinfo ‹wetlandinfo.ehp.qld.gov.au/wetlands/›

Unit overview – Water

Phase	Lesson (or session)
Engage To capture interest and discover what we think we know.	**Lesson 1: Wondering about sustainability** Students use prompts to draw on their prior knowledge to explain what they think they already know about sustainability. They will identify the three themes of water, energy and waste. Students will also participate in a role-play game in which they consider the challenges and opportunities involved in sharing sustainability messages in their community, highlighting a particular focus on water, which will set the scene for this unit.
Explore To have shared, hands-on experiences.	**Lesson 2: Water is precious** Students identified water as one of three themes when investigating how to live sustainably. They now spend some time appreciating how precious this resource is. **Lesson 3: Water around the school** Students: • investigate water around the school, describing how it is used, accessed and wasted • conduct the *Water: Learn it for life!* lower primary school water audit. **Lesson 4: Investigating water use at home** • Read *Whizzy's Incredible Journeys—the family journey*, to investigate the water cycle and how water could be conserved at home. • Students become 'water detectives' to investigate where and how water is used in their homes. **Lesson 5: Community water use** Students research the ways that other people use and manage water by interviewing a guest speaker and recording notes about the interview in their science journal. **Lesson 6: Waste in our waterways** Students investigate the types of waste that are put into waterways using the *Water: Learn it for life!* Story of a river resource OR by watching a short video from Ollie's World. They come up with a list of rules to keep their local waterways clean and healthy.
Explain To demonstrate what we have learnt by exploring.	**Lesson 7: Making a poster plan** Students plan to create a poster that communicates key messages within their local community about using water sustainably and ways to conserve water.
Elaborate To build understanding through an investigation.	**Lesson 8: Poster time** Students design, create and display their posters.

Evaluate To review and reflect on learning. **Evaluate continued...**	**Lesson 9: Informative interviews** Using an interview format, students represent what they know about water, where it comes from and how to use it responsibly. **Lesson 10: Footprints – Water: our steps to a sustainable future** Students: • calculate their individual ecological footprint through an online activity • consider ways that they as individuals can start to reduce their own ecological footprint in relation to water. **Lesson 11: Creating a 'Sustainable water use' calendar** Students create a class calendar that can be distributed throughout their local community that will communicate key water saving messages to promote individual and community actions to support a sustainable future.

Lesson 1 Wondering about sustainability

» Lesson overview

In this lesson, students draw on their prior knowledge to explain what they think they already know about sustainability. They will be prompted, through discussion, to identify the three themes of water, energy and waste. Water will form the basis for the unit and will become the main heading on a classroom display wall. Students will also participate in a role-play game which encourages them to consider the challenges and opportunities involved in sharing sustainability messages in their community, which will set the scene for the outcomes of the unit.

Teacher's background information:

Sustainability is the ability of the earth, with all its resources (water, energy, biodiversity), to keep going into the future, and keep providing a healthy home for humans and all other species of plants and animals.

People usually define sustainability as the ability to use resources now in a manner which will allow them to continue to be used in the future at the same rate.

» Lesson objectives

In this lesson students will:

- understand the meaning of the word 'sustainability'
- record and share ideas about how to live sustainably
- identify themes of water, energy and waste
- participate in a role play game about sharing the sustainability message with the community.

» Equipment

For each class:

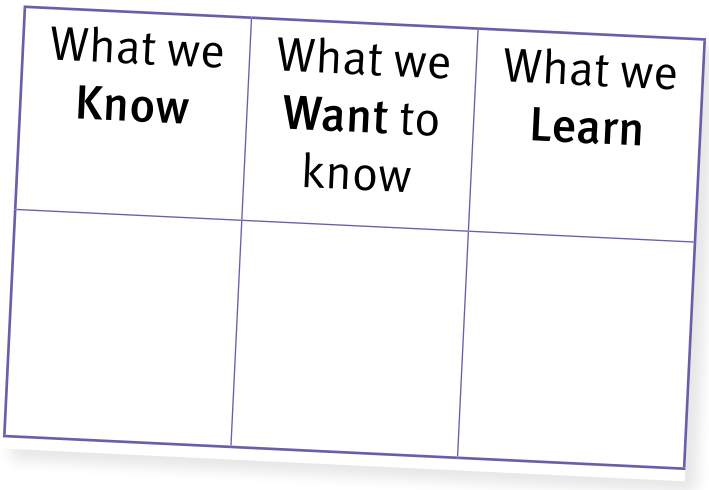
- sustainability display wall
- KWL chart (see preparation section below)
- 'Spread the word' game (Resource 1)

For each student:

- sustainability journal (If possible, use exercise books made out of recycled paper. Explain this to students when handing them out.)
- 'Introducing sustainability' sheet (Resource 2)

» Preparation

- Create a display wall for the unit entitled 'Living Sustainably—Water' (or similar).
- Create a KWL chart (**K**—what we think we know; **W**—what we want to know;
- **L**—what we learned)—ensure the chart is large enough to cover several lessons.
- Write 'Sustainability Journal' on the board.



» Lesson steps

1. Hand out exercise books to students and tell them to write their names on the front —explain that this will be called a Sustainability Journal.

2. Point out the words 'Sustainability Journal' on the board and ask students to write this on the front of their journals and on the title page.

3. Rub out the word 'journal' and focus on the word 'sustainability'.

4. Ask students what they think the word means. Record student responses on a pre-prepared KWL chart in the K section (what we think we Know).

5. Explain that we can break the word 'sustainable' down into two parts:

   sustain = 'keep going'
   able = 'can'

   ....so, something that is **sustainable** is something that **can keep going**.

6. Announce to the students that in this unit they will identify ways to live sustainably and develop a calendar to promote sustainable water use in the school and community. In doing this, students will design posters throughout the unit depicting ways to use water sustainably. These will then be used to create the calendar.

7. Invite students outside to play the game 'Spread the word' (see Resource 1).

8. At the end of the game return to the classroom and facilitate a discussion. Some possible leading questions that may be appropriate, depending on how the game ended, include:
   - What comparisons can be drawn between how the game progressed and the way sustainability messaging might be spread in groups or communities?
   - Why did the chain eventually tag (or not tag) everybody? Are there any parallels in real life?
   - How did it feel to be a participant trying to avoid the chain after more than half the group had joined the chain?
   - How could the chain have been more effective at tagging participants? Are there any parallels in real life?
   - Did the chain find it easy to tag participants throughout the game? Were there times when it was harder or easier and why?
   - Did the original sustainability person have an important role to play once the chain started to grow?
   - What impact did the tree (or other obstacle) have on the game? What are some of the obstacles that sustainability educators might face in real life?
   - In real life why might it not be possible to eventually get everyone to join a movement like sustainability?

9. Now that the students know they have the challenge to educate themselves and the community about sustainability, the first step is to understand what the word means. In groups ask students to complete the 'Introducing sustainability' sheet (Resource 2).

10. Once students have had enough time to complete the task, as a class, discuss responses and record outcomes and discussion points on the sustainability display wall. Ensure that students understand that, in order to live sustainably, they need to investigate how to use water and energy wisely and be aware of the disposal and recycling of waste.

Lesson 2
Water is precious

» Lesson overview

In the previous lesson, students identified three themes to focus on when investigating how to live sustainably. Water was identified as one of the themes and will become the focus of the remainder of this unit.

During this lesson, students are involved in engaging experiences, carefully sequenced to develop and build a deep understanding of some of the properties that make water unique.

» Lesson objectives

In this lesson students learn about water as a precious resource and that water has many unique properties, including three states (liquid, solid and gas) that we can change to meet our needs.

Students understand that:

- water can do many things
- water can change into three forms.

» Equipment

For each class:

- 'Living Sustainably—Water' display wall
- a box wrapped to look like a very special gift, containing a bottle of water, a letter and card from Whizzy (Resource 3) attached to the outside of the box
- water messages (Resource 4)
- coloured cardboard cut-outs
- markers
- *Whizzy's Incredible Journeys*
- KWL chart (previously created)

For each student:

- sustainability journal

» Preparation

- 'Whizzy' is a water drop, an imaginary character from the book, *Whizzy's Incredible Journeys* (Oxenham, Stephans & Brown, 2008). This lesson will work best if students haven't met Whizzy yet, so students can engage with Whizzy and Whizzy's message about how special water is.
- Prepare Whizzy's gift box. Inside the box, place the bottle of water and cloud with a water message (Resource 4). Attach Whizzy's letter and card (Resource 3) to the outside of the box.

- Consider the water component of the display wall and how it will be prepared. Have materials ready so that students can be involved in creating it after they have met Whizzy.
- Consider the timing of the lesson. Try to schedule it after a break or first thing in the morning so that you can come into the room with the students and 'find' the box. This will help to build interest and excitement.

» Lesson steps

Session 1—Finding the gift

1. Before the students arrive, place the gift in an obvious area in the classroom where the students can 'find' it.
2. Dramatise your careful and gentle handling of the gift, as if it were a great treasure.
3. Lead a discussion with students about the gift. Ask them questions like, 'Who do you think that it is from? Why do you think they would leave a gift here? I wonder why they chose such beautiful, blue paper? How could we find out who left it here?'.
4. Read the card (or ask a student to read it) to the class. Say to students, 'I wonder why Whizzy chose to give us this gift?'.

Session 2—Opening the gift

5. Open the box and take out the bottle of water. Congratulate students who already guessed that Whizzy's gift would be water.
6. Hold up the water bottle and ask students to discuss what they already know about water. Lead them to think about water conservation—write their ideas in the K column of the KWL chart (you could write student's initials on their ideas to track their learning).
7. Take out water message 1. This is your first key concept (Resource 4). Discuss with students that we are going on a learning journey with Whizzy, and it is important to find a way to record and track what we are learning. Collaborate with the students to come up with the idea that special water messages and ideas will be kept on the Sustainability display wall under the water heading.
8. Discuss what students know about the three states of water. Have words and associated pictures ready to hang on the wall: solid (ice), liquid (glass of water) and gas (steam out of a kettle). Ask a student to hang these on the wall as they are discussed. Discuss the reverse of each and if it is possible.
9. Take out water message 2 and discuss with students. Write their ideas about water conservation on pre-prepared cut-outs of coloured cardboard.
10. Tell students that Whizzy's gift has given you a great idea. Together, you are going to investigate water ***conservation***—explain what this term means and write it on a piece of coloured cardboard to hang on the display wall.
11. Ask students for their ideas as to how they can investigate water conservation in their own local communities, thinking about where and how water is used and where it comes from/goes to. Students aren't expected to know all of the answers at this stage. Rather, time is taken to elicit their ideas and get their minds actively thinking about water within their community. Write their ideas in the form of an organisational chart in their sustainability journals. Prompt discussion where necessary.
12. Explain that in the lessons to come, students will be actively involved in investigating water use and conservation within their local community. Let them know that they can have an impact on a sustainable future, both locally and globally, by beginning to look at individual and community actions.
13. Ask students what it is that they **W**ant to know in the coming lessons. Write their responses in the **W** column of the **KWL** chart.

Lesson 3 Water around the school

» Lesson overview

In this lesson students investigate water around the school, describing how it is used, accessed and wasted.

» Lesson objectives

In this lesson students will:

- explore the school to find evidence of water use
- record and share their observations.

» Equipment

For each class:

- 'Living Sustainably—Water' display wall
- school plan
- 'Lower primary school water audit'—can be downloaded from the department's website

Optional:

- digital camera

For each student:

- sustainability journal

» Lesson steps

1. Explain that students are going to investigate water use around the school. Ask students to predict how and where they might see water being used. Discuss possible water access points (bubblers, taps, and hoses). Record students' predictions on the board.
2. Go for a walk around the school grounds and buildings to look for examples of how water is used (water features, plants, swimming pool) and how water is accessed (sprinklers, bubblers, taps).
3. After returning to the classroom, ask students to record in their sustainability journals their observations from the water walk under headings such as:

   Water is used for ...

   Places where water is used ...

   Water access points at the school are ...
4. Conduct the water audit. Specific lesson steps are provided in both of the above mentioned downloadable resources.
5. Ask students to describe what they learned about water on their water walk/ during the water audit. Add their responses to the 'Living Sustainably—Water' display wall.
6. Discuss student observations about water being used responsibly including where and how, as well as how water was used irresponsibly and was being wasted.

Optional:

Take photos of water use and access points to display on the 'Living Sustainably—Water' display wall and record in sustainability journals.

Locate and show students the school water meter.

Lesson 4 Investigating water use at home

» Lesson overview

In the previous lesson, students investigated water around the school, describing how it is used, accessed and wasted. In this lesson students become 'water detectives' to investigate where and how water is used in their homes.

» Lesson objectives

To help students plan and conduct an investigation of how water is used and how it should be conserved around the home, students:

- predict how water is used at home
- observe the patterns of water use at home
- record their observations
- share their observations
- create a class graph showing patterns of water use at home
- discuss and interpret their observations.

» Opportunities for assessment

In this lesson you are looking for evidence of the extent to which students can follow directions to complete simple investigations at home; make, describe and record observations; and identify patterns in a simple column graph.

Session 1—Water audit

» Equipment

For the class:

- enlarged copy of the 'Home water audit' sheet (Resource 5)
- *Whizzy's Incredible Journeys* pick a path book can be downloaded from the department's website.

For each student:

- Home water use audit' sheet (Resource 5).

» Lesson steps

1. Read through the beginning of *Whizzy's Incredible Journeys* and continue on with the 'family journey'. Your class may wish to read the other journeys, but the family journey will introduce students to the concept of conserving water in the home.

2. As this may be the students' first introduction to Whizzy, have fun with the story – remember to build up a sense of wonder and excitement about how wonderful water is all students no matter what the age enjoy a good story.

3. Ask students to discuss ways that Whizzy helped the family to conserve water—write them on the 'Living Sustainably—Water' display wall under a sub-heading, 'Water conservation'.

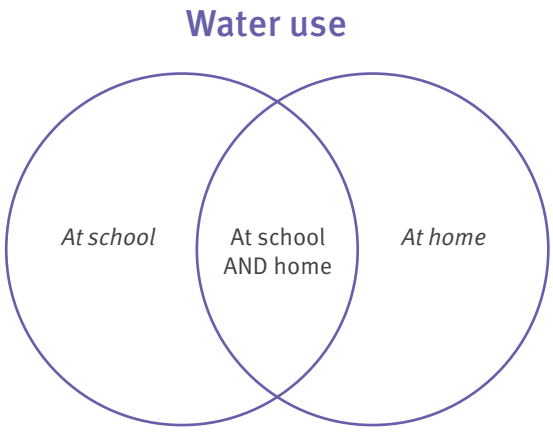


Figure 1 Example of a Venn diagram

4. Explain that students are going to investigate how water is used in their homes—this activity could be by very individualised with students focusing on their own homes, or broader, with students focusing on how water can be used in the home; e.g. not all homes have swimming pools.

5. Introduce the enlarged 'Home water audit' sheet (Resource 5). Ask students to think back to their school water walk and predict which of the school water uses they think they will find at home. Record their predictions in a simple graphic organiser such as a Venn diagram (see Figure 1).

6. Ask students to predict other uses for water they might find at home. Record their predictions. Complete the diagram by listing those water uses that are only found at school.

7. Model how to complete the 'Home water audit' sheet (Resource 5), using a blown up house plan, photos of inside a house, or the teacher's own home as an example.

8. Explain to students that they will survey four places around the home to be used for a class investigation. Discuss the need for students to investigate safely—for example, avoiding hot water, chemicals or appliances.

9. Distribute the 'Home water audit' sheets.

10. The 'Home water audit' might form part of students' weekly homework. Send home in a clear plastic sleeve in students' homework folders (or similar) to ensure that they will return with them.

11. Read through the sheet and explain how to complete it properly. Check for understanding before students take this activity home.

Optional:

- Students may create a simple plan or map of their home and garden and mark the water use areas.
- You can allow the students free exploration of the book (*Whizzy's Incredible Journeys*) before the lesson.

Session 2—Graph it

» Equipment

For the class:

- 'Living Sustainably—Water' display wall
- poster paper or cardboard to create large, class graph

For each student:

- completed 'Home water audit' sheet (Resource 5)
- Home water use detectives sheet (Resource 6)
- sustainability journal

» Preparation

Hang up the poster paper or cardboard on or near the 'Living Sustainably—Water" display wall, drawing in the horizontal and vertical axes and increment lines that are the same size as the 'Home water use detectives' sheet when cut into quarters, without the instructions at the top of the page.

» Lesson steps

1. Have students share the results of the 'Home water audit' survey with a partner to discuss what they have in common.

2. Hand out 'Home water use detectives' sheet.

3. Read through the sheet and explain how students can write or draw their findings from their 'Home water audit' sheet (Resource 5)—discuss neatness/legibility and the use of colours, as this work will eventually be on display.

4. Ask students to choose four areas from their home, including the three problem areas identified in Resource 5 and use this information to complete the new sheet.

5. Ask students to write their initials in the boxes on their completed sheets and cut out the four sections.

6. Explain that, as a class, we are going to organise their information in a graph that will be displayed on the 'Living Sustainably—Water' display wall.

7. Discuss the features and purpose of a graph—in this instance, the class graph will show how water is used in the students' homes, making clear patterns and common water use areas.

8. Ask students to suggest categories such as cooking, cleaning, drinking, gardening or recreation and make these the column titles on the horizontal axes.

9. Collect students' work and start by organising them into like groups using the titles on the horizontal axes then, with the help of the students, glue them into the appropriate columns.

10. Label the vertical axis of the graph with numbers. Count and record the number of responses in each group. Discuss and record a name for the graph and titles for each axis.

11. Use questioning and discussion to support students to analyse and interpret the information graphed—are there any noticeable patterns? Are there particular areas where water is generally well conserved and others where it is wasted?

12. Discuss the examples given of responsible and irresponsible water use and water wastage.

13. Tell students that it is time for them to be 'scientists' (you might like to prepare some sort of tangible object for students to wear when doing this), and write statements in their sustainability journals based on this discussion. Point out relevant words on the display wall that might assist them with their statements, such as conservation.

14. Ask if there are any volunteers who might like to share their statements. Forcing feedback is often counterproductive, so if there are no volunteers, ask leading questions about overall results observed when monitoring students completing this task.

15. Add any new vocabulary to the 'Living Sustainably—Water' display wall.

Cross curricular foci:

A graph organises, represents and summarises information so that patterns and relationships can be identified. Graphs have a title and each variable is labelled on the graph axes, including the units of measurement.

Lesson 5 Community water use

» Lesson overview

In the last lesson students became 'water detectives' to investigate how and where water is used in their homes. Students now begin to research the ways that other people use and manage water by interviewing a guest speaker and recording notes about the interview in their sustainability journals.

» Lesson objectives

To research ways other people use and manage water, students:

- brainstorm questions and plan interviews with a guest speaker
- interview a guest speaker
- recount events in their sustainability journals.

» Opportunities for assessment

In this lesson you are looking for evidence of the extent to which students can plan and conduct an interview and write notes from a guest speaker's interview.

Session 1—Interview planning

» Equipment

For each student:

- writing paper/sustainability journal.

» Preparation

Invite a local community member who uses water in their workplace on a daily basis to visit the class as a guest speaker. The speaker should be asked to talk to the students about how they use and manage water responsibly in their work.

Optional:

- organise an excursion to a workplace.

» Lesson steps

1. Ask the class about if and how any of their parents'/guardians' occupations involve water.
2. Invite a visitor such as a plumber, farmer, gardener or local council representative to come to the classroom to be interviewed.
3. Explain the purpose and features of an interview—a labelled, graphic representation might assist students in understanding this.
4. Brainstorm questions that students would like to ask a guest speaker about their use and management of water. Encourage open-ended rather than 'yes/no' questions. Record students' questions on butchers paper.
5. Ask students to assist you in choosing the questions that will be asked.
6. Before the guest speaker arrives, model appropriate oral communication skills such as looking at the person you are speaking to and using appropriate voice volume and pace. Ask students to practise these skills by conducting role plays in pairs, taking turns to be the interviewer and interviewee.
7. Cut the paper into strips and hand out questions as you read them aloud, to student volunteers. Students are then to choose a partner and rewrite their question on a smaller piece of paper to use during the interview.

8. Explain that everyone, especially the people not asking questions, have an important job as scribes, by writing notes.

Literacy focus

An interview is a discussion between two or more people where questions are asked by an interviewer of an interviewee to collect information and opinions. An interview is guided by questions relating to the purpose of the interview and can occur face to face, or long distance via telephone or video link.

Session 2—Guest speaker

» Equipment

For the class:

- 'Living Sustainably—Water' display wall.

For each student:

- sustainability journal
- prepared questions from Session 1.

Optional:

- digital camera

» Lesson steps

1. Introduce the guest speaker and allow them some time to tell the students about their job and how water is used within their workplace. Ask speaker to also discuss how water is wasted.

2. Support students as they conduct the interview.

3. Allow the students some time to discuss what they have learnt about water so far with the guest speaker, prompting discussion about how the students use water in their homes and school in comparison to how the guest speaker uses water.

4. Ask at least two students to thank the guest speaker on behalf of the class. You might like to present some sort of class award of appreciation.

5. After the guest speaker is escorted out, students are to write and draw information in their sustainability journals about the guest speaker's visit. Encourage them to compare and contrast their own water usage with that of the guest speaker. For instance, 'I use water to... but a hairdresser uses it to...'. A simple graphic organiser could be used to assist students.

6. Discuss ways in which the guest speaker could use water more efficiently and how students could promote more water-efficient behaviours within that particular workplace. The teacher could model the creation of a simple poster to promote these new behaviours. Students copy and make some minor adjustments to make this more individual where appropriate (only allow a short time for this so explain that this is a quick, rough sketch).

7. Add new vocabulary to the 'Living Sustainably—Water' display wall.

Optional:

Photograph the visit and display on 'Living Sustainably—Water' display wall with an appropriate heading such as 'Water use in the community'.

Lesson 6
Waste in our waterways

» Lesson overview

In this lesson, students will examine waste in their local waterways, including rubbish sediment and excess nutrients. Discuss the effects of this on waterways as well as marine life. Students look at their local catchment area and think about where waste might be contributing to waterways.

» Lesson objectives

In this lesson students will:

- investigate waste in their local waterways

» Equipment

For each class:

- interactive whiteboard / display area with internet access
- map / Google Earth image showing students their nearest waterway

Optional:

- digital camera

For each student:

- sustainability journal

» Preparation

Prior to the lesson, ensure that a decision has been made regarding the definition of waste. SEQ water provides some valuable resources and information regarding what goes into waterways. These resources can be found at ‹http://www.upadrygully.com.au/resources.php›.

» Lesson steps

1. Engage students by watching a short video about waste in waterways at ‹http://www.olliesworld.com/marinelitter/index.htm› and/or complete Story of a River (Resource 11).
2. Ask students to think about the types of things that they have seen in their local waterways.
3. What happens when it rains? After a discussion, you might like to show a short video clip about runoff. Relevant video clips can be found by entering ‘water runoff’ into the search engine on YouTube.
4. Discuss the concept that when it rains in particular, everything that is on the ground could potentially end up in their own, local waterways.
5. Introduce a relevant water cycle poster to show students the water flow through a catchment. Poster examples can be found at ‹www.dews.qld.gov.au›.
6. Play The Healthy Catchment Game (Resource 12) to start students thinking about the types of items that should/should not be found in their local waterways.
7. Search Google Earth for an image of a local waterway and display this on either an interactive whiteboard or as an overhead transparency. As a class, trace one of the waterways using an interactive whiteboard marker or similar for the overhead transparency.
8. Students trace the journey of the waterway either in small groups with a laminated copy of the map and ribbon and blu-tack, or a whiteboard marker, or independently on a print-out of the map for them to glue in to their sustainability journals.

9. Ask the students where their own drinking water comes from—the concept of water treatment plants may be discussed but this is not the primary focus of the lesson.

10. Students discuss ways to ensure that their waterways are kept healthy—come up with a set of five to ten class rules about safe disposal of rubbish when considering local waterways.

11. Write the class rules up on a poster to hang on the 'Living Sustainably—Water" display wall with an appropriate heading. Allow students to decorate appropriately/ glue suitable pictures from magazines or the Internet if possible.

Optional:

- If time permits, you might like to go into more detail to explain what a catchment is, and about water treatment processes.
- Creating a model in the school sandpit using a simple tarpaulin and a bucket of water that shows how water flows through a catchment when it rains may also assist students' understanding.

Lesson 7 Making a poster plan

» Lesson overview

In previous lessons, students investigated where and how water is used in their school, homes and in the community. The focus of this lesson is to create a poster to communicate key messages about using water sustainably and ways to conserve water. These posters will form part of their living sustainably campaign and the most effective in design and message communication will form part of a calendar that will be distributed throughout the local community.

» Lesson objectives

Students know and understand that:

- a poster communicates a key message
- for a poster to be effective, the key messages and supporting ideas need to be planned
- to create impact, the arrangement of different elements such as text and graphics must be carefully laid out.

» Equipment

For the class:

- an enlarged copy or overhead transparency of the 'Poster evaluation sheet' (Resource 9)
- one copy of a poster to evaluate, such as 'Whizzy's water saving tips' from the Department of Energy and Water Supply.

For the student:

- a copy of the 'Technology design process' sheet (Resource 7)
- a copy of the 'Poster information planning sheet' (Resource 8)
- sustainability journal.

» Lesson steps

Part one

1. Draw a mind map on the board and ask students to share ideas about what they have learnt about water waste and conservation during previous lessons.

2. Take the time now to retrieve appropriate information for the **L** column of the **KWL** chart—what students have **Learned**.

3. Introduce a poster such as 'Whizzy's water saving tips'.

4. Highlight important elements of design that are evident on 'Whizzy's water saving tips' poster.

Design

- Text can be easily read from a distance of two metres.
- Images and drawings clearly express the main ideas for the poster.
- Text and images stand out and are arranged in a balanced way on the poster.

Context

- The information used is important.
- Text and images express an idea and purpose.
- Text and images suit a particular audience.

5. Ask students what they think the 'Whizzy's water saving tips' poster is about and evaluate it as a class using the poster evaluation sheet (Resource 9).

6. Let students know that they are going to create their own poster to communicate key messages about using water sustainably and ways in which we can conserve water. These posters could then be displayed around the school and may feature in the class sustainability calendar.

7. Give students some time to research posters that communicate key messages about the environment, whether you give them some homework time to do this, or some time to search the Internet for relevant materials. Websites provided by Ergon Energy, and Green and Healthy Schools are good places to start.

Part two

8. To help design the posters, introduce students to the 'Technology design process sheet' (Resource 7). Discuss the stages and steps answering questions where necessary.

9. Ask students to complete this sheet, thinking about how water is used in schools, home and in the community and ways in which we can conserve it.

10. Students then complete the 'Poster information planning sheet' (Resource 8).

11. Allow students to draw a detailed draft/ plan of what their actual poster will look like, either in their sustainability journal, or on a blank piece of paper.

12. Allow time for students to conference with the teacher, checking through the 'Poster evaluation sheet' (Resource 9), to ensure that all elements are covered. Students may need to complete a second or third draft before moving on to complete their final copy.

Lesson 8
Poster time

» Lesson overview

In the previous lesson, students planned the information they would like to include in their Waterwise poster. In this lesson, students design and create their posters.

» Lesson Objectives

Students will:

- follow the technology design process (Resource 7)
- create a poster to communicate key messages about using water sustainably and ways to conserve water.

» Opportunities for assessment

The finished posters will provide evidence of the extent to which students have effectively communicated key water saving messages and ideas. Teachers may like to assess the posters using the Guidelines for making judgements (Resource 14) or similar when considering individual schools' assessment guidelines.

» Equipment

For the class:

- art supplies
- 'Poster design guidelines' sheet (Resource 10)
- digital camera.

For each student:

- a large sheet of paper/A2 piece of cardboard (you may need to send a notice home asking for this, in the form of a letter or if applicable, on their homework sheets/books)
- art supplies
- completed 'Technology design process' sheet (Resource 7)
- completed 'Poster information planning sheet' (Resource 8)
- completed 'Poster evaluation sheet' (Resource 9).

» Lesson steps

1. Ask students to refer to their completed poster information planning sheet. Explain that in this lesson student will create their posters.
2. Read through the poster design guidelines with students. You could rewrite the guidelines in the form of a checklist and project this on an electronic whiteboard.
3. Step students through each stage, ensuring that they consider neatness and audience appeal at all times.
4. When students have completed their poster, ask them to go through the 'Poster evaluation sheet' ensuring that they have met all of the requirements. Allow them time to make small modifications where necessary.
5. Ask students to glue their evaluation sheets to the back of their posters for future reference/marking.
6. Students take photos of their posters to keep a digital/electronic version for future presentations/calendar creation.
7. Students present their posters to the rest of the class, explaining their thought processes and how they have communicated the water saving message effectively.
8. Display completed posters around the classroom.

Optional:

- the presentation of the poster could be used as a speaking assessment if appropriate
- as this poster is part of an advertising campaign you may like to compose a jingle to go along with it.

Lesson 9 Informative interviews

» Lesson overview

Students represent what they know about water, where it comes from and how to use it responsibly in an interview format.

» Lesson objectives

To provide opportunities for students to represent what they know about water, where it comes from and how to use it responsibly, and to reflect on their learning about water and its uses.

Students:

- review the unit using their journals, 'Living Sustainably—Water' wall and other resources developed during the unit
- record and share their ideas about water in an interview
- reflect on their learning in this unit.

» Opportunities for assessment

In this lesson you are looking for evidence that students can identify and describe uses of water, compare and contrast their own and others' water use, and identify actions that can be taken to conserve water.

Students will be formally assessed in teams on their level of understanding about the supply, distribution and conservation of water using a role-play interview format.

» Equipment

For the class:

- 'Living Sustainably—Water' wall.

Optional:

- digital camera.

For each student:

- team role badges
- sustainability journal.

» Preparation

- Watch televised interviews—for example, ABC's *Behind the News*.

» Lesson steps

1. Review the 'Living Sustainably—Water' wall and all of the information and resources on it.
2. Remind students of the interview they participated in during Lesson 5, and explain that they are going to role-play an interview in cooperative learning teams to show how much they know and have learned about water and how to use water sustainably.
3. Explain that students will cooperate to write questions and answers and practice their interview before they present their interview to the class. Explain that they can participate in the interview as themselves or they can role-play as another water user within the community.
4. Discuss the types of information that teams can include. For instance:
   - Where does water come from?
   - What is water used for?
   - Who uses water?
   - Why do we need to use water responsibly?
   - How do you use water responsibly?
   - What could happen if we don't look after our waterways?

Optional:

Students can use their posters they created as backdrops for their interview.

» Presentations

5. Review and practise oral presentation skills such as eye contact and using appropriate volume and pace when speaking.

6. Form teams and allocate roles. Arrange for students to prepare, practise and present their interviews.

7. Revisit and complete the **KWL** chart and check students' learnings. Ask students to reflect on the most interesting or important things they have learned during this water component of the sustainable living unit. Students record their reflections in their journals.

Lesson 10 Footprints – Water: our steps to a sustainable future

» Lesson overview

If everyone in the world reduces their individual consumption of water, the possibility of having enough water to support local, community and global needs for many years to come will be increased. Taking action to support a sustainable future is called 'reducing your ecological footprint'.

» Lesson objectives

In this lesson students will:

- understand that they have a role to play in a sustainable world
- identify ways that they can make a difference in conserving water.

» Opportunities for assessment

The actions listed by individual students should demonstrate their understanding of the impact that they as individuals have on water conservation through effectively communicated key water saving messages and ideas.

» Equipment

For each class:

- class set of A4 cardboard (preferably white) to trace footprint
- class set of computers and a large display area to project internet
- KWL chart (previously created).

For each student:

- piece of A4 cardboard.

Optional:

Students may lightly decorate the background of their footprints—focus on the environment as a theme.

» Preparation

- Prepare an area in the classroom where students can display their individual ecological footprints. Have a title such as, '**(class name)** are Reducing our Ecological Footprints'.

» Lesson steps

1. Hand out a piece of white A4 cardboard to each student.
2. Students trace around one of their feet (you may choose to either have everyone trace the same foot for uniformity or allow individual choice), and then cut it out. You may decide to allow the students to decorate the background, modelling how to colour/decorate LIGHTLY. Students keep this in a safe place until further notice.
3. Go to the following website to show students how to complete a short, online survey about reducing their individual, ecological footprint. Ensure that students are aware that it's just an example and that they are completing the survey with what they know now—no stress relating to exact and specific information. ‹http://www.footprintnetwork.org/en/index.php/gfn/page/calculators› or ‹www.wwf.org.au› (and search for footprint calculator).
4. Allow students to complete the survey about their ecological footprint in a computer laboratory if accessible, or during rotational group activities.
5. Have a class discussion about how everyone can reduce their own ecological footprint—focus on water use and conservation—this could be presented in a mind map type of format while allowing students to write ideas/notes in their sustainability journals with

a suitable title.

6. Students return to their own footprints and write out several ways they can personally reduce their ecological footprints through water conservation.

7. Display footprints in chosen area.

8. Revisit **KWL** chart created at the beginning of the unit and have students discuss if they have Learned anything else about sustainable water use—teacher writes any responses in the appropriate column.

Lesson 11 Creating a 'Sustainable water use' calendar for the local community

» Lesson overview

If everyone in the world reduces their water consumption, the possibility of living in a world that will be there to support future water demands will be increased. Students create a class calendar that can be distributed throughout their local community that will communicate key water saving messages to promote individual and community actions to support a sustainable future. Remaining posters will form an art display (or similar) within the school, as all students' work should be appreciated.

» Lesson objectives

In this lesson students will:

- critically evaluate their own as well as other class created posters (Resource 13)
- choose 13 posters that will best communicate water conservation messages
- organise a display area within the school for the remaining posters to form an art display (e.g., library, school hall).

» Opportunities for assessment

The actions listed by individual students should demonstrate their understanding of the impact that they as individuals have on water conservation through effectively communicated key water saving messages and ideas.

Teachers may choose to utilise the 'Guide for making judgements—Poster design' criteria sheet (Resource 14) to allocate a mark to each student for their poster designs.

» Equipment

For each class:

- enlarged, digital photos of student posters—this could be presented in the form of a slideshow.

For each student:

- copy of 'Reflection questions' sheet (Resource 13)
- students' own sustainability journals (to take notes).

» Preparation

- Prepare a set of criteria that each poster should adhere to
- Have a list of local businesses/people that the calendar could be sent to
- Speak with local businesses to see if you can obtain funding for the calendar to be printed at a high quality standard.

» Lesson steps

1. Discuss with students the objective of the session to create the best possible calendar to effectively communicate key water saving messages throughout the local community.

2. Students are to begin by critically evaluating class posters to determine the 13 (1 will become the front cover) posters that are the most popular and effective.

3. Show students enlarged, digital versions of each poster and allow students time to write notes in their sustainability journals. Ask them to focus on what makes each poster appealing and effective when communicating the desired message. It is recommended that each poster is given a number rather than displaying student names, to avoid students showing bias toward their friends' posters when critically evaluating them.

4. Hand out reflection questions (Resource 13) and ask students to firstly consider their own poster and what made it successful/unsuccessful when communicating messages about water sustainability. Allow them time to answer the first 2 questions about their own poster.

5. Ask students to think about their favourite poster, aside from their own, when considering its effectiveness at communicating key messages. Show the images of each poster again, with students now completing their reflection questions sheets (Resource 13).

6. As a class, discuss which posters would be the most effective when being used to educate the community about saving water and sustainability—remind students it's not just about the best artist or the neatest poster, rather, it's about educating the community.

7. As a group, decide on the best posters for the calendar and the most appropriate posters to form an art display or similar in the school library. Ensure that all posters are appreciated for their uniqueness.

8. Involve students in the set-up and design of both the calendar and the art display (or similar). It is important that they feel a sense of ownership over their culminating work.

Optional Consolidation activities

- Students create a PowerPoint presentation of the unit. Include photos taken as well as electronic versions of posters and give a presentation on assembly of their learnings.
- If students wrote jingles, they can perform these on a school assembly while showcasing their posters and barometers.
- Students learn lyrics to song 'Big Yellow Taxi' (see over page) and sing this while giving a dramatic performance on a school assembly, showcasing posters and what they have learnt.

Big Yellow Taxi lyrics—idea taken from Our Wetlands—a field based unit

They paved paradise
And put up a parking lot
With a pink hotel, a boutique
and a swinging hot spot

Don't it always seem to go
That you don't know what you've got
Till it's gone
They paved paradise
And put up a parking lot

They took all the trees
And put them in a tree museum
And they charged all the people
A dollar and a half to see `em

Don't it always seem to go
That you don't know what you've got
Till it's gone
They paved paradise
And they put up a parking lot

Hey farmer, farmer
Put away that D.D.T. now
Give me spots on my apples
But leave me the birds and the bees
Please!
Don't it always seem to go
That you don't know what you've got
Till it's gone
They paved paradise
And put up a parking lot

Late last night
I heard the screen door slam
And a big yellow taxi
Took away my old man

Don't it always seem to go
That you don't know what you've got
Till it's gone
They paved paradise
And put up a parking lot

Counting Crows
http://www.lyricsondemand.com/p paolosantoslyrics/bigyellowtaxilyrics.html

Where to from here...

At the beginning of this unit, students identified three components to consider when thinking about a sustainable future; water, energy and waste.

Using the outline provided for this unit, the concepts of energy and waste can also be covered. This would result in a well rounded tourism campaign based on a broader understanding of sustainability.

Ergon Energy and Resource Smart (Victoria), both provide useful and relevant information and resources to guide unit planning around the sustainable use of energy, and waste minimisation.

Ergon Energy

‹www.ergonenergy.com.au›

Resource Smart

‹www.resourcesmart.vic.gov.au/for_educators/waste_and_recycling.html›

"If we want children to flourish,
to become truly empowered,
then let us allow them to love the earth
before we ask them to save it"

David Sobel

Resource 1 Game—Spread the word

This role-play game encourages participants to consider challenges and opportunities involved in sharing sustainability messages in their community.

One player represents the 'sustainability messenger'—someone that is passionate about sustainability'. This person has just moved to the school/town/other. Other participants represent community members to whom the person is trying to spread the sustainability message.

Spread the word is a chasing game in which 'tagging' someone represents converting them to sustainable thinking. Once tagged, a participant links arms with the person who tagged them. This resulting chain of people represents a network of sustainability-driven community members.

Note: The game can be adapted for indoor or outdoor play. If outdoors, participants can either run or walk. If in a classroom environment, backward and forward movement should be limited to 'heel to toe' steps only. Select speed and movement as appropriate to the group size, age and space available.

» Instructions

Mark out an appropriate area for game play. If outdoors, the area size should be proportional to the number of participants (suggest 20 large paces x 35 large paces for 12–18 people; half that if playing at walking speed). A single tree (or other object) inside the area is useful but not necessary. If indoors, clear the space leaving one desk or a number of stacked chairs just off centre of the room. Remove any hazards or draw participants' attention to these during the pre-game briefing (for example the edges of the desk).

1. Introduce the activity to the group, explaining purpose, rules and expectations.
2. Select one person as the 'sustainability messenger' and ask the other participants to spread out.
3. Upon a pre-discussed instruction (such as a short, sharp whistle blow), the messenger begins chasing the others to tag them, thereby spreading the message. Participants try to avoid being touched while staying within the marked area.
4. Once converted (tagged), newly 'sustainable' individuals link up with the original sustainability person to form a chain that grows as other people are converted. If playing outdoors, players use monkey grip to link arms (holding each other's wrists). If indoors, chain members link side by side, holding the other person's waist.
5. The free arm at either end of the chain can now tag other participants.
6. The chain can only tag others when it is linked and must stay linked at all times. If it breaks apart it must re-form before new participants can be tagged.
7. Participants are allowed to go under links in the chain, but not break through or jump over links. If this happens they are instantly converted and must join the chain.
8. The game ends when all players are tagged or when the chain reaches a point, where it is obvious that no further players are able to be tagged.

   Note: To maintain player interest, do not labour the game too long once it fails to progress. Depending on the group you are working with, the game may be advanced by pausing and giving each team one minute of planning time. By facilitating a discussion on leadership with the chain, it may be possible to get the game progressing towards elimination of all participants. This will be dependent on the group members and the space being used.
9. At the end of the game - regardless of how it ends - a broad range of debrief/ reflection points and opportunities will be available for facilitated discussion. Refer to possible leading questions that may be appropriate, on page 9.

Task One:

Use your dictionary to look up and record in your sustainability journal the meaning of the words, “sustainability”, “resource” and “natural resource”.

Differentiation – if students are unable to use dictionaries, have several definitions for students to choose from to match with the above words.

Task Two:

Brainstorm with your group ways we can start living sustainably. Share your list with other groups until you have as many different ways as possible.

Task Three:

Group them into categories

Water	Energy	Waste

Resource 3 Whizzy's letter

Whizzy's letter and card

Teacher to handwrite this message inside card:

Hi there (class name).....

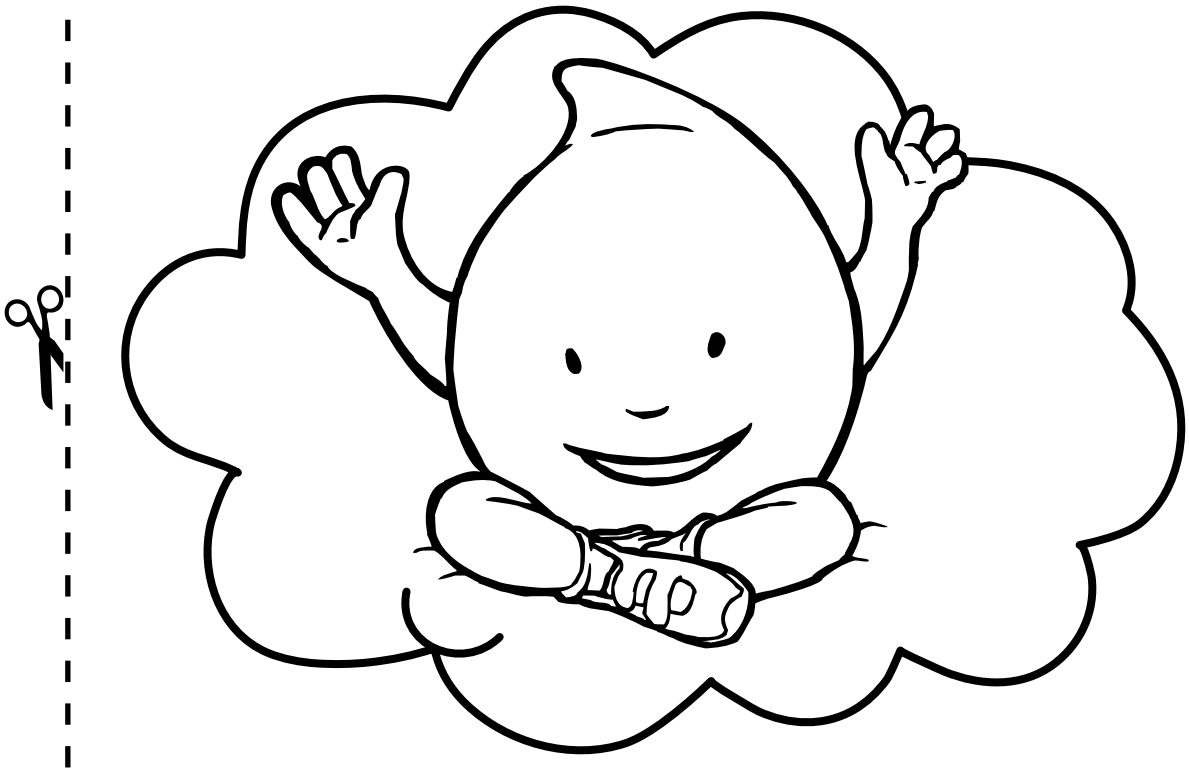
Sorry I couldn't stay and give you this present personally, but I had to fly back to that little cloud up there with my friends. I really wanted to give this present. It is very, very, very precious. Whatever you do, please take good care of it and don't waste it! It is one of the most amazing things on this Earth. Without it we could not live. Actually without it, plants and animals could not live either.

I wanted to give you this little present and invite you to come on a learning journey with me to find out all about this special gift. It will be lots of fun. Would you like to come?

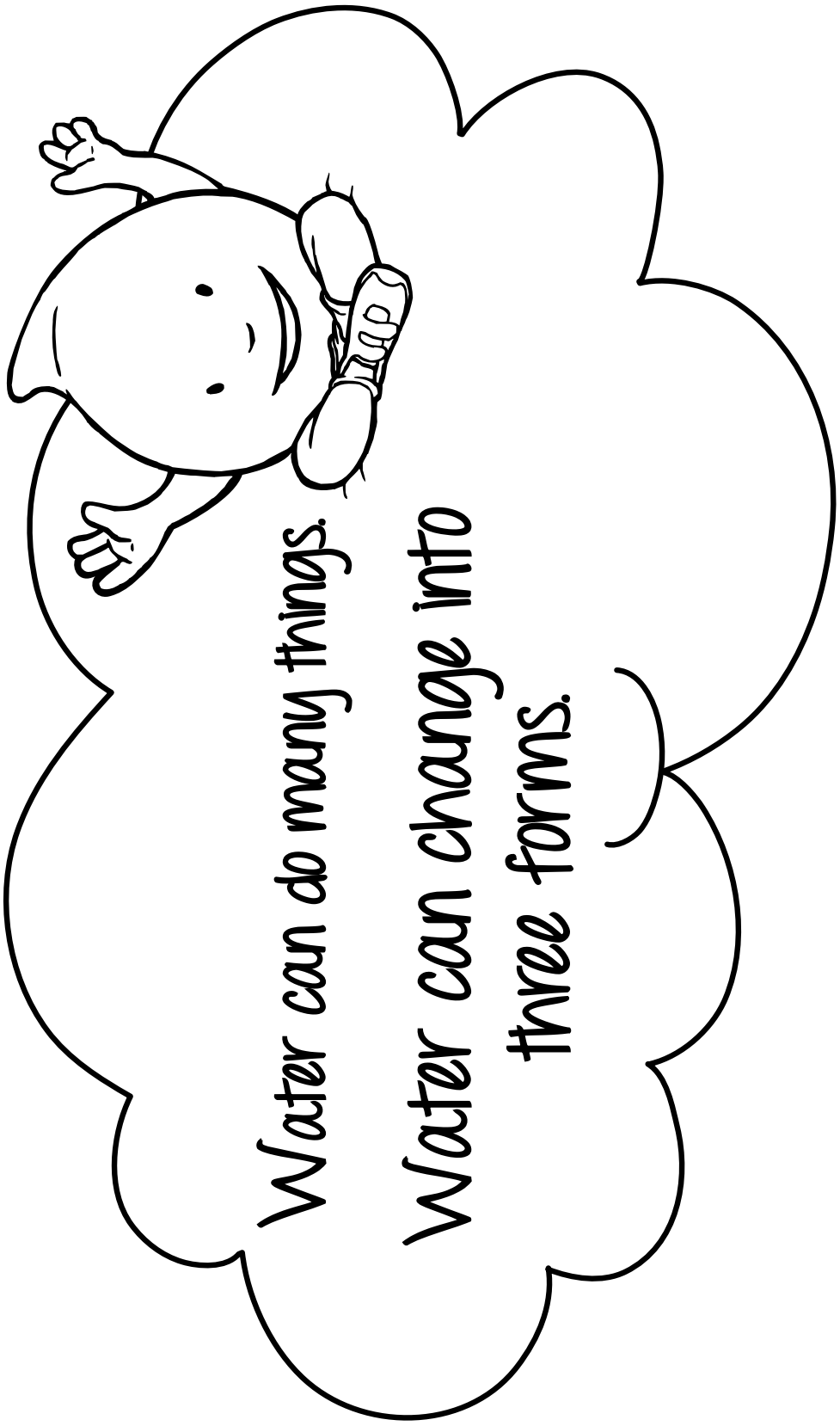
We'll talk soon.

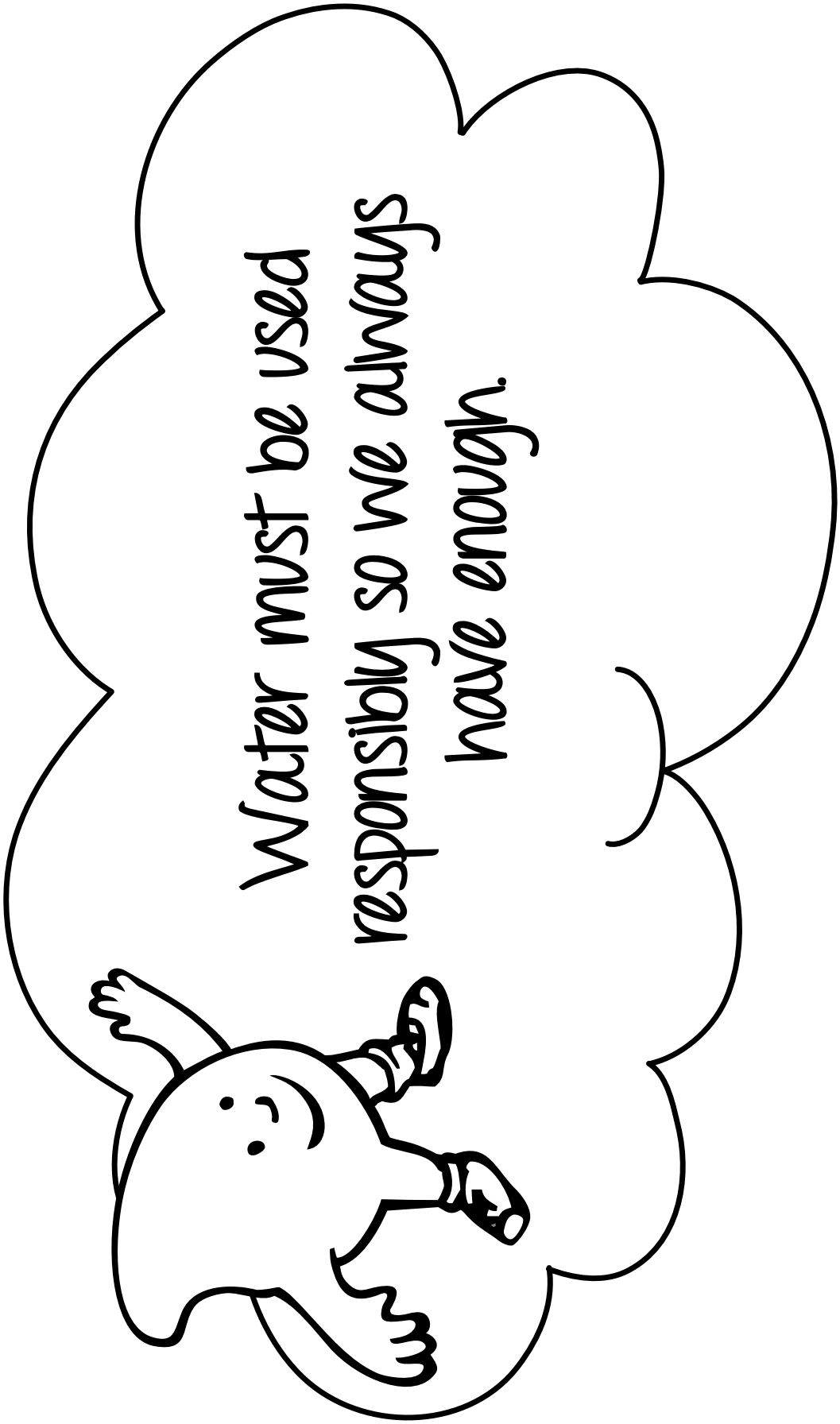
Love

Whizzy



Resource 4 Water messages




Water must be used
responsibly so we always
have enough.

Resource 5 Home water audit

Name: Date:

Water use	Water quantity	Number of times/ mins a day	Working column	Daily total
Flushing toilet				
Single flush	11 L per flush			
Dual flush–half	3 L per flush			
Dual flush–full	6 L per flush			
Showering				
Water-efficient head	6 L per min			
Non water-efficient head	11 L per min			
Bath				
Full	150 L per bath			
Half	100 L per bath			
Cleaning teeth				
Tap running	3 L per min			
Tap off	0.5 L per brush			
Washing hands	3 L per min			
Washing dishes				
Sink	15 L per wash			
Dishwasher	15 L per load			
Washing clothes				
Top loader	120 L per wash			
Front loader	70 L per wash			
Cooking a meal	10 L per wash			
Drinking	0.25 L per glass			
Washing cars				
Hose	15 L per min			
Bucket	9 L per buck			

Water use	Water quantity	Number of times/ mins a day	Working column	Daily total
Washing pets Hose Bucket	 15 L per min 9 L per bucket			
Watering garden Hose Bucket	 15 L per min 9 L per min			
Dripping tap or dripping water	15 L per tap or shower per day			
			Total water useage	

	÷		=	
Your family's daily total		Number of family members		Water use per person per day

Possible problem areas	Possible solutions
1.	
2.	
3.	

Resource 6 Water use detectives

Home water use detectives

Name: Date:

In our Science classes, we have been investigating water, including how it is used. We are going to investigate four water places at home and record examples of water use.

In each space, write or draw what the water is being used for and who uses it.

This resource sheet needs to be back at school by .....

The first water use place is .....

Initials

The second water use place is .....

Initials

The third water use place is .....

Initials

The fourth water use place is .....

Initials

Resource 7 Technical design

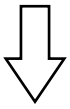
Making a Water Conservation Poster

Name:

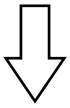
Stage and Steps	Check Box
PHASE ONE: *Investigation* (Examine, analyse, gather, research)	
1. Look at several posters that have been used to communicate an important message about the environment. Your teacher will give you one example to start with. It is your job then to see if you can find any more either at home or on the Internet. **What posters did you look at?** **Write down any observations made that could improve your own design:**	
2. Think about the message that your poster is trying to communicate. Choose a 'catchy phrase' about water conservation, or create one of your own. **Write your catchy phrase here:**	
3. Think about the focus of your poster and how the design is going to reflect your message and appeal to your target audience. **Who is your target audience?** **Write about your poster design here:**	
PHASE TWO: *Ideation* (Generating, communicating, planning, and designing)	
1. Use the 'Poster design guidelines' and the 'Poster information planning' sheets to help you put your ideas into action!	
2. Use a blank piece of paper/a page in your sustainability journal to draw and label a diagram of your poster. This diagram should include details about pictures, fonts (if creating electronically), text to insert, colours, formatting etc.	
3. Have a meeting with your teacher about your design. Discuss any possible changes or improvements to your design. If changes are going to be made, a new labelled diagram will need to be done before creating a good copy.	
4. Go through the 'Poster evaluation' sheet with your teacher to make sure that all criteria are met.	
PHASE THREE: *Production* (Creating, developing, managing, making)	
1. Create the poster using your design, making sure that you include all of the elements listed in the design.	
2. Take a photo of your poster and print out a small copy to glue in your sustainability journal.	
PHASE FOUR: *Evaluation* (Testing, judging, reflecting, comparing)	
1. Describe your poster and how you created it for a specific audience to the rest of the class.	
2. Complete the 'Poster evaluation' sheet and glue it on the back of the poster.	

Resource 8 Poster information planning sheet

(poster title/main idea/catchy phrase—think about how this will be presented)



(information)



(pictures)

Resource 9 Poster evaluation sheet

Poster evaluation sheet

Name: | **Date:**

Title of poster

Main idea of poster

	Parts of a poster	Ratings (please tick the best match)		
		Yes	Partly	No
Design	**Text:** Text can easily be read from 2 metres.			
Design	**Image:** Images clearly express the main idea for the poster.			
Design	**Space:** Text and images stand out and are arranged in a balanced way on the page.			
Content	**Information:** 1. The information used is important. 2. Text and images express an idea and purpose. 3. Text and images suit a particular audience			

Comments:

Name: | **Date:**

Title of poster

Main idea of poster

	Parts of a poster	Ratings (please tick the best match)		
		Yes	Partly	No
Design	**Text:** Text can easily be read from 2 metres.			
Design	**Image:** Images clearly express the main idea for the poster.			
Design	**Space:** Text and images stand out and are arranged in a balanced way on the page.			
Content	**Information:** 1. The information used is important. 2. Text and images express an idea and purpose. 3. Text and images suit a particular audience			

Comments:

Resource 10 Poster guidelines

Task:

You are to make a poster that communicates key messages about sustainability.

Stage One Borders

- Select a plain piece of cardboard and design a border—borders are the frame that sets off your work so it must be neat.
- Use a ruler to draw your border—a border should not be too thin or too thick. The width of a ruler is a good size.
- You may leave your border plain (*plain border*), or you may decorate it with stripes, spots etc.(*decorated border*), colour it in (*block border*), or use theme drawings (*thematic border*.)

Frame your poster with a groovy border

Stage Two Title

- The title is very important so rule guide lines with a light pencil to help keep it neat.
- The width of a ruler is a good guide for Capital Letters.
- Poster titles are usually written in capital letters.
- Underline your title twice.
- Make sure your title suits your topic.
- A title may be placed at the top of a page, the middle of a page or the bottom of a page but it should be centred.
- You may choose to use normal printing, or feature printing such as bubble printing.

Give your poster a good title...

Stage Three Layout

- Posters usually have no more than four or five sections.
- Each section should have a sub-heading e.g., Characteristics

Make sure your poster is not cluttered

- Sub-headings should be half the size of titles and underlined only once.
- Each section should have an illustration (drawing, photograph or cut-out) and no more than a paragraph of information.
- Information should be fact not opinion.
- Do not use personal pronouns.
- Make sure your information matches your sub-heading.
- Check to see that your poster looks neat and not too jumbled up!

Stage Four Create

Make sure your poster is neat and appealing

- Begin your poster using the plan you have chosen.
- Remember to use guidelines in light pencil to keep your writing neat.
- Information should be half the size of your sub-heading.
- Do one section at a time and take time to do it neatly and check it thoroughly.
- Illustrations should have a simple caption to link them to the information they are illustrating.

Resource 11 The story of a river

Focus

This activity is designed for upper primary students to highlight the idea that all land uses and human activities in a catchment impact in some way on the quality of waterways in that catchment.

'The story of a river' can be used as an 'Engage' activity to introduce:

- science or geography concepts related to your local catchment
- the contaminants/waste in river water that need to removed when treating the water for drinking.

Materials

For the class:

- one large clear glass or plastic container, or a small fish tank filled with water (4-5 Litre capacity)
- catchment story labels
- a copy of 'The story of a river' (Resource 11)
- 12 small plastic containers with screw lids or film canisters

Preparation

- Photocopy the labels listed in Table 1. Cut and tape each label to a container.
- Fill the container with the appropriate amount and type of substance listed in Table 2.
- The story (Resource 11) could be copied onto card and laminated for reuse.

Procedure

1. Place a clear jar, such as a punch bowl or small fish tank containing four to five litres of water, centrally in the room; explain it represents the river water. The effect is improved if the clear container is placed near a window so students can look through.
2. Distribute the small containers among the group. Remind students not to open their small container until their 'land use' emerges in the story; then they are to empty their container into the clear bowl of water—'the river'. (Students could place their container on the desk near them so no 'accidents' happen with the container contents).
3. Read the story in a dramatic way, stopping at the end of each section when an activity or land use is mentioned. Participants come forward and empty their small container into the bowl. Each particular land use is written in bold italic in the story. Students might take turns to read a paragraph of the story.

Table 1 Catchment labels

Forest	Farming	Orchard	Grazing
Hobby farms	Spring	Fishing	Waterskiing
Picnic	Subdivision	Roads	Industry

Table 2 Substances

Land use	Substance	Quantity / Condition
Forest	Tea, mulch	½ container of tea and 1 teaspoon of mulch
Farming	Soil	1 teaspoon
Orchard	Baking powder	½ teaspoon
Grazing	Muddy water	½ container
Hobby farms	Yellow water / toilet paper	Full container water + small pieces of paper
Spring	Clear water and table salt	Full container of tap water and ½ teaspoon of salt
Fishing	Tangle of line	Piece of fishing line
Water skiing	Vegetable oil	½ teaspoon
Picnic	Styrofoam, plastic, pieces of balloons etc.	small pieces of paper, styrofoam, plastic, balloons cut up or broken up
Subdivision	Soil	1 teaspoon
Roads	Coffee grounds	½ teaspoon
Industry	Detergent	A couple of drops of detergent in full container of water—shaken up

Note: All of these substances are non-toxic and safe.

1. This is the story of the travels of a river through its catchment. It begins in the higher parts of the catchment where the rain runs off the slopes and begins its long journey to the sea. The river flows through a national park and then through a **forest**. The water gathers momentum as it descends the slopes. Even in these relatively undisturbed areas, the rain washes mulch and some soil into the river.

2. The river continues its journey towards the sea through **farming** country. Some farmers left their crop residues on the paddocks to protect their soil. But one farmer ploughed the fields and left them bare. Recent rains have carried soil from the bare paddocks into the river.

3. On a nearby **orchard**, the farmer wanted to encourage his crop to grow, so he put fertilisers in his soil. However, he applied more fertiliser than his crop could use. This farmer also wanted to protect his crop from weeds and bugs, so he sprayed the crop with pesticides. But again he used too much of the chemicals. When the rain comes, the extra fertiliser and pesticides on the farmer's paddock are washed into the river.

4. On the other side of the river are **grazing** lands. A herd of cattle feed on the vegetation on the banks and drink from the river. They disturb the soil on the river banks. When heavy rains arrive, the banks erode and collapse into the river.

5. Slowly the river starts to wind its way through the outskirts of a major town. Out here there are a number of **hobby farms**. The houses here are not connected to a sewerage system; they have their own septic tanks. If the septic tanks are not maintained, they can occasionally overflow and untreated sewage can seep directly into the river.

6. Just before the town a freshwater **spring** from an underground aquifer reaches the surface near the river and replenishes it. The spring water collects salts as it moves through underground layers and these, too, enter the river.

7. There are a number of people making use of the river around the bend. Someone is **fishing** on the banks. Unfortunately their line gets caught around a rock and is left in the water.

8. Other people are **waterskiing**. Their boat needs a service and its engine is leaking oil directly into the river.

9. Another group of people are enjoying a birthday **picnic** at a park overlooking the river. A gust of wind blows some of their rubbish off the table and down into the water. They release some balloons and some of these balloons are also blown into the river.

10. The river now starts to meander through the suburban part of the town. A new **subdivision** is being developed. Many of the trees have been removed and the developers have built small fences to hold the soil on the building site when it rains. However, there is a big storm and run-off washes away the fences. The top layer of soil is eroded and washed downstream, contributing to the silting up of the river.

Resource 11 cont'd The story of a river

11. People who have spent the day at work are now starting to drive home. The **roads** are choked with traffic. Oil drips out of many of these cars and sometimes they brake in a hurry, leaving traces of rubber on the road. Every time it rains these pollutants are washed into the stormwater drains and into the river.

12. There is some **industry** along the river here. Detergents are used to keep the production equipment clean. Sometimes the dirty water is washed out of the factory into the gutter where it disappears into stormwater drains. This water flows straight into the river. If there are certain chemicals in the detergent it will cause increased algal growth in the river. When this algae dies and begins to rot, it uses up oxygen which animals in the water rely on. They may suffocate as a result.

13. With one final bend the river finally arrives at its mouth and flows out into the sea. But just look at what flows out with it!

The 'story of a river' is adapted from '*Who Polluted the Potomac?*', Alice Ferguson Foundation, USA.

Resource 12 Healthy catchment game

This team game is designed to reinforce the concept of a healthy catchment. It provides students with an opportunity to think about the types of items that should and should not be found within their own local waterways. It aims to promote discussion about students' experiences with various items in local waterways and the possible impacts that these items have on the catchment and life within it.

Teachers can use this game as an introductory or reflection tool to assist them to explain how items in local waterways travel through the catchment. The game has been created specifically to assist in developing the overarching idea of 'Systems' in the Australian Curriculum: Science.

Games provide highly engaging and effective learning experiences for students. As with all activities, the more you play games with students, the more skilled you will become at facilitating them. Also, you will find lots of opportunities to use games for learning with your students. This game is quick, easy and enjoyable and most importantly it reinforces to students what they need to do to maintain the health of their local waterways, wetlands and coastal areas.

Equipment

The following equipment list has been written for three teams.

- seven hula hoops
- six 'smiley' face pictures for items that we ***should*** find in our coastal catchment
- six 'frownie' face pictures for items that we ***should not*** find in our coastal catchment
- at least eight pictures of objects that ***should*** go into waterways
- at least eight pictures of objects that ***should not*** go into waterways.

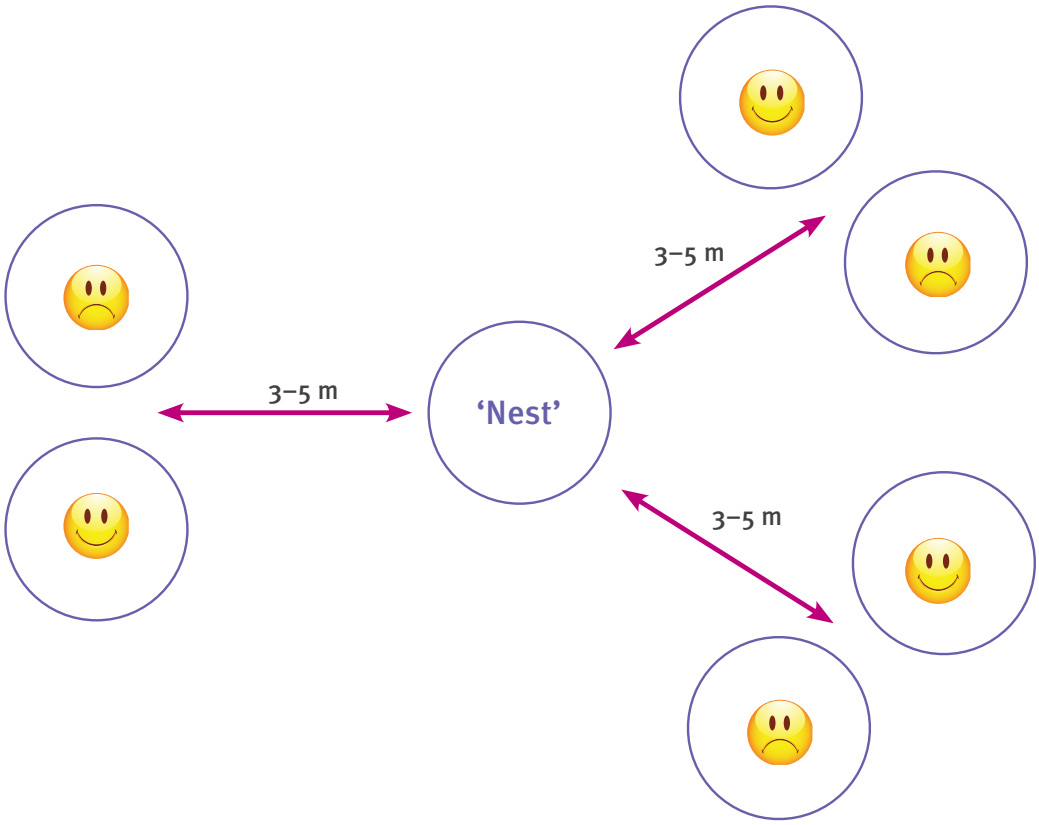
Preparation

Locate pictures and items that reflect your local catchment. For instance, suitable items for a coastal catchment could include sea shells and sand.

The following instructions are written for three teams. Set up the 'rob the nest' game with one hoop in the centre as the 'nest' which contains the pictures or objects of the items to be robbed—and two hoops for each team placed approximately three to five metres from the nest in the centre. The distance will depend on the age of the students. Decide whether students will be permitted to run or to walk quickly.

Each team should have one hoop with a smiley face for ***should*** items and one hoop with a frownie face for ***should not*** items. Tape the faces to the top of the hoops.

Resource 12 cont'd Healthy catchment game



How to play

1. Divide the class into three teams.
2. Students line up at least one metre behind the two team hoops as shown in Figure 1. Teachers could use witches hats, masking tape or chalk to show students where to stand.
3. Explain the purpose, lay-out and rules of the game.
4. On a signal from the teacher—for instance, one short, sharp whistle blow—the first student in line (the 'robber') walks quickly to the nest in the centre and takes one item.
5. This student walks quickly back to their team hoops, keeping the hoop to the right side of their body.
6. Place the item they selected in one of the hoops—either the smiley face or the frownie face hoop.
7. After placing their item in the desired hoop, the 'robber' lightly tags the right hand of the next player in line before moving to the end of the line.
8. Alternatively, if a player sees that an item has been placed in the wrong hoop they can move the item before tagging the next player. This is considered to be a full turn.
9. Teams continue to play this relay race until they have three items in both hoops.
10. When a team has three items in both hoops, they sit on the floor behind their team hoops with their hands on their heads or some other appropriate signal.
11. The other teams continue to play while the teacher checks the finished team's items to make sure they are correct before signalling that the game is over. You could do this by giving three short, sharp whistle blows, for instance.
12. If the team did not place their items in the correct hoops, they continue to play by correcting the placement of their chosen items and revisiting the nest.

Rules

1. There is no physical contact—a team may be disqualified if there is physical contact from any player.
2. The teacher can pause the game at any time if rules aren't being followed. Use a predetermined signal such as two short sharp whistle blows to pause the game, demonstrating this prior to the commencement of the game.
3. Only one item can be taken from the nest during a player's turn.

Variations

This game can be readily adapted for use with any age or size group with minor rule changes and appropriate use of technical, scientific or specialised language. Some variations are:

- Place the pictures face down so that students don't know what they are robbing until after they have the item.
- Increase the number or difficulty level of items.
- For younger students, this could become a fishing game. Students fish for paper-clipped items using a magnetic fishing rod before placing them in the appropriate hoop. You could allow students to discuss their choices before placing them in the hoop. The fishing rod is made from a piece of dowel and a length of string with a magnet attached to the end of it.
- The items could be used as discussion starters. Place the smiley and frownie faces at the top of two pre-drawn columns with the headings— 'should items' and 'should not items'.
- Team hoops could be accessed by other teams. For instance, a team member may choose to use their turn to rob an item from another team's hoop.

Resource 13 Poster reflection questions

1. In what ways was your poster design successful?

2. In what ways was your poster design unsuccessful?

3. How could you change your design for a more successful / appealing result?

4. What parts of your poster design do you think would appeal to other class members and why?

5. Which is your favourite poster design in the class, (other than your own), and why is it your favourite? What is it in particular that appeals to you? (e.g., colour, words, pictures, message).

Resource 14 Guide to making judgements—Poster design

Assessable Elements	A	B	C	D	E
Investigation	Wide range of relevant posters were viewed to research types of poster advertising and their appeal. Observations made are very relevant to design challenge.	More than one relevant poster was used to research types of poster adverting and their appeal. Observations made are relevant to design challenge.	One poster was used to research types of poster advertising and their appeal. Observations made were somewhat relevant to design challenge.	Research was very minimal. Observations made are not relevant to design challenge.	No research has been attempted. Observations made are irrelevant/not factual.
Ideation	Design ideas have been communicated using accurately labeled diagrams listing all elements of design.	Design ideas have been communicated using a labeled diagram and listing most elements of design.	Design ideas have been communicated using diagrams and listing some elements of design.	Design ideas are lacking and have minimal drawings. Very few elements of design have been suggested.	No drawings have been attempted, or elements of design suggested.
	Suitable elements of design have been chosen according to purpose, accuracy and effectiveness.	Suitable elements of design have been chosen according to purpose.	Elements of design chosen are mostly suitable for its purpose.	Elements of design chosen are mainly not suitable for its purpose.	Elements of design chosen are not suitable for its purpose.
Production / creativity	Suitable techniques have been used to successfully combine elements to meet design requirements.	Techniques have been used to combine elements in order to meet design requirements.	Techniques have been used to combine materials but with some assistance to carry this out.	Techniques have been used but with a lot of support from the teacher.	Techniques have not been used to meet design requirements.
	The student has very successfully created their poster, using elements of design that are very neat and appealing and targeted to their specific audience.	The student has successfully created their poster, using elements of design that are neat and appealing and targeted to their specific audience.	The student has created their poster, using elements of design that are somewhat neat and/or appealing and targeted to their specific audience.	The student has attempted to create their poster, using elements of design that demonstrate and attempt to appeal to their specific target audience.	The student was unable to create their poster, submitting an unfinished product/ not submitting a product.
Evaluation	The student has very successfully evaluated the effectiveness of their design and creation of their poster, while being able to critically and thoughtfully view and reflect on their own and other designs.	The student has successfully evaluated the effectiveness of their design and creation of their poster, while being able to view and reflect on their own and other designs at a high standard.	The student adequately evaluated the effectiveness of their design and creation of their poster, while being able to view and reflect on their own and other designs at a satisfactory standard.	The student has not adequately evaluated the effectiveness of their design and creation of their poster, while attempting to view and reflect their own and other designs.	The student has not evaluated the effectiveness of their design and creation of their poster, while being unable to reflect on their own and other designs.
Task requirements	A poster that clearly conveys the water conservation message has been thoughtfully designed and created while meeting all of the task requirements to a very high standard.	A poster that conveys the water conservation message has been well designed and created while meeting most of the task requirements to a high standard.	A poster that conveys the water conservation message to a degree has been designed and created while meeting some/ most of the task requirements to a satisfactory standard.	A poster that attempts to convey the water conservation message has been created while meeting some/few task requirements to a limited standard.	A poster was not submitted / was submitted with little to no attempt to meet task requirements.
Overall Result	A	B	C	D	E