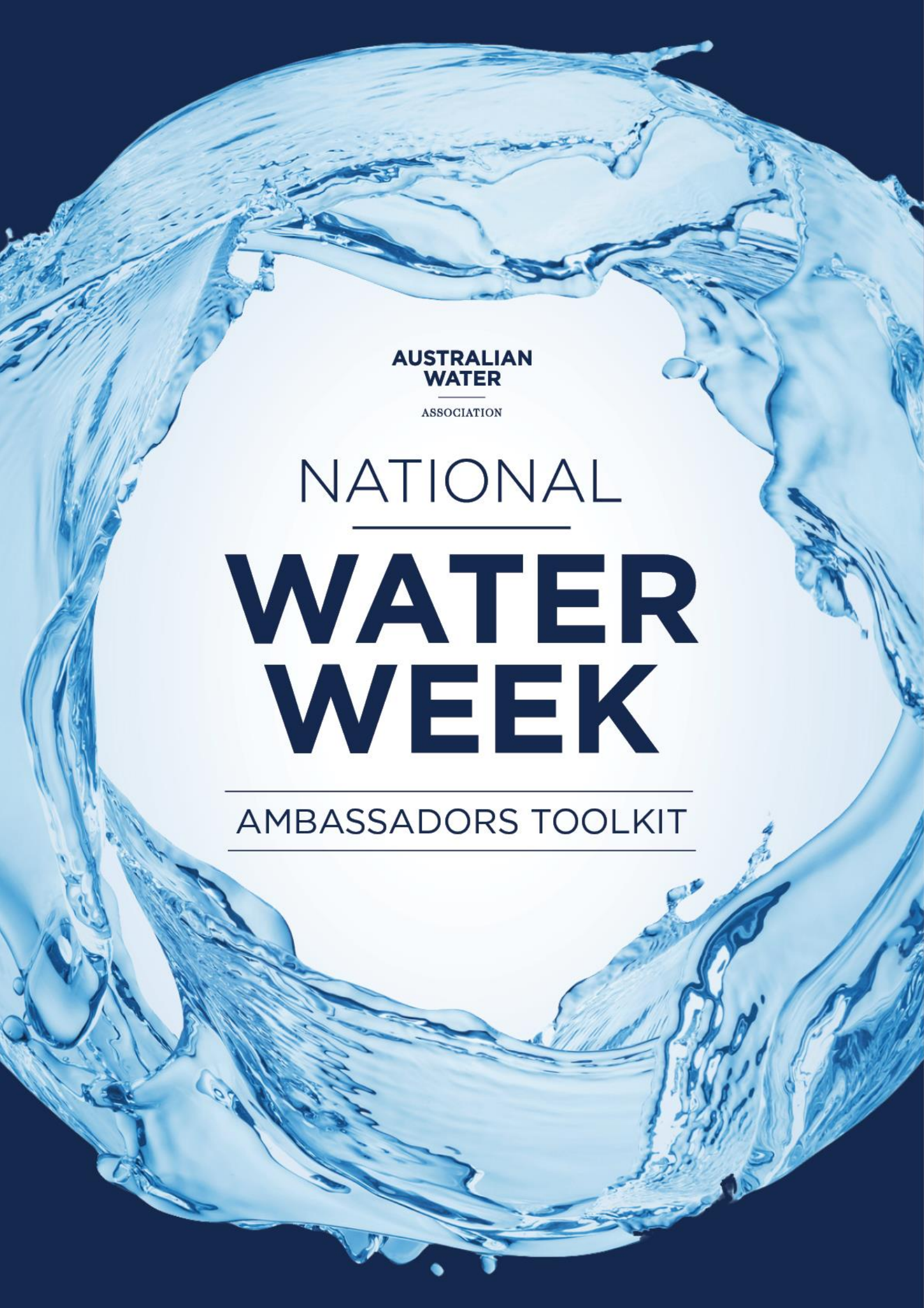
AUSTRALIAN
WATER
ASSOCIATION
NATIONAL
WATER
WEEK
AMBASSADORS TOOLKIT

TABLE of Contents

4.3 What happens to treated wastewater
4.4 Wipes out of pipes

5. Water use and management

5.1 Water sensitive urban design
5.2 Plan a liveable settlement
5.3 Stormwater campaign
5.4 Drink tap double bubble
5.5 Bottled water
5.6 Water bingo

6. Using water wisely

6.1 Water at home
6.2 Water carers
6.3 School water audit
6.4 Using water efficiently
6.5 Embodied water
6.6 Using greywater

PART B: CLIMATE CHANGE

7.1 Climate changing
7.2 Weather makers - Water worries
7.3 More water / less water
7.4 Save climate change while acting

PART C: CAREERS

8.1 Careers expo
8.2 Water themed field day
8.3 Guest speaker

Introduction

Australia is a dry continent with a highly variable climate. While it generally receives significant rainfall and is well-endowed with groundwater resources, these water sources occur in northern and central Australia rather than in southern areas where it is most needed for agriculture and urban supplies. Understanding the complex story of water in Australia is critical for students making future informed decisions about managing our water resources sustainably.

The Australian Curriculum V9 (Foundation-Year 10) provides a valuable opportunity for water educators to share ideas and activities. The subject areas of Science and Geography are particularly relevant for water education topics. The Cross Curriculum Priorities of Aboriginal and Torres Strait Islander Histories and Cultures, and Sustainability have been integrated.

The purpose of this toolkit is to collate 'tried and tested' activities in a National Water Week Ambassadors Toolkit to assist water educators and ambassadors - particularly novice water educators—to develop student and teacher understanding about their local water story. With the help of experienced members from the AWA Water Education Network, the toolkit provides engaging, hands-on and experiential learning activities that can be used in face-to-face contexts with students and the public.

The most enduring water education activities have been modified many times and the toolkit provides ideas for adapting activities including activities for site tours and classroom incursions. Many of the activities are drawn from excellent existing resources such as 'Water – learn it. live it.', the websites of water organisations and environmental education sites in each state. The toolkit is a small selection of the hundreds of water education activities available for educators.

The Australian Curriculum links are highlighted for each activity. A large number of activities are linked to Stage 4 Science (understanding and skills) and Stages 4 and 7 Geography (knowledge and skills) where natural resources or water are explicitly taught. Some activities have been linked to Civics and Citizenship K-10. Activities can be used or adapted to suit all years by educators.
Note: The Australian Curriculum V9 content descriptions show the year level in which a particular concept is assessed. For instance, students need to demonstrate the quality of their understanding about the water cycle in Year 4 Science and Year 7 Geography. However, it is important that students are exposed to these foundational water concepts informally as early as possible so that by the year the concept is assessed students have a mature understanding of the concept. Simple explanations and explorations of the water cycle should be introduced from the Foundation year or earlier.

Topics

The activities are organised in the following overlapping water topic areas:

PART A: Water in the World (organised under the following sub-headings)

- Natural water cycle
- Catchments and waterway health
- Water sources
- Water treatment – drinking water and wastewater (combined categories)
- Water use and management (combined categories)
- Water use
- Using water wisely

PART B: Climate change

PART C: Careers

Activities

Activities are categorised as:

- Lesson
- Game / Interactive Digital / Spatial technology
- Hands-on activity / Creative Activity
- Demonstration
- On-site tour activity / virtual tour
- Incursion
- Excursion
- Take-home activity

WATER IN THE WORLD

PART A. WATER IN THE WORLD

1. NATURAL WATER CYCLE

1.1 Earth globe toss game [1]

Hands-on activity / Discussion

This is an activity to begin a study Earth's water resources. Students play a game of 'Toss the globe' in which they throw and catch an inflatable globe to estimate 'How much of Earth's surface is water'. If students have no knowledge about the proportion of water in the oceans this provides a great starting activity. If students know the general distribution of water on Earth this activity can be used to test data and discuss the pros and cons of random sampling.

Suggested discussion topics to follow include
- What types of surface water are there on Earth?
- Where else is water other than on the surface?

Follow up activities could include asking students
- to predict the amount of water that might represent fresh drinking water, icecaps and glaciers, saltwater, and groundwater and research the correct data.
- to represent the amount of water on Earth by shading in a circle to show the percent of water in the oceans.

Support materials include:
- Video and Poster: How much water is on Earth?
- Video: Show Me the Water

Variations

The South East Water Water- learn it. live it resource (Pages 42-46) has activities requiring students to predict the distribution of the world's water, create a pie graph (circle graph) and research questions about Earth's rivers and oceans.

Water- learn it. live it *Volume One: Water in the Natural Environment* is broken into four sections: Properties of Water, Natural Water Cycle, Bodies of Water and Weather. Each provides a collection of activities for students from K to 10. The water activities are based around Science, Geography, Mathematics, English, Art and Music. Most activities can be undertaken in any state in Australia.

[1] NASA California Institute of technology
https://www.jpl.nasa.gov/edu/teach/activity/ocean-world-earth-globe-toss-game/

Year levels: Years 4 - 7 but suitable for all year levels
Key curriculum links: Year 4 Science (AC9S4UO2) Year 7 Geography (AC9HG7K01)
Geographical concepts: place, space, environment; Scientific ideas: scientific inquiry, systems

1.2 Make a water cycle model[2] [3] [4]

Hands-on activity / Demonstration

In this activity, students replicate what happens in nature by creating simple models and identifying the processes of the water cycle. The models can made using a bottle (terrarium), a plastic bag or a bowl covered with cling wrap. Each model imitates the processes of evaporation, condensation and precipitation. To assist their understanding provide students with a copy a water cycle diagram or poster such as The Water Cycle poster[5].

Year level/s: Years 4 to 7
Key curriculum link/s: Year 4 Science (AC9S4UO2) (AC9S4104) (ACS4105); Year 7 Geography (AC9HG7K01) (AC9HG7S02) (AC9HG7S03)
Geographical concepts: place, space, scale, environment, interconnection, change
Scientific ideas: systems, scientific inquiry

1.3 Water cycle processes [6]

Practical activities / incursions

Students perform experiments and activities using easy to access materials to understand the water cycle processes of evaporation, transpiration, condensation and precipitation. They

- compare what happens when fresh and saltwater evaporate and examine the role that exposure to sunlight plays in evaporation by placing water in different locations.
- catch water transpired by plants and compare transpiration from different plants. This activity is set up one day and left overnight. Students place plastic bags over a bunch of the leaves on selected plants and seal the end of the bag. The next day, they collect the bags to observe the contents. Follow up activities could include measuring the contents, making notes and/or graphing their results. These steps will develop student's literacy and numeracy skills.
- construct a simple rain gauge to measure precipitation. The final activity makes a good introduction to the concept of a water catchment in which the funnel used represents a catchment.

[2] Sydney Water: Make a Water Cycle Model https://www.sydneywater.com.au/content/dam/sydneywater/documents/education/make-a-water-cycle-model.pdf
[3] Mobile Ed Productions: Education through entertainment. How to make a water cycle in a bag https://www.mobileedproductions.com/blog/how-to-make-a-water-cycle-in-a-bag
[4] Science Sparks Make a Mini Water Cycle Model https://www.science-sparks.com/make-a-mini-water-cycle/
[5] Waterwise Queensland Water Cycle poster https://www.resources.qld.gov.au/__data/assets/pdf_file/0010/1407628/water-cycle-poster.pdf
[6] Shoalhaven City Council: Shoalhaven Water: Water Education https://tapstar.shoalwater.nsw.gov.au

Year level/s: Year level/s: Years 4-7
Key curriculum link/s: Year 4 Science (AC9S4UO2) (AC9S4104) (ACS4105); Year 7 Geography (AC9HG7K01) (AC9HG7S02) (AC9HG7S03)
Geographical concepts: change, interconnection, environment
Science ideas: scientific inquiry, systems

1.4 The water cycle silent card shuffle [7]

Game

In small groups, students use a set of cards with labelled images of the following: mountains, condensation (clouds), rivers and lakes, sun, ocean, evaporation (gas), infiltration (groundwater), transpiration from plants and run-off (surface water). Without talking, students sort the cards into the order they think is the water cycle. They can only use actions to communicate, and all members of the team should contribute. Allow time for students to discuss amongst their group and share with the class.

A full lesson plan and background information accompanies this activity at The Water Cycle from the Queensland North East Water website.

Year level/s: Years 4 to 7 but suitable for most year levels
Key curriculum link/s: Year 4 Science (AC9S4UO2) AC9S4106); Year 7 Geography (AC9HG7K01) (AC9HG7S06)
Geographical concepts: change, interconnection, environment; Science ideas: systems

1.5 Being the water cycle [8]

Lesson / Creative activity

In this drama lesson (Learn it Live it Page 32), students act out, mime, dance or create a short film about the water cycle. You could provide them with some cards with pictures and words of the following water cycle stages: precipitation, infiltration, transpiration, evaporation, condensation. Or these images could be displayed on the whiteboard or classroom wall.

Variations

Use a storyboard template to plan a short film and use movie making software to collate the final product. (Learn it Live it Page 84)

Year level/s: Years 4 and Year 7 but suitable for most year levels

[7] North East Water: The Water Cycle https://www.newater.com.au/Portals/0/NE-Water/Sections/What-we-do/Education/Teacher-resources/water-cycle/Water_Cycle_Activity_Teacher_Information.pdf
[8] Barwon water: Water – learn it. live it. (2013) *Volume 1 Water in the natural environment* p. 32 https://www.barwonwater.vic.gov.au/__data/assets/pdf_file/0023/6278/Water-Learn-it!-Live-it!-Volume-1-Water-in-the-Natural-Environment.pdf

Key curriculum link/s: Year 4 Science (AC9S4UO2) (AC9S4106); Year 7 Geography (AC9HG7K01) (AC9HG7S06)
Geographical concepts: change, interconnection, environment; Science ideas: scientific inquiry, systems

1.6 Wet and dry Australia [9]

Lesson

Australia is made up of six main climate zones: Equatorial, Tropical, Subtropical, Desert, Grassland and Temperate. Each zone varies in its rainfall and temperature. As a group, discuss the climate zone you live in using the map on the Australian Bureau of Meteorology website (for older students) or Page 61 of learn it, live it for younger students. By understanding climate, we can choose an appropriate holiday destination, plant the right crops and ensure our homes are designed for long-term comfort and durability. Brainstorm ways that climate (such as hot and humid or freezing cold) might change the way a person lives. Think about clothing, housing, activities and hobbies, food and travel. Create a collage or map to indicate the different climate zones in Australia.

Variations

Younger students collect images and group them into wet and dry then make a collage on A3 paper. Older students can create maps to show the climate zones around Australia. (learn it, live it (Page 70). Ask students to identify the climate zone in which they live.

Older students could use a think, pair, share activity to explain in 1 minute the reason Australia has so many climate zones. Use the Australian Bureau of Meteorology's media report Why do we have different climates across Australia? Focus on making connections between different climate zones, water cycle processes and interconnections between these.

Year level/s: Years 4 to 7 but suitable for all year levels
Key curriculum link/s: Year 4 Geography (AC9HS4K05) (AC9HS4S03); Year 7 Geography (AC9HG7K02) (AC9HG7S03) (AC9HG7S04)
Geographical concepts: environment, place, space, interconnection

1.7 Day zero [10]

Lesson

Day Zero teaches students to respond to questions in a geographically distinctive way particularly to; collect, evaluate, analyse and interpret information; and suggest responses to what they have learnt.

[9] Barwon water: Water - learn it. live it. (2013) *Volume 1 Water in the natural environment* p. 70-73 https://www.barwonwater.vic.gov.au/__data/assets/pdf_file/0023/6278/Water-Learn-it!-Live-it!-Volume-1-Water-in-the-Natural-Environment.pdf
[10] South East Queensland: Water H2O Kids Lesson Toolboxes Day Zero https://www.seqwater.com.au/h2o-kids-toolboxes

In April 2018, Cape Town in South Africa nearly ran out of water. Students will consider if a similar scenario could happen in South East Queensland. An initial presentation illustrates how water is managed and supplied by Seqwater and our 30-year plan for water security.

Variation
Compliment the activity using this Australian example 'Lessons from the Australian city that nearly ran out of water' [11]

Year level/s: Year 7 but suitable for Years 5 - 10
Key curriculum link/s: Year 5 Geography (AC9HS5K05) (AC9HS5S03) (AC9HS5S05); Year 7 Geography (AC9HG7S02) (AC9HG7K04) (AC9HG7S03) (AC9HG7S04) (AC9HG7S05); Year 10 Geography (AC9HG10K01) (AC9HG10K04) (AC9HG10S03)
Geographical concepts: place, change, environment, sustainability

2. CATCHMENTS AND WATERWAY HEALTH

2.1 Story of a river [12] [13]

Hands-on activity

This activity highlights the impact land uses and human activities in a catchment impact in some way on the quality of waterways in that catchment. The activity can be used to teach students about their local catchment, to highlight water quality and treatment such as what needs to be removed when treating water for drinking. Labels and the story are online and can be printed. You will need a large clear plastic container filled with clean water (five litre capacity) and 12 small plastic containers.

Read the story and pause at the points that something is added to the 'river' (the large container of water). For example, when the river flows through a national park and then through a forest, students add the contents of the containers labelled 'forest'. This contains tea and mulch. When the story is finished and all of the contaminants have been added, the river (and everything else along with it) flows out to sea.

There are many versions of this activity. The original 'Story of a river' was adapted from 'Who polluted the Potomac?' developed by the US-based Alice Ferguson Foundation.

Variations

Discuss the impacts each contaminant might have on the river, the ocean and our drinking water supply. Students can research their catchment and write their local story of a river.

[11] ABC News In Depth: Lessons from an Australian city that ran out of water. https://www.youtube.com/watch?v=fU5pQiUud-0
[12] Queensland Government: Water - Learn it for life! (2014) *Year 4 Science: Are we living sustainably?* Resource 11 p. 44 https://www.rdmw.qld.gov.au/__data/assets/pdf_file/0007/1407634/year4-water-living-sustainably.pdf
[13] Water Corporation Lesson Plans: We are all Connected Year 4 Page 3 https://www.watercorporation.com.au/Education/Water-supply-and-water-conservation/Lesson-plans

Junior Landcare's '*Catchment Management: Story of a River'*[14] is the first part of a sequence of 5 learning activities focused on Catchment Management. The order of these learning activities are: the story of a river, water sustainability, what's in a drop?, the drain is just for rain and where the river meets the sea. Additional activities include using the Australian Topographic Drainage Divisions and River Regions map to determine the catchment students live in, forming groups to make a catchment model and comparing water flows between models. *'Danny the Drip'* [15] is a similar activity for suited to younger students.

Year level/s: Suitable for all year levels
Key curriculum link/s: Year 4 Science (AC9S4U02) (AC9S4S04); Year 4 Geography (AC9HS4K05) (AC9HS4K06) (AC9HS4S05) (AC9HS4S06); Year 7 Geography (AC9HG7K02) (AC9HG7S03) (AC9HG7S04); Year 10 Geography (AC9HG10K01) (AC9HG10K04) (AC9HG10S03) (AC9HG10S04)
Geographical concepts: place, change, interconnection, environment, sustainability
Civics and citizen concepts: active citizenship; Science ideas: scientific inquiry, sustainability

2.2 Create a catchment [16]

Hands-on activity

Following Story of a River, or as a separate indoor activity, use natural resources such as grasses and twigs and craft supplies to Make your own catchment. In this version form two groups with one group creating a natural catchment model and the other an urban catchment (the river has been dammed) model. Water cycle posters could be used as a guide.

Students could annotate their models with sticky notes that include the most important features then present their models to the class before discussing difference in water flows between the two catchment models.

Variations

A similar activity Build a model water catchment [17] has large and smaller model options supported by a range of observation and discussion activities. There are links to other activities such as Mapping my local water catchment using a topographic map.

Students can make a Crumpled Paper Catchment Model,[18] a simple and fun activity to show features of a catchment and how water moves in a catchment Crumple the paper then place in

[14] Junior Landcare: Catchment Management Story of a river. https://juniorlandcare.org.au/learning_activity/catchment-management-the-story-of-a-river/?age=
[15] City of Ryde: The Last Drop. Teacher Activity Book Danny the Drip Page 9 https://www.ryde.nsw.gov.au/files/assets/public/environment-and-waste/reen/reen-last-drop-activity-book.pdf
[16] Story of a River Extension Activity: Make your own catchment. Junior Landcare https://juniorlandcare.org.au/learning_activity/catchment-management-the-story-of-a-river/?age=
[17] Science Learning Hub: Build a model water catchment https://www.sciencelearn.org.nz/resources/2887-build-a-model-water-catchment
[18] NSW SEA: Factors that shape places. People and floods in the Hawkesbury- Nepean Catchment. Stage 3 Learning Sequence 1: Natural Environment of the Hawkesbury-Nepean River and its Catchment Pages 5, 10. https://www.ses.nsw.gov.au/for-schools/primary/water-in-the-valley/

a large shallow plastic container. Use textas or watercolour paints to colour the crumpled paper, then a spray bottle or jug used to pour the "rain" into the catchment. Protect the table from spills using a sheet of plastic or do the activity outside. See SES NSW Water in the Valley, Factors that shape places, Learning sequence 1 Pages 5 & 10.

The SES NSW resource Water in the Valley[19] is a comprehensive water resource for primary schools to support the NSW Geography syllabus, with integrated approaches to literacy, numeracy and science for Stages 1, 2 and 3. In the secondary resource Water in the World[20]students examine water as a resource in the Hawkesbury-Nepean Valley, the factors influencing its flows and availability across the catchment and floodplain, the nature of water scarcity and abundance and ways of overcoming it, specific to the Hawkesbury-Nepean Valley. Many of the activities can be used by schools across Australia studying water and catchments.

Year level/s: Years 4, 6 and 7 but suitable for most year levels
Key curriculum link/s: Year 4 Science (AC9S4U02) (AC9S4104); Year 4 Geography (AC9HS4K05) (AC9HS4K06) (AC9HS4S03); Year 7 Geography (AC9HG7S02) (AC9HG7S03) (AC9HG7S04); Year 10 Geography (AC9HG10K01) (AC9HG10K04) (AC9HG10S03) (AC9HG10S04)
Geographical concepts: place, change, interconnection, environment, sustainability
Science ideas: systems, sustainability

2.3 Healthy catchment game [21]

Game

This team game is designed to reinforce the concept of a healthy catchment. Students think about the types of items that should and should not be found within their local waterways. In teams, students take pictures of items that you might find in a catchment from the 'nest' hoop and place it in one of two hoops – a smiley face or a frownie face. The smiley face means a happy catchment and a frownie face means the item should not be in there. For example, a picture of a fish goes from the 'nest' hoop into the smiley face hoop, but a picture of a plastic bag goes from the 'nest' hoop into the frownie face hoop.

Variations

This game can be used as an introduction or reflection tool and can be modified depending on the students' year level and level of knowledge. It can be a race or simply a discussion starter. For younger students, it could be turned into a fishing game by putting paper clips on each item and fishing for them with a magnetic fishing rod.

Key curriculum link/s: Year 4 Science (AC9S4U02) (AC9S4104); Year 4 Geography (AC9HS4K05) (AC9HS4K06) (AC9HS4S03)

[19] NSW SEA: Factors that shape places. People and floods in the Hawkesbury- Nepean Catchment. Stage 3 Learning Sequence 1: Natural Environment of the Hawkesbury-Nepean River and its Catchment Pages 5, 10. https://www.ses.nsw.gov.au/for-schools/primary/water-in-the-valley/
[20] SES NSW: For schools https://www.ses.nsw.gov.au/for-schools/
[21] Waterwise Queensland: Water: Learn it for life (2014) Year 4 Science, Are we living sustainably? p. 48 https://www.rdmw.qld.gov.au/__data/assets/pdf_file/0007/1407634/year4-water-living-sustainably.pdf

Geographical concepts: place, change, interconnection, environment, sustainability
Science ideas: systems, sustainability

2.4 Water quality monitoring / waterbug sampling [22]

Excursion / Hands on activity

Students investigate the health of a waterway. This can be through observation (qualitative assessment), by testing a range of water quality parameters such as temperature, salinity, pH, Phosphate, Dissolved Oxygen and turbidity or by sampling the macroinvertebrates/ waterbugs (quantitative assessment).

There are a number of Waterwatch[23] and Streamwatch[24] resources available online to support this activity. They can be published by local councils, water utilities, regional natural resource management agencies or state government departments. Seek out resources in your region as often organisations have water testing kits for borrowing. It is important not to return chemically tested water to local waterways when testing is completed.

The Waterway health check[25] is an introductory qualitative assessment tool for all years. This is an ideal activity for teachers and students unable to access equipment for water testing.

A macroinvertebrate / waterbug dip netting exercise shows students what lives in a particular river or waterway. There are various guidebooks to identify different waterbugs and show their level of pollution tolerance. Equipment can include dip nets, ice cube trays, buckets, pipettes, petri dishes and magnifying lenses. Find a suitable stretch of river and either let students dip in their own nets or collect one large sample with a net and bucket. Students examine the tiny waterbugs in the sample through magnifying lenses or separate larger bugs into segments in the ice cube trays. Students return the water and waterbugs to the river or waterway when they're finished.

Waterwatch NSW [26] resources for waterway monitoring include

- Testing procedures and record sheets
- Waterwatch Manuals for primary and high school (Teacher guides)
- Water Bug ID charts and posters

[22] Waterwatch New South Wales: Resources Waterwatch NSW
[23] Waterwatch Australia https://www.waterwatch.org.au
[24] Streamwatch https://www.streamwatch.org.au
[25] Waterwise Queensland: Water: Learn it for Life: Year 7 Geography Mapping our Waterway Page 23 https://www.resources.qld.gov.au/__data/assets/pdf_file/0010/1407637/year7-mapping-waterway.pdf
[26] Waterwatch New South Wales: Resources https://www.nswwaterwatch.org.au/resources

Melbourne Water[27] offers comprehensive resources for primary school water quality education

- The life of waterbugs (year 3 / 4)
- Turbidity and erosion (Years 3-4)
- Stormwater in the urban environment (Years 3-4)
- Increased nutrients in the waterway (Years 5-6)

The River Detectives Waterbug Detectives Guide is also ideal for primary school students

Variations

If there is a stream nearby or the school has a wetland, collect a sample in a bucket and do this activity in the classroom, returning the sample to the source area when completed.

Year level/s: Suitable for all year levels
Key curriculum link/s: Year 4 Science (AC9S4U02) (AC9S4103); Year 4 Geography (AC9HS4K05) (AC9HS4K06) (AC9HS4S02) (AC9HS4S03) (AC9HG7S04); Year 7 Geography (AC9HG702) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04); Year 10 Geography (AC9HG10K01) (AC9HG10K04) (AC9HG10S02) (AC9HG10S03) (AC9HG10S04)
Geographical concepts: place, change, interconnection, environment, sustainability
Science ideas: systems, sustainability

2.5 Catchment detox game [28]

Students play the online game to see if they can successfully manage a river catchment and create a sustainable, thriving economy. They decide what activities to undertake in the catchment such as planting crops. The aim is to prevent or avoid environmental problems. Catchment Detox shows how difficult it is to manage a river catchment.

Year level/s: years 7 - 10 but could suit some primary students.
Key curriculum link/s: Year 7 Geography (AC9HG702) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04); Year 10 Geography (AC9HG10K01) (AC9HG10K04) (AC9HG10S02) (AC9HG10S03) (AC9HG10S04)
Geographical concepts: place, change, interconnection, environment, sustainability
Civics and citizen concepts: active citizenship; Science ideas: systems, sustainability

2.6 Pollution audit: At school / At home[29]

Lesson / Take home activity

Students investigate the various sources of stormwater pollution: in the home, school and the local community. The Home Environment checklist (Page 2) can be used to identify ways in which our homes could be contributing to stormwater pollution. This activity is an ideal homework assignment. On completion of the surveys students can compare water use, energy

[27] Melbourne Water https://www.melbournewater.com.au/water-data-and-education/learning-resources-and-tours
[28] ABC Science: Catchment detox game https://www.abc.net.au/science/catchmentdetox/files/home.htm
[29] Sustainable Schools NSW: School stormwater pollution checklist https://www.sustainableschoolsnsw.org.au/teach/water

use and car use across the class and list activities that could be taken at home to reduce environmental impact.

In the School Stormwater Pollution Checklist (Page 4) students survey school operations to identify potential sources of stormwater pollution. Students are divided into research teams with each team allocated a portion of school activities to survey. The checklist will help to identify potential risk areas in the day-to-day operation of the school. The school cleaner and principal will be important sources of information

Year level/s: Years 4 - 7 but suitable for all year levels
Key curriculum link/s: Year 4 Science (AC9S4U02) (AC9S4103); Year 4 Geography (AC9HS4K05) (AC9HS4K06) (AC9HS4S02) (AC9HS4S03) (AC9HG7S04); Year 7 Geography (AC9HG702) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04)
Geographical concepts: place, change, interconnection, environment, sustainability
Civics and citizen concepts: active citizenship; Science ideas: systems, sustainability

3. WATER SOURCES

3.1 Water storage features [30]

Hands-on activity

Water can be stored in many different systems. Natural systems include aquifers, oceans, lakes and rivers; man-made systems include rainwater tanks, dams and reservoirs. Students brainstorm all types of water storage systems. Discuss large areas (like reservoirs or the ocean) and small areas (like a rainwater tank).

Variations

Depending on their year level, students can:

- cut out pictures of storage systems and link it to its features
- invent and draw a diagram of their own man-made storage system
- research a variety of storage systems and analyse their benefits in terms of cost, size, environmental impact, source of water, water yield etc.

Year level/s: Years 1 - 7
Key curriculum link/s: Year 4 Science (AC9S4U02) (AC9S4S104); Year 1 Geography (AC9HS1K03); Year 4 Geography (AC9HS4K05) (AC9HS4S02) (AC9HS4S03); Year 7 Geography (AC9HG7K01) (AC9HG7K02)
Geographical concepts: place, space, environment; Science ideas: Scientific inquiry

[30] Barwon Water: Water - learn it. live it. (2013) *Volume 2 Water in the urban environment* Page 15 https://www.barwonwater.vic.gov.au/__data/assets/pdf_file/0024/6279/Water-Learn-it!-Live-it!-Volume-2-Water-in-the-Urban-Environment.pdf

3.2 Exploring groundwater [31]

Demonstration / Hands on activity

Conduct two experiments to demonstrate the features of groundwater and how groundwater reaches the surface. In Activity 1 the bottom of a cup or container acts like the bedrock of clay that is found beneath the earth's softer soil layers. Fill two cups with gravel and sand and add water. Measure the amount of water 'stored' in each cup. Discuss how the water fills, or saturates, the soil/sand once it reaches an impermeable layer. Note any similarities or differences. In Activity 2 make a layer of gravel 1 - 2 cm deep is in a clear container. Make a finger sized hole in the gravel. Pour in water you have coloured with food dye into the container at one edge. Note what happens to the 'soil' and where the water gathers. Identify the water table and where groundwater reaches the surface. Encourage students to make predictions about what will happen to the water in these activities.

Year level/s: Years 4 to 10
Key curriculum link/s: Year 4 Science (AC9S4U02) (AC9S4102); Year 4 Geography (AC9HS4K05) (AC9HS4S02); Year 7 Geography (AC9HG7K01) (AC9HG7K02) (AC9HG7S02) (AC9HG7S03)
Geographical concepts: place, space, environment; Science ideas: scientific inquiry

3.3 Gnangara groundwater system[32]

Lesson

The Gnangara groundwater system is one of the Western Australia's precious water sources, a huge aquifer that is Perth's largest source of fresh water.

Students are introduced to Perth's aquifers, believed by the Noongar people to have been created by the Waugal, forming the Gnangara groundwater system. They were of significance to past generations of Aboriginal communities and continue to supply valuable water into Perth's Integrated Water Supply Scheme. Students watch the video and complete the comprehension worksheet. A Lesson Plan is available for teachers.

Variations

Use the full range of Walk with the Waugal videos and lesson plans to guide students through an immersive journey by Noongar Elder Dr Noel Nannup to learn about the story of how Waugal created deep underground system and waterways. He takes students to significant sites around Perth and explains their cultural importance and sustainable management today.

[31] South East Water: Water - learn it. live it. Volume 1 Water in the natural environment (2013) Discovering Groundwater Activity 2 Page 34
https://www.educationsoutheastwater.com.au/assets/volumes/resource-downloads/Water-LiLi-Volume-1.pdf
[32] Water Corporation: Walk in Aboriginal culture. Walk with the Waugal videos.
https://www.watercorporation.com.au/Education/Water-in-Aboriginal-culture/Walk-with-the-Waugal-videos

Walk with the Waugal 360 experience [33] is an interactive website in which students can investigate habitats across Perth with 12 points of interest to follow. In each scene, videos, images, audio and text are used to develop students understanding of water in Aboriginal culture and the cultural practices carried out using the flora and fauna of these environments.

Following this insight into Aboriginal connections to water in Western Australia, students investigate their local groundwater the uses of groundwater today and the value to Aboriginal Peoples past and present.

Year level/s: Year 7 but suitable for Foundation to Year 10
Key curriculum link/s: Year 4 Science (AC9S4U02) (AC9S4H02); Year 4 Geography (AC9HS4K05) (AC9HS4K06); Year 5 Geography (AC9HS5K04) Year 7 Geography (AC9HG7K02) (AC9HG7K03) (AC9HG7K07); Year 10 Geography (AC9HG10K02) (AC9HG10K03)
Geographical concepts; place, space, environment, interconnection, sustainability
Science ideas: sustainability

3.4 Desalination: make a solar still[34]

Hands-on activity / Virtual Tour

This 'Solar Stills' activity shows salt removal from water by evaporation. Pour salt water into a large container, place a smaller glass beaker in the middle of the water. Cover the container with cling wrap, making sure the seal is tight. Place a weight in the centre of the plastic wrap, suspended over the empty glass. This will assist the water to collect in the glass. Carefully place your construction (called a solar still) in a protected sunny area. Refer to Activity 1.3 'Water Cycle Processes' for a different context for this activity.

Variations

Students investigate other methods used to create fresh water (desalination methods) and investigate places where desalination is an essential source of water. The advantages and disadvantages of desalination processes can be examined by older students. Students brainstorm the challenges to remote communities in accessing fresh water and propose solutions before examining the use of desalination to meet this challenge. This Australian Water media report[35] is an appropriate place based example.

[33] Water Corporation: Walk with the Waugal immersive experience https://www.walkwiththewaugal.com.au/index.html
[34] South East Water: Water - learn it. live it. (2013) *Volume 1 Water in the natural environment* pages 29 and 31 https://www.educationsoutheastwater.com.au/assets/volumes/resource-downloads/Water-LiLi-Volume-1.pdf
[35] Australian Water: *New desalination plant to deliver drinking water to remote SA Aboriginal Community* https://tinyurl.com/mrhvhhwa

Some corporations have virtual tours of their desalination plants and facts sheets online. Examples include Water Corporation [36] Turning Seawater into Drinking Water and Sydney Water Take a Virtual Tour [37]

Year level/s: Year 7
Key curriculum link/s: Year 7 Science (AC9S7H03) (AC9S4104) (ACS4105); Year 7 Geography (AC9HG7K02) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04)
Geographical concepts; environment, sustainability, place; Science ideas: sustainability, scientific inquiry

3.5 Removing the salt [38]

Demonstration

There are a number of ways salt can be removed from sea water to produce freshwater. This demonstration models reverse osmosis. Mix a handful of uncooked rice into a bowl of coloured set jelly. The rice represents the salt molecules and the jelly represents water. Place a sieve over the bowl and pour the jelly and rice mixture into the sieve. Use a spoon to put pressure on the mixture and force the jelly through the sieve. The rice (salt) should stay in the sieve while the jelly (water) gets through.

Year level/s: Year 7 but suited to Years 4 - 6.
Key curriculum link/s: Year 7 Science (AC9S7H03) (AC9S4104); Year 7 Geography (AC9HG7K02) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04)
Geographical concepts; environment, sustainability; Science ideas: sustainability

3.6 Recycled water [39]

Game

Using images of things people do with water (shower, flush the toilet etc.) and a worksheet with two columns labelled ‘treated water’ and ‘recycled water’, students match the activity to what can and can’t be done with recycled water then cut and paste their answers (either in hard copy or on the computer). For example, a picture of brushing teeth should go in the ‘treated water’ column and a picture of washing a car should go in the ‘recycled water’ column. Adapt this activity for the types of recycled water used in your area.

[36] Water Corporation Virtual Tours https://www.watercorporation.com.au/Education/Water-supply-and-water-conservation/Virtual-tours
[37] Sydney Desalination Plant https://sydneydesal.com.au/who-we-are/
[38] Barwon Water: Water - learn it. live it. (2013) *Volume 2 Water in the urban environment* Page 55 https://www.barwonwater.vic.gov.au/__data/assets/pdf_file/0024/6279/Water-Learn-it!-Live-it!-Volume-2-Water-in-the-Urban-Environment.pdf

[39] Barwon Water: Water – learn it. live it. (2013) *Volume 2 Water in the urban environment* Page 49 https://www.barwonwater.vic.gov.au/__data/assets/pdf_file/0024/6279/Water-Learn-it!-Live-it!-Volume-2-Water-in-the-Urban-Environment.pdf

Variation

Research recycled water and find an interesting example of how it is being used in a real-life community. They may find something locally or search for some examples overseas.

Year level/s: Years 4 - 8
Key curriculum link/s: Year 7 Science (AC9S7H03) Year 8 Science (AC9S8H04); Year 4 Geography (AC9HS4K06) (AC9HS4S02) (AC9HS4S04); Year 7 Geography (AC9HG7K02) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04)
Geographical concepts: sustainability; Science ideas: scientific inquiry, sustainability

4. WATER TREATMENT: DRINKING WATER and WASTEWATER

4.1 Catchment to tap [40]

Demonstration or hands-on activity

In this demonstration, students watch as different materials are used as a filter for water from the catchment. It can also be done as a hands-on activity with students in small groups. You will need 'dirty' water (you can add things like dirt and leaves), cotton wool, sand, gravel, a hand towel and a 2-litre plastic soft drink bottle without a lid.

Cut the plastic bottle in half. Turn the top half of the bottle upside down and put it inside the bottom half. Put the hand towel into the plastic bottle and pour the dirty water through it. The hand towel will act as a filter. Students can record their observations on the worksheets provided. Remove the used filter and clean the plastic bottle. Repeat with each different filter (cotton wool, sand and gravel).

Variations

The Water: learn it for life [41] (Page 16) version uses similar materials for filters. However, the filters are put into a cup before students can see them then covered up with aluminium foil, creating a mystery filter. The cup also has two or three holes in the bottom for drainage. Pour the dirty water into the mystery filter then discuss what comes out and why this happened. Reveal the mystery filter.

Water Corporation's Lesson Plan[42] Environmental Sustainability has a virtual tour through one of Water Corporation's wastewater treatment plants. Students create an educational

[40] Barwon Water: Water – learn it. live it. (2013) *Volume 2 Water in the urban environment* Page 33 https://www.barwonwater.vic.gov.au/__data/assets/pdf_file/0024/6279/Water-Learn-it!-Live-it!-Volume-2-Water-in-the-Urban-Environment.pdf
[41] Queensland Government: Water: Learn it for life (2013) *Year 7 curriculum Science* p. 16 https://www.resources.qld.gov.au/__data/assets/pdf_file/0004/1407640/year7-water-cycles.pdf
[42] Water Corporation Lesson Plans: Environmental Sustainability P2 https://www.watercorporation.com.au/Education/Water-supply-and-water-conservation/Lesson-plans

poster to educate fellow students about items which can or cannot be flushed down the toilet. The activity teaches students about their personal responsibility.

Year level/s: Year 7 but suitable for most year levels
Key curriculum link/s: Year 7 Science (AC9S7H03); Year 4 Geography (AC9HS4K06) (AC9HS4S02) (AC9HS4S04); Year 7 Geography (AC9HG7K02) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04)
Geographical concepts; environment, sustainability, change; Science ideas: science inquiry, sustainability

4.2 Tour a wastewater treatment plant

On-site tour activity / incursion

Many water corporations offer tours of wastewater treatment or recycled water plants. Different plants have different ways of treating wastewater after it leaves our homes and businesses. Students can see and smell the process in action and visit the many interesting visitor centres.

Variation

Many corporations also have virtual tours of their treatment plants and many facts sheets online. One Example is Water Corporation's Inside a Waste Resource Recovery Facility[43] to look inside the Beenyup Plant in Craigie at the process wastewater undergoes to be treated for reuse or discharge in the ocean. Please see the Resources list.

Year level/s: Years 4 - 7. Also suitable for most years.
Key curriculum link/s: Year 4 Science (AC9S4U02), Year 7 Geography (AC9HG7K02)
Geographical concepts: sustainability; Science ideas: sustainability

4.3 What happens to treated wastewater[44]

Lesson

Investigate the different ways of using or disposing of treated wastewater. List advantages and disadvantages of each option on the worksheet and decide which is the best option.

Year level/s: Years 4 - 7. Also suitable for most years.
Key curriculum link/s: Year 4 Science (AC9S4U02), Year 7 Geography (AC9HG7K02)
Geographical concepts: sustainability

4.4 Wipes out of pipes [45]

[43] Water Corporation Virtual Tours https://www.watercorporation.com.au/Education/Water-supply-and-water-conservation/Virtual-tours
[44] Water corporation. Water Supply and Virtual Lessons: What happens to treated wastewater activity https://www.watercorporation.com.au/Education/Water-supply-and-water-conservation/Virtual-lessons
[45] Sydney Water: Stage 4 Science resources: Practical Investigation *Wipes out of pipes* https://www.sydneywater.com.au/education/programs-resources/high-school.html

Lesson and practical experiment

What happens when we flush something down the toilet? Investigate the issue of what should and should not go down the toilet by reading 'What happens after you flush' and 'Love your loo' [46]

Undertake a test to see what happens to things that are flushed down the toilet and into the wastewater system. You will need five jars, one wet wipe, one facial wipe and two types of toilet tissue. Discuss any environmental claims on the packaging, for example recyclable, contains oxygen bleach rather than chlorine bleach. Place each kind tissue into a separate jar and shake the jar for 30 seconds. Students observe and record what happens. Leave the jars for one week and observe and record again. Students draw conclusions about what type of tissue is the most environmentally sound (easiest to treat at a treatment plant). Note: At the treatment plant, materials that stay in larger pieces are best as they are removed in one of the first two screening stages. Small, slushy pieces (and dyes) must be chemically removed.

Variations

Discuss environmental claims on product packaging.
Flushable wipes are a product that is also of concern to wastewater treatment plant operators. There are a number of current online media articles [47] to provide a 'real-world' context for this issue and flushable wipes could be added to jars in the hands-on activity above.

Year level/s: Years 6 and 7 but suitable for all year levels
Key curriculum link/s: Year 4 Science (AC9S4H02), Year 8 Science (AC9S8H04), Year 7 Geography (AC9HG7K02) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04)
Geographical concepts: sustainability; Civics and citizen concepts: active citizenship
Science ideas: scientific inquiry, sustainability

5. WATER USE and MANAGEMENT

5.1 Water sensitive urban design[48]

Hands-on activity / Creative activity

Water sensitive urban design (WSUD) is a concept that refers to designing and planning urban areas that use water in an environmentally sustainable way. The key principles of WSUD include protecting natural water bodies, directing stormwater, protecting water quality, and reducing run-off. Students use an online search engine to find out about

[46] Unity Water Toilets and Sewerage: *What happens when you flush*? https://www.unitywater.com/residential/toilets-and-sewerage
[47] Unity Water Toilets and Sewerage: *Wet wipes are rubbish* https://www.unitywater.com/residential/toilets-and-sewerage
[48] Barwon Water: Water – learn it. live it. (2013) *Volume 2 Water in the urban environment* Page 65 https://www.barwonwater.vic.gov.au/__data/assets/pdf_file/0024/6279/Water-Learn-it!-Live-it!-Volume-2-Water-in-the-Urban-Environment.pdf

raingardens. What are they? Why should we use them? Find some instructions on how to plan and build your own raingarden. As a class or in groups, students use the instructions to plan and design a raingarden in their school.

Variations

Walk around the school gardens after a period of heavy rain. Where is the water collecting? Are there puddles in some places? Why might a garden help?

Visit the Melbourne Water website [49] to find out what sorts of techniques WSUD includes. Select one feature to research.

Year level/s: Years 7 -10
Key curriculum link/s: Year 7 Geography ((AC9HG7K02) (AC9HG7K05) (AC9HG7K08) (AC9HG7S02) (AC9HG7S02); Year 10 Geography (AC9HG10K04) (AC9HG10S02) (AC9HG10S06)
Geographical concepts: sustainability, environment, liveability

5.2 Plan a liveable settlement[50]

Lesson

Discuss the term 'liveability' and what students think increases the liveability of a place for them. They should consider the role of water in liveability and the value people place on water for their physical and mental wellbeing. In this lesson students use the Sydney water 'Liveable cities' information and the video Water: Enriching life and liveability [51] to identify what settlements need to make them liveable. They can plan a new settlement to include features 'needed' to ensure it is liveable. Water in the new settlement may be limited so students should consider all sources of water (dams, groundwater, desalinated sea water, recycled water, stormwater harvesting or other new innovative sources).

Variations

Students replan their own neighbourhood to enhance liveability, with the focus being on water. Link the planning activity to Activities 3.1, 4.1 and 4.3 for an added a focus on sustainability.

Year level/s: Years 5-10
Key curriculum link/s: Year 7 Geography (AC9HG7K05) (AC9HG7K06) (AC9HG7S02) (AC9HG7S06)
Geographical concepts: sustainability, environment, liveability

[49] Melbourne Water: *How to build a raingarden*. https://www.melbournewater.com.au/water-data-and-education/environmental-issues/why-we-need-save-water/tips-saving-water/raingardens
[50] Sydney Water: Liveable cities https://www.sydneywater.com.au/education/water-management/liveable-cities.html
[51] Water services Association of Australia: Water Enriching life and liveability https://www.wsaa.asn.au/water-enriching-life-and-liveability

5.3 Stormwater campaign[52]

Lesson

Many environmental campaigns from the past have encouraged people to put their rubbish in the bin or to clean up their local areas. Students can research past campaigns then create their own. Ideas for campaigns include creating slogans, posters, TV ads, songs or a performance.

Variations

Research some successful campaigns, for example Clean Up Australia Day and Keep Australia Beautiful. What makes them work?

Year level/s: Year 5 - 10
Key curriculum link/s: Year 7 Geography (AC9HG7K02) (AC9HG7K08) (AC9HG7S06) (AC9HG7S02) (AC9HG7S05) (AC9HG7S06)
Geographical concepts: sustainability; Civics and citizen concepts: active citizenship

5.4 Drink tap double bubble [53]

Hands-on activity

On one piece of paper, draw (or make on the computer) a cluster of blue bubbles attached to a bubble labelled 'tap water', a cluster of purple bubbles attached to a bubble labelled 'bottled water' and a cluster of green bubbles attached to both. Inside the blue bubbles, students list all of the things that are unique to treated tap water such as: goes through a filtering system, treated according to highly regulated standards. Inside the purple bubbles, they list all of the things that are unique to bottled water, such as: uses water from underground springs, uses plastic bottles. Inside the green bottles, students then list what bottled water and tap water have in common, such as: necessary for survival, helps keep us hydrated. Discuss the positives and negatives of both types of water.

Variations

This activity can be used in an incursion with another activity that explores why water is important for human health. It uses a three-dimensional anatomical model of a human with removable parts to build understanding of how water helps the human organs to function at their best. The incursion also provides information on the environmental and cost benefits of drinking tap water.

---

[52] Barwon Water: Water - learn it. live it. (2013) *Volume 2 Water in the urban environment* Page 48 https://www.barwonwater.vic.gov.au/__data/assets/pdf_file/0024/6279/Water-Learn-it!-Live-it!-Volume-2-Water-in-the-Urban-Environment.pdf

[53] North East Water: *Drink tap double bubble* activity teacher information worksheet https://www.newater.com.au/Portals/0/NE-Water/Sections/What-we-do/Education/Teacher-resources/Choose-Tap/Choose-Tap-Double-Bubble-Activity-Teacher-Information.pdf

Year level/s: Years 4 and 7 but also suitable for Years 5-8
Key curriculum link/s: Year 4 Science (AC9S4H02); Year 4 Geography (AC9HS4K06) (AC9HS4K06); Year 7 Geography (AC9HG7K02) (AC9HG7S02) (AC9HG7S04)
Geographical concepts: sustainability. Science ideas: scientific inquiry, sustainability

5.5 Bottled water[54]

Hands-on activity

This activity asks students to list the good and bad aspects of bottled and tap water before and after they watch the YouTube video *The Story of Bottled Water*. A worksheet is provided for students to compare their impressions.

Variations

This activity has a number of extensions:

- Students create a chant, song or poem that remind other students to bring a refillable water bottle to school instead of buying bottled water.
- Students plan a campaign to ban bottled water being sold or used at school.
- Students investigate the strategies used to market bottled water.

The brand without a bottle[55] is Sydney Water's project-based learning resource to build students' writing skills in a fun and engaging way. Students analyse and create persuasive texts by studying different marketing strategies used by bottled water companies. By inspiring your students to make a short film, you can engage them, spark their imagination and creativity, and improve their persuasive writing skills all at the same time. And they'll learn about the impact of how people choose to get their hydration.
A full set of supporting resources is provided for download online. Targeted at persuasive writing in English, the activity links with Australian Curriculum Geography topics.

Year level/s: Years 4 and 7 but also suitable for Years 5-8
Key curriculum link/s: Year 4 Science (AC9S4H02); Year 4 Geography (AC9HS4K06) (AC9HS4K06); Year 7 Geography (AC9HG7K02) (AC9HG7S02) (AC9HG7S04) (AC9HG7S06)
Geographical concepts: sustainability; Civics and citizen concepts: active citizenship

5.6 Water bingo [56]

Game

To prepare for this game, record a range of water sounds: running a shower, brushing teeth, drinking water/water in a glass, flushing toilet, water running down a sink, a running tap and

[54] South East Water: Water – learn it. live it. (2013) *Volume 3 Water in the community* Bottled Water p. 46 https://www.educationsoutheastwater.com.au/resources/water-learn-it-live-it-curriculum
[55] Sydney Water: Programs and Resources: High School, *The Brand without a bottle.* https://www.sydneywater.com.au/education/programs-resources/high-school/the-brand-without-a-bottle.html
[56] Logan City Council Foundation Lesson 2 Water Bingo https://www.logan.qld.gov.au/downloads/file/1420/lesson-plan-foundation-year-lesson-2-water-bingo

a sprinkler. You could also include other water sounds: waves, rainfall, frogs and thunder. A number of websites provide free downloads of sound effects. An activity sheet is provided with images that match the sound effects or you could make your own.
Students then play water bingo—they place a coloured counter on the image when they hear the matching sound. The student who matches all correctly and shouts 'bingo' is the winner.

Variations

Afterwards, younger students can engage in activities that use water such as making jelly, painting with watercolours and blowing bubbles using water and detergent.

Year level/s: Years Foundation - Year 1
Key curriculum link/s: Foundation Geography (AC9HSFK03) Geography Year 1 (AC9HS1K03)

6. USING WATER WISELY

6.1 Water at home [57]

Lesson

The intention of this activity is for students to recognise the ways water is used in the home and how to reduce water use.

Brainstorm the ways water is used in the house or garden – e.g. washing the dog, cleaning dishes, and drinking. Collect and display these words according to categories such as: cleaning; cooking; playing. Students use 'think, pair, share' to consider ways to save water and share them with the class, briefly describing or displaying water saving actions. Remind them that simple actions can save lots of water. This information could be displayed in the classroom, perhaps on a display shaped like a large bucket. Some numeracy activities are be integrated into this activity

Variations

Every drop counts, being waterwise! [58] is a similar activity that includes a tool to measure water use at home and an extension activity in which students create a waterwise garden Water – learn it. live it.[59] offers an additional idea—students create an educational board game (such as Snakes and Ladders, Monopoly or Trivial Pursuit) to teach younger students about efficient water use at home. Students should come up with a clear set of rules, clear instructions and ensure there is a winner at the end. Students should also make sure their information is accurate.

[57] Logan City Council: Year 1 Lesson 4: Being a water saver at home https://www.logan.qld.gov.au/downloads/file/1408/lesson-plan-year-1-lesson-4-being-a-watersaver-at-home
[58] Junior Landcare Learning Activity: Every Drop Counts. https://juniorlandcare.org.au/learning_activity/every-drop-counts-being-water-wise/
[59] South East Water: Water – learn it. live it. (2013) *Volume 3 Water in the community Water at home* p. 26 https://www.educationsoutheastwater.com.au/resources/water-learn-it-live-it-curriculum

The Australian Environmental Education [60]Water Use Calculator can assist students to calculate personal or household water use.

Year level/s: Years 1 - 7 but suitable for all years if adapted.
Key curriculum link/s: Foundation Geography (AC9HSFK03) Geography Year 1 (AC9HS1K03); Year 4 Geography (AC9HS4K06); Year 7 Geography (AC9HG7K02) (AC9HG7S06)
Geographical concepts: sustainability; Civics and citizen concepts: active citizenship

6.2 Water carers[61]

Lesson (x 2)

This activity contains two lessons. The first lesson sets the background understanding for the second. In 'Water challenges' (Page 31) students respond to hypothetical scenarios about water shortages. The lesson activity requires the preparation 'what if' water scenario cards, with text or images provided in the resources. or Use scenarios that are suitable for the class.

In 'Water carers', after considering hypothetical water scenarios students draw on their understandings about water, to design and produce persuasive posters. These are to be placed in prominent places in the school and possibly in the wider community to inform people about reasons and strategies for reducing water usage. Students also complete a sorting task to demonstrate their understanding of water and how it is used.

Variation

Teachers use the full sequence of connected water lessons in this resource for continuity and focus on deep understanding.

Year level/s: Years 2-7
Key curriculum link/s: Year 4 Geography (AC9HS4K06); Year 7 Geography (AC9HG7K02) (AC9HG7S06); Year 4 Science (AC9S4U02)
Geographical concepts: sustainability; Civics and citizen concepts: active citizenship

6.3 School water audit [62]

Lesson / Incursion/ take home Activity

This lesson or introductory activity is useful for students in the early years to highlight just how many places water comes from around the school. Students are asked to suggest the areas around the school where they think water is used. Make a list then discuss any areas

[60] Australian Environmental Education website https://www.australianenvironmentaleducation.com.au

[61] Waterwise Queensland Water Learn it for life Year 2 Science for the Australian Curriculum. Lesson 9 and Lesson 10. https://www.resources.qld.gov.au/__data/assets/pdf_file/0006/1407633/year2-wonder-water.pdf

[62] Queensland Government: Water: Learn it for life! (2013) *Lower Primary School Water Audit* p. 6 https://www.rdmw.qld.gov.au/__data/assets/pdf_file/0004/1407631/prep-year3-water-audit.pdf

that they may have overlooked. Students may think of drinking fountains and taps but may not take showerheads, toilets or tanks into consideration. Students take a walk around the school and grounds to review all of the places water is used. Complete a water audit to see what fixtures and fittings the school has and make a note of any that are broken or leaking. Worksheets are provided or can be created to suit a school's size and facilities. Students may be asked to complete a similar activity at home.

Variations

The Water – learn it. live it.[63] version provides worksheets to fill in the information students find during their audit. The activity can be extended using copies of the school's water bills and datalogger information to graph and chart water use.

Year level/s: Years 2 and 7 but also suitable for Years 3-6
Key curriculum link/s: Year 4 Geography (AC9HS4K06); Year 7 Geography (AC9HG7K02) (AC9HG7S06); Year 4 Science (AC9S4U02)
Geographical and scientific concepts: sustainability; Civics and citizen concepts: active citizenship

6.4 Using water efficiently[64]

Take home activity

A single dripping tap can waste up to 20,000 litres of water per year. If found early, leaking taps may be fixed by simply replacing a worn washer. Water efficient appliances are another effective way to use only the water you need at home. A worksheet is provided for students to audit their home to find out how many leaks they have and how many water efficient appliances are in each room of the house. Another worksheet offers a place for students to calculate how much water is used for each dripping tap.

Variations

The Water Efficiency Labelling and Standards (WELS) program is introduced to draw students' attention to water efficient products.

Year level/s: Year 7 but also suitable for Years 3-6
Key curriculum link/s: Year 4 Geography (AC9HS4K06); Year 7 Geography (AC9HG7K02) (AC9HG7S06); Year 4 Science (AC9S4U02)
Geographical concepts: environment, sustainability
Civics and citizen concepts: active citizenship; Scientific concepts: scientific inquiry, sustainability

[63] South East Water: Water – learn it. live it. (2013) *Volume 3 Water in the community* p. 29 https://www.educationsoutheastwater.com.au/resources/water-learn-it-live-it-curriculum
[64] South East Water: Water – learn it. live it. (2013) *Volume 3 Water in the community* p. 32 https://www.educationsoutheastwater.com.au/resources/water-learn-it-live-it-curriculum

6.5 Embodied water[65]

Hands-on activity

Embodied water, sometimes called 'virtual' or 'hidden' water, refers to the total amount of water required to produce an item, for example an apple, a loaf of bread, a car or a smartphone. Embodied water takes into account the water used in the item's production and transport. Using an online calculator or app, students research how much water is used to produce everyday items. Using pictures or models of items (for example, a chip packet or a fake apple or toy cow), ask students to put in order the items that use the least water to the items that use the most.

Variations

The Angela Morelli infographic[66] can be used as an introduction to this topic.

The Australian Environmental Education Water Use Calculator[67] can assist students to calculate personal or household water use.
https://www.australianenvironmentaleducation.com.au/activities/school-water-audit/

The Water Footprint PDF[68] presentation can be used for a deeper investigation into Virtual Water as a component of water use at a variety of scales - personal to national.

Year level/s: Year 7 but also suitable for Years 5, 6, and 8
Key curriculum link/s: Year 4 Geography (AC9HS4K06); Year 7 Geography (AC9HG7K02) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04); Year 4 Science (AC9S4U02)
Geographical concepts: sustainability; Civics and citizen concepts: active citizenship

6.6 Using greywater[69]

Demonstration or hands-on activity

Greywater contains contaminants like detergent, oil and soap so it cannot be reused for drinking. However, these contaminants are often hard to see so care must be taken when and where we use greywater. This experiment demonstrates the typical contaminants in our greywater and students are asked to analyse and research the effect it might have on our gardens.

---

[65] South East Water: Water – learn it. live it. (2013) *Volume 3 Water in the community* p. 42 https://www.educationsoutheastwater.com.au/resources/water-learn-it-live-it-curriculum
[66] Morelli, Angela (2012) Infographic: The water we eat. *What if I told you…* https://thewaterweeat.com
[67] Australian Environmental Education website https://www.australianenvironmentaleducation.com.au
[68] Water Footprint Network presentation https://waterfootprint.org/media/downloads/WFN_presentation_schools.pdf
[69] Water – learn it. live it. (2013) *Volume 3 Water in the community* p. 64 https://www.educationsoutheastwater.com.au/resources/water-learn-it-live-it-curriculum

Into a large empty soft drink bottle, pour 3 cups of water. Add 1 cup of cooking oil. Screw the lid on and shake it. What do you see? Take the lid off and add 1 cup of dishwashing detergent. Replace the lid and shake it again. Students record their observations again. Leave the bottle to settle for 10 minutes and describe what you see. Does it look safe enough to drink or to put on your garden?

Variation

Discuss where greywater may be used around the home and where it should not be used.

Year level/s: Years 4 - 7
Key curriculum link/s: Year 4 Geography (AC9HS4K06); Year 4 Science (AC9S4U02)
Year 7 Geography (AC9HG7K02) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04)
Geographical and scientific concepts: sustainability


CLIMATE
CHANGE

PART B. CLIMATE CHANGE

7.1 Climate changing [70]

Lesson

Students discuss differences between weather and climate and the impacts of weather and climate on water supplies using the text on live it. learn it Page 64 as a starting point. For the main activity, they create a set of interview questions for an older friend or relative about how they have noticed their local climate changing over time. Students reflect on the most interesting thing they learnt. They could create a PowerPoint presentation about their findings or write an article including quotes and images. Students use the Engage, Connect, Explore, framework to analyse their findings. Details about this activity can be found on Page 64.

Year level/s: Year 2 - 7 but suitable for most year levels
Key curriculum link/s: Year 4 Geography (AC9HS4K06); Year 7 Geography (AC9HG7K02) (AC9HG7S01) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04)
Geographical concepts: environment, sustainability, change

7.2 Weather makers – Water worries [71]

Lesson

A free membership is available to teachers / schools to access and download the Cool Australia[72] Teacher Guidelines and Student Worksheets for this activity.

Students investigate how rainfall levels are changing in Australia. They begin the activity by brainstorming the causes and effects of declining rainfall using guided questions before completing a student worksheet. Depending on age or ability, students can either work independently or in pairs. Activities include

- calculating and comparing the percentage of water available and inflow levels in cities across Australia.
- investigating ways of harvesting and storing water by researching and assess the strangest or weirdest water harvesting or storage ideas they can find and creating a blog post on these ideas.

[70] Water – learn it. live it. (2013) *Volume 1 Water in the natural environment* p. 60 https://www.barwonwater.vic.gov.au/__data/assets/pdf_file/0023/6278/Water-Learn-it!-Live-it!-Volume-1-Water-in-the-Natural-Environment.pdf
[71] Cool Australia. Activity: Weather Makers - Water worries https://www.coolaustralia.org/activity/weather-makers-water-worries/
[72] Cool Australia: https://www.coolaustralia.org/

Variation

As an extension activity, students predict the annual average water consumption in 20 years' time, taking into account better efficiency measures and projected population growth.

Year level/s: Year 7
Key curriculum link/s: Geography 7 (AC9HG7K02) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04) (AC9HG7S05) (AC9HG7S06)
Geographical concepts: environment, sustainability, change

7.3 More water / less water [73]

Lesson / Discussion / Spatial technologies

This activities in this lesson require students to consider the impact of climate change on water resources generally and then specifically in the region of NSW where they live.

1. As an introductory activity, students can examine the illustration from the Australian Climate Commission found at Cool Australia[74] to discuss the impact of climate change on rainfall distribution. They can be asked to predict whether they think their own location will become wetter or drier with climate change in the future.

2. Students discuss *How water resources are affected by climate change in NSW*[75]. They consider surface water, groundwater and water quality.

3. In NSW, students use the Adapt NSW Interactive Climate Change Projection Map to investigate predicted changes in climate for NSW and ten regions. Information available includes temperature, rainfall, fire, heat and cold nights across two projected scenarios - to 2030 and to 2070 referred to as Near Future and Far Future. Students can work in small groups to:

- select their own region from the dropdown menu and examine predictions for the.
- download the regional report to examine the diagrammatic summary of predicted changes to climate on page 3.
- compare predicted changes for their region to all of NSW and another region.
- write a scenario describing what life would be like in 2030 and 2070 under the current predictions. This could include references to water security and liveability.
- develop a personal and class plan of action to address climate change at a local scale.

Year level/s: Year 7 - 10
Key curriculum link/s: Geography 7 (AC9HG7K02) (AC9HG7S02) (AC9HG7S03) (AC9HG7S04) (AC9HG7S06); Geography 10 (AC9HG10K01) (AC9HG10K06) (AC9HG10S06): Science 10 (AC910U04)
Geographical concepts: place, change, environment, sustainability
Civics and citizen concepts: active citizenship

[73] ADAPTNSW https://www.climatechange.environment.nsw.gov.au/home
[74] Cool Australia: https://www.coolaustralia.org/
[75] ADAPT NSW: Water resources https://www.climatechange.environment.nsw.gov.au/water-resources

7.4 Save climate change while acting[76]

Lesson / Creative activity

The purpose of this activity is for students to practice their improvisational skills but with a climate change twist! Each group is given a story of someone suffering from climate change and they are tasked with acting it out with a positive mindset.

Variation

Students link the human impacts of climate changes to the water cycle, water resources and water related hazards.
Everyday stories of climate change[77] is a graphic novel that also contains human stories of climate change that can be used in a similar way or added to the stories in the main activity.

Year level/s: Year 7 - 10
Key curriculum link/s: Geography 7 (AC9HG7K02) (AC9HG7S04) (AC9HG7S06); Geography 10 (AC9HG10K01) (AC9HG10K06)
Geographical concepts: change, environment, sustainability

[76]Climate Science: Change while acting. https://climatescience.org/schools/solve-climate-change-while-acting-9-11?curr=2bddc015-9301-4638-a007-560de57053cd
[77] Gemma Sou: *Everyday Stories of climate change:* Graphic novel https://gemmasou.com

CAREERS

C. CAREERS

8.1 Careers expo

Event

Local governments often run careers expos for year 10 and/or 11 students. Setting up a stand at one of these expos, along with a member of staff who is an engineer or human resource professional, is a great way to show students what your company offers and what types of careers are available in the water industry.

Variations

Some expos give students a passport this is stamped once certain activities are completed. Students fill in the passport throughout the day. Puzzles or games are popular for this. Giveaways are also handy.

Year level/s: Years 9 and 10

8.2 Water themed field day

Event/Excursion

Invite students along to a water or environmental themed field day, along with other environmental education providers. Students complete hands-on activities throughout the day and learn more about the industry.

Year level/s: Years 5-8

8.3 Guest speaker

Incursion

Some teachers like having an industry professional come to speak to their students in specific classes. This may also be relevant for TAFE or university groups. Industry professionals talk about their career and other careers in the water industry and conduct a Q & A (question and answer) session. If the water corporation has a graduate program, this may be useful for senior secondary, TAFE and/or university groups. Younger students may be interested in how their learning relates to the water industry.

Variation

Water authorities often have a section of their website promoting careers related to water. Teacher Associations may have publications such as careers posters and flyers that highlight careers with water linked to Geography or Science.

Year level/s: Years 5–9, TAFE and university students in a range of courses (Engineering, Science, Administration, Education, Communication)

RESOURCES

Books / PDFs

CSIRO
The Waterbug Book by John Gooderham
http://www.publish.csiro.au/pid/3148.htm

Global Education Project
Water for life
https://www.globaleducation.edu.au/verve/_resources/Water_for_Life_web.pdf
A link to Water for life can also found at Geography Teachers Association Victoria
https://www.gtav.asn.au/resources/resources-all-levels/water-for-life

Water For Life Queensland
Water: Learn it for Life Year 7 Science for the Australian Curriculum
https://www.resources.qld.gov.au/__data/assets/pdf_file/0004/1407640/year7-water-cycles.pdf

Posters

Water Corporation WA
Think before you flush poster
https://www.watercorporation.com.au/-/media/WaterCorp/Documents/Help-and-advice/Water-issues/Flush-poster.pdf?rev=ed1aada270ff4377b66bdf8a21d721e1

Waterwise Queensland Government
Water cycle poster
https://www.rdmw.qld.gov.au/__data/assets/pdf_file/0010/1407628/water-cycle-poster.pdf

Sydney water
Urban Water cycle poster
https://www.sydneywater.com.au/content/dam/sydneywater/documents/education/urban-water-cycle-presentation.pdf

Games, activities and animations

Angela Morelli
Virtual water infographic The Water we eat
https://thewaterweeat.com

ABC Science
Catchment detox
https://www.abc.net.au/science/catchmentdetox/files/play-game.htm

EPA (USA)
http://water.epa.gov/learn/kids/drinkingwater/gamesandactivies.cfm

Interactive site for education
http://interactivesites.weebly.com/clouds--water-cycle.html

Project WET – Water Education for Teachers
http://www.discoverwater.org/

South East Water
Natural water cycle and game
http://www.educationsoutheastwater.com.au/natural-water-cycle/
Urban water cycle and game
http://www.educationsoutheastwater.com.au/melbourne-water-cycle/

Australian Science Teachers Association
Wetrocks games
http://www.wetrocks.com.au/games

Videos

Barwon Water
School Resources
https://www.barwonwater.vic.gov.au/community-and-education/teachers-and-students/school-resources

Ecosafe international
Innovative technologies to improve water quality
https://www.ted.com/talks/michael_pritchard_invents_a_water_filter

Hands on H2O Water Lab (NRMA)
www.watersciencelab.com.au
http://www.watersciencelab.com.au/videos.html

Melbourne Water

Learning resources and tours
https://www.melbournewater.com.au/water-data-and-education/learning-resources-and-tours

The story of stuff project

The story of bottled water
http://storyofstuff.org/movies/story-of-bottled-water/

SA Water

Treated well, it's not just waste: A remarkable journey. (Part 1 of 3)
https://www.youtube.com/watch?v=iocus1ZyNbU
Treated well, it's not just waste: An amazing transformation. (Part 2 of 3)
https://www.youtube.com/watch?v=4cbnRwWGlE0
Treated well, it's not just waste: An important responsibility. (Part 3 of 3)
https://www.youtube.com/watch?v=yK4Q_RQRIT8
SA Water – safe, clean drinking water
https://www.youtube.com/watch?v=1iRJ0AVobIw

South East Water

States of matter
http://www.educationsoutheastwater.com.au/resources/changing-water-video/
How we use water
http://www.educationsoutheastwater.com.au/resources/water-for-our-future-video/

Sydney Water TV

Water filtration explained
https://youtu.be/31ZUXx6NXDA
Ultrafiltration at St Marys Water Recycling Plant
https://youtu.be/Ge6RT6eAXDA
How does reverse osmosis work?
https://youtu.be/aVdWqbpbv_Y
The osmosis principle
https://youtu.be/2RNVkHRQ-Lg

ACT - Icon Water

A variety of videos
https://www.youtube.com/user/ACTEWCorporation

Unity Water

Resources
https://www.unitywater.com/community/education

Virtual tours

SEQ Water
Virtual tour / Excursions and Incursions
http://www.seqwater.com.au/education/virtual-tour

South East Water
Treatment plant tour
https://www.educationsoutheastwater.com.au/resources/where-does-the-water-go-video

Sydney Water TV
Sydney Water's wastewater treatment explained
https://www.youtube.com/watch?v=rntqxqrJ2Yk

Sydney Desalination Plant
Take a virtual tour
https://sydneydesal.com.au/learn-more/take-a-virtual-tour/

Sydney Water
Wonders of water school van visits
https://www.sydneywater.com.au/education/programs-resources/wonders-of-water.html

WA Water Corporation
A great variety of videos including groundwater, catchment to tap, desalination, reverse osmosis and water and the drying climate.
https://www.youtube.com/channel/UCQHJSMfAX-CGTrIOSnGKLMA

Fact sheets and other resources

Barwon Water
Excursions / Incursions and resources
https://www.barwonwater.vic.gov.au/community-and-education/teachers-and-students

Cool Australia
Water fact sheet
https://www.coolaustralia.org/ca_topic/water/

Fizzics Education
Water science activities
https://www.fizzicseducation.com.au/category/150-science-experiments/water-science-activities/

Melbourne Water

Teacher resources and fact sheets
https://www.melbournewater.com.au/water-data-and-education

NT Power and Water (PowerWater)

That's my water
https://www.powerwater.com.au/about/community/thats-my-nt-water-story
'

South East Water

Fact sheets about treatment plants, recycled water and the water cycle
http://www.educationsoutheastwater.com.au/resources/

Wannon Water

A variety of water resources for primary schools
https://www.wannonwater.com.au/stronger-communities/learning-centre.aspx

ACT - Icon Water

Water Education
https://www.iconwater.com.au/Water-education.aspx

WaterNSW

Education resources
https://www.waternsw.com.au/water-quality/education

Sydney Water

Education Programs and resources
High school
https://www.sydneywater.com.au/education/programs-resources/high-school.html
Primary school
https://www.sydneywater.com.au/education/programs-resources/primary-school.html

Sustainable schools NSW

Water programs and activities
https://www.sustainableschoolsnsw.org.au/teach/water

STELR - Australian Academy of Technology and Engineering.)

Water in the 21st Century is a STEM education program designed to engage students in learning about the Earth's water resources and sustainable use of water.
https://stelr.org.au/stelr-modules/water-in-the-21st-century/