

Teacher Support Package

Stage 4 - Life Skills

This package is designed to support teachers by providing links to relevant, quality and engaging educational resources related to the work that WaterNSW does managing the drinking water catchments and dams for Greater Sydney. The selected content, activities and on-line learning tools are aligned with NSW syllabus outcomes as outlined below.

This package may be used as a standalone resource or to enhance an excursion to Warragamba Dam.

Pre-visit

Prior to visiting Warragamba Dam on a school excursion, teachers may choose to introduce new ideas and concepts. This will enable students to connect place-based learning to existing understandings.

Post-visit

Following an excursion to Warragamba Dam, teachers may choose to validate, consolidate, or further extend student understanding.

Resource topics include:

- The water cycle GELS-1
- Water availability and human use GELS-1
- Warragamba Dam GELS-1
- What is a catchment GELS-1, GELS-5
- Natural hazards - drought and flood GELS-2, GELS-6
- What is storm water? GELS-2, GELS-3, GELS-5
- Healthy water is home to many creatures GELS-5
- Geographical field sketch GELS-7, GELS-8



The following icons have been used to categorise the links:



Websites



Books



Videos



Movement
and Singing



Puzzles, Games
and Creativity

Visit waternsw.com.au/education for more information or to book an excursion.

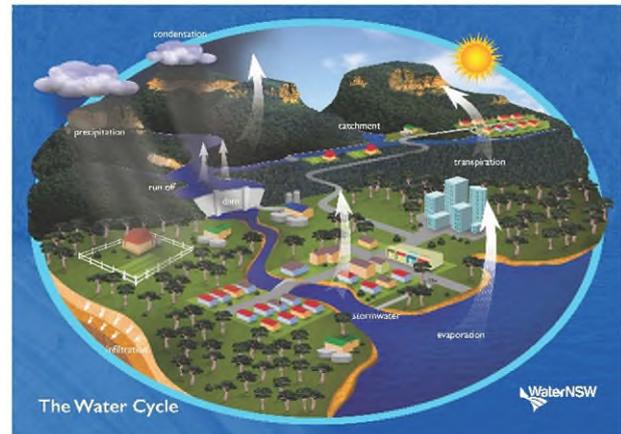
The Water Cycle

The earth only has a limited amount of water. This water keeps going around and around – from the land to the sky and back again. This journey is called the ‘water cycle’.

We all need clean freshwater to survive.

Although about three-quarters of the Earth’s surface is covered with water, less than one percent of this is available for us to use.

When we interrupt the natural water cycle by building dams so that we have clean safe water, this is called the ‘managed water cycle’.



Resources	
	<p>WaterNSW – Water Cycle Information (teacher level)</p> <p>WaterNSW – A4 Water Cycle Factsheet</p> <p>Sydney Water – Outline of the Natural Water Cycle</p> <p>NASA – Water Cycle Board Game</p>
	<p>WaterNSW – How does the water cycle move water around earth? (2:18mins)</p> <p>British MET office – Water Cycle (1:47mins)</p> <p>BBC Planet Earth – Fresh water (2:46mins)</p> <p>Niagara Falls Webcam – Live</p>
	<p>Meg Humphrys – When water lost her way (8:00mins)</p> <ul style="list-style-type: none"> • An Australian story about water • From the 2019 Notable list from the Children's Book Council of Australia • Lost in her ever-changing forms, Water questions who she is after an encounter with a creature in an underground cave. Water seeks all parts of her cycle for answers <p>Red Cat Reading – Earth's Water (5:57mins)</p> <p>The book explores the different states of water - liquid, gas and solid. It explains how the changes occur</p> <ul style="list-style-type: none"> • At the end there are some simple experiments you can do at home or in the classroom

	<p>Yorta Yorta Man and Aboriginal artist Mr Francis Firebrace – How the Great Fish Goodoo Created the Murray River (4:30mins)</p>
	<p>Blazer Fresh - Water Cycle Rap (3:16mins)</p> <p>Songs for Teaching</p> <ul style="list-style-type: none"> • A site with many educational songs • Select a song. Lyrics and/or purchase options are available • Many can be viewed on YouTube
	<p>WaterNSW – Water Cycle in a Bag (Hands-on Activity) Introduction video, Conclusion video, Instructions, Results sheet</p> <ul style="list-style-type: none"> • You can make it rain in a bag! These videos and worksheets show you how to create a water cycle in the bag. <p>WaterNSW – Play and learn about the water cycle with Gillie</p> <ul style="list-style-type: none"> • Learn about the water cycle with a printable board game <p>South East Water – Water Cycle Game</p> <ul style="list-style-type: none"> • In this fun, interactive game, students learn about the role of temperature in the water cycle. <p>Legends of Learning – Water Cycle</p> <ul style="list-style-type: none"> • Interactive games that help students understand changes of state in the water cycle

Water availability and human use

Water is a precious natural resource that supports all human, plant and animal life. We use it to grow food and make goods. It supports our way of life.

Australia is the driest, permanently inhabited continent, and our frequent droughts and long periods of hot dry weather make water an even more valuable resource. We store more water per person than any other country, to make sure we have enough during times of drought.

When the dams are full, we store over 500,000 litres (half a megalitre) of fresh water for every person. However, our growing population and variable climate means that saving water makes good sense.

Resources	
	<p>WaterNSW – A Precious Resource</p> <ul style="list-style-type: none"> Balancing competing human and environmental demands for water is a critical global issue. <p>WaterNSW – Factsheets: What is a dam? & What is a weir?</p> <p>WaterNSW – Greater Sydney Dam Levels</p> <ul style="list-style-type: none"> Discover how much water is in Sydney Dams by using this interactive map <p>WaterNSW – Water Insights</p> <ul style="list-style-type: none"> Explore how much water is available in each water supply across the state via an interactive state map <p>Sydney Desalination Plant – Virtual Tour</p> <p>25 ways to be a water hero – poster</p> <ul style="list-style-type: none"> With your class, brainstorm how many ways to conserve water; keep pollution out of oceans, rivers and streams; and protect the animals that live there. Then open up the PDF to see how you scored
	<p>ABC Education - Show me the water! (2:05mins)</p> <ul style="list-style-type: none"> Where does the water in your tap come from? Fresh water accounts for only 3% of the earth's water supply and only 1% of that is available to us in lakes and rivers or in the atmosphere <p>WaterNSW – How WaterNSW supplies water to Greater Sydney (3:12mins)</p> <p>ClickView – Water: A Precious Resource (13:00mins)</p> <p>Through our eyes – Finding water in an arid environment (5:00mins)</p>

	<ul style="list-style-type: none"> • Badger Bates is Baarkindji man from Western NSW. He explains how traditional Aboriginal people find water in an arid environment, such as following animals to water or identifying signs left by other people. He also demonstrates a traditional technique for reducing water wastage <p>ABC Education – River Kids (8 chapters digibook)</p> <ul style="list-style-type: none"> • Join Tyrone, a young Ngarrindjeri boy, as he introduces us to people who depend on the Murray River. Discover how Australians are working together to look after the river, and how the river supports people, wildlife, and the economy. <p>ABC Education – Lake Condah (4:46mins)</p> <ul style="list-style-type: none"> • By creating a paradise for eels using artificial channels and ponds, the Gunditjmara people of western Victoria enjoyed a reliable source of food and a valuable item to trade. <p>Dr Karl – How much water do we need each day? (0:41mins)</p> <ul style="list-style-type: none"> • Watch as Dr Karl busts a myth
	<p>South Australia Water - Captain Plop</p> <ul style="list-style-type: none"> • A downloadable PDF in the series Captain Plops Tour De recycle for a parent or teacher to read aloud <p>Southern Water - Be a Water Hero</p> <ul style="list-style-type: none"> • Comprehensive workbook from Southern Water UK with lesson plans and activities with answers
	<p>Halls Creek Community in the Kimberly - "Don't waste the water" rap</p>
	<p>Cool Australia – Water poster campaign</p> <p>United States Environmental Protection Agency – Safe water</p> <ul style="list-style-type: none"> • This site has numerous resources from colouring in to find-a-words <p>WaterAid – WaterQuest game</p> <ul style="list-style-type: none"> • Explore the village and surrounding area, talk to three key villagers, and help WaterAid decide what solutions to implement <p>Arizona USA, Water Use it Wisely campaign - Interactive games</p> <p>South East Water – Interactive games Join the pipes to get the water to the house and flushing the toilet</p>

Warragamba Dam

Located about 65 kilometres west of Sydney in a narrow gorge on the Warragamba River, Warragamba Dam is one of the largest domestic water supply dams in the world.

Created by damming Warragamba River and flooding the Burratorang Valley, the storage lake is four times the size of Sydney Harbour and stores up to 80 percent of Sydney's water. Warragamba Dam supplies water to more than 5 million people living in Sydney and the lower Blue Mountains.

The best quality water is selected and drawn through screens on three outlets in the upstream face of the dam. Water flows by gravity through a valve house into two pipelines that feed the raw water to Prospect water filtration plant and via off-takes to smaller filtration plants at Orchard Hills and Warragamba.



Resources	
	<p>WaterNSW – Visiting Warragamba Dam and related information</p> <p>WaterNSW – Factsheets: What is a dam? & What is a weir?</p>
	<p>WaterNSW – Warragamba – A story of our making (21:31mins)</p> <ul style="list-style-type: none"> Generations of Sydneysiders owe thanks to the 2000 workers who worked round-the-clock shifts to build Warragamba Dam between 1948 and 1960. This is their story told by the men and women who lived and worked at Warragamba. The original footage of the construction reveals how complicated and large the project was. <p>WaterNSW – 2012 Warragamba Dam spilling video footage (2:27mins) & 2021 Warragamba Dam spilling video footage (1:36mins)</p> <p>WaterNSW – How the gates on Warragamba Dam work (2:10mins)</p> <p>WaterNSW – Caring for the Quiet Beast (4:54mins)</p> <p>ABC News – The lost valley (3:53mins)</p> <ul style="list-style-type: none"> Warragamba dam flooded the Burratorang valley to supply Sydney with water. ABC interviews people with memories of living in the valley.

What is a catchment?

A catchment is an area where water is collected by the natural landscape.

Imagine cupping your hands in a downpour of rain and collecting water in them. Your hands have become a catchment.

The outside edge of a catchment is always the highest point. Gravity causes all rain and run-off in the catchment to run downhill where it naturally collects in creeks, rivers, lakes or oceans.

Rain falling outside the edge of one catchment is falling on a different catchment, and will flow into other creeks and rivers.



Resources	
	<p>Australian Environmental Education – What is a catchment?</p> <p>WaterNSW – Catchment information</p> <p>WaterNSW - Special Areas</p> <ul style="list-style-type: none"> • Special Areas are zones that protect Greater Sydney's drinking water catchment <p>WaterNSW – Sydney's drinking water catchments</p> <ul style="list-style-type: none"> • This catchment fact sheet has a scale, legend and shows the locations of Sydney's water supply dams and their catchments
	<p>WaterNSW – “Protecting the Heart of the Catchment” (4:17mins)</p> <p>ABC Education – Where does water go after it rains? (1:55mins)</p> <ul style="list-style-type: none"> • What happens to rainfall in Australia? Water usually flows downhill, and because we know where the hills are, scientists have been able to divide the country into drainage divisions, or catchments. Find out which drainage division you're in and learn what happens to rainwater that doesn't make it to the sea <p>Buladerang – A Wiradjuri Creation Story of where two catchments meet (4:53mins) Sharon Riley, a Wiradjuri woman, tells the story of Gaygar and Biladurang on the River Lett (near Lithgow).</p>
	<p>WaterNSW – Learn with Shellby: What is a catchment?</p>



- Students think about the activities that happen in their catchment, how those activities impact their catchment, and actions they can take to keep their catchment healthy.

Teach Engineering - [Can you Catch the Water](#)

- Students build a model of a catchment and investigate how landforms impact the way that water flows

WaterNSW – Our Changing Catchment ([Video](#) & [Activity Sheet](#))

- Students build a model of a catchment and investigate weather, erosion and turbidity

WaterNSW – Roots are Underground Superheroes ([Video](#) & [Activity Sheet](#))

- In this hands-on activity, students investigate the role that plants play in reducing weathering and erosion to ensure that the water in our catchments has low turbidity

Natural Hazards – drought and flood

As Australia commonly experiences a range of natural events such as fire, flood and drought we closely plan for, monitor and manage such events. High rainfall events that extend over our catchment areas can lead to increases in our storage levels and dams, resulting in them spilling. WaterNSW closely monitors these events and works together with other key agencies to manage the dams during these incidents.

The Bureau of Meteorology (BoM) says that,

“Drought is a prolonged, abnormally dry period when the amount of available water is insufficient to meet our normal use. Drought is not simply low rainfall; if it was, much of inland Australia would be in almost perpetual drought. Because people use water in so many different ways, there is no universal definition of drought.”

There are different sorts of floods according to the BoM. These include:

- local flooding
- moderate flooding
- major flooding
- flash floods

The definitions of each can be seen in the [Australian Water Dictionary](#)

Resources	
	<p><u>Bureau of Meteorology (BOM)</u></p> <ul style="list-style-type: none"> • BoM is the agency responsible for issuing information about rainfall, river levels and flood • State-wide flood watches and warnings are detailed <p><u>The State Emergency Services (SES)</u></p> <ul style="list-style-type: none"> • Information about preparing for floods • In May 2017, the NSW Government released the Hawkesbury-Nepean Valley Flood Risk Management Strategy – ‘Resilient Valley, Resilient Communities.’ <p>Seqwater – <u>What is a flood?</u></p> <ul style="list-style-type: none"> • Although this has a South Eastern Queensland context, the fact sheet provides information and graphics
	<p>WaterNSW – <u>How floods impact our storages in Greater Sydney</u> (1:54mins)</p> <p>WaterNSW – <u>How drought impacts water storages in Greater Sydney</u> (4:01mins)</p> <p>Bureau of Meteorology – <u>What is drought?</u> (2:17mins)</p>

	<p>Sunday Night – <u>The last straw: The devastation of drought on Australian Farms</u> (25:55mins)</p> <ul style="list-style-type: none"> • A family's story from Coonamble <p>ABC News – <u>The face of Australia's drought crisis</u> (31:55mins)</p> <p>ABC Education – <u>Weather on the go: Floods and Droughts</u> (2:00mins)</p> <p>ABC Education – <u>Heywire: Autobiography of a flood survivor</u> (3:03mins)</p> <ul style="list-style-type: none"> • Shelby Garlick (Year 7/8 student) shared her inspiring story about how she, her family, and her community responded to a flood <p>ABC Education – <u>Big Weather: How to escape a car trapped in floodwater</u> (3:00mins)</p> <ul style="list-style-type: none"> • Craig Reucassell meets swiftwater, rescue trainer, Tren Long, and learns how to escape from a car stranded in floodwater. <p>State Emergency Service (SES) – <u>Flooding in the Hawkesbury-Nepean Valley</u></p> <ul style="list-style-type: none"> • Unit of work that helps students understand the Hawkesbury-Nepean Valley's tendency to flood
	<p><u>Project Honduras</u></p> <ul style="list-style-type: none"> • Through drought and flood prioritise which projects you are going to do with your volunteers to get the best for the community. Note: It may be a bit slow to download and due to literacy level, may require a reader <p>SES Victoria - <u>Flood safe game</u></p> <ul style="list-style-type: none"> • Flood waters contain hazards • Find the hidden dangers in the flood waters

What is storm water?

Stormwater is rainwater plus anything the rain carries along with it. As rainwater runs across different surfaces, it can pick up various types of pollutants.

WaterNSW works with councils to reduce pollution in storm water. This means there is less impact on water supply.

After studying the concept of storm water, students can look at the school and playground and discuss where the water goes when it rains. Are there any problems? Is the school doing a good job of managing storm water to keep the environment and waterways clean? How many drains are there? Can you see rubbish in the drain when you look through the grate?



Resources	
	<p>Washington Department of Ecology – Stormwater Information (simple)</p> <p>Australian Government – Stormwater Information (complex)</p>
	<p>NCTCOG E&D – Freddy the Fish (4:28mins)</p> <ul style="list-style-type: none"> Explores what stormwater is and what should be allowed down the drain <p>ACT Healthy Waterways – Where does stormwater go? (simple) (2:14mins)</p> <p>CWEP – Introduction to Stormwater Runoff (2:57mins)</p> <p>ABC Australia – Storm water drain sock (1:49mins)</p>
	<p>The drain is just for rain (2:34mins)</p> <ul style="list-style-type: none"> An earworm that reinforces that drains are just for rain <p>Banana Slug String Band – Storm Drain Blues (3:47mins)</p>
	<p>Australian Water Association – Water Educator's Toolkit</p> <ul style="list-style-type: none"> A 36-page booklet with activities for Stage 1 through Stage 5 students <p>Murray Darling Basin Authority – Wetlands and Food webs</p> <ul style="list-style-type: none"> Lessons that explain the role of wetlands in biofiltration



Education Services Australia – Old Bernie's Pond Game

- Clean up the rubbish and weeds to make a clean pond (Flash player)

Sydney Water – Stormwater Audit

ABC Science – Catchment Detox

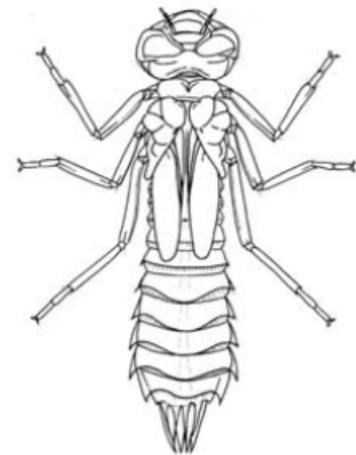
- A game to see if you successfully manage a river catchment and create a sustainable and thriving economy

Healthy water is home to many creatures

Rivers, streams and dams are a hidden world full of life and diversity. Sheltered bays and shallow inlets, where creeks and rivers flow into the lake, are an ideal habitat for native animals such as turtles, platypus and water rats.

WaterNSW scientists use the study of aquatic life as bioindicators of potential issues. A change in the health and numbers of aquatic life could tell us that there is a change in water quality. By studying these changes, we can better understand where we need to put measures in place to stop potential pollutants from traveling into the water supply. Populations of macroinvertebrates or “water bugs” are studied on an ongoing basis.

Macroinvertebrates are creatures without backbones that you don't need a microscope to see. An example is the dragonfly larvae picture to the right.



Macroinvertebrates are usually abundant and diverse when water quality is good, but they are sensitive to deteriorating water quality and habitat condition, and to changes in flow.

Resources	
	<p>Georges Riverkeeper – Meet the water bugs</p> <ul style="list-style-type: none"> Excellent images of water bugs organised according to their sensitivity to pollution <p>Australian Museum – Animal factsheets</p> <p>National Geographic Kids – Freshwater Habitat</p>
	<p>WaterNSW – Beneath Lake Burragorang (5:45mins)</p> <p>Melbourne Water – Water Bugs (3:13mins)</p> <p>Georges Riverkeeper – Catching water bugs at Maddens Creek (1:25mins) Marion Huxley, an aquatic ecologist, demonstrates how to catch water bugs</p> <p>ABC Science Program Catalyst – Eel Migration (5:13mins)</p> <ul style="list-style-type: none"> The eel migration is the epic story of eels travelling thousands of kilometres to breed <p>Deep Look – Water Strider Video (3:33mins)</p>

	<ul style="list-style-type: none"> • Insect Hunters that walk on water <p>The Secrets of Nature – Sky Hunters World of the Dragonfly (49:48mins)</p> <ul style="list-style-type: none"> • An excellent dragonfly documentary with vivid closeups <p>ABC Education – Ingenuity of Aboriginal People in Aquaculture</p> <ul style="list-style-type: none"> • Bruce Pascoe shows how Aboriginal people caught fish without nets, spears, or fishing line <p>National Geographic – Freshwater shrimp clean the water (3:45mins)</p> <ul style="list-style-type: none"> • In this short film by Freshwaters Illustrated, dive into a busy tropical stream ecosystem and learn how shrimp, crabs, and other invertebrates are creating a nutrient-rich environment for wildlife to flourish and humans to enjoy.
	<p>NSW Waterwatch – Printable resources including Bug ID Charts and Posters</p> <p>Department of Primary Industries – A Guide to Freshwater Fish in NSW</p> <p>Aunty Gloria Whalan – Guulaangga, the Green Tree Frog (2:51mins)</p> <ul style="list-style-type: none"> • Gloria is an elder of the Morwell community, though she grew up in Lithgow, NSW. Her people are the Wiradjuri, from around the Blue Mountains in NSW. This story is inspired by Gloria's experiences growing up on a farm. Her grandmother taught her to appreciate all creatures great and small, and their place in the natural environment. The story is in English and Wiradjuri.
	<p>Peter Combes - "Tadpole Blues" (3:12mins)</p> <ul style="list-style-type: none"> • Explores the lifecycle of a frog
	<p>Australian Museum – Frog ID project</p> <p>National Water Bug Blitz – Get involved and meet the bugs</p> <p>The Platypus-Project – Record a sighting of a platypus</p> <p>WaterNSW – Select from a range of colouring-in printables</p> <ul style="list-style-type: none"> • Chatterbox • Water Safety Sudoku • I Spy Water Creatures in Barkindji • Lake Burragarang Word Search • Turtle origami • Platypus (Complex colouring) • Water rat (Complex colouring) • Water Scorpion (Mirror-a-bug) • Shrimp (Enlarge-a-bug)

Geographical Field Sketch

A field sketch provides an opportunity for students to contextualise the features of, and activities that are happening in the environment they are studying.

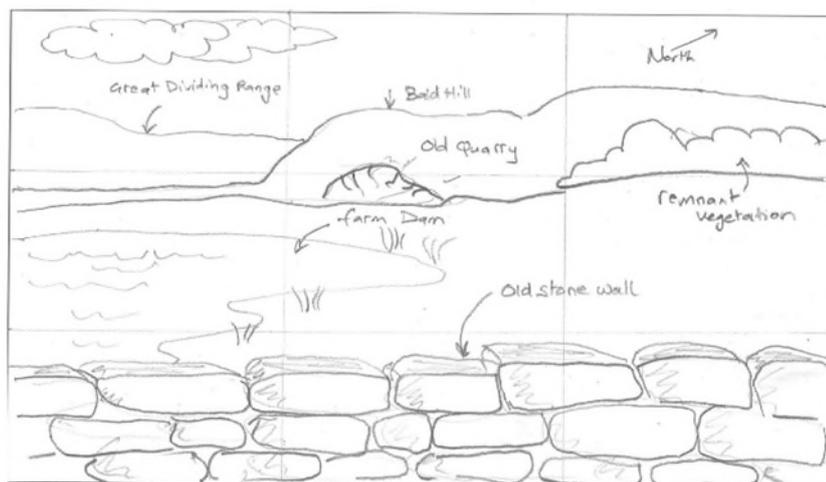
Field sketches are useful to record, highlight and annotate key features of the place being observed.

A field sketch is judged on its ability to convey information, not judged on its artistic merit. This means annotations and labels are an important part.

Steps to draw a field sketch:

- Divide the page into thirds with a light pencil line
- Draw the horizon
- Add important large features
- Draw the foreground & closest things last
- Use shading to give depth
- Which way are you looking?
- Label features e.g. mountain names

Hint: Always draw the background or horizon first. Don't forget the clouds and what is happening in the sky.



Resources



[Click here for more information on field sketching](#)