

Early Learning Water Education Program



WATER

Let's make it last.



Use and acknowledgements

This Early Learning Water Education Program is a free online education resource and whilst it has been specially designed to assist educators in the Bathurst Region, it is freely available to all early childhood educators and is targeted towards children in the pre-kindy age group (ages 3.5 – 5years).

Should you wish to use any of our materials or resources, please acknowledge Bathurst Regional Council as the owner and developer of this resource and any artists associated with the content or work you use (see full list of contributors further in this document).

For more information please contact: council@bathurst.nsw.gov.au ,att: Environmental Programs Officer.

Introduction

The program is supported by a suite of sector specific educational tools and resources and uses local examples and case studies to assist educators in the Early Learning environment to improve their understanding and awareness of water and to help modify behaviours in order to achieve more sustainable water use.

The Early Years Water Education Program aligns closely with learning outcomes in the [Belonging, Being & Becoming](#): The Early Years Learning Framework for Australia, and will also assist educators to meet or exceed sustainability accreditation requirements as laid out in the [National Quality Standard](#) Assessment and Rating Instrument document.

There are five key modules in the Early Learning Water Education program:

- **Module 1: The Water Cycle**
- **Module 2: How do we use water?**
- **Module 3: Water in Bathurst where it comes from**
- **Module 4: Being conservative with water**
- **Module 5: Keeping our waterways clean and healthy**

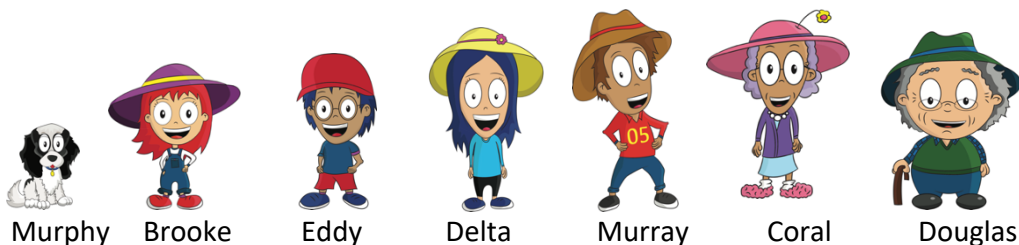
Each of the five modules includes at least three learning elements.

Each module begins with an overview that introduces the key learning elements and their related group discussion points and activities. The module overview section also includes a useful list of key terms and definitions, and detailed background and contextual information on the module focus area, providing early year's educators with insights into the module content that complement the learning activities and associated resources.

Each learning element within the modules is supported by an opportunity for class group discussion, stage appropriate activities and resources to consolidate knowledge and learning, and the chance for reflection and extension through suggested supporting materials and links.

The Wade family

Meet the Wade family: Murphy their dog, kids Brooke and Eddy, parents Delta and Murray and grandparents Coral and Douglas. The Wade family members feature throughout our Early Learning Water Education Program, helping us tell the story of water and providing links between the five modules, each of the learning elements and the supporting resources and activities. The Wade family illustrations act as a point of recognition for young children, engaging them with fun, recognisable characters and act as a linking device across all aspects of the program.



Program modules

Module 1: The Water Cycle		
Learning Elements	Group Discussion	Activity
1. What is the Water Cycle and How Does it Rain?	Where does water come from and how does it get there?	Water cycle role play using musical instruments and movement
		Complete the water cycle activity sheet
2. What are Clouds Made From?	What are clouds? Are they all the same shape, size and colour? How does it rain?	Cloud Study- outdoor activity using observation and reflection skills
		Cloud Creations - art and craft
3. Where Does the Rain Go?	Where does the water go when it rains and what happens to it?	Making it rain- an outdoors experiment that involves hypothesising and investigating

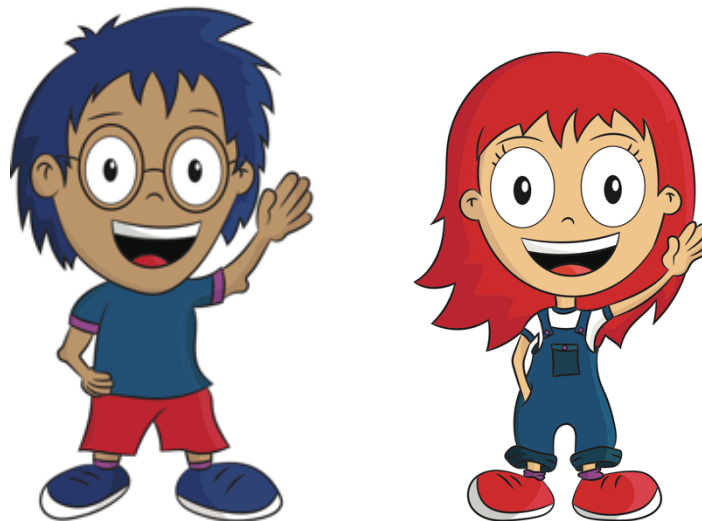
Module 2: How Do We Use Water?		
Learning Elements	Group Discussion	Activity
1. Water in our world: Where do we find water in nature?	How much of the Earth is covered in water? What types of water can we find? What do humans, animals and birds use water for?	How do animals and birds use water? Matching/ pairing activity
		Personal experiences with, in and around water
2. How do we use water at home and in the centre?	Discuss all the different ways water is used around the education environment and at home, for health, hygiene and recreation.	What we use water for- describing actions through use of prompt cards
		Water use through mime- reiterating learning through actions 'Water Discovery Walk'- reiterating learning through observations
3. How do we use water at work?	How is water used in different places of work such as in manufacturing (factories) or agriculture (farming)? What impacts does drought or water restrictions have?	Old MacDonald had a farm...but it didn't rain! Seed planting experiment
		What goes into a bottle of water? Introduction to resource use

Module 3: Water In Bathurst		
Learning Elements	Group Discussion	Activity
1. What is a dam and why are dams so important?	Have you ever been to visit a dam? Do you know what dams do and why they are so important?	Discovering dams, reservoirs and pump stations through photos and videos
2. The journey of water from dam to tap	How does water get from the dam to our taps?	Journey of water from dam to tap!
	What happens to the water on its journey?	Water moving through pipes- an experiment that involves hypothesising and investigating
3. Why do water levels in the dam change?	What causes changes to the water levels in a dam?	Investigating and problem solving experiment to demonstrate changing water levels in a dam

Module 4: Being Conservative With Water		
Learning Elements	Group Discussion	Activity
1. Why do we need to save water?	Why does the weather change at different times of the year?	Weather across the seasons- art and craft decision making activity
	What are the four seasons, and what weather do we associate with each season?	Creating a weather diary
		What's the weather today?
2. How can we look after water?	How many ways do we use water every day?	How water smart is our learning environment? Water Discovery Walk
	How can we use less water and make sure it does not go to waste?	Create your own 'Water- Let's Make It Last' stickers
3. Creating a water smart garden	In what ways does nature- plants and animals- need and use water? What does the water do? How do we use water in our gardens at our childcare centre and at home?	Designing and creating a water smart garden

Module 5: Keeping Our Waterways Clean & Healthy

Learning Elements	Group Discussion	Activity
4. What is litter and where does it come from?	Do you know what litter is? Where do you find litter?	What litter can you see?
	Who do you think litters?	Recognising littering behaviours using poster prompts
5. What happens to litter when it rains?	What happens to litter in the parks or on the streets when it rains?	Creating a water catchment in the sandpit
	Where does it go and what impact does this have on the creeks and rivers?	How does litter effect water quality? An outdoors experiment that involves inquiry and investigating
6. Why is it important to look after our creeks and rivers?	Why is it important that we look after our creeks and rivers? What colour is the water that comes out of the taps? How is water cleaned to make it safe for drinking?	How do you clean water? Demonstrating a water filtration system through research and problem solving



Curriculum links in Early Years Learning Framework

- Outcome 2: Children are connected with and contribute to their world.
 - Children become socially responsible and show respect for the environment.
- Outcome 3: Children have a strong sense of well-being.
 - Children take increasing responsibility for their own health and physical wellbeing.
- Outcome 4: Children are confident and involved learners.
 - Children develop a range of skills and processes such as problem solving, inquiry, experimentation, hypothesising, researching and investigating.
 - Children transfer and adapt what they have learned from one context to another.
- Outcome 5: Children are effective communicators.
 - Children interact verbally and non-verbally with others for a range of purposes.
 - Children express ideas and make meaning using a range of media.

Alignment with National Quality Standard (NQS)

The Early Learning Water Education Program has been developed to assist Centres to meet, or exceed, sustainability accreditation requirements as laid out in the National Quality Standard Assessment and Rating Instrument document in the following Quality Areas:

- Quality Area 2: Children’s health and safety.
 - Standard 2.1: Each child’s health and physical activity supported and promoted.
 - Element 2.1.2 Healthy practices and procedures: Effective illness and injury management and hygiene practices are promoted and implemented.
- Quality Area 3: Physical environment
 - Standard 3.2: The service environment is inclusive, promotes competence and supports exploration and play-based learning.
 - Element 3.2.3 Environmentally responsible: The services cares for the environment and supports children to become environmentally responsible

Delivery options and learning opportunities

This Early Learning Water Education Program has been designed to allow for flexible delivery.

The program can be delivered in its entirety; any of the five modules can be delivered as discrete elements; or the individual learning elements and activities can be utilised as independent units to support and complement an existing program on environmental sustainability.

The program has been developed to encourage early years educators to engage the children in a number of different leaning experiences to accommodate a range of learning styles. As an example, the modules provide numerous opportunities for teacher-led activities, modelled play, open-ended play, experiential learning and participatory decision making.

In addition, the Early Learning Water Education Program provides opportunities for educators to observe and assess children's learning and development, both individually and in groups, which addresses:

Quality Area 1: Education program and practice in the National Quality Standard Assessment and Rating Instrument document

- Standard 1.3: Assessment and planning: Educators and coordinators take a planned and reflective approach to implementing the program for each child.



Collaborators and contributors

Our thanks to the following organisations, small businesses and artists and helpers who have been passionate contributors to, collaborators in and supporters of the development of this comprehensive, engaging early learning program and its many assets.

Hyperlinks to our contributors' websites can be found on our Program Overview page within the Early Learning Water Education Program web portal, established on Council's website:

www.bathurst.nsw.gov.au/early-learning-water-education-program



Envirocom Aust. EDUCATION, TRAINING, RESEARCH	Eaton Gorge THEATRE COMPANY	Indigo EVENTS & MARKETING
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StartleArt GRAPHIC DESIGN	Stefan Elbourne ILLUSTRATOR	Mike Foxall ANIMATOR
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Goodstart EARLY LEARNING (KELSO)	Razzle Dazzle TV & DIGITAL	Natural Splendour GARDENING & HORTICULTURE	Gro Creative PHOTOGRAPHY & VIDEO
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& staff at Bathurst Regional Council's Children's Services

Module 1: The Water Cycle

Early Learning
Water Education
Program



Module overview

Learning Elements	Group Discussion	Activity
1. What is the Water Cycle and How Does it Rain?	Where does water come from and how does it get there?	Water cycle role play using musical instruments and movement Complete the water cycle activity sheet
2. What are Clouds Made From?	What are clouds? Are they all the same shape, size and colour? How does it rain?	Cloud Study- outdoor activity using observation and reflection skills Cloud Creations - art and craft
3. Where Does the Rain Go?	Where does the water go when it rains and what happens to it?	Making it rain- an outdoors experiment that involves hypothesising and investigating

Note: All URL's and links used throughout the Module are accurate and current at the time of publication.

Alignment with Early Years Learning Framework

Outcome 4: Children are confident and involved learners.

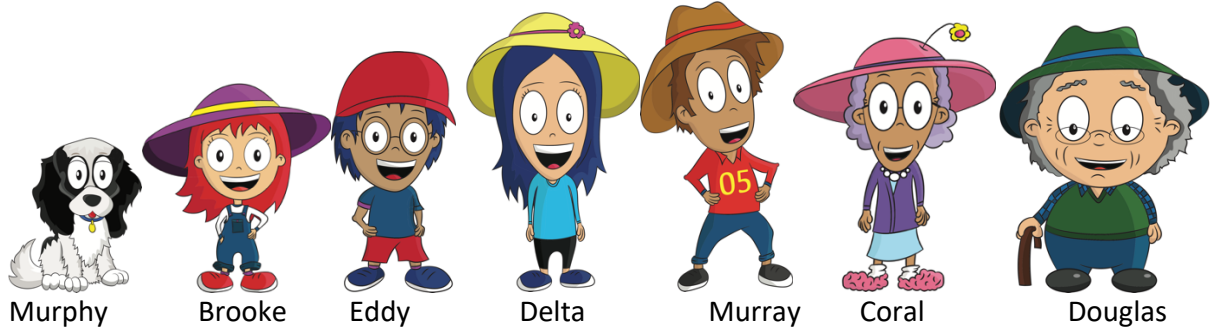
- Children develop a range of skills and processes such as problem solving, inquiry, experimentation, hypothesising, researching and investigating.
- Children transfer and adapt what they have learned from one context to another.

Outcome 5: Children are effective communicators.

- Children interact verbally and non-verbally with others for a range of purposes.
- Children express ideas and make meaning using a range of media.

Telling the story of water

Meet the Wade family, they will help us tell the story of water.



Key terms

Term	Definition
Water cycle	The water cycle, also known as the hydrologic cycle or the hydrological cycle, describes the continuous movement of water on, above and below the surface of the Earth.
Evaporation	Evaporation is the process by which water changes from a liquid to a gas or vapour. Evaporation is the primary pathway that water moves from the liquid state back into the water cycle as atmospheric water vapour.
Condensation	The change of a gas or vapour to a liquid, either by cooling or by being subjected to increased pressure. When water vapour cools in the atmosphere, for example, it condenses into tiny drops of water, which form clouds.
Precipitation	Precipitation, all liquid and solid water particles that fall from clouds and reach the ground. These particles include drizzle, rain, snow, sleet and hail.
Ground water	Groundwater is the water present beneath Earth's surface in soil pore spaces and in the fractures of rock formations
Surface water	Surface water is any body of water above ground, including streams, rivers, lakes, wetlands, reservoirs, and creeks
Urban water cycle	The way water is collected, used and managed in built up environments.

Background information

While over 70% of the earth's surface is covered by water, nearly all of this (97%) is saltwater. Ice makes up a further 2%, which leaves only 1% of all the water on the planet suitable for human needs.

The amount of water on the planet does not change, however water is recycled over and over again. This process is called the *hydrological* or *water cycle*. As water travels through the cycle, it changes shape, form and taste. Three major processes drive the *water cycle*: *evaporation*, *condensation* and *precipitation*. *Evaporation* occurs when water is heated changing it from a liquid to a gas (water vapour). The sun heating the ocean produces most of the water vapour in the atmosphere. *Condensation* occurs as the water vapour rises. It cools and changes into tiny droplets of water seen as clouds, fog or mist. As water vapour continues to rise, the water drops cool and become heavier. Eventually the water drops will fall as rain hail or snow, this is called *precipitation*.

In Australia, water is collected from two main sources, groundwater and surface water. *Groundwater* is rain that has drained underground and collected in impermeable layers. *Surface water* is rain that has drained into rivers or creeks, or been collected in dams.

People modify and manage the natural water cycle to make sure we have a safe and reliable water supply and that used water is removed and cleaned to protect public health and the environment. This is known as the urban water cycle.

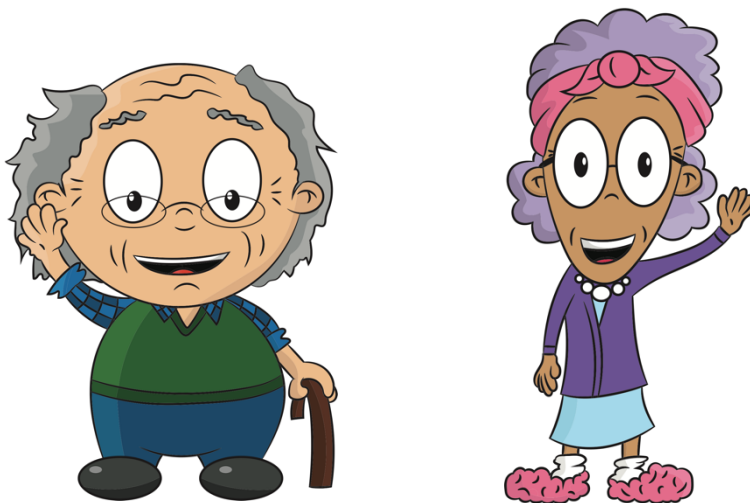
The urban water cycle is the way water is collected, used and managed in built up environments such as Bathurst. In an urban environment, people interact with the natural water cycle by collecting and storing water for use, adding things to water, like rubbish and pollutants, and building structures, roads and other hard surfaces that interrupt the flow of water.

The urban water cycle is a system that helps to manage these interactions so there is enough clean, safe water to service the Bathurst community, protect public health and protect the environment. The urban water cycle is made up of elements such as dams, water filtration plants, water pumping stations, drinking water supply pipes, wastewater treatment plants and pumping stations, wastewater pipes and stormwater drains and pipes. We will learn more about these elements in Modules 3 and 5. Bathurst Regional Council are responsible for managing the urban water cycle in Bathurst.



Support materials, links and additional resources

- Video: Bathurst Regional Council– [Module 1: The Wade Family - The Water Cycle](#)
- Website: Bathurst Regional Council: [Catchments and water supply](#)
- Website: National Geographic Kid: [The Water Cycle](#)
- Video: [Sydney Water Cycle](#) Animation
- Website: [Sydney Water resources](#) for students and teachers
- Video: [Water Cycle](#)
- Song: Youtube - [The Water Cycle](#)
- Book: The Snowflake: A Water Cycle Story (Neil Waldman)
- Book: One Well: The Story of Water on Earth (Rochelle Straus)
- Book: A Drop in the Ocean: The Story of Water (Jacqui Bailey and Matthew Lilly)
- Book: Enviro-stories- [The Raindrop](#), Inverell Public School-(downloadable PDF book)



Learning Element 1: What is the water cycle and how does it rain?



I love going for a swim in the creek, with my mum and dad supervising. Sometimes the creek is full, and sometimes there is hardly any water at all.

Why is that?

Let's learn about the water cycle!

Group discussion: Where does water come from and how does it get there?

Resources for learning:

- o *Activity Sheet: Complete the Water Cycle.*

Note: This group discussion uses a relatively simplistic description of the Water Cycle process for the purposes of explaining the concept to young children.

- **Using the Activity Sheet: Complete the Water Cycle**, ask children to think about where they see water in the natural environment. Do they know where this water comes from or how it gets there?
- Explain to children that water can be found in three different forms: as a solid, as a liquid and as a gas (vapour). Demonstrate the three forms by showing the children water in solid form e.g. an ice cube, water in liquid form e.g. a glass of water, and water in gas form e.g. steam from a boiling kettle.
- Introduce children to the concept of the water cycle and explain how water is recycled over and over again. Demonstrate the journey of a water drop as it is heated by the sun (evaporates) and travels from the ocean up into the sky as water vapour. As the water vapour rises, it cools (condenses) and the water drops form clouds. As the water drops become heavier, they will fall back onto the land and rivers as rain, snow or hail (precipitation) before eventually returning to the ocean where the water cycle starts again.

Activity:

Water cycle role play using musical instruments and movement

Resources for learning:

- *Musical instruments, suggestions include triangle, wind chime, cymbals, castanets, clap sticks, dry rice in a plastic jar with lid, xylophone and drum.*

Note: The musical instruments and movements suggested below are just a guide.

Divide the children into five groups. Each group will represent one stage of the water cycle. Using musical instruments and movement, guide each group to dramatise their stage of the water cycle. Repeat this activity a number of times to demonstrate how water moves through the cycle over and over again.

- **Group 1: The Sun**

Select one child to play the triangle representing the sun evaporating the water from the ocean. The rest of the children wriggle their fingers in an upward motion from their toes to their head to demonstrate the movement of the water vapour.

- **Group 2: The Clouds**

Select one child to wave a wind chime to represent the wind blowing the clouds across the sky. As the clouds get cooler, the water vapour turns into tiny droplets of water, a process known as condensation. The rest of the children wave their hands in the air from left to right as though they are being blown by the wind and shivering as they get colder.

- **Group 3: The Rain**

Select one child to crash the cymbals to represent thunder and another child to clap castanets to represent rain falling (precipitation). The rest of the children wriggle their fingers and wave their arms and bodies in a downward motion to depict the rain falling from the clouds back to the land.

- **Group 4: The Land**

Select one child to play clap sticks or shake a plastic container that holds some rice, to represent the rain hitting the land. The rest of the children can jog on the spot slowly at first and then faster and faster to show the rain hitting the land and then travelling into the ground (as ground water) or running over the land (as surface water).

- **Group 5: The River**

Select one child to run the xylophone wand back and forth over the xylophone keys representing the flow of water in a river. The rest of the children hold their arms out in front of them and as the xylophone is played, they roll their hands over and over each other as if they were a flowing river.

- **Group 6: The Ocean**

Select one child to play the drums representing the crashing waves. The rest of the children put their arms out in front of them and raise and lower them making the shape of waves.

Activity: **Complete the water cycle activity sheet**

Resources for learning:

- *Activity Sheet: Complete the Water Cycle*
- *Scissors, coloured pencils/pens, glue*
- Revise each stage of the water cycle. Using the **Activity Sheet: Complete the Water Cycle** provided, ask the children to colour and cut out each picture from the bottom of the page.
- The children can then paste each picture into its correct sequence on the activity sheet.
- Ask the children to colour in the activity sheet.



Learning Element 2: What are clouds made from?



I was just about to go and water the garden but there are lots of grey clouds in the sky.

It looks like it might rain!

What do the clouds look like where you are?

Let's learn more!

Group discussion: **What are clouds? Are they all the same shape, size and colour?** **How does it rain?**

Resources for learning:

- *Activity Sheet: Complete the Water Cycle*
- Ask children to describe clouds i.e. what colours are they, what shapes are they and when and where do they see them?
- Do they know what clouds are made from? Ask children if clouds change or if they are always the same? Do they see more or less clouds on different days and at different times of year?
- Remind children about the role of clouds in the water cycle.

Activity: **Cloud study - outdoor activity using observation and reflection skills**

- Take the children outside and find a shaded area where they can see the sky and the clouds. If room allows, ask them all to lie down and study the clouds.
- Ask them to describe what sizes and shapes they can see and what colours the clouds are. Ask them whether the clouds appear to be moving or staying still.
- If possible, repeat this exercise several times in a day, or over several days, to demonstrate that clouds move, and change shape and colour.

Activity: Cloud creations

Resources for learning:

- *Activity Sheet: Cloud Template (optional)*
- *A4 card/paper, cotton wool pieces, scrap newspaper, paints, blue ribbon or blue paper (or similar), sticky tape, hole punch, string*
- Use the **Activity Sheet: Cloud Template** provided, or ask children to draw their own clouds on a piece of A4 paper or card.
- Ask children to carefully cut out their clouds and decorate them. Cotton wool pieces, scrunched up newspaper and paints are most effective for this activity.
- Use thin strips of blue paper, or blue ribbon (or similar) to depict the rain drops. Stick the ribbon or paper strips along a piece of sticky tape and tape this along the bottom of the clouds.
- Punch a hole in the top of each of the clouds and thread with string. Hang the cloud creations from the ceiling to create a cloud filled sky in your room!



Learning Element 3: Where does the rain go?

I love to walk in the rain and splash in puddles in my gumboots.

Where does all the water come from, how does it get there and what happens to it next?

Let's learn more about rain!



Group discussion:

Where does the water go when it rains and what happens to it?

Resources for learning:

- o *Video: Module 1 The Wade Family - The Water Cycle*
- Ask children to think about when it rains. Where does the rain come from and where does it go to? Ask them to think about where the rain lands. Does it all land on the same spot or on different places? What do they think would happen differently to rain that lands on the road, rain that lands on the houses, rain that lands on the grass and rain that lands on the sandpit?
- Where does most of the rain eventually end up? Revisit the water cycle and the journey of the water drop once it falls back to the ground.
- Explain that some of the rain is used by the trees and plants, some is stored in the dams or reservoirs, some flows back to the ocean via streams and rivers, and some soaks into the ground where it may be stored or moves slowly through the ground before ending up in the ocean.
- **Watch Video: Module 1 The Wade Family - The Water Cycle**



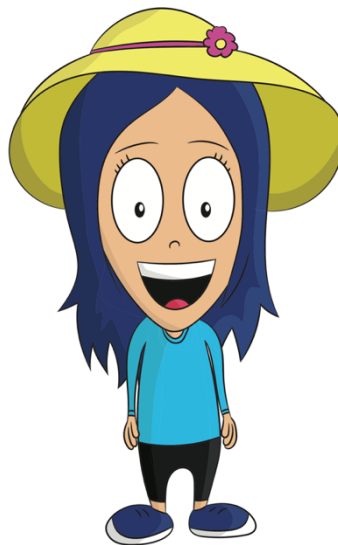
Activity: Making it rain- an experiment

Resources for learning:

- 1 litre clear plastic bottles with lids (label removed) and/ or small watering cans with rain flow spout
- Sharp scissors (or similar, for use by educators only)
- Bucket of water

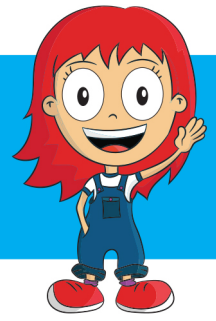
Note: It is recommended that an adult prepare the rain bottles. Having several bottles to share around the group will allow the children to conduct their own experiments, following the teacher demonstration. The quickest way to fill the bottle is to remove the lid and immerse the bottle in a bucket of water

- Take a clear, 1 litre plastic bottle (labels removed). Punch (or drill) one hole in the lid and several holes in the bottom. Alternatively, small watering cans with rain flow spouts could be used.
- Take the children outside and fill the bottle with water. Demonstrate how to use the rain bottle by keeping a finger over the hole in the lid to stop the 'rain', and uncovering the hole in the lid to allow it to 'rain'.
- Ask the children to choose 3 or 4 different surfaces for it to rain on. For example, the sandpit, the path, the grass, the soil. Ask the children to watch what happens when it 'rains' on those different surfaces and explain what happens. Pour some of the water over a man-made structure e.g. a slide or cubby house. What happens to the 'rain'?
- Repeat the experiment on a path or hard cover area in a shaded area and on a path or hard cover area in the direct sunlight. Ask the children to explain what they think happens to the rain in this instance? Watch and or time how long it takes for the water to disappear in the shaded area as compared to the sunlit area and explain why this is.



Module 2: How Do We Use Water?

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Module overview

Learning Elements	Group Discussion	Activity
1. Water in our world: Where do we find water in nature?	How much of the Earth is covered in water?	How do animals and birds use water? Matching/ pairing activity
	What types of water can we find? What do humans, animals and birds use water for?	Personal experiences with, in and around water
2. How do we use water at home and in our environment?	Discuss all the different ways water is used around the learning environment and at home, for health, hygiene and recreation.	What we use water for- describing actions through use of prompt cards
		Water use through mime- reiterating learning through actions
		'Water Discovery Walk'- reiterating learning through observations
3. How do we use water at work?	How is water used in different places of work such as in manufacturing (factories) or agriculture (farming)?	Old MacDonald had a farm...but it didn't rain! Seed planting experiment
	What impacts does drought or water restrictions have?	What goes into a bottle of water? Introduction to resource use

Note: All URL's and links used throughout the Module are accurate and current at the time of publication.

Alignment with Early Years Learning Framework

Outcome 2: Children are connected with and contribute to their world.

- Children become socially responsible and show respect for the environment.

Outcome 3: Children have a strong sense of well-being.

- Children take increasing responsibility for their own health and physical wellbeing.

Outcome 4: Children are confident and involved learners.

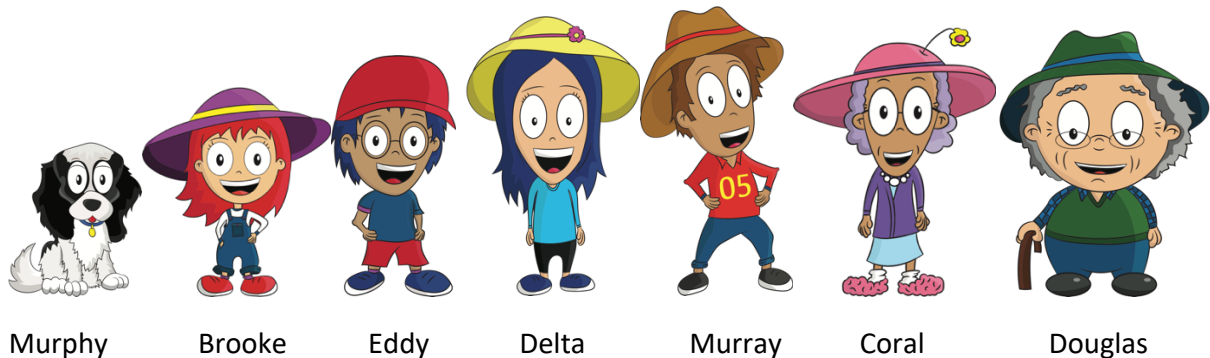
- Children develop a range of skills and processes such as problem solving, inquiry, experimentation, hypothesising, researching and investigating.
- Children transfer and adapt what they have learned from one context to another.

Outcome 5: Children are effective communicators.

- Children interact verbally and non-verbally with others for a range of purposes.
- Children express ideas and make meaning using a range of media.

Telling the Story

Meet the Wade family, they will help us tell the story of water.



Key Terms

Term	Definition
Ground water	Groundwater is the water present beneath Earth's surface in soil pore spaces and in the fractures of rock formations.
Surface water	Surface water is any body of water above ground, including streams, rivers, lakes, wetlands, reservoirs, and creeks.
Dehydration	Excessive loss of fluid from the body.
Manufacturing	The making of articles or goods on a large scale, using machinery. Can also be called industrial production.
Agriculture	The science or practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals (livestock) to provide food, wool, and other products.
Consumption	The action of using up a resource.
Megalitre	A unit of volume equivalent to one million litres.
Drought	A prolonged period of abnormally low rainfall, leading to a shortage of water.

Background information

Water is vital for life. Without it, humans, animals and plants cannot physically survive. Water is also necessary for a host of other reasons including industrial manufacture, agriculture (food production) and recreation. While over 70% of the earth's surface is covered by water, nearly all of this (97%) is saltwater. Ice makes up a further 2%, which leaves only 1% of all the water on the planet suitable for human needs.

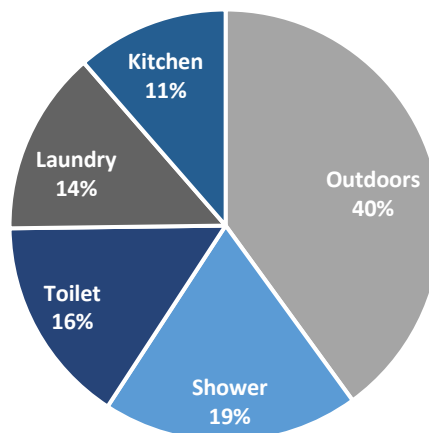
In Australia, water is collected from two main sources, groundwater and surface water. *Ground water* is rain that has drained underground and collected in impermeable layers. *Surface water* is rain that has drained into rivers or creeks, or has been collected in dams or water tanks. Before water can be used for drinking or washing, it must be cleaned at a water treatment plant. It is then pumped to a dam or reservoir for storage.

Water is essential for the human body to function correctly. Water makes up approximately 60% of our body weight and humans cannot survive for more than a few days without it. The body uses water in all its cells, organs and tissues to help regulate temperature and maintain other bodily functions. The body loses water through breathing, sweating and digestion and it is essential that humans rehydrate by drinking fluids and eating foods that contain water, such as fruit and vegetables.

Water use in the home

However, humans do not just need water for drinking. Water is also used for many activities in and around the home such as for bathing, washing, cleaning, cooking and gardening as depicted in the pie chart below. The average Australian consumes 100,000 litres of freshwater per year, that's around 270 litres per day.

Average daily water usage (%)



Source: www.yourhome.gov.au/water

The table below shows how much water is used, on average, in general household activities:

Activity	Water used
Toilet flush (single flush cistern)	11 litres a flush
Bath	110 litres
Shower (10 minutes)	100 litres
Dishwasher load	12 litres a load
Washing machine load (front loader)	65 litres a load
Washing machine load (top loader)	110 litres a load
Brushing teeth with tap running	4 litres a minute
Garden sprinkler per hour	999 litres per hr
Car Washing with hose	180 litres a wash
Car Washing with bucket	99 litres a wash

Industrial water use

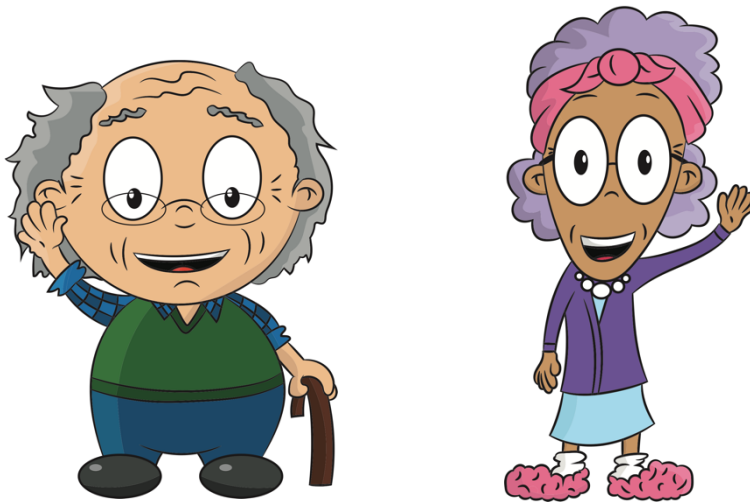
Industrial water consumption places strain on the world's limited water supply. In fact, the agricultural and industrial sectors account for approximately 90% of direct water withdrawals. Water is used in industry and manufacturing for such purposes as fabricating, processing, washing, diluting, cooling or transporting a product.

The garment and textile industry is one of the most water-intensive industries in the world. Creating a single pair of jeans requires close to 7600 litres of water. The beverage industry that produces juices, soft drinks and beer is also water intensive. Water is not only required in the liquid themselves but also in the additives that are included in the drink such as barley, sugar, coffee, fruit etc. It takes between 680 and 1241 litres of water to produce a 2-litre bottle of soft drink, 140 litres of water to produce the ingredients to make a single cup of coffee, and between 3 and 7 litres of water to make just one litre of bottled water.

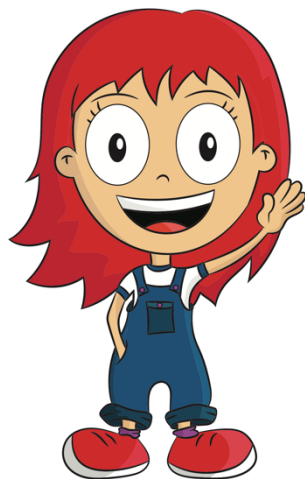
According to the Australian Bureau of Statistics (ABS) in 2018/19, 8 million megalitres of water was used in agricultural production in Australia. 70% of water used on farms was applied to pastures and crops. Periods of drought can deplete water stores for animals and other farm uses. Dry seasonal conditions across much of Australia have driven up feed and water prices, due to high demand and limited availability.

Support materials, links and additional resources

- Video: Bathurst Regional Council – [Module 2 The Wade Family - How Do We Use Water](#)
- Website: Bathurst Regional Council: [Catchments and water supply](#)
- Video: YouTube [Weather on the Go - Floods and Droughts](#)
- Website: ABC Behind the News – [Drought Kids](#)
- Website: [Sydney Water resources](#) for students and teachers
- Book – [The Adventures of a Plastic Bottle](#)



Learning Element 1: Water in our world: Where do we find water in nature?



I swim in the ocean, paddle in the creek, fish in the river, go boating on the dam, walk to the waterfall and splash in the puddles

Where else do we find water? Let's learn more!

Group discussion: How much of the Earth is covered in water? What types of water can we find? What do humans, animals and birds use water for?

Resources for learning:

- o *Support Resource: World Map with Oceans*

Note: Educators may wish to use a world globe or large poster world map

- Using the **Support Resource: World Map with Oceans, or a globe**, ask children to think about all the different bodies of water that can be found on Earth and see if they can name them e.g. ocean, stream, creek, river, dam, waterfall, puddle etc.
- Explain to the children that all these different bodies have different characteristics. Some of the bodies of water are salty, while others are fresh; some are deep while other are shallow; some are there all the time e.g. an ocean, while others may change (or disappear altogether) depending on the season and the weather e.g. a creek or a dam.
- Have a **look at a globe**. How much of the surface of the globe is covered in water? Explain to the children that most of the water shown on the globe is the oceans. Have a look at a larger scale map. Can children pick out other water bodies e.g. dams/ reservoirs, rivers or streams? Explain to the children that eventually, all the water from the creeks, rivers and streams will flow into the ocean either through surface or groundwater flow.
- Explain that as well as humans, birds and animals also need and use water. Ask the children to think of the ways different animals and birds may use different bodies of water.

Activity: How do animals and birds use water?

Resources for learning:

- *Activity Sheet: Water in the Environment Matching Cards (print double sided, laminate and cut out the animal and environment water use matching cards provided, making sure to cut them into their puzzle match shapes)*
- *Support Resource: World Map with Oceans*

Note: You may wish to source additional pictures or photos for this activity

- Discuss why some animals can survive in one environment and not another. Name some animals or birds that can live in saltwater environments and some that live in freshwater environments. Using the **Support Resource: World Map with Oceans, or a globe**, show children where the Arctic and Antarctic is located. Ask them to think about what water looks like in very cold places such as these (e.g. icebergs, snow etc.) See if they can name any animals or birds that live in these kinds of environments.
- Using the **Activity Sheet: Water in the Environment Matching Cards**, ask the children to match the animal or bird with its correct environment or water use.

Activity: Personal experiences with water

Resources for learning:

- *A4 paper, coloured pencils and pens*
- Ask the children to share their memories of an experience with different bodies of water e.g. a trip to the beach, playing in the pool, going on a boat trip, visiting a waterfall etc. What was the water like in those places? Ask the children to **draw a picture** of this experience.



Learning Element 2: How do we use water at home and in our learning environment?



Hi kids!

I'm busy watering the garden, Grandpa is washing up, Delta is washing clothes, Brooke is drinking a glass of water, Dad is cooking pasta, and Eddy is watering a pot plant.

Let's learn about all the different ways we use water!

Group discussion: **Discuss all the different ways water is used around your learning environment and at home, for health, hygiene and pleasure.**

Resources for learning:

- *Video: Module 2 The Wade Family – How Do We Use Water?*
- Explain that water is essential for humans and that we need to drink water to stay healthy and to keep our bodies functioning well. Remind the children about the importance of bringing a water bottle to their learning environment every day and to make sure they have regular drinks and keep their water bottle topped up.
- Talk about the use of water for hygiene and staying clean and healthy. Ask the children to talk about washing their hands and when they do it e.g. before they eat, after playing outside, after going to the toilet, etc. Discuss with the children about the importance of washing their hands thoroughly and of practicing good hygiene.
- Apart from drinking and keeping clean, ask the children what other uses there are for water at home, for example, cooking, playing, gardening.
- Ask the children to think about all the different ways water is used in and around your learning environment. How is some of the water use different at home to how the water is used at your learning environment?
- **Watch Video: Module 2 The Wade Family - How Do We Use Water?**

Activity: What we use water for

Resources for learning:

- *Activity Sheet: Water Use Flash Cards (print and laminate the Water Use Flash Cards)*
- *Activity Sheet: Water Use At Home*
- *Activity Sheet: Wade Family Indoors*
- *Activity Sheet: Wade Family Outdoors*
- *Video: Module 2 The Wade Family – How Do We Use Water?*
- *Coloured pencils*
- Print and laminate the **Activity Sheet: Water Use Flash Cards**. Hold each card up and ask the children to describe how the water is being used in each picture.
- Discuss which of these activities requires a lot of water and which require less water. For example, having a shower uses more water compared to wiping a table which uses less water
- Ask the children to list all the ways they use water in one day, from when they get up to when they go to bed
- Using the **Activity Sheet: Water Use At Home**, discuss the various ways water is used in the drawing, and ask the children to colour in the sheet
- Show the children the **Activity Sheet – Wade Family Indoors** and the **Activity Sheet: Wade Family Outdoors**, ask the children to identify all the ways the Wade family use water
- **Watch Video: Module 2 The Wade Family - How Do We Use Water?**

Activity: Water use through mime

- Taking it in turns, ask the children to mime various uses for water at home. The remainder of the group try to guess what is being mimed.



Activity: 'Water Discovery Walk'

Resources for learning:

- *Activity Sheet: Water Discovery Walk*
- Using the **Activity Sheet: Water Discovery Walk**, take the children on a 'Water Discovery Walk' around the learning environment (and outside) to discover the different ways water is being used and for what purposes – complete the Water Discovery Walk worksheets as you go. During this exercise, the children can practice counting, i.e. counting the number of toilets and the number of taps in the learning environment. They can also identify the various different uses for water in all areas of the learning environment e.g. For cooking, cleaning, washing up, gardening etc.
- Back in the room, use tally marks to show how many toilets and how many taps were in the learning environment. Discuss all the other uses for water in the learning environment, and which activities use more water than others.

Extension activity

As a take-home activity, ask the parents/ caregivers to repeat the 'Water Discovery Walk' around their home and garden. This will allow children to identify the different ways water is being used in the home compared with water use in the learning environment. Again, children should be encouraged to practice counting during this exercise i.e. counting the number of toilets and the number of taps at home. They can also identify the various different uses for water in all areas of the home e.g. For cooking, cleaning, washing up, gardening etc.

Back at the learning environment, have a discussion about the different uses for water at home and the different uses for water in the learning environment.



Learning Element 3: How do we use water at work?

When I was a young boy, we lived on a farm. I remember what the farm looked like when we had lots of rain and when it was dry and we had no rain.

Let's learn about the importance of water and how it is used in different places of work.



Group discussion:

How is water used in different places of work, such as in manufacturing (factories) or agriculture (farming)? What impacts do drought and water restrictions have on water?

- Introduce the idea of a work-place as somewhere that people go to do their jobs. Discuss some different types of jobs and get the children to think about the associated work-places e.g. fireman works in a fire station, teacher works in a school, farmer works on a farm.
- Discuss the types of jobs and workplaces of their parents or grandparents. Think of the different ways that water is used in different type of workplaces?
- Explain that water is used in all places of work and is often an essential part of the process. For example, in agriculture (farming), water is essential for helping crops to grow. In factories and industries, water is essential in processing and manufacturing (making) products.
- Introduce the word drought to the children and explain what it means. Ask the children if they feel that Bathurst is in a period of drought or of good rain. Why do they feel that?



Activity: Old MacDonald had a farm....but it didn't rain!

Resources for learning:

- Support Resource – Dry Environment (farm in drought)
- Support Resource – Wet Environment (green pastures and waterways)
- Small pots or containers (2x per child), name labels, kitchen towel, cotton wool, cress seeds, spray water bottle

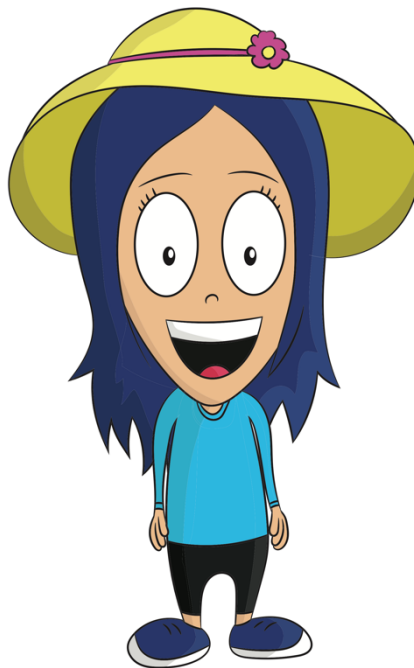
Note: Photos of farms in periods of drought and in periods of rain can be sourced from the internet or contributions from children

- Ask the children to think of a farmer. What job does a farmer do? Ask the children to think of all the ways that water would be used on the farm. Do they think that farms would use a lot of water or not very much water? Why do they think that?
- What would happen to the crops and animals on the farm if it stopped raining? Show students **Support Resource: Dry Environment and Support Resource: Wet Environment**, and other **photos of farms** during periods of good rain and in periods of drought. Ask the children to describe what they see in the photos. What are the colours like in the landscape in the two photos? What do the crops or livestock look like in each of the photos? In what ways are the photos different?
- To demonstrate the impact of drought on crops, get the children to grow some 'crops' of their own:
 - Each child should be given two small pots (e.g. yoghurt pots, small plastic cups, or similar) with their names on.
 - Wet some kitchen roll or cotton wool and place it in the pot, leaving a 3cm gap at the top.
 - Sprinkle cress seeds into the wet cotton wool and press down gently.
 - Place in a warm light place (e.g. windowsill). The first pot will represent a farm during a period of good rain- this pot will get rain (a light spray of water) each day. The second pot will represent a farm in a period of drought and will not receive any rain (do not water this pot).
- Get the children to check their 'crops' every few days- discuss what is happening. After 7-10 days look at the crops (cress pots) that have had lots of rain (have been watered), and the crops that have had no rain (not been watered). What are the differences? Reiterate that plants need rain to grow and share the photos of the farm in a drought again to show the same issue on a much bigger scale.

Activity: What goes into a bottle of water?

Resources for learning:

- Support Resource: *Plastic Bottle Impact*
- Book – [*The Adventures of a Plastic Bottle*](#) (optional purchase item)
- Explain that water is used in manufacturing and industry to make the things we need and use every day e.g. clothes, furniture, cars, toys etc.
- Ask the children to go and collect their water bottles. Why do we bring water bottles to the Centre every day? When do we drink water? Why is it important to drink lots of water? What happens to the water bottles when they go home (i.e. they get washed and refilled for the next day).
- Show children the **Support Resource: Plastic Bottle Impact** image of how much water and other resources are used in making a plastic bottle.
- Alternatively, read the **book – The Adventures of a Plastic Bottle**
- Introduce the work 'reusable' as something that can be used again and again. Ask the children to think about why reusing something is a good thing rather than throwing it away.



Module 3: Water In Bathurst

Early Learning
Water Education
Program



Module overview

Learning Elements	Group Discussion	Activity
1. What is a dam and why are dams so important?	<p>Have you ever been to visit a dam?</p> <p>Do you know what dams do and why they are so important?</p>	Discovering dams, reservoirs, pump stations and filtration plants through photos and videos
2. The journey of water from dam to tap	<p>How does water get from the dam to our taps?</p>	Journey of water from dam to tap!
	<p>What happens to the water on its journey?</p>	Water moving through pipes- an experiment that involves hypothesising and investigating
3. Why do water levels in the dam change?	<p>What causes changes to the water levels in a dam?</p>	Investigating and problem solving experiment to demonstrate changing water levels in a dam

Note: All URL's and links used throughout the Module are accurate and current at the time of publication.

Alignment with Early Years Learning Framework

Outcome 2: Children are connected with and contribute to their world.

- Children become socially responsible and show respect for the environment.

Outcome 4: Children are confident and involved learners.

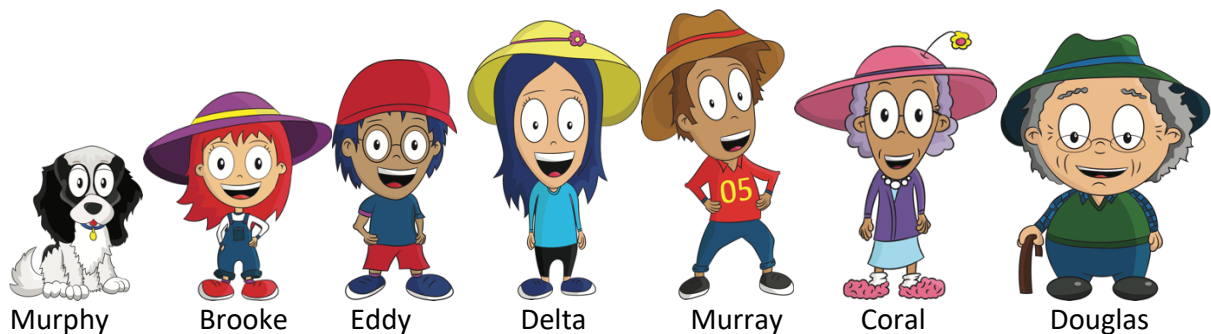
- Children develop a range of skills and processes such as problem solving, inquiry, experimentation, hypothesising, researching and investigating.
- Children transfer and adapt what they have learned from one context to another.

Outcome 5: Children are effective communicators.

- Children interact verbally and non-verbally with others for a range of purposes.
- Children express ideas and make meaning using a range of media.

Telling the story of water

Meet the Wade family, they will help us tell the story of water.



Key terms

Term	Definition
Dam	A barrier constructed to hold back water and raise its level, forming a reservoir used to generate electricity or as a water supply.
Gigalitre (GL)	A unit of volumes equivalent to 1,000 megalitres, which is 1,000,000,000 litres.
Irrigation	Irrigation is the process of applying controlled amounts of water to plants at needed intervals. Irrigation helps to grow agricultural crops, maintain landscapes, and revegetate disturbed soils in dry areas and during periods of less than average rainfall.
Catchment	The action of collecting water, especially the collection of rainfall over a natural drainage area.
Water Filtration Plant	A water filtration plant is a facility that works to filter and purify water by removing chemicals, hazardous materials, and toxic matters from a water source. Most plants of this type filter drinking water suitable for human consumption.
Flocculation	Flocculation is a process by which a chemical coagulant added to the water acts to facilitate bonding between particles, creating larger aggregates which are easier to separate. The method is widely used in water treatment plants.
Pump station	Facilities including pumps and equipment for pumping fluids from one place to another.
Bore water	Bore water comes from groundwater which in turn comes from rain that has naturally seeped into the ground and is stored in spaces between soil and rocks. Groundwater is brought to the surface using a bore (well).
Capacity (dam)	The maximum amount that something can contain. When a dam is 'at capacity', it is full.
Evaporation	Evaporation is the process by which water changes from a liquid to a gas or vapour. Evaporation is the primary pathway that water moves from the liquid state back into the water cycle as atmospheric water vapour.
Drought	A prolonged period of abnormally low rainfall, leading to a shortage of water.

Background information

What is a dam?

Dams are built to control and store water. Dams are made from earth, stacked rock or concrete, and are usually constructed across rivers to store water in the reservoir that is formed behind the dam as a result of the river being blocked. Dams vary immensely in size and shape, from small farm dams that hold water for stock watering, to large dams which store water for large urban centres.

Australia is the driest inhabited continent and has the highest per capita surface water storage capacity of any country in the world. The large number and size of water storages is a function of both Australia's aridity and the highly variable rainfall. There are more than 820 dams on waterways in Australia with a total capacity of greater than 91,000 GL

The stored water in the reservoir behind the dam can be used for various consumptive consumption purposes, including use as water for irrigation, or as sources of drinking water for urban and regional towns and cities. The stored water can also be released from the reservoir during the times that natural flows in downstream rivers are inadequate to help meet a variety of environmental objectives.

Depending on the catchment area for the dam, the water stored in dam reservoirs is usually easier to treat to meet drinking water standards than other sources of drinking water, such as run of river supplies. This is because the quality of the water usually improves the longer it is stored in the reservoir.

Bathurst's dams

Chifley Dam

The major water storage for Bathurst is **Chifley Dam** located on the Campbell's River some 17 kilometres upstream of Bathurst. Water released from the dam flows down the Campbells River into the Macquarie River. It is then drawn from the Macquarie to supply Bathurst. Chifley Dam is an earth and rock fill structure. The catchment area is 960 square kilometres, and the dam's capacity, with the present wall height, is 30,800 million litres.

The earth wall is 455 metres long and 34.4 metres high. It has a concrete side channel spillway on the eastern side of the embankment. There is also a six bay, 172 metre wide emergency spillway excavated into natural material on the western side of the structure, designed to sequentially operate if the side channel spillway cannot cope with high flood flows.

Unless water level is low, Chifley Dam is open for all water activities, such as fishing and watersports – including skiing, sailing, powerboating, canoeing and swimming.

In August 2020, Chifley Dam was at 57% capacity, which was the highest level since January 2019. The table below allows comparison of water levels at Chifley Dam 2017-2020, at the same time of year.

Date	Water Level, Chifley Dam
August 2017	88%
August 2018	55%
August 2019	45%
August 2020	57%

Winburndale Dam

Windburndale Dam is located on the Winburndale Rivulet, some 21 kilometres east of Bathurst. Raw water from the dam is used primarily for park watering and industrial purposes. Water supplied to Bathurst from Windburndale Dam is provided in part by an old wood stave pipeline between the dam and the city.

The dam is a concrete gravity structure, 32 metres long and 22 metres above foundation level at its highest point. The abutments are earth fill, sealed with a thin layer of concrete. The capacity of the dam is estimated at 1,700 million litres, from a catchment area of approximately 88 square kilometres.

Bathurst's Water Filtration Plant - the process

Raw water contains undesirable sediments, colour, algae (which can produce a taste and smell) and other harmful organisms. The Water Filtration Plant (WFP) is designed to remove this undesirable matter, and produce water fit and safe for drinking, known as 'potable water'.

There are four x 11 metre long pumps installed on a platform beside the river lifting raw water up into the WFP. The WFP is designed to remove the undesirable matter, and produce water fit and safe for drinking. The raw water from the river system is delivered into a pit chamber or channel, where two chemicals are added and the mixture is agitated by a propeller-type 'Flash Mixer'. The chemicals used in raw water include:

- Alum (aluminium sulphate) to flocculate (join together) the tiny particles suspended in the water;
- Polymer, consisting of long chain molecules which join the 'floc' into even larger particles;
- Soda ash (sodium carbonate) to prevent the water from becoming acidic and therefore corrosive, as it would if only alum were added. This is used to adjust the pH at the end of the process.
- A powdered activated carbon (PAC) dosing plant is located near the raw water pumps (only dosed when there is an algae problem or taste or odour, which has been rare to-date).

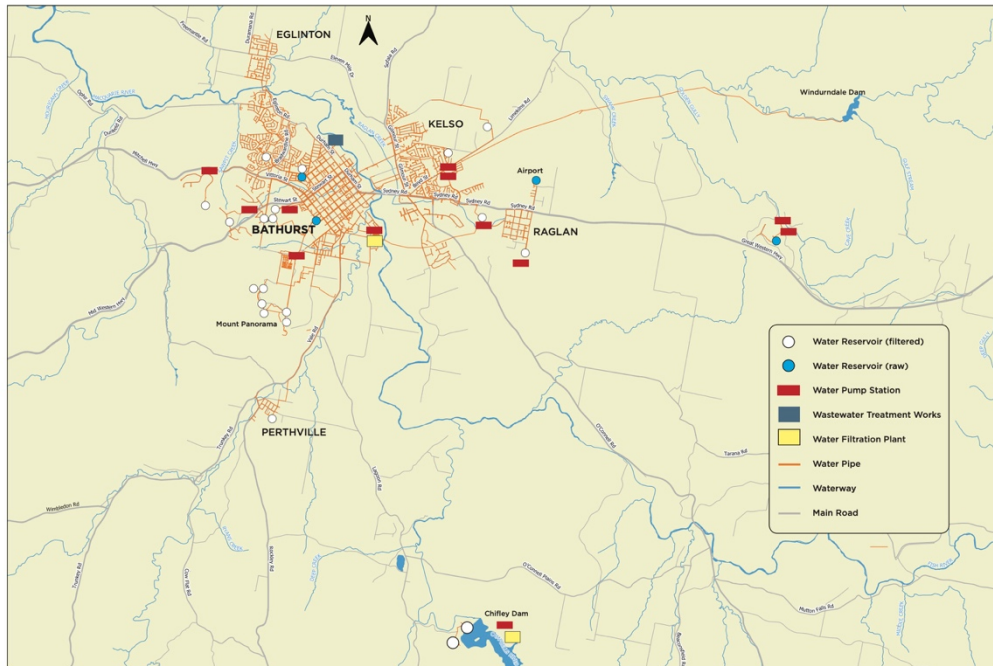
PAC can be injected into the water to adsorb odours and toxic compounds produced by the algae. It is then removed by the conventional process. The mixture of water and chemicals is vigorously agitated a second time before being distributed by a channel into one of the three flocculation tanks. Here large horizontal paddles rotate slowly to encourage the floc to form and grow larger. From the flocculation tanks, the water enters the sedimentation tanks. As it flows slowly down these tanks, the large particles settle to the floor under gravity.

A sludge rake scrapes along the bottom of each of the three sedimentation tanks, collecting the settled sludge and pushing it towards hoppers at one end. From here it is released periodically to the sludge lagoons, which are drained so that the sludge can be dried and removed. After the heavier floc has settled, the water is passed through sand filters which collect smaller particles. The filters are periodically backwashed by forcing a combination of air and water up through the layers of sand, thus removing the fine material captured by the filters which could clog them. The filtered water drops into underground reinforced concrete clear water tanks, one of which is located under the main building. As it enters these storage tanks, it is treated with chlorine to kill any harmful organisms and with fluoride which aids in the dental health of the community.

From the underground tanks, the water is pumped into the town water supply system. Reservoirs located at high points in the system store the water and balance the usage against the capacity of the pumps. When the pumps are not running, the pressure in the system is maintained by feeding from the reservoirs. The plant has a complex control and monitoring system, allowing equipment to be operated either automatically or manually from a central control area. A telemetry system now complements the original electrical control system.

It exhibits on a computer screen the status of all the equipment in the plant, of the reservoirs and of the pumping stations. It also allows the plant to be controlled from a remote location, using a portable computer. Alarms are registered at the plant and are communicated to the operators by pager out of working hours, so that problems are dealt with promptly. A well-equipped laboratory enables constant testing of the raw water and of the treated water delivered to customers. It monitors such things as turbidity, colour and pH. Operators also do periodic testing for Coliforms or indicator bacteria, and algae identification and counting.

Council, in conjunction with the New South Wales Health Department, conducts a monitoring program to ensure the treated water complies with the Australian Drinking Water Guidelines 2011. The water is tested for a comprehensive range of organic and inorganic analytcs monthly and for indicator bacteria weekly. Any failures to meet the Australian Drinking Water Guideline's result in notification of the Local Health Unit and Council and investigation and remedial action are promptly instigated.



AS AT NOVEMBER 2020

Support Materials, Links and Additional Resources

- Video: Bathurst Regional Council– [Module 3: The Wade Family – Water In Bathurst](#)
- Website: Bathurst Regional Council [Catchments and water supply](#)
- Book: [Whizzy's New Adventures: Journey through the pipes](#)
- Video: YouTube - The Wiggles- [The Handwashing Song](#)
- Website: [Sydney Water resources](#) for students and teachers



Learning Element 1: What is a dam and why are dams so important?



I love to visit the Chifley Dam with my family. Sometimes we camp and other times we take the boat out on the dam when it is open. However, dams also play a very important role in providing water to drink.

Let's learn more about dams!

Group discussion: **Have you ever been to visit a dam? Do you know what dams do and why they are so important?**

Resources for learning:

- Web link to Chifley Dam water level information <https://www.bathurst.nsw.gov.au/chifley-dam-details.html>

Note: Refer to Module 2: How do we use water? Learning Element 3 How do we use water at work?

- Ask children if they know what a dam is. Ask if they have ever been to Chifley Dam in Bathurst- what did they do while they were there?
- Explain that dams are built to capture and store rainwater- almost like pouring water into a bowl or filling a bath. Ask the children to think about why we need dams. What do they think the water in the dams is used for?
- Ask if any of the children who live in rural areas have a dam on their property. What is the dam used for? Is their dam full or empty at the moment?
- Explain that, in Bathurst, the water from Chifley Dam supplies Bathurst with its drinking water. Explain that when the children fill up their water bottles or wash their hands, the water has come from the Chifley Dam. Clarify that if some children live on rural properties, then their drinking water may come from rainwater tanks if they are not connected to the town water system.

- Ask the children to think about what would happen to the water levels in the dam if it did not rain. Ask the children why this could be a problem. Tell the children how full Chifley Dam is at the current time and explain how the levels in the dam have changed over time dependent on the weather and the amount of rainfall.
- Introduce Bathurst's second dam, Winburndale Dam. Explain that this dam is primarily used to supply raw water for park watering and industrial purposes and not for drinking water.

Activity: **Finding out about dams, reservoirs, pump stations and filtration plants**

Resources for learning:

- *Support Resource: Chifley Dam*
- *Support Resource: Reservoir*
- *Support Resource: Water Pump Station*
- *Support Resource: Water Filtration Plant*

Note: Educators may choose to search for photos and videos on the internet, or visit Bathurst Regional Council's website to source more photos of local dams and water filtration centre

Visit: www.bathurst.nsw.gov.au

- Show the children the **Support Resources: Photos of Chifley Dam, a Reservoir, a Water Pump Station and Bathurst's Water Filtration Plant**
- Discuss the role of Council water operators and what they do.



Learning Element 2: The journey of water from dam to tap



How many times a day do you turn on the tap? Maybe to wash your hands or fill up your water bottle. Have you every stopped to think about where the water comes from and how it gets to the tap?

Let's learn more about how water gets from the dams to our taps.

Group discussion:

How does water get from the dam to our taps? What happens to the water on its journey?

Resources for learning:

- o *Video: Module 3: The Wade Family - Water In Bathurst*

Note: How and why water is cleaned before we drink it is covered in further detail in Module 5: Keeping our water clean and healthy, Learning Element 3 Why is it important to look after creeks and rivers?

- Show the children the **Video Module 3 The Wade Family - Water in Bathurst**
- Explain to the children that the drinking water that comes out of taps in Bathurst comes from the Chifley Dam.
- Clarify that if some children live on rural properties, then their drinking water may come from rainwater tanks and that they might have their own dams or bore water on their properties to use on their paddocks and for their animals.
- Ask the children to describe what colour the water is that comes out of the tap in their learning environment - is it brown and dirty or clear?
- Discuss that the water has to be cleaned to make sure it is safe to drink. Talk about how the children would clean their hands or teeth to make them clean. Ask them how do they think you would clean water?
- Introduce the term 'water filtration' and give a simple description of how water is filtered and cleaned to remove all the dirt and sediments using the information provided in the background section.
- Explain how the water is then pumped from the water filtration plant into the town water supply system through an underground pipe system ready to be used in homes, schools and businesses across Bathurst.

Activity:

How does water get from the dam to our taps?

Resources for learning:

- Support Resource: Map of Bathurst Regional Council's Filtered and Raw Water System
 - Support Resource: Chifley Dam
 - Support Resource: Reservoir
 - Support Resource: Water Pump Station
 - Support Resource: Water Filtration Plant
- Show the children the **Support Resource: Map of Bathurst Regional Council's Filtered and Raw Water System** and ask them the following questions while they are looking at the picture. Children can come up and point to what they can see if the picture is displayed on a smart board or similar.
 - Who can see Chifley Dam? Who can see Bathurst? Point out the other suburbs marked on the map. Point out the airport.
 - Is Chifley Dam right next to Bathurst or further away?
 - Who can see the squiggly blue lines? These are rivers- how many can you see?
 - Point to the key showing the icon for a water filtration plant- who can see the water filtration plant on the map? Remind the children that this is where the dam water is cleaned
 - Point to the key showing the pump stations- how many pump station are there on the map? Count them together.
 - Point to the key showing the water reservoirs that hold filtered or cleaned water. How may filtered water reservoirs are there on the map? Count them together.
 - Point to the key showing the water pipes. Are there lots of water pipes on the map or just a few? What shapes do they make on the map?
 - Trace some of the orange lines (pipes) between the water filtration system and the pump stations. Explain that this is how the water moves from one area to another and eventually to our homes.
 - Explain that where all the orange lines (pipes) are located, is also where most people in Bathurst live and work.



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Activity: Water moving through pipes experiment

Resources for learning:

- Plastic tubing of different lengths and diameters, watering can or jug (or similar), collection bucket, linking tubes (optional), water pistol (optional)

Notes: This experiment is best done in an outdoor area. Children can take it in turns to pour the water into the pipes. Use a bucket to collect and reuse water to prevent wastage.

- Gather some transparent plastic tubing or pipes of different diameters and different lengths (e.g. from a local hardware store).
- Place the tubes at different gradients and different angles in an outdoor area.
- Pour water through each of the tubes/ pipes and time how quickly the water moves through.
- Ask the children to describe what they are seeing and how they would describe the movement of water in tubes of different diameters and different gradients.
- Use some linking tubes to connect the plastic pipes together into a network. Pour water in one end (the dam) and ask the children to describe the journey of water though the pipes and into the bucket (the home tap).
- For an extension exercise, use a water pistol to demonstrate how much faster water moves when it is under pressure. Explain that pressure helps water come out of the tap straight away when it is turned on.
- At the end of the experiment, reiterate that Bathurst's drinking water is fed into our homes via a series of underground pipes



Learning Element 3: Why do water levels in the dam change?

I visited Chifley Dam today.

It has been 6 months since I was last there and I cannot believe how much the water level has changed. Do you know why this might be?

Let's learn more about what causes the water level in the dam to change!



Group discussion: What causes changes to the water levels in a dam?

Resources for learning:

- *Activity Sheet: Complete the Water Cycle*
- *Activity Sheet: Wade Family Indoors*
- *Activity Sheet: Wade Family Outdoors*

Notes: Educators may also wish to revisit the Activity Sheet: Water Use Flash Cards, used in Module 2: How do we use Water Learning Element 2 How do we use water at home and in our learning environment?

- Remind the children that a dam is a structure used to capture and store water that we use every day. Explain that the dam fills up when it rains.
- Revisit the **Activity Sheet: Complete the Water Cycle** from **Module 1: The Water Cycle - Learning Element 1 and 3** and explain that the sun can heat the water in the dam and cause it to evaporate. Explain this is similar to what happens to a puddle, but on a much bigger scale! When it rains, this can cause a puddle to form on the ground. Once it stops raining and the sun comes out, the puddle gradually dries up because the heat from the sun is evaporating the water.
- Using the **Activity Sheet : Wade Family Indoors** and **Activity Sheet: Wade Family Outdoors**, ask the children to identify the ways water is used by the Wade family
- Ask the children to think of all the ways they use water both at home and in their learning environment.
- Ask the children to think about what would happen to the water levels in the dam if everyone in Bathurst was using water every day for lots of different activities AND there was no rain. What do they think would happen to the water in the dam? Use the activity experiment below to demonstrate.

Activity: Experiment to demonstrate changing water levels in a dam

Resources for learning:

- Large bowl, waterproof pen, small containers (e.g. yoghurt pots) – one for each child or can be shared, collection bucket, watering can

*Notes: Being conservative with water, water-saving pictures and how to be water smart are all covered in **Module 4: Being Conservative with Water***

- Fill a large bowl (e.g. washing up bowl or similar) with water almost to the top.
- Use a waterproof pen or sticker to mark the water level at the start. Explain to the children that this bowl represents Chifley Dam.
- Give each of the children a small plastic canister (e.g. yoghurt pot, plastic cup or similar)
- Go around the table and ask each child to name one way they use water each day. Once they have said their water use, ask them to come up to the dam (bowl) and scoop out some water and then tip it into a bucket.
- Once all the children have had a turn, mark another line at where the water in the dam (bowl) has dropped to.
- Ask the children to describe what has happened to the water level in the bowl. Reiterate that this is what happens, on a much larger scale, to the Chifley Dam in Bathurst. When everyone uses water and it does not rain, the water level drops. Explain that this is why there are sometimes water restrictions (high, critical or extreme) in place in Bathurst to encourage everyone to try and save water so the dam does not run dry.
- Tip all the water from the bucket back into the bowl (dam) and repeat the experiment. This time, once a third of the class have removed their water for various water uses, use a watering can, to signify rain, to fill the bowl (dam) up.
- Ask more children to take water out, signifying further water uses and then use the watering can to again add more 'rain' to the dam.
- As you are going through this exercise, ask the children to describe what is happening to the water levels in the bowl and how they change i.e. when water is used, the water levels in the dam fall and when rain is added, the water levels in the dam rise.
- Explain that changes in water level also happens at the Chifley Dam based on how much rain the dam gets and how much water is used by the Bathurst community. During period of good rain, the dam fills up which means that water restrictions can be eased. However, in periods of drought (when there is no rain), people continue to use water but it is not getting replaced therefore water levels in the dam drop and water restrictions have to be introduced.

Module 4: Being Conservative With Water

Early Learning
Water Education
Program



Module overview

Learning Elements	Group Discussion	Activity
1. Why do we need to save water?	Why does the weather change at different times of the year?	Weather across the seasons- art and craft decision making activity
	What are the four seasons, and what weather do we associate with each season?	Creating a weather diary
		What's the weather today?
2. How can we look after water?	How many ways do we use water every day?	How water smart is our learning environment? Water Discovery Walk
	How can we use less water and make sure it does not go to waste?	Create your own 'Water- Let's Make It Last' stickers
3. Creating a water smart garden	In what ways does nature- plants and animals- need and use water? What does the water do? How do we use water in our gardens at our childcare centre and at home?	Designing and creating a water smart garden

Note: All URL's and links used throughout the Module are accurate and current at the time of publication.

Alignment with Early Years Learning Framework

Outcome 2: Children are connected with and contribute to their world.

- Children become socially responsible and show respect for the environment.

Outcome 3: Children have a strong sense of well-being.

- Children take increasing responsibility for their own health and physical wellbeing.

Outcome 4: Children are confident and involved learners.

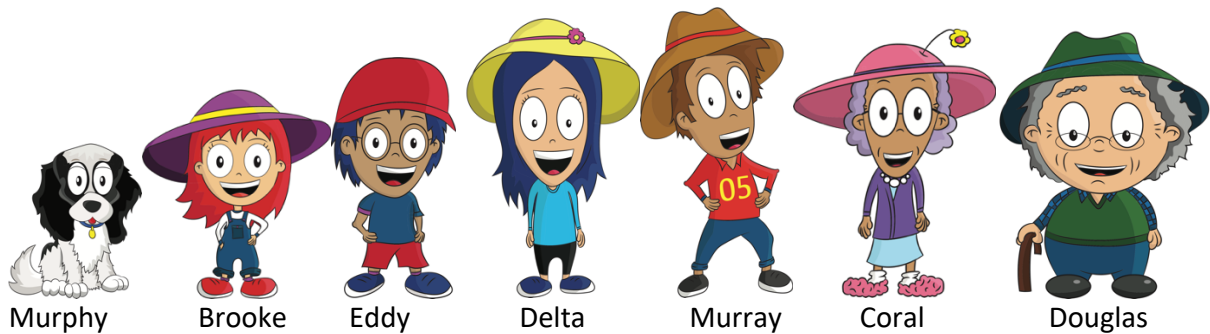
- Children develop a range of skills and processes such as problem solving, inquiry, experimentation, hypothesising, researching and investigating.
- Children transfer and adapt what they have learned from one context to another.

Outcome 5: Children are effective communicators.

- Children interact verbally and non-verbally with others for a range of purposes.
- Children express ideas and make meaning using a range of media.

Telling the story of water

Meet the Wade family, they will help us tell the story of water.



Key terms

Term	Definition
Freshwater	Fresh water is any naturally occurring water except seawater and brackish water.
Consumption	The action of using up a resource.
Ecosystems	A biological community of interacting organisms and their physical environment.
Climate change	Climate change is a long-term shift in global or regional climate patterns and is influenced by human emissions of greenhouse gases.
Conservation	Prevention of wasteful use of a resource.
Degradation	The process by which something is made worse, especially the quality of land.
Stormwater	Stormwater is surface run-off from rain and storms that enters our drains.
Stormwater pollution	Stormwater can carry materials such as soil, organic matter, litter, fertilisers from gardens and oil residues from driveways and pollute downstream waterways.
Water restrictions	Water restrictions have been enacted in many cities and regions in Australia in response to chronic water shortages resulting from the widespread drought. Depending upon the location, these can include restrictions on watering lawns, using sprinkler systems, washing vehicles, hosing pavements, refilling swimming pools, etc.
Drought	A prolonged period of abnormally low rainfall, leading to a shortage of water.
Water smart	A form of water conservation traditionally used to describe plant adaptations in response to drought stress, including drought escape, drought avoidance, and drought tolerance.
Evaporation	Evaporation is the process by which water changes from a liquid to a gas or vapour. Evaporation is the primary pathway that water moves from the liquid state back into the water cycle as atmospheric water vapour.
Mulch	A layer of material applied to the surface of soil. Reasons for applying mulch include conservation of soil moisture, improving fertility and health of the soil, and weed suppression.

Background information

Freshwater is essential to human existence, and to the functioning of the ecosystems that support us. Australia is the driest populated continent on earth and can yield only a limited amount of freshwater. The average annual rainfall in Australia of around 470mm a year is well below the global average. Despite this, Australians are the greatest per capita consumers of water, using an average of 100,000L of freshwater per person each year. This figure does not include the significant quantities of water embodied in the food and products we consume.

Available freshwater resources are expected to decline with changes to rainfall patterns accompanying global climate change. As our population grows, so does the pressure on water use. To ensure future supplies of fresh, clean water we need to use it more carefully.

In addition to the problems of limited supply, the way we use water contributes to a range of ecological problems. Conserving water resources, even in areas without shortages, helps reduce the need to build dams, protects river health by reducing the need to extract water, reduces wastewater produced and treated at sewage plants, lowers energy requirements for treating and transporting water and wastewater, and reduces greenhouse gas emissions. Managing surface runoff and stormwater pollution helps to prevent the degradation of rivers, wetlands and oceans.

The two big issues that households can help to address are:

- Reducing the *quantity* of water we consume
- Improving water *quality* by managing stormwater and wastewater

Homes and gardens are directly responsible for about 12% of Australia's water use and much can be done in the home and garden to reduce water use and the impacts of stormwater and wastewater.

Australia is the driest populated continent on earth, and yet Australians are the greatest per capita consumers of water in the world. While action by government at all levels can help to reduce water use, it is actions by individuals in the home, at work, and at play, that are also important in conserving this valuable resource. By checking, monitoring and reducing our water use, we can ensure the sustainability of our water supply for the future.

Bathurst Regional Council has implemented a range of drought management actions in accordance with its [Drought Management Plan](#), water restrictions are part of this plan and relate solely to Bathurst's water supply. Alternative water supplies do exist, including bores, wells, independent rainwater tanks (not filled/topped up from Bathurst water supply) and water sourced from supplies outside the local government area (LGA).

There are different levels of water restrictions enforced in Bathurst based on the level of the Chifley Dam, the main source of Bathurst's water supply. From late 2019 through to mid 2020, Bathurst's water restriction level was **extreme** with Chifley Dam level dropping to a low of approximately 29%. Depending on the level of water restrictions in place, number of activities by residents, business, community groups and Council are prohibited or carefully managed, to help conserve water supplies.

The following table shows an example of how different levels of water restrictions can be used to change water consumption and conserve water supplies during dry times.

	Enforced Restrictions		
	HIGH	EXTREME	CRITICAL
In Effect	26/11/18	14/10/19	15%-0%
Watering – Lawns	Odds and evens 6am-9am or 6pm-9pm Maximum 30 minutes/day	Not permitted	Not permitted
Watering – Gardens	Odds and evens 6am-9am or 6pm-9pm Maximum 30 minutes/day	Above 29% hose and trigger nozzle permitted for 30 minutes/day on Wed & Sun only 6pm – 9pm Below 29% bucket or watering can permitted for 30 minutes/day on Wed & Sun only 6pm-9pm	Not permitted
Car Washing - At Home	Bucket & trigger nozzle on lawn 6am-9am or 6pm-9pm	Not permitted	Not permitted
Swimming Pools	Top up: 6am-9am or 6pm-9pm with pool covers First fill: with Council permission	Top up & filling not permitted	Top up & filling not permitted
Garden Features & Temporary Child Pools	Top up & filling permitted	Top up & filling not permitted	Top up & filling not permitted
Washing Hard Surfaces	Not permitted	Not permitted	Not permitted
Indoor Activities	Water wise actions required	4 minute showers or 1 bath/person/day (150mm deep) Water wise actions required	3 minute showers or 1 bath/person/day (100mm deep) Water wise actions required

Water Restrictions for Home Gardens
IN EFFECT FROM 24 FEBRUARY 2020

SUNDAYS AND WEDNESDAYS ONLY
MON TUE WED THU FRI SAT

USING BUCKETS OR WATERING CANS ONLY (NO HOSES)

MAXIMUM 30 MINUTES WATER RUNNING TIME (ONE TAP)

BEFORE 10.00AM OR AFTER 4.00PM

WATER
Let's make it last.

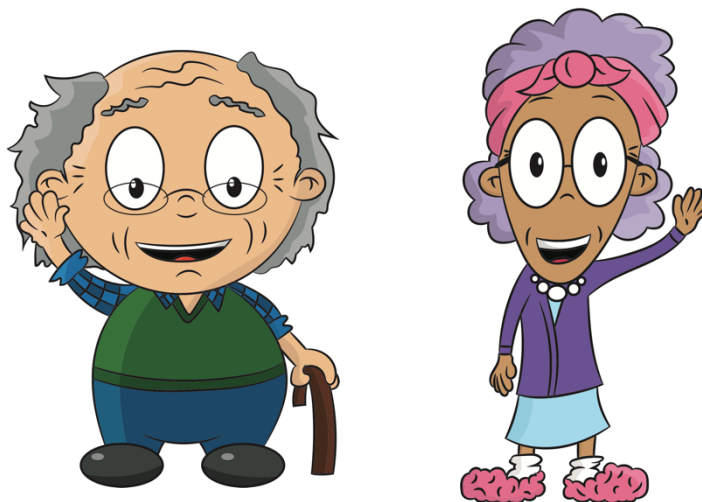
For more information:
Phone: 6333 1683
www.bathurst.nsw.gov.au/waterrestrictions

BATHURST REGIONAL COUNCIL

Advertising artwork used to communicate water restrictions to the Bathurst community

Support materials, links and additional resources

- Video: Bathurst Regional Council – [Module 4: The Wade Family – Being Conservative With Water](#)
- Video: [Tutorial by horticulturist Dhyan Blore – Creating a Water Smart Garden](#)
- Website Bathurst Regional Council: [Catchments and water supply](#)
- Website: Bathurst Regional Council [Water Restrictions](#)
- Document: Bathurst Regional Council: [Drought Management Plan](#)
- Website: Smartwatermark - smart water advice in the [home](#)
- Website: Smartwatermark - smart water advice in the [garden](#)
- Website: Water NSW- Regional NSW [drought information](#)
- Website: Community Early Learning Australia: [Respectful water play](#)
- Website: Kids Gardening- [wise watering](#)
- Video: Youtube - [Isabella's Garden](#)
- Website: [Dirt Girl World](#) episodes- Water, Rain
- Book - [Enviro-stories- Drought to Flood, Narrabri Public School](#)
- Book - [Enviro-stories- How to Save Water, St Joseph's Primary school, WeeWaa](#)
- Website: [Sydney Water resources](#) for students and teachers



Learning Element 1: Why do we need to save water?



I love the summer, but it does get very hot and dry! My family are saving water which means I have not had to have a bath for ages- yippee!!

I wonder when it is going to rain again

Group discussion: Why does the weather change at different times of the year? What are the four seasons, and what weather do we associate with each season?

Resources for learning:

- *Video: Module 4 The Wade Family – Being Conservative With Water*
- Discuss seasons with the children. Do they know what the four seasons are? Introduce the 12 months of the year. Explain that the 12 months of the year are split into 4 to make up the 4 seasons: Spring (September, October, November); summer (December, January, February); autumn (March, April, May); and winter (June, July, August).
- Discuss some special events and what season they fall in e.g. Christmas, Easter, children's birthdays etc.
- Have a look outside. Ask the children to describe what the weather is doing today. Ask children to name as many different types of weather as possible (sunny, cloudy, rainy, snowy, windy, stormy etc.) Write and draw these different weather types on a board.
- Ask the children to think how the weather changes across the seasons. What is the weather like in the winter compared to the weather in the summer? Discuss the idea that in the summer, when the weather is hotter and more humid, there is more water in the air and more likely to rain and storm. Ask the children what effect this has?
- Show the children the **Video: Module 4 The Wade Family – Being Conservative With Water**

Activity: Weather across the seasons

Resources for learning:

- *Activity Sheet: Weather Across the Seasons (A4 poster)*
- *Activity Sheet: Weather Across the Seasons (icons to cut out)*
- *Coloured pencils, scissors*
- Print out a copy of the **Activity Sheet: Weather across the Seasons (A4 poster)** and **Activity Sheet: Weather Across the Seasons (icons)** for each child. Help the children to cut out the weather icons.
- Ask the children to think about the most common types of weather that occur in each of the seasons and then get them to stick the appropriate weather icon/s from **Activity Sheet: Weather Across the Seasons (icons to cut out)** in the spaces available on the **Activity Sheet: Weather across the Seasons (A4 poster)**.
- Once completed, the children can colour in the **Activity Sheet: Weather across the Seasons (A4 poster)**. Use the completed posters to demonstrate that it can rain more at certain times of year, and in certain seasons, than in others.



Activity: Creating a weather diary

Resources for learning:

- Activity Sheet: *Weather Across the Seasons (icons to cut out)*
 - Activity Sheet: *Weather Diary Worksheet*
 - A4 or A3 paper, pens, coloured pencils, scissors
- Get the children to keep a weather diary for a week/ fortnight. Print out and use the **Activity Sheet – Weather Diary Worksheet** (onto A3 or A4 paper). Each day, ask the children to describe what the weather is doing. It is suggested that the children do this twice during the day; once in the morning and once in the afternoon. They can either draw the weather type onto their weather diary or alternatively choose an appropriate icon from the **Activity Sheet: Weather Across the Seasons (icons)** to stick to the diary.
 - At the end of the week/ fortnight, discuss the different types of weather depicted on the weather diaries and how the weather changed during the time. Was there more of one weather type than another? Which weather type was there more of and why? If possible, this activity could be repeated throughout the year during the different seasons to give children a better understanding and appreciation of various weather types across the year.

Activity: What's the weather today?

Resources for learning:

- A4 or A3 paper, pens, coloured pencils, paints, brushes
- Ask children to draw or paint a picture showing what the weather is like today



Learning Element 2: How can we look after water?



Hi again kids! While I really enjoy watering the garden and keeping the grass green, it is really important that we use water carefully. That is why I have a water tank that collects rain water from the roof, and I only water my garden in the evening when it is cooler.

Let's learn why it is important we all save water!

Group discussion: How many ways do we use water every day and how can we use less water and make sure it does not go to waste?

Resources for learning:

- o *Activity Sheet: Water Use Flash Cards*
- Revisit all the different ways that water is used in the home and in the learning environment. Explain that water is used for drinking (to keep our bodies healthy), for washing hands and bodies (to keep us clean). However, water is also used for lots of other activities around the house and learning environment, such as washing clothes, cooking, watering the garden etc.
- Remind the children about how weather changes across the seasons and that, at certain times of the year, it can rain less than at other times of year. Also, some years can be wetter than others. Ask the children to think about what impacts this might have.
- Explain the importance of looking after water and trying to save water wherever possible. Using the **Activity Sheet: Water Use Flash Cards** from **Module 2: Learning Element 2 'How do we use water?'** ask the children to think about ways water could be saved, or less water could be used, during each of the activities. For example, turning off the tap when brushing teeth.
- Discuss other ways that water could be saved, or less water used, in the learning environment. For example, washing paint brushes in a jar of water and not under a running tap. If the learning environment has a water tank, explain what this does, how it works and how it is a good way to save water.

Activity: How water smart is our learning environment?

Resources for learning:

- Activity Sheet: *Water Discovery Walk*
- Support Resource: *Examples of Stickers*
- Support Resource: *Map of Bathurst Regional Council's Filtered and Raw Water System*

Note: Educators may wish to refer to **Module 2: Learning Element 2**, Activity 'Water Discovery Walk', for instructions on how to use the worksheet.

- Take the children on the 'Water Discovery Walk' around the learning environment and discover the different ways water is being used and for what purpose. Complete the **Activity Sheet: Water Discovery Walk** as you go. Discuss whether it would be possible to use less water, or save water, in all the different areas around the learning environment. Don't forget to also go outside.
- Back in the classroom, ask the children to remember all the ways water was being used around the learning environment.
- Show the children **Support Resource: Examples of Stickers** that prompt or remind us of ways we can conserve water (known as point of source prompts) and explain that these act as reminders to save water at all the taps and toilets around the learning environment.



Activity: Create your own 'Water – Let's Make It Last' stickers

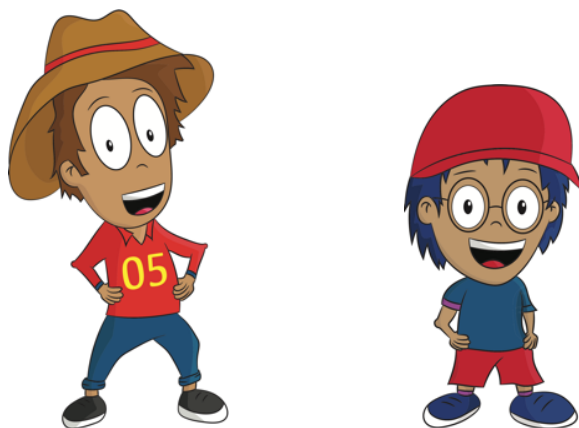
Resources for learning:

- Activity Sheet: Remember...Water Let's Make It Last Sticker Template
- Support Resource: Examples of Stickers
- Pens, pencils, paint, scissors, blue-tac or sticky tape, laminator & sleeves (optional)

Note: Bathurst-based educators may wish to scan and email a small selection of sticker artwork (no more than 4) drawn on the sticker templates, to Bathurst Regional Council's Environmental Programs Officer for printing purposes. A maximum of 200 total stickers/decals will be produced at no charge. These professionally printed stickers/decals of the artwork will be sent back to the educator for distribution to the children and their families. Alternatively, educators may use the sticker template for children to draw onto, then laminate and cut out the drawings and stick these to relevant surfaces around the learning environment.

Email: council@bathurst.nsw.gov.au attention: Environmental programs Officer

- Using the **Support Resource: Examples of Stickers** and **Activity Sheet: Remember Water Let's Make It Last sticker template**, ask the children to draw in their own water smart pictures onto the template, for example: turning of dripping taps, half flush on the toilets, take short showers, turn taps off when brushing teeth etc.
- Make copies of the stickers to use around the learning environment.
 - Send a small selection of the artwork template drawings (no more than 4 drawings) to Bathurst Regional Council's Environmental Programs Officer, for professional printing – 200 stickers will be printed free of charge. Printed stickers/decals will be returned to the educator for distribution to families; **OR**
 - Laminate and cut out the children's artwork
- Get the children to take it in turns to attach a copy of the water smart sticker prompts at all the taps and toilets in the learning environment as you take them on the Water Discovery Walk. Remember to also include outdoor taps.
- The completed pictures could also be taken home to assist in family discussions and to raise awareness of being water smart in the home.



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Learning Element 3: Creating a water smart garden

I love gardening and my garden is known as a 'water smart' garden so we can save as much water as possible. Do you have a garden at home or in your learning environment?

Let's learn more about what nature- plants and animals- use water for and how to create a water smart garden!



Group discussion:

In what ways does nature – plants and animals – need and use water? What does the water do? How do we use water in our gardens in our learning environment and at home?

Resources for learning:

- *Support Resource: Dry Environment*
- *Support Resource: Wet Environment*
- *Activity Sheet: Water Storage & Use*
- *Video: Module 4 Being Conservative with Water*

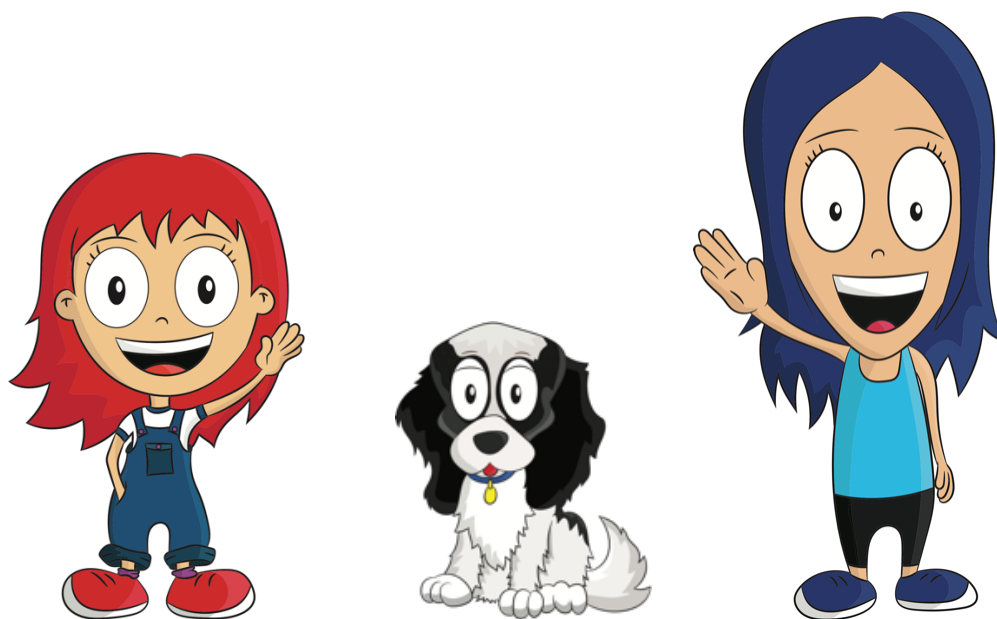
*Notes: Educators may wish to revisit **Module 2: Learning Element 3 How do we use water?***

Educators may wish to find photos of several different landscapes in wet and dry seasons.

- Using the **Support Resource: Dry Environment** and **Support Resource: Wet Environment**, or other images of Australian landscapes, show children of two different landscapes within Australia; a picture of the outback, that receives low amounts of rain, and a picture of a tropical rainforest that receives higher amounts of rain. Ask the children to describe what they see and ask them to think about why the landscape is so different in each case.
- Explain to children that it is not just humans and animals and birds that need and use water, but water is also essential for trees, plants, flowers and crops as well. Ask the children to think about, and describe, what happens to the grass and to plants that don't get regular water.
- Explain that without water, we would not be able to grow the food that we eat. Ask which children live on a farm or a rural property. Find out if they know where the water comes from? Explain that most farms have dams (that are filled up with the rain) and also bore

water (which is water that is stored underground and is pumped to the surface using a windmill or electric pump). The dams and water bores are used for livestock and also to water any paddocks and crops. During particularly dry times of the year, the dams can dry up. Use the **Activity Sheet: Water Storage & Use** to engage the children in a game that links water storage to its use.

- Explain that plants, trees, flowers and crops all have roots underground. When it rains, the rainwater soaks into the ground. The roots of the plants suck the water up into the stems and the leaves allowing the plants to grow. All plants need sunlight and water to grow, however some plants can survive on much less water than others. While some plants will wilt and die if it does not rain for a period of time, other plants are able to withstand hot and dry conditions for longer.
- Introduce the idea of a water smart garden. Explain that water smart gardens are specially designed and planned so that they do not use as much water.
- **Watch Video: Module 4 The Wade Family Being Conservative with Water**



Activity: Designing and creating a water smart garden

Resources for learning:

- Video: Tutorial by horticulturist Dhyan Blore, "Creating a Water Smart Garden"
- Raised garden bed (or similar), plants, gardening tools, mulch, watering can or hose.
- Factsheet: Education Centres (water smart gardening tips for education centres)

Notes: Educators may wish to visit the Water Restrictions pages on Bathurst Regional Council's website for more easy-to-follow factsheets that support water smart gardening

- Show the children the **video Tutorial by horticulturist Dhyan Blore, 'Creating a Water Smart Garden'** (12mins 45secs)
- Discuss with the children what they have learnt from watching the video and what they liked most about the water smart garden.
- Take the children into the outside area and asking them to look around and think about where might be good spot to locate a water smart garden. Ask them to think about how much sun and shade the potential garden site may get, how the garden could be watered and whether the garden is easy to access.
- Go back inside and complete a brainstorm session with the children about designing and creating a successful water smart garden. You may wish to discuss:
 - Where you are going to build the water smart garden, the size, shape and design of the garden.
 - The type of plants that you might want to grow in the water smart garden. Are you going to grow an edible garden or a flower garden? Would it be better to have plants that require lots of watering or plants that require less watering?
 - The purpose of mulch and how placing mulch around the plants helps to protect the soil and helps to capture and keep water in the soil and prevent it from evaporating. Discuss what different types of mulch could go on the water smart garden.
 - How the water smart garden could be watered. Does the learning environment have a water tank? Would there be a way of capturing the water that comes off the roof? Whose responsibility will it be to water the garden?
- Involve the children in the creation of a water smart garden for the learning environment **using the information from Dhyan and the video for inspiration**. Ensure the children are actively engaged in the planning, planting, maintenance and upkeep of this garden. Engage the children in frequent observations of, and discussions about, the water smart garden and check their learning and understanding through questions such as: How quickly are the plants growing? Are some plants doing better than others? How often does the garden need watering? What time of year is the garden most healthy etc.?
- Wherever possible, try and use 'recycled' rainwater to water this garden e.g. from a water tank, or rainwater captured in bottles or buckets from the downpipes.

Inspiration for water smart gardening in your learning environment



Left and right: Shaded play areas, native plants in raised pots, hardwearing artificial turf



Left and right and below: Worm farms are a useful way to dispose of suitable organic waste, and they provide nutrient rich liquid for plants





Left, right and below: create interesting, sunsafe and environmentally sustainable gardens and play spaces with native plants, different materials and textures. Large trees and sails provide shade and introduce different shapes and colours to the learning environment.



Thank you to the staff and children at Goodstart Early Learning Centre Kelso for allowing us to photograph your engaging, water smart play and learning initiatives.

Module 5: Keeping Our Waterways Clean and Healthy

Early Learning
Water Education
Program



Module overview

Learning Elements	Group Discussion	Activity
1. What is litter and where does it come from?	Do you know what litter is? Where do you find litter?	What litter can you see?
	Who do you think litters?	Recognising littering behaviours using poster prompts
2. What happens to litter when it rains?	What happens to litter in the parks or on the streets when it rains?	Creating a water catchment in the sandpit
	Where does it go and what impact does this have on the creeks and rivers?	How does litter effect water quality? An outdoors experiment that involves inquiry and investigating
3. Why is it important to look after our creeks and rivers?	Why is it important that we look after our creeks and rivers? What colour is the water that comes out of the taps? How is water cleaned to make it safe for drinking?	How do you clean water? Demonstrating a water filtration system through research and problem solving

Note: All URL's and links used throughout the Module are accurate and current at the time of publication.

Alignment with Early Years Learning Framework

Outcome 2: Children are connected with and contribute to their world.

- Children become socially responsible and show respect for the environment.

Outcome 3: Children have a strong sense of well-being.

- Children take increasing responsibility for their own health and physical wellbeing.

Outcome 4: Children are confident and involved learners.

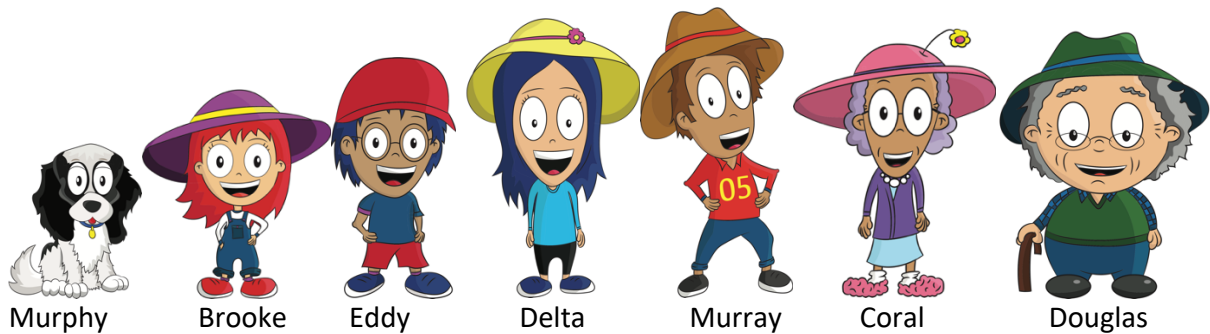
- Children develop a range of skills and processes such as problem solving, inquiry, experimentation, hypothesising, researching and investigating.
- Children transfer and adapt what they have learned from one context to another.

Outcome 5: Children are effective communicators.

- Children interact verbally and non-verbally with others for a range of purposes.
- Children express ideas and make meaning using a range of media.

Telling the story of water

Meet the Wade family, they will help us tell the story of water.



Key terms

Term	Definition
Dam	A barrier constructed to hold back water and raise its level, forming a reservoir used to generate electricity or as a water supply.
Catchment	The action of collecting water, especially the collection of rainfall over a natural drainage area.
Wiradjuri people	The indigenous people of the three rivers – the Wambool (Macquarie), the Calare (Lachlan) and the Murrumbidgee.
Water table	The water table is an underground boundary between the soil surface and the area where groundwater saturates spaces between sediments and cracks in rock.
Biodiversity	The variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable.
Sedimentation	Sedimentation occurs when eroded material that is being transported by water, settles out of the water column onto the surface, as the water flow slows.
Ecosystems	A biological community of interacting organisms and their physical environment.
Water filtration	Water filtration is the process of removing or reducing the concentration of particulate matter and impurities from water to produce safe and clean water for a specific purpose, such as drinking.
Stormwater	Stormwater is surface run-off from rain and storms that enters our drains.
Stormwater pollution	Stormwater can carry materials such as soil, organic matter, litter, fertilisers from gardens and oil residues from driveways and pollute downstream waterways.
Litter	Waste products that have been discarded incorrectly, without consent, at an unsuitable location.
Water Cycle	The water cycle, also known as the hydrologic cycle or the hydrological cycle, describes the continuous movement of water on, above and below the surface of the Earth.

Background information

The Bathurst local government area (LGA) is located within the Macquarie - Bogan catchment, part of the Murray Darling Basin, covering 7 4,800 square kilometres. The Macquarie River is one of the major rivers running through the catchment. It begins in the Great Dividing Range south of Bathurst and flows north-westerly through Wellington and Dubbo until it joins the Barwon River near Brewarrina.

Today the Macquarie-Bogan catchment supports around 180,000 people. Over half of this population lives within the regional cities of Dubbo, Orange and Bathurst. The catchment has a number of smaller towns including Wellington, Narromine, Nyngan and Warren.

The Macquarie-Bogan catchment supports a diverse range of industry including agriculture, agribusiness, tourism, mining and viticulture. The largest agricultural use of water in the valley is for cotton production downstream of Dubbo. Other significant irrigated crops include lucerne, cereals, oilseed, wheat and vegetables. Most of the major cities and towns rely on the rivers in the catchment for their water supply, including Bathurst.

Waterways include water that is above and below the ground. Water is stored above ground in creeks and rivers, and below the ground in the water table. The water table is the level underground where all the spaces around rocks and soil are completely filled with water. This water table depth can change across locations, seasons or the amount of water that is used.

Our waterways are important to the community because they:

- Provide water for drinking and industry
- Transport and store water, drain land and carry flood waters
- Are a significant part of our heritage
- Provide opportunities for recreation, tourism and community activities
- Provide distinctive landscape features and have aesthetic values
- Support biodiversity and provide habitat for flora and fauna, including threatened species

Over the past two centuries, land clearing, farming practices, invasive plants and animals, unsustainable water usage, increased urbanisation, poor industrial and business practices, and climate change, have contributed to the degradation of the health of our waterways. Signs of this decline in the health of our waterways include the loss of biodiversity, toxic algal blooms, declining water availability and water quality, increased salinity, and sedimentation. This in turn affects the health of our rivers, creeks and wetlands

Waterways are important to both the natural environment and human activities. We all need to take responsibility for looking after our waterways. Some of the important uses of waterways include:

- Source of food production
- Aesthetic values and educational resource
- Aquatic species for commercial food consumption
- Providing food and habitat to important marine ecosystems

- Supporting life, including terrestrial ecosystems, as all living things require water
- Recreation activities such as fishing and swimming
- Source of transport and a filtration system for stormwater

Human activity is a major cause of water pollution. Anything we place down the sink or drains in our homes or businesses will end up in our waters. Unsustainable water use, land clearing and urban development have also placed stress on our waterways.

Some of the challenges that have resulted are:

- Balancing the environmental, social and economic goals for sustainable use of the waterways
- The economic and community costs of decreasing water quality
- The increase in land clearing, soil erosion, water and soil salinity as well as littering and weed invasion to previously balanced ecosystems
- The loss of native plants and animals near creeks and rivers
- Cigarette butts and other littered items which wash into our drains and end up in creeks, rivers and beaches. Litter is a major source of pollution in waterways.

Daily activities have an effect on water quality. Our waterways are connected and you can help protect the quality of water in your local waterways by:

Car

- Washing the car on grass or at the car wash to avoid unwanted chemical detergents and dirt going down the drain.
- Fixing oil leaks that are dripping from your car to prevent oil and chemicals entering waterways.

Garden

- Not using herbicides or pesticides on the garden as they can end up in our creeks. Use organic products, or create your own natural fertiliser (compost) from food scraps and garden waste that will work the same and are environmentally safe.
- Sweeping your footpath and gutter instead of hosing them to prevent dirt, grass and other waste going down the drain. Garden waste washing down storm drains ends up in our waterways where it can cause weed and algae growth.

Home

- Disposing of household chemicals, oils, paints and pesticides correctly. Never pour them down the sink as chemical and oils create problems by blocking drains and polluting waterways
- Storing chemicals and paints properly and only buy what you need.
- Rinsing brushes used for water-based paints on the grass and throwing away paint brushes used with oil-based paint.

Litter

- Placing all litter and cigarette butts in the bin or taking your rubbish home with you when you are out.
- Cleaning up after your dog and disposing of dog waste in the bin to prevent polluting our waterways with bacteria.
- Participating in clean up days in your local area to keep our parks and creeks clean.

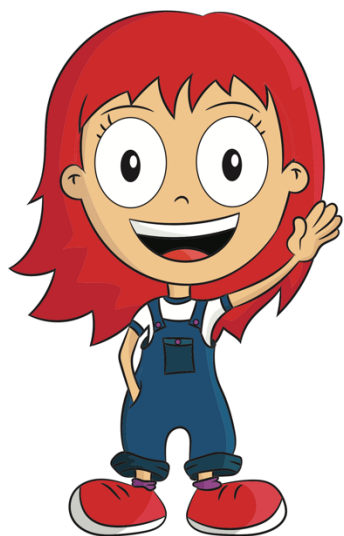
Source: [NSW Office of Water](#) and [NSW WaterWatch](#)

Support materials, links and additional resources

- Video: Bathurst Regional Council– [Module 5 The Wade Family – Keeping Our Waterways Clean and Healthy](#)
- Website Bathurst Regional Council: [Catchments and water supply](#)
- Website: [Sydney Water resources](#) for students and teachers
- Website: [Plastic Pollution Coalition](#) – How to talk to kids about plastic pollution
- Book: Enviro-stories – [Rubbish in the River, Maitland Public School](#)
- Book: [How to Help the Earth](#) – By the Lorax (Dr Seuss)
- Book: [What a Waste – Rubbish, recycling and protecting our planet](#)



Learning Element 1: What is litter and where does it come from?



Have you ever been to the park or walked down the street and seen a chip packet or plastic bottle on the ground?

This is called litter and we are going to learn more about litter and where it comes from.

Group discussion: Do you know what litter is? Where do you find litter? Who do you think litters?

Resources for learning:

- *Video: Module 5 The Wade Family - Keeping our Water Ways Clean and Healthy*
- Show the children the **Video: Module 5 Keeping our Waterways Clean and Healthy**
- Using some common litter items such as a plastic bottle, chip packet and take away packaging, role play someone eating their lunch in a park and then they throw the litter on the ground.
- Ask the children if they know what it is called when we leave rubbish on the ground. Introduce the word litter and explain that this is the term used when someone purposefully drops or leave rubbish behind.
- Ask the children if they have seen litter before and where they saw it. See if the group can name all the different places where we might find litter and the types of litter that they see.
- How does litter make the children feel? Sad, happy, angry, surprised. Why do they feel that way?
- Ask them who they think drops litter and ask why they think people might litter.

Activity: What litter can you see?

Resources for learning:

- Photos of familiar places (e.g. the playground, nearby oval, park or other) that have been littered

Note: Educators can take their own photos familiar places and print these out to show children or find suitable images of familiar places on the internet.

- Show children some **photos of familiar places** such as a playground, oval, park or beach that have been littered.
- Can they spot the litter in the photos? What types of litter can they see?
- As a group, count how many pieces of litter are in each photo?
- How do the photos of litter in natural environments make the children feel?

Activity: Recognising littering behaviours

Resources for learning:

- Photos of litter (e.g. the playground, nearby oval, park or other) that have been littered
- Web link – [different littering behaviours](#)

Note: Educators can take their own photos litter by taking photos and print these out to show children or find suitable litter images on the internet.

- People do many different things with their rubbish in public places such as parks, shopping centres or beaches. Some actions involve putting stuff in bins, cleaning up and getting others to do the right thing while other actions damage the environment, create health hazards and make work for others to clean up.
- Show the children each of the pictures of different [littering behaviours](#)- there are nine positive behaviours and eleven negative behaviours. You may wish to print these out and laminate them separately or show via a smart board or similar.

[Copyright Community Change, 2—3, Cartoonist Kerry Millard]

- Ask the children to describe what the people are doing in each of the pictures. Can they distinguish between those behaviours that are wrong and the behaviours that are right?



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Learning Element 2: What happens to litter when it rains?



Have you been to the park before and maybe seen some litter on the ground? Do you know what happens to that litter when it rains?

Let's learn more about where the litter goes after a rainstorm and its impact on the water quality and the environment.

Group discussion: What happens to litter in the parks or on the streets when it rains? Where does it go and what impact does this have on the creeks and rivers?

Resources for learning:

- *Activity Sheet: Complete the Water Cycle*
- *Support Resource: Stormwater Drain*
- Revisit The Water Cycle with the children, **Module 1, Learning Element 1: What is the Water Cycle and how does it rain?** Remind the children that water on earth is recycled again and again and travels in a cycle from water bodies (lakes, rivers and oceans) to sky to rain to land to creeks/ rivers to oceans.
- Ask the children to think about litter in a park or street when it rains. What do they think would happen to the litter and where would it go?
- Explain that the rain will wash the litter either directly over land and into the creeks and rivers or it may travel through a stormwater drain that leads out the rivers and creeks. Show the children the **Support Resource: Stormwater Drain**, or show them a drain located in the outdoor area at the Centre.
- Explain that eventually all rivers and creeks lead out to the ocean. Ask the children to think about the effects of litter on the quality of the water and the impacts of litter on the natural environment and the animals and birds that live there.

Activity: Creating a water catchment in the sandpit

Resources for learning:

- Sandpit, watering can, model houses or Lego blocks (or similar) plastic animals, Lego people, 'litter items'
- Outside at the sandpit, dampen the sand if it is dry. At one end, mound the sand to make some hills and scoop out a gully running down the middle of the sandpit to show the river.
- At the other end of the sandpit at the end of the river mark a semi-circle shape to show the ocean.
- Add some different toy models around the river to show different land uses in the catchment e.g. put some Lego houses/ or Lego blocks to show the buildings in a town, flatten an area to show a park and put some Lego people in the park, put some plastic animals e.g. cows and sheep to show a farm etc.
- Get the children to add some litter items to different areas of the catchment- you need to use light materials that will wash away- you could use leaves as rubbish times or cut up small pieces of a plastic from a chip packet or similar.
- Use a watering can, let the water fall on the top of the hill like gentle rain, watch how the water runs into the gully (river).
- Use the watering can to rain over the other areas of the catchment and watch how it picks up the litter and washes it into the river.
- Use the watering can to continue to rain over the catchment until all the litter has washed into the river and into the ocean.
- Explain to the children that this is what happens, on a much larger scale, when people litter in and around Bathurst. Have a conversation about what steps could be taken to reduce litter and stop people littering.



Activity: How does litter effect water quality?

Resources for learning:

- *Blue paper or material (or similar), large clear jug, food colouring (various colours), small containers*

When litter, pesticides from farms, paint, motor oil and other nasty pollutants wash into the rivers and creeks, they make the water dirty. This makes it unsafe to drink and can also harm the animals and plants that live in and around the rivers.

- Lay a blue sheet or pieces of blue paper in a squiggly line down the centre of the room. This will be the river.
- Ask the children to line up on each side of the river.
- Give each child a small tube or container filled with different colour food colouring. Explain that the food colouring is to show what happens to the water quality in the river when litter and other nasty products are washed into the river by the rain.
- Carry the jug of water slowly down the river and, one by one, ask the children to tip their litter/ chemicals (food colouring) into the jug and watch what happens to the colour of the water.
- When you get to the end of the river ask the children to describe the colour of the water. Does it look like it is safe to drink?
- Reiterate that this is why we need to look after our waterways- rivers and creeks- and make sure that no litter or other nasty products wash in as this will affect the quality of the water.
- Explain that all of our drinking water is cleaned before we drink it so that it is safe- this will be covered in further detail in **Learning Element 3**, in this module.



Learning Element 3: Why is it important to look after our creeks and rivers?

We are very lucky in Australia that we have clean and safe drinking water. However it is very important that we look after our creeks and rivers for our own health and the health of the animals and plants that live in and around our rivers.

Let's learn more!



Group discussion:

Why is it important that we look after our creeks and rivers? What colour is the water that comes out of the taps? How is water cleaned to make it safe for drinking?

Resources for learning:

- *Module 3 Activity Sheets, including Support Resources: Chifley Dam, Reservoir, Water Filtration Plant, Water Pump Station*

*Notes: Educators may wish to revisit **Module 3: Learning Element 2 Water in Bathurst**, covering where our water supply comes from and more details about water filtration.*

- Talk about the different uses of our creeks and rivers- what animals and plants might we find there, what might we use the rivers for?
- Remind the children of what happens to the water when litter and other pollutants are washed into the river when it rains.
- Ask the children to describe what colour the water is when it comes out of the tap at home or at the centre.
- Remind children that water from the dam in Bathurst is cleaned by a special system call a water filtration plant. This make sure the water is clean before it gets to our taps.
- Explain that, in Australia, we are very fortunate to have clean and safe drinking water. In some parts of the world, the water is not cleaned and there is lots of litter and pollution. When people drink dirty water it can cause sickness and poor health.
- Remind the children that drinking lots of water every day is very important for our bodies and helps to keep us fit and healthy.

Activity: How do you clean water? Demonstrating a water filtration system

Resources for learning:

- *Two jugs of water, two buckets, colander, coarse sand, Lego blocks/leaves or similar (to represent dirt and rubbish)*
- Fill a colander with some coarse sand.
- Fill two clear jugs or bottles with water. To one of the jugs, add some small Lego blocks, leaves or similar to represent dirt or rubbish.
- Tip the 'clean' water through the colander and into a collection bucket. Ask the children to describe how the water moves through the sand and into the bucket. Explain that this is called filtration. What does the water look like in the bucket?
- Repeat the exercise with the 'dirty' water. Ask the children to describe how the water moves through the sand and into the bucket- what has happened to the 'dirt' (the pieces of Lego or leaves will get trapped by the sand).
- Ask the children to look at the water in the second bucket- what does it look like? Is there any dirt (Lego blocks or leaves) in the bucket? Where did all the Lego blocks and leaves end up?
- Explain this this process is called filtration. The sand helps to filter out the dirt and lets the clean water through!
- Compare the bucket of 'clean' water and the bucket of 'dirty' water that has been filtrated. Is there any difference between the water in the two buckets?
- Reiterate that a similar system using sand filters is used on a much bigger scale to clean the drinking water in Bathurst.

This activity could be repeated using sieves or colanders with different size holes to demonstrate changes to the speed of water filtering through the sand.



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