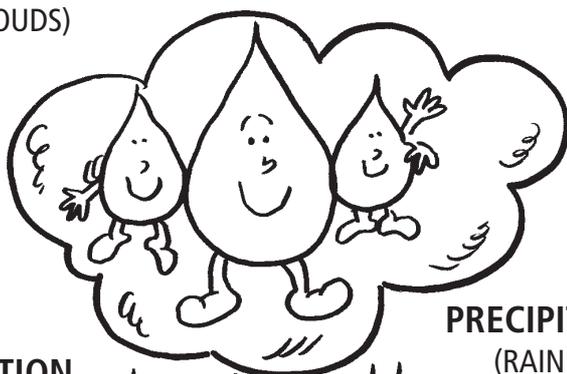


# The Water Cycle

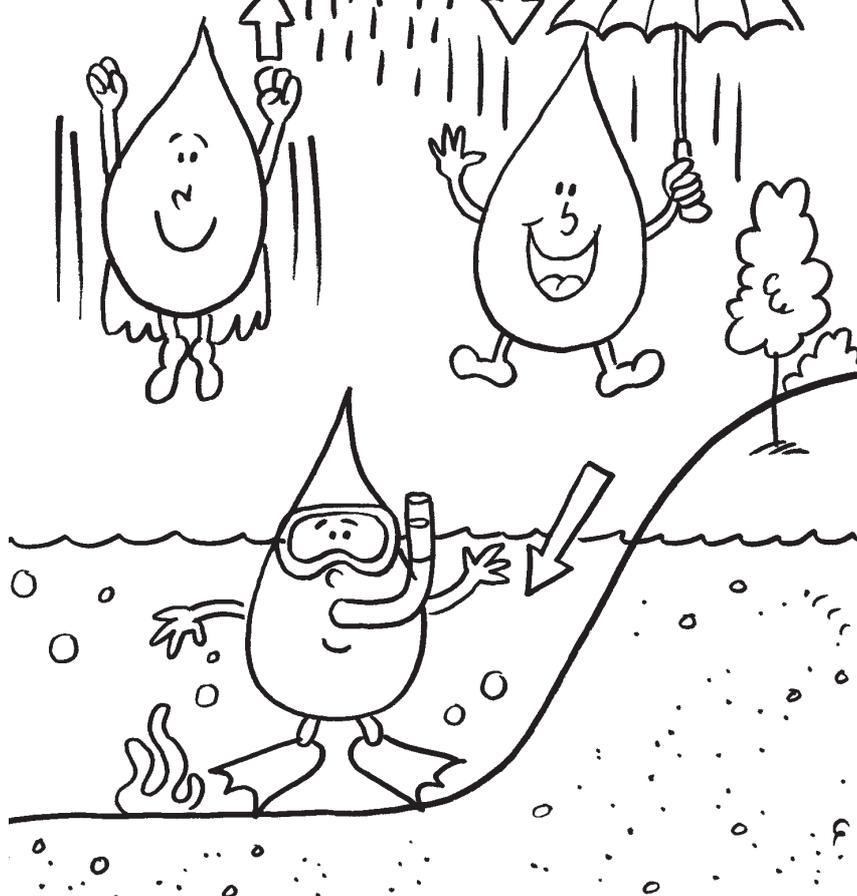
## EARLY CHILDHOOD TOPIC BOOKLET

### CONDENSATION (CLOUDS)



### PRECIPITATION (RAINFALL)

### EVAPORATION (WATER VAPOUR)



### Water Learning Objectives

The students should:

- understand what the water cycle is
- understand how the water cycle works
- realise that the water cycle is present in our everyday life
- understand that protecting the natural water cycle benefits people and the natural environment.

### Curriculum Framework

#### Overarching Learning Outcomes

This Topic Booklet can be used to develop student understandings, knowledge and skills and values in Overarching Learning Outcomes Nos 1, 2, 3, 4, 5, 6, 7, 8, 10, 12 and 13.

Sustainability is the achievement of positive environmental, social, health and economic outcomes while meeting the needs of current and future generations.



# Teacher Background Notes

## What Is the Water Cycle?

Water is continuously circulated through a global cycle powered by the sun and the rotation of the earth. With exposure to the sun and the wind, water evaporates from the ocean and is blown by the wind over land as vapour in clouds; given the right conditions, it then precipitates as rain, hail or snow. Some of this water returns to the atmosphere through evaporation or transpiration by vegetation; some flows back to the sea in streams and rivers; some is stored in lakes; and some infiltrates into the ground, where it may be stored, or through which it moves slowly to be discharged, eventually, back into the sea.

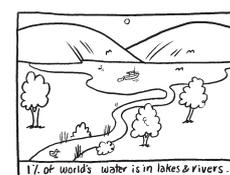
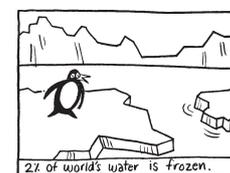
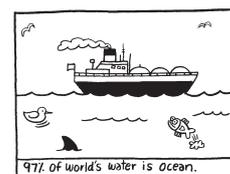
## How We Use the Water Cycle

We use the natural water cycle to meet our needs for water. In Australia we are a 'thirsty' nation: the spread of population, the development of our cities and towns and water-based recreational activities have all combined to create an increasing demand for water. Water is supplied from the natural cycle, and water utilities make sure that the water reaching our homes is safe to drink. After water is used, water utilities treat it before it is returned to the water cycle. It is everyone's responsibility to ensure that water sources—whether or not they are used for drinking water—do not become polluted, as they are all part of the water cycle.

## Water in the World

The oceans hold 97% of the world's water. Of the rest, 2% is frozen in the polar ice-caps, and the remaining 1% comprises the water found in the lakes and rivers of the world, in the atmosphere and in the ground—including all the water we use. We depend almost entirely on the constant recycling of that 1% to meet our needs.

The volume of water in the world's atmosphere amounts to about 10 days' normal rainfall. If it were used up in the way that gas or oil is consumed, then the world would run dry very quickly indeed. However, thanks to the continuous circulation of water in the water cycle, water is not used up—it simply goes round and round.



# Suggested Student Activities

## Did you know that...

Only 3% of the planet's water is fresh, and 97% of that is locked up in icebergs and glaciers.

## Water in Our Environment

Society and Environment

- Discuss with students where they have observed water in the natural and human environments: e.g. puddle, lake, river, wetland, ocean, dam, bath, kitchen sink. Show pictures representing places where water is used. Make a class collage of water in the environment, using pictures from magazines.



## What Happens When It Rains?

Society and Environment/English/Science

- Discuss where rain comes from.

**Note:** See the 'Rain' activity in the Stormwater—Where Does It Go? Topic Booklet.

- Investigate what happens when it rains in the school grounds by conducting the following experiment:
  - In pairs, fill your 'rain bottle' (refer to the '**How a Rain Bottle Works**' activity sheet) from a plastic tub of water.
  - Take turns to see what happens when you pour your rain bottle (with the lid on) over certain places: e.g. on a path, in the garden, under a tree, on the lawn, on sand, on clay, on a compacted area or an area of your choice.
  - Use the explanation on the '**How a Rain Bottle Works**' activity sheet to conduct and record your investigation (refer to *First Steps Writing: To Explain*).

**Notes:** 1. The quickest way to fill the rain bottle is to take the lid off the bottle and immerse it upside down in the water. 2. As a variation to this experiment, pour water from your rain bottle down a sandy slope. 3. As a further variation, compare what happens with different kinds of rain. Use a rain bottle with 1 millimetre holes in the lid to simulate drizzle, one with 1.5 millimetre holes to simulate light rain, and one with 2–3 millimetre holes to simulate heavy rain.

- Use your rain bottle, or a watering can or hose, to dampen (a) a patch of sand, and (b) a patch of soil containing humus (decayed organic matter). After two hours, see which of these is still damp. Which type of soil do you think would be best for growing plants?
- Use a thermometer to see whether rain cools the soil. Take the temperature of the soil (a) before it rains, (b) after it rains, and (c) two hours after rain. Discuss your results.



## The Seasons

Society and Environment/English

- Discuss the different seasons of the year experienced by your community and how the climate of Australia is characterised by floods and prolonged droughts.

**Note:** Learn the Australian song 'My Country' to gain an understanding of the climatic nature of Australia.

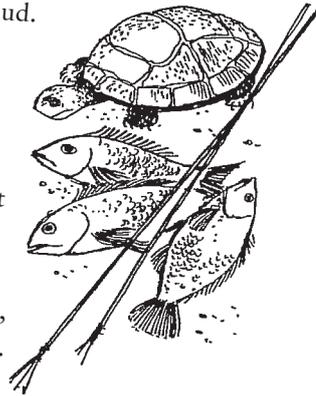
- Locate articles from newspapers or magazines illustrating rain, floods, droughts, etc.
- Read and discuss the extract from a poem entitled 'Law' by Bill Neidjie (an Aboriginal Australian), which expresses the seasonal nature of the water cycle. Read other Aboriginal Dreamtime stories: e.g. 'Tiddalik the Frog'. Discuss the stories and explore ways in which Aboriginal people interact with water.

**Note:** See the Sustainability and Wetlands Topic Booklet for information on the six Aboriginal seasons of the South West region of Western Australia.



### Law

Creek, plain, hill.  
That plain can change...  
wet season, him mud.  
You get lily,  
you get fish.  
But, he dry up...  
that's alright.  
Then people can get  
long-neck turtle.  
Same for animal.  
People look for food,  
animal look for food.  
Lizard look,  
bird look,  
anyone look.  
We all same.



Each billabong can be dry...  
no fish, turtle, nothing.  
He want new water,  
then fish and turtle,  
make him new one.  
New rain coming up,  
that rain make everything again...  
plenty fish, turtle, lily.

Rain for us...  
for anybody.  
Rain give us everything new...  
yam, fish, everything.

Used with the kind permission  
of Bill Neidjie

### Did you know that...

For many millennia, the ability of Aboriginal people to find water in arid conditions ensured their survival.

## Observing the Weather

Society and Environment/Science

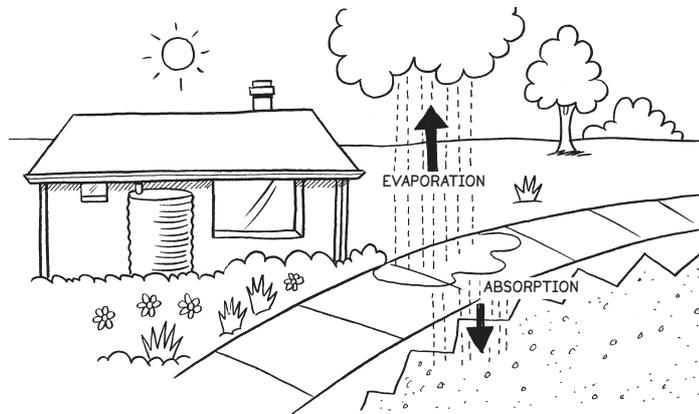
- Choose a day when there is heavy rain at school and ask students about what happens to puddles when the rain has stopped: i.e. the water in the puddles evaporates. Especially observe what happens to the water if it has rained on extremely hot days.
- Use a weather chart to record rainy days, sky observations and air temperature (air temperature could be taken before, during and after rain). Discuss with students the link between clouds, rain and evaporation. Draw diagrams, and label them, to show what happens.

**Note:** Weather charts, on which students can record percentage cloud cover, temperature, wind direction, etc., are available from the Gould League (see **Supporting Resources**). See also the Gould League booklet entitled Weather.

## Understanding the Water Cycle

Society and Environment/English/Science

- Introduce students (in simple terms) to the water cycle, using either or both of the following approaches:
  - Read and discuss a story about the water cycle (there are many excellent books that can be used to describe it). Then have students retell how the water cycle works, by writing key sentences: e.g. 'After it rains, the water evaporates back up into the air and forms clouds'.
  - Discuss the Water Corporation's 'The Water Cycle' poster (see **Supporting Resources**), focusing on what happens to water when it reaches the ground. Brainstorm and categorise where the water might go: e.g. it might soak into the ground, it might hit the bitumen and dry up (evaporation), plants might drink it and then transpire it through their leaves (transpiration), it might go into lakes or the ocean (refer to *First Steps Reading: Brainstorm and Categorise*).



## Water Cycle Experiments

Society and Environment/Science

- Carry out the following simple experiments related to the water cycle. For each experiment, students should record the materials needed, the aim of the experiment and what happened.

**Note:** It is important to relate each of the elements of the water cycle to what is happening in the local environment (see the '**Climate Change and the Water Cycle**' activity).

### Evaporation

- Place a large shallow bowl or tub of water outside in the sun and mark the water level on the side of the container (or use a dipstick or ruler). Observe what happens after one hour, two hours and three hours.
- Fill identical containers with an equal volume of water and leave them to stand for a week in different places inside and outside the classroom. Observe what happens. Empty the water (if any is left) from these containers into a measuring jar and describe what you notice.

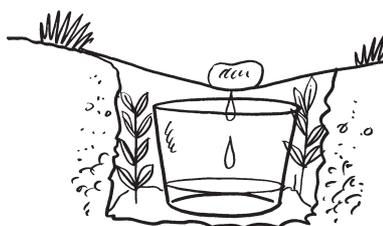


### Did you know that...

Evaporation is affected by four things: water temperature, air humidity, air pressure and wind speed.

### Transpiration

- Arrange for a hole to be dug (about 30 centimetres deep). Put a bowl (or tin) in the middle of the hole and place fresh green leaves around the bowl. Cover the hole with a plastic sheet, anchored by rocks, and place a weight (e.g. a small rock) in the middle of the sheet (over the bowl). Leave overnight and then examine how much water has been collected in the bowl.



**Note:** Plants lose water when they transpire (breathe). This is the water that is collected in the container.

- Place a plastic bag over a leafy branch of a plant, seal it and leave it overnight. Describe what you see in the morning.

## Condensation

- Freeze some iceblocks overnight. Fill up a glass with the iceblocks and place the glass in a warm spot in the shade. Ask students to observe what happens (water from the air condenses on the outside of the glass).

**Note:** Students could also observe condensation at home by breathing on a mirror. Glass is colder than our breath, and the water vapour will change to liquid.

## Precipitation

- Put a large metal bowl in the freezer for 30 minutes or longer. Boil water in an electric kettle. Place a large, flat tray on a table/bench and have an adult hold the chilled bowl directly above the tray. Put the kettle near the chilled bowl and ask students to watch as water vapour condenses and falls as 'rain' onto the tray.



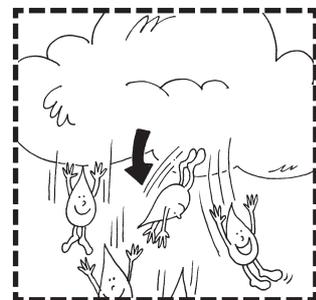
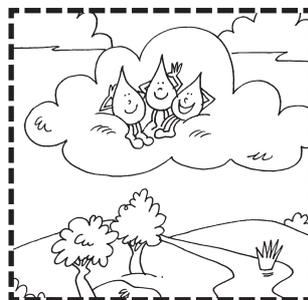
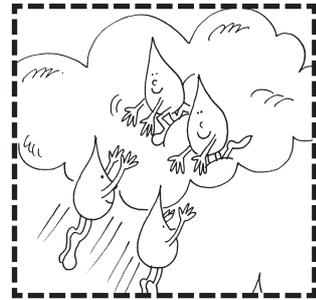
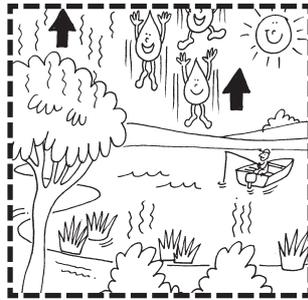
**Notes:** 1. Remove the electric kettle from the mains before conducting this experiment.  
2. Due to the risk of burning/scalding from the steam of the kettle, students should remain a safe distance away while adults move the kettle and the bowl.

## The Story of the Water Cycle

Society and Environment

- Have students colour in pictures from the activity sheet 'The Story of the Water Cycle' and then cut them out. Place the cards in a sequence to tell the story of how water moves and how the water cycle works.

**Note:** Students can start the water cycle at any stage: i.e. precipitation, or evaporation, or transpiration, or condensation.



## Mini-terrarium

Society and Environment/Science

- Have students bring in recycled plastic soft drink bottles (2 litres is a good size). Cut the top off the bottle and construct a terrarium by placing soil and plants in the base, and then re-sealing the top. Observe the water cycle at work.

**Note:** It is recommended that the teacher (or parents at home) cut off the top sections of the plastic bottles so that students can easily make their terrariums.



## Water Cycle Model

Society and Environment/The Arts/Science

- Make a water cycle model with students. Provide a group of four students with an ice-cream container and ask them to represent an environment in the container: e.g. by putting in it moist dirt, a small container of water, sticks as trees, and other elements. Once they have set up their environment, have them cover the ice-cream container with a sheet of plastic wrap and put a weight such as a stone in the middle of the wrap. Place the container in the sun and have students observe what happens. When they see water start to fall inside their ice-cream container, liken this to the daily water cycle.

**Note:** Alternatively, students could make a box diorama. See the 'Model of a Wetland' activity in the I Love Wetlands Topic Booklet.

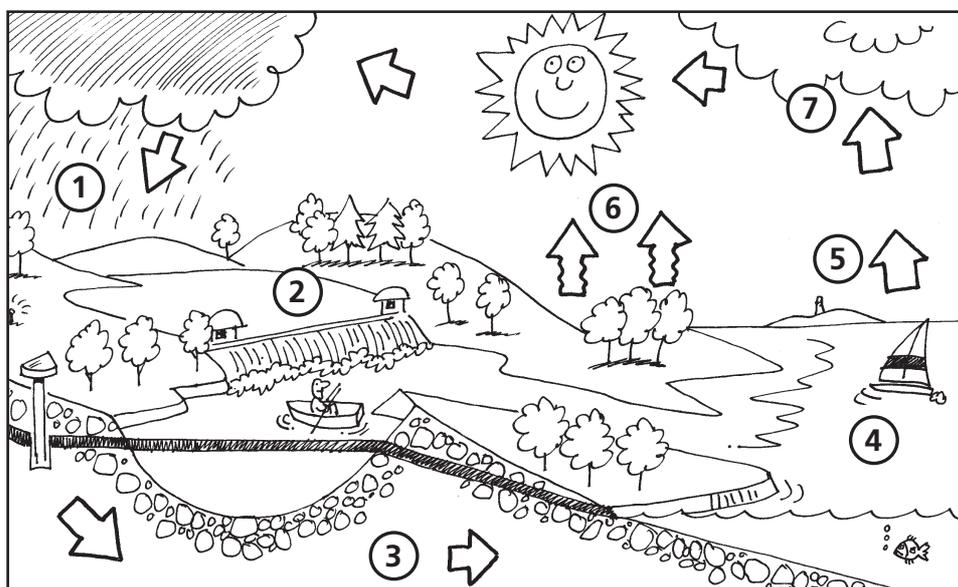
## Labelling the Water Cycle

Society and Environment/The Arts/English

- Use the activity sheet '**Labelling the Water Cycle**' to identify the parts of the water cycle. Alternatively, have students design their own water cycle, or draw the water cycle that reflects their own environment, using the Water Corporation poster as a model (this is especially helpful for students who live in a different landscape from the one portrayed on the poster).

The following is a key for the illustration on the activity sheet:

- |                        |                |                  |
|------------------------|----------------|------------------|
| 1. precipitation       | 4. ocean       | 6. transpiration |
| 2. dam (surface water) | 5. evaporation | 7. condensation  |
| 3. groundwater         |                |                  |



**Note:** Teachers should use labels that are appropriate to their year level: e.g. precipitation = rain.

- Do an oral retelling of the water cycle using the activity sheet '**Labelling the Water Cycle**' as a guide (refer to *First Steps Reading: Read and Retell*).

**Notes:** 1. Students need to understand that the natural environment also needs water and that we are changing the water cycle when, for example, we surface an area with bitumen instead of leaving it in its natural state and letting water soak into the ground. 2. It is important to show students where the water-table occurs and how it is interconnected with the level in lakes and the sea. 3. It is also important to emphasise the need to protect our water sources from pollution: e.g. protecting catchment areas by preventing chemicals and fertilisers from entering the drainage system.

Extension: Students could make up their own 'Water Drop' characters to place on the activity sheet '**Labelling the Water Cycle**', to show the different stages.

## Climate Change and the Water Cycle

Society and Environment

- Discuss with students the relationship between climate change and the water cycle. The following are some examples:
  - Rainfall (precipitation) has decreased in south-western Australia over the past 30 years. This has reduced the volume of available water in our dams, and therefore increased the need to save water.
  - In drier climates, water evaporates more readily. We should not water the garden during the hottest part of the day, as the water evaporates instead of draining into the ground and reaching the roots of plants and, eventually, groundwater.



**Notes:** 1. Water supply in the Perth metropolitan area comes from dams (surface water), under the ground (groundwater) and desalination. 2. The climate in Australia is changing, with the CSIRO predicting that some parts of Australia will become wetter and other parts (e.g. south-western Australia) drier.

## Our Interaction with the Water Cycle

Society and Environment/English

- Design a flow chart for classroom display, showing elements of the water cycle (e.g. rainfall, groundwater, stormwater, evaporation, transpiration, mountain streams, the use of water by houses and factories, hydroelectricity) and how humans and the natural environment interact with it. In groups, illustrate one particular element of the water cycle for display on the flow chart (refer to *First Steps Writing: Graphic Organisers*).



**Note:** Teachers should emphasise groundwater in the water cycle.

## The Water Cycle in Our School Grounds

Society and Environment/Science

- Walk around the school grounds or otherwise demonstrate to students elements of the water cycle (precipitation, condensation, transpiration and evaporation). Some examples of these are as follows:
  - Precipitation: rain falling in the school grounds
  - Condensation: steam condensing on windows; clouds in the sky
  - Transpiration: plants in a plastic bag or a terrarium breathing out moisture, which is trapped in the container
  - Evaporation: water drying up after rain (especially on a hot summer's day), with steam vaporising off hot asphalt or concrete.
- Use the activity sheet **'The Water Cycle in Our School Grounds'** to record examples of these elements. The teacher should point out to students examples of these water cycle elements: e.g. precipitation.

**Note:** Some words used in this activity might need to be explained to students first.

- Give an example of where you have seen one of these elements in the natural environment: e.g. dry creek bed.

### Did you know that...

It is everyone's responsibility to ensure that water sources—whether or not they are used for drinking water—do not become polluted, as they are all part of the water cycle.

## Looking After the Water Cycle

Society and Environment

- Discuss with students how humans can interfere with the natural water cycle: e.g. by polluting our river systems, by covering the ground with bitumen.
- Ask the class to suggest some positive things they can do to protect the water we drink, the water we use for washing ourselves, and the water used in the natural environment.
- Discuss with students aspects of the water cycle they have seen at home or in the community. For example, discuss evaporation (e.g. from swimming pools, gardens) and why it is better to water gardens early in the morning.
- Explain that because we live in a dry climate, it is important to care for water in the natural environment and to use it wisely. Relate this to looking after the natural water cycle and not interfering with it.
- Discuss how climate change can affect the water cycle: e.g. less rainfall means less water available for animals; loss of habitat.

## Song: 'The Water Cycle'

Society and Environment/The Arts

- Learn the song 'The Water Cycle' (see the activity sheets (three) for lyrics and sheet music). You might wish to perform this song at a school assembly for a special water-related event: e.g. World Water Day, World Environment Day, National Water Week.

**Note:** The song is included on the Precious Water CD available from the Water Corporation (see **Supporting Resources**).

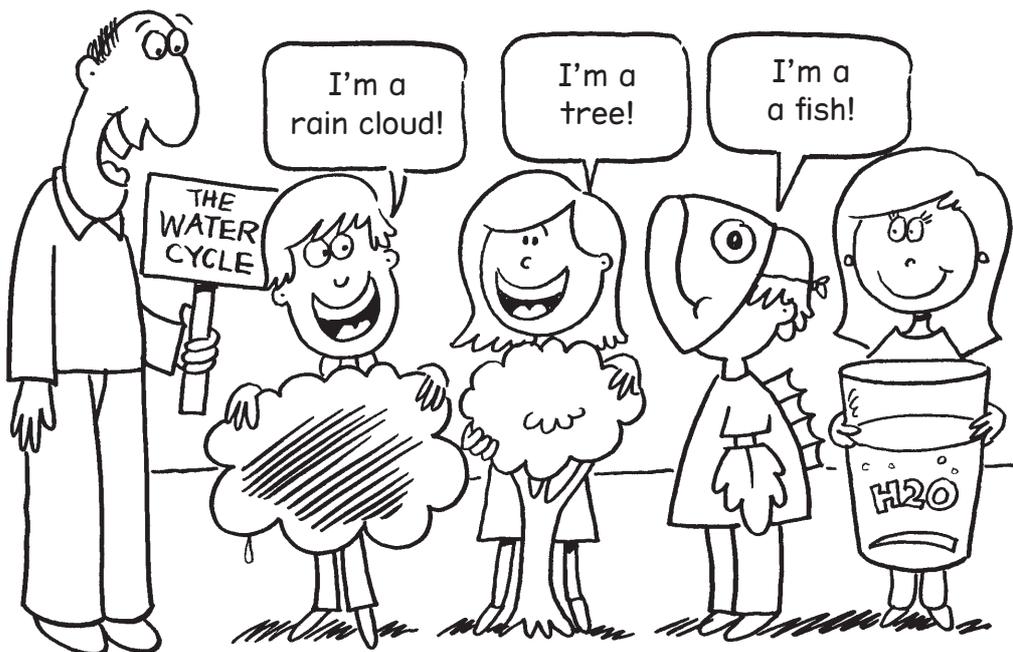


## Acting Out the Water Cycle

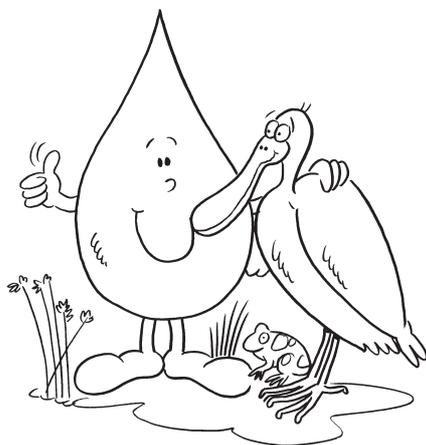
Society and Environment/The Arts

- Have students discuss the different parts of the water cycle and suggest how they could act it out as a class. Ask for ideas on how each of the group members for different parts of the water cycle could dress up or otherwise represent their role.

**Note:** When acting out the water cycle, have students look at human interaction with it: e.g. they might drink water from a surface water catchment area.



# Terminology



**Atmosphere:** the layer of gases surrounding the earth.

**Catchment:** the surface area from which runoff flows to a river, a dam or a wetland.

**Cloud:** visible condensed water vapour floating high above general ground level.

**Condensation:** the process whereby water vapour changes to a liquid (rain) or solid (hail).

**Conservation:** rational protection of natural resources from destruction.

**Evaporation:** the process whereby water disappears into the air as water vapour.

**Infiltration:** movement of water from the ground surface into the soil.

**Lake:** an inland body of water, fresh or salt, of considerable size, occupying a basin or hollow in the earth's surface.

**Ocean:** the vast body of salt water that covers almost three-quarters of the earth's surface.

**Pollution:** any direct or indirect alteration of the environment by wastes or chemicals that is hazardous to public health, animals or plants.

**Precipitation:** falling products of condensation in the atmosphere (rain, snow, hail).

**Rain:** condensed moisture in the atmosphere falling visibly in separate drops.

**Recycling:** reusing treated wastewater for purposes like agricultural and landscape irrigation. Also referred to as water reclamation or water reuse.

**River:** a copious stream of water flowing in a channel to a sea or lake or marsh or other water body.

**Transpiration:** the 'breathing' of plants, whereby water vapour is emitted through their surfaces (especially the leaves).

**Water cycle:** the circulation of water on Earth, as it evaporates from the sea, condenses into clouds and precipitates.

**Wetlands:** areas of seasonally, intermittently or permanently waterlogged soils or inundated land, whether natural or otherwise.

# Supporting Resources

## Water Corporation

### Online Resources

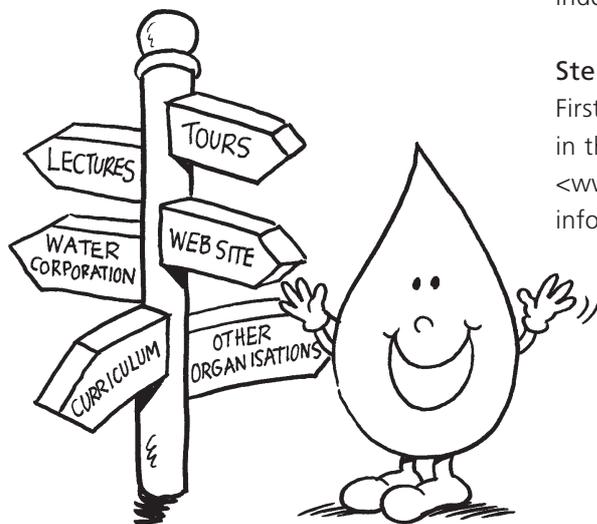
For further information about this topic, or to find online publications, go to [www.watercorporation.com.au/education](http://www.watercorporation.com.au/education).

### Educational Resources

Videos, posters, stickers, badges, bookmarks, other Topic Booklets or other supporting resources suggested in this Topic Booklet can be located either in the Merchandise Catalogue in the Early Childhood *Water Is Our Future: Teacher Resource File* or on the web site.

### Tours and Lectures for Metropolitan Schools

Arrange for a Water Corporation Education Officer to come to your class to give a lecture on water and the natural environment. These lectures are free and can be tailored to suit all year levels.



## Other Organisations

### Resources Support

The following organisations may also be able to provide resources or tours and lectures for this topic. See the 'Resources' section of the Early Childhood *Water Is Our Future: Teacher Resource File* for additional information.

- Department of Environment and Conservation (Ribbons of Blue/Waterwatch WA)
- Department of Water
- Herdsman Lake Wildlife Centre (Gould League information available here)

### Curriculum Support

#### Department of Education and Training

For further information on programs and curriculum materials on water, go to [www.det.wa.edu.au/education/cmiseval/curriculum/pathfinders/water/index.htm](http://www.det.wa.edu.au/education/cmiseval/curriculum/pathfinders/water/index.htm).

### Steps Professional Development

First Steps activities are referred to in this Topic Booklet. Go to [www.stepspd.com](http://www.stepspd.com) for further information.

# HOW A RAIN BOTTLE WORKS

**DEFINITION:** A rain bottle is used to show what happens when it rains.

**WHAT YOU NEED:** A rain bottle consisting of a plastic container full of water, with holes drilled in the bottom of the container.

**HOW IT WORKS:** Pour the rain bottle (with lid on) over certain places. Observe and record what happens. For heavier rain, take off the lid.



## WHAT HAPPENS TO THE WATER?

**IN THE GARDEN**



**UNDER A TREE**



**ON A PATH**



**ON THE LAWN**



Tick ✓ if the water:

- soaks into the ground
- forms drops
- wets leaves
- washes sand away
- forms pools

Tick ✓ if the water:

- soaks into the ground
- forms drops
- wets leaves
- washes sand away
- forms pools

Tick ✓ if the water:

- soaks into the ground
- forms drops
- wets leaves
- washes sand away
- forms pools

Tick ✓ if the water:

- soaks into the ground
- forms drops
- wets leaves
- washes sand away
- forms pools

## INTERESTING COMMENT

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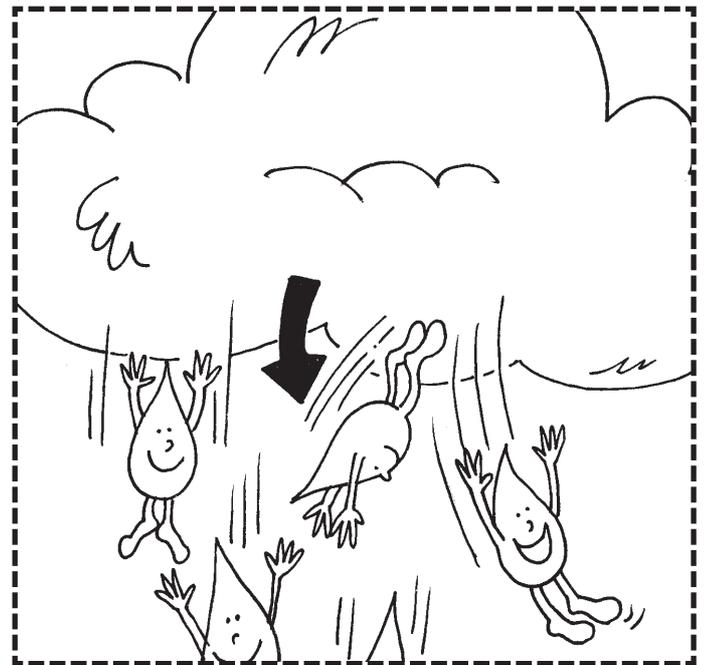
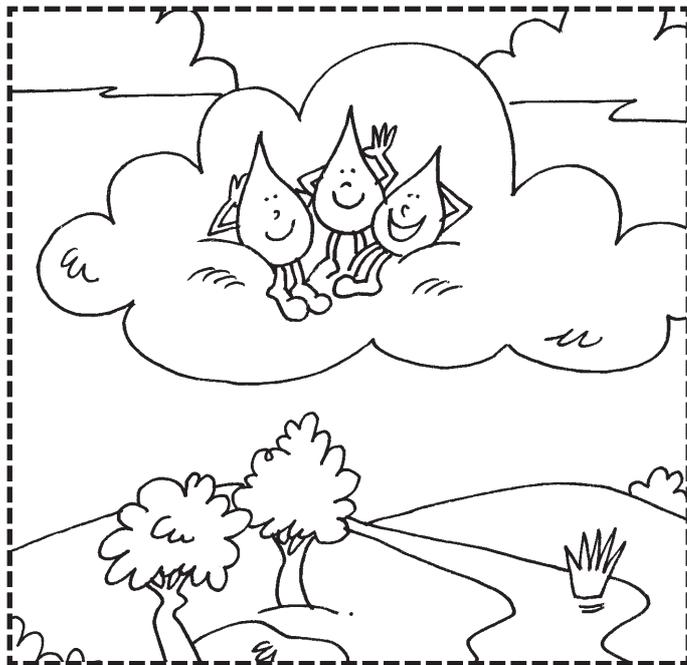
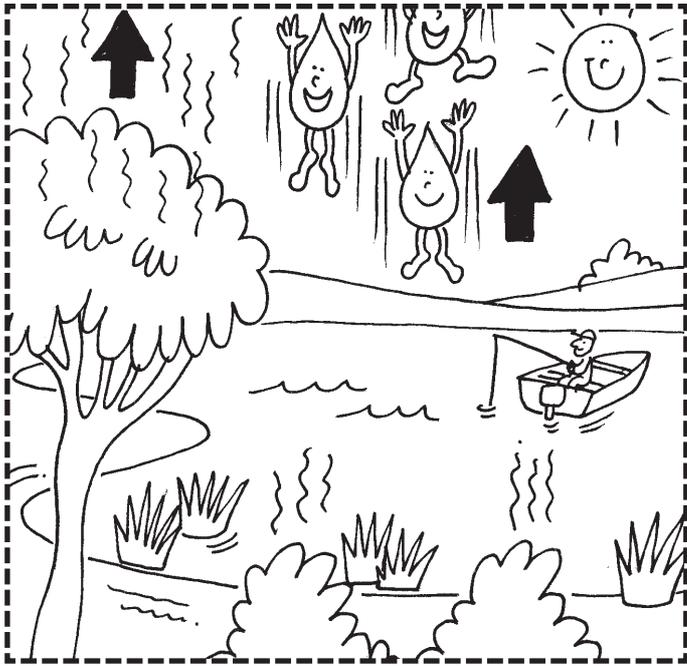
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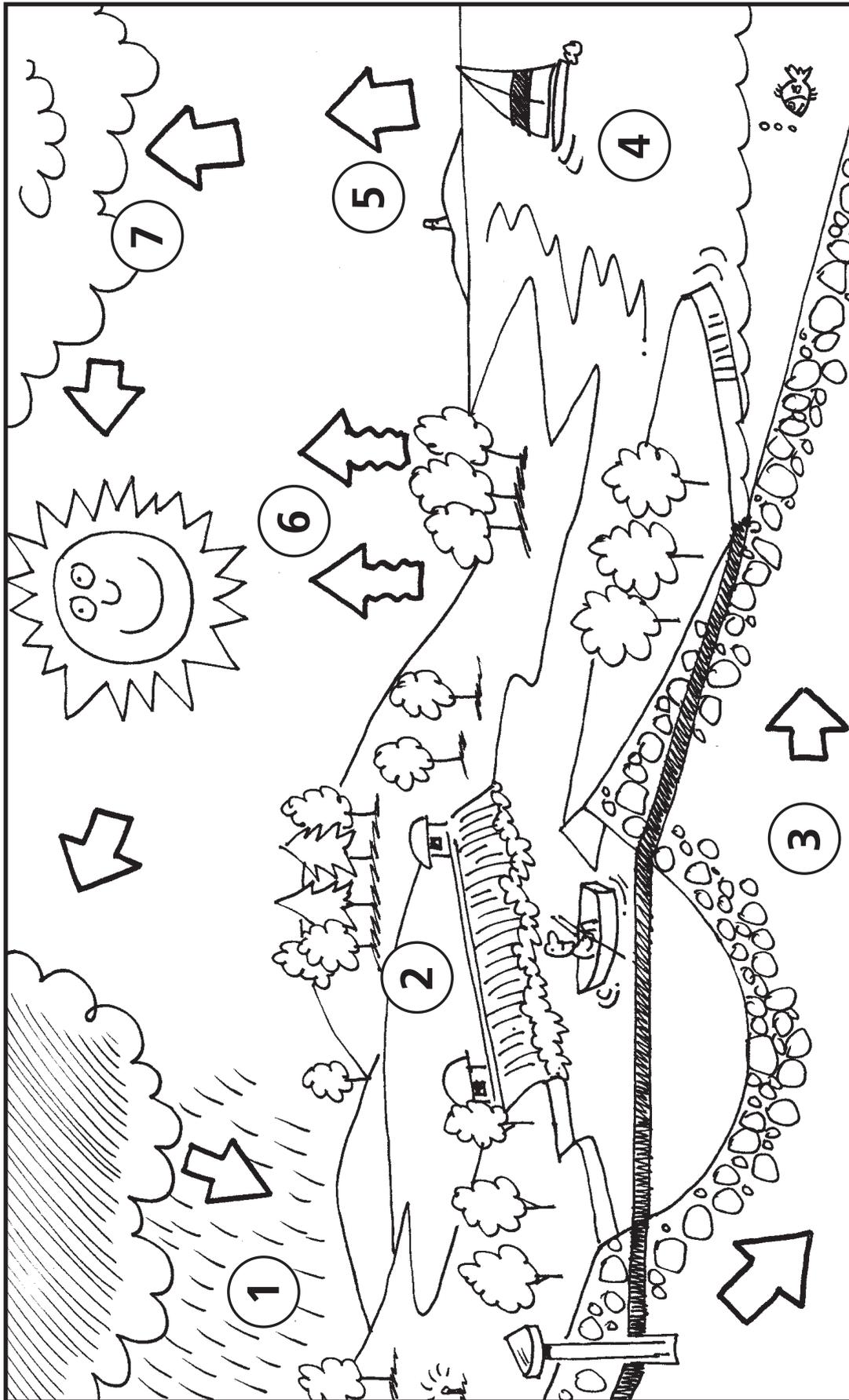
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# THE STORY OF THE WATER CYCLE

Colour in the pictures, and then cut them out and place them in order to show how the water cycle works.



# Labelling the Water Cycle



evaporation

groundwater

precipitation

dam (surface water)

ocean

condensation

transpiration

# The Water Cycle in Our School Grounds

Draw pictures to show the water cycle at school.



Where do you see the rain fall in the school grounds?

This is \_\_\_\_\_

What happens to plants when they sweat (i.e. transpire)?

This is \_\_\_\_\_

Where do you see pools of water in the school grounds? What happens?

This is \_\_\_\_\_

Where does the water collect in the sky?

This is \_\_\_\_\_

# The Water Cycle

## THE WATER CYCLE

Words by Carmel Charlton 2004



### Chorus

The water cycle goes round and round  
Going up, coming down  
The same old water's been going round  
Since the world began.

The sun warms up the ocean. Vapour rises in the air.  
Sun warms up the ocean. That's evaporation.

Vapour rises in the air. Clouds form in the sky.  
Cooling down as they rise. That's condensation.

### Chorus

The clouds cool as they rise. Some grow dark in the sky.  
Water droplets form and then down comes the rain.

Rain comes tumbling down. That's precipitation.  
Rain comes tumbling down and runs back to the sea.

### Chorus

It's a possibility that the water we drink could sometimes be  
The same old water that was around  
When dinosaurs walked the earth.

We're made up of water too like living things everywhere  
Every day we're taking care to keep our water clean.

### Chorus

# The Water Cycle

## Sheet Music 1

Words and Music by  
CARMEL CHARLTON

♩ = 86

### CHORUS

1 G C G C F C  
The wat-er cy-cle goes round and round.

4 G C F C Am  
Go - ing up, com - ing down. The same old wat - er's been go - ing 'round

6 G C 1. F C  
since the world be - gan. (The) sun warms up the o - cean.

8 G C F C G C  
Vap - our ris es in the air. Sun warms up the o - cean. — That's e - vap - or - a - tion.

11 F C G C F C  
Vap - our ris - es in the air. Clouds form in the sky. Cool - ing down as they rise.

14 G C 2. F C  
That's con - den - sa - tion. The Clouds cool as they rise.

16 G C F C  
Some grow dark in the sky. Wat - er drop - lets form and then

18 G C F C  
down comes the rain. Rain comes tum - bling down

# The Water Cycle

## Sheet Music 2

20 G C F C G C

That's pre-cip - i - ta - tion. Rain comes tum - bling down and runs back to the sea.

2 23 *Bridge* G F

It's a pos-sib-il-i- ty that the wat- er we drink could some - times be, the

25 G D G

same old wat - er that was a - round when din - o - saurs walked the earth.

27 F C G C

We're made up of wat - er too, like liv - ing things eve - ry where.

29 F C G C

Eve - ry - day we're tak - ing care to keep our wat - er clean. The

31 *CHORUS* F C G C

wat - er cy - cle goes round and round. Go - ing up, com - ing down. The

33 F C Am 1. G C

same old wat - er's been go - ing 'round since the world be - gan. The

35 2. G C G C

since the world be - gan oh yeah! since the world be - gan. that' right!

37 G C G C G C

since the world be - gan. that' right! since the world be - gan.



### **Water Education Program**

The Water Corporation produces Topic Booklets and other resources to give practical curriculum support to classroom teachers over a wide range of water issues.