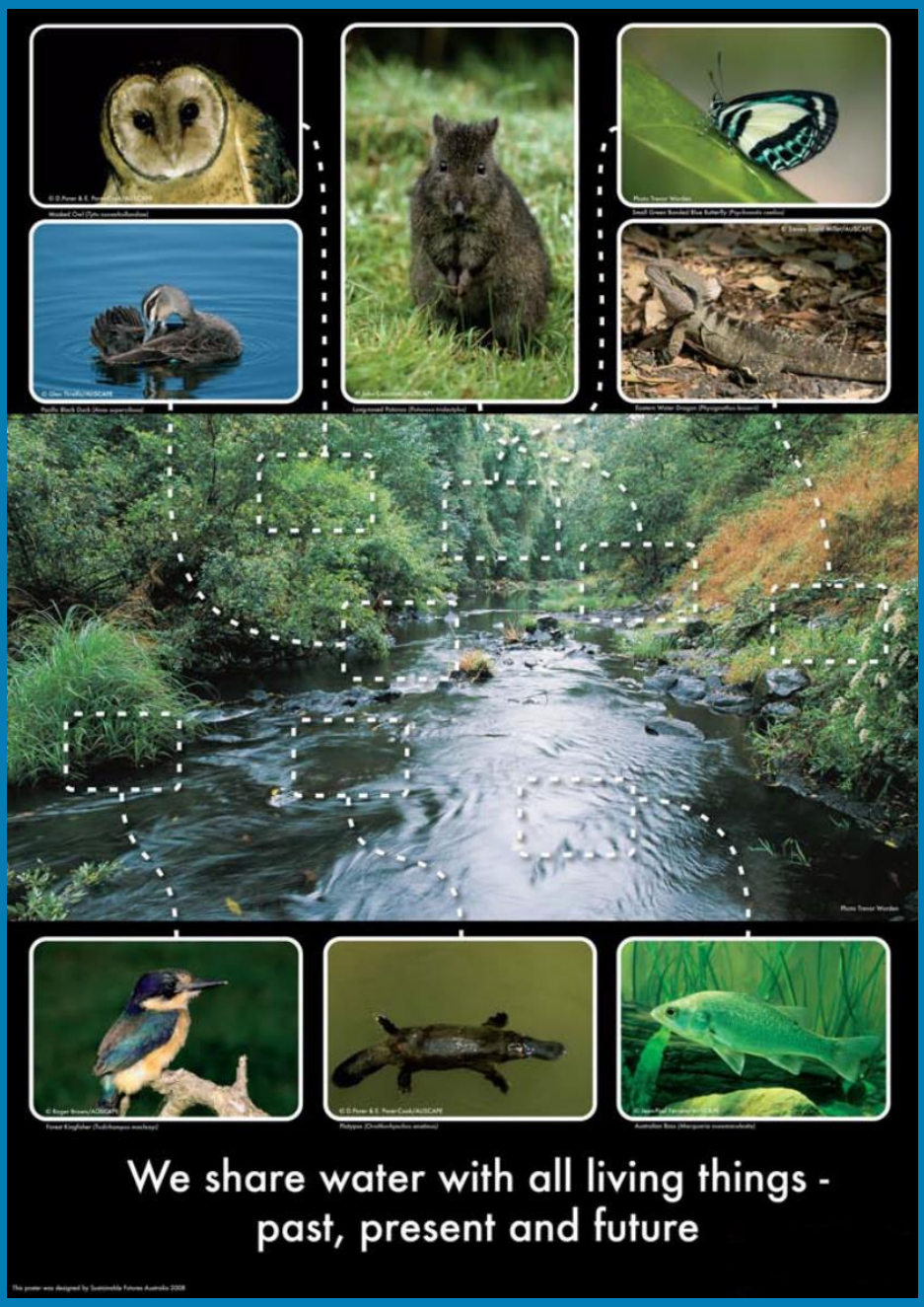
ROUS COUNTY COUNCIL

# Water Education Worksheets

## Stage 3

Rous County Council aims to support local schools and their communities to make choices and take action for wise water use and catchment care with free water education programs, activities and resources. Worksheets have been produced each year to complement the ‘Every Drop Counts Program’. Please copy and use with your class.



How much water did Wally waste on Wednesday at school?

# What a Water Wally

**Read this story, then:**

**a) Calculate approximately how many litres of water Wally used (see Water Use Chart).**
**b) Identify at least 4 things Wally could have done differently to save water.**
**c) Calculate approximately how many litres those new actions would save.**

When Wally got to school on Wednesday he rushed off the bus and straight to the toilet, flushed the full flush, quickly washed his hands and dashed out to find Evan, as he was bringing in his birthday cricket bat today. The bat was great but the bell rang before he could try it out and all too soon it was assembly and class time.

It was a hive of activity in the classroom today. Everyone was painting sea creature masks for the Book Parade. Wally had created an Eel mask and was painting blue, green and brown as stripy skin. He needed to wash the brushes two times each to stop the colours mixing. Luckily they had the demountable with the sink. It was sticky paint and took about 2 minutes each, to wash under the running tap.

This week Wally was the fish monitor, so it was his turn to clean the tank and change the water. It took forever to catch the fish; they were not keen on being lifted out of the water and into the plastic container. The tank was heavy; it must have contained at least a bucket and a half. He tipped the old water down the sink and scrubbed the sides with the tap running. With all the splashing he seemed to be getting very wet but it was fun and he was busy at it for 10 minutes.

Lunch time was very hot and he finished his water bottle in a flash as he rushed out to find Evan. Evan let him bat first, awesome! Unfortunately the bat got covered in dirt when he went for a big six and missed and they had to spend 3 minutes washing it under the garden tap.

On the way back to class Wally went for a quick drink at the bubblers and noticed that the second bubbler was still dripping. That must be at least 2 days now, he was sure he noticed it on Monday! He looked around for a teacher to report it to but with no one in sight he headed back to class and forgot all about it. One reason he forgot was probably because just as he came around the corner of his classroom there was a loud swishing noise that gave him such a fright. Cautiously we went back for a look. It was only the oval sprinkler starting up and then hitting the side of the Library every time it rotated around. He hoped they had the windows closed.

After an hour of project work their class went out for sport. Wally warned them about the sprinkler, which was still on but at least someone had moved it over and the Library wall was already dry. It was still hot! Wally filled his water bottle and kept it nearby during sport. He decided to fill it again for the bus trip home. As usual Wally nearly missed the bus because he was day dreaming on the toilet about batting for the green and gold. But in a flash and with a full flush he was out the door and onto the bus, just in time.

## Water Use Chart

**Flushing toilet**
- Single flush = 12 litres
- Full/half = 6/3 litres
- With displacement device 7 to 9 litres (eg like bottle in cistern)

**Washing hands**
- Well = 4 litres
- Quickly = 1litre

**Drink**
- A glass = 0.25 litres
- Fill drink bottle = 0.60 litres

**Garden hose, sprinkler or running tap**
- 16+ litres per minute

**A bucket**
- 9 litres

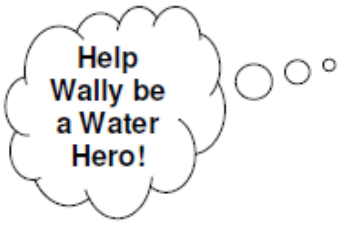
**Drip**
- 22 litres per day

## a) Calculate approximately how many litres of water Wally used.

**Wally the water WASTER used:**

**Litres**

**How many buckets is that?**




b) Identify at least 4 things Wally could have done differently to save water.

**1**

**2**

**3**

**4**

**5**

c) Calculate approximately how many litres those new actions would save.

**Wally the water SAVER used:**

**Litres**

**How many buckets is that?**

# Our school water study

**Aim**

- To discovery more about water, its use and value and water use at your school.
- To take actions that will help develop understanding and reduce consumption of water at your school.

**Method**

**Teamwork**: Divide your class into Water Study teams. Each team needs to plan and then undertake their task. You may need to have multiple numbers of Team B to D.

**Team A Water use daily monitoring team**
**Team B Water use mapping team**
**Team C Water survey team**
**Team D Water research team**

**Class presentation**: At a chosen time all teams will present their findings to the whole class.

**Plan actions**: Following the class presentation, each team plans 2 actions that will help reduce water consumption at your school or encourage students and teachers to use water more efficiently.

**Confirm actions**: List all the action ideas and then as whole a class, sort into a priority order. Allocate one action for each team.

**Undertake actions**: Finally each team carries out one of the chosen actions.

**Team A - Water use daily monitoring team**

How much water is used in one day at your school? Read the water meter (at the same time) everyday for a week.


- Graph your results in litres/days. The meter will look something like this.
- Ask the Principal if you can find out the cost of your schools water bills over a year (or two years) and graph those figures too.

**Team B - Water use mapping team**

Draw a map of the school showing the buildings and main features. Draw in all water points eg indoor taps, toilets, sinks, drains, water meter, tanks, pumps, garden taps, sprinklers, frog ponds etc. Think about the following and mark these places on the map:

- Where are the underground pipes?
- Where does your fresh water come from? (Name and mark)
- Where does your waste water go? (Name and mark)
- Where does water go when it rains? (Use arrows)
- Did you find any leaks or dripping taps? (Tell the teacher and mark it on your map too)

**Team C - Water survey team**

Write and carry out a survey of teachers and students in your school.

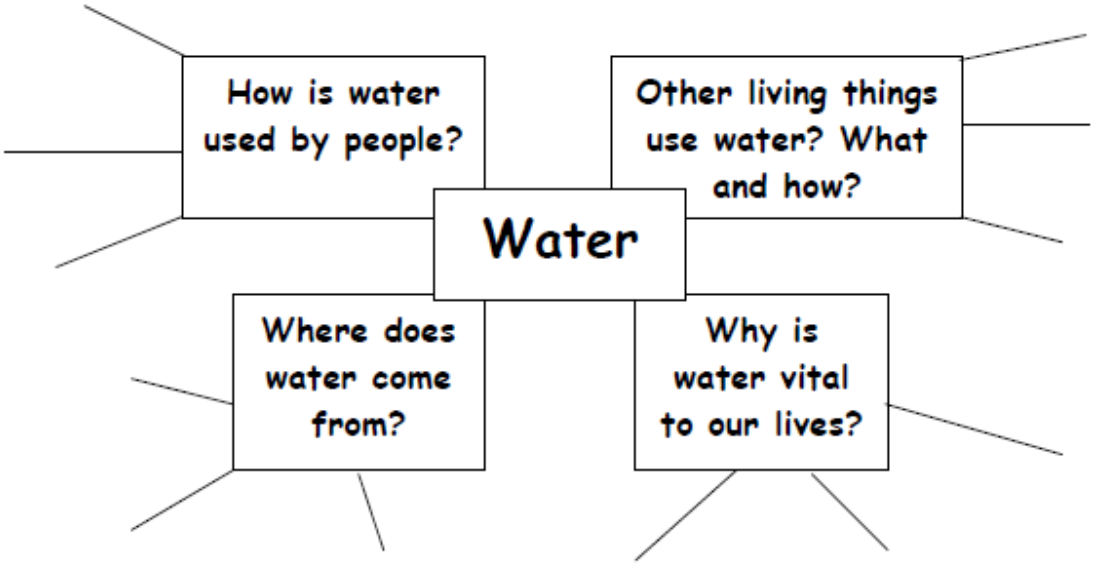
- Ask them 10 questions and record their answers. Write the questions to find out what they think about water and what they know about how to reduce their water use.
- Survey at least 10 people.
- After the survey read the replies and see if you can find any patterns or similarities in their answers.
- Write a short summary of the replies you got from the survey.

**Sample questions**

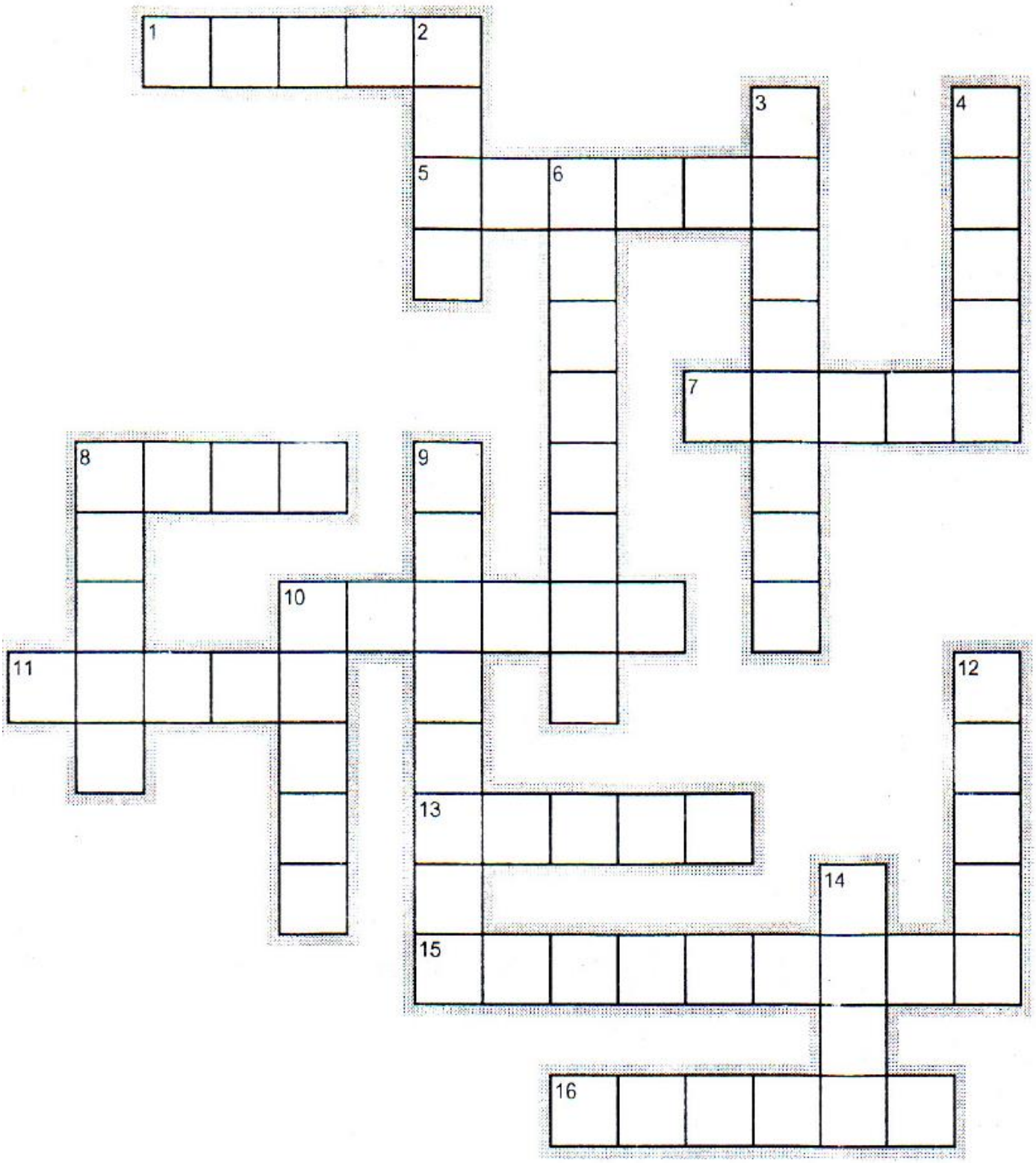
Think up your own questions but here are some ideas:
Do you think it is important to learn about water? Why?
Can you name 3 reasons why water is important for us?
Do you know where we get our water from?
Do we pay for the water we use, yes or no?
Can you name 3 ways to save water in the house?
What do you do at home that saves water?
What do you do at home that wastes water? How could you do that differently and save water instead?
Do we only need to reduce our water use in the summer or all year? Why?
Estimate how many litres of water you would use in an average day!

**Team D - Water research team**

- Draw a chart using this pattern to discover what you know and what you may need to find out about water. Add more boxes and lines where you need too.
- Research for information you do not know.



# Be wise with your water



## Across

1. Have a long soak in the bath but keep your showers _ _ _ _ _.
5. Plants that are adapted to our local environment do not need watering and are home and habitat for our local wildlife.
7. Found in the night time sky and on all water conservation rated shower roses, bubblers, aerators, dishwashers and washing machines.
8. Use this in the sink to control your water use when washing, rinsing and cleaning.
10. Used when washing your car (on the lawn of course).
11. Records how much water you are using at your home or school.
13. Look after your taps and toilets, watch out for and fix or report these immediately.
15. The water efficient toilet. (2 words)
16. Attached to the hose to control and save water.

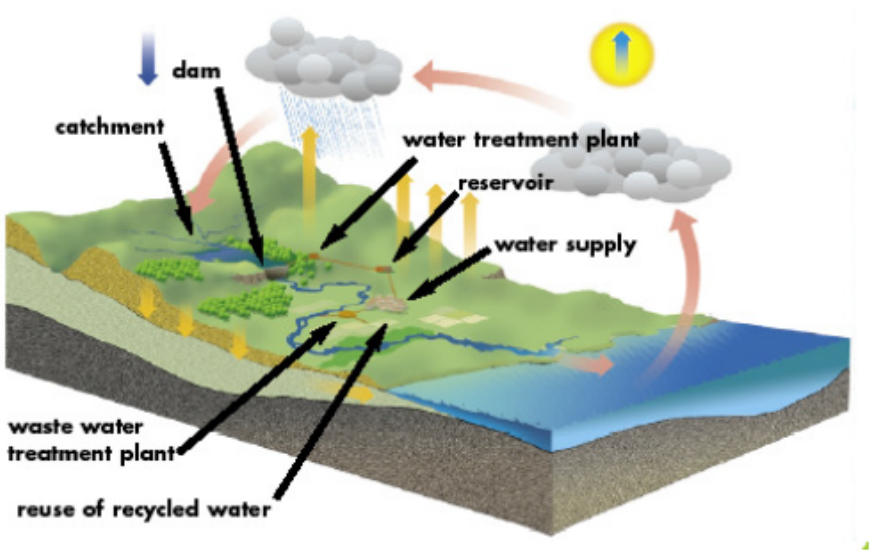
## Down

2. If every one installed one of these and connected it for toilet flushing and outdoor use, it would save 50% of our daily water use.
3. Put in taps to reduce the water flow and you may not even realise.
4. Soak don't spray, water these not the leaves.
6. Fixed to the garden tap to help control watering times. (2 words)
8. Safe drinking water comes to your school in these from the town reservoir.
9. This type of water is used more than once.
10. Used to clean the path or driveway, without wasting water.
12. Keeps the soil cool and moist, reducing the evaporation by 75%.
14. To save water with a dishwasher, make sure it is _ _ _ _ before you turn it on.

# Where do you stand in the water cycle?

Of all the water on this earth only 3% is fresh. 2% is locked up in the atmosphere, ice caps, glaciers and soil. That leaves only 1% available for the world's use. The amount of water we have on earth does not change, it just moves through time and place. Water evaporates, forms into clouds and returns as rain. It moves around and around our world in the water cycle.

People interact with the water cycle in many ways. We build dams for water storage. We clean water at water treatment plants. We pump up groundwater. We use water in our homes, on farms and in factories. We use water for cleaning and to remove our wastes. Our wastewater is cleaned at sewage treatment plants. Then we use the rivers and oceans to take the treated water away, putting it back into the water cycle. During all these uses, (as the water moves through the urban water cycle) we add many things like chemicals, oils and detergents. This places demands on our water supplies, our economy and our environment.




The amount of fresh water in the world is finite (we are not getting any more water) but the world's population is ever expanding. Governments and water suppliers like Rous County Council need to make decisions about the management of the urban water cycle. Their aim is to ensure there is enough good quality drinking water for today and for the future without any negative effects on the environment and in a cost effective way. To meet this aim there are many options, some are listed below.

## *Have your say!*

***Choose 3 options from the list below. Write each one above the number line - over the page. Then decide where you stand on each option and justify this position with your comments.***

**A:** **Build new water storages** eg new dams or increase the size of an existing dam.

**B:** **Desalination** ie turning seawater into freshwater.

Discuss or research to understand more about these topics.

**C:** **Permanent water restrictions** eg garden watering only allowed before 9 am and after 5pm.

**D:** **Rules and regulations** eg all new homes must have water saving appliances and fittings or install a rainwater tank.

**E:** **Recycling water** ie cleaning and reusing wastewater from our homes or catching and using the rain that runs into the stormwater drains. This recycled water is then used for watering gardens, sports fields and other areas or piped back to homes for flushing toilets and outdoor use.

*Choose three options and write each one into the spaces below.*
*Circle where you stand on the line between agreeing and disagreeing.*
*Explain your reasons - why do you think so?*

**Option 1 . . .**

1 2 3 4 5

***Strongly agree*** ***Strongly disagree***

I stand here on this option because . . .

**Option 2. . .**

1 2 3 4 5

***Strongly agree*** ***Strongly disagree***

I stand here on this option because . . .

**Option 3. . .**

1 2 3 4 5

***Strongly agree*** ***Strongly disagree***

I stand here on this option because . . .

# Let's have a school rainwater tank

## How much water can a rainwater tank collect at your school?

### 1 How much water can you collect?

You will need to know:

- ✓ *Annual rainfall for the region.*
  - Find data from Bureau of Meteorology, local rainfall stations or local Council.
  - Rainfall is measured in millimeters (mm).
- ✓ *Roof Catchment size* ie the area of roof that will catch the water that then flows into the gutters and fills the tank.
  - Where the tank is situated will determine what part of the roof is catching the rain. Therefore decide where the tank would be put and examine gutters and down pipes.
  - Roof area is measured in square metres ($m^2$).
  - Each $m^2$ of roof area collects 1 litre (L) of water for every 1mm of rainfall received.
- ✓ *Runoff percentage from roof catchment.*
  - Assume 90% runoff from a metal or tiled roof (90% = 0.90).
- ✓ *First flush devices*
  - To remove dirt etc from the roof many tanks have a first flush device that will divert the first rain and stop that water getting into the tank.
  - If the tank has a first flush device calculate the litres diverted per rainfall event and subtract that number from the final total. ***Source 'Rainwater tank summary' at*** [www.greenplumber.com.au](http://www.greenplumber.com.au)

**Formula** - Annual rainfall (mm) x roof catchment ($m^2$) x runoff (%) = litres (L) of rainwater per year

**Example – Calculation 1:**

There is a tiled roof on a residential house in Sydney where 70m2 roof area is draining to a single down pipe where they would like to capture and store the roof water in a rainwater tank nearby.

- ✓ Rainfall for the Sydney region - 1217mm/year
- ✓ Catchment size – 70m2
- ✓ Runoff percentage - 90% for tiled roof
- ✓ First flush device – No

*Answer: 1217 x 70 x .90 = 76,671 L of rainwater per year.*

**Example – Calculation 2:**

There is a metal roof on a residential house in Perth where 200 m2 roof area is draining to four down pipes where they would like to capture and store the roof water in an underground rainwater tank nearby, with a first flush device diverting 40 L each time it rains.

- ✓ Rainfall for the Perth region - 869 mm/year
- ✓ Catchment size –200m2
- ✓ Runoff percentage - 90% for metal roof
- ✓ First flush device 20 L per rainfall event (assume 50 rainfall events in Perth) =2000L.

*Answer: 869 x 200 x .90 – 2000 L = 154,420 L of rainwater per year.*

***Your school calculations***

*Rainfall mm/year =*

*Catchment size m2 =*

*Runoff % =*

*First flush device =*

***Answer =***

# How much town water will you save with a tank?

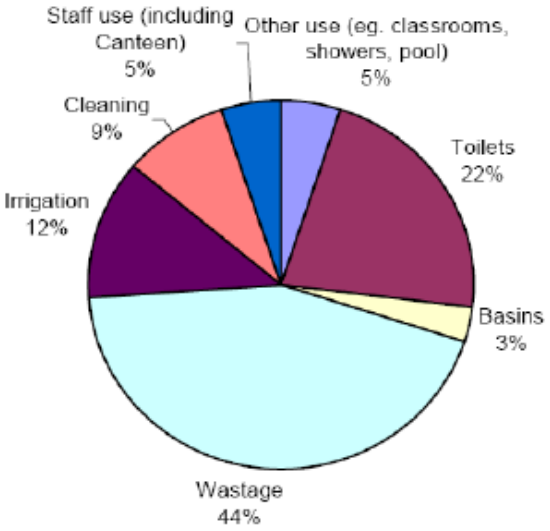
## 2 What will the rainwater be used for?

Maintenance and filtration will help to ensure good quality rainwater. This and local Council regulations need to be considered before installing a tank. A tank could be used for:

- ✓ Outdoor uses.
- ✓ Toilet Flushing.
- ✓ Pool or water feature top up.
- ✓ Garden irrigation.

*I think the tank water should be used for . . .*

*Because . . .*




**Water use in schools (in the Sydney Water Area) www.sydneywater.com.au**

## 3 How much town water will be saved?

To calculate how much town water will be saved by using the rainwater instead, think about the amount currently used for the purpose you chose. (Refer to the Water use chart).

**The school will save**

If our school installs a rainwater tank the school will save per day:

**Litres =**

**$ =**

*NB Ask the Principal for the water bill and calculate the cost of water per day.*

| Water use chart | |
|---|---|
| Flushing toilet | |
| • Single | 12 litres |
| • Full/half | 6/3 litres |
| • With displacement | 7 to 9 litres |
| Washing hands | |
| • Well | 4 litres |
| • Quickly | 1litre |
| Drink | |
| • A glass | 0.25 litres |
| • Fill drink bottle | 0.60 litres |
| Washing dishes | |
| • Kitchen sink | 15 litres |
| • Dishwasher | 4 star = 18 |
| | 30+ litres |
| Garden hose, sprinkler or running tap | 16+ litres per minute |
| Drips | 22 litres per day |
| | |
| **Other uses – calculate yourself** | |
| Bubblers - | ? |
| Canteen - | ? |
| Washing paint brushes - | ? |
| | ? |
| | ? |

# Watch out for the blue star label


www.waterrating.gov.au

'AA' rating is the old labeling scheme.

The blue star label is Australia's water efficiency labeling scheme. It requires certain products to be registered and labeled with their water efficiency rating. The more stars the more water efficient the product. It is similar to the way appliances are labeled for energy efficiency (ie white stars on a red and yellow label).

***Instructions:***

## *How much water can you save?*

Work out just how much water can be saved in a day by using water efficient appliances.

1. ***For each appliance, calculate how much water is saved and write in the 'saved' box.***
2. ***Add all boxes and find out the total amount of water saved.***


***Washing machine***

### *1 Dual flush toilet*

Saved:

**Single button toilet = 12 litres**
**Dual flush = 6 or 3 lt**

How much water will you save when you use the half flush 4 times for the day (instead of a single button toilet)?


***Tap flow restrictor***


***Dual flush toilet***

### *2 Showerhead*

Saved:

**Old showerhead = 25 litres a minute**
**3 star showerhead = 9 lts/min**

- How much water will you save when you have a 3 star, three minute shower?
- And that's mostly hot water so what else will you save?


***Showerhead***

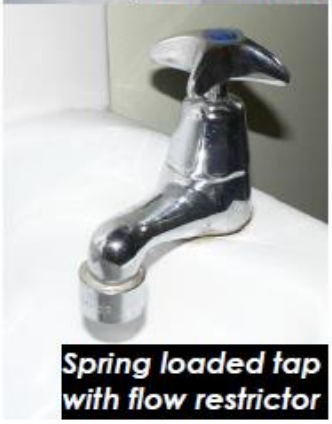

***Dishwasher***

### *3 Washing machine*

Saved:

**Old washing machine = 150 litres**
**4 star rated = 70 lts a wash**

How much water will you save when you do one full load a day in a 4 star rated machine?


***Spring loaded tap with flow restrictor***

## 4 Tap Flow restrictor

Saved:

**No restrictor in tap = 12 litres a minute**
**3 star restrictor in tap = 5 lts/min**
How much water will you save when you fill a jug for 2 minutes from a tap with a restrictor.

## 5 Spring loaded tap *(*more efficient washing , ie can't leave it running)*

Saved:

**No restrictor in tap = 12 litres a minute** & ***Washing hands for 2 minutes = 24 litres***
***Washing with spring loaded tap for 2 minutes(* tap only running for 1 min) = 12 lts***
How much water will you save when you wash your hands at a spring loaded tap?

## 6 Spring loaded tap with restrictor

Saved:

**3 star restrictor in tap = 5 litres a minute** & ***Washing hands for 2 minutes = 10 litres***
***Washing with spring loaded restrictor tap for 2 minutes(* tap only running for 1 min) = 5 lts***
How much water will you save when you wash your hands at a spring loaded tap with restrictor?

## 7 Dishwasher

Saved:

**Standard 12 place setting dishwasher = 34 litres per wash**
**3 star 12 place setting dishwasher = 18 lts**
How much water will you save when you do one full load a day in a 3 star rated dishwasher and you don't rinse the dishes before stacking them in the dish-washer?

## Total Water saved =

Add the litres saved from the 7 boxes for a total:

**How else can the students, teachers, parent helpers, gardeners or cleaners save water at your school? Name at least 4 ways:**

**1.**

**2.**

**3.**

**4.**

**5.**





| ***Gardner's Intelligences*** | Water Conservation Activity Table<br>***Blooms Taxonomy*** | | | | | |
|---|---|---|---|---|---|---|
| | Knowing | Understanding | Applying | Analysing | Creating | Evaluating |
| 1. Verbal linguistic | List 5 ways water is used inside and 5 outside. Then list 5 actions you can take to save water. | Write a 2-minute talk to explain why water is important for our lives. | Write a newsletter article on how your class helped the school to save water. | Investigate water use at your school. Arrange under two headings of wasting water or saving water, the activities or appliances that you find. | Your school is buying a water tank; devise a plan for how to use this water and write a newsletter article to inform the parents. | Recommend a list of water saving devises & appliances that would be installed in all new buildings. Sort the list into order of most water efficient. |
| 2. Maths logical | Write a timeline of your daily water use. Eg shower, flush etc. Find or estimate the amount of water you use with each action. Calculate your daily water use. | Choose two water conservation appliances and describe how they work to save water. | Carry out a questionnaire (for the teachers in your school), on water saving appliances and actions in their homes. | Analyse whether your school should install a tank (or another tank if you already have one). | Invent a piece of equipment or a plan to redesign the area, so that no water is wasted at the bubblers. | A University science student is studying water supply 'demand management'. Prepare a list of questions they could use to assess how Rous County Council is managing the community's water use. |
| 3. Visual spatial | Find a poster to show how the drinking water gets from the dam to your tap. | Draw a water conservation poster under the heading of "Every Drop Counts". | Make a model of the Rous County Council supply including hills, dam, treatment plant, pipes, a reservoir and a home. | Draw the water pipe system in your school ie showing the fresh water coming in and waste water going out. | Create a water cycle using a bottle and plastic bag etc. | Evaluate the usefulness of the Sydney Water website for students who are studying water conservation. |
| 4. Body kinaesthetic | Mime the journey of a drop of water through the water cycle. | Express through dance, 5 reasons why water is important for our daily lives. | With a map or diagram show the importance of water in the production, cleaning and cooking of our food. | Examine water by drawing a mind map, start with water in the middle and work out from there identifying the values & uses. | Devise a game for outside that has a water conservation message. | Evaluate the 'Every Drop Counts' program ie its effectiveness for learning about water conservation |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5. Music rhythmic | Write a 5 line poem about water with each line starting with the letters w, a, t, e, r. | Express through a chant how "Every Drop Counts". | Illustrate the journey (in percussion) of water moving through the water cycle. | Select an instrument and explain why you chose it. Select one that represents water and its value in our lives. | Compose a rap about water conservation. | Choose a piece of music that would suit a documentary about water conservation. Justify your choice. |
| 6. Interpersonal | In a group make up a list of all the water saving actions you can remember doing or heard about others doing, when we had the last drought. | In a group, as school teachers, write a list of actions a school could take to understand their water use and wastage. | Visit the water treatment plant and report on the how the dam water is made safe to drink. | Conduct a mock public meeting (to compare opinions) of people considering the option of building a new dam. | Play charades. First write a list of words to use that are all water saving appliances or actions. | Conduct a debate "desalination will solve all our water problems". |
| 7. Intrapersonal | Visit a water information website and list 3 water conservation actions we can take to save water in the house and 3 in the garden. | Look up an international water information website and determine 2 global water issues. Write a brief outline of these issues. | Look up an international water information website, and determine 2 global water issues. Report on these issues considering the impact of this for Australia. | Prepare a consequences chart to investigate the consequences, if it was decided to have permanent water restrictions. | Design a sign that council would put up at the entrance to town, when water restrictions are applied. | Carry out an internet web search to learn more about water. Compare 4 sites and recommend the best one, explain why. |

***Possible websites for water information:***
Rous Water www.rous.nsw.gov.au
Sydney Water www.sydneywater.com.au
Environment Protection Authority www.epa.nsw.gov.au
CSIRO Land and Water www.clw.csiro.au
UNESCO Water Portal www.unseco.org/water/
World Health Organisation www.who.int/en/

# What water is that?

## *Our place in the water cycle*

Water is salty in oceans, frozen in ice caps and glaciers, vapour in the atmosphere and hot gas in steam. All living things need water to survive. We are about 65% water, it's found in our blood, muscle, fat and bone etc. It takes away wastes, carries oxygen and nutrients and keeps the body temperature stable. Water is used in agriculture and industry to grow our food and manufacture all our products.

Water moves through time and space in the water cycle. It evaporates from the sea, it condenses into clouds, it transpires from plant leaves, it infiltrates slowly through soil where it may collect underground and it runs rapidly in creeks and rivers, back to the ocean once again.

On average, each Australian consumes around 100,000 litres of water per year, that's about 274 litres or 31 buckets per day. When you factor in the water used to produce the food we eat and the products that we use in everyday life, we are each responsible for using about 1 million litres of water per year ie 2740 litres or 304 buckets per day .

## *Instructions*

An important question is ***What water do we have available and how can it best be used?*** We need to consider where water comes from, what is the best why to use that water and what are the costs or impacts for people, the economy and our environment.

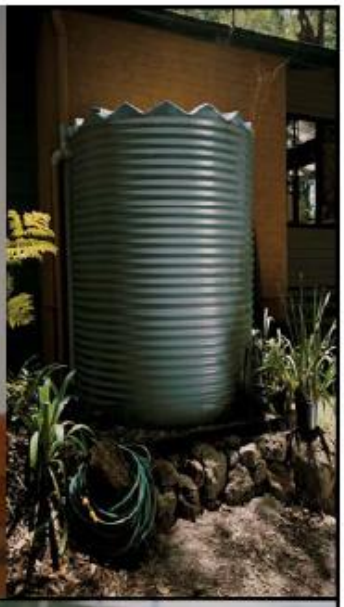
1. ***Read the information on the next two pages.***
2. ***Choose 3 types of water and fill in the table below (or on the last page).***
3. ***Design a school or home water system that uses at least 3 types of water for all its water needs eg flushing, cooking, cleaning, art work, gardens, drinking etc.***

**NB: This worksheet provides basic facts only from a variety of sources, consider doing research to get further information.**

| *Type of water*<br>**What is the water source, refer to the list.** | *Best uses*<br>**Consider uses for people, agriculture or industry.** | *Why & what are the issues?*<br>**Consider the costs and impacts for people, the economy and our environment.** |
|---|---|---|
| | | |
| | | |
| | | |

## Greywater

Greywater includes wastewater generated from the shower, bath, spa, hand basin, laundry tub, washing machine, kitchen sink and dishwasher. Greywater put through reuse systems from the bathroom and laundry, (but not the kitchen), can generally be used for non-drinking purposes providing it is managed to ensure the environment and public health are protected. Dishwashing powders can be harmful to soil structure and plants.

## Treated wastewater

Treated wastewater is sewage (wastewater from the toilets or urinals), industrial wastewater or other effluent that is treated to a level appropriate for its intended usage. It is used on land through sub surface irrigation. State and local governments have guidelines and regulations for the use of treated wastewater, including usages, storage, treatment, application methods, maintenance and water quality monitoring.

## Urban stormwater

Urban stormwater is run-off from roads, roofs, paths or other urban surfaces. In times of flooding, peak volumes of water can flow into creeks, lakes and wetlands, bringing pollution that has been washed from the urban surfaces. Therefore stormwater can pose the same health and environmental risks as sewage.

## Rainwater

Rainwater is rain collected on roofs and piped into storage tanks. It is an accepted part of rural living where mains water is not available but in urban areas governments don't recommended it for drinking.

## Mains water (town water)

Mains water is water pumped from dams or rivers and cleaned in a water treatment plant to Australian drinking water guidelines. Then it is distributed through a network of pipes and reservoirs to homes and businesses in towns and cities. The water is metered as it enters the properties and families or businesses pay according to their usage. Some people want to avoid certain chemicals used in the treatment process such as chlorine or fluoride and filter their water at home with tap or jug filtering systems.

## *Bottled water*

Bottled water is drinking water packaged in plastic (or glass) bottles and sold in shops. It is sourced from springs and wells or is purified water from taps or rivers. It is distilled, purified, filtered or disinfected. Most countries have government regulations for its water quality. It takes about 3 litres of water to produce a one litre bottle of water and only 35% of bottles are recycled, the rest get thrown out, filling up our rubbish tips.

## *Desalinated water*

Desalinated water is fresh water extracted from saltwater. The salt is removed by distillation (ie heating salty water to capture water vapour) or reverse osmosis (ie forcing water through tiny pores in a synthetic surface). Desalination requires huge amounts of energy and generates large amounts of concentrated brine and salt as a waste product. Each litre of seawater contains, on average, about 35g of salt.

## *Bore water*

Rainwater trickles down through the soil over many thousands of years and collects beneath the surface in layers of rock, like an underground pool. Australia's largest underground reserve is the Great Artesian Basin. People bore down to tap into these ancient supplies and can quickly pump out large quantities of water. As the water infiltrates through soil and rock it leaches minerals into the water. This may effect the colour, taste or salt levels and therefore influence its potential usage.

| *Type of water*<br>**What is the water source, refer to the list.** | *Best uses*<br>**Consider uses for people, agriculture or industry.** | *Why & what are the issues?*<br>**Consider the costs and impacts for people, the economy and our environment.** |
|---|---|---|
| | | |
| | | |
| | | |

## *Using what water for what! Make your school (or home) water wise*

*3 Design a school or home water system that uses at least 3 types of water for all its water needs eg flushing, cooking, cleaning, gardens, drinking etc. Draw it in this space.*

# Water science: What and where is water?

## An eternal journey . . .

Water is constantly travelling through time and space in the water cycle. Only 1% of the water on planet earth runs in creeks and rivers like those feeding Rocky Creek Dam. Good water quality at any one place depends upon all parts of the system being healthy.

**Name at least 3 other places where you would find water?**

- **Circle the form water takes in that place.**

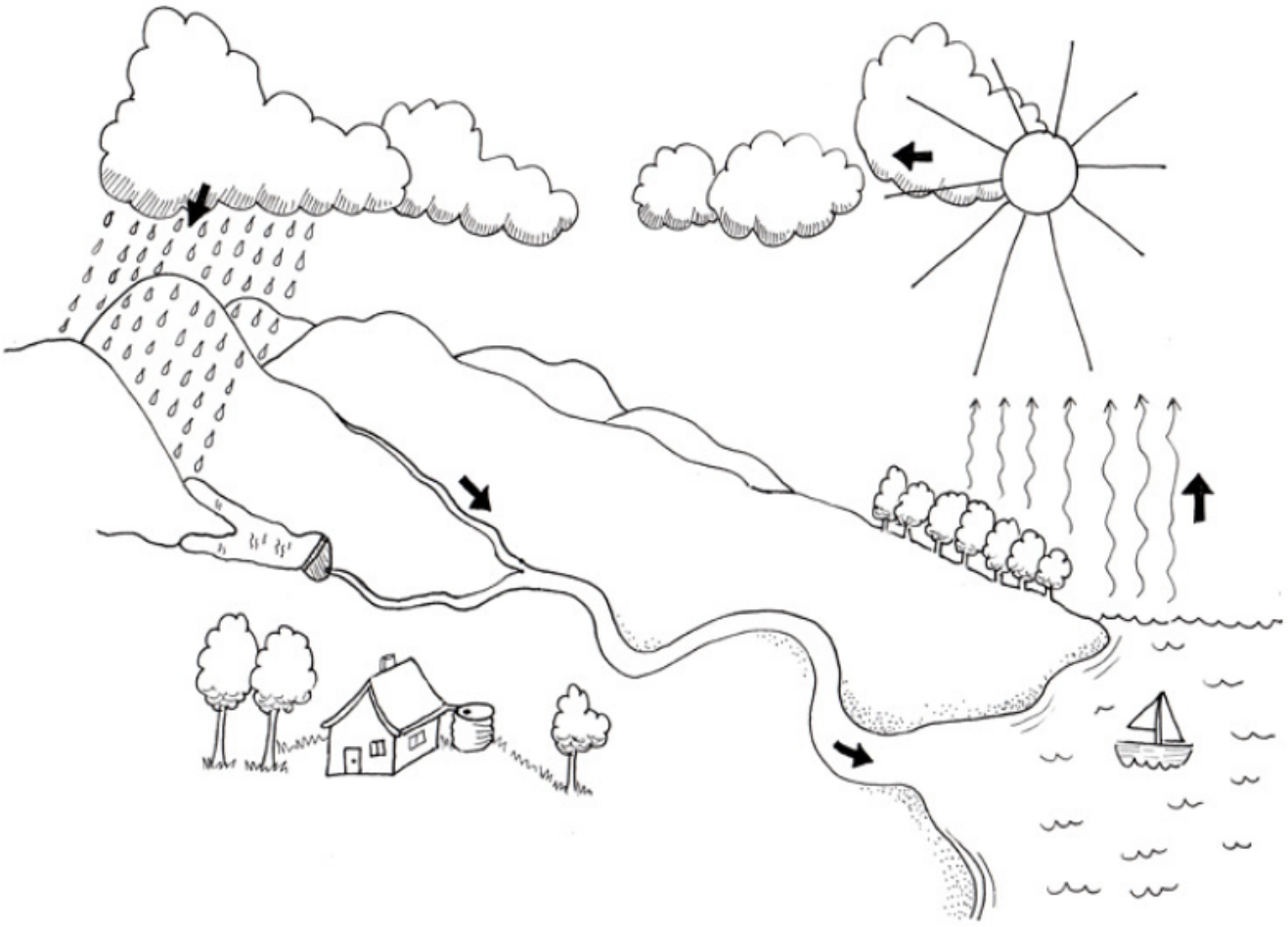
| | | | |
|---|---|---|---|
| 1 | Gas, | liquid, | solid? |
| 2 | Gas, | liquid, | solid? |
| 3 | Gas, | liquid, | solid? |
| 4 | Gas, | liquid, | solid? |

## Our place in the water cycle . . .

Some of the water that usually flows through the natural water cycle is diverted through a human made system for our use. This means the demand we have for water can impact greatly on the natural water cycle and that we need to use water with great care.

**Draw and label the diagram with the human made elements that are needed to supply water to our homes, schools or factories.**

- **Use arrows to show how they interact with the natural cycle. (Examples below).**



*Water catchment area.*
*Water treatment plant and distribution pipes.*
*Reservoirs storing water closer to town.*

*Pipes for grey water and stormwater.*
*Sewerage treatment plant.*
*Recycled waste water. And others?*

# Water science: What and where is water?



## Design experiments to demonstrate water properties and concepts.

**Working in small groups choose 2 statements from the list below.**

- **Research and design an experiment that will show each statement to be correct.**

A. Water is an universal solvent.

B. When ice melts it absorbs heat energy.

C. Water bends light.

D. Water has a high surface tension.

E. Water expands as it changes from a liquid to a solid.

F. Ice is less dense than water.

G. Water particles are closest together in a solid, further apart in a liquid and even further apart in a gas.

H. Water transpires from leaves, this helps the plants draw water and nutrients from the soil.

I. Water evaporates from seas, lakes, rivers and other wet surfaces on land.

J. The water supplied by Rous Water is treated at Nightcap or Emigrant Water Treatment Plants but water is naturally cleaned in the water cycle, for example by plants and sand.

K. Water passes through the leaves of plants and is released back into the air.

L. Water evaporates from the ocean and rises as vapour, leaving behind salt and other elements or impurities.

M. Pollution on the land will effect the water quality.

N. Scientists think that the first oceans formed nearly 4 billion years ago. And that the ocean water probably came from steam which was released by erupting volcanoes.

O. We all live in the Richmond catchment and the everyday things we do on the land will have a positive or negative effect on the Richmond river or it's creeks and waterways.

P. Some water from the water cycle seeps into underground aquifers.

Q. Water can be used as a source of energy.

R. *Or other experiments that you can suggest which will demonstrate water properties and concepts.*



# Water knowledge survey

1. Interview a student using the questions below and write their answers in the space provided.
2. Read through their answers and think about their current level of knowledge and what they don't know or understand.
3. Make a list of research questions that will help the person you interviewed fill in the gaps in their water knowledge.

A. Where does our school water come from?

B. Name at least three stages in the pathway from the clouds to the school taps.

C. All living things need water to survive. Apart from people, name two other types of living things that need water for their survival.

D. We each use about 180 litres of water a day to carry out our daily life, name at least five ways you personally use water or it is used daily in your home.

*You are a water guardian. What can you do each day to save water?*

E. Name at least three water efficient fittings or appliances found at your school or home.

F. As well as being wise with our water use (water conservation) we also need to protect water too. What are we protecting it from?

G. There is no new water, it just moves around and around in the water cycle but the population of the world will greatly increase. Name at least two possible options for governments, water suppliers or people to ensure there will be enough water for the future.

You have $500 to spend on water conservation actions for your school. How would you spend it?

## Research questions

Make a list of research questions that will help the person you interviewed fill in the gaps in their water knowledge.

# Get the water smarts – use shower power!


***It's easy to become water smart in the bathroom.***

### *1 - Tick off water saving actions you take:*

- Our showerhead is a water efficient model, it is a 3+ WELS star rated one that uses less than 9 litres a minute – the more stars, the more water saving.
- I stay focused and use the time spent in the shower to soap up, wash down and rinse off.
- I use a shower timer. That's an easy way to help me have a quick shower.
- We collect any cold water in a bucket or jug, that comes from our hot shower tap while we wait for it to get hot. This water is ready to recycle, handy for watering our pot plants.
- Our hot water pipes are insulated. This avoids wasting water while you wait for hot water to flow through.
- Our hot water system thermostat is not set too high. Adding cold water to reduce the tem-perature of very hot water is wasteful.
- Our family has installed a special valve (Aquadivert or Redwater Diverter). It diverts the cold water from the hot water line when you first turn on the hot tap.
- Our family has installed a paddle (Every Drop Shower Saver) that makes it very easy to turn the shower water off while we lather up.

### *2 - Choose one of these slogans and use it in a sticker design to encourage people to have short showers and save water (energy, m o n e y and the environment too!):*

**Shower power – keep it brief.**

**Shower stars – more than just the singing.**

**Take shorter showers and savings will really flow.**


## Did you know?

3-star WELS rated showerheads use less than 9 litres of water per minute, while old style showerheads use 15–20 litres per minute.

If you shower for five minutes, a water efficient showerhead will save at least 30 litres of water per shower.

For an average family, installing a 3 star WELS rated showerhead means a saving of around 14,500 litres a year.

## Sticker ideas:

### Less is more

Less time spent in the shower is more water, energy and money saved.

3 minutes is all it takes!

Any more time spent in the shower is a waste.

### Catch the cold

***Question***: In the shower, do you have to wait for the hot water to warm up?

***Action***: Put a bucket or jug in the shower to catch the water until it heats up. Then recycle this water onto your pot plants or into your gardens. Every drop counts!

### One minute less is one bucket saved!

About 20% of water used at home is used in the shower. Water saved while showering will also save money, energy & the environment. A 3+ Rated showerhead uses 9 litres a minute, a bucket holds 9 litres, so I minute less is one bucket saved.

# Singing for Rain

**The watering hole is a special place. It is where all the local creatures gather to talk about what is going on in the world. It is a talking place. A thinking place. A place where stories are told. Nganyul Mah – Our Place. The watering hole is full of fresh, clean water. All the creatures depend on it for life. Boodgeragah the fig tree is the guardian of the watering hole.**


1. Jerranj the green tree frog is sad. Out in the rainforest, he sings his heart out. His deep croaky cries fill the air.
2. Gadjul the brush turkey is annoyed. He tells Jerranj to stop making so much noise and disturbing the peace.
3. Bininy the echidna, who's usually very shy, speaks up. She tells Gadjul to listen to what Jerranj has to say. Rain is very important to Jerranj. He needs damp weather to keep his skin nice and moist and shallow water to raise his tadpoles in. He tell Gadjul and Bininy how there hasn't been as much rain as usual and that much of the country is still in drought. (See the rainfall chart he's pointing to?) He explains how he is singing for rain.
4. Jerranj is asking for the rain to come again because water is so precious, not just for him but for all the creatures.

**The Watering Hole Cartoons were created by Rous Water, Widjabul descendents and Sustainable Futures in 2007. The language used is Wiabul, the traditional language of the Widjabul people. The animals & plants are local native wildlife from the rainforest around Rocky Creek Dam part of the Big Scrub area. Download more Watering Hole Cartoons at www.rouswater.nsw.gov.au**

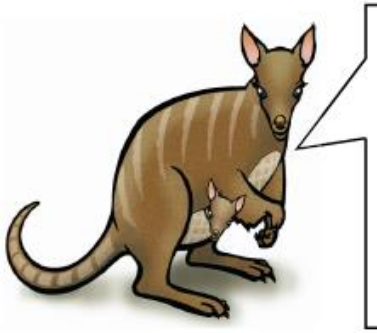
## Study the cartoon: Messages for us all

1. **What is the main message you got from this cartoon?**

2. **Below are other messages from this Cartoon. Rank from 1 as the most important to 5 as the least important. Write each number in the boxes.**

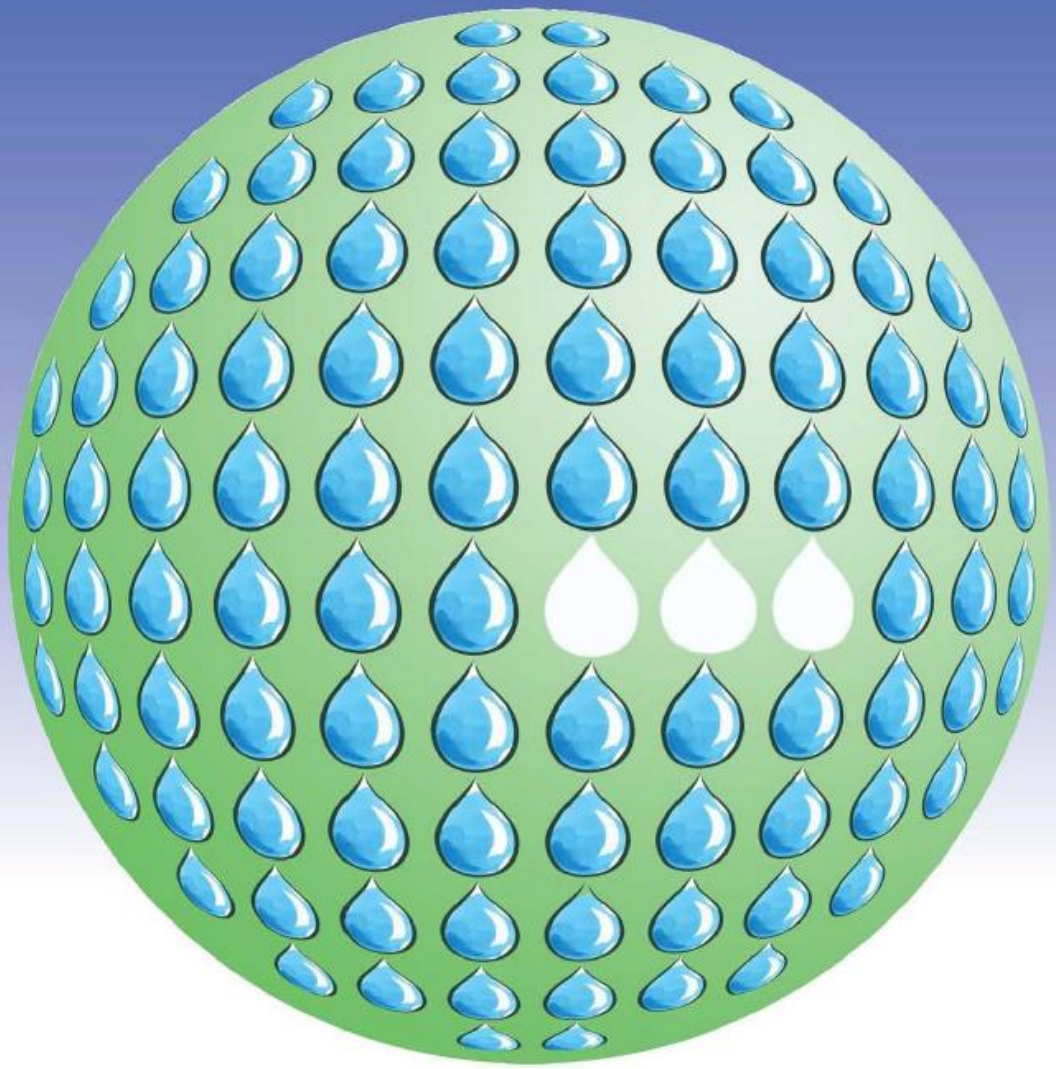
| | |
|---|---|
| | Green tree frogs are good indicators of rainy weather because they call loudest during damp weather (even if it's not raining yet). |
| | Although for most of 2011 our dams have been full, in 2007 this region was declared to be in drought. As well scientist say that the likely effects of climate change include less reliability of rainfall, with wetter summer wet seasons and drier dry winters. |
| | Where there is water, there is life. Where water is scarce or polluted, things struggle to survive. Don't waste a drop. |
| | Voice your concerns. When you know something bad is happening, like if you are aware of an environmental issue such as a shortage of water, it's worth 'making a noise' about it. |
| | By paying attention to how you feel about what's happening in the natural environment, you can motivate yourself and others to take actions to care for our precious natural resources, for example water. |

3. **Saving water helps to keep the water level high in Rocky & Emigrant Creek Dams. This ensure there is plenty of water for our future. What are at least 2 other benefits for our community if we save water? Use the talking box of Bundoon, the pademelon for your answer . . .**



Rous County Council recognises Widjabul elders as the custodians of the dam catchments and works with them to provide information for visitors to the dams. Drawings of the native wildlife are used to pass on many of these important messages.

# Of all the water on the Earth only 3% is fresh water



**2%** is locked in the atmosphere, ice caps, glaciers and soil

**that leaves only 1% available for the world's use**

***every drop counts***

# Be wise with your water

# Every Drop Counts!

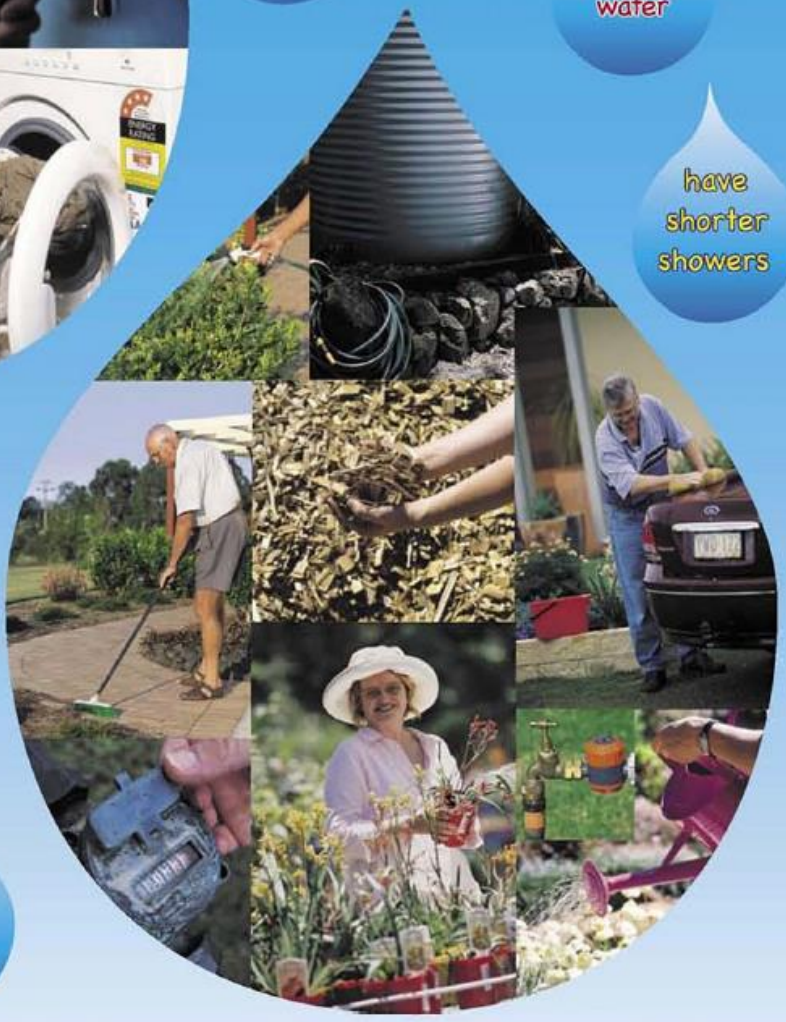
fix leaky taps

flush less

use water efficient appliances

recycle water

have shorter showers



use rainwater

use buckets not a hose

mulch and compost

sweep don't hose

plant native plants

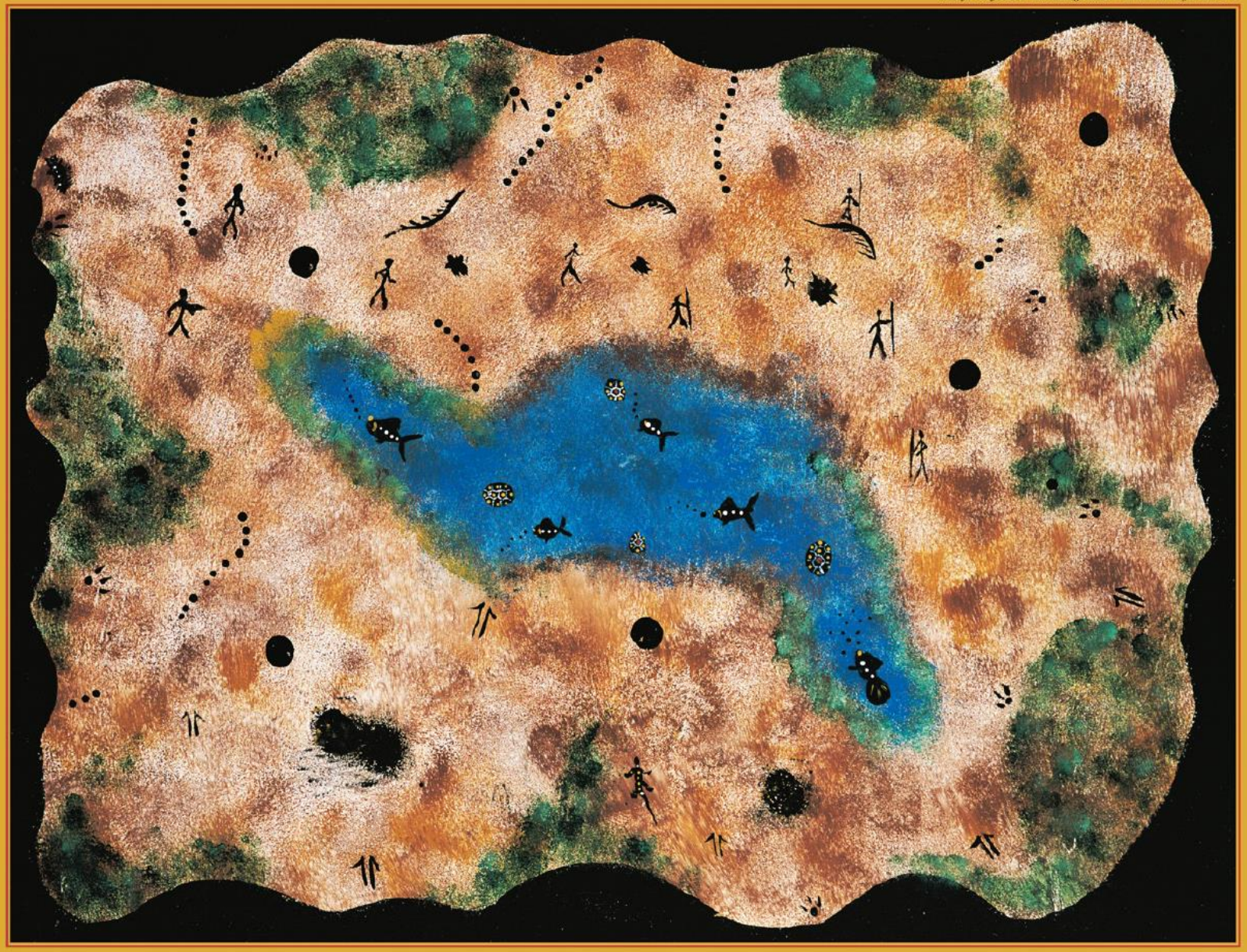
watch how much you use

*BURBANG. The Animals are Coming Together* © Sheldon Harrington Snr, 2003

ROUS COUNTY COUNCIL

'Look after the water. The water looks after us.'

*Garima gala nyabay. Gala nyabay garima ngali ngih.*



echidna

wallaby

bird

dog

ROUS COUNTY COUNCIL

*Jahna ngali garimaleh jogun.*

*'Lets stand together, looking after country.'*