



Water

Let's be sustainable

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Topic 1: Why do we need water?

Introduction

In Topic 1, students will think about why water is an important resource. They will brainstorm a list of ways that they use water every day, sort and classify these uses and list them in order of importance. This will require class discussion and debate to come to an agreed class list of water uses.

Learning outcomes

- Students will understand why water is important for the survival of humans, animals and plants.
- Students will be able to list several ways in which they use water and consider which are the most important or necessary.

Resources

- Interactive whiteboard
- **'Water mind map'** activity sheet
- Small pieces of paper (an A4 sheet divided and cut into 8 rectangles)
- Sticky tape or Blu Tack™ (if sticking paper to a wall)
- Word wall

Lesson steps

Write the word 'Water' on the board (or display a copy of the **'Water mind map'** activity sheet). Ask students what they know about water and record their initial ideas. This can be a whole class brainstorm, or you can provide small groups with a copy of the sheet.

If students are having trouble thinking broadly about water, you may wish to ask the following questions:

- How have you used water today?
- How have you seen other people using water?
- Other than people, what else needs water?

Once you have a variety of ideas, ask students if they could group or categorise their ideas (e.g. showers, cleaning teeth and having a bath, could be grouped as 'hygiene').



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When you are satisfied with the number of categories, ask students (in pairs) to record each category on a separate piece of paper.

In small groups ask students to consider how important each category is and rank them in order from most important to least important (e.g. is hygiene more or less important than cleaning, drinking or gardening?). Encourage discussion and debate.

Once groups are finished, have each group display their water uses in order of importance. This can be done by sticking them to the wall or by having students stand in their agreed-upon order, holding the cards and reading them out.

Are students' lists similar? Are there a lot of differences in how students ranked the uses of water?

Working together, compile an agreed class hierarchy of water use. This can be teacher or student led, but encourage students to explain and defend their points of view.

Discuss the final list. Use questions such as:

- Which items from the list could we survive without? For example, what would happen if we had to stop going swimming? What if we couldn't drink?
- Which items are essential to our survival? Why?

During Topic 1, begin a word wall to record vocabulary used throughout the unit (in English and local language). This can be added to if you complete further topics.

Extension option

Students can further investigate why water is essential to the survival of humans, animals and plants.

How does our body use water? How does water contribute to environmental stability?



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Topic 2: Where does our water come from?

Introduction

In Topic 2, students will learn about the water cycle and participate in an activity to explore the composition of the Earth's water (e.g. salt, fresh, frozen). This will show students that, while there is a lot of water on the surface of the Earth, not all of it is in a form that we can use.

This topic will be delivered in two parts, each of which may take several lessons.

Learning outcomes

- Students will be able to describe the stages of the water cycle using correct terminology.
- Students will realise that the Earth's water supply is not all the same (some is salt water, some is fresh, and some water is frozen).

Resources

Part 1

- Interactive whiteboard
- **'Water cycle animation'** (available in the 'Interactives' section of the website)
- **'The water cycle explained'** fact sheet
- **'Water cycle puzzle – level 1'** activity sheet
- **'Water cycle puzzle – level 2'** activity sheet
- **'Mini water cycle'** activity sheet (the resources required are listed on the sheet)

There are numerous songs and raps available on YouTube that explain the water cycle. Some examples to search for are provided below, however, you should select ones appropriate for your students.

Younger students

- The Magic School Bus Wet All Over (book or video available)
- The Water Cycle: Collection, condensation, precipitation, evaporation

Older students

- The Water Cycle (by the National Science Foundation)
- Earth's Water Cycle NASA GSFC Space Earth Science Weather Video



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Part 2

- World map or globe (or access to Google Earth)
- Three clear containers (e.g. measuring jugs or beakers) that can hold one litre of water
- One litre of water
- Sticky labels or masking tape
- Textas

Lesson steps

Part 1

Ask students if they know where water comes from. They may answer with ideas such as taps, waterholes, bores, etc. Ask them to think about how it gets into the waterholes, rivers, lakes, rainwater tanks, etc.

What do students know about the water cycle?

Explain that all the water on Earth is the only water we have ever had. We do not get any new water, it just cycles around and around in what is known as the 'water cycle'.

Show the '**Water cycle animation**' on the interactive whiteboard. This animated version brings the cycle to life, but should be viewed in conjunction with '**The water cycle explained**' fact sheet as this explains the cycle in more detail.

To further explore the cycle, select a book or video (listed in 'Resources') that demonstrates/ explains it and read or watch it as a class. From the listed videos, select the ones that are relevant/appropriate to your class.

Discuss the cycle, focusing on the correct terms for each part. Add these terms to a word wall (you may have started one already in Topic 1).

If the day is cloudy, take the students outside to look at the clouds and discuss their role in the cycle.

As a class (or in pairs if appropriate) make your own mini water cycle. The instructions and resources required for this are available on the '**Mini water cycle**' activity sheet. There is space for students to record their predictions about what they think will happen to the water.

This experiment will show how water evaporates (students will see the water level lower slightly). Condensation will appear on the plastic wrap and then fall back into the bowl and mug (precipitation).

If possible, this activity should be conducted in a sunny, outside area as this will make the process quicker and more obvious.



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Once students have finished the activity, ask them to complete the **'Water cycle puzzle'** activity sheet to demonstrate their understanding of the cycle.

There are two levels of this sheet. Select the one that is suitable for your students.

Part 2

Display the world map or globe so all students can see it. Ask students to look at the map/globe and decide how much of the Earth's surface they think is covered with water (it is around 71 percent).

Where do we find water on the Earth's surface (e.g. in lakes, rivers, dams, oceans, glaciers, ice caps, soil)?

Let students find the oceans, rivers and lakes on the map/globe. Google Earth is also a great resource to show the Earth's surface.

Place the three plastic containers on a table. Explain to students that water takes three forms on Earth. Do they know what they are?

Using sticky labels or masking tape, label one container as 'salt water', one as 'ice' (fresh water) and one as 'fresh water'. The only form that is really useable for humans (for drinking, irrigation, etc.) is fresh water.

Show students the one litre of water and explain that this represents all the water on the Earth. Ask students to have a go at pouring this water into the various containers to show how much of each form they think we have (for example, they may pour half the water into the fresh water container and a quarter each into ice and salt water).

You may wish to mark students' guesses on each container with a piece of masking tape or using a texta.

Once students have finished guessing, show them the actual result:

- Salt water (97%) – pour 970 mls of water into that container
- Ice (2%) – pour 20 mls of water into that container
- Fresh water (1%) – just 10 mls of water is poured into that container

This demonstrates that 97 percent of the Earth's water is salt water and is not suitable for drinking or most types of irrigation; and three percent is fresh water, but 2 percent of that is frozen (or in the soil) and therefore inaccessible.

Discuss students' reactions to this:

- Are your students surprised?
- What do they think this means for the way we use water?
- How can we survive on such a small amount of water?
- What sort of water is available in your community?



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Topic 3: On the surface or under the ground

Introduction

In Topic 3, students will learn about groundwater and surface water (e.g. rivers, lakes, bores, tanks, waterholes etc.). They will participate in an activity that demonstrates how an aquifer is formed. They will also start to explore the idea that not all water is clean, so we should use it for different purposes, depending on where it is accessed.

Topic 3 is delivered in two parts, each of which may take several lessons to complete.

Learning outcomes

- Students will be able to explain the difference between surface water and groundwater and describe one or more of these specific sources (e.g. lakes, aquifers, creeks etc.).
- Students will understand how aquifers form.

Resources

Part 1

- 'Ground water' fact sheet
- 'Surface water' fact sheet
- 'Waterholes, rock holes and springs' fact sheet
- Computers with internet access
- Resources about water sources (e.g. books, posters, pamphlets, websites etc.)
- Water sources in your community (with the potential for an excursion)
- Access to Google Earth or the SA Water website www.sawater.com.au

Part 2

- 'Creating an aquifer' instructions (the resources required for this activity can be found on the sheet)
- Plastic drop sheet or newspaper
- Soil sample from the local community (optional)
- Camera or phone to take video/photographs



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Lesson steps

Part 1

In this lesson, students will research three sources of water: groundwater, surface water and waterholes, rock holes and springs. To begin their research, provide students with the **'Ground water'**, **'Surface water'**, and **'Waterholes, rock holes and springs'** fact sheets.

These sheets provide basic information, but students will need to use other resources (e.g. books, internet, etc.) to find further information.

If your community has a particular source of water, you may wish to limit student's research to this source only.

As students research, discuss the sources of water. You may also wish to visit any examples of these sources in your community. This could include bores or wells (where groundwater may be extracted), rivers, lakes, dams or catchments (even if they are dry).

If your community does not have a local water source, Google Earth can be used to view water sources outside your community.

You may also find some information about your community's water supply on the 'What's in your water?' page of the SA Water website www.sawater.com.au/community-and-environment/water-quality/in-your-area-whats-in-your-water

This is a good opportunity for students to see where their water comes from (before it comes out of the tap). It is also a good chance to discuss the wise use of water, particularly if you can visit dry river beds or lakes. This reinforces the idea that water is not an unlimited resource.

Part 2

Depending on the resources available, this activity can be done in pairs or as a whole class demonstration. Follow the instructions on the **'Creating an aquifer'** sheet to demonstrate how an aquifer is formed.

Once this is completed, students may wish to discuss the soil composition in your community and repeat the experiment with locally collected soil samples. What can students surmise about local groundwater from this activity?

Extension options

Explore how the seasons (wet and dry) affect the sources and amount of water available in your community.



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Topic 4: Water treatment

Introduction

In Topic 4, students will explore the water treatment process relevant to your community. They will participate in testing a water sample and learn that whilst water may look clean, it can still be dirty, and then learn about the water treatment methods used to clean water and make it suitable to drink

Topic 4 is delivered in two parts, each of which may take several lessons to complete.

Please note: The water treatment process varies between communities. The steps and information in this lesson are deliberately broad.

To find out how your water is treated, and tailor the lesson to your context, check your community in the Water in your community section of this website or visit the 'What's in your water?' section of the SA Water website www.sawater.com.au and enter your postcode.

Learning outcomes

- Students will recognise that water quality cannot always be determined by sight and/or smell and that not all water is safe for drinking.
- Students will provide a basic explanation of the water treatment process (general or in their community).
- Students will logically sequence events to explain a process.
- Students will work in a group to create a presentation.

Resources

Part 1

- Water samples collected from around the school or community
- Jars or containers to hold water samples
- Water testing kit (these are available online or from hardware stores). If you require help finding one contact KESAB *environmental solutions* - admin@kesab.asn.au
- 'What's in the water?' online books (these are available in the 'Interactives' section of the website)



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Part 2

- SA Water website www.sawater.com.au, specifically the 'What's in your water?' section www.sawater.com.au/community-and-environment/water-quality/in-your-area-whats-in-your-water and the water quality video series www.sawater.com.au/education-and-community/education/the-well/teaching-resources
- 'Bore-to-tap' online books (these are available in the 'Interactives' section of the website)
- 'The water treatment process' fact sheet
- Computers with internet access
- 'Bore-to-tap sequence 1 (with reverse osmosis)' activity sheet
- 'Bore-to-tap sequence 2 (UV treatment only)' activity sheet.

(The Bore-to-tap sequence sheets are suitable for communities who have a local treatment shed, not for those who access their water through a mains pipeline.)

Lesson steps

Part 1

Briefly discuss what students know about water, or have learned so far from participating in other topics: how they use it, where they can access it, how it is collected after it rains.

Introduce the idea of water quality. View one of the 'What's in the water?' online books (available in the 'Interactives' section of the website).

Please note: the 'What's in the water?' online books were created for the Amata and Mimili communities, and include the information in English and local language, but they may be suitable for your community (particularly pages 1 to 7).

How can students tell if water is clean enough to drink? Explain that even if water looks clean, it may not be. Collect several water samples from around the school/community. If possible, collect the samples from different sources (e.g. taps, puddles, buckets, creeks, hoses etc.). Make sure you label each sample.

Ask students to use their senses (sight and smell) to determine how clean they think the water is.

Use a water testing kit to test for pH level, turbidity and salinity. These terms will need to be discussed and defined before and during testing.

Discuss the results.



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Teacher notes: Testing the pH level of the water tells us how acidic or alkaline the water is. This cannot be determined by looking at the water. Although water may look clean, it could still contain chemicals which cause it to have a high or low pH level.

Turbidity refers to how dirty the water is. Sometimes water can look unclean, but it is not turbid.

Salinity refers to the salt levels in the water. Again, we can't see the salt, so testing helps us to identify the quality of the water.

After the testing is finished, ask students to make a conclusion about the cleanliness of the water.

Part 2

Explain to students that in order to make sure we have safe, clean water to drink, our water must go through a treatment process. In this part of the topic, students will explore the process that is used for water in your community.

To find the applicable water information, visit your community's page in the 'Water in your community' section of the website. You can also visit the 'What's in your water?' section of the SA Water site, type in your postcode and access more information about your water (the URL is in the resources list).

Discuss the information on '**The water treatment process**' fact sheet. If your community has a local treatment shed and the water is treated with UV treatment, reverse osmosis, or a combination of those, you can also use the 'Bore-to-tap' online books (available in the 'Interactives' section) during this topic.

Once you have located the information about the treatment process, discuss the steps with students. Collect a sample of clean drinking water, refer back to the results of the water testing and compare an untreated sample with the treated sample.

Once students are familiar with the treatment method they work in small groups to create their own presentation to explain the process. This could be a flow chart, an oral presentation, a visual artwork, an animation etc.

For those communities who have a local treatment shed (particularly communities on the APY Lands), students can complete the applicable '**Bore-to-tap sequence**' activity sheet.

Finally, as a class, discuss which water sources provide clean water in your community. Which water is safe to drink and which is not.

You may wish to create a map to identify the location/s of safe drinking water in your community.



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Teacher note: If you have a local water holding tank or treatment shed, a representative from KESAB *environmental solutions* or SA Water may be able to organise a visit to that location.

Contact KESAB for more information admin@kesab.com.au



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Topic 5: Which water do I use?

Introduction

In Topic 5, students will be encouraged to consider how they use water in their lives. This includes for health (e.g. drinking and washing), work (e.g. watering plants, cleaning tools and equipment etc.) and recreation (e.g. swimming).

Students will also work in small groups to create an education campaign designed to inform the community about water quality and educate them about accessing water that is safe to drink. This could include posters, videos, letters, speeches, radio advertisements etc.

This topic will be delivered in two parts, each of which will require more than one lesson to complete.

The second part of this topic requires completion of Topic 4, or that students know about the safe and unsafe (treated and untreated) water sources in their community.

Learning outcomes

- Students will be able to list several ways they use water in their lives.
- Students will understand that water is essential in maintaining good health.
- Students will recognise that water safety is a community issue.

Resources

- Exercise book to use as a water diary (if using option 1)
- **'Water at any time'** cards (if using option 2)
- Magazines or newspapers (optional)
- Cameras (optional)
- Glue
- Scissors
- Large sheets of paper (A3 or butcher's paper)
- Map of the local community or access to Google Earth
- Resources to create a text (this will depend on the mode students choose)



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Lesson steps

Part 1

In this lesson, the aim is for students to think about all the ways they use water. There are two options for doing this (you can do one or both options):

■ Option 1: Water diary

Ask students to keep a water diary for a few days. In this diary students list all the ways in which they use water each day. This can be through writing, drawing and/or photographs/videos.

■ Option 2: Time and event cards

Provide small groups of students (or individuals) with a set of 'Water at any time' cards. These cards have times or events written on them (e.g. morning, afternoon, school holidays, sporting event etc.).

Print and cut out the cards, stick each one on a separate large sheet of paper and have students draw or write how they use water at those times or during those events.

Alternately, students could cut out pictures of how water is used (from newspapers or magazines), or take photographs of themselves using water and stick them on the appropriate card.

Create a class list of the ways that students use water (if you have completed Topic 1, you could refer to the brainstorm completed during that topic).

In small groups, students to select one or two ways they use water and consider what would happen if they stopped that activity. For example, what are the consequences of not showering? Not drinking? Not watering plants?

Part 2

Now that students have determined how they use water in their lives, it is important that they understand the difference between treated and untreated water and when each is appropriate to use.

Using a map of the local community (or a print out from Google Earth), identify water sources in the community (this could include dams, catchments, bores, river, lake, wells etc.). Students may also like to consider the water sources inside buildings, such as taps.

Do students know which of these provide treated water and which are untreated? Once you have discussed this, have students think back to the water use activities they listed in part 1.

Which water is suitable to use for the activities? For example they can swim in a lake or dam, but they should not drink from it, so where should they access their drinking water from?



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After the discussion about treated and untreated water, ask students how this information could be provided to others in the community (or people visiting) so that everyone can safely access water.

In pairs or small groups, students decide how they would like to share this 'Safe water' message with the community. This could be a poster, radio advertisement, YouTube video, social media post, a dance or a brochure.

Encourage students to be creative and use language (in English and/or local language) that will educate their audience.



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Topic 6: Using our water wisely

Introduction

In Topic 6, students will consider how water comes into their community and how it goes out. They will discuss how our use and disposal of water can affect its supply and the implications for the future.

Students will then select a water sustainability topic that they would like to investigate further.

Whatever they choose, they should demonstrate an understanding of the fact that water is a limited resource and we are all responsible for conserving and protecting it.

This topic is delivered in two parts, each of which will take more than one lesson to complete.

Learning outcomes

- Students will understand that how we use water affects its future supply.
- Students will explore what happens to water after it is used.
- Students will develop their research skills while focusing on a water sustainability topic of their choice.

Resources

- Maps of your school and local community (if available)
- Different coloured markers for highlighting
- A3 paper and pencils
- Computers with internet access
- 'How much do we use?' sheet

Lesson steps

Part 1

This lesson can be completed as a whole class (conducting activity 1 first followed by activity 2).

Alternately, if your class has enough students, you can create two groups and group one will complete activity 1 and group 2 will complete activity 2. In this case, students should present their findings to the rest of the class.



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Whole class

As a class, consider maps of your community and school (if these are not available you may wish to create them as a mathematics activity).

On the map/s, highlight (using two different colours) the places where water comes in and the places it goes out.

Ask students to then draw rough maps of their own homes and repeat the task (i.e. highlight water in and water out). Discuss these maps.

Activity 1 - 'Water in'

In this activity, students will consider what they do with the water in their community (e.g. drinking, washing, cleaning, irrigating).

They can refer back to the ideas from Topic 5 if you have completed it. Then, discuss and research what can be done to ensure water from these sources is being conserved and used sustainably (e.g. turn off taps, have shorter showers, recycle water if possible, etc.).

The 'Using water wisely' section of the website has some ideas to help here.

Activity 2 - 'Water out'

Discuss what goes down the drains/toilets etc. For example, consider toothpaste, soap, cleaning products, human waste, cooking by-products (e.g. oil), food, medicines, paints and garden chemicals.

What happens to the water that goes down our drains and toilets? Investigate stormwater drains, recycling/treatment plants, etc.

Whole class

Overuse is a major threat to ground and surface water supplies, so this is an ideal opportunity to discuss how water is wasted in your community.

You may also wish to discuss the areas that may flood with surface water in the wet season. The '**How much do we use?**' graph shows how much water is used (on average) per month in several communities.

Discuss this with your students in relation to your community.

If your community is not on the graph, ask students how much water they think is used (in general terms). Do they see water being wasted? Where? How?



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Part 2

Students to choose a water sustainability topic to investigate further and present to the class or community in a mode of their choice.

Here are some suggested topics:

- Seasons – how do they affect the amount of water available? What does this mean in terms of water use and conservation?
- Balancing human and environmental needs.
- Examining different viewpoints on water use in your community.
- Custodial responsibility for place and how this influences water use and views around sustainability. What does our culture say about water?
- Who looks after our water?
- The science and technology involved in water conservation and protection.
- Water from a global perspective. How is Australia similar to and different from other places?
- Educating the community. Developing a 'use water wisely' campaign. Students could present their findings to their peers in a format agreed upon with the teacher.