Year 6
Lesson 2
How water gets to our houses

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Learning objectives

Students will understand:

- Why water delivered to our homes is treated before use?
- Common processes used in the treatment of water.

Learning outcomes

Subject	Strand & Content Descriptors
Science	Science Understanding • Changes to materials can be reversible such as melting, freezing, evaporating; or irreversible, such as burning and rusting (ACSSU095) Science as a Human Endeavour • Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena (ACSHE098) Science Inquiry Skills • Communicate ideas, explanations and processes in a variety of ways , including multi-modal texts (ACSIS110)
English	Literacy • Participate in and contribute to discussions, clarifying and interrogating ideas, developing and supporting arguments, sharing and evaluating information, experiences and opinions (ACELY1709)

Important questions

- Why is water treated before it reaches our homes?
- What processes are used to treat water before it is delivered to our homes?
- What are coagulation; flocculation, filtration and sedimentation?
- What is solubility? How can it be measured?

Background information – through the pipes and down the drain

In Australia we collect our water from three main sources, groundwater, surface water and the ocean. Groundwater is rain that has drained underground and collected in impermeable layers. Surface water is rain that has drained into rivers or creeks or collected in dams and water tanks. Water from the ocean is treated by desalination; it removes salts and minerals and is processed into drinking water.

Water from a dam contains:

- Dissolved organic material,
- Algae, bacteria and viruses,

- Vegetation, tree roots and branches,
- Chemicals leached from rocks and soil.

Treating this water provides good quality drinking water, reduces waterborne diseases, removes tastes and odours, and reduces corrosion and staining.

Water from a dam may have colour as a result of tannins and minerals. It may be turbid or cloudy as a result of clays and other suspended particle matter. Colour and turbidity are removed via coagulation and flocculation.

Coagulation adds a coagulant, usually alum (aluminium sulphate) that clumps contaminating particles in small lumps or flocs. During flocculation the water is slowly stirred allowing the flocs to enlarge so that when they settle they can be removed. This is sludge and may be used as a soil conditioner in horticultural industries.

Following flocculation, water is filtered to remove suspended matter or algae. Finally a disinfectant, such as chlorine, is added to kill remaining harmful bacteria.

The treated water is pumped to reservoirs for storage. The reservoirs are usually on high ground. Gravity helps the water flow into underground pipes (water mains) and into your house when you turn on the tap.

Linking locally – Logan

Most of the water used by Logan residents comes from various source points. These include:

- Wivenhoe Dam treated at Mt Crosby water treatment plant,
- Hinze Dam treated at Mudgeeraba and Molendina water treatment plants,
- Leslie Harrison Dam treated at the Capalaba water treatment plant,
- Stradbroke Aquifer (not treated), and
- Seawater treated at the Gold Coast Desalination Plant at Tugun.

Water from these source points are supplied to the city through 6 water supply zones. These zones supply different suburbs in Logan. Logan City uses approximately 55 mega litres per day. This will change as seasons change.

The daily water demand for the city can be met in a number of alternative ways. This water is supplied to 270,000 residents of Logan City. Treated water is stored in 28 reservoirs and delivered to households through a 2,060 kilometre network of pipes.

Lesson plan – through the pipes and down the drain

Pose the question: How can we identify drinking water? What should it look, taste and smell like?

Use samples of water from various sources (tap water, creek water, rain water) to inform the discussion. Examine the samples, identifying various features that can influence water quality, including turbidity and particulate matter.

Briefly discuss methods for treating water. Gauge students understanding of water treatment processes in familiar domestic situations such as for swimming pools and filtered drinking water.

Using the poster **'Our urban watercycle'** discuss the processes involved in collecting and treating water in your district. Define and discuss important terms including turbidity, coagulation, and flocculation.

Students research how water was cleaned prior to the development of modern water treatment plants, including processes currently used in developing countries.

Following this students design and test a simple water filter that demonstrates one or more common treatment practices such as sedimentation or filtration. Utilising a class sample of dirty water, which includes fine dirt, gravel, leaves and plastic litter, students predict what elements their filter will remove and discuss how well the water has been cleaned and what other processes would be required to produce drinkable water.

Resource requirements

- Poster – 'Our urban watercycle' (see appendices or online resources)
- Water samples
- Salt; sugar; Epsom salts; distilled water, beakers; teaspoons

Additional activities

Research how water is collected and treated in other countries.

Solubility: In small groups students will use sugar, salt and Epsom salts to measure the solubility of each ingredient in water. Weigh and record the samples of the 3 ingredients (approximately 50 grams of salt and Epsom salts and 250 grams of sugar will suffice).

Fill a beaker with 100mls of distilled water and add a small amount (1/2 teaspoon) of one of the ingredients and stir until dissolved; continue until it can no longer dissolve; weigh the remainder of the ingredient. Repeat with the other 2 ingredients. Chart and record the results; compare group findings.