Year 5
Lesson 3
What we drink comes back

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Learning objectives

Students will be able to:

- Recognise that all water is continually recycled and that treatment is important to maintain quality.
- Understand the potential impacts of incorrect disposal of materials in sinks and rains.
- Undertake experiments to filter water samples.

Learning outcomes

Subject	Strand & content descriptors
Science	Science understanding: • Pose questions about place, space or environment and make some predictions about their answer. • Sort information and data and look for relationships or patterns, using maps and spatial technologies as appropriate. Science inquiry skills • With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be. (ACSIS231) • With guidance, select appropriate investigation methods to answer questions or solve problems. (ACSIS231) • Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts. (ACSIS093)
Geography	Geographical knowledge & understanding • Place: Places are locations for different activities and functions. • Communities manage places and make decisions about the provision of service for their people. • Environment: Human activities can change environments and places over time. • Environment: Sustainability is about managing the capacity of the environment to support our life.
English	Literacy • Plan, rehearse and deliver presentations for defined audiences and purposes incorporating accurate and sequenced content and multimodal elements. (ACELY1700)

Important questions

- What happens to water flushed down the toilet or drained from the sink?
- Why is it important to treat water before pumping it to the ocean?
- What role does filtration play in maintaining water quality?

Background information – caring for our water

When we have finished using water we simply dispose of it – flush the toilet or pull the plug. We rarely consider where it goes or what happens to it. Treating and disposing of wastewater (or sewage) is a critical consideration for all communities. Inadequate treatment can cause environmental harm by introducing nutrients, heavy metals and other pollutants into waterways. Additionally, human health may be impacted through the distribution of pathogens and bacteria.

Wastewater contains many things that need to be removed – food scraps, human waste, detergents, grease, toxic chemicals and plastics. The process and level of treating wastewater varies. The three main processes are:

- **Primary treatment**
  Large objects such as plastics or needles are removed by passing the water through a series of screens or bars. The water is allowed to settle so materials such as grease and oil can be removed.

- **Secondary treatment**
  After primary treatment the wastewater is exposed to naturally occurring microbes that remove organic matter by eating it.

- **Tertiary treatment**
  Wastewater may be further treated or 'polished' to produce recycled water for other use such as irrigation.

The treated wastewater is either discharged to oceans or rivers. The environmental impacts of disposing of wastewater vary according to the level of treatment. If not treated properly impacts may include changes in oxygen and nutrient levels resulting in algal blooms, fish kills and other impacts.

Important: Wastewater is often confused with stormwater.

Stormwater is rainfall runoff or water used in homes and businesses – hosing litter from a driveway – that runs into the gutters.

Wastewater is contained and travels directly to wastewater treatment plants.

Linking locally

Most wastewater in Logan City is converted to treated effluent and discharged to the Logan River (Loganholme) and the Albert River (Beenleigh).
Logan City has four wastewater treatment plants:

- Loganholme wastewater treatment plant (discharges to the Logan River);

- Beenleigh wastewater treatment plant (discharges to the Albert River and to customers in the Gold Coast region);
- Jimboomba wastewater treatment plant (discharges to irrigation of Golf club)
- Flagstone wastewater treatment plant (discharges to irrigation)

The Beenleigh wastewater treatment plant supplies recycled water to recycled water carriers via its filling stations and fixed site customers in the Gold Coast district, mainly horticultural industries.

Lesson plan – caring for our water

Ask students a series of questions to gauge their understanding of the natural water cycle and the way water is collected, cleaned and transported within your community. These could be framed in a true and false format if you wish. For example:

- The water in the bubbler is millions of years old and was around when dinosaurs ruled the earth?
- The water you brushed your teeth with this morning and the water you swam in at the beach in the holidays is the same water?
- The water in the dam use to be in the ocean?
- Water comes in 3 different forms? What are they?
- When water warms it turns from a gas into a liquid?

Use **Activity sheet 1 'The water cycle' if necessary.**

In small groups, asks students to identify how water is used in the house and what happens to the water during this process. For example water used in showers, sinks and washing machines goes down the drain; water used to wash the car may flow to the street drain or soak into the ground; and some of the water in the swimming pool may evaporate.

Collect the various water pathways and use them to add detail to a diagram of the natural water cycle.

Discuss what happens to the water that 'disappears' down the plughole. Differentiate between stormwater and wastewater.

Ask students to identify the impact of untreated stormwater entering waterways and oceans.

Use the poster 'Our urban watercycle' to assist.

Make a Water Filter
Make two samples of dirty water in clear containers, showing the students the different types and particle size of the materials; for example fine dirt or sand, leaves or grass clippings, small pieces of plastic litter. Food colouring to represent oil or other liquids and a squirt of dishwashing liquid to represent run off from car cleaning can also be added.

Students undertake research and planning to design a working filter that will remove contaminants from the water samples. This should include identification of:

- Materials to make the filter body (e.g. soft drink bottle or other plastic container).
- Filtering mediums (e.g. chux cloths; filter papers; sand/gravel).
- Filter construction (including explanation of filter layers and expectations of what will be trapped in each layer).

Introducing a range of filtering tools, a funnel, colander and a fine strainer for example, and asking students to predict what type of materials would be trapped by each of the filters and why it will assist in the planning process.

Students then make predictions as to the effectiveness of their filter and the expected improvement in quality of the water sample.

Students undertake filtering and compare their results with predictions. Students present their findings using appropriate terminology and graphical support, noting how factors such as the speed or volume of water and the configuration or condition of filter layers and materials affected the process.

Resource requirements

- Activity sheet 1 ‘The water cycle’.
- Poster – ‘Our urban watercycle’ (see appendices or online resources).
- Water samples.
- Various filter materials as identified (for example: filter papers; chux cloths, cotton wool, sand, aquarium gravel or similar).
- Filter containers (for example soft drink bottles or plastic containers).

Additional activities

Water treatment: Explain that the treatment of water usually involves a series of steps including filtration (removal of large particles), settlement (drop out and settlement of finer particles), nutrient removal (soaps, detergents and fertilisers), bacteria is used to ‘eat’ nitrates and phosphates in these materials, disinfection (addition of chlorine) to kill pathogens.

Students research water treatment processes and in small groups, plan, produce and present to the class that explains the processes in sequence in clear, non-technical language. Supporting materials such as performance, visual aids and graphics should be encouraged.