

What kinds of things do we find in our water?

» Lesson overview

In previous lessons, students explored the characteristics and land uses of the catchment of the local water source. This lesson focuses on the interconnections within a catchment, and the effects that a variety of land uses have on the quality of water in a waterway. It identifies the types of substances found in rivers prior to treatment in a water treatment plant.

» Lesson objectives

In this lesson, students compile a list of contaminants that have to be removed from water to make it drinkable.

» Opportunities for assessment

Monitoring of student journals will allow identification of student alternative conceptions and will provide the opportunity to find evidence of student learning.

» Equipment

For the class

- one large clear glass or plastic container, or a small fish tank filled with water (10–20 litre capacity)
- catchment story labels
- a copy of 'The story of a river' (Resource 3)
- 13 film canisters (available from most photo labs)

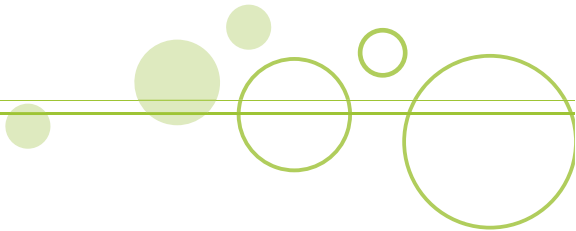
For each student

- student journal

» Preparation

There are fifteen land uses identified in the activity story. Adapt these to suit the size of the group. For instance, each land use could be assigned to two students; some uses could be omitted, or more than one allocated per student. Some land uses could be omitted if they are not relevant to your catchment.

Prepare one labelled film canister for each student. Fill with substances and quantities listed in the table on the next page. Photocopy the labels and cut and tape a label to each canister.



» Lesson steps

1. Review students' understandings from the previous lesson about the local catchment that supplies water to their dam.
2. Work through the activity described in 'The story of a river' (Resource 3).
3. Ask students to compare their river catchment to the catchment described in the story. Which of the land uses mentioned in the story occurs in your catchment?
4. Ask students to suggest where a water storage dam for the town would most likely be located in the story. (On the outskirts of the town, end of paragraph 7.)
5. Ask students to list in their journal the types of substances that would go into the water before it reaches the dam. Reread the story until the water reaches the outskirts of the town at the end of paragraph 7 (fertiliser, manure, salt, soil, vegetation, sewage, fishing line, oil, rubbish, drink cans). You could use this activity as a listening game where students compete to record all the substances in the water.

6. Ask students to think about the land uses in the catchment that drains to their local water supply dam. What types of substances would be in the water before it is treated at the water treatment plant? Ask them to record their ideas in their journals.
7. Make any new entries on the class TWLH chart and discuss.

» Curriculum links

English

Write your own story about the catchment in which you live, drawing on the specific land uses in your area.

Resource 3

❖ The story of a river

1. Place a clear jar, such as a punch bowl or small fish tank containing four to five litres of water, centrally in the room; explain that it represents the river/water. The effect is improved if the clear container is placed near a window so students can look through it.
2. Distribute the film canisters among the group. Remind students not to open the canisters until their 'character' emerges in the story; then they are to empty their canister into the clear bowl of water—'the river'. (Students could place the canisters down near them so no 'accidents' happen with the canister contents.)
3. Read the story in a dramatic way, stopping at the end of each section when a character or land use is mentioned. Participants come forward and empty their canister into the bowl. Each particular land use is written in ***bold italic*** in the story. Students might take turns in reading a paragraph of the story.

❖ Catchment labels

» Set 1

Herd of cattle	Grazing land	Waterskiing	Gardens
Farming country	Hobby farms	Park	Roads
Piggery	Fishing	Tourism	Subdivision
Industry	Forest	National park	

» Set 2

Herd of cattle	Grazing land	Waterskiing	Gardens
Farming country	Hobby farms	Park	Roads
Piggery	Fishing	Tourism	Subdivision
Industry	Forest	National park	

Resource 3 (continued)

❖❖❖ Substances

» Land use	» Substance	» Quantity/condition
Herd of cattle	Thick muddy water	canister
Farming country	Baking powder	teaspoon
Piggery	Thick muddy water	canister
Grazing land	Salty water	teaspoon of salt in full canister of water
Hobby farm	Yellow water/toilet paper	full canister of water and small pieces of paper
Fishing	Tangle of line	
Waterskiing	Vegetable oil	teaspoon
Park	Styrofoam, plastic, etc.	small pieces of paper, Styrofoam, plastic cut up or broken up
Tourism	Paper, plastic, etc.	
Subdivision	Soil	teaspoon
Gardens	Baking soda (pesticide)	teaspoon
Roads	Vinegar (acid run-off)	canister
Forest	Tea	canister
National Park	Mulch	1 teaspoon
Industry	Soapy water (detergent)	1 drop of detergent in full canister of water

Note: All of these substances are non-toxic and safe.

Resource 3 (continued)

❖ The story of a river

1. This is the story of a river travelling through its catchment. It begins in the higher parts of the catchment where the rain runs off the slopes and begins its long journey to the sea. The river flows through a **national park** and then through a **forest**. The water gathers momentum as it descends the slopes.
2. The river continues its journey towards the sea through **farming country** where, recently, some crops were fertilised. Afterwards they were watered and the run-off into the river has brought with it some of the fertiliser.
3. The neighbouring farm is a **piggery**. Some of the manure from the pigpens washes into a drainage pipe, which then empties into the river. On the other side of the river are **grazing lands**. There are very few trees remaining and, in some of the lower parts of the pasture, the water brings salts in the soil up to the surface, making the land unusable. It also means that run-off from the land is salty and this threatens the fresh water organisms and animals that live in the river. A grazing **herd of cattle** feed on the vegetation on the banks and drink from the river. When heavy rains arrive, the banks erode and collapse into the river.
4. Slowly the river starts to wind its way through the outskirts of a major town. Out here there are a number of **hobby farms**.
5. The houses here are not connected to a sewerage system; they have their own septic tanks. Occasionally these tanks overflow and untreated sewage seeps directly into the river.
6. There are a number of people making use of the river around the bend. Someone is **fishing** on the banks. Unfortunately their line gets caught around a rock and is left in the water. Other people are **waterskiing**. Their boat needs a service and its engine is leaking oil directly into the river. Another group of people are enjoying a picnic at a **park** overlooking the river. A gust of wind blows some of their rubbish off the table and down into the water.
7. Further downstream the river is being utilised for **tourism**. A charter boat is giving some people a scenic tour of the river. Drinks are for sale on board but not everyone uses the bins that are provided.
8. The river now starts to meander through the suburban part of the town. A new **subdivision** is being developed. Many of the trees have been removed and when it rains, the top layer of soil is eroded and contributes to the silting up of the river. Most houses in the developed parts of the town have a garden. To keep those nasty bugs away, gardeners use a range of pesticides. When it rains, the pesticides wash off the **gardens**, into the stormwater drains and then into the river.

Resource 3 (continued)

9. People who have spent the day at work are now starting to drive home. The **roads** are choked with traffic. Oil drips out of many of these cars and sometimes they brake in a hurry, leaving traces of rubber on the road. Every time it rains these pollutants are washed into the stormwater drains and straight into the river.
10. There is still some **industry** along the river here. Detergents are used to keep the production equipment clean. Sometimes, the dirty water is washed out of the factory into the gutter where it disappears into stormwater drains. Once again, however, this water flows straight into the river. If there are phosphates in the detergent it will cause increased algal growth in the river. When this algae dies and begins to rot, it uses up oxygen that animals in the water rely on. They may suffocate as a result.
11. With one final bend, the river finally arrives at its mouth and flows out into the sea. But just look at what flows out with it!

(‘The story of a river’ is adapted from ‘Who Polluted the Potomac?’ Alice Ferguson Foundation, USA.)

This story could be copied onto card and laminated for students to read.

Students could create a story of their own river. A PowerPoint presentation could be developed with digital images from their catchment to localise the information. Local infrastructure, such as a power station, an industrial area or an extractive industry, could be inserted.