Year 4 and 7 geography, year 7 science

Story of a river

Australian Curriculum links:
Year 4 Geography
The use and management of natural resources and waste, and the different views on how to do this sustainably (ACHASSK090)
Year 7 Science
Mixtures, including solutions, contain a combination of pure substances that can be separated using a range of techniques (ACSSU113)
Geography
The way that flows of water connects places as it moves through the environment and the way this affects places (ACHGK038)

In this activity, students use a story of a fictional river to explore the impacts of various land uses on the ecological health of a river. This demonstration can be used as an 'engage' activity to introduce:

- science or geography concepts related to your local catchment e.g. land uses, water cycle, human impacts
- contaminants or waste in river water that needs to be removed when treating the water for drinking.

Equipment

For the class:

- one large clear glass or plastic container or a small fish tank filled with water (4-5 litre capacity)
- a copy of 'story of a river' (resource 1)
- 12 small plastic containers with screw lids or film canisters and substances (table 2)

Preparation

Story of a river: Photocopy the labels listed in table 1 (resource 1). Cut and tape each label to a container. Fill the container with the appropriate amount and type of substance listed in table 2 (resource 1). The story could be copied onto card and laminated for reuse.

Lesson steps

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.

2. Distribute the small containers among the group. Remind students not to open their small container until their 'land use' is mentioned in the story; then they are to empty their container into the clear bowl of water—the river. (Students could place their container on the desk near them so no 'accidents' happen with the container contents).
3. Read the story in a dramatic way, stopping at the end of each section when an activity or land use is mentioned. Participants come forward and empty their small container into the bowl. Each particular land use is written in bold italic in the story. Students might take turns to read a paragraph of the story.

Resource 1 Catchment labels and substances

Table 1 Catchment labels

Forest	Farming	Orchard	Grazing
Hobby farms	Spring	Fishing	Waterskiing
Picnic	Subdivision	Roads	Industry

Table 2 Substances

Land use	Substance	Quantity / Condition
Forest	Tea, mulch	½ container of tea and 1 teaspoon of mulch
Farming	Soil	1 teaspoon
Orchard	Baking powder	½ teaspoon
Grazing	Muddy water	½ container
Hobby farms	Yellow water / toilet paper	Full container water + small pieces of paper
Spring	Clear water and table salt	Full container of tap water and ½ teaspoon of salt
Fishing	Tangle of line	Piece of fishing line
Water skiing	Vegetable oil	½ teaspoon
Picnic	Styrofoam, plastic, pieces of balloons etc.	small pieces of paper, styrofoam, plastic, balloons cut up or broken up
Subdivision	Soil	1 teaspoon
Roads	Coffee grounds	½ teaspoon
Industry	Detergent	A couple of drops of detergent in full container of water—shaken up

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

Story of a river

1. This is the story of the travels of a river 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. Even in these relatively undisturbed areas, the rain washes mulch and some soil into the river.
2. The river continues its journey towards the sea through **farming** country. Some farmers left their crop residues on the paddocks to protect their soil. But one farmer ploughed the fields and left them bare. Recent rains have carried soil from the bare paddocks into the river.
3. On a nearby **orchard**, the farmer wanted to encourage his crop to grow, so he put fertilisers in his soil. However, he applied more fertiliser than his crop could use. This farmer also wanted to protect his crop from weeds and bugs, so he sprayed the crop with pesticides. But again he used too much of the chemicals. When the rain comes, the extra fertiliser and pesticides on the farmer's paddock are washed into the river.
4. On the other side of the river are **grazing** lands. A herd of cattle feed on the vegetation on the banks and drink from the river. They disturb the soil on the river banks. When heavy rains arrive, the banks erode and collapse into the river.
5. Slowly the river starts to wind its way through the outskirts of a major town. Out here there are a number of **hobby farms**. The houses here are not connected to a sewerage system; they have their own septic tanks. If the septic tanks are not maintained, they can occasionally overflow and untreated sewage can seep directly into the river.
6. Just before the town a freshwater **spring** from an underground aquifer reaches the surface near the river and replenishes it. The spring water collects salts as it moves through underground layers and these, too, enter the river.
7. 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.
8. Other people are **waterskiing**. Their boat needs a service and its engine is leaking oil directly into the river.
9. Another group of people are enjoying a birthday **picnic** at a park overlooking the river. A gust of wind blows some of their rubbish off the table and down into the water. They release some balloons and some of these balloons are also blown into the river.
10. 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 the developers have built small fences to hold the soil on the building site when it rains. However, there is a big storm and run-off washes away the fences. The top layer of soil is eroded and washed downstream, contributing to the silting up of the river.

11. 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 into the river.

12. There is 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. This water flows straight into the river. If there are certain chemicals in the detergent it will cause increased algal growth in the river. When this algae dies and begins to rot, it uses up oxygen which animals in the water rely on. They may suffocate as a result.

13. 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.