

Pollution – The Story of a River

Focus

This activity provides an excellent introduction to the issues relating to water, wastewater and river/creek management. It introduces the inter-connections within a catchment and some of the causes of water pollution by observing the impact of pollution on a simulated catchment.

Students can work in pairs to rank the significance of different causes of water pollution based on their own experiences and knowledge of various causes of water pollution. The class can discuss the impacts and the significance of each. You can then identify what issues may exist in your own catchment.

You may wish to do some simple testing – salinity, turbidity or have students make observational recordings, describing what happened and the changes that resulted.

Aims

- To explore the links between lifestyle and water pollution
- To investigate decision making processes
- To develop understanding of catchment areas and the fact that we live in one
- To facilitate ideas of ways to reduce human impacts on local water quality

Materials

- One clear container such as a large glass / plastic or small fish tank filled with water (10-20 litre capacity)
- Catchment story labels and copy of Fact sheet - The Story of a River
- 16 film canisters (available from most photo labs)

Advanced Preparation

- There are 16 land uses identified in the activity story. Adapt to suit the size of the group (eg. Each land use could be assigned to two people, some uses could be omitted or more than one allocated per participation to cater for the size of the group). Some land uses could be omitted if they are not relevant to your catchment.
- Prepare one labelled film canister for each participant. 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.
- Briefly review the concept of Australia being the driest inhabited continent and discuss that water is so precious yet many ecosystems are under threat of pollution. All of us living within water catchments contribute directly or indirectly, significantly or not so significantly to the degradation of our waterways, often without realising the relationships and impacts that humans make.

Procedure

- Place a clear jar (eg. A punch bowl or small fish tank) containing 4-5 litres of water centrally in the room and explain it represents the 'river'.
- Distribute the canisters among the group. Remind them not to open them until their 'character' emerges in the story, then they are to empty their canister into the clear bowl of water – 'the river'.
- Read the story in a dramatic way, stopping at the end of each section when a character / land use is mentioned.
- Remind participants to come forward and empty their canister. {Each particular land use is written in bold italic in the story}

Catchment Labels

Set 1			
Power Station	Grazing Land	Water Skiing	Gardens
Herd of Cattle	Coal Mine	Park	Roads
Farming Country	Hobby Farms	Tourism	Subdivision
Piggery	Fishing	Industry	Tannery

Set 2			
Power Station	Grazing Land	Water Skiing	Gardens
Herd of Cattle	Coal Mine	Park	Roads
Farming Country	Hobby Farms	Tourism	Subdivision
Piggery	Fishing	Industry	Tannery

Substances

Land use	Substance	Quantity / Condition
Power station	Vinegar (acid rain)	½ canister
Herd of cattle	Thick muddy water	½ canister
Fertiliser	Baking powder	½ teaspoon
Piggery	Thick muddy water	½ canister
Grazing land	Salty water	½ teaspoon salt in full canister of water
Coal mine	Vinegar (acid run-off)	½ canister
Hobby farm	Yellow water / toilet paper	Full canister water + small piece of paper
Fishing	Tangle of line	
Water skiing	Vegetable Oil	½ teaspoon
Park	Styrofoam, plastic, etc	
Tourism	Paper, plastic, etc	
Subdivision	Soil	½ teaspoon
Gardens	Baking soda (pesticide)	½ teaspoon
Roads	Vinegar (acid run-off)	½ canister
Industry	Soap water (detergent)	1 drop detergent in full canister of water
Tannery	Food colouring (red) or beetroot juice	5 drops of solution in full canister of water

Note: All of these substances are non-toxic.

The Story of a River

Note: The title of the river in the story has been left open so that you may like to include the name, if you wish, of the local river, which runs through your catchment. Eg Brisbane River, Condamine River. However, the industry elements are not entirely valid for the Darling Downs as our rivers run west to the Murray-Darling into rural areas.

This is the story of the travels of a very special river – **our 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. In the valley below there is a **power station** that generates electricity for the region. It burns large quantities of coal and releases pollutant gases into the atmosphere.

These pollutants combine with moisture in the atmosphere to produce acid rain. Rainfall carries these acids back to the Earth's surface and can pollute the very source of the river. The water gathers momentum as it descends the slopes. 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.

The neighbouring farm is a **piggery**. Some of the manure from the piggens 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 the 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 freshwater organisms and animals in the river. A **grazing herd of cattle** feed on the vegetation on the banks. When heavy rains arrive the banks collapse into the river.

The **coal mine**, which supplies raw mineral for the power station, pumps water out of the river to clean its equipment and flush out some of the waste. This includes various acids which all drain back into the river. 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 but have their own septic tanks. Occasionally these tanks overflow and untreated sewerage seeps directly into the river.

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 **water-skiing**. Their boat needs a service and in the meantime its engine is leaking oil directly into the river. Another group of people is enjoying a picnic at a park overlooking the river. A crust of wind blows some of their rubbish off the table and down into the water.

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.

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 the gardeners use a range of pesticides. At the end of the day the sprinklers are turned on to water the plants. The pesticides wash off into the stormwater drains and enter the river.

People who have spent the day at work are now starting to drive home. 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 carried into the stormwater drains and straight into the river.

There is still some industry along the river here. It uses detergents to keep its production equipment clean. But sometimes, the dirty water is hosed out of the factory into the gutter where it disappears into storm water drains. Once again, however, this water flows straight into the river. If there were phosphates in the detergent then it will cause excess algae 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.

Redevelopment is occurring on the opposite bank. Demolishers have discovered a few drums of something mysterious. They won't be able to sell these as scrap. Someone suggests emptying them into the river. Everyone agrees and the waste from the old tannery is released into the river, to the detriment of all the organism and animals living in it.

With one final bend the river finally arrives at its mouth and flows into the sea. But look at what flows out with it!

What can we do with our river? A heavy rainstorm would help. The fresh supply of river water from rain can help flush out many pollutants. Indeed, rivers can be a major way of flushing and cleaning ecosystems. However this only moves the problem to a coastal area where other ecosystems will be affected. We must reduce the amount of pollution that is entering the river.

Adapted by Brisbane City Council; taken from Story of a River – [Adapted from Who Polluted the Potomac? – Alice Ferguson USA, and Queensland WaterWatch.]

Questions

- Q How did you feel about the change in the colour and look of the river? How would you feel about drinking or swimming in this water?
- Q Why was the water so different in appearance at the end of the story? Do you think this is like the real situation? – Is this how pollution might occur in our river?
- Q List the ways that pollution in a catchment might affect you personally. How might the accumulated pollution affect the coast/beach/ocean, and in turn you?
- Q Were any types of water pollution in the activity illegal? If so, why does this pollution still happen? If not, why aren't laws or penalties to protect waterways more effective?
- Q What other kinds of measures could be used to prevent or reduce water pollution?
- Q Where could this activity be used to raise people's awareness of water pollution?
- Write your own story about the catchment in which you live, drawing on the different issues in your area.