

Story of a River: What happened to our river?

Learning through stories: understanding catchment water quality

Introduction

'Story of a River' introduces the concept of cumulative effects within a catchment and provides an excellent introduction to issues relating to water quality and catchment management.

It is rare that the actions of one person will seriously degrade a catchment. Rather, catchment degradation usually occurs as a result of the combined actions of entire communities. The effect of this incremental pollution is the gradual degradation of river systems.

Preparation

For 30 students you will need:

- Teachers Sheet 1: Catchment Character Name Labels (1 copy)
- Student Sheet 1: What Happened to Our River? (30 copies)
- A large transparent container, such as a salad bowl or fish tank
- 30 small clear containers with lids
- 2 glasses, paper towels, scoops, strainers and milk cartons containing sawdust (for clean up)
- Various materials representing pollutants, as outlined in the list below:

Dry ingredients

- Leaves
- soil
- fishing line/dental floss
- cotton ball
- bicarbonate soda
- litter, plastic
- washing detergent
- brown paper/toilet roll
- vegetable peelings

Wet ingredients

- water
- vinegar
- salt
- food colouring
- soy sauce
- vegetable oil

Concept

This resource is a participatory story telling activity. It aims to increase the knowledge and awareness of how individual actions can impact on rivers and streams, and to illustrate how pollution negatively affects a waterway and the community that uses it.

The history of local rivers provide insight into the effect population growth has on a natural resource and the cumulative impact of individual actions.

Story telling is a powerful tool for environmental education. Through story telling, educators can present facts in a framework that enables learners to consider the complexities of a concept. Story telling engages emotions and the imagination, and encourages personal connections to the world around.

Skills

Creative and critical thinking, literacy, understanding cause and effect.

Method

1. Label each plastic container with the name of a character from the story. These are found on Teacher Sheet 1: Catchment Character Name Labels . Where additional characters are required, these can be prepared for members of 'the community' who dispose of substances to the drain.
2. Add each pollutant to the labelled container, according to the 'Catchment Characters and Pollutants' table.
3. Distribute the labelled containers to students. Tell students to be careful and to keep their container closed until the appropriate time, and not to reveal the identities of their character or contents.
4. Fill the large transparent container with clear, clean water to represent the 'river'. Place this in a prominent and easily accessible position, such as on a desk at the front of the classroom.
5. Explain that you will tell a story about a river, and that each of them will play a part in the story. At the beginning you can explain the concept of the pristine upper catchment, where there is no development or pollution. Explain that these areas are where drinking water is usually collected and stored in dams.
6. Fill one glass with water from the 'river' and demonstrate its purity by pouring it from one glass to another. Set the glass aside for comparison at the end of the story.
7. Read the 'Story of a River', inviting students to come up to the 'river' and empty their container into it when their character's name is mentioned. Add emphasis as you read each bolded character name.
8. Hold a class discussion about what happened to the river. Talk about the small events that lead to the river becoming polluted. What can the characters do to reduce their impact on the river? What changes need to occur to solve the pollution problems?
9. Encourage the students to think of how they impact on their local waterway and to think of ways that they can reduce these impacts.
10. It is important to set a positive example and dispose of this water responsibly. Strain the water through a kitchen sieve and place the solid matter in the bin. Pour the oil off into the milk cartons containing sawdust, and dispose in the bin. Pour the strained water onto a garden or lawn. Do not dispose of this water down the sink or toilet.

Discussion questions

- Who polluted the river?
- What effect did increasing population have on the health of the river, or the water quality?
- Think about the pollution contained in the canisters. Could something be done to prevent those types of materials from entering the water?

Acknowledgements

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Story

I'd like to tell you a story about a beautiful river and how everyone within the catchment affects the river's health. Before I start the story, let us first think about water catchments.

Can anyone tell me what a catchment is?

A 'catchment' is an area that collects rainwater as it falls to earth. This water drains into streams and creeks, which then combine to form larger waterways, such as lakes and rivers. *HINT: Demonstrate this by getting everyone to cup their hands and pretend that they are standing in the rain. Ask what would happen?*

The Earth's surface is divided into catchments. We all live in a 'catchment' and we all use the land within these catchments for different purposes, for example houses, farms, roads, parks and businesses. Everyone within a catchment has an effect on the water quality in its waterways.

I have given each of you a small container with the name of a character from our story on it. The contents of these containers represent some of the pollutants that enter our river. When the name of your character is mentioned in the story, I want you to come to the front of the class and empty your container into the river (represented by a salad bowl or fish tank).

Introduction

It begins as barely a trickle, high on the cool mountain peaks. It trickles down and small streams emerge, these rapidly grow into creeks that flow. Through forested slopes and over the plains our creeks flow. For thousands of years, alongside the River, the Darug people live. They harvest from the plains, catch fish in the river, they learn from the river, and protect it.

Imagine the bowl of water in front of you is taken from the Parramatta River, 500 years ago. how does it look to you? Does this look like water that you might drink? catch fish in? swim in?

And then, in some time, new colonialists, begin to arrive, and different populations begin to thrive. Through lush rolling hills our river flows, and **Clancy** runs cattle that are quite on the nose. To the river each day Clancy's cattle lope, where they stand on the bank and then slip-slide down the slope. They drink from the river and while chewing their cud, the river is turned into a quagmire of mud. And while in the river they do what cows do – that's right, it's true, number ones and number twos!

From the forest it flows out and into a clearing, where **Little Bo Peep** runs sheep for the shearing. The sheep nip and they nibble, grazing without a care, uprooting soft grasses and trampling the hills bare. Now without plants to bind it, we no longer find it, soil on the mountains up there. **Ben Baboy** raises pigs, in pigsties they're confined, these beasts some refer to as swines. With their snouts in the trough they eat, grunt and drink, and oh how these hefty pink oinkers do stink! While a sad pig in muck I've never seen, to keep the stench down Peter hoses them clean. And so the pig's waste, their foul effluent, flows into our river to its detriment.

Mais the Corn Farmer applies nutrients, to increase the yield from his field of corn plants. The water that runs off from his plants irrigation carries fertilisers that lead to eutrophication. Eutrophication leads to thick algal blooms, which can collapse causing oxygen to be consumed. Now as a result of this deoxygenation, many poor fish die of slow suffocation. Denuded of trees it's no great surprise that the unstable table of water would rise. With this ground water comes a poisonous load, the salt of the earth damaging farms, towns and roads.

Wheat farmers like Joe all do despise, the salts that result in their crops slow demise. And what of our river, where the salt does great harm? Its waters are beginning to look lifelessly calm. Now as these salts do relentlessly rise, 'Salinity: Silent Killer!' the headlines all cry.

Upstream, **Monty the Miner** digs deep underground, to extract coal for export and to power our towns. Once while tunnelling Monty splashed in a puddle and suddenly his thoughts all turned into a muddle. Realising the danger of acid mine water seeping, Monty exclaimed 'eew... the thing's leaking!'. Now for his safety Monty deals with this leak, by pumping water out and into a creek.

The river flows down and into the valley where **Sparky** runs a big power station. The station burns coal and releases foul gases, to generate the electricity that's consumed by the masses. When these gases mix with moisture to form clouds, acid rain is produced which comes tumbling down. Sometimes it falls here, sometimes it falls there, in the 'big wet' it falls almost everywhere.

Doug the Digger digs in the river, taking truck loads of gravel and sand. From the river this form of extraction was surely long ago banned. Against better judgement, Doug chances his luck to line his pocket with a few extra bucks. Now the water turns turbid due to Doug's digging, but digging's what Doug does on the side for a living.

While big on 'serenity' the area lacks some 'amenities' with no sewers to flush the human waste away.

Rena the Recliner escapes from the city to her cottage, her quiet getaway. She relies on a septic, for which I'm a sceptic, when family and friends come to stay. As her guest numbers grow, the septic tank overflows, and raw sewage leaks out and away.

To the river **Arjay** goes to angle for fish, to put food on the table, a piscatorial dish. More often than not he just catches snags – logs, rocks and roots – and submerged plastic bags. Now calm as the waters that run deep at 'his spot', he stands on the bank all entangled in knots. Now with knots he's not clever, and with growing frustration he severs the line to prevent his strangulation. A source of great danger to all wildlife thus entwined, are the twists and tangles of his fishing line.

Lisa Leaks tows friends strapped into skis, from a rope at the back of her boat at high speeds. Lisa's boat she poorly maintains, and from it's burbling motor, oil slowly drains. Wherever she goes, and she goes really quick, she leaves in her wake fine oily slick. Now on the surface this oil slick floats, as little by little it leaks from Lisa's high-speed ski boat.

The **Picnickers** stop by the river to snack, and to quieten the ravenous kids in the back. Some salads and a few cold drinks. As they sit and they eat and they swat away flies, a strong gust of wind descends from the skies. It picks up plastic wrappers and blows them away, with the kids, **Padi and Param**, chasing after the strays. But where does the wind take them, where do you think? Into our river, where they slowly sink!

Just around the bend a tour boat is cruising, while its backpacking passengers are noisily schmoozing. The cruise is fully catered, everything is provided, 'free food!' is the call, and they become all excited. One of the passengers seems a bit lazy, either that or his eyesight's becoming quite hazy. When **Terry the Tossler** takes aim for the bin, he overshoots and tosses his rubbish straight in. 'It's cool, no worries, what's the matter, it's such a big river the rubbish will scatter... '.

On the outskirts of town **Shady Dealing's** subdividing, selling 'the great Aussie dream' for young families to reside in. But before building dream homes and garden displays, their fine sandy loams are all washing away. A torrent of water runs off whenever it rains, carrying topsoil to the river via stormwater drains. As the turbid water settles, with mud all is covered, and beneath fine silt bottom dwellers are smothered. Here in the 'burbs' is where Doug sells his sediments, to **Con the Concreter** who mixes cements. At the end of the day when Cons' work is all done, he hoses his equipment and the wastewater runs. These wastes include lime, which can burn a bloke's skin, just think what it does to our friends with fins!

Our river now flows through suburbs, where **Gia Green-Thumb** grows vegies and herbs. Gia's garden is sometimes invaded by bugs; leafmunchers, sap-suckers, snails and slugs. To rid her patch of the pests she detests, Gia thinks copious chemicals work best. As she waters her garden the excess washes away, and downstream water bugs are left in a daze. Now due to overuse of such pesticides, the more sensitive bugs in our river have expired. For the third time this month **Jim's** been mowing Gia's grass that in summer just won't stop its growing. Rather than composting or mulching the lawn clippings, the stormwater drain is where Jim's been tipping. He seems to think these clippings don't matter, but the weeds and the seeds these clippings do scatter. Once in the river plant materials decay, removing dissolved oxygen from our waterway.

Through local parks **Kai** walks every day, where his dog stops to 'relieve itself' one might like to say. A dog-lover, Kai's always caring and kind, but he's blind to what his four-legged friend leaves behind. Now, dog poo on your shoe is considered a curse, but when it's washed to the river where you swim it's far worse. At the end of the day, at knock-off time, people head for home in long traffic lines. They're all in a rush but going nowhere, they honk on their horns, they yell and they glare.

Harry Hardworker drives a gas-guzzling beast, its petrol consumption is far from the least. His truck shakes and shudders and billows a thick plume of choking smoke and acid rain forming fumes. **Bronny Busy-all-Day** is a menace at the wheel, her driving technique making her tyres screech and squeal. The dust from her driving, on the road quickly settles, but when it rains it runs off carrying its heavy metals. **Studios Samira** drives an old rusty bomb, to uni and back (it cannot last long). It's constantly dripping a trail of black oil, and as long as it does, our river it spoils.

Our poor river is looking very sick now!! But its journey isn't over yet. Just when you thought this madness would end, guess what comes up around the next bend. On the side of the river in the old part of town, sits **Bill Bolton's** bolt factory, in decline, all run down. Bill's churned out bolts for many a year, but churning out pollution is what I most fear. For without the use of modern manufacturing equipment, Bill discharges wastewater to the river without treatment. 'Urban renewal' is the term that is used for converting riverside factories into apartments with views. As **Demolition Dan** turns old walls to rubble, he encounters something that looks like trouble. A chemical cocktail contained in steel drums, Dan downs tools, he scampers, he runs! Where these drums came from nobody knows, but it's now up to Dan these drums to dispose. Dan ponders the problem and arrives at a solution that contributes more to the growing pollution. He rolls the drums down and into the river, their toxic effect making the toughest fish quiver. The mouth of the river lies just ahead, but with all this pollution it's bordering on dead

But before it flows out and into the sea, there's one last input from you and me - **members of the community***. Sure, our sewage is treated and screened, but from it some substances aren't easily cleaned. Detergents, chemicals, paints, fats and oils, persist in wastewater, our river they spoil. So remember when you flush or rinse down the sink, the wastes you dispose of may end up in the drink. Discharged to the river on an outgoing tide, it flows through the heads on its ultimate ride. What we must realise is that in our own way, we contribute to the decline of our rivers each day.

To solve this troubling pollution many say, there's an important role for each of us to play. A change in behaviour is what we require, before all our beautiful rivers expire. So what can you do for our rivers' revival? Think globally, act locally, reduce, reuse and recycle. Become a 'Streamwatcher', with an eye on your river, observing what goes on out there. Monitor to keep a check on pollution. It's a great way to show that you care.

What do you think of the water now? Take a glass of water from the 'river' and pretend to drink it. Hesitate, stop and look at how dirty it is, smell it. Compare it to the water in other the glass. Let the students have a close look at the two glasses for comparison.

Imagine being a plant or a fish that lives in this water. Imagine swimming in it. Think for a moment about where this water goes to when it flows into the sea? Where do you like to swim on a hot summer day? What do you think about swimming in the Parramatta River?

As a class, discuss how the combined actions of many individuals, and many small pollution events, lead to the river becoming highly polluted. Discuss ways that the characters in the story could have reduced their impacts on the river.

Sadly, this story is not entirely a work of fiction - this is happening to our rivers everyday, in Australia and all around the world. However, there are many things you can do to reduce the pollution in your catchment and most of them are easy.

Have the students brainstorm ways that they might be able to reduce their impact on their local waterway. Students then record their ideas on Student Sheet 1 – What Happened to Our River.

Cleaning up

Even if you don't mention it, someone is sure to ask 'What are you going to do with the water now?' The answer is to 'dispose of the waste as responsibly as possible to minimise harm to the environment'. Strain or filter the liquid to remove any solid material. Pour the oil off the surface into milk cartons filled with sawdust, or absorb it with paper towels. Dispose of these in the rubbish. Pour the remaining water onto a garden, lawn or compost. Do not dispose of this water down the sink or toilet.

Story of a River : What Happened to Our River?

Student Sheet 1

What is a water catchment?

Look at a map and find out which catchment your school is in.

My school is in the catchment:

List 5 ways that you might be able to reduce your impact on your local waterway.

1.

2.

3.

4.

5.

Story of a River : What Happened to Our River?

Answers to Student Sheet 1

What is a water catchment?

A 'catchment' is an area that collects rainwater as it falls to earth. This water drains to the lowest point due to gravity, collecting in streams and creeks, which then combine to form larger waterways, such as lakes or rivers that flow to the sea. A catchment is physically defined by the landscape and can be seen on a map, bordered by a ring of hills. Within a large catchment there are many smaller catchments.

Some suggestions to help reduce your impact on your local waterways:

- take shorter showers
- use lawn clippings and fallen leaves for compost
- don't litter
- pick up litter when you see it, so that it doesn't wash into our waterways via stormwater drains
- use less single use plastics
- don't put garden waste into stormwater drains
- don't put rubbish down the toilet or sink – it can clog up the sewer system
- don't put paint or chemicals down the stormwater drains
- only use the dishwasher when it is full to reduce the amount of water and detergent being sent to the sewer
- clean up your dog's poo when you take it for a walk
- plant trees, shrubs and native grasses along the river bank to reduce erosion
- ask smokers to make sure that they don't drop their cigarette butts on the ground, as these wash into our waterways via stormwater drains. Cigarette butts are slow to decay, and when fish swallow them, they can become sick or even die.

Class Discussion

Story of a River : What Happened to Our River?

Teacher Sheet 1 - Labels

Clancy Mud Stockman	Kai Dog Owner	Jim Lawnmower man
Little Bo Peep Sheep farmer	Bronny Busy all day Event coordinator/ motorist	Harry Hardworker Labourer/Motorist
Ben Baboy Pig Farmer	Bill Bolton Bolt Factory	Studios Samira Student
Farmer Jo Wheat Farmer	Monty the Miner Coal Miner	Demolition Dan Demolition man
Rena the Recliner Urban Escapee	Sparky Power station manager	Mrs Gupta The Community
Lisa Leaks Ski boat owner	Mais Corn farmer	Mr Barbie The Community
Padi Picknicker	Doug the Digger Gravel extractor	Jo Average The Community
Param Picknicker	Arjay Fisherman	Mrs Mangle The Community
Shady Dealing Property Developer	Terry the Tosser Backpacker	Miss Artist The Community
Gai Green-Thumb Gardener	Con Concreter	Esther Everybody The Community

Story of a River : What Happened to Our River?

Teacher Sheet - Character Name, Pollutant & Pollutant recipe

Character Name	Occupation	Pollutant
Clancy Mud	Stockman	Cow pats: 1 teaspoon of soil + grass
Little Bo Peep	Sheep farmer	Topsoil: 1 teaspoon of soil + water
Ben Baboy	Pig farmer	Pig effluent: 1 teaspoon of soil + vegetable peelings
Farmer Joe	Wheat farmer	Salt: 1 teaspoon of salt + water
Rena the Recliner	Urban escapee	Septic tank overflow: 1 container yellow water + shredded toilet paper
Lisa Leaks	Ski boat owner	Motor oil: 1 teaspoon of vegetable oil + water
Picnicker - Padi	Picnicker	Plastic litter: Plastic bags and wrappers
Shady Dealing	Property developer	Eroded topsoil: 1 teaspoon of soil + water
Gia Green-Thumb	Gardener	Garden pesticides: 1 teaspoon of bi-carbonate soda + water
Kai	Dog owner	Dog poo: 1 teaspoon of soil + water + rolled wet brown paper
Bronny Busy-all-Day	Event coordinator/motorist	Tyre and brake dust: 1 teaspoon of bi-carbonate soda
Bill Bolton	Bolt manufacturer	Industrial discharge: 1 teaspoon of vegetable oil
Mrs Mangle	The Community*	Washing powder: 1 teaspoon of washing powder + water
Miss Artist	The Community*	Paints via sewer: Food colouring + water
Esther Everyone	The Community*	Sewage: 1 teaspoon of soil + water + toilet paper
Monty the Miner	Coal miner	Acid mine water: 1 teaspoon of vinegar + water
Sparky	Power station manager	Station fumes forming acid rain: 1 teaspoon of vinegar + water
Mais	Corn farmer	Fertiliser: 1 teaspoon of bicarbonate soda + water
Doug the Digger	Sand and gravel extractor	Eroded river sediments: 1 teaspoon of soil + water
Arjay	Recreational fisherman	Fishing line: A tangle of fishing line or string
Picnickers - Param	Picnicker	Plastic litter: Plastic bags and wrappers
Terry the Tossler	Backpacker	Assorted litter Bottles tops, ring pulls, cigarette butts
Con the Concreter	Concreter	Concrete wastewater 1 teaspoon of bi-carbonate soda + water
Jim	Lawnmower man	Grass clippings 1 container full of grass clippings
Harry Hardworker	Labourer/motorist	Motor oil: soy sauce + water
Studios Samira	Student/motorist	Motor oil: 1 teaspoon of vegetable oil
Demolition Dan	Demolition man	Chemicals: Green food colouring + water
Jo Average	The Community*	Household chemicals: 1 teaspoon of bi-carbonate soda + water
Mr Barbie	The Community*	Animal fats and oils via sewer: 1 teaspoon of vegetable oil + water
Mrs Gupta	The Community*	Hygiene products via sewer: cotton ball + floss

*The Community characters dispose of a range of substances to the sewer. These characters are not specifically mentioned in the story and can therefore be used to tailor the story to you individual class size.