

“Urban stormwater causes serious problems in some areas (e.g. Auckland), polluting estuaries and harbours with sediment and toxic substances (e.g. heavy metals and hydrocarbons derived from motor vehicles) and, in some cases, infiltrating and flooding sewerage systems. Stormwater quality is often similar to that of secondary treated sewage.”

“The natural character and habitat quality of many freshwater and estuarine waters has been lost or degraded by drainage, construction of flood control channels and stopbanks, development, removal of riparian vegetation, waste-disposal, urban stormwater and agricultural run-off.”

(State of New Zealand Report, Auckland Regional Council 1997)

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**Teacher  
information**

# Stormwater and Environmental Education

Through the exploration and development of the Stormwater theme, and underlying issues within the Auckland region, it is hoped that students will develop:

- **awareness and sensitivity** to the quality of Auckland's stormwater and related issues
- **knowledge and understanding** of stormwater and the impact of people on it
- **attitudes and values** that reflect feelings of concern for our stormwater issues
- **skills** involved in identifying, investigating and problem solving associated with the issues related to stormwater quality
- a sense of responsibility through **participation and action** as individuals (and as members of a group) in addressing the issues of stormwater quality

(Ref. Guidelines for Environmental Education in New Zealand Schools p. 9)

## Keeping safe

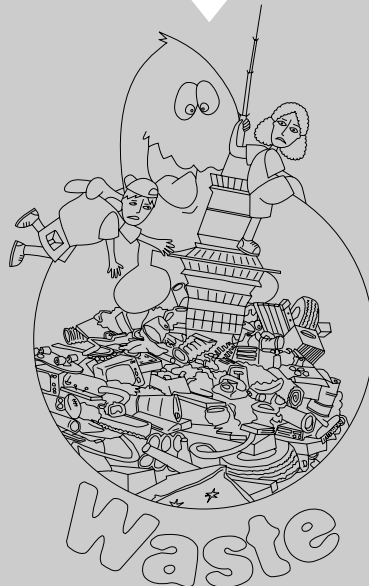
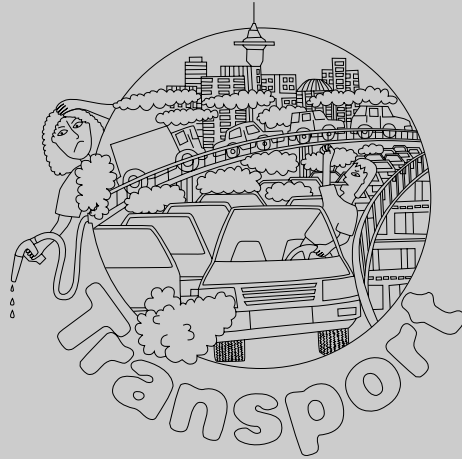
Take care near stormwater drains. Never enter a stormwater manhole or pipe and after rain, do not go close to drain openings.

Students should be told not to touch material found lying in or near stormwater drains. However, as part of an organised litter clean-up, it is appropriate to collect samples of pollutants - gloves must always be worn to protect hands from germs and cuts.

## Key Concepts

- Differences between stormwater and wastewater
- Stormwater drains
- Pollutants in stormwater drains - what are they and where do they come from?
- Motor vehicles and stormwater pollution
- Stormwater pollution at home
- The effect of pollutants on streamlife
- The importance of keeping our streams clean - why and how
- Critical numbers - small amounts of pollution add up to a critical number, when just one bit is just one bit too many
- Personal and community commitment and action to improving stormwater quality.

# Links to other City Issues



# Curriculum Area: Science

## **Making Sense of Planet Earth and Beyond**

Students will:

- Justify their personal involvement in a school or class initiated local environmental project (level 3)
- Investigate a local environmental issue and explain the reasons for the community's involvement (level 4)

## **Making Sense of the Nature of Science and its Relationship to Technology**

Students will:

- Investigate the impact of well known technological innovation or scientific discovery on people and / or the local environment
- Investigate the ways in which science and technology have changed the lives of people / and / or environment.

### **Focusing and Planning**

Students will develop skills and attitudes as they:

Ask questions of themselves, their group and resource people and identify questions suitable for scientific consideration

### **Information Gathering**

Use information sources purposefully, asking coherent, directed questions of people and media sources

### **Processing and Interpreting**

Use coherent data and scientific ideas to suggest answers to their selected questions and problems, and make an evaluation of their investigation

### **Reporting**

Present what they did and what they found out in their investigations in ways and forms appropriate to their peer group.

## Essential Skills

(Highlight as appropriate)

Problem Solving	Social / Co-operative
Numeracy	Physical
Work and Study	Communication
Self-management	Information

## Curriculum Links

English  
Maths  
Arts  
Social Studies

# Possible Learning Outcomes

### Students will:

- Understand the difference between stormwater and wastewater
- Locate and record the position of stormwater drains in their local area
- Identify and describe things that pollute our stormwater drains
- Research the effects of different pollutants in stormwater drains
- Develop solutions to the problem of stormwater pollution
- Use criteria to evaluate a range of solutions
- Make a choice about possible action and justify this choice

### Assessment

Teachers may derive specific learning outcomes that are appropriate to the learning needs of their students. These learning outcomes will provide the criteria against which student's achievement can be assessed. Some suggestions for assessment activities can be found in the Teacher Resource.

# Related themes

The focus of this resource is stormwater and related issues in the Auckland region. There are a number of other topics that you may wish to explore, for example:

- the water cycle
- wastewater and sanitary sewers
- water use and conservation
- Auckland's water catchment area
- ground and surface water issues in the Auckland region

# Background information

## Stormwater

There are two sets of drains running under the city:

**Sanitary sewers** collect waste flows from inside houses, offices, factories, hotels, shops, schools and other buildings. Wastes from sinks, basins, laundries, toilets, baths and showers flow through this network to a sewerage treatment plant before disposal into the environment.

**Stormwater pipes** collect rainfall from rooves, yards, driveways and other hard surfaces. Rain is channelled through roadside drains or stormwater grates in roads, yards and parking lots into stormwater pipes which carry this run-off to the nearest stream, lake, harbour, beach or aquifers (underground rocks which have water in the cracks and spaces).

## The Environmental Issue

- Every day all over the Auckland region (and the rest of New Zealand) pollutants find their way into our streams, lakes, harbours, beaches and aquifers (underground rocks which have water in the cracks and spaces).
- Pollutants are either accidentally or occasionally deliberately spilt on the ground or directly down stormwater drains.
- The enormous range of pollutants are having a disastrous impact on our water systems and their ecology e.g. fish, shellfish, plants and birds and have serious consequences for people.
- Most people are unaware that whatever goes down a stormwater drain goes untreated to the nearest body of water.

## What is a catchment

"A catchment can be described as an area of land, bounded by hills or mountains from which surface and groundwater flow into streams that join and ultimately have the same outlet to the sea. Almost everybody lives in a catchment. Catchments in New Zealand vary in size from large, such as the Waikato River stretching from Taupo to Pukekohe, to tiny areas of only a few hectares.

Tangata Whenua understand their ancestral waterways in terms of tribal boundaries and relationships rather than the scientific definition of a catchment area. The 'tribal catchment area' is identified in terms of key geographic features such as maunga (mountains), awa (rivers), puna (water sources/springs), which form the basis of iwi and hapu identity and spiritual and physical sustenance.

You will need to have an understanding of the Tangata Whenua relationship with their streams and rivers. Each waterway will have significant history, names and stories attached to it because of the way it has been used by hapu/marae in the past.

Streams are generally described as permanently flowing (perennial) or intermittently flowing (ephemeral) which dry up in summer.

A lot of the urban waterways in Auckland would be described as small compared to other parts of NZ or overseas, with catchments only several hundred hectares in area. Many are

less than 3 kilometres in length and are small enough that you could easily jump across them (during low flows!). We have about 9,500 kilometres of these types of streams in the region, about 90% of the total. Even the large catchments are made up of many smaller sub-catchments. Whatever happens in the smaller feeder streams affects the overall wellbeing of the main waterway lower down".

To find out which of your daily activities affect stormwater quality you should read the Wai Care book entitled 'Clean Up Your Act'.

## Reference

Wai Care Books 2 and 7, Auckland Regional Council, Auckland City Council, North Shore City Council, Manukau City Council, Waitakere City Council.

<http://waicare.org.nz>

# Types and sources of stormwater pollutants

Knowing what pollutants are present in stormwater and where they come from can assist in working out ways to avoid practices that produced them or reduce their impact on waterways.

The following table lists typical sources of stormwater pollutants.

<b>Urban Runoff Contaminant Sources</b>							
<b>Contaminant Source</b>	<b>Solids</b>	<b>Nutrients</b>	<b>Bacteria</b>	<b>Oxygen Demanding Substances</b>	<b>Metals</b>	<b>Oils</b>	<b>Synthetic Organics</b>
Soil erosion	●	●		●	●		
Cleared land	●	●		●			
Fertilisers		●					
Human waste	●	●	●	●			
Animal waste	●	●	●	●			
Vehicle fuels /fluids	●			●	●	●	
Fuel combustion	●				●	●	●
Vehicle wear	●			●	●		
Industrial /household chemicals	●	●		●	●	●	●
Industrial processes	●	●		●	●	●	●
Paints /preservatives					●	●	
Pesticides				●	●		

# Effects of pollutants on living creatures

Pollutant	The effect it has on living creatures
Fuels	<ul style="list-style-type: none"> <li>● Damages gills so fish can't breathe</li> <li>● Poisons animals</li> <li>● Burns plants</li> <li>● Causes cancer in fish and shellfish</li> </ul>
Oil (and toxic substances in waste oils like sulphur and acids)	<ul style="list-style-type: none"> <li>● Creates a barrier that stops oxygen from getting in water</li> <li>● Causes serious damage</li> </ul>
Paint and ink	<ul style="list-style-type: none"> <li>● Poisonous to creatures who come into contact with them</li> <li>● Stops light from getting into the water making it difficult for plants to get the energy they need to make food, and consequently for animals to find food</li> </ul>
Food stuffs	<ul style="list-style-type: none"> <li>● Rot and decay in water using up all the oxygen, suffocating fish and insects</li> </ul>
Sediment	<ul style="list-style-type: none"> <li>● Reduces water clarity and interferes with vision, breathing and digestion</li> <li>● Fills the gaps between rocks in which some animals live</li> <li>● Affects the growth of plants, which can disrupt the food chain</li> </ul>
Detergents (even some claiming to be biodegradable or environmentally friendly)	<ul style="list-style-type: none"> <li>● Can be toxic to fish</li> <li>● Remove oxygen from the water as they break down and suffocate the fish</li> </ul>

Refer to Wai Care - Book 6 Fact Sheets for additional and in-depth information on the effects of pollutants.

# What can we do?

Educate others about the effects of pollutants on our waterways

Inform others about alternatives for waste disposal:

## **Paints and brushes**

- wash out paint brushes in an inside sink
- allow all unwanted paints to dry, then dispose with household rubbish
- allow used brush cleaning fluids to evaporate

## **Oil**

- drop off used oil for recycling at a local service station or Refuse Transfer Station

## **Household hazardous waste**

- drop off at any Refuse Transfer Station

## **Detergent and wash water**

- wash cars at a car wash or on the lawn (most pollutants will be absorbed and broken down in the ground)
- pour all household liquid wastes down a sink or toilet

**Take responsibility for changing our own actions -  
ensure that what we do does not cause further pollution**

**If you see water pollution in a stream at the beach or in  
the harbour**

**Call the Water Pollution Hotline (09 377 3107)**

# Other activities could include:

## Questions for gathering before-views

- 1 Rain falling on the house roof into the guttering and down the drain pipe. Where does the water go next? (stormwater)
  - 2 Where should the water from the kitchen sink go? (sanitary sewer)
  - 3 Where should the water running in the street gutters go? (stormwater)
  - 4 Where should the bath water go when you pull the plug? (sanitary sewer)
  - 5 Where should the contents of the toilet go when you flush it? (sanitary sewer)
  - 6 Where should wastes from factories go? (sanitary sewer)
- Walk in the rain. Select a viewing spot to watch the flow of water from one place to another. Discuss the local catchment area. What and where is it?
  - Talk about what happens when rain hits the ground. Conduct experiments to show what happens when water is poured on different surfaces e.g. grass, soil, sand, and hard surfaces. Discuss erosion and its causes and solutions.
  - Invite a plumber or your school caretaker to talk to the class about the difference between sanitary sewers and stormwater systems. Ask them to show students where the systems are obvious within the school.
  - Locate a healthy and an unhealthy stream. Visit these and observe differences (sight, smell, and evidence of life).
  - Clean up local gutters and create an inventory of the items found. This should only be done if students can wear gloves and if it can be done safely. Write letters to the local papers about the amount of litter students found and what action they would like others to take to clean up the area. (Check Wai Care Book 8 "Taking Action" for more ideas about litter clean ups).
  - Create posters with strong messages about stormwater issues and display these in public places.
  - Students could role-play different scenarios related to stormwater issues.
  - Invite a water pollution expert from the Auckland Regional Council to talk about how water pollution is monitored/tested.

# Suggestions for monitoring and assessment

**Complete a concept map** that represents the flow of stormwater and the source and effect of pollutants.

## Interactive approach

- observing
- working with small groups
- listening to discussions

## Conferencing individuals - groups

- Tell me about your.....
- Explain your.....

## Checklists

Use specific skills and objectives from given lists as criteria in checklists

## Peer support

Students give constructive/positive feedback to peers

## Self evaluation

Students complete an evaluation sheet that may include the following:

- In this study I enjoyed learning about.....
- The most interesting fact I learned was.....
- Four new words and their meaning I have learned are.....
- The most interesting sentence I read/learned about the topic was.....
- One thing I would like to find out more about is.....
- One thing I would like to find out more about is.....
- This picture/illustration shows.....

**Complete activities from this resource:**

- 'I know what I know' - page 26.
- 'All power to the poster' - page 50.
- Redo the flow diagrams from 'Getting into the flow of stormwater' to determine how much knowledge and understanding the students have gained during their work on stormwater - page 21.

# Environmental Action Planner

What's the issue?	
What's our goal?	
What skills will we need?	Who could influence the decision?  Who makes the final decision?
<b>ACTION</b> What are we going to do?	
Evaluation of action	Evaluation of plan
How will we find out what people think and feel about the issue?	How can we make people more aware of this issue?
What information do we need and where will we find it?	

# Resources

## Included in City Issues - Stormwater pack

No.	Type	Resource
1	Poster	Keep our Streams Clean
2	Poster	Your Council Manages 3 Waters
3	Poster	I only Drain Rain
4	Stencil	Rain Only Drain to Sea
5	Land Facts WO 2	Stormwater Quality
6	Pollution Facts UPC 01	Why preventing water pollution is important
7	Pollution Facts UPC 10	Vehicle and Equipment Washing
8	Flyer	Operation Stormwater

Further copies of ARC resources are available from:

Enviroline 09 366 2070

(for callers outside the toll free area please phone 0800 80 60 40)

Website [www.arc.govt.nz](http://www.arc.govt.nz)

## Other resources

EcoWater - Waitakere City Council - has excellent resources about the water cycle, rain, water use, stormwater and waste water. [www.ecowater.co.nz](http://www.ecowater.co.nz)

Magic School Bus at the Waterworks. Scholastic Books.

Robert D Froggs Taps Under Wraps. An old resource distributed to all Auckland Schools by the Water Conservation Team, Auckland Regional Authority.

# School journals

**Blue fish on the footpath** by Patt Quinn 1992 2:2

The children of Westmere School have an unusual job helping the Auckland Regional Authority to tell people about storm water drains and the dangers that these drains can create for the fish in the Waitemata Harbour.

**New Zealand's colourful sea life** by Kim Westerskov 1988 2:3

Some people think you can only find brightly coloured fish in tropical seas. Kim has taken flash photos to show the colourful sea life in New Zealand waters.

**The shapes of water** by Gillian Shannon 1995 1:4

A photo-article about water in some of its many forms: rain, sea, clouds, fog, hail, frost and rainbows.

**Turid Reid: field studies scientist** by Frances Parkin 1979 4:1

Turid Reid's job is to find out how clean the water is in the streams and harbours and at the beaches of Auckland. She works for the Auckland Regional Authority which, as part of its responsibility, safeguards the purity of the waters of its region.

**Wairere - poem** by Kevin White 1987 4:2

**Water - poem** by Stanley Cook 1984 2:4

**Water - poem** by Alan Bagnall 1997 2:3

**Water mad - poem** by Peter Bland 1979 4:1

**Water supply** 1978 4:3

An outline of the problems of a good water supply - the need for a piped supply as a population grows, the treatment of the water and the growing need for water conservation. Good diagrammatic illustrations.

**The water we breathe** by Gillian Crook 1978 3:2

How clouds are formed, the three main types of the sort of weather they foretell. Also how fog and mist are formed.

**The creek** by Tuaine Taniwha 1990 pg. 43







**Student  
activities**

# Getting into the flow of stormwater

## Part One

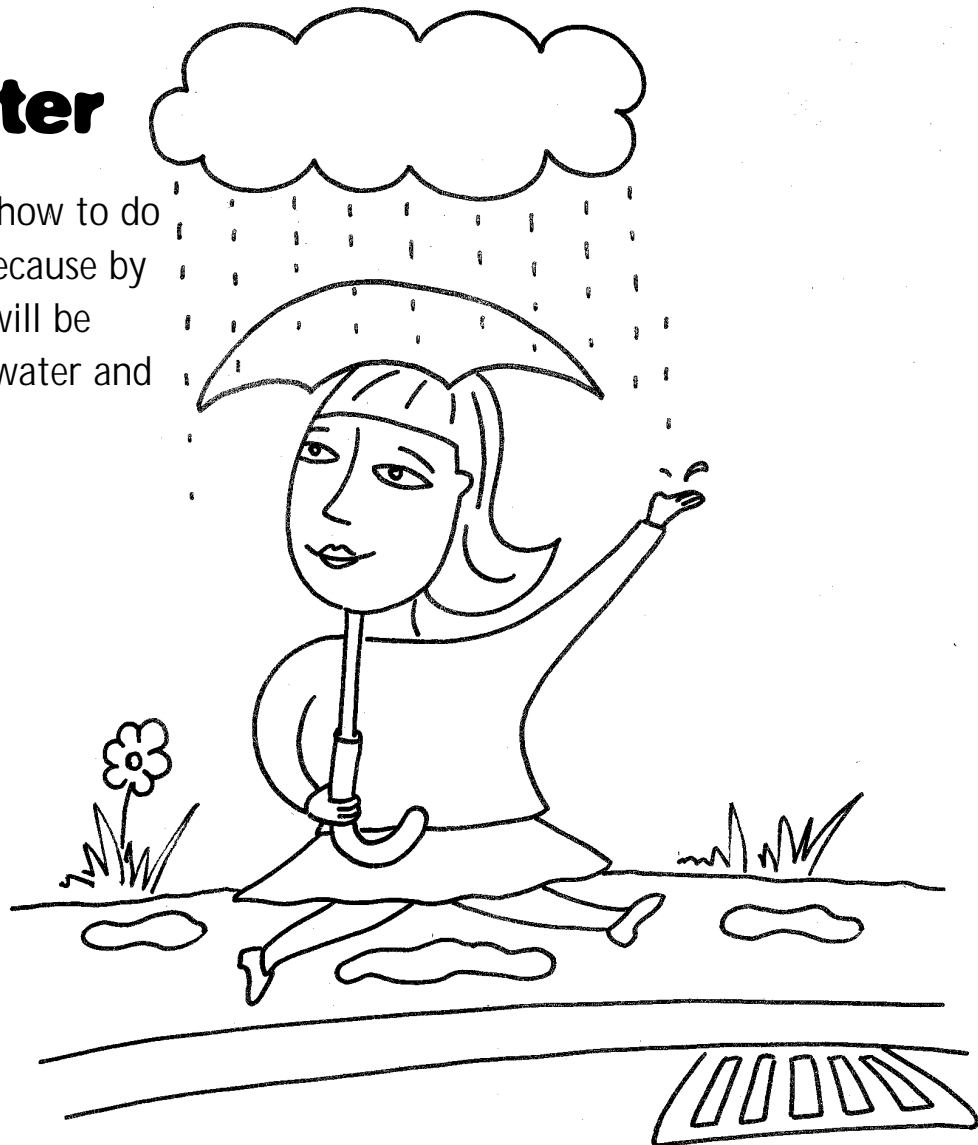
This activity is about finding out what you already know about stormwater and the difference between stormwater and wastewater.

### YOU WILL NEED

- one or two people to work with
- paper - A3 size or bigger would be good
- and something to write with

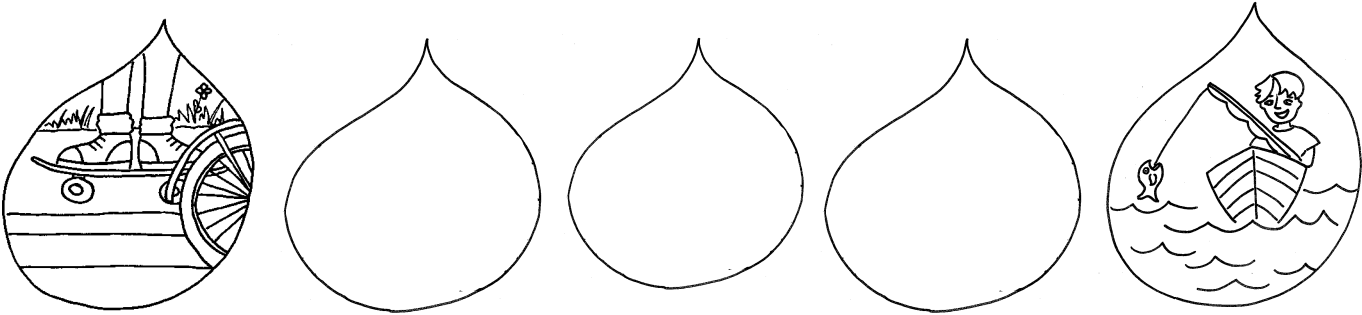
## @ Stormwater

If you don't know exactly how to do this activity don't worry because by the end of this topic you will be absolute experts on stormwater and stormwater issues!



**YOUR TASK** ➔

Draw a flow diagram that shows the journey stormwater takes from a road into a stream, lake, beach or harbour.



Include any living creatures you might expect to meet along the way. You should also show your amazing knowledge of the water cycle.

**b Wastewater**

Complete yet another flow diagram but this time show the journey wastewater takes from hand-basins in the school toilets to a sewage treatment plant.

**c Comparing what you know**

**(Your teacher will probably organise this).**

As a class record on a chart what you already know about stormwater and wastewater and the journeys they take. **(Be sure to revisit it as you work through this topic, as some of it might need changing!)**

# Getting into the flow of stormwater

## Part Two

**Hey** - we're still gathering before-views, so here's a bit of reading, writing and drawing for you to flow into.

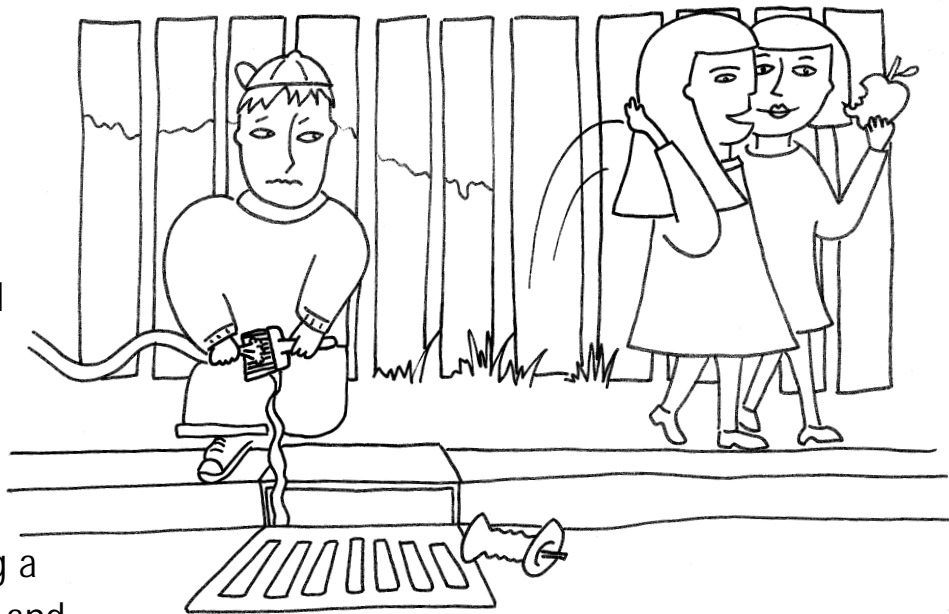
### YOU WILL NEED



- A photocopy of this activity
- Something to write with
- Reading glasses - if you use them
- One or two other people to work with
- Active brains that are thinking about stormwater - now there's a challenge!

## Read this

Stormwater pollution is a growing problem in the Auckland region. Everyday at work, home and at school people are responsible for the pollutants which end up in our stormwater drains (accidentally or on purpose). This polluted water is having a disastrous effect on streams and harbours and for the things that live in them, and for us.



Sad to say many people don't even think about where the stormwater drains run to  
**- worse still, many don't even care!**

# So, what do you know?

**In this space, draw or write the name of the all the things you think are polluting our stormwater drains.**



# **Finish these statements. (This is what you know now.)**

**“I only drain rain” means**

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**If the wrong things (pollutants) go down the stormwater drains**

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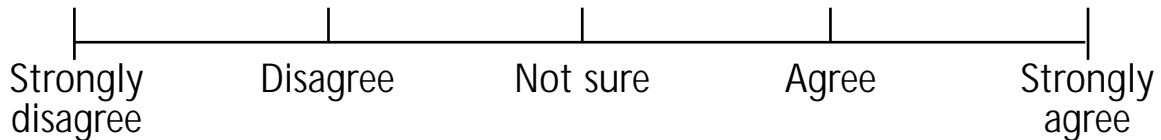
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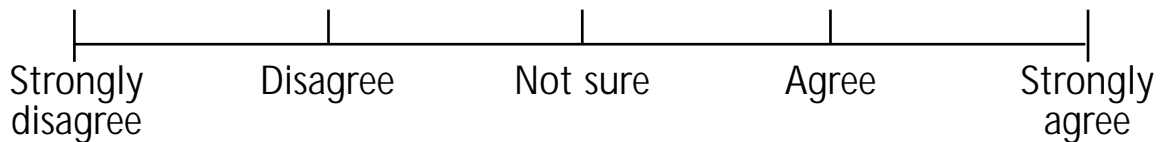
# Put your mark here!

Look at the following statements. Put a tick  above the opinion line to show how you feel about the statement.

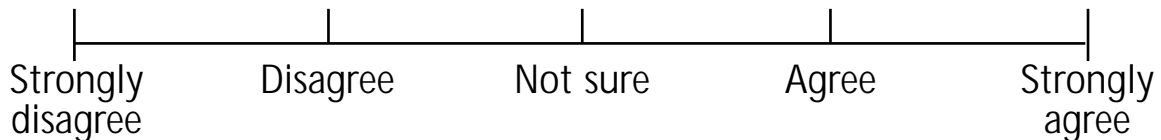
## 1 Motor vehicle use is the major cause of stormwater pollution.



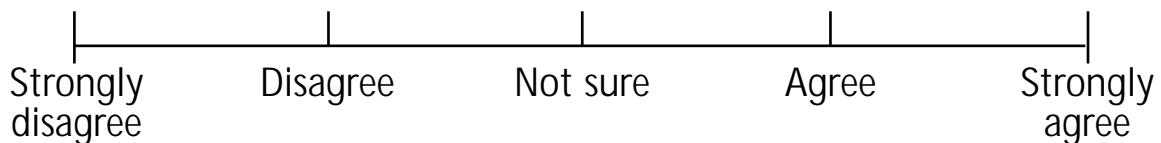
## 2 It's ok to wash your car on the road outside your own house.



## 3 Stormwater pollution is the Auckland Regional Council's problem not ours.



## 4 It doesn't matter if we only put small amounts of waste down the stormwater drains.



Share what you have done with the rest of your class.



# I know what I know!

**(The more you read the more you'll know)**

To complete this information  
packed activity



- Information from City Issues (especially Operation Stormwater)
- a copy of this activity

## First things first

**FIND and READ** the information you will need to complete this activity.  
You could squeeze in some pictures or symbols if you want to.

## Moving right along

Stormwater is \_\_\_\_\_

Stormwater drains flow into \_\_\_\_\_

Stormwater is not treated in any way. This means \_\_\_\_\_

\_\_\_\_\_

Wastewater comes from \_\_\_\_\_

Wastewater flows through \_\_\_\_\_

Wastewater is treated. This means \_\_\_\_\_

Stormwater becomes polluted when \_\_\_\_\_

\_\_\_\_\_

Polluted waterways means that \_\_\_\_\_

\_\_\_\_\_

**If you do this activity brilliantly (as you will) you can use it as your personal reference sheet!**

# Don't let these activities drain you!

**You're in this together.**

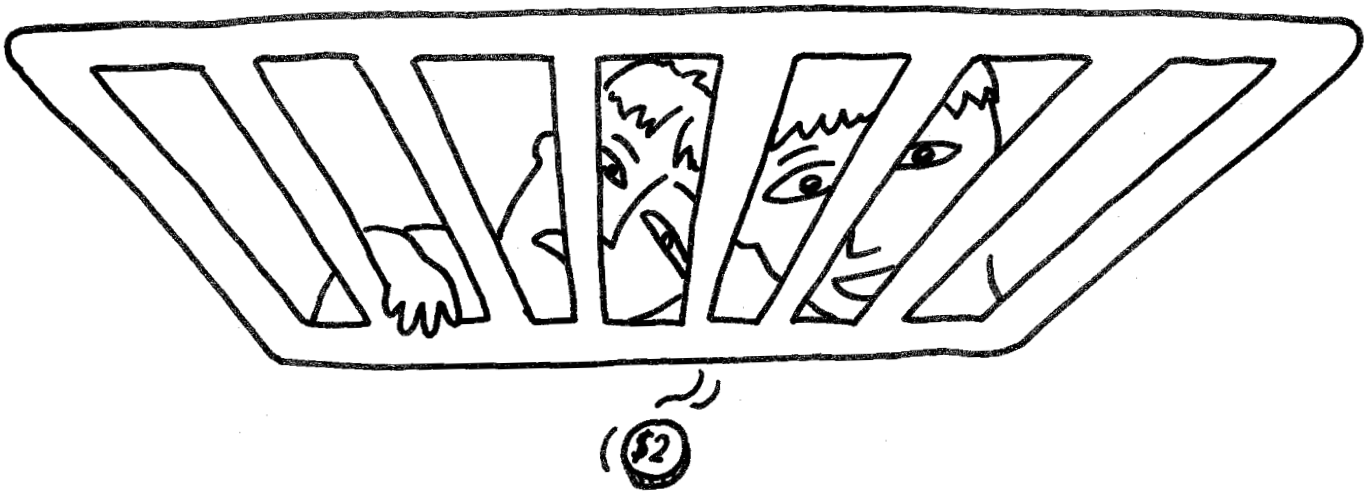
**(These activities could be for the whole class).**

## Gone Away!

You watch the rainwater running down the street and into the stormwater drain.

Many people don't give a second thought to what happens next to the water.

It's just gone!



**Gone away.**

**Out of sight, out of mind.**

**Gone!**

That's the problem. It is really important that you find out where this 'Gone Away' place is and you need to find out what is happening there.

# You can start by working out your catchment area.

## What is a catchment area?

A catchment is an area of land which collects rain. It is bounded by hills or mountains. Almost everyone lives in a catchment area.

Rain that falls onto hard concrete and asphalt surfaces flows off into gutters and underground stormwater drains and into streams that join and flow out to the sea.

Rain that falls onto grassed or un-vegetated areas partly soaks into the ground.

Catchments vary in size from large, such as the Waikato River stretching from Taupo to Pukekohe, to tiny areas of only a few hectares.

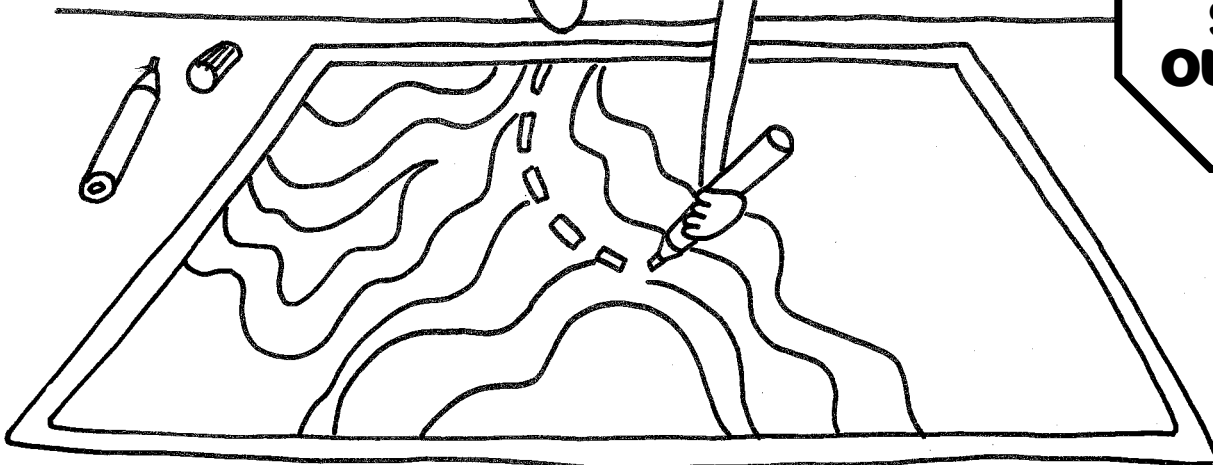


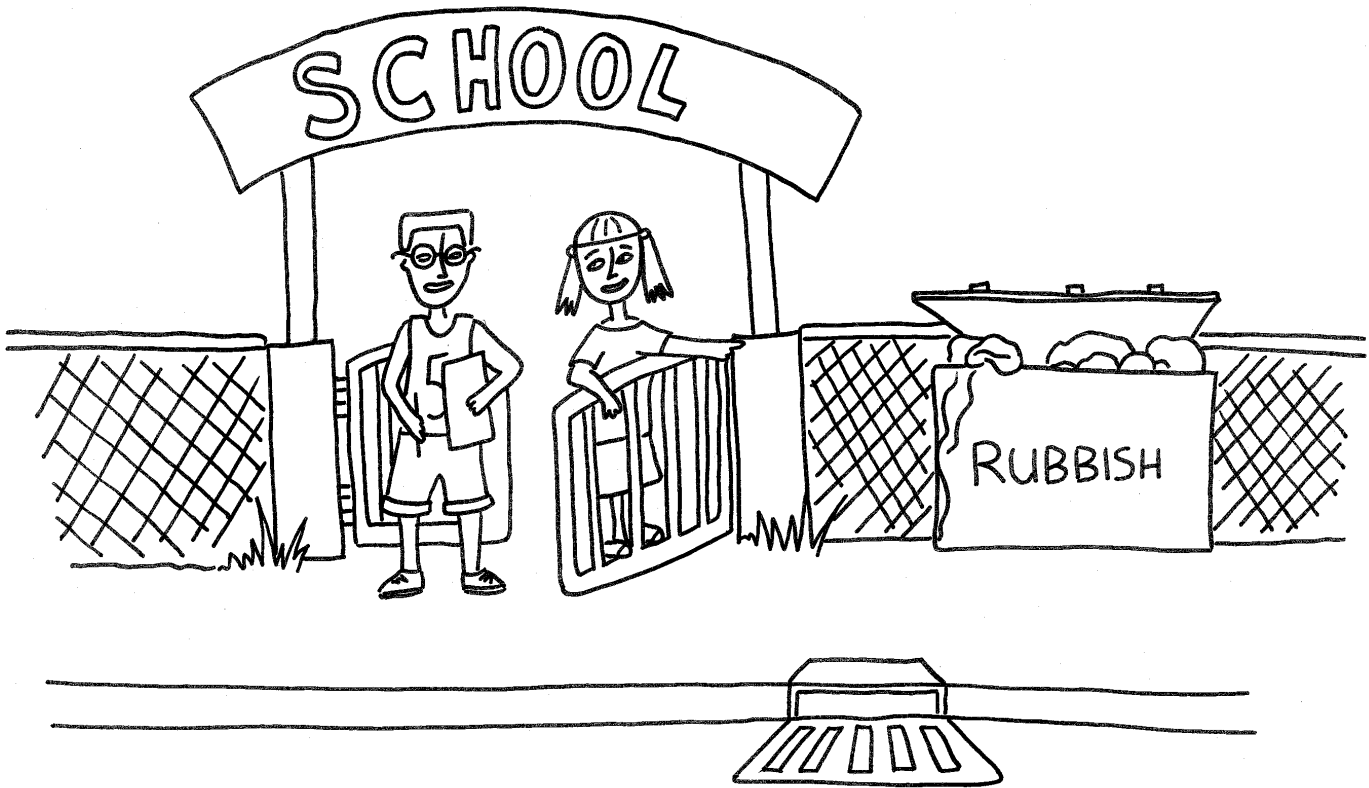
On a map of your local area mark in the catchment boundaries in the school neighbourhood.

(Where does the water run to?

Where does it collect?

How does it naturally move through your area?)





**Go for a walk around the school neighbourhood and complete the following:**

- 1 **LOOK** for higher land or ridges that form your catchment boundaries. Use this information to update your classroom map back at school.
- 2 **LOCATE** stormwater drains in the road gutters, (in built up areas the metal grilles should be easy to spot).
- 3 **TALK** about where these drains might run.
- 4 **RECORD** any dirt, rubbish, oil or oily sheen you see that might wash into stormwater drains. Look in gutters, around the drains and, if you can, where the stormwater pipe flows into a stream or a beach.

(Please look for the 'Stormwater Drains Recording Sheet' to record your findings).

# Stormwater Drains Recording Sheet



Still more -

# Don't let these activities drain you!

## Meanwhile, back at school

**ADD**



ADD any useful information to the map of your catchment area e.g.

- Hills, ridges, higher land
- Stormwater drains
- Streams

**COMPLETE**



COMPLETE this activity by marking on your map where the stormwater drains are discharged. You might find that your stormwater flows into and through a number of streams or it could be discharged directly into the sea.

**(You may need to contact your local city council to obtain a drainage plan of your area.)**

**DISCUSS**



- How much and what kind of rubbish was found in and around the stormwater drains.
- What other things might be washed into the gutters from the roads?
- What about the pollutants we can't see? What are these and where do they come from?

P.S. You'll use the information gathered to help you complete other activities.

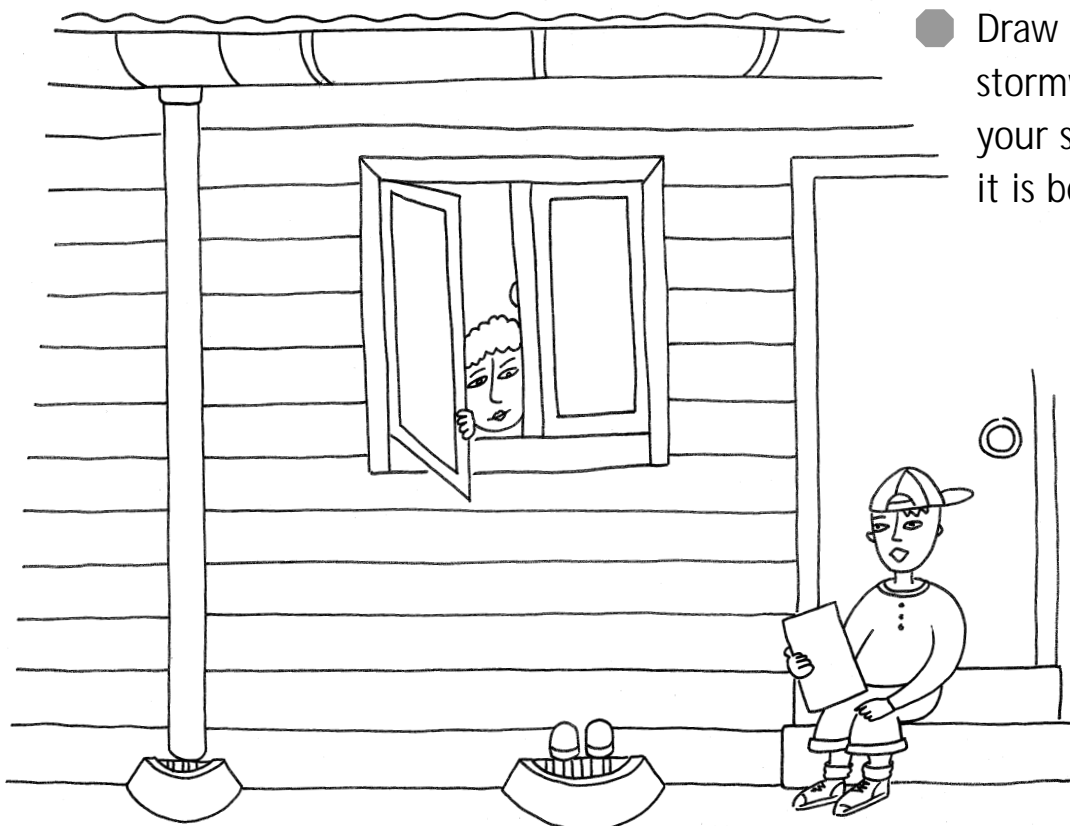
and still more -

# Don't let these activities drain you!

## Who says homework can't be fun?

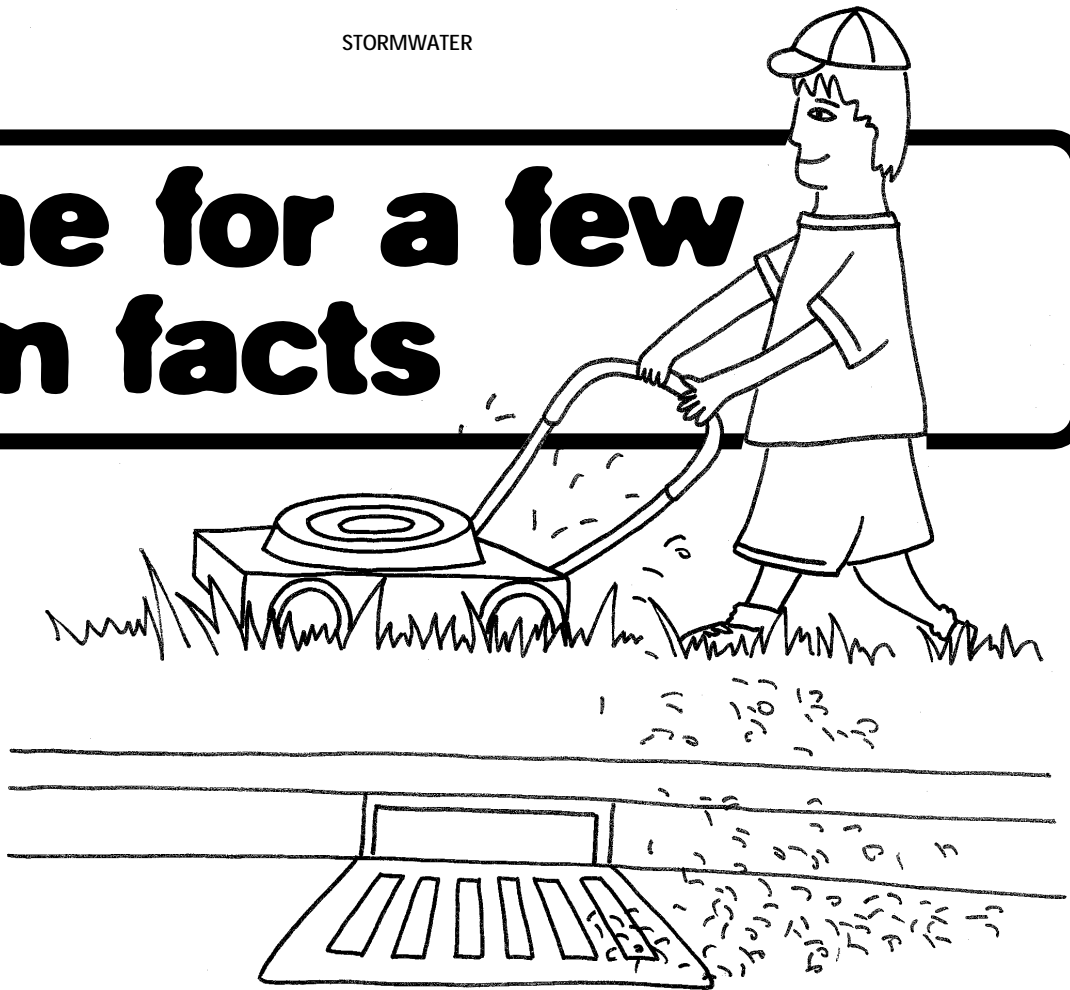
**Complete this activity at home** (no excuses!)

- Draw a floor plan of your house and section.
- Show where all the drains run under the house and off the section.
- Colour code the drains to clearly show where wastewater is going and where the stormwater drains are nearest to your house.
- Talk to your family (and / or neighbours) about where your stormwater drains go. If possible, follow the path from the stormwater drains to the place where this water is discharged.



- Draw a map showing the stormwater journey from your street to where it is being discharged.

# Time for a few grim facts



- Any time we let something other than rain water flow down a stormwater drain we are causing pollution.
- Many of the things that cause the most serious pollution of stormwater are invisible, or very hard to see.
- It's illegal to allow oil, paint, detergents and other wastes into stormwater drains.



Here is a list of pollutants often found in our stormwater as it is discharged into streams, beaches and harbours. Find out how these pollutants get into the stormwater. Information from 'City Issues' might help you to get started.

<b>Pollutant</b>	<b>How do they get into stormwater</b>
Rubbish such as drink cans and plastic bottles, plastic bags	
Paint	
Food wastes	
Animal faeces	
Soil	
Lawn clippings, garden rubbish, rotting plant material	
Herbicides, pesticides, garden fertiliser	
Grease and oil	
Chemicals	
Air pollution	
Heavy metals e.g. zinc and copper cadmium from cars	
Soapy water (detergent)	
Paper	
Bits of rubber	

# So you say you love that car - think again!

Cars are really quick and convenient (unless they break down!)

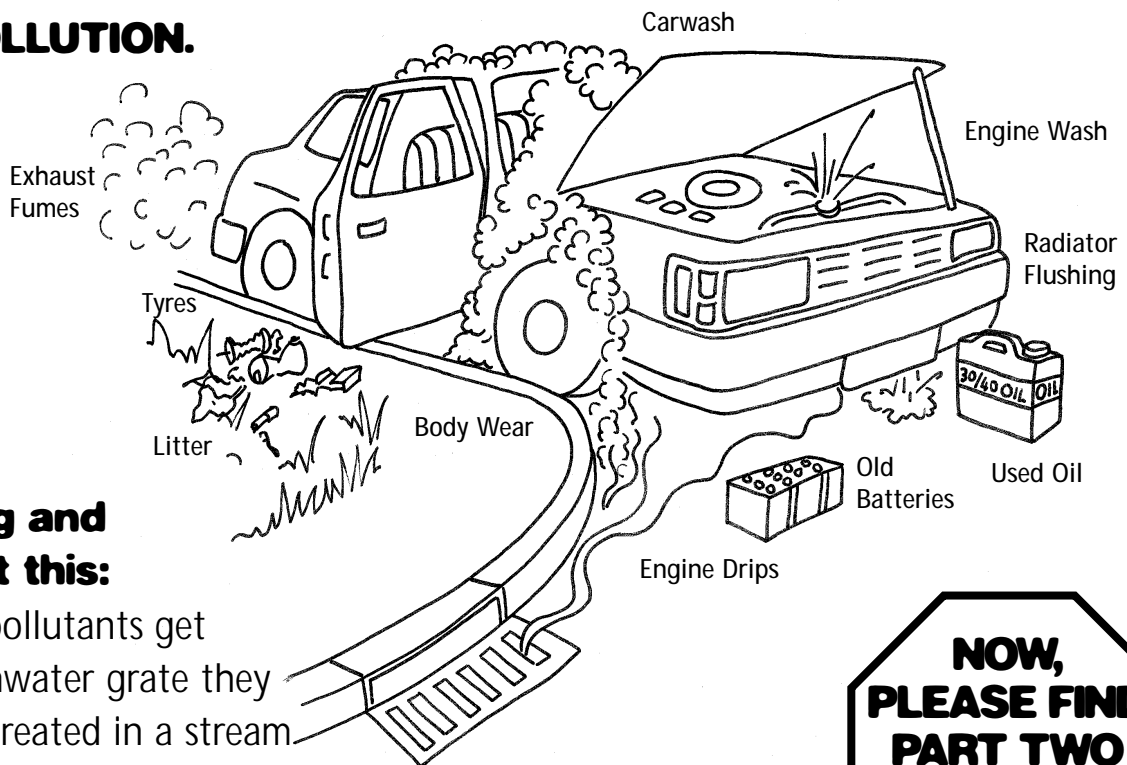
Cars are so comfortable (most of the time)

Cars are a great place to daydream (unless you're driving!)

Cars are a major source of stormwater pollution (and that's a fact!).

**WHAT?** Yep. In fact, Auckland's motor vehicles are **THE greatest source of stormwater pollution.** They have become a serious problem!

## TAKE A LOOK HOW A CAR CAN CAUSE WATER POLLUTION.



### THINK long and hard about this:

When these pollutants get down a stormwater grate they come out untreated in a stream and eventually in a harbour.



# So you say you love that car - think again!

## Part Two

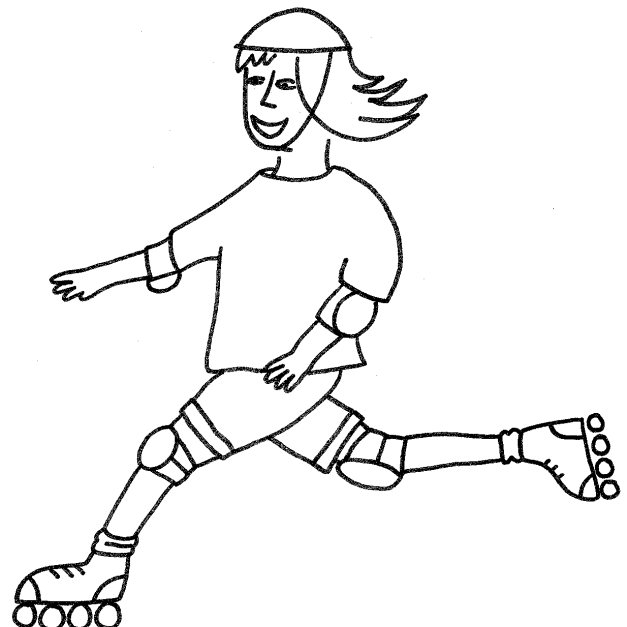
Everyone needs to think about ways of reducing stormwater pollution caused by cars - everyone, **EVEN** if you don't personally own and drive a car.

You need to **THINK** about what you can do and then you need to turn your thoughts into **ACTION!**

**What can you do to help reduce stormwater pollution caused by cars?**

**START BY MAKING A LIST** of things you can do directly and indirectly. Confused? Here are a few ideas to get you started.

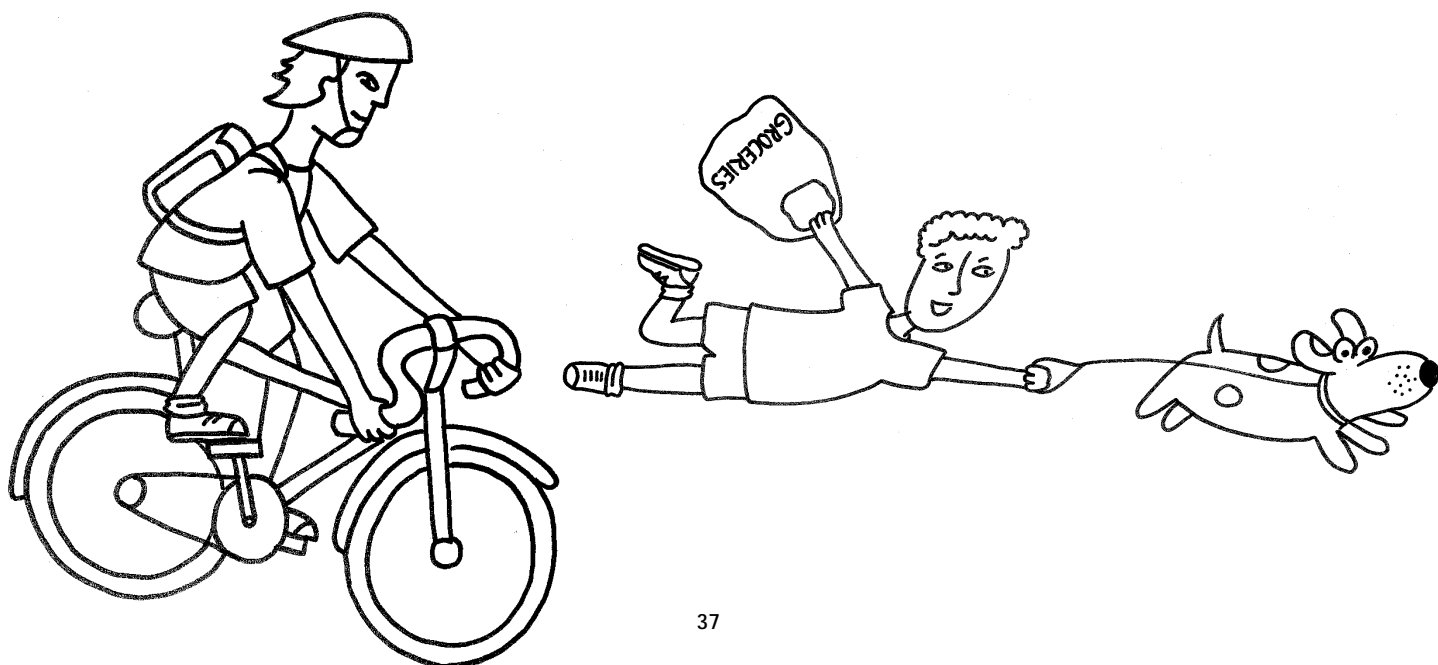
- Walk, jog, bike, skateboard, rollerblade places instead of being taken by car.
- Encourage other family to use the car less. Remind them about carpooling and using public transport.



- Design and display a poster in the local shops reminding people to wash their car on the grass or to go to a car wash place.
- Talk to car owners about having their car tuned and serviced regularly. (See the Air Quality part of 'City Issues' to find out why this will help).
- Carry out a family / neighbourhood / local community campaign that will help educate car owners about things like:
  - the need to check and fix oil leaks
  - recycling oil and batteries
  - disposing of unwanted oil in the right place!

**When you have completed the list make a plan about how you will carry out your action(s).**

**The Environmental Action Planner might help you to get organised with this.**



# Wanted: home detectives

**to find out what's going  
down at home.**

Four easy steps to helping reduce stormwater pollution  
at home



**STEP ONE**

Ask your family to get involved in this activity.

**STEP TWO**

Complete the checklist.

**STEP THREE**

Brainstorm with your family for solutions \*

**STEP FOUR**

Make it happen!

<b>Possible source of Pollution</b>	<b>Possible Solution*</b>	<b>Action taken (Tick-date)</b>
-------------------------------------	---------------------------	---------------------------------

Paint brushes washed outside		
Unwanted paint tipped down stormwater drains		
Grass clippings and plant material left on roadside or next to stream		
Unwanted oil tipped down drains		
Car washed in driveway or at kerbside		
Liquid wastes tipped in wrong drains		
Household drains connected wrongly - ie; stormwater and wastewater		
Other waste materials not disposed of properly		

\*Need help with solutions? - Check City Issues Information Sheets

# There are blue fish where?

This is a really important activity because it's all about helping to get the message into the community about stormwater drains.

**READ**



READ the School Journal article 'Blue Fish on the Footpath' (1992, No. 2, page 31)

**FIND OUT**



if there are any blue fish, or similar stencils (Rain Only- Drains to Sea) in the school or neighbourhood.

**IF not, AND if you think it's a good thing to do, just get out there and do it.**

**TAKE ACTION**  
**GET ORGANISED**  
**MAKE IT HAPPEN**



# STOP!!!

Before you go painting the footpath:

## YOU WILL NEED



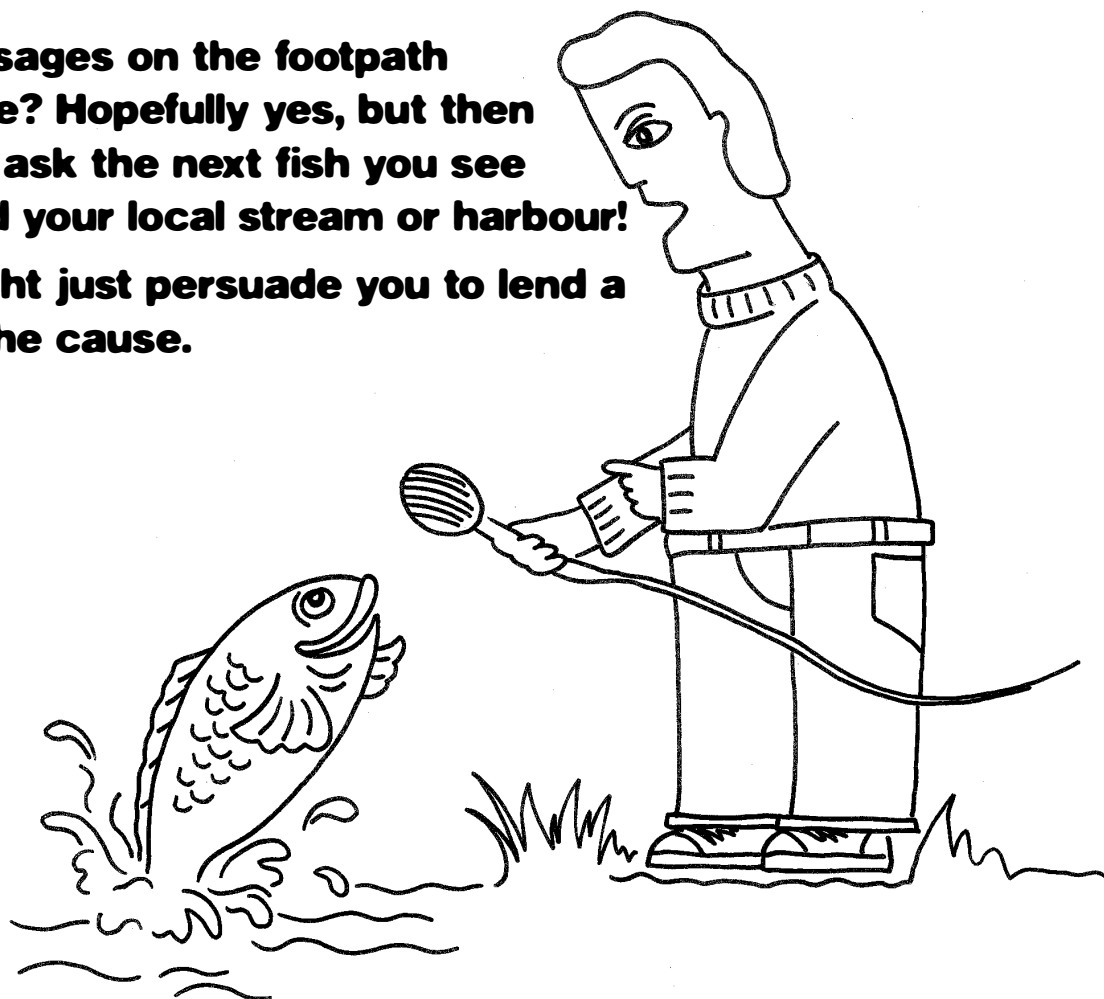
- people to help
- plans
- permission
- paint
- perfect painting weather (PLEASE don't let the paint wash down the drain if it rains!)

(HEY- this might be another excellent time to use the Environmental Action Planner).

You could use the stencil in the 'City Issues' resource - 'Rain Only. Drains to Sea', or you might get wildly creative and design your own stencil.

**Will painting messages on the footpath make a difference? Hopefully yes, but then you really should ask the next fish you see swimming around your local stream or harbour!**

**Their opinion might just persuade you to lend a helping hand to the cause.**



# “Poison the sea, poison me!”

Grate art competition

Do you want to do something for the environment?

By entering this competition you can help get the message about stormwater drains into the community (and have fun at the same time!)

## So what is the message about stormwater drains?

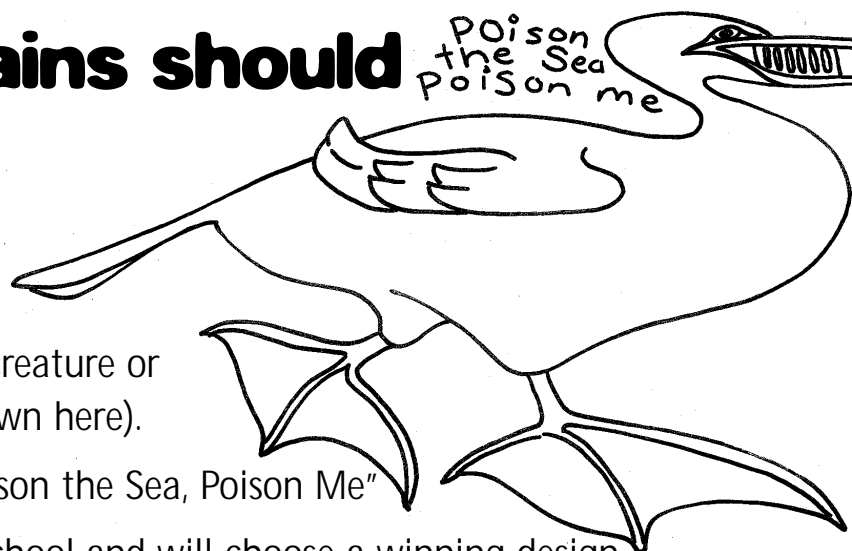
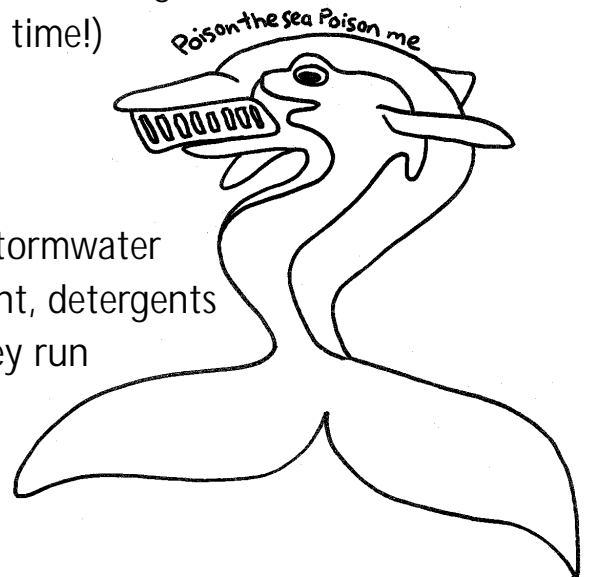
Nothing but clean rainwater should run into stormwater drains. If chemicals and wastes such as oil, paint, detergents or even food flow down stormwater drains they run directly into streams or the sea untreated - where you like to swim!

They can kill fish, shellfish, insects, plants and other living things.

## Stormwater drains should only drain rain!

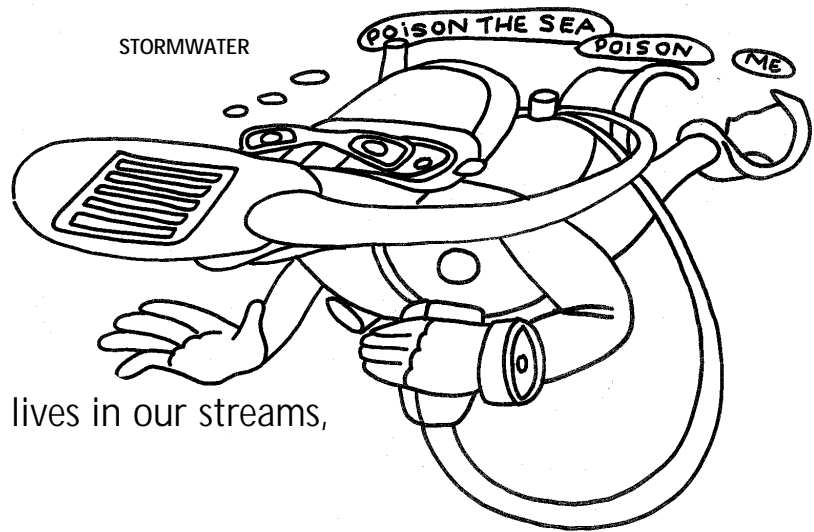
### What do you have to do?

- Create a design for a stormwater grate using a real creature or person (some examples are shown here).
- You must include the logo “Poison the Sea, Poison Me”
- ARC will accept 3 entries per school and will choose a winning design from each school.



## Your design should be:

- Eye catching
- Appealing to all ages
- Based on a real creature (why not choose one that lives in our streams, sea or harbours).



## The Prizes

- All winning designs will receive a certificate.
- For the most outstanding entries (5 per year) an artist will come to your school and work with you to paint a real stormwater grate. ARC will provide the paint.
- Entries close 1st October



ARC will help you educate the wider community about stormwater pollution by helping you to gain permission to paint your design at a local shopping mall, or in the car park of your local supermarket.

Send entries to: Environmental Education Co-ordinator  
Auckland Regional Council  
Private Bag 92 012  
Auckland

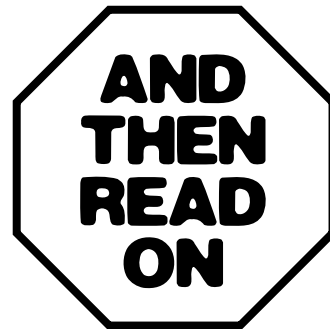
# I'm having trouble breathing!

## You? Having trouble breathing?

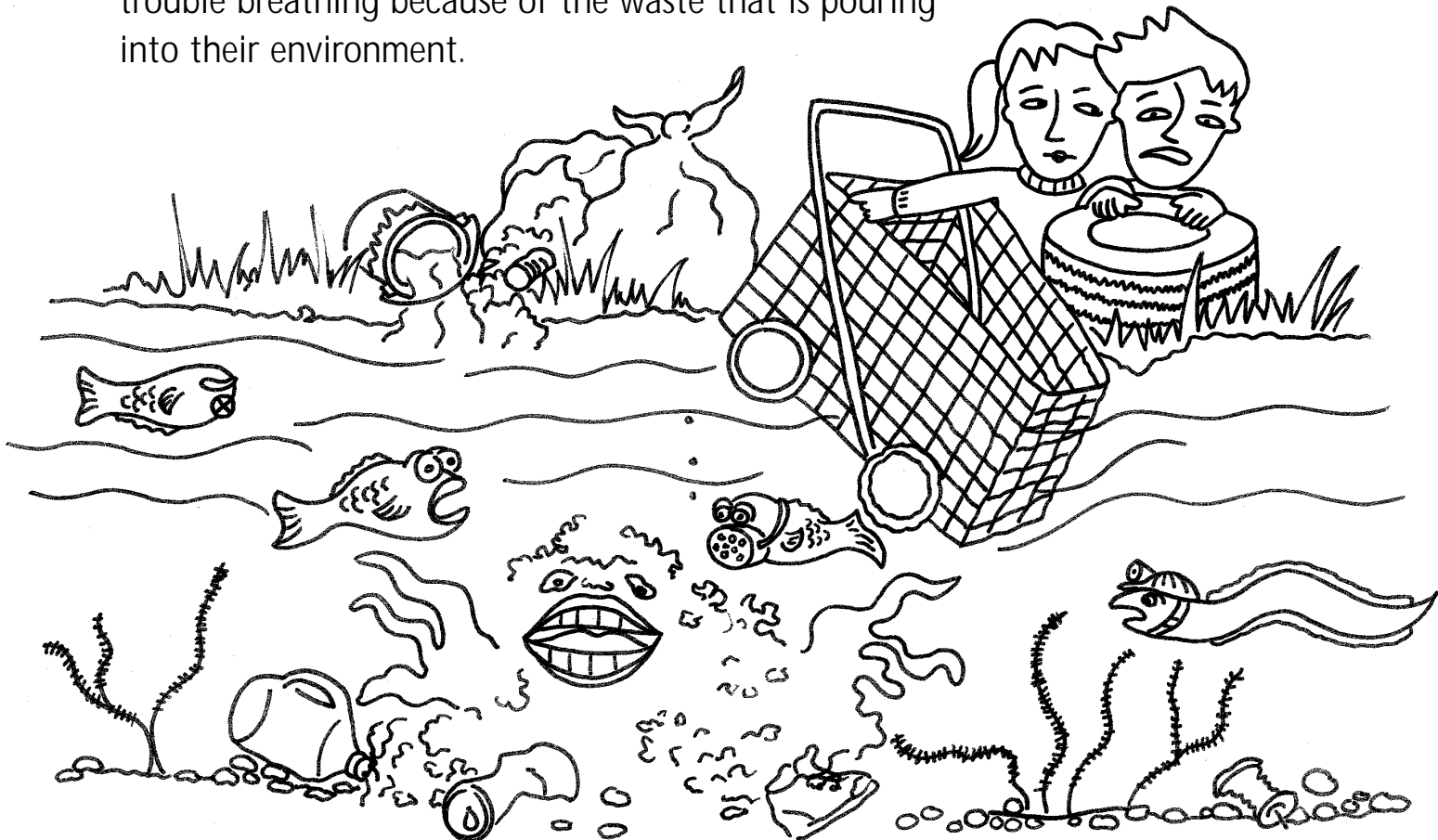
**See a Doctor**

**use an inhaler**

**get some fresh air!....and do it now....**



**What about the fish** and other creatures who live in our streams, harbours, estuaries, beaches and other waterways? Many of them are having trouble breathing because of the waste that is pouring into their environment.



## Check out this gruesome list.

Pollutant	The effect it has on living creatures
-----------	---------------------------------------

Fuels	<ul style="list-style-type: none"> <li>● Damages fish gills so they can't breathe</li> <li>● Poisons animals</li> <li>● Burns plants</li> <li>● Causes cancer in fish and shellfish</li> </ul>
Oil (and toxic substances in waste oils like sulphur and acids)	<ul style="list-style-type: none"> <li>● Creates a barrier that stops oxygen from getting in water</li> <li>● Causes serious damage</li> </ul>
Paint and ink	<ul style="list-style-type: none"> <li>● Poisonous to creatures who come into contact with them</li> <li>● Stops light from getting into the water making it difficult for plants to get the energy they need to make food and for animals to find food</li> </ul>
Food stuffs	<ul style="list-style-type: none"> <li>● Rot and decay in water using up all the oxygen, suffocating fish and insects</li> </ul>
Sediment	<ul style="list-style-type: none"> <li>● Reduces water clarity and interferes with vision, breathing and digestion</li> <li>● Fills the gaps between rocks in which some animals live</li> <li>● Affects the growth of plants, which can disrupt the food chain</li> </ul>
Detergents (even some claiming to be 'biodegradable' or 'environmentally friendly')	<ul style="list-style-type: none"> <li>● Can be toxic to fish</li> <li>● Remove oxygen from the water as they break down and suffocate the fish</li> </ul>

**PS This list is just a start - There's much, much more you could learn about what damage pollutants are causing.**

So, what do you think? Convinced that you need to do something to help?

Keep these facts in you head while you find

**'You're not too young to adopt'.**

# You'll be amazed!

## Yes you!

You'll be amazed at how much life exists in Auckland's small streams, creeks and drains. They might look grotty. They shouldn't smell or look bad but even if they do, they are home to:

---

### **And what about further downstream at the estuaries?**

They are 'home sweet home' (well maybe not so sweet to you) for:

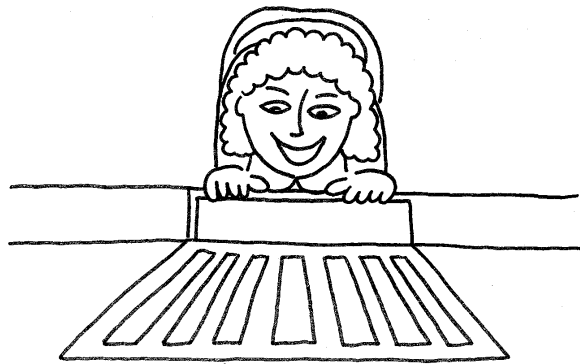
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### **and are the nursery grounds for:**

## **WORTH looking after?**



'You're not too young to Adopt' - page 48  
to see what you should do next.



worms

algae

freshwater  
crayfish  
(koura)

geckos

snails

shrimps

.....  
native fish like eels,  
bullies and kokopu  
(our own New  
Zealand trout)

insects (eg. mayflies)

plants

worms

.....  
a variety of birds

shrimp

cockles

frogs

oysters

crabs

mackerel

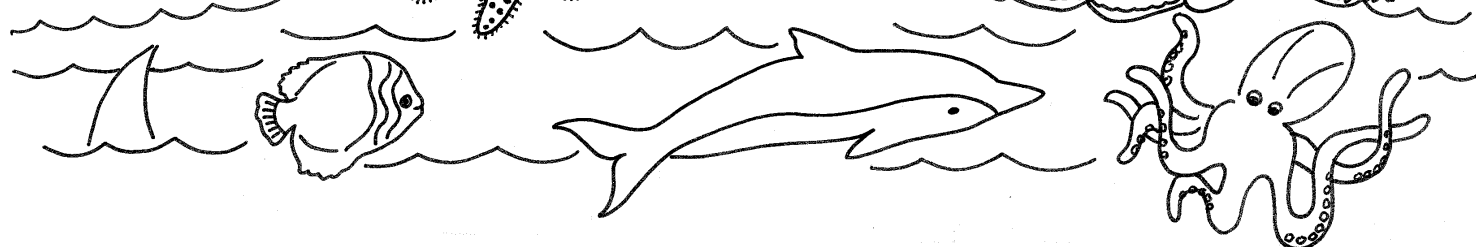
flounder

dogfish

kahawai

shark

snapper



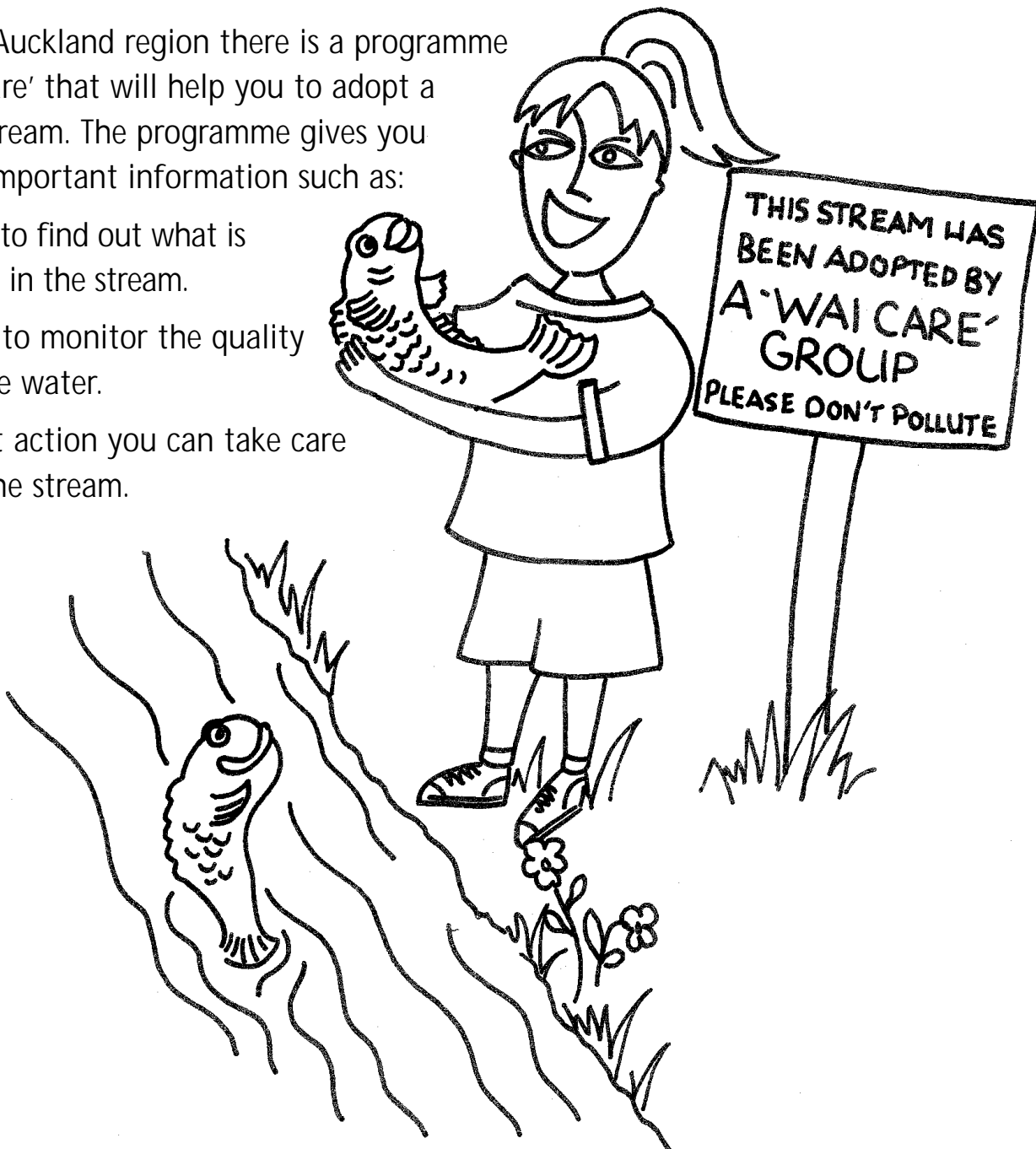
# You're not too young to adopt.

**You've read the information, now take things a bit further by doing one or more of the following activities.**

## ● **Adopt a local stream**

In the Auckland region there is a programme 'Wai Care' that will help you to adopt a local stream. The programme gives you really important information such as:

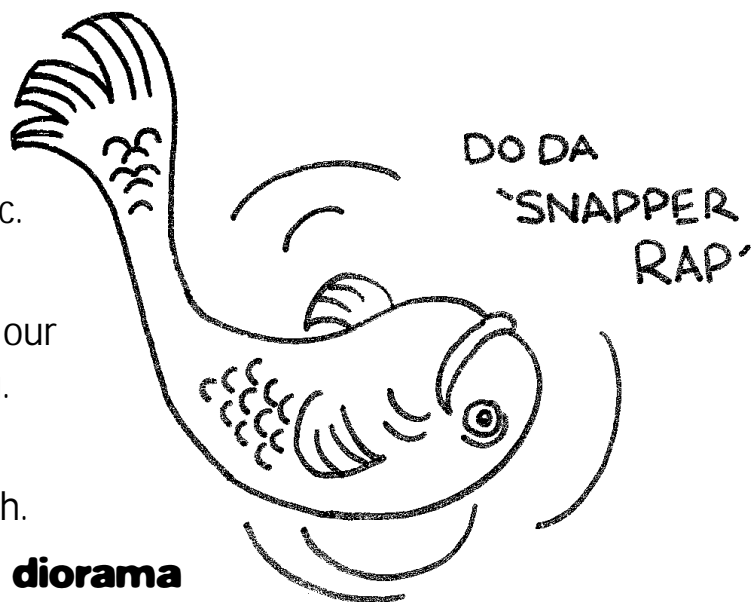
- How to find out what is living in the stream.
- How to monitor the quality of the water.
- What action you can take care for the stream.



# INTERESTED?

Get your teacher to sign up for the Wai Care programme at your local council or the Auckland Regional Council.

- **Complete an investigation**  
about one or more of the endangered species living in our streams. Present your work as a report, wallchart, video etc.
- **Create an amazing board game**  
that will educate others about the life in our streams and the problems they are facing.
- **Write and perform a rap**  
or song about the plight of our native fish.
- **Work with a friend to produce a diorama**  
'Life in our local Stream'.
- **Produce a video 'The Adventures of a Lonely Koura'.**  
Include the challenges the koura faces as its home becomes more and more polluted.
- **Create and perform a dance**  
about the effect polluted water is having on life in our streams.



# All power to the poster!

**Waitakere City Council has produced a magnificent poster**

## Simple Steps to ...Keep our Streams Clean

Here are some simple steps for you to take:

**Step one**     **LOCATE** the poster (included in this resource).

**Step two**     **LOOK** closely and carefully at the poster.

**Step three**   **MAKE** a list of all the negative (harmful / wrong) things you see happening to the environment on the left-hand side of the poster.

**Step four**    **MAKE** a list of all the positive (helpful / good) things you see happening to the environment on the right-hand side of the poster.

**Step five**     **CREATE** an Environmental Care Code for our streams using the information from the two lists. This will be about the positive things we need to do to keep our streams clean and healthy. Think carefully about the strong messages you want to give people who will read your care code.

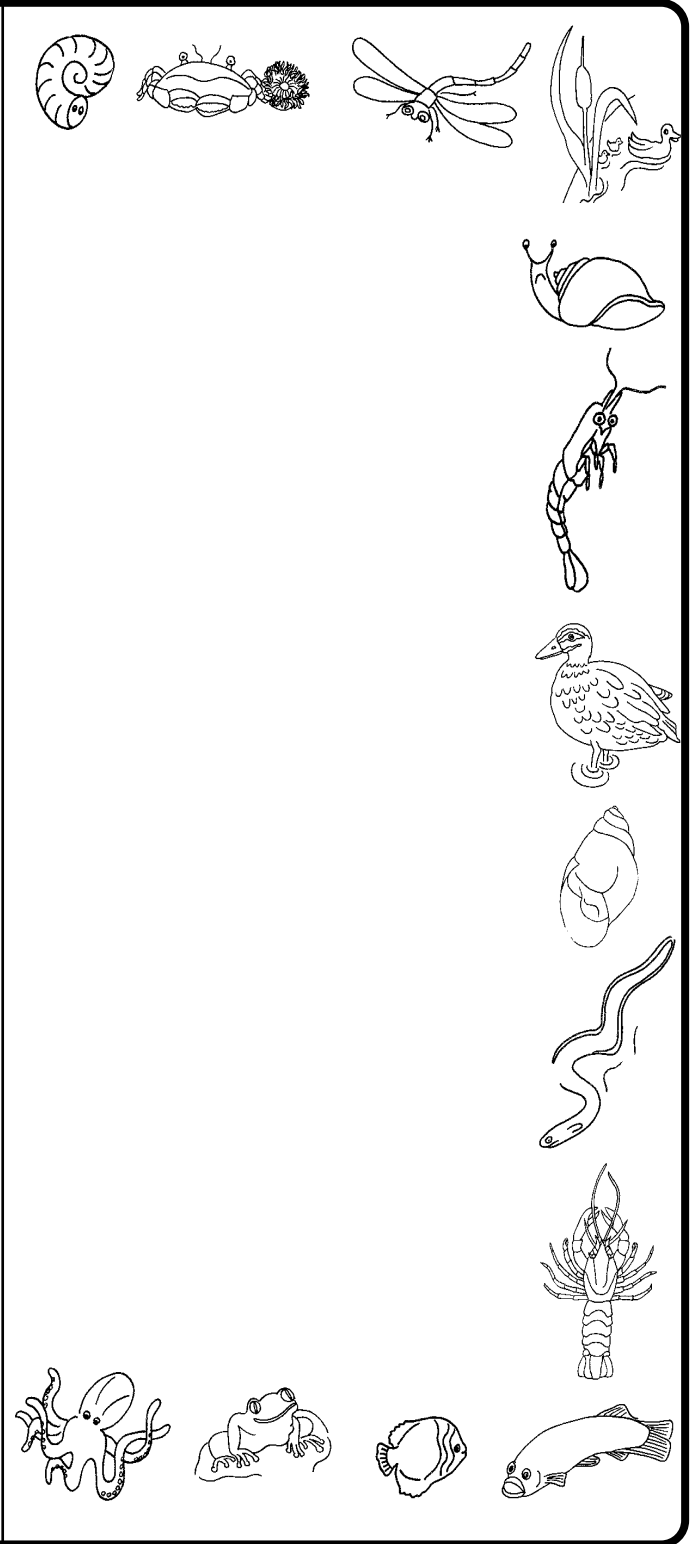
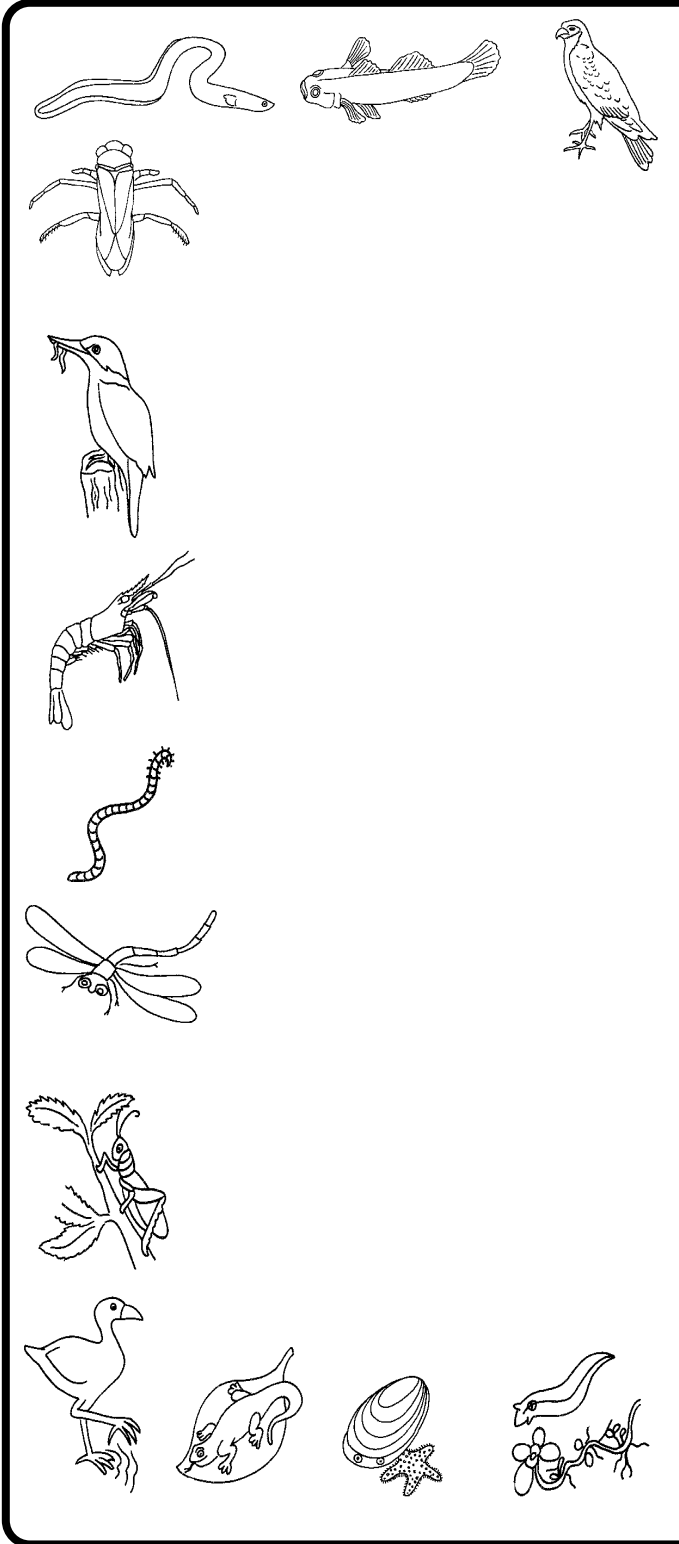
**Step six**      **DECORATE** the border of your Environmental Care Code (E.C.C) with pictures of some of the amazing creatures that live in our streams (no you are not included this time!).

**Step seven**   (and maybe the most important step!)  
**DISPLAY your E.C.C in a public place.**

**Step eight**    Give yourself some time out for a job well done (but not too much).

**NEGATIVE**  
harmful - wrong

**POSITIVE**  
helpful - good



# Get out your white coat and scientific thinking hat

(Your teacher will probably give you further instructions about this activity).

## Pollution - it all adds up!

Your task is to observe what happens when pollutants are gradually added to water.

### YOU WILL NEED



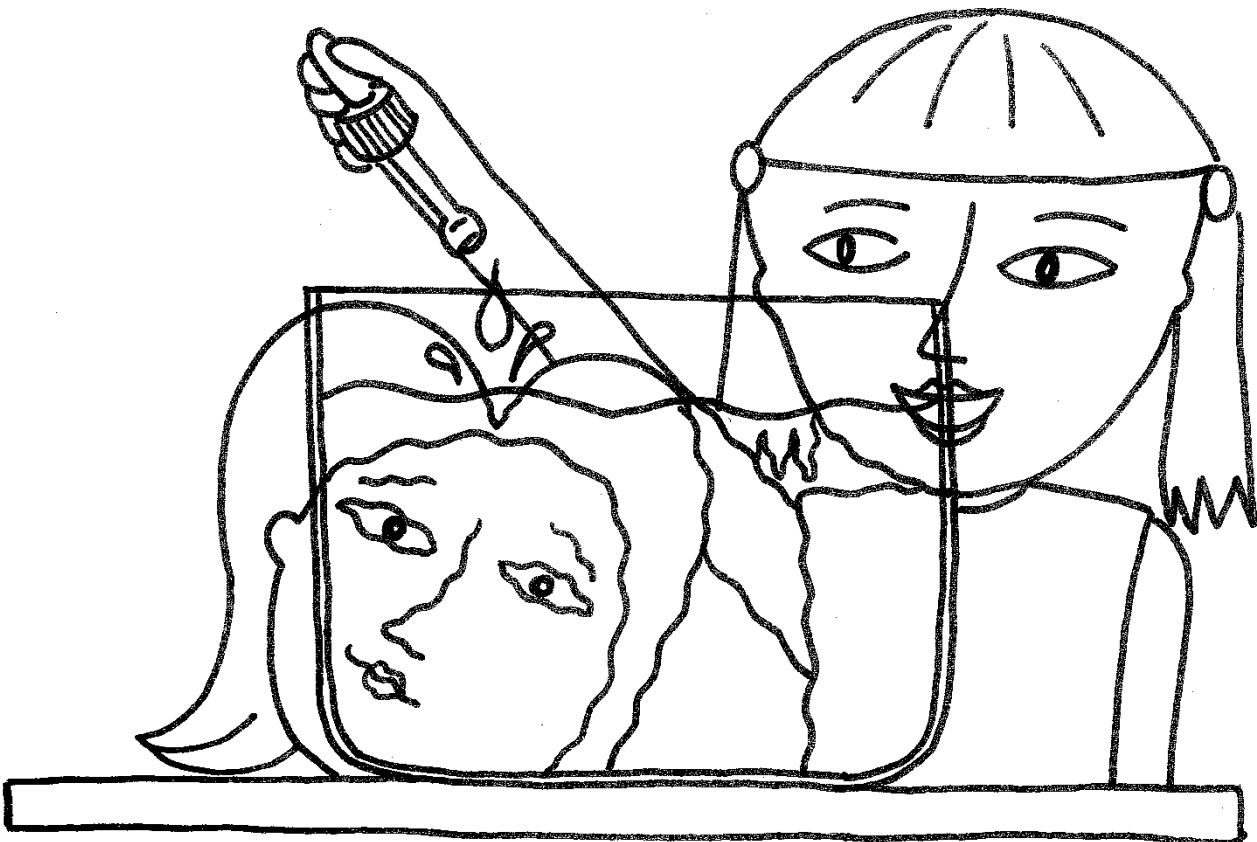
- a small group to work with (this could be done as a whole class activity)
- a range of pollutants e.g. oil, detergent, litter, grass clippings, food scraps
- coloured dye
- eye dropper
- mixing spoons
- a large glass bowl / aquarium
- 10 days
- a method of recording your observations

**WHAT YOU  
NEED TO DO** ➤

- Predict what you think will happen as pollutants and coloured dye is added to the water.
- Gradually add the pollutants to the water over a 10-day period.
- Every day each group member should add one drop of dye.
- Monitor what happens. Note changes to colour, smell and water clarity.
- Present your observations.
- Complete your work by using your observations to form a statement about the consequences of the gradual pollution of our streams and waterways.

**REMEMBER** ➤

- Deal with the waste materials properly when you have finished with them.



# A little bit doesn't matter...or does it?

## YOU WILL NEED

- A photocopy of this activity
- A pencil
- Multiplication facts at your fingertips!

Some people don't worry too much about putting pollutants down their stormwater drains because they see it as only a small amount. (These people need to be reminded about multiplication).

Sad to say, the small amounts add up to a **Critical Number**, when just one bit is just one bit too many.

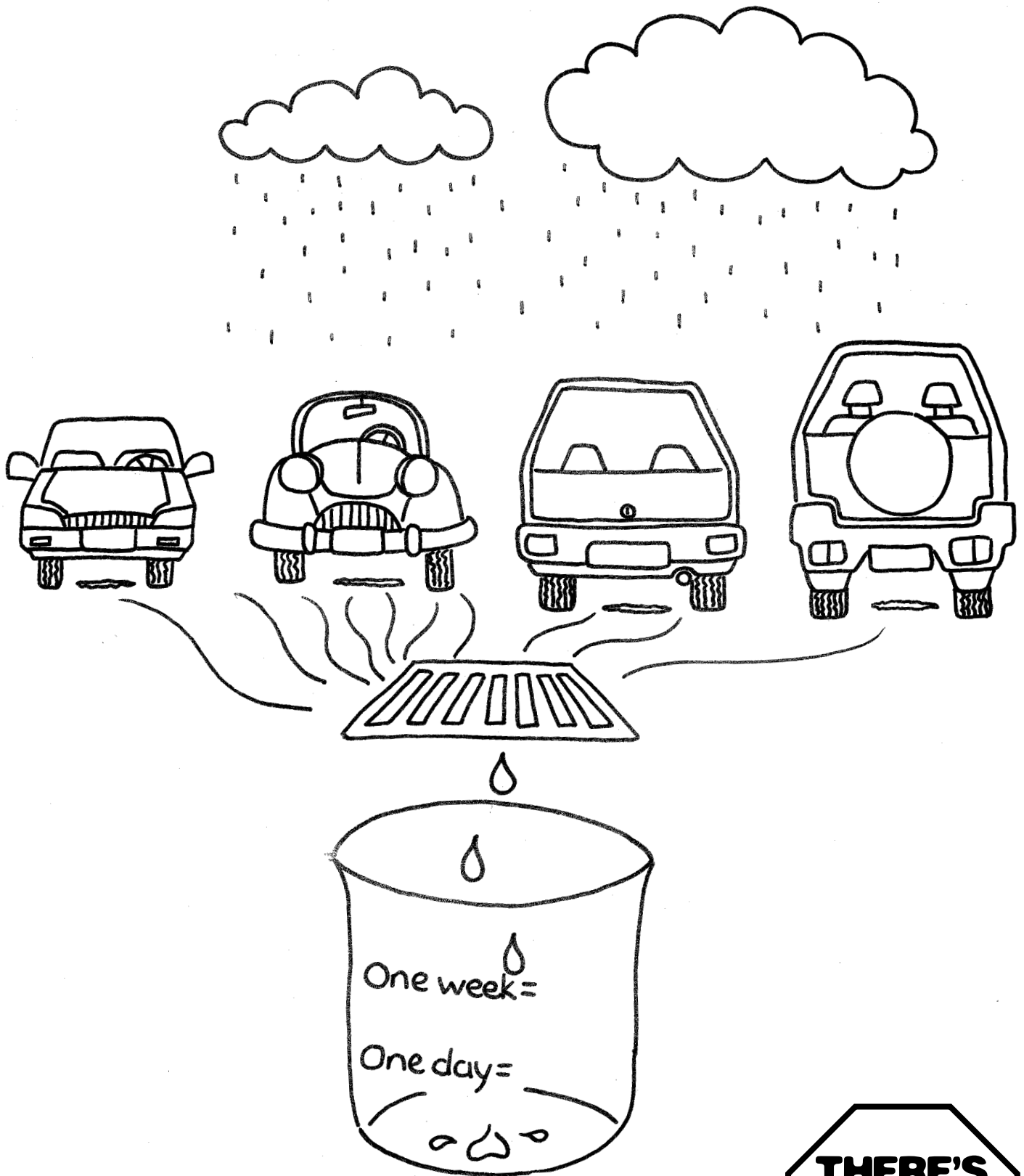
## How's your maths? Try these for size.

### Drip, drip, drip.

There are 17 cars parked in a school carpark. Each car leaves 5 drops of oil each day. (When it rains heavily this oil will be washed down a stormwater drain).

- What is the total number of drops of oil each day from these cars? \_\_\_\_\_
- What is the total number of drops of oil in one week? \_\_\_\_\_
- If there are 197 days in the school year how many drops of oil will have been left in the carpark? \_\_\_\_\_
- Work out how many litres of oil this might be? (Happy dripping!) \_\_\_\_\_

STORMWATER



**THERE'S  
MORE IN  
PART TWO**

# A little bit doesn't matter...or does it?

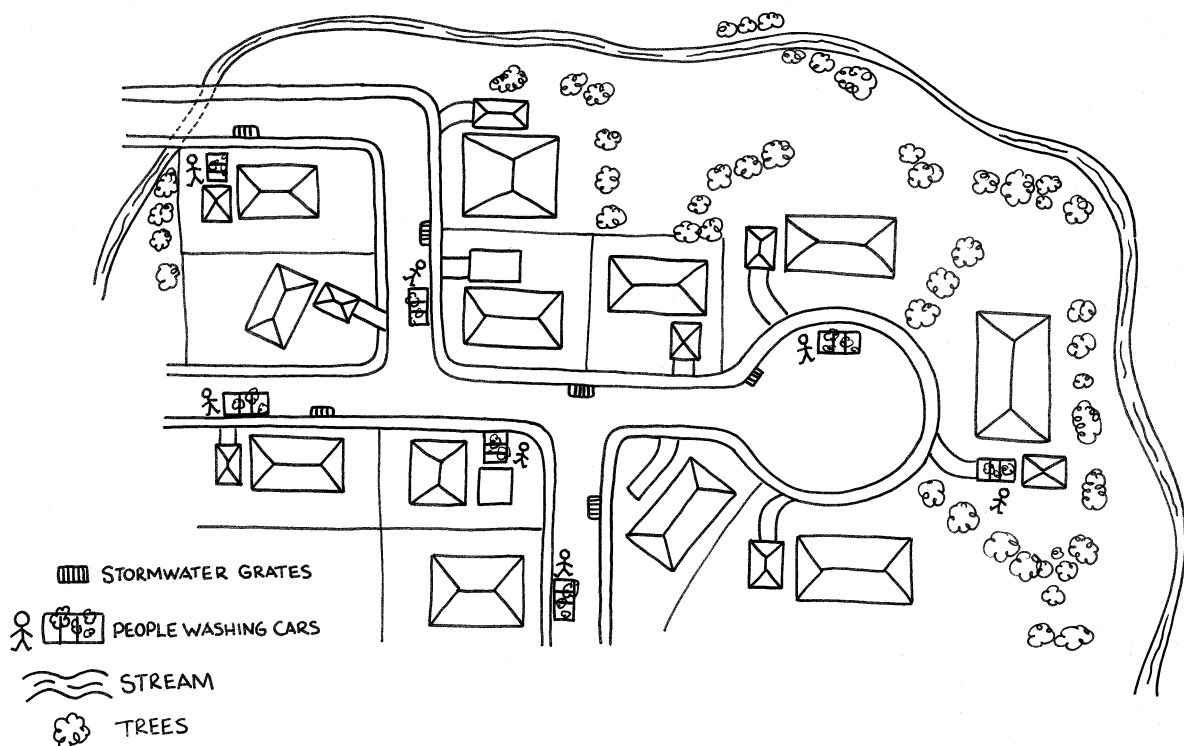
## Part Two

### Car Wash Valley

Joanna Bloggs uses 8 litres of soapy water to wash her car in the driveway. She knows it will run down the driveway, into the gutter and down the stormwater drain but she's not too worried because, after all it's only a couple of buckets of water.

Joanna Bloggs should be worried, she should be very, very worried because she is not alone. In Joanna's street that afternoon 3 other people are doing the same thing.

- How many litres of soapy water will they put down the stormwater drains in one afternoon? \_\_\_\_\_
- There are 25 streets in Joanna's suburb.  
In each street 4 people are washing their cars on the roadside or in their driveway.  
How many litres of soapy water from this suburb? \_\_\_\_\_





## Are you getting the picture?

Every little bit of pollution we put down the stormwater drains does matter because that little bit is multiplied again and again and again! Sooner or later the environment just won't be able to cope anymore.

- When your local stream or creek reaches that **critical number (when just that bit too much pollution has been added)** it will eventually die, along with the plants and the creatures that live there.
- When your favourite beach reaches that **critical number (when just that bit too much pollution has been added)**, plants and animals will struggle to survive and may eventually die. And you? Well, you won't be able to swim there unless you want to run the risk of getting sick!

**Isn't it worth doing something about it?**

# How do you spell Stormwater?

**S** Sea life is suffering terribly because of polluted water coming down the stormwater drains. Research to discover the impact on one species.

**T** The Auckland Regional Council has a 24-hour Water Pollution Hotline. Find out what this number is and design a sticker for displaying on the fridge at home.

**O** One litre of oil can cover 100m<sup>2</sup> of water. Measure out this distance on the rugby field to see the disastrous impact an oil spill can have.

**R** Remind people in your neighbourhood of the correct way to get rid of waste products by producing and delivering a Waste Disposal Information list.

**M** Make a magnificent mobile of what NOT to put down a stormwater drain.

**W** Write and record / perform a funky advertisement that will get the message about stormwater drains across to an age group of your choice.

**A** Anti-pollution posters should be hard hitting and 'in your face'! Design and display one about the stormwater drains issue.

**T** The Internet is an excellent way of educating people about issues. Design a brilliant page about stormwater drains that will attract millions of hits.

**E** Everyone loves to swim in clean water. Make up an Environmental Care Code to help keep our beaches, rivers, streams and harbours clean.

**R** Read as much as you can about stormwater issues. List the facts and decide what action you are going to take to help.