POLLUTION BUSTERS CLUB

WATER

ISSUE 49 - DECEMBER 2011

Tēnā koutou e hoa ma

Hello pollution busters! We hope that you showed New Zealand how much you loved it during Conservation Week and enjoyed the Rugby World Cup with whanau and friends.

We had some great entries for the design a sticker competition – check out the winner on the Club page.

In this issue we are going to look at water, water pollution and the effects it has on our environment and wildlife.

Our competition is a quiz on page 11. Thank you to all the Pollution Busters and Parents who took the time to return our survey, there was some great feedback that will help us make this newsletter even better!

BuzzBOP and the team hope you have a really good holiday break and remember to send us your stories and photos to feature in the 'Club Page'.

See you in 2012!

"Kia u, kia ngakaunui ki nga mahi pai"
Be steadfast and conscientious in all your good work.

From BuzzBOP and the team at
Bay of Plenty Regional Council.

Bay of Plenty Regional Council
Freepost 122076, PO Box 364, Whakatāne 3158
Email: buzzbop@boprc.govt.nz

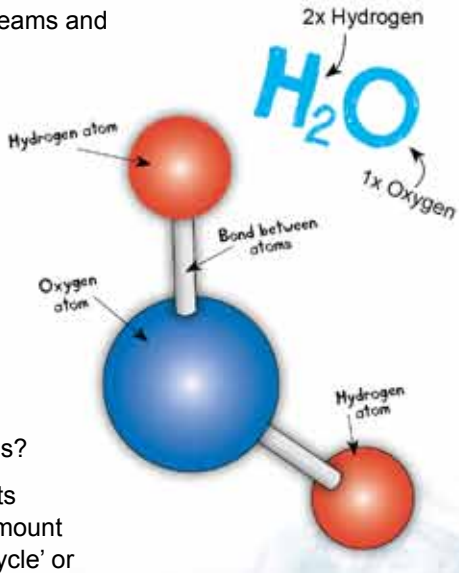
Bay of Plenty REGIONAL COUNCIL

WATER!

Water is one of the most important natural resources and is essential for all living things. We need water to drink, to cook with, to wash our hands, to water plants and many other things. Water is also great to have fun in or on! (like swimming, paddle boarding, surfing, water skiing or donuting!).

Water is everywhere - lakes, rivers, streams, glaciers, oceans; and it covers about 70% of the earth's surface!

In the Bay of Plenty we are lucky and have lots of natural waterways like lakes, rivers, streams and beautiful beaches by the ocean. But… 'what is water' and 'where did it come from'?



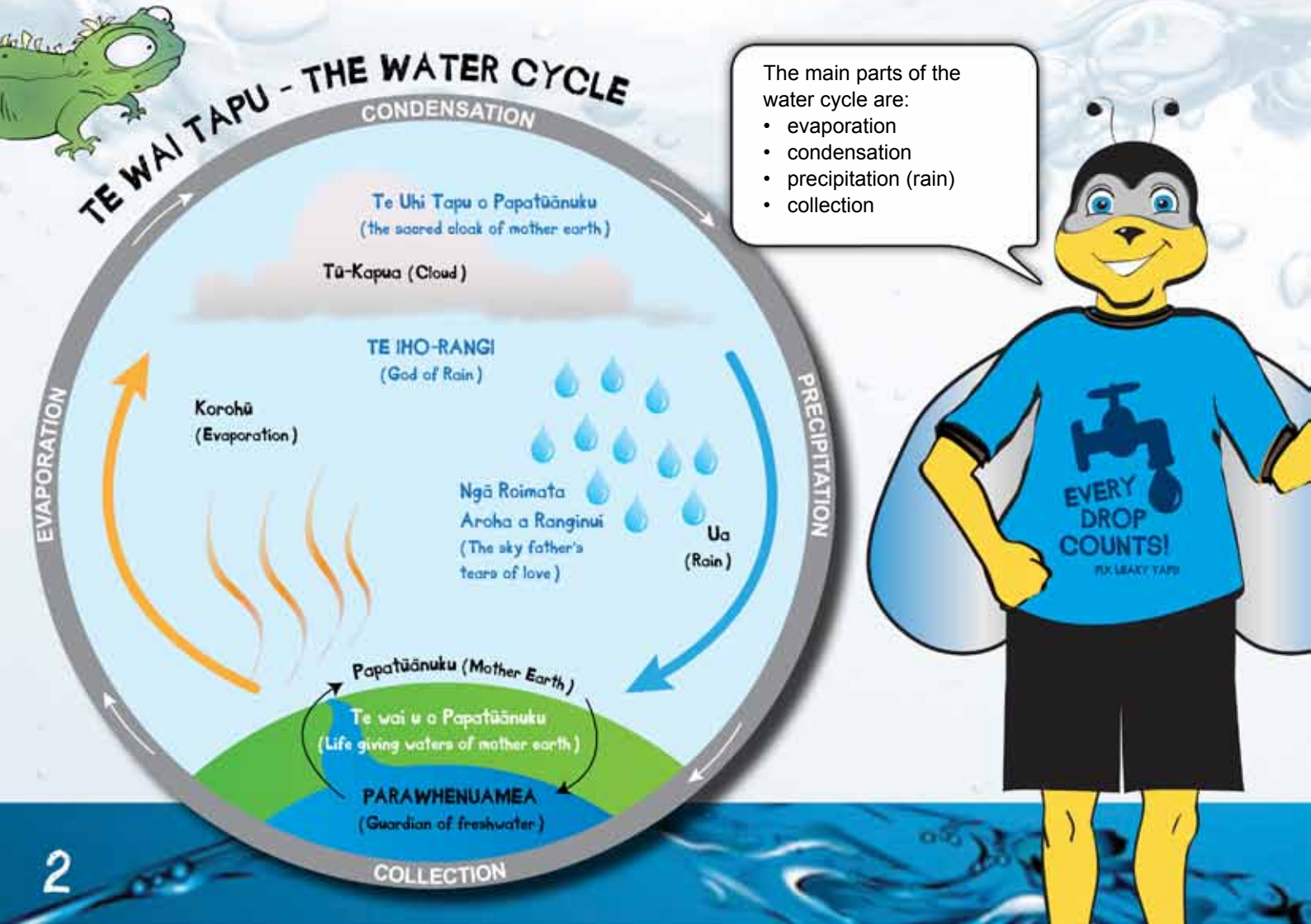
What is water?

Sometimes when people talk about water they call it H_2O. Do you know why? H_2O is the chemical formula for water. It is a basic molecule made up of two hydrogen atoms and one oxygen atom. When they come together they form a strong bond that is really hard to break. They are joined together so strongly the water molecule stays together for millions and even billions of years!

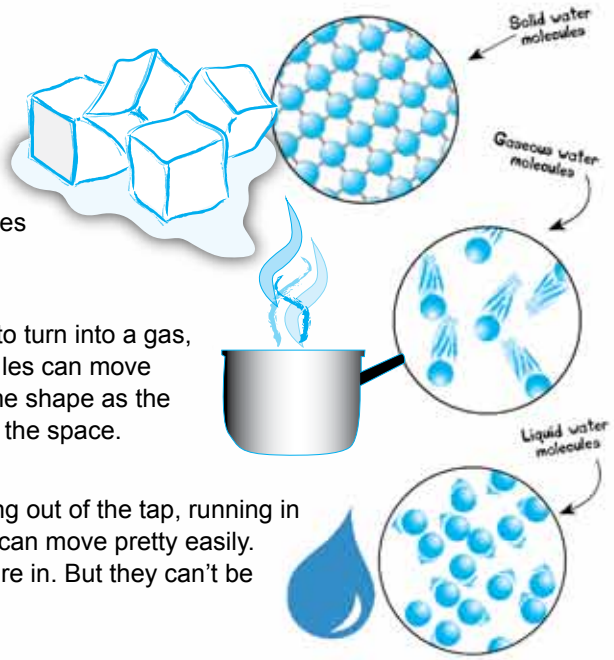
Where does it come from?

Next time you are having a glass of water have a good look at it - how old do you think it is?

It might have just come out of the tap, or fallen from the sky as rain last week but scientists believe it has actually been around as long as the earth has! There is always the same amount of water on the earth. That water keeps going round and round what we call 'The water cycle' or 'Te wai tapu'. That means that the water in your glass could have once been part of the ocean, or a stream that the dinosaurs used to drink from. That makes the water in your glass pretty old!



States of water



Solid water – it's called ice.
Ice and snow are examples of water in its solid state. When water is solid the molecules can't move very much. So they stay in the same shape unless a powerful force – like heating or crushing changes them.

Gaseous water – it's called 'water vapour'.
Steam is an example of water in a gaseous state. Water evaporates to turn into a gas, it's colourless and odourless and floats in the air. In a gas the molecules can move more easily, that's why if the gas is in a container it becomes the same shape as the container. The molecules can squash together or spread out to fill up the space.

Liquid water – it's called 'Water'!
Liquid water is found in lots of places. You can see liquid water coming out of the tap, running in a stream, falling from the sky as rain. When it's liquid, the molecules can move pretty easily. This is why liquids flow and take up the shape of the container they are in. But they can't be squashed or expanded by force like gaseous water can be.

ACTIVITY

SEE THE WATER CYCLE IN ACTION!

You will need:
- large clear glass bowl
- a small bowl
- cling film e.g. glad wrap
- a weight e.g. pebble

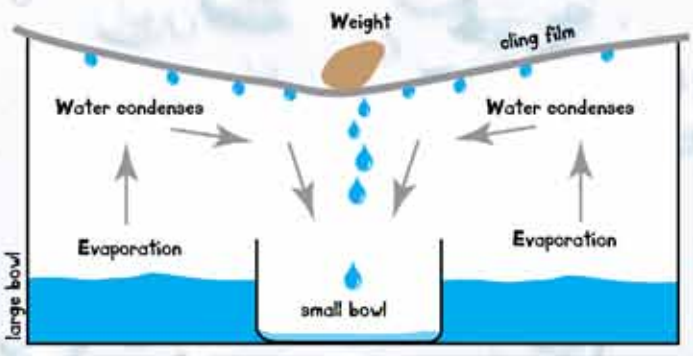
1 Put some water into the large glass bowl

2 Place the small bowl carefully in the centre of the large bowl (don't get any water in it!)

3 Cover the top of the large bowl with cling film so there are no gaps. Don't pull it too tight.

4 Place a weight in the centre of the cling film so the film sags in the middle.

5 Place the bowl in direct sunlight and leave it for a few hours. What do you think will happen?



Here's what should happen:
The sun will heat the water in the bowl causing it to ***evaporate*** *into water vapour. This will then rise, hit the cling film, cool and then* ***condense*** *forming water droplets. The droplets will continue to collect on the cling film until they become too heavy to stay there. They will then drip down and fall* ***(precipitation – rain)*** *into the small bowl* ***(collector)*** *in the centre. The weight is there so there is a sloping surface for the water to drip down and guide it into the smaller bowl.*

GLOSSARY

Molecule – a structure consiting of two or more atoms bound together.
Hydrogen – a gas that has no colour or smell and is lighter than air.
Atom – smallest part of an element.
Evaporation – the process of changing from a gaseous to a liquid or solid state.
Condensation – the process of changing from a gaseous to a liquid or solid state.
Precipitation – rain, snow, or hail, all of which are formed by condensation of moisture in the atmosphere and fall to the ground.
Collection – a group of things or people together in one place.

MĀORI AND WATER

In Māori culture, water is the life-giver, it represents the blood of Papatūānuku, the Earth Mother, and the tears of Ranginui, the Sky Father. Waterways are home to many taniwha (spiritual beings) that look after the people and ensure their physical and spiritual protection.

Ngā momo wai – types of water

Ngā momo wai is the Māori perspective of types of water. The types of water are based on spiritual and geographical features.

Waiariki - Collective term for geothermal hot water. Water of the gods.

Wai horoi - Water that is used to bathe in or to wash clothes, or other personal possessions.

Wai inu/Wai unu - Water that is used only for drinking. Drinking water is not usually taken from a place where washing is done.

Waikino - Water that has been polluted and can cause harm or water that conceals hidden danger.

Wai makariri/Wai matao - Cold water, mainly cold fresh water.

Waimāori - Water that runs freely and has no particular qualities. Ordinary water.

Waimate - Water that has lost its 'mauri' or life force. It is "dead", damaged or polluted with no ability to sustain life.

Waiora - Purest form of water, a source of well-being and life. Used for cleansing from sickness and to create positive energy.

Waipiro - Slow moving, slack water, often water that smells, such as repo (swamps). These waters are still able to provide many resources such as rongoa (medicine), dyes for weaving harakeke and tuna (eels) for kai and homes for many living organisms.

Waipuke - Flood or flood waters

Wairere - Waterfall

Waitai - The sea, surf or tide. Used to distinguish seawater from fresh water.

Waitapu - Water that has had a 'tapu' imposed upon it. Water that is used for special ritual practices, or has had a tapu placed on it because someone has died there recently.

ACTIVITY

Can you match the photos to the types of water?

1. Waimate
2. Waipiro
3. Wairere
4. Waikino
5. Waipuke
6. Waitai

The Māori word for water is wai.

There are many rivers with names that begin with the word wai (water), like Waikato (flowing water) and Wairarapa (glistening waters).

Can you think of any others?

Answers: 1B, 2A, 3D, 4F, 5C, 6E

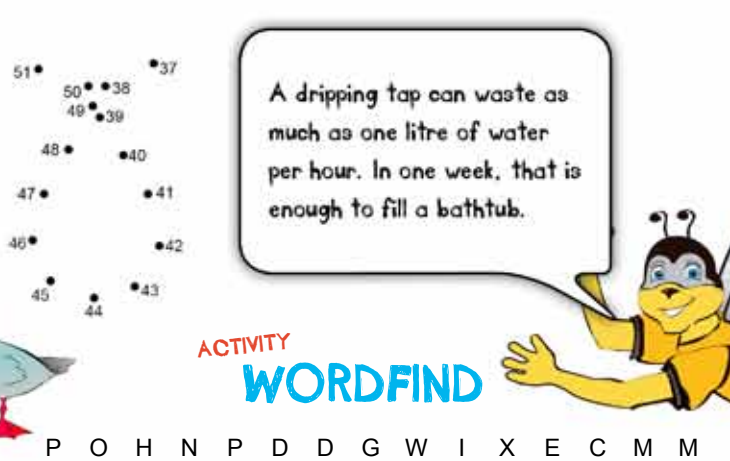
Watery facts

Did you know:

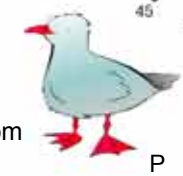
- 70% of the earth's surface is water.
- An elephant can smell water five kilometres away.
- 60% of household water is used to flush toilets or take baths and showers.
- Almost all the freshwater on earth is frozen in huge blocks of ice or glaciers.
- A person can survive without food for more than 30 days but less than a week without water.
- Brushing your teeth with the tap running wastes almost nine litres a minute. Rinse out from a glass instead.
- The longest river in the world is the Nile in Africa – it is 6670 kilometres long (that is about four times the length of New Zealand!)
- A rat is the animal that can last the longest without water.
- A seagull can drink saltwater as it has special glands to filter out the salt.
- The worlds biggest icebergs are about 100km wide! - thats about the same distance from Ohope to Tauranga!
- About 70% of our bodies are made of water.
- The smallest ocean is the Arctic Ocean and the biggest is the Pacific Ocean.
- Water boils at 100°c.
- Water is actually blue when there is enough of it. It looks clear in a glass but from space it's definitely blue!
- Water expands 10% when it freezes, making it less dense, that's why ice floats on water.
- Water regulates the earth's temperature - and the temperature of the human body! In the body it carries nutrients and oxygen to cells, cushions joints, protects organs and tissues and removes waste.
- The heaviest hailstones weighed one kilogram (that's the same as two packets of butter). They fell in 1986 in Bangladesh.
- Flowing water can dissolve solid rock.
- The sea contains 97% of the earths water.

ACTIVITY

DOT-TO-DOT



A dripping tap can waste as much as one litre of water per hour. In one week, that is enough to fill a bathtub.



ACTIVITY

WORDFIND

P	O	H	N	P	D	D	G	W	I	X	E	C	M	M
Q	R	I	Y	I	O	L	I	C	C	V	R	O	O	I
L	A	E	U	D	A	B	E	M	A	J	U	N	I	S
R	A	Q	C	C	R	L	Z	P	U	M	O	D	S	T
N	I	K	I	I	R	O	O	Z	P	H	P	E	T	Y
L	O	E	E	O	P	R	G	Y	U	O	A	N	U	S
C	R	I	E	B	A	I	J	E	B	B	V	S	R	Y
C	U	W	T	T	A	J	T	E	N	G	H	A	E	A
R	Q	X	I	C	S	L	L	A	F	R	E	T	A	W
M	I	O	L	D	E	U	W	A	T	E	R	I	O	R
O	N	V	R	K	C	L	J	Y	X	I	P	O	C	E
T	J	I	E	E	H	G	L	R	A	X	O	N	E	T
A	P	O	L	R	H	S	N	O	W	U	Z	N	A	A
S	C	O	N	D	E	N	S	E	C	M	F	Z	N	W
W	M	Z	N	Y	S	U	O	E	S	A	G	P	B	A

ATOM
BUZZBOP
COLLECTION
CONDENSATION
CONDENSE
DRIPS
EVAPORATION
GASEOUS
GLACIER
HUMID
HYDROGEN
ICE
LAKE
LIQUID
MIST
MOISTURE
MOLECULE
OCEAN
PRECIPITATION
RAIN
RIVER
SNOW
VAPOUR
WATER
WATERFALLS
WATERWAYS

WATER POLLUTION

Water pollution can come from lots of different sources. Water pollution is bad because it harms our health and the natural environment's health.

Types of water pollution:

Nutrient pollution – when there are too many nutrients in the water, usually from waste water, or fertilisers.

Microbiological pollution – viruses or bacteria in the water.

Oxygen depleting pollution – too much biodegradable material which increases the organisms that use up all the oxygen so other things can't live.

Suspended matter pollution – things that don't dissolve or disperse in the water.

Chemical pollution – chemicals that enter the water.

What causes water pollution?

Wastewater and sewerage – Households, industry and agriculture produce wastewater that can cause pollution.

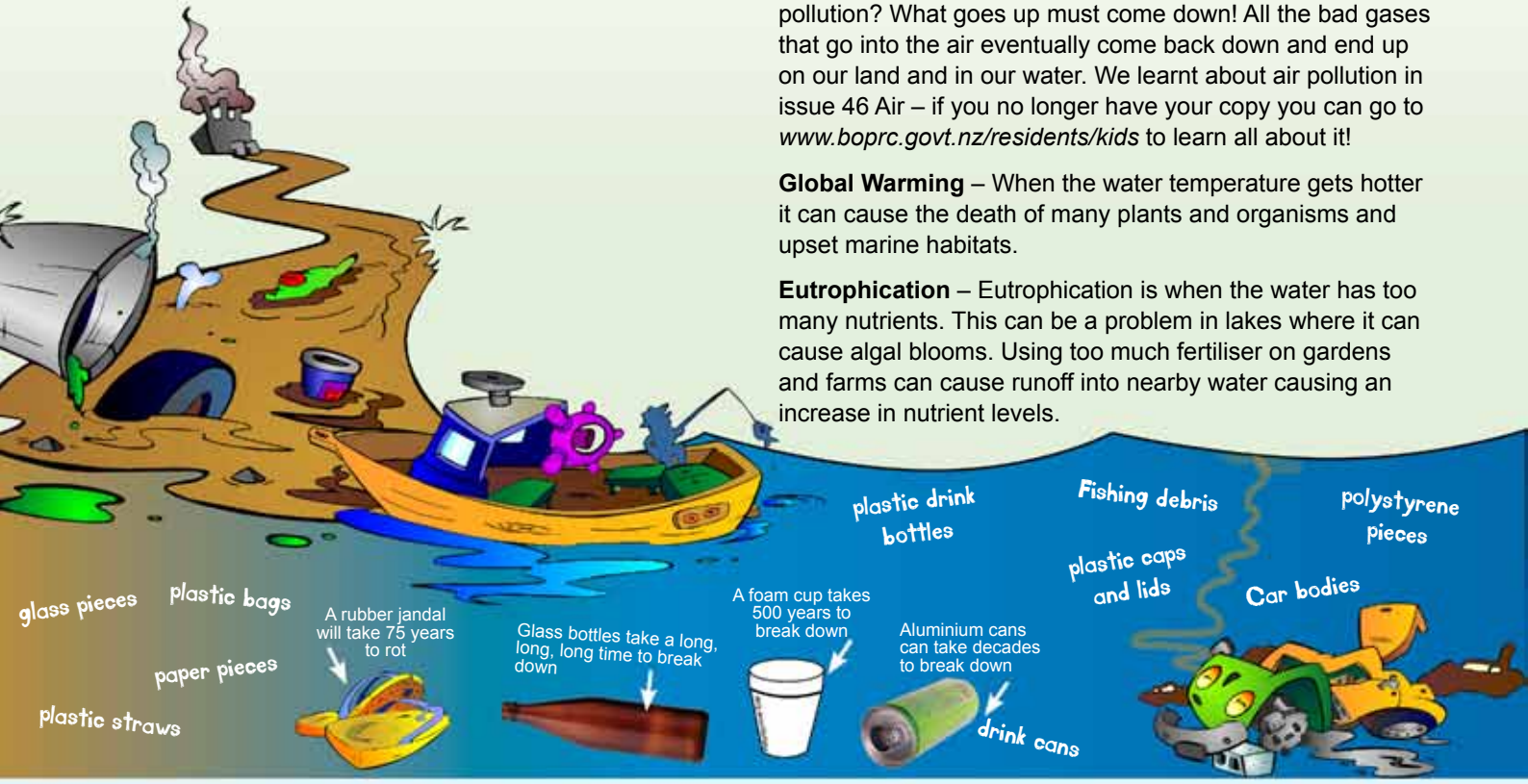
Marine dumping – Dumping of rubbish in the sea can cause huge problems (this can come from fishermen and bait bags, fishing line, or from litterbugs in town! – We will learn more about that when we look at stormwater pollution!). Look at the image below and how long it takes some things to degrade in the ocean.

Oil pollution – Oceans are polluted by oil every day from oil spills, normal shipping/boating activities, run-offs and dumping.

Atmospheric – Is the pollution of water caused by air pollution? What goes up must come down! All the bad gases that go into the air eventually come back down and end up on our land and in our water. We learnt about air pollution in issue 46 Air – if you no longer have your copy you can go to *www.boprc.govt.nz/residents/kids* to learn all about it!

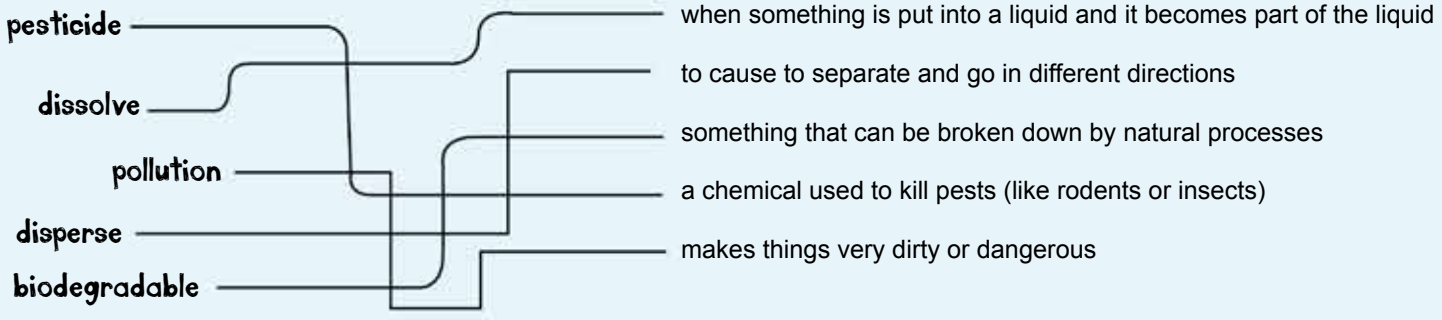
Global Warming – When the water temperature gets hotter it can cause the death of many plants and organisms and upset marine habitats.

Eutrophication – Eutrophication is when the water has too many nutrients. This can be a problem in lakes where it can cause algal blooms. Using too much fertiliser on gardens and farms can cause runoff into nearby water causing an increase in nutrient levels.



ACTIVITY

Follow the lines to find the word meanings



Storm water pollution

In the Bay of Plenty at the moment we have the oil spill polluting our water and we will look at that on the next page, but normally the main reason that our rivers, streams, lakes and beaches get dirty is from the water and other pollutants that flow into storm drains.

We call it 'storm water pollution' and it goes into our streams and rivers and eventually ends up in the sea.

So what is storm water pollution?

Storm water is the water that runs down the streets when it is raining. Storm water goes into the holes in the sides of the road called storm drains. Water that flows down the street when it is not raining, like if you wash your car on concrete or the roadside is called 'urban runoff'. After storm water or urban runoff enters the drain it flows to the nearest stream, beach or river so our streets don't flood. This means that any pollutant that gets carried away by the water goes there too – like, soaps, dirt, oil, chemicals, litter.

Common types of storm water pollution

- Chemicals like oil, pesticides, cleaners, chlorine and fertilisers can harm the animals, insects and plants that live in the water, and make people sick when it gets into our waterways where we play (like rivers and oceans).
- Too many leaves and grass clippings can take the oxygen out of water. This suffocates the plants and animals who need oxygen to breathe. (Oxygen depleting pollution)
- Pet waste is very harmful to our water, it has dangerous bacteria that can spread diseases to plants, animals and humans that swim in the dirty water. (Microbiological pollution)
- Soaps and detergents (just like too many leaves and grass clippings) can take oxygen out of water and suffocate plants and animals. They can also harm the slimy layer that protects fish against diseases and bacteria.
- The litter left on the streets is not nice to look at and it pollutes our water and can make animals sick.

ACTIVITY

Can you colour in and see how many different things in the picture could enter the storm drain and pollute our waterways? Are there any others that you can think of?

There are lots of little things at home that you and your whanau can do to prevent storm water pollution. Some are listed below but are there any more? Let BuzzBOP know if you think of any others.

- If your car is leaking oil, ask mum or dad to get it fixed
- Don't let water full of pollutants like soap, litter, grass clippings or chemicals run down the road and into drains
- Wash the car on the grass – the grass and soil will soak up the water and filter out the dirt and grime

Oil pollution

In the Bay of Plenty the sea is used by lots of people in many different ways – we use it for fun like swimming, sailing, fishing and surfing, to collect kai like shellfish, and as a way to transport goods in ships that travel around the New Zealand and overseas from Tauranga's busy port.

All of these uses are a part of our life in the Bay but they put a big demand on our marine environment. As we have just experienced accidents can and do happen.

We are sure that you have heard about the container ship Rena, the large amount of oil spilled and the marine debris from the containers lost overboard. An oil spill is a big problem because so much oil is spilt in one place. It cannot dissolve in the water and forms a thick sludge. This can suffocate the fish, cover the feathers of birds stopping them from flying and swimming, and it blocks the light from aquatic plants. It's also really stinky and yucky and not good for us or our pets when we are at the beach!

How does the oil travel?

Oil spills in the sea spread quickly and it moves with the tides and currents as well as the wind. Oil will move at the same speed as the water carrying it.

DID YOU KNOW?

Oil spills like Rena make up about 12% of the oil that enters the ocean. The rest come from shipping travel, drains (storm water pollution) and dumping.

RENA

Early in the morning on 5 October the Rena Cargo ship hit the Astrolabe Reef off the Tauranga coast. Some oil spilled into the ocean and washed up on the beaches. There were heaps of volunteers helping clean up the mess and care for the birds that got oiled. Luckily most of the oil is now off the ship and they are taking off the containers.

Rena by numbers

2.20 am the Rena hit the Astrolabe Reef

236m long cargo vessel

1712 tonnes of oil on board when it grounded

350 tonnes lost overboard at the start

Over 1000 tonnes of fuel recovered (that is great – now it won't end up on the sea!)

1368 containers on board, 88 containers lost overboard.

1000+ people in the oil spill response team

approximately **8,000** volunteers registered

approximately **1,000** tonnes of waste collected from beaches

Top: Booming operations underway with Rena and support vessels in the background - 24 October, losing containers as heavy swells wash her deck, Debris from containers that have toppled off the stricken Rena. Bottom: Oil on beach, NZ Defense Force personnel continuing with cleanup operations on the northern side of Mount Maunganui. Booms at Maketu, Rena on the Astrolabe Reef, A container from the Rena with its contents spilled across the beach. Image credits: Maritime New Zealand

Every little bit counts!
If you're out in your boat and some oil leaks into the sea/lake use some sorbent pads to soak it up (you can get these at most marine supply shops) – did you know that a piece the size of this page will absorb 2 cups full of oil!

OIL POLLUTION AND WILDLIFE

The main ways oil harms birds and mammals is by the damage done when their feathers, skin or fur comes into contact with the oil or the toxic effects when they inhale or ingest (eat) the oil.

Birds

When birds get even a little bit of oil on their feathers it can make them really sick, it can destroy their waterproofing (protective layer of feathers) and they can get cold very quickly. When they try to clean themselves they can then breathe in or eat the oil which is toxic and can poison them. Because the oil clogs the birds feathers they can't fly or float and can drown.

RENA AND WILDLIFE

Since the Rena disaster there has been a wildlife centre set up to clean and care for all the birds affected by the oil spill. There is a special process to cleaning and looking after the birds – The National Oiled Wildlife Response Team has a great web page with lots of videos explaining all about what they have been doing.
https://www.facebook.com/NOWRT

Rena wildlife by numbers:

- **409** animals being cared for at the wildlife facility
- **340** clean little blue penguins
- **4** clean pied shags
- **60** rare New Zealand dotterels caught so they don't get covered in oil and held in wildlife centre – learn more about the dotterels on the next page!
- **2,009** dead birds collected

Numbers as at 23 November 2011

ACTIVITY

OIL AND FEATHERS

You will need:

- 2 bowls of water
- oil (from the kitchen)
- bird feather

Put a couple of teaspoons of oil in one bowl of water – what happens? Will the oil and water mix together, or will they stay separate?

Place the feather in the bowl of clean water – what happens? Does the feather repel the water and float?

Take the feather out of the clean water and put it in the oil bowl, swish it around in the water. What happens to the feather?

Now put the feather back into the clean water – what happens? It should sink to the bottom of the bowl because the oily feather can no longer repel the water.

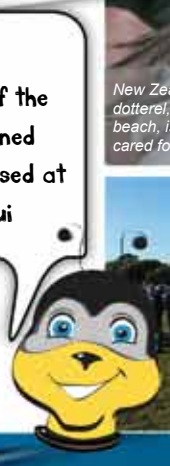
Oiled shag being cleaned at the wildlife rehabilitation facility set up at Tauranga.

A penguin awaits cleaning at the Oiled Wildlife Response facility

A little blue penguin gets the star wash treatment at the Oiled Wildlife Response Centre

Little Blue penguins, recovering from their encounter with fuel oil

New Zealand's rare and protected dotterel, whose favourite haunt is a sandy beach, is being especially watched and cared for while there is a risk to its habitat.



YAY! the first of the rescued and cleaned birds being released at Mount Maunganui

NZ DOTTEREL

NZ Dotterels are native birds that live on the beach. You might have seen them scurrying around on the sand. They have been affected by human activity (like vehicles and pedestrian use of beaches) and pests (like cats, rats, hedgehogs and possums). In the Bay of Plenty we have about 100 rare New Zealand Dotterels and there are about 1400 in the rest of New Zealand.

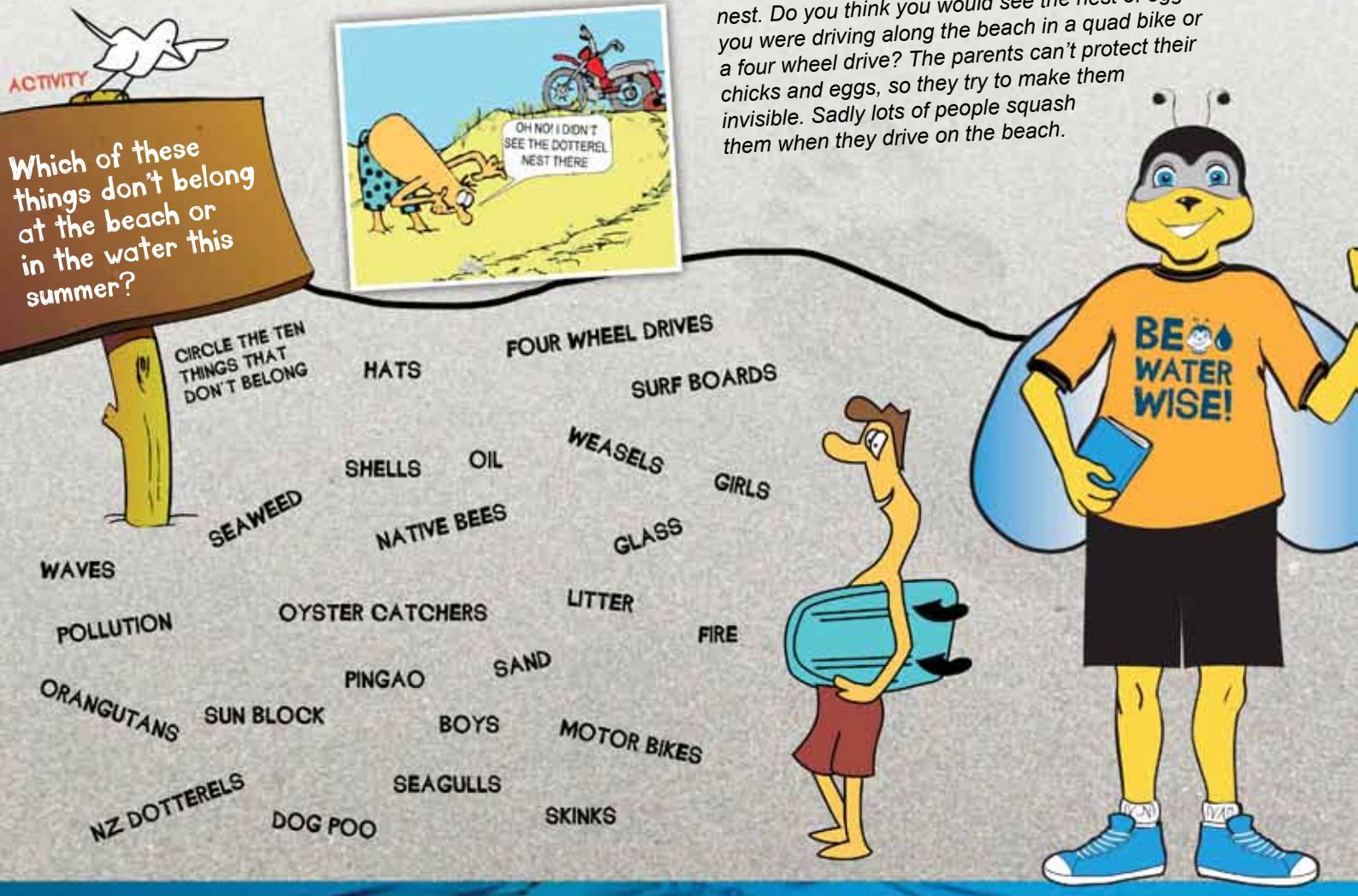
Where are they found?

They are shorebirds and are usually found on sandy beaches and sandspits or feeding on tidal estuaries. They nest and lay their eggs in the sand and like to live in areas with driftwood near estuaries and river mouths. If they are nesting in dunes, they prefer spinifex and pingao to hide in.

What can you do to help the dotterel?

- Watch out for 'Birds Nesting' signs
- Stay outside of fenced areas
- Keep dogs, vehicles and boats off beaches and sandspits that NZ dotterel are nesting on, especially during the breeding season from September to March.

There are baby NZ Dotterel chicks in the eggs in their nest. Do you think you would see the nest of eggs if you were driving along the beach in a quad bike or a four wheel drive? The parents can't protect their chicks and eggs, so they try to make them invisible. Sadly lots of people squash them when they drive on the beach.



CLUB PAGE

Well done to those of you that entered our sticker competition. There were some awesome entries. The winner was **Aaliyah Martin-Batt** (12 years)

Max McIntosh

Nicholas Wotton

MAILBAG! Make sure you send your photos, stories, art etc. to BuzzBOP to feature in the club page. (Remember you can also email competition entries, letters, stories, jokes or photos to **buzzbop@boprc.govt.nz**)


To Buzz Bop

Thankyou for all you do. I love your newsletters about the environment and natural resources.

Keep up the good work

Grace

Bodhi, Age 4

Connor, Age 12

COMPETITION

Can you remember all the things we have learnt this year? BuzzBOP thought it would be a good idea to test your knowledge as the competition this time. Check out his cool new waterbottle and wristband prizes (below) that are up for grabs! Remember you can visit the website to check out the old Pollution Busters issues… http://www.boprc.govt.nz/residents/kids/newsletters

1 What are the two main gases that make up air? _____

2 Name one type of activity that reduces air pollution: _____

3 Riding a bike and walking are good for the air because: _____
A) less cars on road, B) reduces carbon monoxide emissions C) doesn't use fossil fuels D) A,B and C

4 What is a wetland? _____

5 Name two important jobs wetlands do: _____

6 Name 3 types of wetlands: _____

7 What is the name for the Māori god of rain? _____

8 What does Aotearoa mean? _____

9 Name 3 things you can do to keep NZ green? _____

10 What is upcycling? _____

11 What does wairere mean? _____

12 The solid state of water is known as what? _____

13 What is the chemical formula of water? _____

14 True or false? Ice sinks in water. _____

See the back page for email and postal address to send your entry to.

BuzzBOP's Friend

Nicole Head - Graphic Designer

What do you do?

I work with BuzzBOP and the team at the Regional Council as a Graphic Designer. I work to bring all the words and ideas my team create to life through design. I work on a really wide range of media, from newsletters and brochures, to websites and signs for everything related to the Council.

What do you like best about your job?

I get to be creative and problem solve every day! I enjoy the challenge of creating designs that are interesting to read and communicate the information to our community in the best way possible. I also get to work with a great bunch of people and learn lots of interesting information from them about our region.

What's special about the Bay of Plenty to you?

I love spending time at all the beautiful beaches and lakes in the region with my friends and family. I love being outdoors exploring, running, cycling, swimming and making the most of the beautiful environment we live in.

Do you have any messages for Pollution Busters?

Talk to your parents about starting a vegetable garden or a compost bin if you don't already have one at home.

We found the information for this newsletter from the following places:
www.gdc.govt.nz | www.nrc.govt.nz | www.doc.govt.nz | http://oils.gpa.unep.org | www.water-pollution.org.uk. | www.sciencekids.co.nz. | www.education.com | www.kidsgeo.com
Parragon, Publishing. (2004). The World of Science | Bay of Plenty Regional Council education resource - Waiora and Life's a Beach | www.maritimenz.govt.nz

Pollution Busters join up or change of address here...

Please have an adult check that the details are correct before you send this.

☐ I am a new Pollution Buster

☐ I am already a Pollution Buster but I have changed my address

Name _____

School _____ Birthday ____/____/____ day / month / year

Address _____

(Postcode)

BuzzBOP and Team
Bay of Plenty Regional Council
Freepost 122076
PO Box 364
Whakatāne 3158

Email: buzzbop@boprc.govt.nz

Write your name, age and address on your letters and on the back of your artwork.

Have you moved and changed address?
If you have moved and changed address, please write or email to us so we can make sure you get your newsletter.