2018

World Water Day Education Pack

Nature for Water

www.watercare.co.nz

Watercare
An Auckland Council Organisation

2018 World Water Day Education Pack

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2018 World Water Day Education Pack

Thank you for requesting Watercare's World Water Day Pack. You will find:

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2018 World Water Day Education Pack

Hi teachers!

Thanks for downloading our World Water Day Education Pack. This year's theme is Nature for Water – exploring how we can use nature to overcome the water challenges of the 21st century.

Here at Watercare, building a sustainable future is at the core of everything we do.

I also know that, sustainability is at the heart of the New Zealand school curriculum, with students exploring all aspects of their environment, including:

- The interaction between the natural environment and human activities, and the consequence of these
- The choices and actions they can take to prevent, reduce or change harmful activities to the environment.

As New Zealand's largest water and wastewater service provider, part of our role is to minimise the impact humans have on their environment by collecting wastewater and treating it so that it is safe to go back into the environment. If the water in the environment is kept clean it's easier and more cost effective to treat it to the highest quality so it can be used again.

I would like to share with you the many ways in which our company relies on nature to help it supply clean drinking water to Aucklanders every day and collect, treat and dispose of their wastewater.

There are plenty of interesting facts to find out along the way as well as some fun interactive games. Maybe your school would like to wear blue on World Water Day and raise money for a global water charity?

But above all, have fun, learn lots and enjoy World Water Day!

Sally

Sally Smith
Watercare education co-ordinator

Watercare celebrates World Water Day 2018

World Water Day has been celebrated around the world on 22 March since the United Nations designated the day in 1993.

This year's theme for World Water Day is Nature for Water – exploring how we can use nature to overcome the water challenges of the 21st century.

It's a theme that has particular relevance to us at Watercare, because sustainability is at the heart of everything we do. We're continually looking at new ideas and technology that will benefit the environment in which we operate and the communities we serve. Read on to learn more about these initiatives.

What we do

At Watercare we are proud to provide a lifeline service to our customers. We provide the highest quality drinking water to 1.5 million Aucklanders, and take it away again once it's been used in the sink or flushed down the loo. Without using chemicals, we treat wastewater to a very high standard and safely return it to the environment, which protects the health of our communities.

We also plan for new and upgraded infrastructure far into the future to ensure we can cater for Auckland's fast-growing population.

Watch: Watercare at work: https://www.watercare.co.nz/About-us

Extraction of raw water

Please refer to: https://www.watercare.co.nz/Water-and-wastewater/Where-your-water-comes-from

We extract water from 23 sources including dams, rivers and underground aquifers. About 80 per cent of Auckland's water comes from dams located in the Hunua and Waitakere ranges.

Our headworks team – a passionate group of dam technicians – are dedicated to protecting our water sources and their surrounding environments.

Watercare's Mangatangi Dam in the Hunua Ranges.

Nature-based solution: Ultrasonic technology combats algae

https://www.watercare.co.nz/About-us/News-media/Watercare-fights-blue-green-algae-with-ultrasonic

All waterways, including dams, can experience problems with algal blooms in warm weather. Cyanobacteria, more commonly known as blue/green algae, spreads rapidly in warm water, forming slimy clumps that become toxic to all mammals.

At Watercare's Lower Nihotupu Dam in the Waitakere Ranges, we're using ultrasonic sound waves to break down the cell walls and kill the algae. The technology comes from the Netherlands. This is the first time it has been used in New Zealand.

Our headworks team is trialling some new Dutch ultrasonic technology to monitor and combat blue/green algae in the Lower Nihotupu Dam, in the Waitakere Ranges.

Extraction of raw water

The five devices attached to buoys take samples every 10 minutes, 24 hours a day. They transmit information back to the Netherlands where the settings can be altered.

Benefits:

- No chemicals are needed
- The vibrations are harmless to humans, animals, fish and aquatic plants
- The devices, which resemble a small house, are solar-powered
- Real-time data allows for instant corrective measures to kill the algae.

Nature-based solution: Looking after our freshwater friends

One way we minimise the effects of our dams on freshwater species is with a trap and haul programme. To ensure migration paths of native fish species are not interrupted by the dams, we trap juvenile native fish and eels in the downstream river systems and transfer them upstream of the dam.

Adult eels, aged anywhere between 15 and 80 years old, migrate to the Pacific Ocean near Tonga to breed as they approach the end of their lives. Each year we trap eels in our Hunua and Waitakere dams and release them downstream so they can continue their journey to Tonga.

The trapped eels are released downstream of the dams so they can continue their journey into the Pacific Ocean.

Did you know?

New Zealand longfin eels breed only once at the end of their lives, so helping the eels from our dams to reach the ocean is essential for the survival of this declining species.

Extraction of raw water

Nature-based solution: Managing flows to protect our rivers

As dams block natural river flows by creating artificial water supply lakes, a great deal of planning and dam management is needed to minimise any impact on the environment.

A free-discharge valve releasing water.

The team working at our dams carefully manages discharges to ensure the ecosystems downstream have sufficient water flow. All our dams have compensation and free-discharge valves which allow the release of a continuous flow of water downstream. We also periodically release water to simulate floods that occur during storms. This replicates the natural flushing that reduces algae build-up in streams.

Benefits:

- Compensation flows support flora and fauna habitats when dams are not full and spilling
- We can imitate the typical flow in different seasons – usually more in winter and less in summer.

Nature-based solution: Getting smart with planting

Native bush and trees can make an important contribution to protecting our water sources. Their root systems can stabilise the soil and help to prevent erosion around our water supply lakes.

Watercare supports the Trees for Survival programme by providing money and staff volunteers to assist at planting programmes in the Hunua Ranges. The planting sites are assessed for erosion and chosen based on their impact on water quality. The planting also benefits birdlife in the area.

Extraction of raw water

The Waikato River has been one of Auckland's crucial water sources since 2002. Watercare sponsors the charitable trust Waikato RiverCare which undertakes planting alongside the lower Waikato River catchments.

Students from Paparimu School supporting Trees for Survival.

The benefits of planting alongside the river include:

- deterring cattle that could pollute the waterways
- filtering the water
- preventing erosion of soil into the water
- moderating water flow to help prevent flooding
- moderating water temperature by providing shade to allow fishes and other water animals to live.

Did you know?

Since we began supporting Trees for Survival, we've helped to plant about 16,000 trees in the Hunua Ranges.

Treatment of raw water

Treating water to the highest quality

https://www.watercare.co.nz/Water-and-wastewater/Water-treatment-and-supply/

As we have a wide variety of water sources, we use a broad range of treatment techniques at our 15 water treatment plants.

Each treatment plant is designed to deal with the characteristics of its particular water source.

Water from the dams in the Hunua and Waitakere ranges is sourced from areas that are protected from farming and industry. It's naturally high quality and therefore requires less complex treatment to meet the New Zealand Drinking Water Standards.

However, water from the Waikato River contains more contaminants, and therefore requires additional treatment processes. This includes ultra-filtration using membrane technology.

By adapting the treatment processes to suit the raw water source we:

- don't waste energy by unnecessarily processing water
- keep our costs as affordable as possible for our customers.

A public open day at Ardmore Water Treatment Plant.

Membrane filters at the Waikato Water Treatment Plant.

Watch: How we treat Auckland's water: https://www.watercare.co.nz/Water-and-wastewater/Water-treatment-and-supply/Treating-water

Distributing Aa-grade water

Nature-based solution: Making gravity work for us

Because our dams are located at high elevations, water flows easily to the city by gravity. All of the dams use gravity alone to transport water from the dams to treatment plants.

There are 9096 kilometres of pipes in our water network. If we had to pump water through every one it would take a great deal of energy and increase our costs. Instead Watercare's network takes advantage of Auckland's naturally hilly landscape so gravity does as much of the work as possible.

On top of the hill, Three Kings Reservoir in Big King Reserve, Auckland.

Treated drinking water is kept in reservoirs, which are also built in high places, like at Big King Reserve in Three Kings, as well as Mt Victoria and Mt Eden. From these reservoirs water can flow down, again using gravity, through the water supply network to homes and businesses.

Pump stations are used strategically at low points in the network so that water can be lifted to a higher point and continue its journey under gravity until it reaches a home, business or another pump station.

Using gravity to transport water:

- Keeps energy costs down
- Reduces our carbon footprint

Customers use the water

Customers use our water:

https://www.watercare.co.nz/Help-and-advice/Be-Waterwise

We're fortunate that water is not scarce in Auckland, but it's still important to use water wisely.

At Watercare we offer a free home water audit service to help our customers use water more efficiently.

Our free Watercare Education Programme for primary and intermediate schools gives thousands of students the chance to learn all about water and the essential role it plays in our lives.

Pictured: Watercare education co-ordinator Sally Smith and pupils from Bucklands Beach Primary School identify the types of freshwater bugs that can be found in the stream at Macleans Reserve.

Comprehensive waterwise tips aimed at homes and businesses can be found on our website.

Our water efficiency strategy also sets out our efforts to reduce average water consumption rates as Auckland grows. This enables us to defer the need for more water sources, and saves money that would have been spent on interest costs to fund the associated infrastructure.

Did you know?

Aucklanders are already the most efficient water users in the country. We use on average 160 litres per person each day.

Collecting wastewater

Collecting wastewater:

https://www.watercare.co.nz/Water-and-wastewater/Wastewater-collection-and-treatment

Each time you flush the toilet, pull the plug from a sink or have a shower, the water drains into a wastewater pipe on your property. From there it joins Watercare's network of 7999 kilometres of wastewater pipes which take it to one of our wastewater treatment plants.

Sometimes, blockages in our system can cause dry-weather overflows.

Tree roots can cause blockages on private properties.

Most wastewater pipes are only 100 millimetres in diameter and are not designed to carry anything other than wastewater and biodegradable products, like human waste and toilet paper. But overflows can occur when people flush rubbish down the toilet or pour cooking fat down the sink.

Items like rags, sanitary items, wipes, dental floss and nappies don't break down in the wastewater network. Instead, they form large, impenetrable clumps that can block pipes. When this happens, undiluted wastewater can overflow into private properties and the wider environment, polluting your property and Auckland's streams and beaches. Our dedicated wastewater crews attend dry-weather overflows within an hour of them being reported and don't leave until the problem has been identified, fixed, and the area decontaminated.

Learn more about what not to flush.

Did you know?

Last year, a 'fatberg' that stretched the length of two football fields blocked a section of London's sewage network. It was a congealed mass of fat, nappies and wet wipes that should never have entered the wastewater system.

Collecting wastewater

During periods of heavy rainfall, we also experience wet-weather overflows. This is because stormwater can inundate our wastewater network. Learn more about what causes wet-weather overflows, and what we're doing to reduce them here: **https://www.watercare.co.nz/Faults-outages/Plumbing-and-wastewater/Wastewater-overflows/Wet-weather-overflows**

Treating wastewater

Treating wastewater:
https://www.watercare.co.nz/Water-and-wastewater/Wastewater-collection-and-treatment

Nature-based solution: We use good bugs to fight the bad bugs

More than 90 per cent of Auckland's wastewater goes to our treatment plants at Mangere and Rosedale. Here it is treated to standards that protect public health, the local environment and our coasts and harbours.

To remove phosphorus and nitrogen from the liquid wastewater, we use a process called 'activated sludge'. An army of micro-organisms living in our reactor-clarifiers eat the carbon in the wastewater and reduce the amount of phosphorus and nitrogen, making it safe to release into the environment. This process is entirely natural and chemical-free.

A public open day at Mangere Wastewater Treatment Plant.

Did you know?

Our reactor-clarifiers at Mangere hold 31 million litres. That's enough to fill 16 Olympic-sized swimming pools!

Watch: How we treat wastewater at Watercare: https://www.watercare.co.nz/Water-and-wastewater/Wastewater-collection-and-treatment

Treating wastewater

Nature-based solution: We use wastewater by-products to create our own power

During the wastewater treatment process, solids are separated from the liquids. The sludge is pumped to anaerobic digesters, where fats and carbon are consumed by anaerobic bacteria.

An important by-product of this process is gas, mainly methane. The gas is then fed into engines to generate electricity for the plant. We also use heat from the engines to heat the digesters and buildings.

Methane gas generates engines to produce two-thirds of the energy at Mangere Wastewater Treatment Plant.

By generating our own electricity we are keeping the cost of wastewater treatment to a minimum while using up a potential waste product, reducing the amount that has to go into landfill.

Did you know?

We currently generate enough power to meet about two-thirds of our plants' energy needs. Watercare's goal is to achieve energy neutrality at our two largest wastewater treatment plants – Mangere and Rosedale – by 2025.

Nature-based solution: Rehabilitating Puketutu Island with biosolids

At our Mangere Wastewater Treatment Plant, we produce about 330 tonnes of treated biosolids a day. Instead of sending this to landfill, we truck it to neighbouring Puketutu Island, where it is being used to rehabilitate a former quarry.

https://www.watercare.co.nz/Help-and-advice/Environment-and-community/Rehabilitating-Puketutu-Island-with-biosolids

Treating wastewater

The biosolids are tipped into pre-constructed cells, and covered over with earth at the end of each day. At the end of the project – not until 2049 – four small hills will be created to replicate the scoria cones that were quarried in the 1950s for an extension of Auckland Airport.

The vision for the island is for it to become a park for the people of Auckland.

Biosolids are trucked to Puketutu Island where it is being used to rehabilitate a former quarry.

The benefits of this project:

- We use less fuel in disposing of biosolids
- It is more cost effective
- It reduces truck movements for our treatment plant neighbours
- It will restore a culturally-significant site to its former state.

Return water safely to the environment

Nature-based solution: Wastewater that improves the quality of the receiving waterways

Watercare is committed to continuous improvement, and that includes investing in new technologies that deliver the highest-quality treated wastewater.

Last year we received consent for a $60 million upgrade of the Pukekohe Wastewater Treatment Plant. It includes the construction of a new activated sludge reactor with membrane bioreactors which combine ultra-filtration with the biological wastewater treatment process.

Pukekohe Wastewater Treatment Plant will receive a $60 million upgrade.

The upgrades mean the water that will be discharged to Parker Lane Stream will meet contact recreational standards and will actually improve the quality of the stream.

And up in Wellsford, another innovative project is underway that's expected to enhance water quality in a tributary of the Hoteo River.

Watercare is trialling advanced wetland treatment – a low-energy and low cost wastewater treatment technique using manmade wetlands. This particular technology hasn't been used before in New Zealand.

If it works as we expect it to, the treated wastewater will improve the quality of the stream it discharges to.

Learn more:

https://www.watercare.co.nz/About-us/Projects-around-Auckland/Wellsford-Wastewater-Treatment-Plant-upgrade

https://www.watercare.co.nz/About-us/News-media/Green-light-for-Pukekohe-Wastewater-Treatment-Plan

Return water safely to the environment

Nature-based solution: Watercare Coastal Walkway a haven for migratory birds.

https://www.watercare.co.nz/Help-and-advice/Environment-and-community/Coastal-Walkway

Back in the 1960s and as recently as 2000, oxidation ponds in the Manukau Harbour were used as part of the final stages of treatment. When the Mangere Wastewater Treatment Plant was upgraded to handle the full treatment process on land, the oxidation ponds were removed and the surrounding area rehabilitated.

Watercare restored 13 kilometres of white-shell beaches, planted more than 270,000 native trees and built several bird roosts that attract birds migrating from the Arctic Circle, Asia and the South Island. The bird roosts provide a safe place for the birds to feed and rest during high tides – safe from cats and dogs that inhabit the mainland.

Watercare's coastal walkway connects Ambury Farm and the Otuataua Stonefields.

A seven-kilometre coastal walkway was built to connect Ambury Farm with the Otuataua Stonefields.

These days it is a renowned bird-watching spot, with wrybill, pied stilt and eastern bar-tailed godwits, as well as nesting New Zealand dotterels.

Watercare's coastal walkway is a renowned bird-watching spot.

More about World Water Day

When did it all begin?

World Water Day is an annual event celebrated on 22 March. It's been observed on this date every year since 1993, after the United Nations (UN) designated the day to focus attention on the importance of universal access to clean water and sanitation facilities.

It's an opportunity to learn more about water-related issues, be inspired to tell others and take action to make a difference.

Each year UN-Water sets a theme for World Water Day that relates to a current or future challenge.

You can learn more about past World Water Day themes on our website: https://www.watercare.co.nz/Help-and-advice/Environment-and-community/Watercare-Education-Programme/World-Water-Day.

Themes from past World Water Days

2017 – Water and wastewater

2016 – Water and jobs

2015 – Water and sustainable development

2014 – Water and energy

2013 – Water co-operation

2012 – Water and food security

2011 – Water for cities

2010 – Water quality challenges

2009 – Transboundary water

2008 – Sanitation

2007 – Global water scarcity

Clean water for all – a United Nations goal

In 2015 at a global conference in New York, countries in the United Nations agreed to a new set of 17 global Sustainable Development Goals, pledging that 'no one would be left behind'.

One of these goals – Goal 6 – is to "ensure availability and sustainable management of water and sanitation for all" by 2030.

At the time, UN Secretary-General Ban Ki-moon was quoted as saying: "Water is life. Water is health. Water is dignity. Water is a human right".

This video explains Goal 6 further: **https://www.youtube.com/watch?v=LCKsU4bPFoQ**

The subset of targets linked to Goal 6 are:

- by 2030, achieve universal and equitable access to safe and affordable drinking water for all
- by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
- by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally
- by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity
- by 2030, implement integrated water resources management at all levels, including through transboundary co-operation as appropriate
- by 2030, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
- by 2030, expand international co-operation and capacity-building support to developing countries in water and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
- support and strengthen the participation of local communities for improving water and sanitation management.

Interactive activities

Here are some fun water-related games you can find online:

Learn some great waterwise tips:
https://wateruseitwisely.com/tip-tank-game/

Identify the wise water users and the water wasters:
http://www.discoverwater.org/use-water-wisely/

What are all the different ways we use water without even realising it?
http://www.discoverwater.org/we-all-use-water/

Catch Splash before he hits the ground!
http://www.scholastic.com/njaw/game/

The Power of Poop – Elizabeth Gillis, goes to a dairy farm and a wastewater treatment plant to learn how to turn poo into heat, electricity, and fertiliser and also looks at how human poo from people in Boston, USA, gets reused.
http://www.pbs.org/wgbh/nova/tech/power-of-poop.html

News flash: The spa that runs on human waste (A BBC story):
http://www.bbc.com/news/av/world-asia-38438474/the-spa-that-runs-on-human-waste

More water activities for the classroom

We have some great ideas for water activities that we can send you. We don't have them available for download as they must only be used for educational purposes by teachers in the classroom.

To request these activities, please email Sally Smith at Sally.Smith@water.co.nz

Activities/lessons include:

- Exploring soil erosion in New Zealand
- Why do people dam water?
- Does surface area affect evaporation?
- How to make a bottle garden
- Algae and water pollution
- Make your own water cycle
- Water careers
- Invent a fish
- Other ideas to celebrate World Water Day

WEAR BLUE DAY
in celebration of

World Water Day
22 March 2018

Please wear blue clothes to school on this day

Get your

WEAR BLUE BADGE

from your teacher for a

$ _____ donation

towards

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List of some water charities you may like to support

The Waterlife Foundation

www.waterlife.org

Just a drop

www.justadrop.org

Wateraid

www.wateraid.org

Or you may prefer to find one of your own.