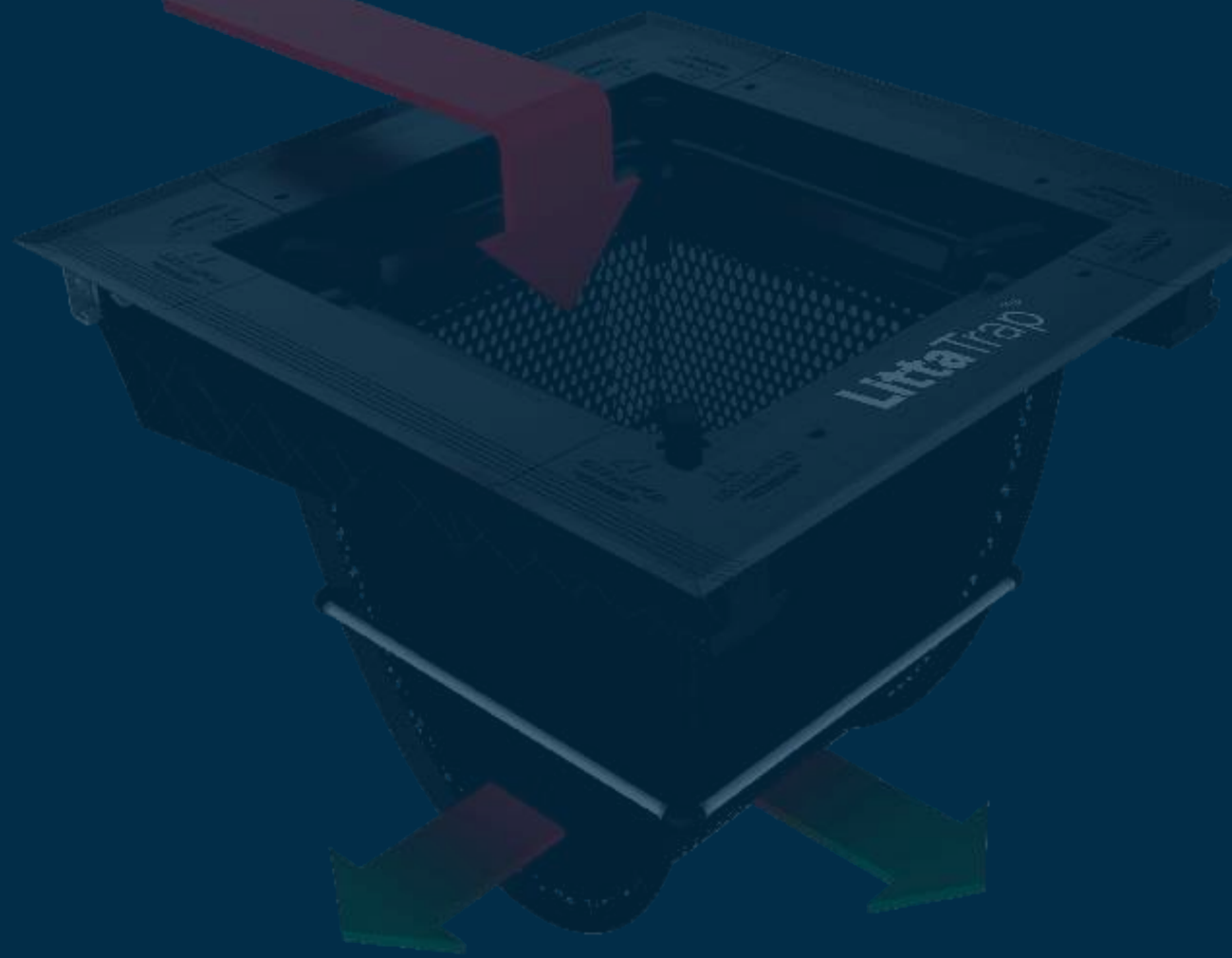
LITTATRAP.COM



An Applied Stormwater Education Programme

ENVIROPOD™

Our Solution

MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

New Zealand Government

From

TAKING ACTION

Down the Drain

by
Philippa Werry

Part one: The problem

In 2016, students from Wilford School in Petone were snorkelling at Lowry Bay. Under the ocean, they were amazed by all the different forms of life: fish, starfish, seaweed, a stingray ... The 253 pieces of rubbish they found were less impressive.

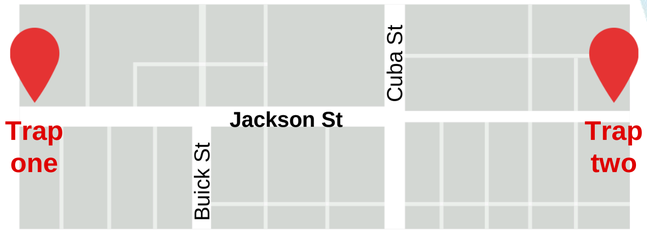
The students realised that rubbish from Petone town centre was ending up at their local beach. Three students – Harvey, Ethan, and Jemma – decided enough was enough. It was time to do something about it.

Photograph: By Mark Coote, copyright © Crown 2017
Illustrations (clouds and raindrops): By George Frost, copyright © Crown 2017

Part two:
The set up

The students found that stormwater was gathering rubbish from Petone town centre and washing it down footpaths and gutters into drains. From there, it was going directly into Lowry Bay. Jemma, Ethan, and Harvey wanted to find a way of catching the rubbish before it reached the sea. They decided to target the gateway that all the rubbish passed through – the stormwater drains.

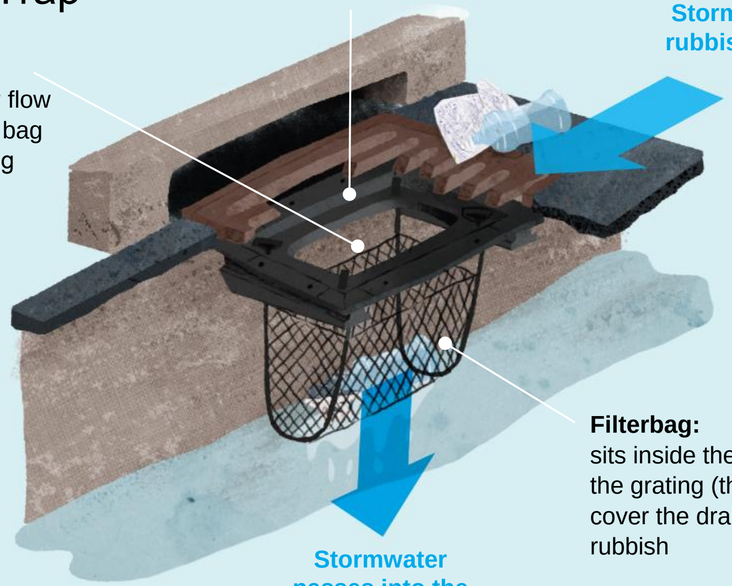
The students set up traps in two drains on Jackson Street, the main street in Petone. They investigated different technologies and chose the LittaTrap™ because it was easy to use. Trap one was set up outside restaurants and cafes in the shopping area. Trap two was at the far end of the street, surrounded by houses.



The LittaTrap™

Flow diverter seal:
Makes sure the stormwater and rubbish goes into the filterbag

Overflow bypass:
lets the stormwater flow into the drain if the bag is full or if it's raining very heavily



Filterbag:
sits inside the drain, under the grating (the bars that cover the drain), to catch rubbish

Photographs: By Mark Coote, copyright © Crown 2017
Illustration (trap diagram): By Josh Morgan, copyright © Crown 2017
Illustration (map and rain drops): By George Frost, copyright © Crown 2017

Part three:
The collection

Once a week, their teacher Mrs Webb drove the students to the two sites to empty the traps. They wore hi-vis vests and put marker cones on the street so the passing traffic could see them. Each of the students had a different job. Harvey took the grating off and lifted the trap out, Ethan tipped the contents of the trap into a rubbish bag, and Jemma replaced the trap in the drain.

Back at school, they put on disposable gloves, laid a large sheet of paper on a desk, and emptied the rubbish bag onto it. Then they sorted the rubbish into categories, such as hard and soft plastics, food, paper, and cigarette butts. They didn't count any **organic** material, such as wet leaves, because it doesn't harm the environment. Lastly, they counted the items in each category and entered the data onto a computer spreadsheet. The students repeated this process for twelve weeks.

organic – from living organisms

The following photographs are licensed under CC BY 2.0: background texture, glass, can, cigarettes, cardboard, plastic bottle, styrofoam cup (full details); Photograph (wood blocks): "wooden chips" from https://goo.gl/T8fnn9 is in the public domain; Photographs (straws and nylon): By Simon Waterfield, copyright © Crown 2017
Photographs (food wrapper, parking ticket, and receipt): By George Frost, copyright © Crown 2017

Part four:
The results

At the end of the investigation, the students held an information evening to share their findings with the community. People from Hutt City Council, the Department of Conservation, Wellington Water, and other community groups were there. “They were a bit shocked by the amount of stuff we had collected,” Harvey said.

- In twelve weeks, the students collected 2,680 pieces of rubbish from two drains. That meant 2,680 pieces of rubbish that didn’t end up in the sea.
- Half of these pieces (50 percent) were cigarette butts.
- Other rubbish included plastic, aluminium cans, polystyrene, wood, broken glass, straws, soft drink bottles, parking tickets, library receipts, food wrappers, cardboard, and fabric.
- The stormwater drain outside the cafes and restaurants collected much more rubbish than the drain outside the houses.

The students used a calculator to estimate how much rubbish is sent to Lowry Bay from Jackson Street every year.

The two drains that the students investigated collected 2,680 pieces of rubbish over 12 weeks.

– 2 drains
– 2,680 pieces of rubbish
– 12 weeks

This meant that one drain would have sent about 1,340 pieces of rubbish to the sea in 12 weeks.

2,680 ÷ 2 = 1,340

And each week, one drain would have sent about 110 pieces of rubbish to the sea.

1,340 ÷ 12 = 111.67 (rounded down to 110)

To work out how much rubbish this is over one year (52 weeks), the students multiplied 110 by 52.

110 x 52 = 5,720

There are 93 stormwater drains in and around Jackson Street, all leading to the sea. If one drain sends about 5,720 pieces of rubbish, then 93 drains could send 531,960 pieces of rubbish into Lowry Bay every year.

5,720 x 93 = 531,960

That’s over half a million pieces of rubbish.

Photograph (graph paper): "Graph paper mm green A4.svg" from https://goo.gl/4RjPTF is in the public domain.
Photograph (calculator): Calculator from https://goo.gl/XaXmnN is in the public domain.

Part five:
The message

It wasn’t always easy for Jemma, Harvey, and Ethan to keep going with their project. The rubbish was often messy and smelly. They collected it at lunchtime and had to catch up on any classes they missed if the collection took longer. It was also scary to present their information to a large group of people.

At the end of the project, all these difficulties made the students feel proud of what they had achieved. They’d taken action over an issue and made a difference in their community. More people started talking about stormwater Pollution. Students from other schools were even inspired to start similar projects.

For Jemma, Ethan, and Harvey, it all comes down to a pretty simple message.

Photographs: By Mark Coote, copyright © Crown 2017
Illustration (rain drop): By George Frost, copyright © Crown 2017

Environmental Education

The components of environmental education are:

- Awareness and sensitivity to the environment and environmental challenges
- Knowledge and understanding of the environment and environmental challenges
- Attitudes of concern for the environment and motivation to improve or maintain environmental quality
- Skills to identify and help resolve environmental challenges
- Participation in activities that lead to the resolution of environmental challenges

The Mountains to Sea Wellington - Experiencing Marine Reserves Programe

Snorkel Field Trips & Follow up class room sessions.

- Students are split into 2 groups

- Group 1 undertakes a snorkelling session - identifying numerous marine animals and experiences the beauty and wonder of the underwater world. As part of the snorkel, stressors such as rubbish are also pointed out

- Group 2 carries out land-based activities. Activities may include a stormwater walk, where the concept of the natural water cycle and stormwater pollutant sources and pathways are identified in the catchment draining to where the students went snorkelling. Other land based activities may include rocky shore/beach explore or a beach clean-up.

Action Projects

- Drain monitoring using a LittaTrap
- Designing information posters/pamphlets to increase community awareness
- Investigating stormwater pollutants.
- Letter to politicians and local papers
- Community engagement events
- Public awareness signs
- Fundraising projects for marine conservation
- Drain stencil design and implementation
- Organise a beach clean-up and display
- Mural painting
- Marine monitoring projects
- Public presentations
- Coastal and riparian planting events
- Initiating marine reserve or other marine protection projects

CURRICULUM CONTEXTS

- SCIENCE: NATURE OF SCIENCE: PARTICIPATING AND CONTRIBUTING
- SCIENCE: PLANET EARTH AND BEYOND
- TECHNOLOGY: NATURE OF TECHNOLOGY: CHARACTERISTICS OF TECHNOLOGICAL OUTCOMES
- MATHEMATICS AND STATISTICS: STATISTICS & STATISTICAL INVESTIGATION

SCIENCE: NATURE OF SCIENCE:

PARTICIPATING AND CONTRIBUTING

Students will explore and act on issues and questions that link their science learning to their daily living

Key nature of science ideas:

- When we engage scientifically with an issue we:
- Look for a range of scientific information that related to the issue.
- Check that information we use is from a trustworthy source.
- Consider the reliability and validity of the evidence.
- Decide if and how to respond to the issue, justifying our decisions based on evidence and/or reliable scientific information.
- Monitor the effects or any actions we take.

SCIENCE: PLANET EARTH AND BEYOND

INTERACTING SYSTEMS

Students will describe how natural features are changed and resources affected by natural events and human actions.

Key science ideas:

- People can cause changes to habitats and environments from which recovery may be difficult.
- People can intervene to aid the recovery.

TECHNOLOGY: NATURE OF TECHNOLOGY:

CHARACTERISTICS OF TECHNOLOGICAL OUTCOMES

Students will understand that technological outcomes are developed through technological practice and have related physical and functional natures.

Key technology ideas:

- Technological outcomes are fit for purpose.
- Environmental issues can influence what technological outcomes are made.

.

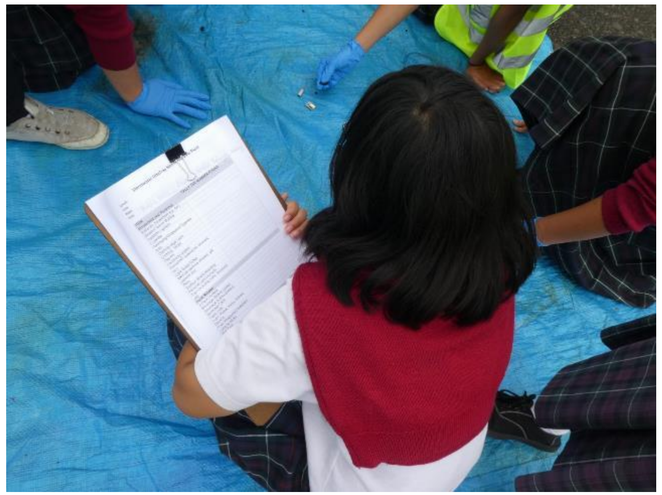
MATHEMATICS AND STATISTICS:

STATISTICS & STATISTICAL INVESTIGATION

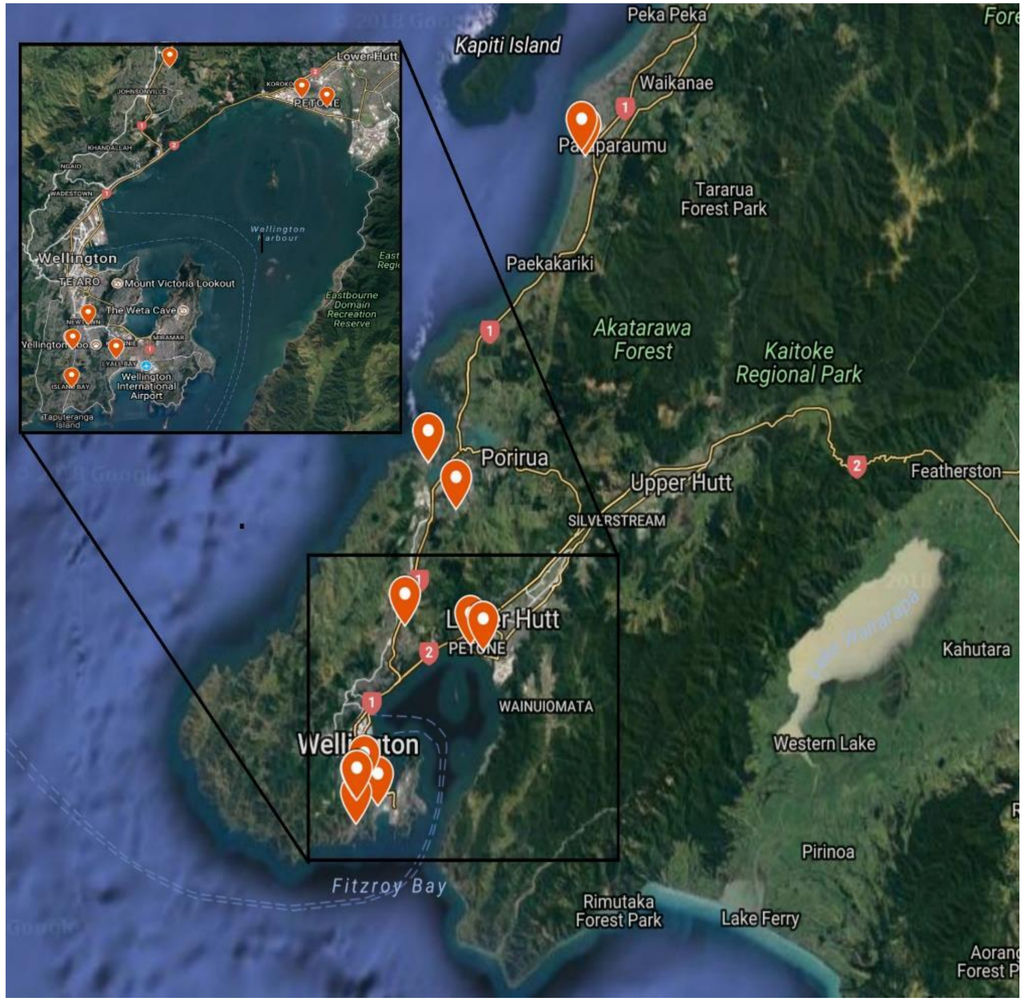
Students conduct a statistical investigation by:
posing and answering questions; gathering, sorting, and displaying category and whole-number data; communicating findings based on the data.

Key mathematics ideas:

- Data can be used to answer multiple questions.
- Organising data can reveal information, patterns, and trends.
- Looking for patterns is an important part of statistical thinking



Drains Monitoring Project

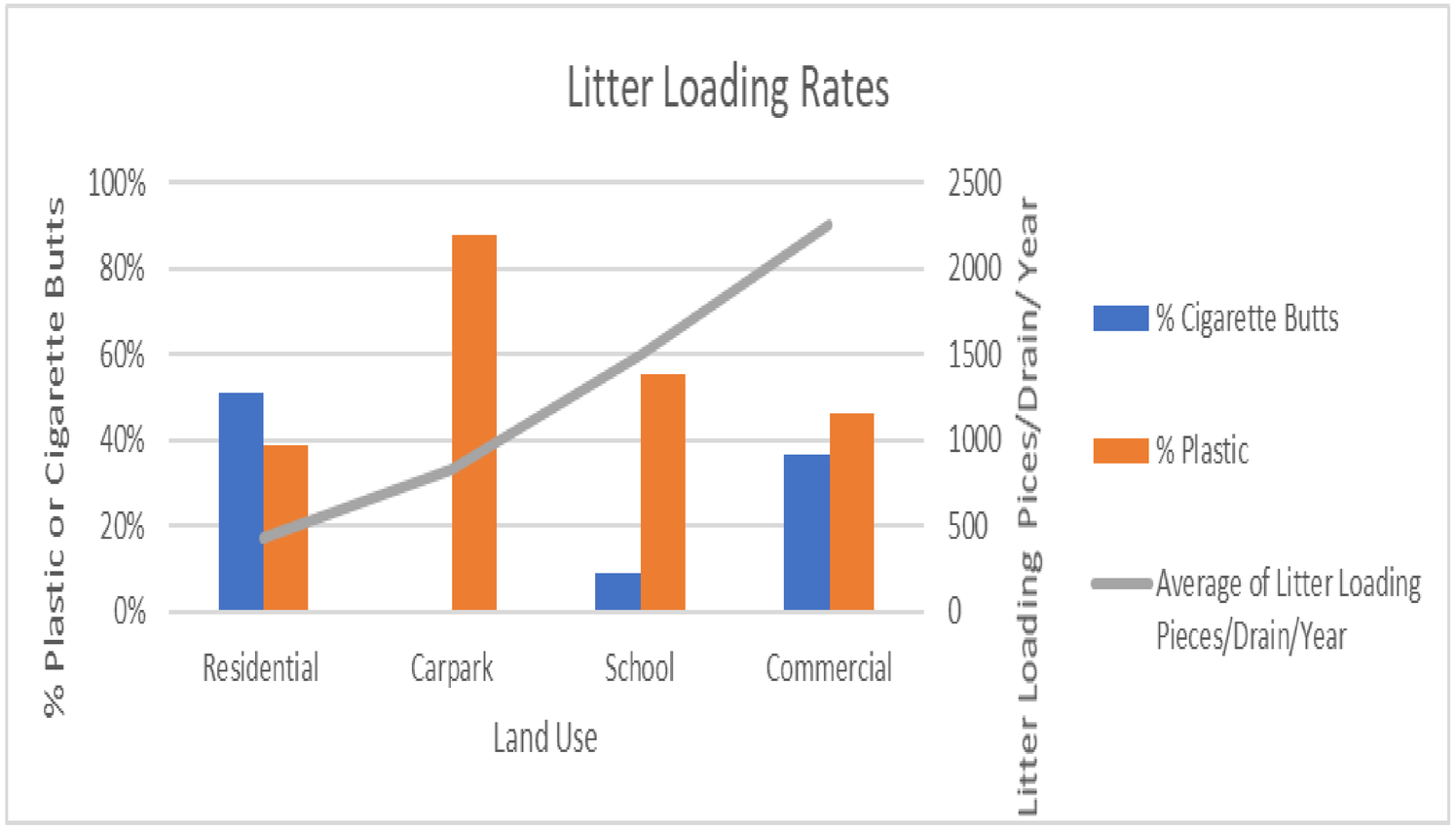


LittaTrap™

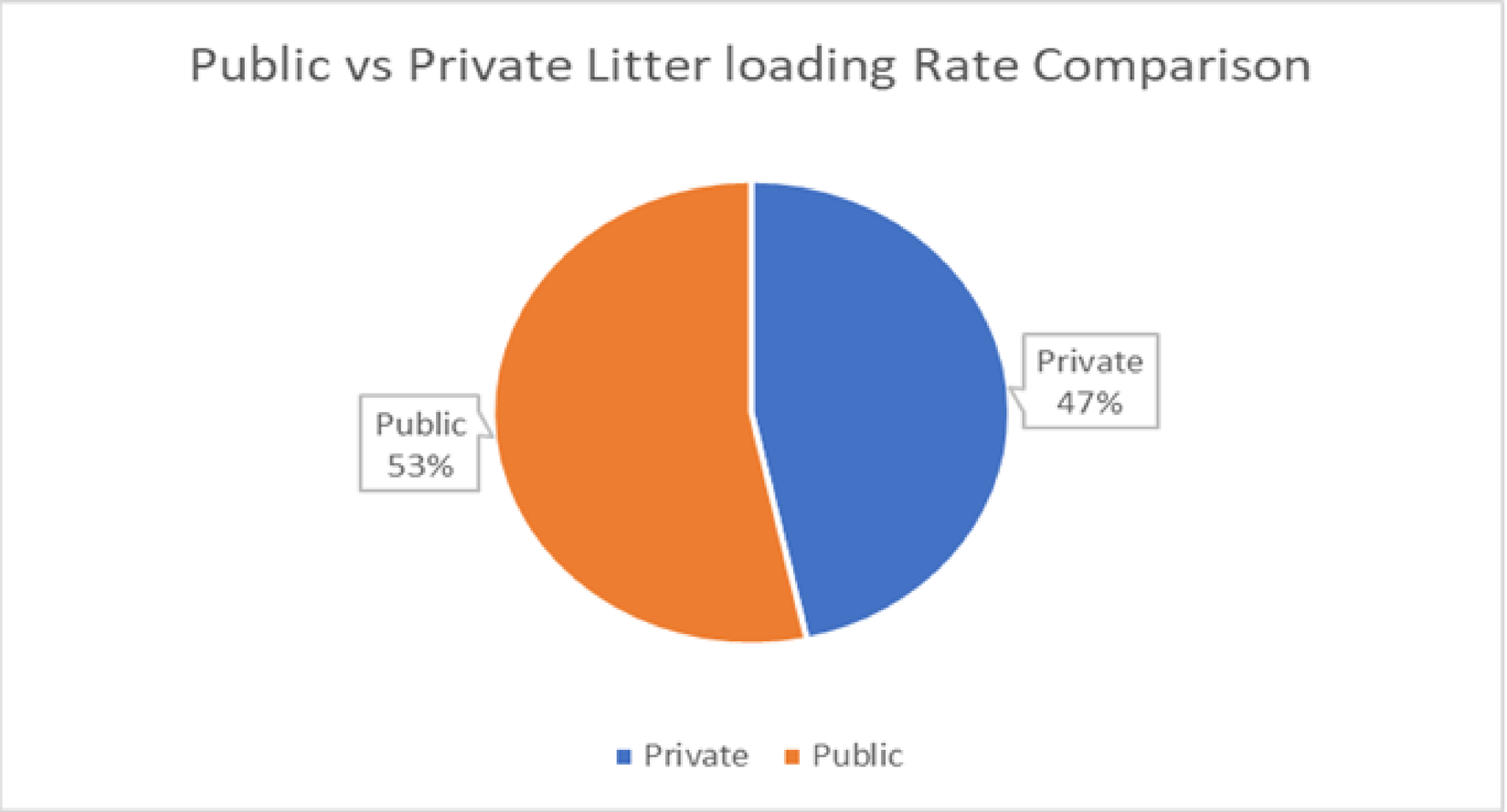
Results

Location	Land use	Public / Private	Number of Pieces	Number of Weeks	Litter Loading (Pieces/Drain/Year)	Plastic	Cigarette Butts
Kapti College South	School	Private	143	2	3718	45%	21%
Berhampore	School	Private	87	2	2262	60%	0%
Paparangi Shops	Commercial	Public	60	5	624	67%	13%
Titahi Bay School	School	Private	112	5	1165	43%	12%
St Anne's School	School	Private	181	11	856	25%	20%
Glenview	Commercial	Public	42	5	1092	36%	36%
Island Bay 2	Commercial	Public	411	14	1527	42%	48%
Lyall Bay	Residential	Public	49	6	425	39%	51%
Titahi School 2	School	Private	112	5	774	59%	0%
Marine Gardens	Carpark	Public	16	1	832	88%	0%
Kapiti College North	School	Private	4	1	208	100%	0%
Wilford (Petone) (2 pits)	Commercial	Public	2680	12	5807	40%	50%

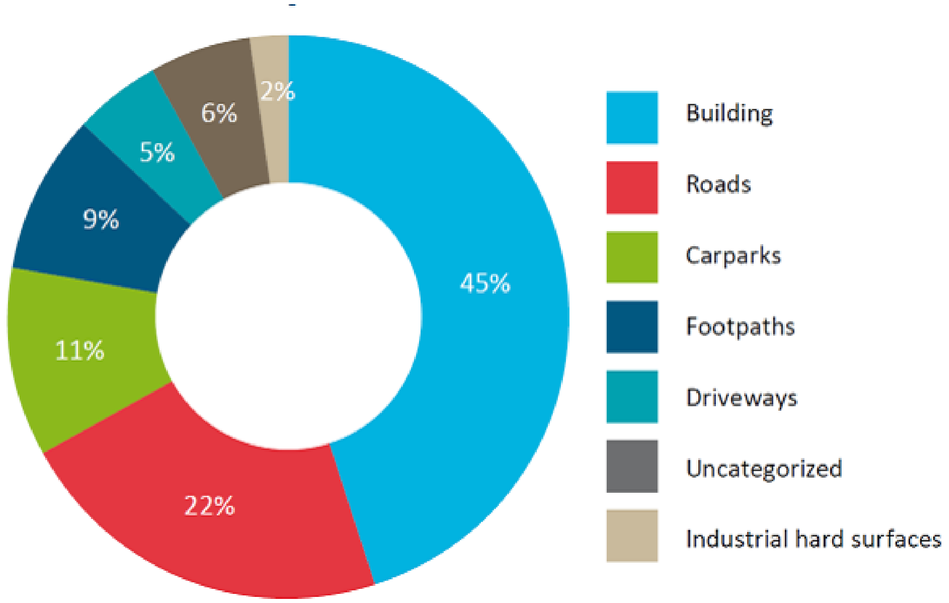
Landuse Influence



Private vs Public Contribution



Wellingtons impervious make up



The Size of the Problem

- In 1995 the Island Care Marine Trust, Auckland estimated that there were 28,000 pieces of litter a day (10.2 million pieces/year) on average that were being discharged into the waters of the Waitemata Harbor

- The first edition of Auckland Regional Council's Design of Stormwater Treatment Devices Manual 1995 noted litter as having a visual impact but stated it was not an extensive problem.

- The World Economic Forum estimates that by 2025, there will be one ton of plastic for every three tons of fish in the worlds' oceans.

- By 2050, the oceans will contain more plastics than fish

- University of Connecticut estimates there are at a minimum of 5.25 trillion pieces of plastic in the ocean

The Size of the Problem

Main Urban Areas	Area (km2)	Population density (People/km2)	Percentage of New Zealand's resident population	Estimated litter loading (Pieces of litter /Yr.)
Whangarei	133	347	1.2	11,130,545
Auckland	1,086	989	28.8	91,198,761
Hamilton	1,100	151	4.4	92,360,394
Tauranga	178	537	2.6	14,962,742
Rotorua	89	593	1.4	7,447,186
Gisborne	85	373	0.8	7,131,240
Napier-Hastings	375	303	3	31,515,292
New Plymouth	112	425	1.3	9,436,800
Wanganui	105	376	1.1	8,804,349
Palmerston North	178	408	1.9	14,973,150
Kapiti	60	563	0.9	5,016,875
Wellington	**444**	**765**	**9.1**	**37,263,793**
Nelson	146	367	1.4	12,273,549
Christchurch	608	549	8.9	51,070,609
Dunedin	255	420	2.9	21,420,112
Invercargill	123	377	1.2	10,311,134

The Size of the Problem

Over **420 Million** Pieces of Litter Per Year

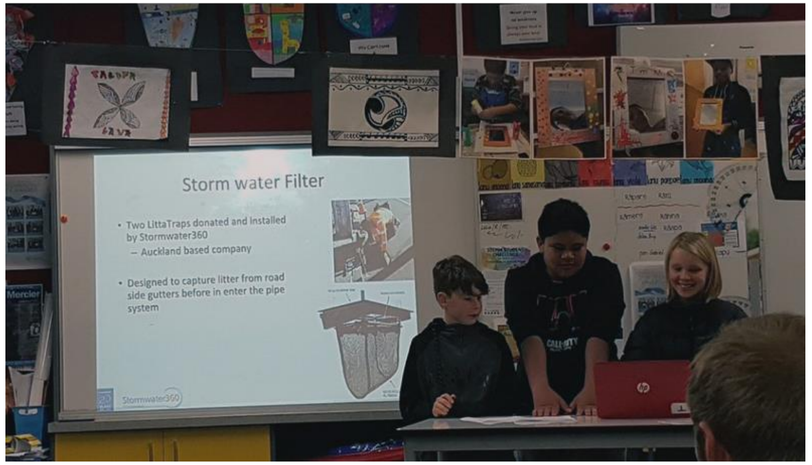
Down New Zealand Stormwater Drains

Children as a vehicle for Change - Discussion

- Environmental education is a management practice designed to change attitudes and behaviors of the participants

- By focusing on environmental education, targeted at children, it is hoped that it will influence the attitudes of their parents and will change their behaviors

- Children do not think of reasons not to do things. They do not present barriers such as; “That costs too much” or “Is it really a problem?” Their minds are full of aspiration and they are hopeful in their thinking.



Why Are We Doing This?

- We are doing the Litta trap to find out how much rubbish is around our school, which might have come from us. It can give us an idea of what is going to our local beach, and gets us thinking about how we can reduce rubbish in our school.

- We are still in the thinking stage of what to do, but so far we are planning a plastic free lunch box day, which will hopefully get people thinking about how to have less rubbish in our lunch boxes.

Source: Inland Bay School Presentation

The LittaTrap data shows

- how much rubbish goes into the storm-water drain.
- the different types of rubbish going into the drain.
- what happens after a heavy rain.
- that we need to educate people and raise awareness about storm-water drains.

Source: St Anne's School Presentation

Conclusion

- Children experiencing plastic and litter in their local marine environment can drive change.
- Learning about the sources of these pollutants and how they make their way to the ocean, can influence a community.
- Collectively MTSW and the 8 participating schools have highlighted the scale of New Zealand's gross pollutant and plastic stormwater problem. This is a problem that has been overlooked for many years by adults.
- The study has shown that in New Zealand, there are large amounts of plastic and litter entering our stormwater drains from a variety of land uses both private and public.
- The children in this program have realised something needs to be done about litter and plastic marine pollution and that action over the problem is not difficult.
- It is hoped that with this information adults in our community can be motivated to take similar action.