University of Canterbury

Christchurch Water Festival – Changing domestic water use behaviour

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1. Executive Summary

1.1 Research Question

How can behaviour associating with domestic use of water be changed to improve water quality in Christchurch's urban waterways?

1.2 Research Context

Better water quality was one of the top public wishes for the post earthquake city (CCC, 2011) and in response to this our community partner Di Lucas plans to organise a year long water festival. Its purpose is to encourage people to think more consciously about their personal use of water and to become more aware of how their behaviour affects water quality. The research group was asked to establish the major causes of contamination in urban waterways and then to consider how behaviour change might best be triggered.

1.3 Aims and Objectives

- To understand peoples perceptions towards water quality in urban waterways and what behaviours, if any, do they adopt to prevent stormwater contamination.
- To consider how perceptions might differ between different population groups.

- To make recommendations about possible ideas that can be used in the festival and to suggest a number of points to consider when deciding on strategy implementation.

1.4 Summary of Methods

1.4.1 Focus Group Discussions – Primary Data

Several different focus groups covering different demographics were carried out. The groups included homeowners, garden club members, students and young professionals, experts and school children.

1.4.2 Review of relevant literature – Secondary Data

The review of relevant literature was conducted at the start of the research. This refined our research question as well as supporting our recommendations made to the organisers of the festival.

1.5 Key Findings

- Majority of participants view Christchurch's waterways as "dirty" and "degraded".
- Most perceived that businesses and the Christchurch City Council (CCC) were to blame for the poor water quality.
- Inadequate understanding about runoff of contaminants and stormwater discharge.
- Most participants do not engage in behaviour to prevent stormwater contamination.
- Disparity between attitudes and behaviour.

1.6 Limitations

- Time – short period (3 months), therefore only allowing 5 focus group discussions.
- Finding suitable respondents, as only those who had an interest in the topic were willing to partake.
- Respondent availability, especially when contacting experts.

1.7 Future Research

- To obtain feedback as to how the recommendations for the water festival would be received.
- Continued assessment of perceptions based on demographic or geographic location.

2. Introduction

2.1 Purpose

This report investigates possible recommendations and points to consider for the organiser's of Christchurch's first ever water festival. Data on people's perceptions and behaviour was collected and then the findings were discussed. Our findings have assisted in the development of our recommendations, as understanding perceptions and behaviour can expose gaps in understanding. Therefore the research group was able to recommend ideas that were accurate and targeted different demographics.

2.2 Background

Over the past two centuries the water quality of Christchurch's urban waterways has been hampered by extensive urban development, and more recently the 2010/11 earthquakes. An increase in pollution has lead to a loss of vegetative cover and a decrease in the quality of in-stream habitat for fish and invertebrates (CCC, 2009). The issue has become widespread; with a recent surface water report stating that 42 out of 43 testing sites fail on at least one parameter, with the Heathcote River catchment reportedly having the poorest water quality (CCC, 2016).

Poor river water quality has received attention in the media, and this has become particularly noticeable during the "mother of all clean ups" event, and currently with local election debates where a large number of candidates are campaigning for cleaner rivers. The Christchurch water festival will attempt to build on this growing awareness, and to encourage people to think more consciously about how their behaviour affects water quality.

2.3 Scope

Research shows that there are a number of factors that contribute to poor water quality in the urban waterways. Factors include domestic water use, wildlife population, road usage and sewage overflows (CCC, 2015). The aim of this study concentrates primarily on domestic water use. Whereby, understanding perceptions and behaviours surrounding domestic water use is important before recommendations regarding behavioural change can be made.

3. Literature Review

3.1 "The urban stream syndrome"

Understanding our urban waterways and the process of stormwater discharge was used as a starting point for our research. Walsh et. al (2005) defines the term "urban stream syndrome", which relates to how streams which drain urban land become ecologically degraded over time. Increased impervious surfaces such as roads and carparks prevent water from being absorbed into the surface and instead is piped into stormwater drainage systems. Furthermore, in urban areas rainwater is also collected from roofs and this water is drained through the system. Throughout this process harmful contaminants are washed from the surface and transported through the network into nearby waterways, contaminating the water.

In Christchurch, the Avon and Heathcote catchments (and in particular the Haytons and Curletts Road streams) are the most polluted as a result of the syndrome (CCC, 2016). In the most recent monitoring report in 2016, significant contaminants are said to include heavy metals such as zinc and copper, sediment loads, and waterfowl (CCC, 2016).

While a range of factors contribute to stormwater and waterway contamination, an Environment Canterbury (ECAN) report on stormwater quality confirms that domestic activities can pollute the water (ECAN, 2010). Car washing for example, is a contributor of petroleum hydrocarbons and zinc, and water runoff from roofs is known to have a high zinc content (ECAN, 2010). Use of outdoor cleaners, littering

of cigarette butts and point discharges from paint brush washing, are also known to contribute to poor water quality (ECAN, 2010).

3.2 Approaches to changing water use behaviour

While the following articles focus on water conservation and primarily on water quality, the articles are of particular relevance as they discuss approaches to changing specific behaviours. In Gilg and Barr (2005), the characteristics of a water saver were identified so that policy makers can more accurately implement initiatives. Here the authors comment that the "lived experiences" be taken into account as well as appreciating those who are more likely to engage in activities similar to those which are being promoted (Gilg and Barr, 2005).

A study in Athens, Greece, by Koutiva et. al (2016), attempts to understand society's water demand behaviour. This is due to the inaccuracies in understanding the attitudes and perceptions of Athenian's, which have hampered management responses. The article found that a significant factor was trust, with most Athenian's blaming water shortages on farmers, as well as perceiving the water as a source of life, and to be used at their discretion (Koutiva et. al, 2016).

Certain aims of our research were briefly discussed in an ECAN report on improving urban waterway health. This report uses previous research on the local community's perception of the Okeover Stream in order to make recommendations on possible ideas to raise awareness about the stream (ECAN, 2010).

These articles stressed the importance of understanding perceptions and behaviour before any ideas surrounding strategies is implemented. From this, the research group was able to formulate a conceptual framework for the study.

3.3 Collecting data

The group investigated data collection techniques, primarily questionnaires and focus groups. According to Flowerdew and Martin (2005) focus groups are useful for gaining an insight into the minds of the participants regarding an environmental issue. Whereas in Gomez and Jones (2010) questionnaires are said to be useful when

obtaining statistically valid data. For these reasons it was decided that focus groups would be the preferred method to collect data.

Dunk et. al (2011), used focus groups to address possible methods to raise awareness about the increase in stormwater pollution due to incorrectly installed domestic, wastewater piping. The article highlights the importance of carefully selecting your groups and to develop a list of pre-prepared questions to ensure that each group was lead down the same pathway (Dunk et al, 2011). Furthermore, questions that were phrased with "what" or "how" were better than "why" as it was felt that these were more challenging to answer.

The impacts of subjectivity when conducting focus groups was laid out in Hay (2010). Subjectivity involves the influence of personal opinions and characteristics during discussions and Hay mentions that emphasis must be given to qualitative research, as the methods used, involve social interactions between the researcher and respondents.

As a result of these impacts from previous research it was decided that questions would be pre-prepared. Two researchers would be present for two reasons, firstly to ensure that the mediator is not influencing the participant and secondly to note any observations about the ways in which the participants responded (Jackson, 2001).

4. Methodology

4.1 Focus Groups

Focus groups were used to gather the primary data for the research. As described by Powell et al, (1996) a focus group is made up of individuals, assembled by researchers to discuss and comment on their experiences on the topic of the research. As discussed above, following the review of previous literature, focus groups were preferred over written questionnaires. Focus groups address our aims by being able to assess people's perceptions and attitudes by talking and engaging with the participants. Furthermore, the group also felt that focus groups would provide an environment where participants could respond without having a significant degree of

personal attachment as they would have during an interview. There was also the opportunity for the researchers to respond to the participants' comments.

4.1.2 Group recruiting

Following with a careful assessment of the diversity of those who are likely to have the greatest impact on the water quality, the group decided to organise a discussion with a group of students and young professionals, experts, garden club members and homeowners. School children were added following feedback from the garden club discussion. There were to be two homeowner groups as the research felt that this was a fundamental area and that the two groups from different locations could make for an interesting comparison. Groups were also chosen to enable both the Avon and Heathcote Rivers to be discussed, as these are the two largest catchments in Christchurch (Figure 1). The research group also chose the groups, as to avoid any open disagreement, for example the views of students may conflict with members of the garden club (Flowerdew and Martin, 2005).

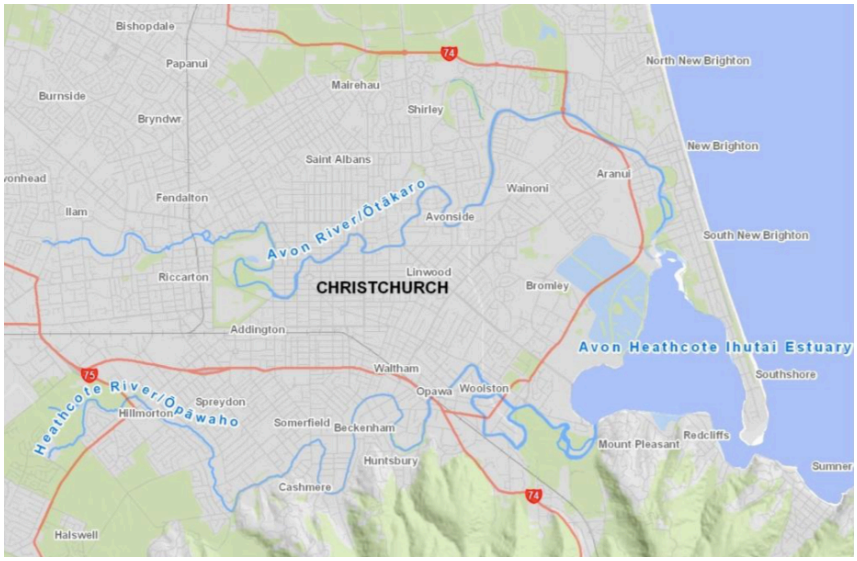

Figure 1: Avon River and Heathcote catchments

Recruiting participants for each group was difficult, hence we adopted a snowball technique (Gomez and Jones, 2010). We began by sending various emails to different groups and contacting friends and various contacts. For example, when recruiting participants for the homeowner discussions local resident associations where

contacted. It was envisaged that each group would contain between 4 to 10 participants with a mix of male and female. Where it was possible we over-recruited by 2 to 3 participants in the chance that somebody could not attend. Lastly, the research group preferred the groups to be 'natural'. According to Flowerdew and Martin (2005), a group maybe 'natural' or 'assembled', each with different implications. A 'natural' group contains participants familiar to each other and 'assembled' is a group of members who don't know each other. 'Natural' groups were preferred, as would encourage participation during the discussions.

4.1.2 Procedures

The group decided that the discussions would be "semi-structured". Each session begun with a 'warm in' period which included an introduction and the distributing of an information sheet to ensure participant confidentiality. This was also done to provide each participant with some insight as to the purpose of our project, and what we hoped to achieve (Appendix 1).

All discussions were conducted in locations familiar to the participants. It was also important that the locations were free from distractions and relatively quiet to ensure that the recording could be replayed. The students at a student flat, the garden club at a members home, the school children at their school the homeowners at their local residential community centre. It maybe important to note that one session was conducted at a nature reserve before the participants were to participate in a tree planting. However this location was quiet and reasonably comfortable with the participants.

4.1.3 Analytical preparation

The recorded transcripts were transcribed through a simplified coding structure in order to identify the key themes. While Strauss (1987) recommends researchers to use different categories the research group simplified this structure and used different columns (Appendix 2). The first column is for the transcript where the others are for commentary and themes. This method allows the research to group to break down the transcript which made it easier to identify the key themes.

4.2 Interview

It was intended to conduct a discussion with a group of waterways experts however due to participant availability a solo interview was arranged. A format similar to the structure used within the focus groups was also adopted for the interview. Another researcher was also present to assist in asking questions and pick up on additional points.

5. Results and discussions from focus groups

5.1 Main findings/ results

Results were collected from each focus group and analysed separately before similarities and differences were examined. Overall, across all groups the level of interaction and collaboration was reasonably strong. For example, people would listen attentively while other group members were talking or raising particular points, and in doing so, others would often stem off their ideas, creating yet more discussion.

5.1.1 Students and young professionals

Students and young professionals tended to show the least interest and engagement when asked questions on water quality and water usage. Apart from one student who had studied a post graduate degree in the field, there seemed to be a lack of interest around water quality, although each participant still willfully took part in the discussion, and offered some interesting feedback. For example, when asked whether they would be comfortable using recycled grey and/or black water, some responses were "it wouldn't really bother me...so long as it was treated to a safe level", and "I don't really mind as long as it's okay to drink". Although they didn't express much interest, each participant agreed that water quality is a major issue, especially for the Avon.

5.1.2 Garden group members

Garden group participants expressed the greatest interest and provided the most discussion of all of the focus groups. Given participants were within an older age bracket, they tended to reflect on their past experiences of water, and how quality was never an issue growing up. For example, one participant said the state of the

waterways was "appalling", and they felt "passionate to be honest... being the age that I am and kiwi born and bred in Canterbury, and knowing the state of the waterways and how they have deteriorated since I was young...". This proves the strong connections that many people have with the waterways around Canterbury, and how overtime, they have witnessed a decline in the state of many streams and rivers.

5.1.3 Homeowners

Homeowners provided a reasonable amount of discussion in regards to visual cues and how this ties in with assessing water quality, however, the group as a whole had little dialogue compared to other groups. The perception on the process of stormwater management was also inadequate. For visual cues, female participants tend to look for rubbish or at the colour/transparency of the water, where as males would look for trout or wildlife, in order to assess the state of the Avon, for example. Similar to other participants, homeowners agreed that the rivers were of poor quality, and also provided several examples of water management strategies, which they adopt.

5.1.4 St Mary's School

Similar to homeowners, pupils from St Mary's School used visual cues to form an opinion of waterways within Christchurch. A number of pupils agreed that when they can't see the bottom of the Avon River, for example, they know it must be dirty. One pupil stated "...you can see it's dirty because you can't see the bottom... but if you could see through the water you can see all the rubbish". This proves the significance of visual cues, and how perceptions on quality correlate strongly with what people see and observe on a daily basis. One pupil said that prior to the quakes they would swim and kayak in the Avon River every second day, but definitely wouldn't now, as perceptions have changed. Pupils also discussed how cleaner water is important for the public eye, stating; "it would be a more pleasant experience for people walking along the river or having a family picnic..." It was also stated that tourists would be "more attracted to the river [if it were cleaner] and make them want to come and look at our rivers". Participants remained enthusiastic and provided a lot of stories based on their experiences with water in Christchurch.

5.1.5 CCC Interview

Several interesting points were discussed throughout our interview with a Waterways Ecologist from the CCC. Firstly, it was stated how there is an evident "disconnect between what people think we are actually protecting", adding, "if people cannot see the fish... they just assume they aren't there, even though they're probably hiding". This relates back to the idea of visual cues, and how other participants used visual observations to form perspectives on the state of our waterways. Our interviewee also suggested that another "perception issue" is people thinking that what we are dealing with in Christchurch is a "unique problem". The only difference in Canterbury is the high number of waterways present, therefore although we are "dealing with a larger scale issue...it is not anything unusual". An important point that was discussed was the need to educate people to take part [in management practices] and "to take on collective responsibility."

5.2 Discussion

Although many groups discussed simple strategies that could be adopted to reduce household runoff and contaminants, very few admitted to actually adopting water management strategies. Homeowner participants however, seemed to engage the most and take on board water saving measures. For example, some participants said they converted grass into native plants to act as a buffer zone for runoff, as well as building a water retention tank, and also installing low-pressure taps.

Reflecting on engagement within each focus group, people who were local to the area tended to have stronger views in regard to water quality, given their experiences with water growing up, and witnessing a decline in quality over time. This can be said for the garden club participants, who stated they felt passionate about Canterbury's waterways given their strong connection. Participants who were not originally from Christchurch, and had less association with the area both temporally and spatially, showed less engagement throughout the discussion. This was the case with young students and professionals, as only 2 from the 9 participants were actually from the region.

According to Dunk et al (2011), respondents may have considerable awareness and concern for the environment, but often know less about their wastewater system. This is consistent with our findings throughout several focus discussions, as there was

limited understanding or awareness of where stormwater ends up. A greater understanding of the impact that household contaminants and stormwater discharges have on nearby waterways, may effectively encourage individuals and groups to take action, and formulate collective responsibility among water users.

5.2.1. Recommendations and points to consider for the Water Festival

The above results were helpful in gaining an understanding of people's knowledge and awareness of water quality issues within Christchurch's urban waterways. Moreover, the results provided an insight into people's perceptions about what they thought was important, who/what they believed was the cause of the problem, and lastly provided an insight to practices they adopt, if any at all, which limit contamination. These results have been analysed and a number of recommendations to the festival organisers have been suggested below.

5.2.1.1 Maori values and history

As mentioned, participants from the garden club and both homeowner groups made frequent reference to the past, however, interestingly made no mention of Maori values or influences with regards to the Avon and Heathcote Rivers. An understanding of Maori traditions could strengthen people's association with the waterways, and in turn, induce change.

Lastly, to recognise participant's references to the past, organisers could include sections that portray the rivers in a positive light. These sections could discuss activities that used to occur in the Avon River. Lamb (1981) describes how in the early 1900's people used to regularly swim in river and described the water as "cool and clear as crystal". It is suggested that the organisers are constantly reminded to continue to portray the history of the waterways and the Avon River specifically when making decisions.

5.2.1.2 Use of visual impacts

It was identified from the results that participants make visual observations when assessing the quality of waterways. Most look for turbidity and rubbish, while some look for fish. These results were not unusual as you cannot taste the water, nor is it common for a river to give off a smell, however the research group felt that the

festival must have a visual impact. Also participants, when questioned on if they had seen any signage, commented that they hadn't.

The effect of visual impacts has been examined by Larson and Edsall (2010), when visual information influencing perceptions of water resource problems in Arizona was assessed. It was noted that there was an increase in awareness through the use of 2D and 3D imagining as long as there was colour and the image was striking. Interestingly the article suggests that movies can be effective in altering peoples behaviours as was the case with the movie "The Day After Tomorrow" which concerned climate change.

Jensen et al (2015) discussed the success of the transformation of the harbour in Copenhagen, Demark. Their harbour is now swimmable following a significant transition and it was noted that a sculpture in the center of town was a crucial component to changing behaviour. The research group recommends that the organisers ensure that the images are striking and also considers the use of objects and figures to influence behaviour. Appendices (3 –7) provide examples of images of the kind that the group believes would be effective in influencing the demographic researched.

Other options may include dying water to show stormwater connections (ECAN, 2010), eye catching pamphlets and strong stormwater messaging such as "washing your car on the drive can kill our fish".

5.2.1.3 "Myth Busting"- what can be done

During the analysis it become known that the participants appeared to blame others for the poor water quality. Participants not only blamed others, but were reasonably hesitant to discuss behaviours that prevent contamination. As discussed in ECAN, (2011) there are numerous behaviours that people can do to prevent waterway contamination and these points were emphasized in the interview with the waterways expert. It is envisioned that this idea will help remove the blame and shift more responsibility back to the homeowner.

5.2.1.4 Water Awards

On analysis it appears that there is a disparity between perceptions and attitudes and behaviour. Disparity also seems to exist between the demographics researched, with many participants expressing different views. This disparity is not uncommon, as Bamberg (2002) raised doubt about whether intention is the only direct determinant of behaviour.

The research group recommends as an attempt to reduce this disparity an awards presentation should be held. We suggest that organisers hold a nomination process with a judging panel awarding different people from different groups. Awards for innovation and contribution maybe included along with others. Essentially what ever form it takes, the idea is to pull the different demographics together, remove the negativity, create competition, and lastly to encourage a desire to change water use behaviour. The success of awards and incentives have been noted. A study in the Netherlands conducted by Ben-Elia and Ettema (2011) found that daily rewards to avoid "rush hour" traffic significantly improved commuter behaviour.

6.5 Consideration of different socio – groups

It may also be important to address different socio groups and personal learning characteristics to ensure the festivals reach a wide audience. Berk et al (1993) concludes that there is a positive relationship between income and water conservation this was similar to a study conducted by Hines et al (1987). Both studies found that those who had small families and lived on smaller properties used less water. While our research focuses on preserving water quality similarities can be drawn as both issues concern water and the environment. Results from our focus groups also show that younger people share less concern for preserving water quality compared to older people. What is also interesting is that women during the discussions on a whole appear to be more vocal than men. This appears consistent with a study that highlighted that women are more likely to prioritize environmental aspects in their evaluation when making purchases (Hurlimann, 2009). Lastly, we recommend that the organisers ensure that different themes and learning styles are incorporated into their campaigns. This is to ensure that the promotion reaches the different socio-groups discussed.

7. Conclusion

The objective of this report was to provide a number of recommendations to the organisers of the water festival as to strategies that could be used to change people's behaviour surrounding their use of water. In order to make these recommendations the current situation had to be addressed, as well as understanding the perceptions, attitudes and behaviours of people from different demographics.

Initial investigation about the quality of the urban waterways was carried out during the literature review. This found that heavy metals and sediment loads were the most significant contaminants and that 42 out of 43 testing sites failed on at least one parameter. This confirmed that state of the waterways as well as its precarious position.

Following analysis of the results most perceived the water as polluted. More interestingly most are hesitant to comment where stormwater goes, and often are not accountable for their behaviour. Also it must be noted that participant's perceptions do not correlate with their behaviours. Most blame others for the water quality problem and do not appreciate that they are able to make a difference.

The recommendations from this research attempts to close the apparent disparity between perception and associated behaviour, and attempts to shift accountability back to the homeowner. Having obtained data about perceptions and behaviour of people living in Christchurch, tailored recommendations were able to be made. These recommendations are not exhaustive however may assist during the development of the festival.

Future research must continue in this area if the quality of the water in the urban waterways is to improve. While future research may continue to examine the current perceptions and behaviours surrounding water use, future research could include an assessment over the effectiveness of our recommendations. This is because no assessment could be completed on how well the ideas would be received. It must also be remembered that our findings are not limited to the water festival and can be used in any situation where a behavioural shift with regards to domestic use of water is required.

8. Acknowledgements

This research was supported by Di Lucas and Professor Eric Pawson. We thank you for you support over the last three months, your guidance greatly assisted the research.

We would like to also make special mention to the St Albans Resident Association for the use of your community hall and to Redcliffs Resident Association for your participation. To St Mary's School, thank you for your enthusiasm and for inviting us to your school to talk to your pupils. Lastly, to the Somerfield Garden Club your contribution was valued.

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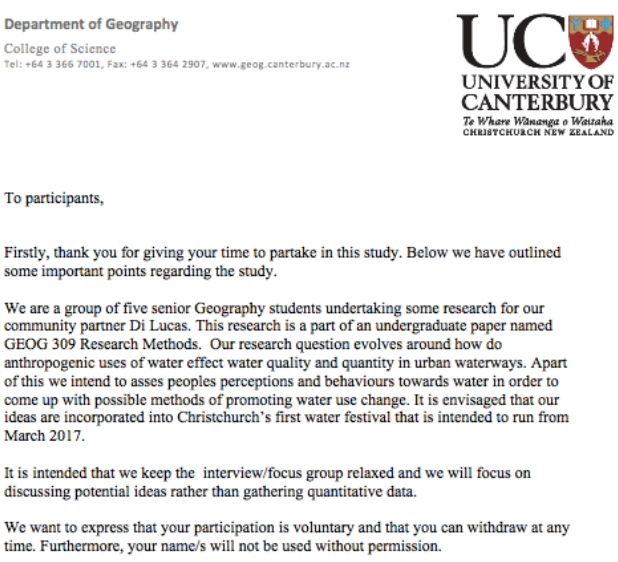
10. Appendices

Appendix 1

Figure 2: Information and confidentiality letter.



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Te Whare Wānanga o Waitaha

CHRISTCHURCH NEW ZEALAND

To participants,

Firstly, thank you for giving your time to partake in this study. Below we have outlined some important points regarding the study.

We are a group of five senior Geography students undertaking some research for our community partner Di Lucas. This research is a part of an undergraduate paper named GEOG 309 Research Methods. Our research question evolves around how do anthropogenic uses of water effect water quality and quantity in urban waterways. Apart of this we intend to asses peoples perceptions and behaviours towards water in order to come up with possible methods of promoting water use change. It is envisaged that our ideas are incorporated into Christchurch's first water festival that is intended to run from March 2017.

It is intended that we keep the interview/focus group relaxed and we will focus on discussing potential ideas rather than gathering quantitative data.

We want to express that your participation is voluntary and that you can withdraw at any time. Furthermore, your name/s will not be used without permission.

Appendix 2

Figure 3: Example of transcript analysis.

Themes	Commentary	Transcripts
Poor water quality	*All the participants shared similar views* *All were very vocal* *"Dirty"was said often*	***What is your current impression of the current state of the waterways?*** *"Dirty"* *"From what you read not very good"* *"Appalling"* *"Dirty"* *"Used to white bait, but not anymore"* *"Dirty"*

Appendix 3

Source: https://www.ccc.govt.nz/assets/Documents/Environment/Water/Monitoring-Reports/Water-Quality-Summary-Infographic-CIT9039-WEB.pdf

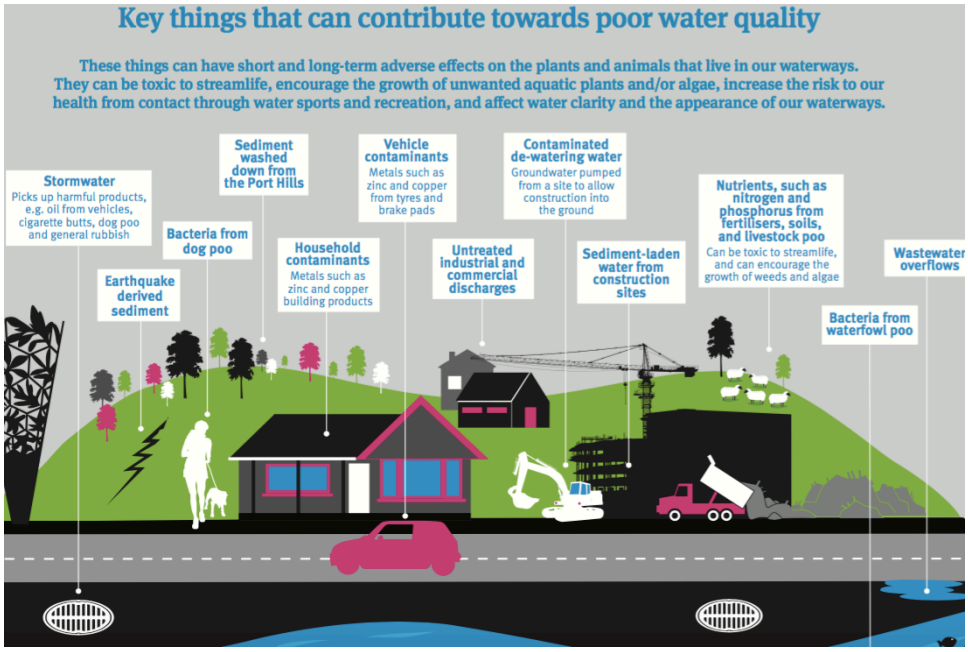

Figure 4: This image was taken from a CCC brochue and outlines the sources of contaminants in the city's waterways

Appendix 4

Source: https://www.ccc.govt.nz/assets/Documents/Environment/Water/Monitoring-Reports/Water-Quality-Summary-Infographic-CIT9039-WEB.pdf

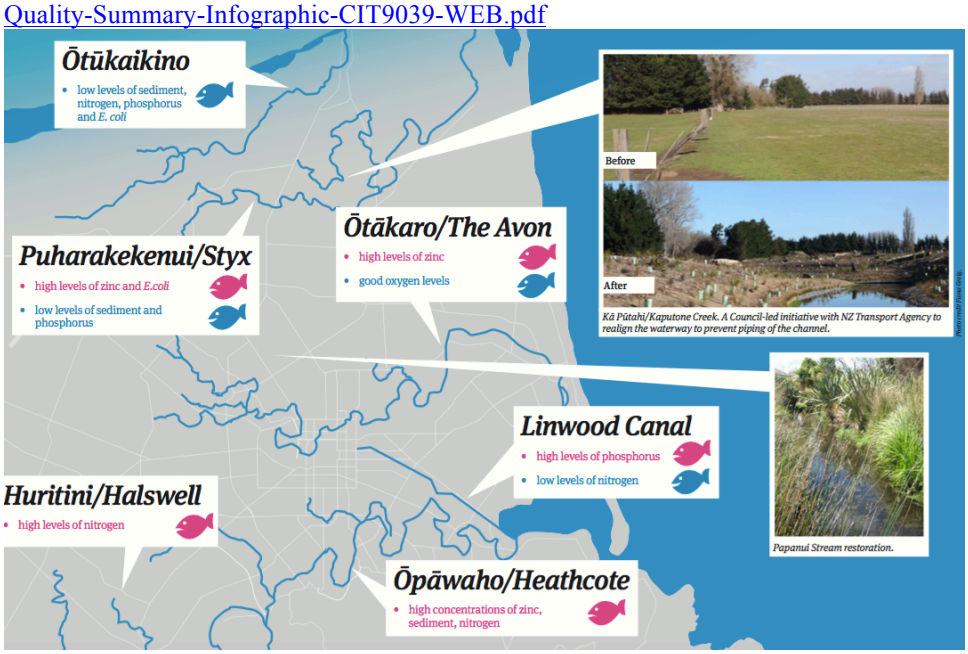

Figure 5: Another image which effectively displays what containments are having the greatest effect on each major waterway.

Appendix 5

Source: http://files.ecan.govt.nz/public/consent-projects/ccc-stormwater/02_CRC160056_Application_Avon_Stormwater_Management_Plan.PDF

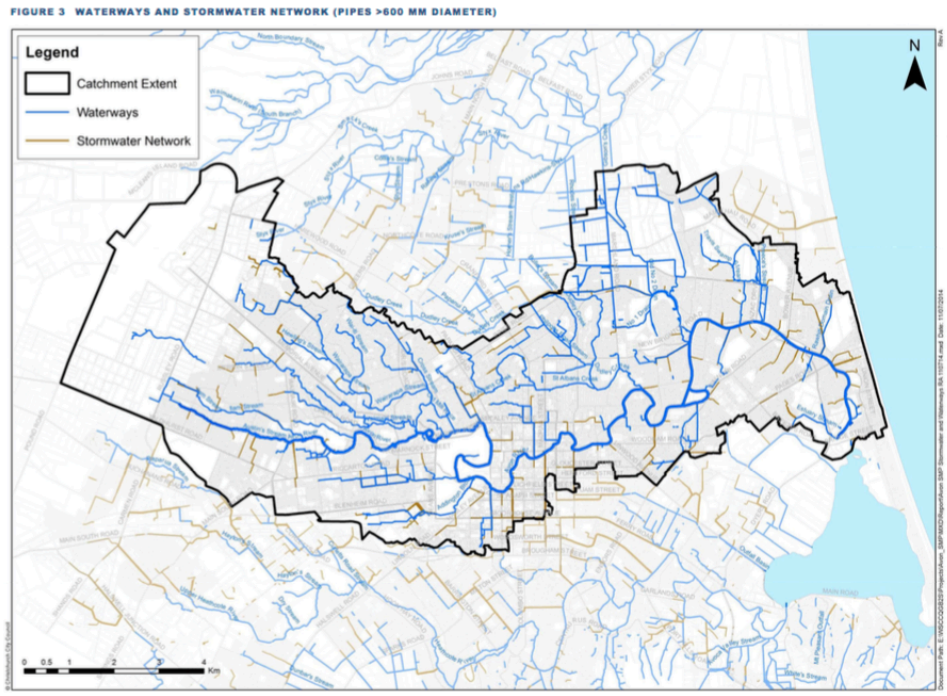

Figure 6: This image shows how the waterways forms an integral part of the stormwater network.

Appendix 6

Source: https://nz.pinterest.com/cityofreno/only-rain-in-the-storm-drain/

Figure 7: An activity that the festival could implement, as is visual, bold in colour and striking.

Appendix 7

Source: Christchurch City Council

Figure 8: We recommend that these polluted water signs could be developed further, to include images of behaviours that can lead to polluted water.