

## **Lincoln University Digital Thesis**

### **Copyright Statement**

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

This thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- you will use the copy only for the purposes of research or private study
- you will recognise the author's right to be identified as the author of the thesis and due acknowledgement will be made to the author where appropriate
- you will obtain the author's permission before publishing any material from the thesis.

# **How has a contamination to drinking water altered Havelock North business owners' perspectives on water?**

---

A thesis  
submitted in partial fulfilment  
of the requirements for the degree of

Master of Water Resource Management

at  
Waterways Centre for Freshwater Management

by  
Rachel Mary Teen

---

Lincoln University

2018

Abstract of a thesis submitted in partial fulfilment of the  
requirements for the Degree of Master of Water Resource Management.

How has contamination to water supply altered Havelock North business  
owners' perspectives on water?

by

Rachel Teen

Safe drinking water is essential to public health. In August 2016 an outbreak of gastroenteritis in Havelock North, New Zealand, shook the public's trust in the water supply service. Over 5,500 of the town's 14,000 residents were estimated to have fallen ill with campylobacteriosis, and 45 people were hospitalised. There were three attributable deaths and an unknown number still suffer on-going health issues. Consequently business owners were detrimentally affected – financially, operationally and emotionally. Their perceptions of water were immediately affected, particularly with the application of chlorine to the water supply, and their trust in their local government bodies diminished. Transformative Learning Theory was the lens used to ascertain if the contamination event transformed Havelock North business owners' perspectives on water. Perspective change is most likely to occur when people experience a series of sensory perceptionary encounters, also critically reflect on the complete context of those physical and mental perceptions, and additionally, critically *self*-reflect on how they can transform the context or situation and then take action. All business owners underwent changes in perception concerning their water supply and all critically reflected on the context of the contamination event. However, none were deemed to have undergone a transformation in their perspectives on water because they did not engage in any critical self-reflection. The various causes of the contamination were all external to Havelock North business owners, they perceived there was no need for them to critically self-reflect on themselves nor their business strategies. Their perceptions in regard to the importance of water did change because the event made many of them realise how integral water was to trading and remaining operational. The disruption triggered them to think about the connectivity of water to natural ecosystems, including humanity. Business owners unquestioningly accepted the unwritten hydrosocial contract with the local councils, and none had experienced a transformative perspective change whereby they sought to renegotiate this contract.

**Keywords:** water supply, hydrosocial contract, hydrosocial cycle, resource management, perception, perspective, transformative learning, business owners, MSMEs, contamination, council, chlorination.

# Table of Contents

<b>Abstract .....</b>	<b>ii</b>
<b>Table of Contents .....</b>	<b>iii</b>
<b>List of Tables .....</b>	<b>v</b>
<b>List of Figures .....</b>	<b>v</b>
<b>Acknowledgements .....</b>	<b>vi</b>
<b>Chapter 1 Introduction.....</b>	<b>1</b>
1.1 Context .....	1
1.2 The contamination event .....	3
1.3 Global issues .....	6
1.4 Purpose and scope .....	6
1.5 Significance of this study .....	7
1.6 Thesis structure and outline .....	8
<b>Chapter 2 Literature Review .....</b>	<b>9</b>
2.1 Human disconnection from water .....	9
2.2 The business of water .....	11
2.3 Theory lens .....	13
2.4 Water connections to micro, small and medium enterprises (MSMEs) .....	14
What is a micro, small or medium enterprise? .....	14
2.5 Theoretical perspective .....	15
<b>Chapter 3 Methodology .....</b>	<b>26</b>
3.1 Introduction.....	26
3.2 Research aims and questions .....	26
3.3 Qualitative research methodology .....	27
3.4 Reflection on the researcher's position.....	27
3.5 Case study research .....	28
3.6 The 'case' context.....	28
3.7 Data collection method .....	29
3.8 Participant selection .....	30
3.9 Semi-structured interviews .....	32
3.10 Ethics approval and confidentiality .....	32
3.11 Data analysis methods.....	32
3.12 Thematic analysis .....	33
3.13 Summary.....	34
<b>Chapter 4 Results .....</b>	<b>35</b>
4.1 Alignment with Mezirow's ten phases of Transformative Learning Theory .....	35
4.2 Findings of the study .....	36
4.3 Phase 1: Disorienting dilemma .....	37
4.3.1 Business owners unwell .....	38
4.3.2 Shock and fear.....	39
4.3.3 Business panic .....	39
4.4 Phase 2: Self-examination .....	41
4.4.1 Thoughts .....	42
4.4.2 Initial responses and adaptations .....	43
4.5 Phase 3: Critical assessment .....	46
4.5.1 Natural ecosystems.....	47

4.5.2	Chlorinated water .....	50
4.5.3	Mistrust of the councils, District Health Board and Ministry of Education .....	52
4.5.4	Councils' communications .....	56
4.5.5	Expectations of councils .....	59
4.5.6	Effects on business .....	61
4.5.7	Mistrust of 'the tap' .....	64
4.5.8	Mistrust of water supply .....	65
4.6	Phase 4: Relating personal discontent to the contamination .....	66
4.6.1	Business discontent .....	66
4.6.2	Divided wider community .....	68
4.6.3	United wider community .....	69
4.7	Phase 5: Exploratory phase .....	70
4.7.1	Testing water quality is crucial .....	70
4.8	Phase 6: Action planning .....	71
4.9	Phases 7-10: Building knowledge and competence to implement plans .....	73
4.10	Results summary .....	75
<b>Chapter 5 Discussion .....</b>		<b>76</b>
5.1	Introduction .....	76
5.2	Research Questions .....	78
5.2.1	Question One .....	78
5.2.2	Question Two .....	80
5.2.3	Question Three .....	82
5.2.4	Question Four .....	85
5.3	Implications .....	90
<b>Chapter 6 Conclusion .....</b>		<b>94</b>
6.1	Conclusion .....	94
6.2	Limitations and further research .....	96
6.3	Recommendations for policy .....	97
<b>Appendix 1 .....</b>		<b>98</b>
<b>Appendix 2 .....</b>		<b>100</b>
<b>Appendix 3 .....</b>		<b>101</b>
<b>References .....</b>		<b>102</b>

## List of Tables

Table 2.1: New Zealand’s Ministry of Economic Development’s enterprise definitions .....	15
Table 2.2: Mezirow’s Ten Phases of Transformative Learning .....	17
Table 3.1: List of interviewees’ business types and data codes.....	30

## List of Figures

Figure 1.1: Havelock North’s geographic location at the base of Te Mata Ranges (south) and in relation to Napier (north) and Hastings (northwest), central Hawke’s Bay, New Zealand.....	1
Figure 1.2: Map showing the five constituencies within the Hawke’s Bay Regional Council (HBRC), the Hastings District Council is represented in the grey area within the blue Ngaruroro Constituency. Havelock North township is indicated with a ‘star’ at the southeastern end of the Hastings Constituency. ....	2
Figure 1.3: Map showing Brookvale Road bores 1, 2 & 3 on the northeast edge of Havelock North township. ....	4
Figure 1.4: Images showing Brookvale Road bore 1 (left) and Brookvale Road bore 2 (right) adjacent to the sheep grazing paddocks on Brookvale Road, April 2017. ....	5
Figure 3.1: Proximity of Havelock North Township to Brookvale Road bores.....	31
Figure 4.1: Number of references by interviewees that could be linked to each of the ten phases of Mezirow’s Transformative Learning Theory (1978).....	36
Figure 5.1: Diagram showing learning processes linked to the Adaptive Water Management policy cycle .....	92

## **Acknowledgements**

I would especially like to thank my principle supervisor Dr. Lin Roberts, for her knowledge, guidance and perserverance with my thesis work. Thank you also to my co-supervisors Dr Ed Challies and Dr Ronlyn Duncan.

Thank you to my colleagues at the Waterways Centre for Freshwater Management, you have all provided a collaborative, engaging and pleasurable place in which to work.

A very special thank you to the Havelock North Business Association and the business owners I interviewed for this case study. You all experienced a very frightening time within your community so I appreciate your willingness to relive those feelings and experiences.

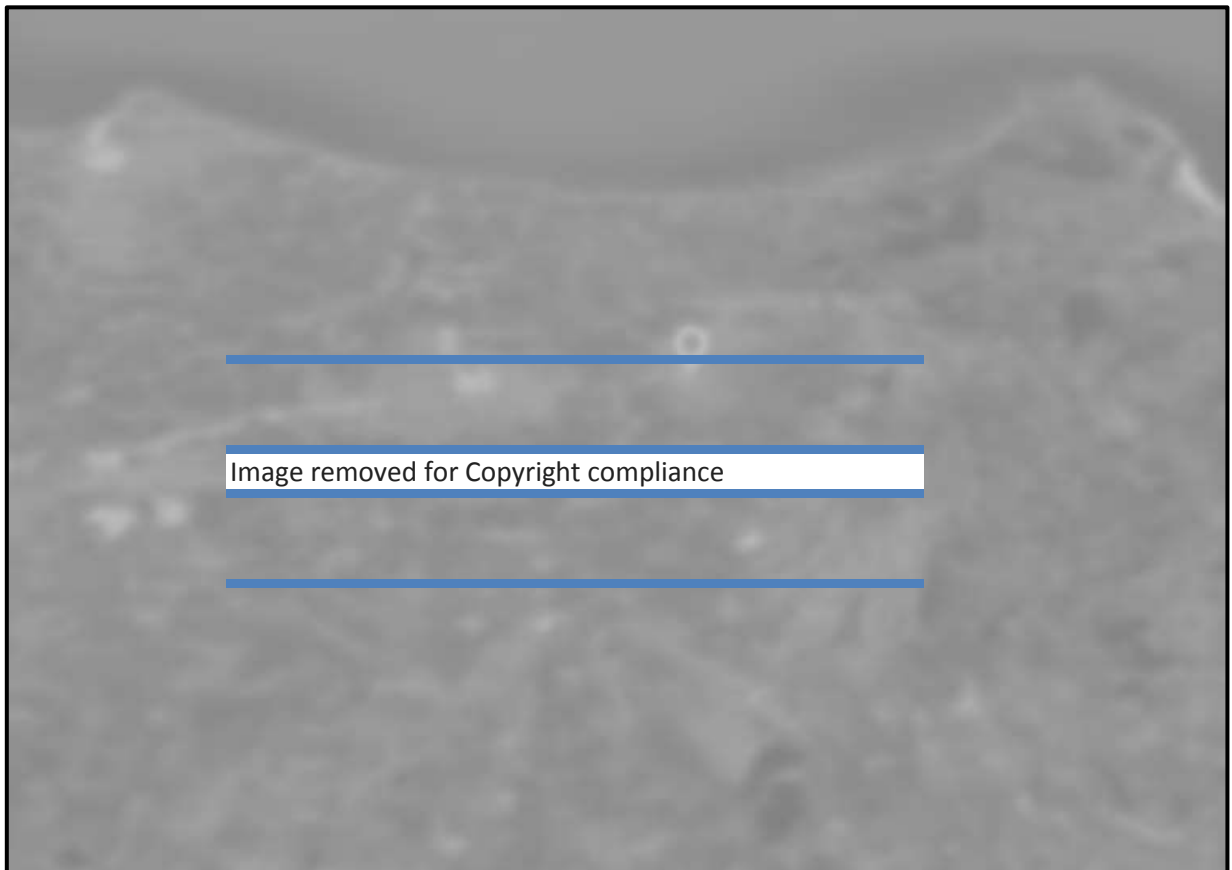
And of course I would like to acknowledge my wonderful family – my supportive husband Raymond and my inspiring young son Liam.

# Chapter 1

## Introduction

### 1.1 Context

In early August 2016, the small New Zealand town of Havelock North was rocked by a *Campylobacter* contamination of the town's water supply. This thesis explores how this extraordinary event affected the local business owners' perspectives on water. Havelock North is a small town nestled at the foot of Te Mata Peak (elevation 399 metres), in the eastern central area of the North Island's Hawke's Bay region (see Figure 1.1 below). To the north runs the 164 kilometre long Ngaruroro River, fed by the Kaweka, Kaimanawa and Ruahine Ranges, and to the south runs the 117 kilometre long Tukituki River, which originates from the Ruahine Ranges. The 'village' of Havelock North has a population of approximately 3,000 people (Statistics New Zealand, 2013) and the wider area is home to over 13,000 people of which twenty-five percent are of retirement age (Hastings District Council, 2015).

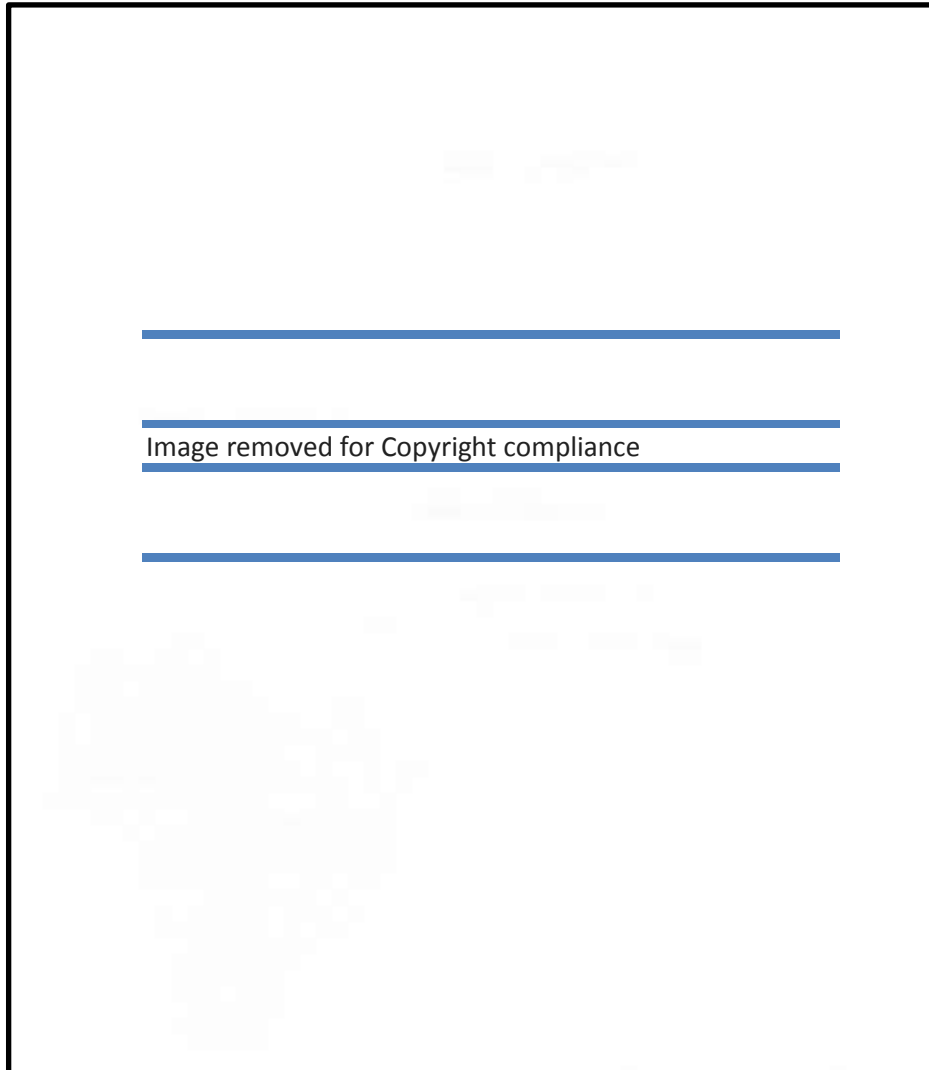


**Figure 1.1: Havelock North's geographic location at the base of Te Mata Ranges (south) and in relation to Napier (north) and Hastings (northwest), central Hawke's Bay, New Zealand.**

(Source: Google Earth, 2018)



The wider district of Hawke’s Bay covers around 14,000 square kilometres in which just over 150,000 people reside (Department of Internal Affairs, 2013) within the five allocated constituencies (see Figure 1.2 below) (Hawke's Bay Regional Council, 2017). One of those constituencies is the Hastings Constituency, within which the Hastings District Council (HDC) operates. HDC is the council from which Havelock North is civically administered.



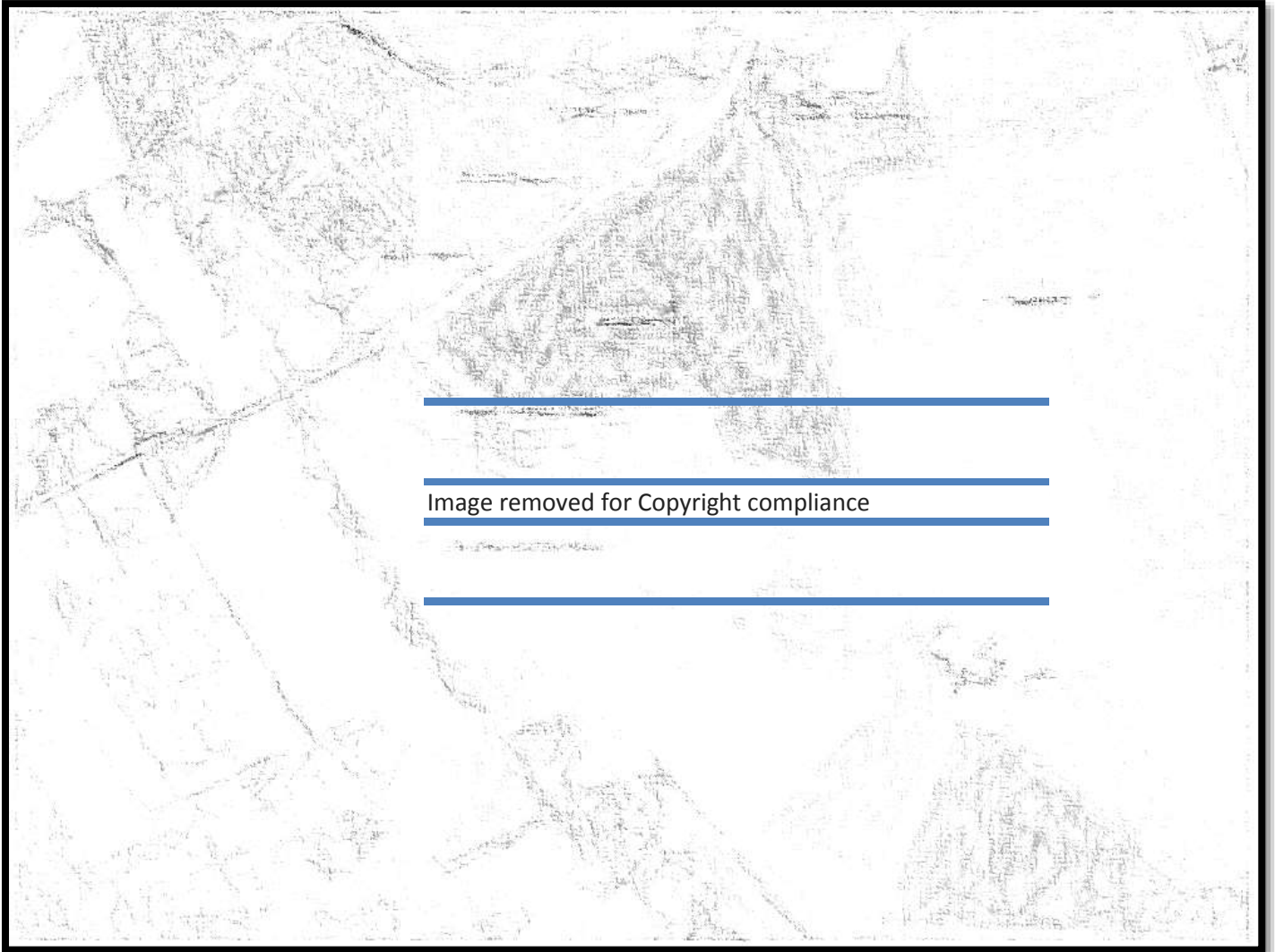
**Figure 1.2: Map showing the five constituencies within the Hawke’s Bay Regional Council (HBRC). Hastings District Council is represented in the grey area within the blue Ngaruroro Constituency, and Havelock North township is indicated with a ‘star’ at the southeastern end of the Hastings Constituency.**  
(Source: HBRC, 2017)

The Hawke’s Bay Regional Council (HBRC) is the Hawke’s Bay region’s environmental management and economic development authority established to ensure the sustainable use of the region’s natural resources (Hawke's Bay Regional Council, 2017). They describe their role as being to provide leadership in natural resource knowledge and management, natural hazard assessment and management, regional strategic planning, regional scale infrastructure and services and economic development (Hawke's Bay Regional Council, 2017, pp. 4-5). Both HDC and HBRC, along with their contracted Drinking-water Assessors, hold responsibility for the water supply regime in Havelock North.

## 1.2 The contamination event

During early August 2016 Havelock North experienced major rainfall events. Contaminated water from nearby sheep grazing paddocks flowed into the Mangateretere Pond about 90 metres from Brookvale Road bore 1. On 5<sup>th</sup> and 6<sup>th</sup> August water in the pond entered the aquifer and flowed across to Brookvale Road bore 1 where the bore pump drew contaminated water through the bore and into the reticulation system (New Zealand Government, 2017a). On Friday 13<sup>th</sup> August 2016, 102 primary school children, from a roll of about 550, were absent from Havelock North Primary School. That weekend multiple queues of people continued to stand at all three local pharmacies and two people were critically ill with gastroenteritis in intensive care at Hawke's Bay Regional Hospital. Fifteen people also presented to the hospital suffering with vomiting and diarrhoea. The cause of all these illnesses was *Campylobacter* bacteria contaminating the Havelock North town water supply (Hunt, 2016).

The following week, then Prime Minister John Key, confirmed an inquiry would be launched into the water contamination issues affecting Havelock North (Price, 2016). By 21<sup>st</sup> August 2016 there were 168 confirmed cases and 355 suspected cases of campylobacteriosis, and approximately 4,500 people had been affected (New Zealand Government, 2016). By May the following year three deaths were deemed likely to be linked to the August 2016 outbreak (New Zealand Government, 2017a, p.1). All of Havelock North's drinking water supply came from the bores on the Brookvale Road (see Figure 1.3 below), located northeast of the township and approximately one kilometre from the Mangateretere Stream. The water was sourced from the gravel aquifers 35m beneath the Heretaunga Plains and supplied untreated to the township.



**Figure 1.3: Map showing Brookvale Road bores 1, 2 & 3 on the northeast edge of Havelock North township.**  
(Source: Havelock North Inquiry Stage One, NZ Government 2017)

The bores sit close to the boundary of two large paddocks where the landowner periodically grazes sheep. In consulting firm Tonkin and Taylor's 2017 report, the key features of Brookvale Road bore 1 are listed as follows:- the 'lid' was 1.8 metres below the ground; a 200 millimetre wide bore was inserted to a depth of 35 metres; there were unsecured mains and cable ducts; shallow drains lay adjacent to the bore; storm water could enter the bore chamber during rainfall events; and the high water level alarm did not activate (Cussins, 2017).

By August 2017, Brookvale Road bore 1 (see figure 1.4 below) had been permanently decommissioned and Hastings District Council confirmed that it would not use that bore again. They also advised that Brookvale Road bore 2 (figure 1.4 below) would be decommissioned and Brookvale Road bore 3 no longer provided the only water source to the town. Subsequently, bore 3 was subjected to on-going filtration, ultra violet and chlorination treatments and is due to be decommissioned after the 2018-2019 summer.



**Figure 1.4: Images showing Brookvale Road bore 1 (left) and Brookvale Road bore 2 (right) adjacent to the sheep grazing paddocks on Brookvale Road, April 2017.**

(Source: R Teen, 2016)

Following the contamination event described above, the Drinking-water Assessors, the HDC and the HBRC were all deemed to have “failed to adhere to the high levels of care and diligence necessary to protect public health and to avoid outbreaks of serious illness” (New Zealand Government, 2017a, p. 2). Stage One of the Government Inquiry found fifteen key findings specifically identifying the areas of responsibility that were breached but that none of the breaches of standards, faults or omissions directly caused the outbreak (New Zealand Government, 2017a). Stage One of the Inquiry identified key issues which had not been learnt from the previous 1998 outbreak – the supply aquifer was not confined, there was already a history of high *E. coli* readings, poor working relationships existed between the regional and district councils, and the response to the outbreak did not sufficiently consider the protozoa risk (New Zealand Government, 2017a). Stage Two of the Government Inquiry focused on a list of issues regarding the improvement of the safety of drinking water in New Zealand, lessons to be learned from the Havelock North outbreak, and changes which should be made to achieve those goals. It also considered the ongoing safety of the Havelock North drinking water supply (New Zealand Government, 2017b).

### 1.3 Global issues

The declining quality and availability of water is a global issue that threatens the environment, societies and economies worldwide. Both 'developed' and 'developing countries' face serious and increasing issues of fresh water pollution that inevitably poses growing risks to public health, food security, biodiversity and ecosystem services (United Nations Water, 2016).

As noted by the United Nations Environmental Programme (2016), until relatively recently concern about water quality was focused on the direct human uses of water. Minimal effort was directed towards maintaining or monitoring water quality levels for the benefit of natural communities or aquatic organisms. However these ecosystems are crucial not only to conserve biodiversity but also due to their importance as sources of food and livelihood (United Nations Environmental Programme, 2016). There appears to be languid acknowledgement of water degradation by business communities despite the well documented numerous pressures due to climatic, geochemical and anthropocentric influences (Cosgrove & Rijsberman, 2000; United Nations Environmental Programme, 2016; United Nations Water, 2016).

After agriculture, industry is the second largest user of water globally, however water use varies significantly across the sector (United Nations Educational Scientific and Cultural Organisation, 2017). Rapid industrial growth and water intakes discharged as waste water into natural water courses has resulted in "industrial water use [as] one of the main causes of water pollution in the world" (Shiklomanov, 1998, p. 18). Water consumption across the sector ranges from simple personal hygiene in retail and services outlets, to production of food and beverages that rely heavily on water as a key ingredient, such as a beer or milk production company.

McDonough & Braungart (2000, p. 55) argue that current practices are unsustainable and suggest a new path:

*Industry and the environment appear to be at odds because current methods of production, extraction and disposal are destructive to the natural world... We present a new paradigm for industry, eco-effectiveness;...new decision criteria that integrate ecology, economy, and equity; and beginning steps businesses can take towards a world of abundance, rather than one of limits and constraints.*

Given the localised failures of industrial 'big water', perhaps disruptions or shocks to the established systems may afford new learnings and trigger paradigm shifts going forward.

### 1.4 Purpose and scope

The purpose of this study is to ascertain how a sudden, significant disruption to and contamination of drinking water supply altered Havelock North's business owners' perspectives on water. The study also seeks to establish the extent to which business owners perceive themselves as connected to and

dependent on the natural eco-systems underpinning their daily business operations, and their level of awareness in terms of their cumulative effects on those ecosystems. Can an unforeseen disruption, from the 'taken for granted' situation with 'water at the turn of a tap', transform the way business owners think about water in their business and their lives? And if so, how and to what extent are people's perspectives on water likely to change? In this qualitative case study, twenty micro, small and medium business owners in the town of Havelock North, Hawke's Bay, New Zealand were interviewed at the end of May 2017, ten months after the *Campylobacter* contamination event. Jack Mezirow's Transformational Learning Theory (Mezirow & Marsick, 1978) was the lens applied to the collected data to ascertain whether or not business owners' perspectives on water had changed.

The specific research questions addressed were:

- 1) Are Havelock North business owners aware their business is connected to and dependent on natural water eco-systems?
- 2) Are Havelock North business owners aware of their cumulative water usage and the consequential, long-term effects on natural water ecosystems?
- 3) Are business owners open to changes in their hydrosocial contract?
- 4) Have Havelock North business owners' undergone a transformative change in their perspectives on water?

## **1.5 Significance of this study**

This study will explore whether business owners perceive their enterprises are connected to and dependent on natural water ecosystems. Hillary (2000) believes that SME's lack awareness of their own impacts on the environment and that their unquantified "contribution to pollution load...[and] their sheer numbers may mean their environmental impacts are substantial...[and there are] potential opportunities to be derived from engaging SMEs in the drive towards sustainable development" (2000, pp. 11-12). This study will therefore explore the extent to which micro and SMEs are consciously aware of their cumulative, long-term effects on those ecosystems when using and engaging with water. Finally, this research will investigate whether a serious contamination of local water supply has transformed affected business owners' perspectives on water.

As anthropocentric activities continue to increase the stresses on Earth's available freshwater resources, it is hoped that the findings from this study will assist businesses to become more aware of their reliance on water for the success of their businesses. Additionally, knowing more about the appropriate contexts and applicability of Transformative Learning may assist with identifying a process to apply "transformative learning in society at large" (Walter, 2011, p. 24), whereby business owners could start to transform their perspectives to start contemplating a different approach to their water resource management.

## **1.6 Thesis structure and outline**

Chapter Two of this study sets out the conceptual framework and provides a literature review of historic and current approaches to water resource management by micro, small and medium enterprises (MSMEs). An exploration of Transformative Learning Theory (Mezirow & Marsick, 1978) is provided, and recent contributions to the literature on environmental and water management paradigms are also examined. Chapter 3 details the research methodology and the Havelock North contamination case study context, interview and data analysis methods are outlined and ethical considerations discussed. Chapter 4 presents the results of the semi-structured interviews according to the ten-phase framework of Mezirow's Transformative Learning Theory (TLT). Chapter 5 discusses the results within the framework of the key research questions. Finally, Chapter 6 concludes the thesis with a synopsis of the research findings, reflects on limitations and avenues for further research, and makes recommendations for government agencies and policy makers involved in the management and governance of water resources.

## Chapter 2

### Literature Review

#### 2.1 Human disconnection from water

The majority of humans no longer collect their freshwater directly from local ecosystems. For most people water now comes into their homes through street pipes, fed into house pipes that are hidden behind the walls and thence emerges from an easily turned tap. Kaika (2005) reminds us that in order for this seemingly simple access to water to occur, water has previously been ‘abstracted, dammed, channelled, stored, distilled and chlorinated’. Access to water has been simplified and made easy specifically for human consumption.

*“In short water becomes a modern “hybrid”...neither purely natural nor purely a human product; something that is materially produced as a commodity (and thus subject to social relations of production), but socially constructed as part of nature (and thus supposedly alien to social processes).”*

(Kaika, 2005, p. 53)

The social and physical qualities of water are inevitably altered by this hybridisation and water becomes subject to ‘social relations of production’ (Kaika, 2005). This means that while water enters our homes in a seemingly effortlessly manner, ‘out there’ in nature, considerable engineering and management is necessary in order to provide this natural resource in high quantities and of a healthy quality. Sound physical logistics are required to manage and provide water, as are the crucial social, cultural and governance conditions.

*“As the Romans had discovered with their aqueducts, and the early hydraulic societies with their canals, urban water systems also required complex forms of governance that defined who owned which supply sources, who would have access and when, and who would pay and be paid for water delivery.”*

(Strang, 2015, p. 109)

The flowing and surface tension characteristics of water are central to the evolution of all biological organisms and are also central to how each human society experiences and thinks about water (Strang, 2015). Early civilisations developed in areas where water dominated the environment and challenged human ingenuity (Leopold & David 1968, as cited in Falkenmark & Rostrom, 2004). Feats of engineering along the Euphrates, Tigris, Nile, Indus and Yellow Rivers secured easy access to river water for transport and irrigation (Falkenmark & Rockstrom, 2004; Richter, 2016). During the United Kingdom’s Industrial Revolution, water was key to the invention of the steam-driven engine and then later development of hydropower to generate electricity (Falkenmark & Rockstrom, 2004).



Present day human access to water differs considerably from how it was accessed hundreds of years ago (Kaika, 2005). In the Western world, water was traditionally searched for outside of settlement areas and painstakingly brought into the house, “predominantly...on the part of women, a practice that can still be found in non-Western societies” (Kaika, 2005, p. 53). She notes the debate about ‘the line’ marking the ‘inside from the outside, nature from human beings’ and the notion that the development of this ‘line’ may have brought about a break in the relationship between an all-encompassing nature and human beings (Kaika, 2005, p. 51). According to Ruskin (1891), during the Enlightenment period the house became a home that went on to become an “autonomous protected utopia...through ostracizing the undesired social as well as the undesired natural elements and processes’ (Ruskin, 1891:136-137, cited in Kaika, 2005, p. 52). For the purpose of this thesis, Kaika’s observations on taming water within the home can be extended to also include small and medium business facilities.

Strang (2015) notes that during Medieval times polluted waterways reinforced ideas of “‘bad’, life-threatening water” (p. 108), so Nature had to be ‘denatured’ and water was “re-produced by human actions” to clean, maintain and control it. This thinking “crystallized a shift in ideas about ownership” (Strang, 2015), that water could be civically owned in order to develop water supplies for urban areas. This ‘ownership’ required civic facilities and plumbing technology, labour and expertise. Thus began water’s conceptual movement from a natural, ecosystem-based resource to a hybrid of natural and socio-economic controlled commodity.

Alongside this hybrid of nature-human ‘control’ of water came responsibilities. Nature could no longer be blamed for the lack, over-abundance, or quality of water (Kaika, 2005). The civic and private organisations that provided water to urban populations had a significant role to play in maintaining the quality and managing the quantities of water.

As global, national and local water issues become more widespread, this relationship between water and society has come to the fore. The traditional hydrologic cycle of water (Horton, 1931) has been advanced by the concept of the hydrosocial cycle as a way to theorise and analyse water-society relations (Linton & Budds, 2014). The hydrosocial cycle is a relational-dialectical approach that conceptualises the socio-natural processing of water to describe how “flows of water reflect human affairs and human affairs are enlivened by water” (Linton, 2010, p. 68).

Strengers and Maller (2012) assert that our water “supply systems [are] characterised by immateriality, (perceived) abundance and homogeneity [which] may allow resources to recede into the background of everyday life, shift responsibility and control onto governments and private utilities, and lock-in resource intensive ways of life” (p. 761). They call for practical suggestions and policy that encourages adaptive capacity towards water resources through implementation of different water resource strategies for

different objectives, sharing practical experiences, incentivising innovation and providing water in a physically present way within our everyday lives – not just from ‘a tap in the wall’.

## 2.2 The business of water

The growing scarcity of freshwater due to changing climate and significant escalations in the demand for water is increasingly seen as a major risk for the global economy (Hoekstra, 2014; Richter, 2016; World Wildlife Fund, 2016) and the global environment (Cosgrove & Rijsberman, 2000). In their *Global Risks Perception Survey*, the World Economic Forum (2016) has identified the global water crises as the highest concern for businesses over the next ten years.

As stated by Houdet *et al* (2015):

*Water sourcing, use and discharge management have become critical issues to numerous business activities throughout the world. For instance, securing water supply is critical to farming and food production (e.g. World Water Assessment Programme, 2014), while increasing water use and pollution are starting to generate severe operational, investment and reputational risk for the agribusiness, mining, industrial and financial sectors.*

(Houdet, Johnstone, & Germaneau, 2015)

With serious issues around water resources, failure of climate change mitigation and adaptation, extreme weather events, and looming food crises (World Economic Forum, 2016), corporate businesses are beginning to measure and report their dependencies and impacts on the environment (Bianchi & Noci, 1998; Bishop *et al.*, 2010; Whitehead, 2013). By setting targets and goals, businesses can frame their sustainability targets in various ways – “the challenge is to be SMART<sup>1</sup>” (Bishop *et al.*, 2010, p. 6) and identify SMART targets, fully integrating the business management systems with an environmental strategy and operational policies (Kerr, 2006), and listening to demands from external stakeholders (Bianchi & Noci, 1998).

But not all businesses are managing, measuring and reporting on their sustainability practices and interactions with water. Hillary (2000) believes the small and medium enterprise (SME<sup>2</sup>) sector is ‘dark’, but there is ‘light within it’. She points out that SMEs have less bureaucracy, are quick to respond and their internal communication channels are efficient, so they should be able to have a distinct advantage over large corporates at implementing environmental management systems (Hillary, 2000).

However Hillary (2000), claims current sustainable business tools have been created with larger firms in mind and are difficult for SMEs to employ. While many large corporates have the financial and

---

<sup>1</sup> SMART – specific, measurable, achievable, relevant and time bound.

<sup>2</sup> See Section 2.4 for definition of SMEs and micro-enterprises by size and turnover. While Hillary (2000) only discusses SMEs, this thesis also includes owner-operator businesses (micro-enterprises).

employee resources to implement reporting, the small and medium businesses do not (Bianchi & Noci, 1998). Small businesses in particular have significant resource constraints that “increase the difficulty of getting started on the path of systematically bringing sustainability issues into their operations and aligned with competitive considerations” (Shields & Shelleman, 2015, p. 60). They simply cannot afford the ‘luxury’ of full-time strategic planning support nor a dedicated sustainability employee (Shields & Shelleman, 2015).

Hillary (2000) notes that the percentages of businesses that are SMEs are similar in various countries – in UK 99.8 percent, in European cities around 90 percent, and the United States at 99 percent. She cites advances in technology having allowed more flexibility around production methods, downsizing, reorganising and outsourcing by large firms as leading to the emergence of increasing numbers of small firms. Meanwhile the combined total environmental impact of all of these SMEs is unknown, “a figure of 70 percent is bandied around as SMEs contribution to pollution levels...” (Hillary, 2000, p. 11).

In the New Zealand Government’s 2014 *The Small Business Sector Report* the Ministry of Business, Innovation and Employment (MBIE) identifies 459,300 enterprises with fewer than twenty people, employing 584,000 people (30 percent of the workforce); as well as a further 326,000 self-employed businesses (39 percent of all firms) (Ministry of Business, Innovation & Employment, 2014). Given that New Zealand industry consumes approximately eleven percent of allocated fresh water resources (New Zealand Institute of Economic Research, 2014, p. 14)<sup>3</sup>, industry leadership around responsible management of water resources and development of exemplary practices could help ensure that New Zealand does not actually reach those ‘water resource limits’.

According to some research, MSME (micro, small and medium enterprise) owners and managers generally, and genuinely, do not believe that their business operations are large enough to warrant natural resource conservation and environmental good practice (Hillary, 2000). They see their individual operations as so small and ‘below the radar’ that their operations and practices are insignificant. Additionally, they are so often focussed on remaining economically viable for the short term that they don’t have the time or financial ability to dedicate resources towards environmental issues that are likely to impact on them over the long-term (Bianchi & Noci, 1998).

While the combined total of MSMEs’ environmental impact is not completely certain, there is an urgent need to start focusing on their environmental impact at a local level where those impacts are indeed important and measurable. According to Hillary (2000), the potential impact of small business can be

---

<sup>3</sup> NZIER source Aqualinc Research Limited (2010) statistics for *Distribution of water allocation by use* at 78% irrigation, 11% industrial, 8% drinking, 3% stock, and their figures exclude hydroelectric water use.

attributable to the use of old technology, lack of regulation knowledge, less structure within the MSME and a lack of environmental awareness and alternative options.

*This sector is under-researched. Little is known about its attitudes to and control of environmental impacts. Its very vastness and importance for a healthy global economy....means that its survival and growth is crucial. (Hillary, 2000, p. 12)*

Within a New Zealand context, Whitehead (2013) found a similar vacuum of information in respect of the environmental behaviour of New Zealand MSME owners. His research focussed on the manufacturing sector due to its close relationship with energy use and pollution, and found that manufacturers saw “little rationale for pursuing environmental action due primarily to high costs and low rewards, or a perception that their business has no environmental impact.” (Whitehead, 2013, pp. 1-11)

However as stated by Hillary (2000), it is important that businesses are encouraged and assisted to improve their environmental protection and sustainable development. Even though MSME’s “do not perceive their own environmental impact as significant...collectively, they are” (Hillary, 2000, p. 9). Their *cumulative* significance is crucial and this study aims to explore MSME’s perspectives on and connections to natural water resources.

Will it take a crisis for MSME’s to realise their collective actions and perspectives are also crucial to improving the water resource situation? Albert Einstein espoused that crises enable change and bring progression. Given that the Havelock North contamination was a community crisis, this study will explore whether or not change has come about or if progress has been made.

## **2.3 Theory lens**

Increasing scholarship around transformational change is seen as a required societal response for the management of current and projected climate events (Termeer, Dewulf, & Biesbroek, 2017).

Transformative Learning Theory (TLT) is the lens through which this research ascertains how and indeed if, the major disruption of freshwater resource contamination that happened in Havelock North in August 2016 altered business owners’ perception of water. TLT argues that a major disruption to the habituation of people’s worldviews can trigger a series of critical reflections that can lead to a transformation in thinking, perceptions and actions (Mezirow, 1981).

*Perspectives are constitutive of experience. They determine how we see, think, feel and behave...perspectives afford a limited basis for anticipating events, they are likely to give rise to disorienting dilemmas requiring a different set of criteria for making judgements. Perspectives involve institutionalised ideologies which predicate descriptive categories and rules or conventions governing their*

*use. These involve roles and appropriate relationships and ways of behaving...*  
(Mezirow, 1981, p. 18)

This study aims to reduce the vacuum of knowledge regarding MSME owners' environmental perceptions and perspectives. By investigating Havelock North MSME business owners' perceptions and perspectives on water, this study hopes to increase our understanding of water resource management amongst MSME's. The business owners' disorienting dilemma that this study will focus on, is the August 2016 freshwater drinking supply contamination that occurred in Havelock North. This external, disruptive event highlights what can happen when nature is contaminated and civic responsibilities are not upheld, that is, what can happen when the water hybrid goes awry.

## **2.4 Water connections to micro, small and medium enterprises (MSMEs)**

### **What is a micro, small or medium enterprise?**

This study will focus on Micro, Small and Medium Enterprises. MSME is an expansion of the previous classification of Small and Medium Enterprises (SMEs), and while there is "no universal definition" of MSMEs (Ministry Economic Development, 2011, p. 25), they are generally identified by the number of employees, annual sales figures/turnover, assets or a combination of these. However, Hillary (2000) argues that the 'catch-all term' 'SME' is a "very blunt instrument when understanding the variety of businesses in the sector" (Hillary, 2000, p. 12). She calls for the term to be 'un-harmonised' in order to help us better understand the huge diversity within the sector, and recommends the sector be considered as sub-groups by size as micro, small and medium enterprises.

The United States definition of SME depends on the industry, for example a manufacturing company with 500 employees and wholesale traders with 100 or less employees are both defined as SMEs<sup>4</sup>. Hillary uses the European Union categories stating that a business with fewer than 250 employees is medium-sized, fewer than 50 is small, and fewer than 10 employees is a micro-business<sup>5</sup>. China identifies unincorporated but registered urban businesses as Small and Micro Enterprises (MSEs) which are identified based on their industry and include a mixture of staff headcount, revenue and assets<sup>6</sup>.

The difficulties of defining MSMEs are also acknowledged by the Ministry of Economic Development (2011, p.25). They use the micro and small enterprise definitions from the European Union. Their breakdown of businesses categorised as micro, medium and small is provided in Table 2.1 (below). Micro, small and medium sized businesses will be the focus of this Havelock North study.

---

<sup>4</sup> US Small Business Administration <https://www.sba.gov/>

<sup>5</sup> European Commission Definition [http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition\\_en](http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en)

<sup>6</sup> China's Ministry of Industry & Information Technology and SME Finance Forum Report 2015 <https://smefinanceforum.org/post/china-msme-finance-report-2015>

**Table 2.1: New Zealand’s Ministry of Economic Development’s enterprise definitions**

(Source: NZ Ministry of Economic Development, 2011)

‘Micro’ enterprise	‘Small’ enterprise	‘Medium’ enterprise
Employs less than 10 people.	Employs at least 10 but fewer than 50 people.	Employs between 50-250 people.

This study will examine MSMEs in Havelock North to learn more about how business owners perceive water and if a transformative change has occurred for them since the 2016 contamination. The unpredicted and disruptive nature of the Havelock North contamination aligns with TLT’s definition of a ‘disorienting dilemma’. TLT has therefore been adopted as the theoretical framework for the study to assess whether, in this situation, the MSME owners’ experience of this initial disorienting dilemma was followed by subsequent perspective transformations.

## 2.5 Theoretical perspective

A theory is an explanation of what is thought to be occurring in reality. Wacker (1998) lists four necessary components of a theory – (1) definitions of terms or variables<sup>7</sup>, (2) a domain that the theory applies to, (3) a set of related variables, and (4) specific predictions or factual claims. “Theories carefully outline the precise definitions in a specific domain to explain why and how the relationships are logically tied so that the theory gives specific predictions” (Wacker, 1998, p. 363).

Gioia and Pitre (1990) broadly define theory as any “coherent description or explanation of observed or experienced phenomena” (p. 587). When devising a theory, they note the process refers to the cycle by which representations of reality are mooted, tested and refined. They also warn that theory-building does not transcend across different paradigms of research and thinking because different paradigms are built on various, intrinsic assumptions that produce fundamentally different ways to build a theory (Gioia & Pitre, 1990).

In essence a theory should provide a typology that is useful to explain and predict phenomena, a sense of understanding, and a control of the phenomenon whenever possible (Lynham, 2000). Theory provides a “footing for considering the world, separate from, yet about, that world. In this way theory provides both a framework for critically understanding phenomena and a basis for considering how what is unknown might be organised” (Silverman, 2010, p. 110).

---

<sup>7</sup> Wacker notes that ‘theoretical definitions are not observable, rather they are conceptual’.

This particular study will draw on Mezirow's (1978) Transformative Learning Theory (TLT) as a means to further explore how the 2016 water supply contamination in Havelock North affected small and medium sized business owners' perspectives on water as a fundamental component of their commercial operation.

Taylor (2008) notes that a more critical worldview is imperative in adulthood as we generally strive to better understand our world through the development of more reliable beliefs, exploration and validation, and informed decision-making. Transformative Learning Theory<sup>8</sup> explores further and explains how some adults experience perspective changes through "constructing and appropriating new and revised interpretations of the meaning of an experience in the world" (Taylor, 2008, p. 5).

A perspective change can be triggered in two different ways. The most common way is through a jolting, disruptive experience, a life crises and/or a "range of external events, all of which induce change" (Clark, 1993, p. 78). Mezirow argues that a second way a change in perspective begins is through gradual, transitional processes over time which allow a person to revise "assumptions about oneself and others until the very structure of assumptions becomes transformed" (Mezirow, 1981, p. 8).

Kitchenham (2008) emphasises that while transformative learning is "a deep, structural shift in basic premises of thought, feelings and actions" and is also "complex and multifaceted" (p. 104). Based on Mezirow's (2006) article, Kitchenham states that transformational learning requires going through the process of two major elements – critical reflection and critical self-reflection. These two types of reflections are based on "assumptions and critical discourse, where the learner validates a best judgement" (Kitchenham, 2008, p. 105). This 'best judgement' is said to evolve for an adult learner through the paradigm of transformative learning, which according to Kitchenham (2008) has in itself "become a paradigm, as it has explained many of the unanswered questions about adult learning and created its own group of specialised practitioners" (Kitchenham, 2008, p. 107).

Since 1978, Mezirow has focused his extensive research on Transformative Learning (Kitchenham, 2008), often, but not always, focussing on educational settings as noted by Dewey. In 1978 he presented a paper titled: *Education for Perspective Transformation: women's re-entry programs in community colleges*, a collaboration with Victoria Marsick based on their pioneering research to address the needs of women in the United States who were resuming education or returning to the workforce. Mezirow and Marsick concluded that the women had undergone "a 'personal transformation' and identified ten phases that they could experience" (Kitchenham, 2008, p. 105), see table 2.2 (below).

---

<sup>8</sup> *Transformation Theory* is the theory of how transformative learning occurs, what transformative learning is and how it is best developed in adults. Within Transformation Theory, a number of terms are used interchangeably for learning that changes a person's meaning perspective; viz. *transformative learning*, *transformation learning* and *transformational learning*. Often the term *transformative learning* and *transformative learning theory* are used synonymously for Transformation Theory. This study will generally use the terms *transformative learning* or *transformative learning theory*.

**Table 2.2: Mezirow's Ten Phases of Transformative Learning**

(Source: Mezirow & Marsick, 1978)

Phase 1	A disorienting dilemma – either external shock or internal experience
Phase 2	A self-examination with feelings of guilt or shame
Phase 3	A critical assessment of epistemic, sociocultural, or psychic assumptions
Phase 4	Recognition that one's discontent and the process of transformation are shared and that others have negotiated a similar change
Phase 5	Exploration of options for new roles, relationships and actions
Phase 6	Planning a course of action
Phase 7	Acquisition of knowledge and skills for implementing one's plans
Phase 8	Provisional trying of new roles
Phase 9	Building of competence and self-confidence in new roles and relationships
Phase 10	A reintegration into one's life/society on the basis of conditions dictated by one's perspective.

During the 1980's and 1990's, Mezirow went on to modify and expand his ten phases theory by introducing three learning *processes* – learning within meaning schemes, learning new meaning schemes, and learning through meaning transformation (Kitchenham, 2008, p. 110). He argued that there were three types of *meaning perspectives*: epistemic (use of knowledge), sociolinguistic (use of language) and psychological (how learners viewed themselves) (Kitchenham, 2008, p. 113). And that there were three types of *reflection* that transform meaning schemes and perspectives: content reflection, process reflection and premise reflection (Kitchenham, 2008, p. 114). He again stressed and articulated the importance of critical reflection from objective and subjective frames of reference (Kitchenham, 2008, pp. 114-115).

Also during the early 1980's, Schon's work noted descriptions of reflective practices that professionals utilised across various fields and his subsequent work was 'highly influential' in educating professionals towards reflective practice (Kember, McKay, Sinclair, & Wong, 2008). During the 1990's, King and Kitchener's (1994) focus moved from adult students to younger, recent graduates and their studies argued that reflective judgements are "surely a generic capability that is needed by graduates in knowledge-based societies" (Kember et al., 2008, p. 369).



Dirkx (1998) was also drawn to transformative learning. However he considered that by the late 1990's it had become too convoluted a theory, so he set out to provide a 'better understanding' of its complexities (Dirkx, 1998). He wanted to summarize the major strands identified in the theory that were then 'evident in the field', identify the overall suggestions within the literature, and explore what this all meant in a practical sense for educators. He did so by identifying four key strands to transformation in adult learning – consciousness-raising, critical reflection, development and individuation – as reflected in the works of Paulo Freire, Jack Mezirow, Larry Daloiz and Robert Boyd, respectively (Dirkx, 1998, pp. 2-8). Dirkx (1998) noted that these four tenets upheld the importance of meaning within the process of learning, and the importance of the role of adult experiences and frames of reference in constructing that meaning within the learning experience.

According to Kitchenham (2008), by the early twenty-first century Mezirow had gone on to provide a clear definition of his theory and, a year after the 2005 debate with Dirkx at the Sixth International Transformative Learning Conference, Mezirow presented a revised overview by "elaborating and revising his original terminology" from his 1990's work (Kitchenham, 2008, p. 118). Meaning perspectives became 'a frame of reference' that comprised of 'habits of mind and subsequent points of view' (Kitchenham, 2008, p. 118). Habits of mind included various dimensions: sociolinguistic, moral-ethical, epistemic, philosophical, psychological, and aesthetic (Kitchenham, 2008). These frames of reference consisted of meaning schemes that operate outside of awareness and assign causality while also shaping meaning (Kitchenham, 2008). "These meaning schemes tend to determine a specific chain of events or actions that are followed automatically unless they are considered through critical reflection and critical self-reflection" (Kitchenham, 2008, p. 118).

Mezirow (1998) defines critical reflection as involving the "critique of a premise upon which the learner has defined a problem (e.g., "a woman's place is in the home," so I must deny myself a career that I would love). Significant personal and social transformations may result from this kind of reflection" (Mezirow, 1998, p. 186). Where critical reflection is the objective reframing of an issue, critical self-reflection is seen by Mezirow as the subjective reframing (Mezirow, 1998). Critical self-reflection involves the analysis of the "psychological or cultural assumptions that are the specific reasons for one's conceptual and psychological limitations, the constitutive processes or conditions of formation of one's experience and beliefs" (Mezirow, 1998, p. 193). Mezirow (1998) identifies four common forms of critical self-reflection – narrative, systemic, organisational and moral-ethical. Mezirow cites Steedman (1991) as understanding critical self-reflection to be a "stereoscopic" account of meaning construction whereby "one lens is on the individual context of interpretations, the other is on the social context which creates the individual" (Mezirow, 1998, p. 198).

Kember et al. (2008) also stress the importance of reflective practice in learning and presented a protocol that can be used to classify reflections as falling into one of the following four categories:

- ‘habitual action’ which occurs when a procedure is followed without significant thought about it;
- ‘understanding’ whereby a learner attempts to reach an understanding of a concept;
- ‘reflection’ takes the new learned concept and considers it in relation to personal experiences; whereas
- ‘critical reflection’ is a higher level of reflection, unlikely to occur frequently, whereby a person’s perspective on a topic is transformed (Kember et al., 2008).

Kember et al. (1999) had earlier attempted to create a protocol containing seven categories based on Mezirow’s writings, but concluded it was of limited usefulness due to being too ‘fine-grained’, so reduced it to the above four categories.

The seemingly intertwined nature of the terms ‘perspective’ and ‘perception’ warrant a working definition for each, as well as the term ‘meaning perspective’. According to the *Oxford English Dictionary* ‘perspective’ is “a particular attitude towards or way of regarding something; a point of view”, and the word can also be used to mean “a true understanding of the relative importance of things; a sense of proportion.” Mezirow identified perspectives, or ‘schemes’, as a major component of his Transformational Learning Theory. Perspectives that provide meaning are defined as “broad sets of predispositions resulting from psycho-cultural assumptions which determine the horizons of our expectations” (Mezirow, 1991).

An insightful understanding of Mezirow’s concept of perspective is found in the interview conducted by Miho Tokiwa-Fus’ (then a student) with Jack Mezirow at the International Standing Conference on University Teaching and Research Education of Adults in London in July 1997. Mezirow asserted that a person has to increase awareness of his or her feelings and be freed from an assumption that has been causing psychological blocks. He said that a meaning perspective is “essentially like having a pattern...you always have some pattern of thinking, you don’t escape from a pattern, but you go toward a pattern that’s better” (Tokiwa-Fus, 2000). In order for a perspective transformation to occur, there must be critical reflections and critical self-reflections regarding prior assumptions and a conscious decision must be made, once an individual has critically reflected, and critically self-reflected on those assumptions. A perspective transformation is the improvement of conditions for decision-making, visible possibilities are expanded, and discourse helps people make their best choice. “Even when the resulting choice is not a change, having options and making a conscious decision makes considerable difference, because the choice is deliberately made by oneself, not uncritically assimilated or imposed as the only possible option” (Tokiwa-Fus, 2000).

The *Oxford English Dictionary* defines *perception* as the action of perceiving – to take in or apprehend with the mind or senses, to realise, to discern, to observe; perception is to become aware or conscious of a thing or things in general. From his discussion with Mezirow in 1997, Mohammadi (2015) asserts that perception can be considered as a process starting from initial sense and moving through to action. Classifications of functionalities from the environment are formed into the layers of the senses, logic and meaning, as illustrated in Mohammadi’s meta-model (Fig. 2.1 below). They are processed in a particular way within each layer so that a mental model is built. This mental model then recognizes surroundings by generating a pattern from the environment and processing that pattern. “Such a pattern is a representative from the outside reality to understand the surrounding world” (2015, p. 122). Sensory experience greatly contributes to people’s learning experiences and change of behaviours (Cornell, Jönsson, Larsson, & Olofsson, 2011, p. 643; Mezirow, 1991; Mohammadi & Banirostam, 2015).



**Figure 2.1: Mohammadi’s Meta-model of Perception** (LTM = long term memory).

(Source: Mohammadi, 2015)

There is a certain amount of interlinking between the terms perspective and perception - both terms make sense of and create our worldviews through the generation of patterns. These patterns create layers and those layers create a mental model of a particular environment, issue, object or feeling. A key point is that in order to establish a perspective on various parts of our world, we need to have experienced numerous and various perceptions over time.

Mezirow also defines “a *meaning perspective* [as] a habitual set of expectations that constitutes an orienting frame of reference that we use in projecting our symbolic models, and that serves as a (usually tacit) belief system for interpreting and evaluating the meaning of experience” (Mezirow, 1991, p. 42). Thus a meaning perspective can determine the crucial conditions for construing meaning from an experience, it selectively orders a criteria for judging right and wrong, good and bad, true and false, appropriate and inappropriate (Mezirow, 1991). When discussing meaning perspectives during the

Tokiwa-Fus' interview, Mezirow noted that they can be limiting and oppressive. However, he also said that meaning perspectives can develop into broader perspectives within society, adapt in changing circumstances and help adults to function in a 'self-guiding, autonomous' manner (Tokiwa-Fus, 2000).

Transformative Learning Theory highlights the "multi-focal, multi-layered nature of adult learning...what is learned has to be viewed as personally significant in some way: it must feel purposive and illuminate qualities and values of importance to the person or group...learning can contribute to fundamentally new ways of seeing and understanding our experiences" (Dirkx, 1998, p. 9).

Personal significance means learners are dealing with questions around meaning, values, quality and purpose that in turn provide a sense of who they are and how they interact with the world (Dirkx, 1998). Adult learners must know and understand 'the self'; they must have a deep understanding of their social, political and cultural context in order to experience transformational learning (Dirkx, 1998). When Dirkx (1998) regards transformative learning as 'a way of *being* rather than a process of *becoming*', he is introducing the concept of worldview – something so 'fundamental and familiar that an individual is usually oblivious to it' (Olsen, 1992). According to Cohen (1976), a person's worldview arises mainly from their culture, and people rarely try to change their worldview because it can be a slow and difficult process (Olsen, 1992). Michael Lind (May 1998) defines a worldview as "a more or less coherent understanding of the nature of reality, which permits its holders to interpret new information in light of their preconceptions. Clashes among worldviews cannot be ended by a simple appeal to facts. Even if rival sides agree on the facts, people may disagree on conclusions because of their different premises."

It is useful that Piasentin & Roberts (2018) note that although worldviews and paradigms are often used as synonyms in the literature Olsen *et al* (1992) distinguishes the two concepts. Paradigms are more restricted than worldviews in that they are "held only by a limited set of people" and only concerned with specific aspects of life (Olsen, 1992, p. 18). Essentially, Piasentin and Roberts (2018) perceive a paradigm as "a component of a major worldview, which deals with a specific realm (environmental, technological, economic, political, interpersonal, etc.)" (Piasentin & Roberts, 2018, p. 695).

Mezirow and Marsick (1978) identify *Ten Phases of Transformational Learning*, the first of which is a 'disorienting dilemma' and can trigger a challenge to one's current paradigm. The development of new action competencies can then lead to the adoption and integration of a new paradigm during the course of one's life (Piasentin & Roberts, 2018).

The roots of Transformative Learning Theory hail predominantly from within formal teaching and educational institutes, but over the years application of the theory into wider learning situations has occurred. Working in the technology field, Kitchenham (2008) realised that TLT would be "an excellent theoretical framework in which to study adult learners' experiences with technology" (Kitchenham,

2008, p. 104). Work, sport, entertainment environments, and life in general can also provide situations where an outside event triggers critical reflection. In their forward of *Transformative Learning in Practice*, Mezirow and Taylor (2009) note that while TLT has become the dominant teaching paradigm within adult education...

*it is no longer just an adult education teaching construct...[it is] becoming a standard practice in a variety of disciplines...professional education, organisational development...[TLT] provides guidance in promoting community among online learners; and it guides the instruction for medical students in palliative care.*

*(Mezirow & Taylor, 2009)*

Canadian adult educators Clover, de O. Jayme, Follen and Hall (2012) compiled an adult education text *Nature of Transformation: environmental adult education*, for use within communities as a transformational learning tool textbook. It provides numerous critical self-reflection tasks and workshops, for environmental educators “interested in weaving environmental issues into their workplace” (Clover et al., 2012). A premise of their book is for adult educators to “enhance people’s collective potential to learn, to query, to make change and to help them more fully realise their capacities as ecological citizens” (Clover et al., 2012, p. 3).

Outside the education sector, within the social work profession, Bay and Macfarlane (2011) focused on the crucial importance of critical reflection within their career positions. Transformative learning aims to “assist students to become autonomous thinkers....to recognise their own and other people’s frames of reference, to identify dominant discourses circulating in making sense of their experience, to problematize their taken-for granted ‘lived experience’, to reconceptualise identity categories, disrupt assumed causal relations and to reflect on how power relations are operating” (Bay & Macfarlane, 2011, p. 745).

In terms of some limitations of transformative learning theory, Pierre Walter (2011) criticises Mezirow’s concept for its lack of attention to historical, cultural, and sociological context; its dependence on rationality to the exclusion of other ways of knowing; and its inadequacy in explaining the connection between personal transformation and collective social change. Mezirow’s emphasis on rational thinking, in particular, has been characterized as “a particularly Western concept, a product of Descartes’ mind-body split and the Enlightenment’s emphasis on science and rationality” (Merriam & Ntseane, 2008, p. 185, as cited in Walter (2011)). However, Taylor (2007) states that the research confirms the centrality of critical reflection, the importance of a disorienting dilemma as a catalyst for change, and the phases of the transformative learning process to be effective at capturing the meaning making process of adult learners. Mezirow himself (Mezirow & Taylor, 2009) acknowledges that because “many transformative experiences occur outside awareness...intuition may substitute for critical self-reflection” (p. 28).

This study will attempt to explore the perceptions and perspectives held by the owners of micro businesses and SME's in Havelock North, and will examine whether water supply contamination facilitated a shift in their perspectives on water supply. It seeks to determine whether transformative learning has occurred within the local business community.

In order to explore whether or not individual perspectives have changed it may be useful to attempt an assessment of the original perspectives on individual business owners and if they have altered their view of water resource supply to a completely different perspective. Piasentin & Roberts observe that the perspectives guiding human behaviour towards nature are “often depicted as a dichotomy: a very strong anthropocentric view on one side and a very strong ecocentric view on the other side” ...but that “a wide spectrum of paradigms can be found within and between these two opposing views” (Piasentin & Roberts, 2018, p. 696). Two such opposing paradigms could be the Dominant Social Paradigm (DSP) as described by Pirages and Ehrlich (1974), and the New Ecological Paradigm (NEP) described as an emerging belief system by Dunlap and Van Liere (1978). Both have extremely different and opposing sets of fundamental assumptions. These assumptions relate closely to the essence of the human-nature relationship, the existence of ecological limits to growth, the risk of eco-crises, and the assumed capacity of science and technology to avert resource scarcity (Piasentin & Roberts, 2018).

Sofoulis (2005) acknowledges that the abstraction and distribution of water has rested largely in the domain of engineering and technology, however we now need to start acknowledging the intrinsic cultural and social aspects of water. A sociotechnical perspective of water as an everyday item recognises the connections between users, technology and the large infrastructure systems. ‘Big Water’ is a term Sofoulis has coined for “Australia’s dominant *sociotechnical* system for municipal water supply, where a centralised public or corporate utility that develops large-scale engineering projects – dams, pipelines, central sewage treatment plants – and assumes almost complete responsibility for drinking quality water (Sofoulis, 2005, p. 452). Sofoulis asserts that this is an outdated way of managing and protecting water that is “often destined to serve mainly business interests...[and] users are left with the remnant responsibilities of simply *using* water” (Sofoulis, 2005, pp. 454-455), as such they do not physically or mentally interact directly with their own water supply. The concern is that the more civic water managers increase the technical aspects of our water supply the less opportunity available for the social interaction and cultural nuances of water to be maintained. We need to unpack and ‘defog’ these social and cultural aspects to “understand water consumption patterns as embedded in [their] meaning-laden contexts or everyday life” (Sofoulis, 2005, p. 447).

For Shove (2010) there is a ‘yawning gulf’ between the social sciences and environmental policies, so there is an urgent need to go beyond the prohibitive, dominant paradigm known as ‘ABC’ – attitude, behaviour, and choice – to overturn the challenges of less natural resources and increased consumption.

Shove perceives contemporary environmental policies as too often framed solely by individual attitudes, behaviours and choices (ABC). She asserts these ABC policies misleadingly locate individuals as the influential decision-makers that should bear all the responsibility to make significant changes to improve our environment. The ABC paradigm positions governments as institutions that exist solely to convince people to make pro-environmental decisions for themselves; however ABC does not proactively facilitate constructive environmental policy to assist with the exceptional behaviour changes that are required (Shove, 2010).

In these uncertain times of climate change Shove (2010) calls for a transformation of the dominant ABC economic and psychologic perspective whereby new, energetic and vigorous efforts to promote alternative ways of thinking are now required. Policy makers and academic researchers must start addressing the underlying question concerning the way people need, or think they need to live and consume (Uzzell, 2008). There is an urgent requirement to investigate “how human needs and aspirations come to be as they are” (Shove, 2010, p. 1277).

Implicit in this investigation is the exposure of the hydrosocial contract (Turton & Meissner, 2002), which is the unwritten contract that exists between the public users and the government provider of water (Ohlsson & Turton, 2000). Brown, Keath, and Wong (2009) applied this originally South African concept to the context of the Australian droughts. They asserted that *unwritten* provider-user contracts have been formed under a “dominant cultural perspective [that] historically embedded urban water values, [that were] expressed through institutional arrangements and regulatory frameworks [which are] physically represented through [current] water systems infrastructure” (Brown et al., 2009, p. 848). Sofoulis and Strengers (2011) attach further key elements to this definition of the hydrosocial contract. They are particularly interested in “The models of humans (especially water users) that pervade these cultural perspectives, institutions, regulations and infrastructures; and the assumed distributions of knowledge, power and responsibility in the relationships” (Sofoulis & Strengers, 2011, p. 1).

A pressing call is made by Sofoulis and Strengers (2011) for a balance to be struck between the responsibilities embedded within the water provider-user relationships. They assert that only an integrated model will offer a wider range of engagement options for water providers and users to begin to bridge their disconnection. So as to change the emphasis on technical data provision and individual’s environmental ‘behavioural guilt’ Sofoulis and Strengers call for an end to the assumption that water consumption is a product of “rational economic and technical calculation” (2011, p. 5). They call for an accentuation of the physical, social and cultural realities that water use practices play in water consumption. Their focus is toward an integrated provider-user relationship where users align to achieve shared water management goals, providers and users have “co-evolutionary and potentially cooperative agents within a hydro-socio-technical system” (Sofoulis & Strengers, 2011, p. 6). A co-

management structure for water supply needs to exist based on mutual provider-user involvement around the management of decentralised water facilities such as greywater systems, water tanks and raingardens (Sofoulis & Strengers, 2011).

Strengers and Maller (2012) and Sofoulis (2011) acknowledge that users' perspectives on water management and supply are strongly influenced by long-held civic policies of 'secure and supply'. This bulk security approach does not permit water to be material (close and visible in everyday life) or diverse in either supply or demand. Nor does this civic security and supply of water facilitate the increasing realities of water scarcity and water quality degradation. They maintain that the majority of water users perceive of water as immaterial, abundant and homogeneous due to their physical disconnection from water resource co-management, and the historic assumption that government bodies are responsible for all supply. Materiality of water encourages active elements of water use where routines are enacted, resourceful competencies are created and common understandings around preservation are formed (Strengers & Maller, 2012). Strengers and Maller (2012) call for practical suggestions and policy that encourages a perspective that implements different water resources for different objectives, shares practical experiences for efficiencies, and incentivises innovation and water provision in a more physically present way within our everyday lives – not only from 'a tap in the wall'.



## Chapter 3

### Methodology

#### 3.1 Introduction

This study observes a qualitative approach for data collection and analysis. The following methodology chapter outlines how the research was implemented. Twenty Havelock North business owners were interviewed. These semi-structured, face-to-face interviews were conducted between late May and early June 2017 – ten months after the Havelock North *Campylobacter* outbreak. The purpose of the interviews was to gain an understanding of how micro, small and medium sized business owners perceive water and its importance to the long-term success of their business.

Mezirow's (1978) Transformative Learning Theory (TLT) was used to assess whether, and to what extent, Havelock North business owners' perspectives on water had changed as a result of the contamination event. This case study was also used to investigate whether the transformative steps identified by Mezirow could be readily applied to a business setting.

#### 3.2 Research aims and questions

The aim of this research was to determine how a contamination to drinking water supply altered Havelock North's business owners' perspectives on water. The study sought to establish the extent to which business owners perceived themselves as connected to and dependent on the natural eco-systems underpinning their daily business operations. Secondly, the study needed to determine MSME owners' level of awareness of their cumulative effects on those ecosystems. The third aim was to determine whether or not the *Campylobacter* contamination had caused business owners to experience a transformative change with regards to their perspectives on water.

The key research questions were as follows:

- 1) Are Havelock North business owners aware their business is connected to and dependent on natural water eco-systems?
- 2) Are the business owners aware of their own cumulative water usage and the consequential, long-term effects on natural water ecosystems?
- 3) Are business owners open to changes in their hydrosocial contract?
- 4) Have Havelock North business owners' undergone a transformative change in their perspectives on water?

### 3.3 Qualitative research methodology

In order to adequately evaluate the overall impact of the drinking water contamination on MSME owners in Havelock North, a qualitative research methodology – informed by social constructivism – was applied. The underlying philosophy of a constructivist qualitative approach is the “assumption of multiple, socially constructed realities” and that social behaviour can be understood through interpreting the meanings that participants “ascribe to things” (Tolich, 2011, p. 33). It was hypothesised there would be numerous perceptions regarding water, and diverse understandings of MSME’s relationships with the environment, within the business community of Havelock North.

Merriam (2002) describes qualitative research as an effort to understand situations within their unique context and the interactions that occur there. Such an understanding does not attempt to predict what may happen, but seeks to comprehend the nature of the study setting and what it means for participants within that setting context. The subsequent analysis of the situation strives for a significant depth of understanding (Merriam, 2002).

### 3.4 Reflection on the researcher’s position

*“Inevitably data findings can be shaped by the assumptions and experiences of the researcher, so decisions about what is important and what is not will be influenced as such.”*

(D. Thomas, 2006)

The author’s relationship to this topic is a career background in business management, experience on commercial and not-for-profit Trust Boards, project management for biodiversity restoration, and three years as the Canterbury network connector for the Sustainable Business Network, therefore considerable experience in dealing with business owners. An assumption within this study is that significant and prolonged contamination could alter business owners’ perspectives on water and trigger them to start thinking outside their traditional model of water supply to something more resilient, innovative and adaptive. The author assumes that if there is a perspective change, it is likely to be at an individual’s level, rather than a full business community level.

The author’s assumption throughout this project has been that transformative learning has the ability to occur for business owners within their business environments. Throughout the ‘lifetime’ of a business it can experience significant and various shocks – global financial crises, sharp industry declines and increases, transport disruptions, employment issues, supply and demand fluctuations. Resilience and flexibility are crucial to business survival (Dahles & Susilowati, 2015), so it is imperative that businesses have tools and processes available to assist with their resilience.

In this era where frequent technological change (of which social change is becoming a 'by-product') corresponds closely with increased climatic changes, business and industry must be able to engage with sound frameworks to assist in their survival. It is hoped that transformative learning theory could be applied to other impacting environmental incidents, as they become more frequent in the future, as a way to navigate and meaningfully work through the turmoil and upheaval.

### 3.5 Case study research

Case study research is a qualitative research methodology used in the social sciences, and is applied when there is a desire to understand contemporary events in the context of complex social phenomena (Yin, 2014). Thomas (2011) states that a case study seeks understanding about how and why something happened within a unique situation. It is the view of Flyvbjerg (2006) that the case study can be an 'effective remedy' against 'academic blind alleys' where the usefulness and effect of the research becomes unclear and untested. He advises that the 'closeness' of the case study and its multiple wealth of details are important for the development of a nuanced view of reality; and that case studies are "important for researchers' own learning processes in developing the skills needed to do good research" (Flyvbjerg, 2006, p. 223).

The contamination event under investigation occurred in the Havelock North region in August 2016, and the objective of the research is to understand whether business owners' perspectives toward water changed as a result of the incident. A case study methodology was therefore deemed the best way to attempt to address this question, and to generate rich, descriptive data on MSME owners' perceptions and experiences prior to, during and after the contamination. Given that this study is a qualitative case study, a mix of inductive and deductive thematic analysis was used to interpret the raw data.

### 3.6 The 'case' context

The New Zealand Government's Draft Terms of Reference (New Zealand Government, 2016), set out prior to the two-staged Inquiry into the contamination, provides a summary of the event:

*On 12 August 2016, Hastings District Council and the Hawke's Bay District Health Board became aware of a widespread situation of gastroenteritis in Havelock North. Due to the nature of the outbreak and the receipt of an initial "positive presence" test for E. coli in the water supply, suspicion fell on the Havelock North water supply. Subsequent analysis confirmed the presence of E. coli in the water supply, and sample testing through the health system led Council and District Health Board staff to suspect that Campylobacter was the primary infectious agent.*

*As of 21 August, there have been 168 confirmed cases and 355-suspected cases of campylobacteriosis, with current estimates suggesting that approximately 4,500 people have been affected. The length of the incubation period (up to ten days) and secondary spread mean that further cases are still being reported*

*despite chlorination of the tap and tanker provided water, and the ongoing advice to boil tap water. Gastrointestinal illness caused by microorganisms with longer incubation periods (e.g. cryptosporidiosis, giardiasis) may also start to be reported. In addition, about 1% of people with campylobacteriosis (approx. 40 people) may develop reactive arthritis and 0.1% may develop Guillain-Barre Syndrome (approx. 3-6 people).*

(New Zealand Government, 2016)

Subsequently, Stage One of the major government inquiry focussed on identifying what occurred, the cause of the outbreak, and an assessment of the conduct of those responsible for providing safe drinking water to the people of Havelock North and results were issued on 8th May 2017 (New Zealand Government, 2017a).

The second stage of the inquiry began at the end of May 2017 with a list of twenty-four different issues. Key points for consideration during Stage Two were firstly the improvement of safe drinking water throughout New Zealand; secondly the lessons to be learned from the Havelock North outbreak; and thirdly the changes that need to be made in order to achieve those identified goals. The findings of Stage Two were published in December 2017 and were also made available on the DIA website.

### **3.7 Data collection method**

The contamination of the water resource supply in Havelock North can be seen as a disorientating dilemma for the community, whereby they suddenly could not rely on their previously dependable local water supply to sustain them. All business owners within the Havelock North community experienced significant disruption to their daily lives, in their homes and at their businesses. In order to ascertain whether business owners' perceptions of water were altered, twenty participants were interviewed at their business premises within and around the Havelock North Village area. Twenty was the number deemed to be optimal to capture a range of business types and their varying scenarios. Owners of businesses that use water to produce their goods and services (e.g. café owners) potentially had a different perspective of water to the owners of businesses (such as a tyre sales or jewellery) where water was needed only for staff drinks, toilets and hygiene.

The data collection method used was face-to-face, thirty- to sixty-minute, semi-structured interviews. This resultant rich primary data provided detailed insight and an in-depth understanding of how businesses were affected by the contamination. These were audio recorded to allow the researcher to focus on the face-to-face conversation during the interview, and later transcribed in full for detailed analysis.

### 3.8 Participant selection

Initial contact was made by the researcher's supervisor with a known contact working at middle management level at the Hawke's Bay Regional Council (HBRC). Based on her knowledge as a local resident, the middle manager employee provided eight names of business owners she thought could be potentially interested in participating in the research. The author then began 'cold calling' those Havelock North businesses owners. The first two businesses were wine makers and expressly did not want to discuss the contamination. The six other business owners from the list were initially hesitant and almost suspicious of the direct phone contact, which appeared to be putting them "on the spot." An alternative approach was deemed necessary, whereby business owners could volunteer themselves to assist with the research and thereby come forward of their own accord.

Contact was therefore made with the chairperson of the local business association, and this approach proved considerably more fruitful. The business association chair suggested this researcher become 'friends' on the Havelock North Business Association Facebook page, and uploaded an invitation to businesses to be interviewed for a Masters Research project. The response was immediate, with ten willing interviewees making themselves available within a week.

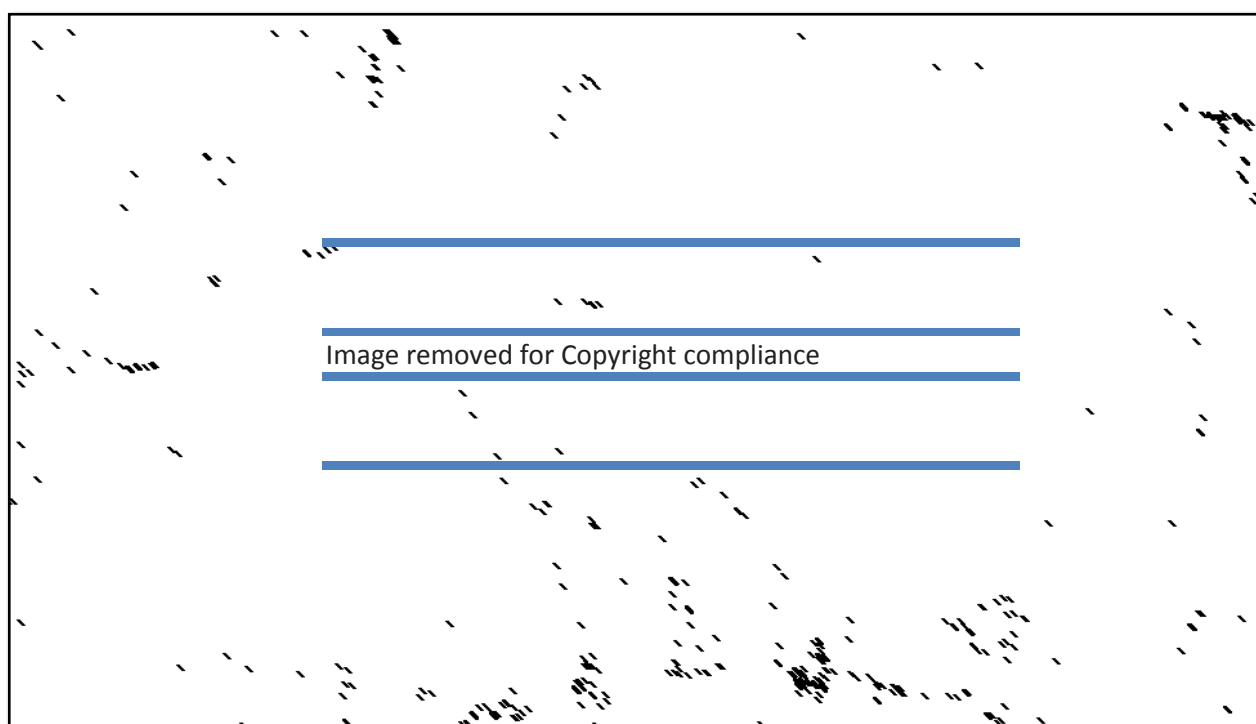
Additionally, one respondent was contacted via a family friend (T6), another two from cold calling into their business premises (T17 and T20), and the remaining seven respondents (T7, T8, T10, T11, T14, T16, T18) were gathered through the 'snowball method' (Biernacki & Waldorf, 1981; Groenewald, 2004) generated by the interviews with the first group of registered business owners. The reference codes and business types of the twenty interviewees are given in Table 3.1 (below).

**Table 3.1: List of interviewees' business types and data codes.**

Reference Code	Date Code	Business type
T1	17290501	Retailer
T2	17290502	Retailer
T3	17290503	Automobile Parts Retailer
T4	17290504	Healthy Fast Food Manager
T5	17300501	Delicatessen Café Owner
T6	17300502	Hospitality Manager
T7	17010601	Restaurateur
T8	17300503	Food and Beverage Retailer and Distributor
T9	17300504	Retail Transport Manager
T10	17300505	Health Food Café Owner
T11	17300508	Hospitality Owner
T12	17300507	Accommodation Provider

T13	17300506	Retailer
T14	17300509	Hospitality Owner
T15	17310501	Commodity Food Producer & Retailer
T16	17310502	Water Supply Provider (private company)
T17	17310503	Retailer
T18	17310504	Commodity Food Producer & Retailer
T19	17010601	Hairdresser
T20	17010602	Pharmacist

Nineteen business owners had businesses located within the Havelock North locale, and T16 was the only owner based in Hastings city. Given the significance of his business in relation to the contamination, he was deemed a valid respondent with rich data to contribute. Figure 3.1 (below) shows the 3.5 kilometre proximity of Havelock North Township, southwest of the Brookvale Road bores, where the contamination was found to have occurred. To the southeast of the bores are the steep Te Mata hills which, during time of high volume rainfall, facilitate significant runoff across agricultural land toward Brookvale Road.



**Figure 3.1: Proximity of Havelock North Township to Brookvale Road bores.**

(Source: Google Earth 2018)

### **3.9 Semi-structured interviews**

In each interview, business owners were asked ten questions (Appendix 1). Those questions were a mix of critically reflective and critically self-reflective questions (Mezirow, 1998). Each respondent answered all ten questions as well as additional, ad hoc questions that arose due to discussion of particular events or feelings the respondent had at the time. Interviews were digitally recorded using an iPhone digital recorder with back-ups made afterwards.

### **3.10 Ethics approval and confidentiality**

As acknowledged by Tisdell & Merriam (2015) all research must produce “valid and reliable knowledge in an ethical manner” (Merriam & Tisdell, 2015, p. 237). In this study sensitive information was provided during a number of interviews and has been treated as confidential throughout the compilation of this thesis.

Ethical considerations were acknowledged via the use of Lincoln University’s specifically informed consent agreement presented to each participant before each interview. Respondents were also provided with the Research Information Sheet (Appendix 2), which outlined notification of the research procedures, the voluntary nature of their participation, their right to withdraw from the interview at any time (Groenewald, 2004) and the coding protocols used to protect their anonymity. They all read the Research Information Sheet and signed the Consent Form (Appendix 3), thereby acknowledging their willing participation in the research study, and receiving assurance of their anonymity throughout – and after – the interview process. All business owners are referred to by a ‘T number’ and no business names are used.

### **3.11 Data analysis methods**

Data collection relied solely on semi-structured, recorded interviews and therefore the analysis of all business owners’ responses was carried out using a combination of manual sorting, and NVivo to code the substantial amount of transcribed interview data. All twenty transcripts were imported into NVivo software ready for highlighting the various themes. Boyatzis (1998) defines a theme as “a pattern in the information that at minimum describes and organises the possible observations and at maximum interprets aspects of the phenomenon” (p. 161).

The process of coding the data based on themes was two-fold. It involved identification of significant insights or descriptions around the *Campylobacter* contamination and encoding words or phrases prior to interpreting them – the empirical data driven approach. Accompanying this was analysis of the interview responses using a deductive approach whereby information aligning with the template of the ten phases of Transformative Learning Theory was categorised and highlighted within NVivo. TLT also

provided the text for the ten main headings and the subcategories emerged from the interviews for the first six phases. Subcategories for the latter phase's seven to ten were devised from what was deemed necessary, in this particular case, for transformative learning to have occurred.

NVivo provided an efficient and methodical software solution for organising all gathered interview data. Six hundred minutes of recorded interviews resulted in over one hundred pages of typed interview data. Given that NVivo cannot itself recognise themes, it was important to become very familiar with the data in order to recognise important themes and subthemes, firstly within individual interviews and secondly, 'horizontally' across the various interviews.

The ability to collate and group identified categories and main themes in a systematic and consistent manner in NVivo was important to the overall analysis, especially given the volume of data collected. Being able to carry out an electronic search for particular 'connecting' words across respondents' transcripts within seconds was efficient and reassuring.

### **3.12 Thematic analysis**

Merriam states that analysis of data is paramount – it is the process by which sense is made from the data (Merriam, 2009; Merriam & Tisdell, 2015). To ascertain if business owners' perceptions of water had been altered, inductive and deductive thematic analysis of the interview data was carried out. This primary mode of analysis occurred through the development of categories from the collected raw data in relation to the ten phases of Mezirow's (1978) Transformational Learning Theory (TLT). Additional sub-categories were applied as they emerged.

To make sense of the collected data the author consolidated, reduced and interpreted what people had said during the interviews. This was a complex procedure involving alternating back and forth between concrete pieces of data and abstract concepts, between inductive and deductive reasoning, and between description and interpretation (Merriam, 2002). The meanings, understandings and insights that emerged constitute the findings of this study.

In order to empirically analyse the raw data, the process described by Fereday & Muir-Cochrane (2006) was used whereby segments of the data emerged from the responsive discussions to the interview questions. These segments were categorised into appropriate data segments or units of data (Merriam & Tisdell, 2015). According to Lincoln and Guba (1985), a unit of data may be as large as pages of descriptive field notes or as small as a descriptive word; however, a unit "should be heuristic...reveal information relevant to the study and stimulate the reader to think beyond the particular bit of information. Second...it must be interpretable in the absence of any additional information" (Merriam & Tisdell, 2015, p. 203).



A priori categories, or deductive themes, within the interview data were influenced by the alignment to the ten phases of TLT. By comparing units of information with Mezirow's ten phases, recurring regularities appeared and were used to further develop the empirical and a priori categories.

The a priori categories also emerged through specific thematic coding based on Mezirow's Ten Phases of Transformational Learning (Mezirow & Marsick, 1978). The significant and applicable units, or words, were identified and categorised in line with these ten stages to provide a deductive analysis linked to Transformational Learning Theory. Both of these processes incorporated inductive and deductive thematic analysis of the raw data which assisted in answering the overall thesis questions (Fereday & Muir-Cochrane, 2006).

### **3.13 Summary**

This case study employed a qualitative approach to explore whether business owners' perspectives on water changed due to contamination of their drinking water supply. Face to face, semi-structured interviews with Havelock North business owners and managers enabled the collection of rich, primary data.

It is expected that the results of this research will add to the currently small body of knowledge on micro, small and medium enterprises (Hillary, 2000), and will assist in ascertaining the extent to which business owners hold an eco-centric perspective of their business operations. That is, whether they perceive of their business as part of, and dependent on, natural systems. The work should also illuminate whether the disorienting disruption caused by the Havelock North *Campylobacter* contamination resulted in business owners' change of perspective regarding water. Finally, results of this case study may help to determine the applicability of Mezirow's Transformative Learning Theory (1978) for future disruptive situations that business owners will face under current climate change conditions.

## Chapter 4

### Results

#### 4.1 Alignment with Mezirow's ten phases of Transformative Learning Theory

Mezirow proposes Transformative Learning Theory (TLT) as a metacognitive epistemology of instrumental and communicative reasoning that assesses and advances a belief, or a set of beliefs (Mezirow, 2006). TLT is the lens through which the data for Havelock North's water contamination case study has been analysed. The original 1978 study by Jack Mezirow, and his assistant Victoria Marsick focussed on women's re-entry programmes into community colleges after 'an extended hiatus'. These women were interested in exploring options for their futures, experiencing personal growth, effecting an occupational change or re-entering the job-market (Mezirow & Marsick, 1978). Mezirow concluded that the women had undergone "a 'personal transformation' and he identified ten phases that they could experience" (Kitchenham, 2008, p. 105). Their original ten phases are listed in Mezirow's *Education for Perspective Transformation* (1978) as follows:

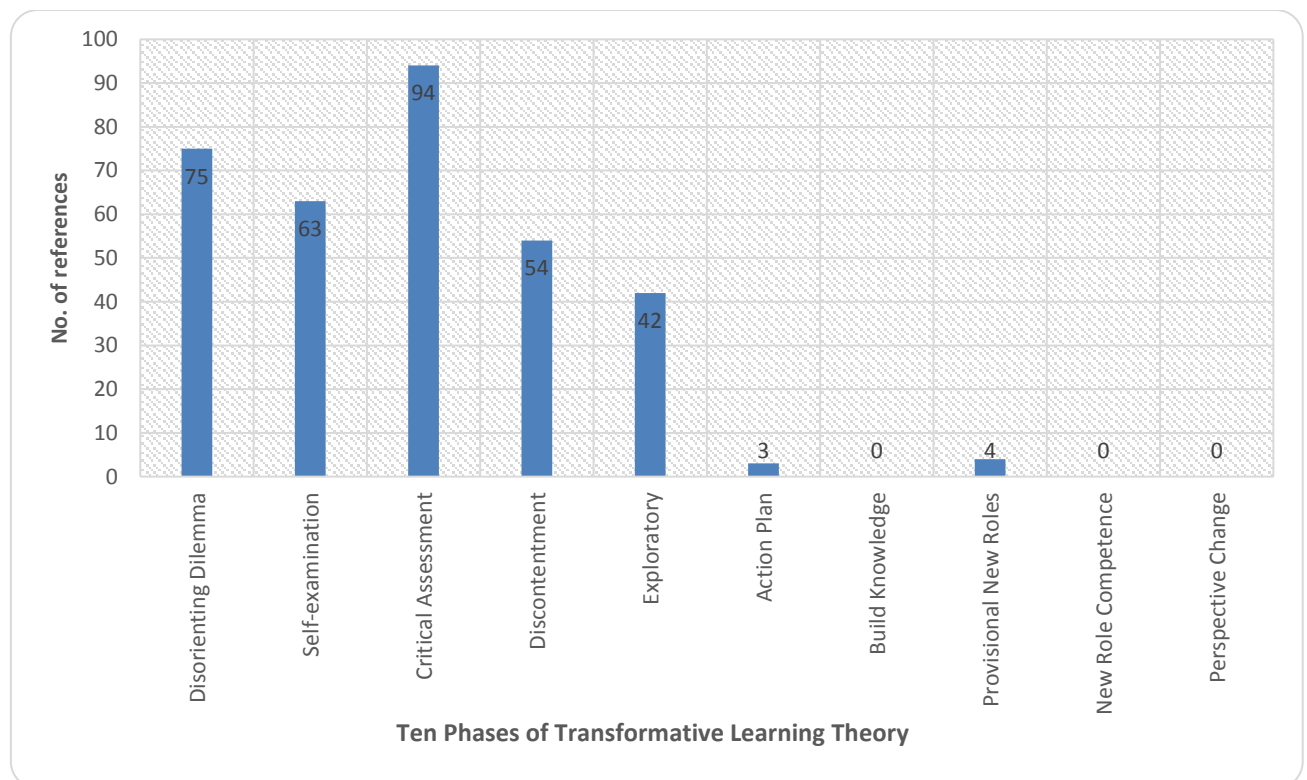
1. Experience a disorienting dilemma or shock
2. Self-examination as to whether or not the individual has been the cause of the dilemma
3. A critical assessment of sex-role assumptions and sense of alienation from taken-for-granted social roles and expectations
4. Relating one's discontent to a current public issue
5. Exploring options for new ways of living
6. Planning a course of action
7. Building knowledge and self-confidence to implement plans
8. Provisionally try new roles or methods
9. Build competence and self confidence in new roles
10. Reintegrate into society on the basis of the conditions dictated by the new perspective.

Mezirow and subsequent theorists assert these transformative phases, and the subsequent reflection and self-reflection that inevitably occurs throughout each phase, can be applied to any transformational change. For the purpose of this thesis, each of these phases is considered applicable to other wider perspective transformations that an individual may experience. Whether it is a return to work through re-training, a complete shift along a political spectrum, or – as in the case of this research – a change in perspective regarding water as a fundamental component of a commercial operation.

## 4.2 Findings of the study

The ten phases of TLT were worked through consecutively to structure the analysis of this case study. The findings are discussed in order of the key research questions with the results from the various phases of Mezirow's (1978) TLT incorporated.

Business owners' responses were allocated to the most appropriate TLT phase and the graph in Figure 4.1 below illustrates the number of times responses were made that were directly linked to one of Mezirow's ten phases of Transformative Learning Theory (1978). There was no limit to the number of times respondents could refer to any of the TLT phases during the interview.



**Figure 4.1: Number of references by interviewees that could be linked to each of the ten phases of Mezirow's Transformative Learning Theory (1978).**

The writer used Mezirow's headings to structure each phase of the data analysis below, except for Phase Three. The heading there is slightly adapted to reflect this particular water contamination case study, thus the writer has used the more generic phrasing "critical assessment." This thesis' divergence from Mezirow's original process of perspective transformation in order to apply an inductive analysis to each of the ten phases whereby interviewees' responses have themselves generated analytical sub-categories.

The largest number of sub-themes emerged from Phase Three: 'Critical Assessment' where business owners have critically assessed what happened to them as a result of the contamination. This phase was where respondents, at the time of the event, were asking 'how', 'what', 'where', 'when' and 'why'

questions of both themselves and others as they recounted their experiences. During this phase business owners' attentions had moved on from their personal experiences of initial shock and disorientation – and their brief self-examination period – toward instead thinking about the way the town water was supplied to their business. They mentioned issues relating to the logistics of the local water supply system itself, and they commented about a combination of factors regarding the natural ecosystem and human-engineered water management systems. Specifically, within Phase Three many business owners spoke about the following issues the author has classified as sub-categories:- chlorinated water; mistrust of the authorities; expectations of local and regional councils and their water supply management; mistrust of their taps; councils' communications; direct effects on their businesses; and natural ecosystems.

In terms of trying to determine business owners' relationship with water short term, initial actions, that allowed business operations to continue during the crises, were identified in Phase 2. Those examples were distinct from Phases 7, 8, 9 where examples of having a more resilient, reduced business dependence, and alternative water supplies determined a long-term relationship with water supply.

Interviewees may have found the questions that aligned to the critical assessment phase were easier to respond to because they were sharing opinions and perspectives formed over ten months since the contamination. For many respondents, this research interview was the first time they had had the opportunity to discuss what had happened to their business with a person external to their family and friends. Given that the contamination was so impactful, many of the business owners were appreciative that someone was interested in listening to their individual experience.

### **4.3 Phase 1: Disorienting dilemma**

Mezirow's first phase of transformational learning theory centres on a person's experience of a 'Disorienting Dilemma'. In this phase an individual undergoes an external shock such as a physical or mental trauma that affects their usual life patterns for a noticeable period of time. Mezirow claims that the degree of stress from a disorienting dilemma will strongly influence the nature of a person's transformation. More importantly he asserts that an individual must actually experience a disorienting dilemma as a trigger to the transformation of their perspective. There are two types of disorienting dilemma, "One is an external event – the death of a husband, divorce, loss of a job, moving to a new city. The other is an internal, subjective experience – the feeling that life is not fulfilling, a sense of deprivation..." (Mezirow 1978, p. 16).

Of the twenty respondents in this study, all experienced a degree of disorientation triggered by the sudden, external event of the contamination. Once they found out what had happened they had to

react quickly. Predominantly, their first focus was on family health and then on the survival of their business.

Their reactions to the official contamination announcement ranged from “oh that’s what it is?” (T1) to “absolutely horrified” (T4). People were confined to their homes “reasonably quickly” over the first week and “as people started getting crook, and then if you yourself weren’t crook, you’d be at home looking after someone else who was” (T11). Only four interviewees were physically sick from the *Campylobacter* outbreak but all respondents knew someone who had been ill. This resulted in respondents experiencing significant external event disorientation, in line with Mezirow’s 1978 observations.

#### **4.3.1 Business owners unwell**

The four respondents who were unwell did not know what was happening to them at the time. Publican T11 had travelled to Wellington for a work function wondering what was wrong with his stomach. He arrived in Courtenay Place “and my whole stomach was twisting and burping, you couldn’t fart because you knew what was going to happen... For the next five days I was on the toilet, lucky I didn’t vomit...it was just horrific...you couldn’t stop it because you didn’t know it was there until it hit you where it hit you.”

Accommodation owner T12 was debilitated with the outbreak and became “one of the 5000 plus.” She was shocked that it had occurred at all, “oh my god, this is third world country stuff, ‘how does it happen here?’” she asked herself. “I was very, very ill for a long time. It hugely affected the business.” Like a number of other victims she continued to drink the tap water. “You know normally when you’re sick, the one thing everyone says to you if you’ve got gastroenteritis, ‘drink more water, drink more water.’ So everyone’s been told to drink more water and it just made the problem worse.”

*“It was horrific...the whole village, there was no one here...just horrible, so many people were sick, it could’ve been a lot worse as well, but it should not ever have happened. I don’t think I’ve been that sick ever, I lost about 7kgs, it was not nice. My gut was wrenching, I couldn’t move, I’d be on the couch and then have to run next door, I couldn’t even get in the car and drive to the doctor’s without being sick. I was only vomiting for two days; my sister had four days, both ends two days. It lasted for well over a week.” [T9]*

Similarly, fast food manager T4 was also sick from drinking water at his business premises. “I was feeling unwell before the announcement so the minute it was announced I thought ‘that explains it’”.

To exacerbate the situation, the delay in notifying the community that something was wrong with the water meant many people continued to drink tap water unaware. This would have prevented people from recovering more quickly as they continued to consume contaminated water. As an example, retail-

clothing storeowner T17 had a friend who was sick with cancer and she believed the outbreak shortened his life. In preparation for his car trip to Palmerston North to undergo cancer treatment, he filled his water bottle from his Havelock North home tap to continue hydrating himself during the journey. He became extremely sick and died much sooner than his prognosis. So for T17 the event was an 'enormous thing...I was really surprised and worried I was going to get sick.'

#### 4.3.2 Shock and fear

Prior to the *Campylobacter* diagnosis announcement, the community in general did not know why everyone was getting sick. They knew the sickness was from something in the water but some thought the worst regarding possible sabotage, "You think all these different things" (T6).

Once the cause was announced as *Campylobacter* a few business owners knew how debilitating the disease could be. "That's pretty damn serious," thought T16, his "initial concerns were for people; it can lead to neurological problems and all sorts...I was absolutely shocked" (T16).

The whole experience was so overwhelming for T15 he didn't know where to turn.

*It's overwhelming...you don't realise how much you rely on something until it's at risk. Something you take for granted, you know that our water is clean and fresh. And as soon as it's gone you don't realise; just like you don't realise how much you use your arm until it's chopped off! [T15]*

Similarly, respondent T4 was "absolutely shocked" and very concerned.

*Because we use water for everything, to clean, for food preparation. And obviously serving food to people and having a water issue is a major issue for us and not very easy to deal with... I don't know whether the media and the Council really understood what it was like for families. People were concerned their kids were going to die, and people thought they themselves were going to die. [T4]*

When retailer T8 was assisting with the distribution of donated potable water, he was shocked to witness the reality of how sick people were *en masse*.

*We got rid of 20 pallets [of water] in the space of three hours... The cars just never stopped coming...there were grown men asking me to carry their box to the car because they were worried that if they picked it up they would 'shit' themselves. Literally they had their wives and kids in the car because the husband was too scared to leave the wife...they looked absolutely dreadful, that's when it really blew me away. You saw kids almost lifeless just lying in the car seats, they were absolutely sick. It was ghastly. [T8]*

#### 4.3.3 Business panic

Given that T4's health food business had only recently opened, he said,

*As soon as it hit, we could see the next day the lack of customers coming in and it just carried on and on and on...it was absolutely the worst thing that could've happened to us because the customers just stopped overnight. So it had a massive impact on us and during that time we would've lost \$5-6,000. Now for a business this size that almost puts you under...It affected us easily for a month and then we slowly picked back up as people got their confidence and became well again. People were unwell for a long period of time. [T4]*

Another food retailer had recently relocated her business within a year of the outbreak. She spoke about how her café had taken considerable work to get re-established following a previous local flooding event at the end of 2015, and how other local weather events cause chaos for her business. “[Now] emotionally when we start seeing the signs of a substantial weather event, we start panicking.” (T5)

As a food supplier and retailer T5's business was 'devastated' and she was 'horrified' when she heard that some of her customers were sick, that something so potent had come into her premises.

*Our business suffered hugely. What can you do? You've got stock that's all dated and perishing that you basically have to throw out. [T5]*

Preparing meat to sell to customers requires a considerable volume of water, so for a local food provider, (T15), the thought of customers coming down with *Campylobacter* “just petrify[ied]” him.

*Being in the food industry we know how long it takes Campylobacter to incubate...If I contribute to making someone sick that's my worst nightmare. So straight away it was just panic stations. It was just 'get in the shop Sunday morning and dump everything'. Empty bottles of water, bleach everything, top to bottom, just get it as safe as we possibly could and then come up with a plan...an initial state of panic that never goes away. Every time I turn the tap on now I can't help but think 'what's coming out?' [T15]*

Respondent T8 was a self-confessed pragmatist who aimed to work through the logistics of the contamination and get involved with helping others.

*I was one of the movers and shakers on the local business association, so we just made a few phone calls and tried to work out what we could do to help and try and get the messaging out... And so yeah as soon as I realised it was a major problem, I knew it would have an effect on our business... The thing is we quickly worked out that things were happening. People were donating water, one thing I did was get Coca-Cola to donate a truck and trailer-side of water into the local community. Of course it's an expensive product. So the cars just started pouring in so we got rid of 20 pellets in the space of three hours. That was on the Monday, I think the Tuesday. That's when it hit home...that morning unloading the product that was quite shocking because we saw a vast number of people coming in and you saw whole families in the car because Mum, Dad and the kids were too scared to leave each other. It was pretty bad. That was when it really struck home just how bad it was. [T8]*

For local pharmacist T20 her concern had been whether she had been treating people with the most appropriate medications for their symptoms and whether she had enough pharmaceutical stock. So once she heard the media announcement she experienced a ‘tinge of relief’ that she had finally heard the answer she was seeking all week.

At that midweek stage, T20 was perplexed because she had not heard from any health authorities. She provided treatments, hoping she was dispensing the correct medications. Once the outbreak was informally confirmed on the Friday night, she was confident with her prescriptions. She decided to call her wholesaler to request extra drug supplies and to open her pharmacy earlier than usual that Saturday.

*On the Wednesday and Thursday mornings, within the first hour or two of opening the pharmacy, we’d had maybe eight to ten customers ring in within that hour with gastric symptoms saying they couldn’t get out of bed, could they send a neighbour in, or could we deliver some supplies to help them?” I called into the doctor’s surgery on the way in and said, ‘I’ve got a wholesaler on stand-by, what do you want?’ So we also got some more IV bags and different things. I came to work by about 20 past nine, by the time I’d sorted stock, and I had a queue at the door thinking I was opening at 10am, so I was on my own for probably the first half hour. I asked [people] to write down who [the medicine] was for, what medication they were on, what symptoms they had and to take a [queue] number. And it was just like that until 4 o’clock in the afternoon. [T20]*

For this local pharmacist, the sheer volume of the epidemic was a shock. She had never experienced anything like it in New Zealand, nor when she practiced in the United Kingdom.

*If you have Campylobacter from eating a chicken salad in a restaurant, you’d go to your doctor, often they’d do a stool sample, probably a good portion of the time they’d give you an antibiotic if the sample comes back positive, so that you usually get a fairly good clearance. But when you’ve got 5,000 people the antibiotics didn’t happen, so [this outbreak] has been treated differently. [T20]*

A positive aspect for hospitality owner T7 was the way the business community came together to help each other and their customers as much as possible.

*The one thing that the Havelock North Business Association did pretty quickly was they got water donated in five or ten litre boxes so that we could use for customers, and so they were dropping off those in bulk pretty quickly I’d say by the following week anyway. So the response from local businesses and the help was really amazing, everyone was really there to support each other. [T7]*

#### **4.4 Phase 2: Self-examination**

For Mezirow’s self-examination phase, findings illustrate how business owners had to think about their business, their business operations and how they dealt with the crisis. While Phase 2 relates to people’s



immediate water supply thoughts and actions – that kept them operational after the initial shock – it is worth noting that these interviews took place nine months after the contamination.

Respondents did not describe their initial reaction in terms of Mezirow's requirement to ask "is this something I've done?" because by the time of the interviews they knew customers' sickness was not due to their business operations. However, some did respond in terms of recalling their feelings of "what have I done to deserve this effect on my business?" They also recalled having to examine what they knew about *Campylobacter* specifically. Some had prior knowledge of water supply systems, due to their health careers or rural upbringing.

Business owners remembered having to look within their own sphere of knowledge in order to examine what they knew of, and how to deal with, water contamination. They were immediately reacting to what they knew, and didn't know, about the contamination. In their own minds they seemed to ask themselves if they were responsible, they established they were not, they then quickly moved to ask, "What is my responsibility now?", or "What can I do to reduce the impacts of the contamination on my business?" All business owners reacted to the immediate situation, they wanted to remain focused in order to keep their businesses operating and, where possible, wanted to assist others.

Data recorded in this phase generally pertains to the second interview question that is: "*How did [the contamination] make you feel in regard to your business operations?*" In order to answer this question, interviewees had to think about their business operations and examine the way they had initially established processes and systems back during their start-up phase, or when they first purchased the business. They had to self-examine whether they could have prevented their decrease in sales or their staff falling sick, and then how that business vulnerability made them feel.

#### **4.4.1 Thoughts**

This section explores what went through business owners' minds as they processed the possible causes of the contamination. It is worth noting that the actual source of the *Campylobacter* was not officially confirmed until approximately two weeks after the official announcement of the outbreak, due to testing regimes and incubation periods. People and organisations had been speculating as to where the pathogen had come from and various theories had been mooted – from a mushroom farm to dead animals.

At this point respondents were pondering the unconfirmed cause of the contamination, how it occurred and how it then impacted their business operations. For new health food café owner T10, her prior experience as an accident and emergency, paediatric and neo-natal care nurse, had exposed her to considerable experience with gastroenteritis bugs and their effects. "To have something like this come into my café, and we were serving it up to people? To me that was just incomprehensible." As a

medically trained respondent T10 asserted, even though she knew bacteria, pathogens and diseases can be carried through water she experienced an even stronger “heightened awareness” that water must be clean.

T10 noted that out in the community there seemed to be...

*[a] mental block in everyone’s head. You could [also] see it at the supermarket - people were really frightened. They were scurrying around; they wouldn’t stop and talk to people. It was in and out, gone to get the necessities, and for some of them it was a caffeine fix, and it just kept them sane for those that weren’t sick. [T10]*

At the other end of the ‘what is happening?’ scale, a retail storeowner “wasn’t totally surprised because anecdotally I’ve a number of people [who have] spoken to me and said they’ve always boiled their water here in Havelock North because over the years they’ve had friends who have had gastro issues.” He had a supplier that was struck hard by the pathogen and became paralysed, “I felt really angry about that.” (T13)

After the initial disorientation phase some business owners realised the level of their isolation and that self-reliance was crucial to their survival. For local hairdresser T19 the situation made him aware that, “you still have to rely on your own savviness to get yourself through it.”

From the initial stages of the contamination food retailer T5 solidified in her mind that “when you’re in business for yourself, it is your own risk and responsibility...there’s nobody [else] accountable.”

*[Others] wouldn’t have [had] the same amount of stuff sitting on the shelves as we had I would think. Nobody else fits into the category. But the cafés, they might’ve had a quiet week because they may’ve had to cut their staff hours and suck it up a bit. But they didn’t have the stock, and that’s what I’m talking about the losses of the stock. [T5]*

#### **4.4.2 Initial responses and adaptations**

Self-examination around the causes of the contamination were not required *per se* because during the first Friday (12<sup>th</sup> August 2016) most of the interviewees started to receive sporadic information that sickness within the community was likely to have occurred through the town water supply. Business owners had no influence or control of the potable water supplied through the local Council’s infrastructure and external contractor management, and regulated by the District Council. Their personal self-examination of their water supply and water use was carried out relatively unconsciously as business owners assessed, planned and started to action interim business systems and processes.

Respondents did not specifically speak about their unique self-examination thoughts during the interviews, but they did convey what their initial water supply changes to, and reactions within, their

operations were. These changes obviously required each individual to cognitively process their thoughts to formulate and implement operational adjustments to their business.

The majority of interviewed business owners automatically took on a communications role – based on the minimal information they may, or may not, have received - within their business and their range of stakeholders. Business owners with health backgrounds and food production training reacted immediately based on their own prior, science-based knowledge.

Hospitality owner T10 immediately posted signs outside the café to notify people the café was closed and staff were educated specifically about asepsis and reviewed how to handle everything in the café. Once he heard about the contamination, food distributor T8 took a pragmatic view, “I wasn’t super perturbed...I just thought there’d been an issue, I didn’t know.” He called people and asked what he could do to help fix things, and went into work to make sure the staff knew to stop drinking the water. He knew his business would be financially affected<sup>9</sup> but he was more concerned about people being sick – two of his own staff and his son were very sick. He espoused, “That whole ‘call your neighbours’ and talk to people, community things in this sort of situation are everything.”

Local food producer T15 immediately picked up the phone and rang the retirement village where many of his regular customers were based. He requested that they dispose of any food they had recently purchased at his retail store, “straight away it was just panic-stations.” The staff rang other customers they knew and also erected signs outside the shop. They stopped making products that contained water and stopped any systems or processes using tap water, such as hand washing. “We used buckets of boiled water with bleach in it to clean the dishes.”

Another food producing business that went into ‘panic mode’ searching for solutions to remain operational was T18’s. Council had informed her of the contamination, so she had started thinking through her production processes and became aware by Saturday afternoon of what she needed to do. “It dawned on me, I was like ‘oh f... I’m not going to be able to run the factory!’”

At that point, T18 rang the Ministry for Primary Industries (MPI) seeking two-way communications. She asked what else she needed to know about *Campylobacter* and “to know its kill parameters” because she knew the water did not need to be boiled to kill it, and that the boiled water notice was to ensure people did not underestimate the organism.<sup>10</sup>

However T18 deduced that the ‘odds were’ that her factory lines could all contain untreated water.

---

<sup>9</sup> T8’s business lost \$40,000 in turnover in the first week, followed by around a total of \$45,000 during the weeks following.

<sup>10</sup> *Campylobacter* dies at 72°C and water boils at 100°C.

*[But] I knew I didn't have a problem because I'm actually a council testing site. I still had to operate under a boiled water notice. So I worked through the process with MPI in terms of a protocol that I would've put in place and that I [would] be on site at all times that anything was [being produced for sale]. I basically licenced myself for 14-hour days for the first seven days... my undertaking with MPI was for me to micro-manage the whole thing. [T18]*

For delicatessen and café owners, attending the local business association meetings helped the owners feel like they were doing something small by getting business owners together, however it appeared those communications were not enough.

*There was a lot of talk. It was all we talked about for a while. We knew we hadn't caused it, we knew our kitchen was fine. There was alot of scrambling about what to do. We couldn't make coffees; they basically shut our water supply down. [T5]*

All interviewed food producers immediately started to think about their local authority's water supply, and as a consequence adapted and changed their water sources. They knew that boiling their current tap water would eliminate the pathogen; however this was laborious on top of all the other hygiene processes they needed to immediately implement.

Health food café owner T10 considered all their water-drinking vessels supplied for customers, and proceeded to take away all the water receptacles from their filtered tap. She transported her home bore water onto the business premises and used it on their coffee machines "so that at least people could still have coffee" (T10).

An immediate priority, for food retailer T15, was to think about what needed to be done and then, "just get into the shop on Sunday morning and dump everything." He bleached everything "top to bottom" to firstly get the store safe and then he could focus solely on developing a forward plan.

*[Staff] all have an awareness, so it was basically buckets of boiled water to wash your hand. We used buckets of boiled water with bleach in it to clean the dishes; just everything went over the top. And I'm not going to say we went over where we should've; I think we took the immediate precautions that we could have. [T15]*

At T10's health food café staff adapted their menus and produced new product. They thought about what types of food and nourishment would be useful to a sick community, so they started producing organic bone broth for customers to purchase because it is full of nutrients and considered a good 'healer and sealer' for the stomach. Initially they gave it away and then sold it at highly discounted rates, "apparently it was a godsend for some."

Businesses that were not food based sought external advice. Product retailer T2 did not put up signs but he attended a couple of business association meetings, which he found helpful. As a retailer T17 also

went to the first business association meeting held at the community centre to find out how to handle the whole thing.

*We were very lucky we didn't have any of our staff off sick so we didn't have to worry about that. So we just, in a fashion, put one foot in front of another and just boxed on. There was nothing else you could do. [T17]*

A hairdressing owner went into 'strategy mode' and spoke to his employees immediately.

*I had a meeting with my guys on the Monday. Typical hairdressers they had this apathetical 'she'll be right' attitude and they couldn't believe all the [safety measures] that I was putting in place. By the end of the week they thanked me because they didn't realise [the outbreak] was so bad. [T19]*

A number of retail owners operating within Havelock North lived on properties outside the township, so once they realised they needed to supply their staff with an alternative water source, they also carted water from their private properties to their retail outlets. "We had meetings with staff, I supplied fresh water from my orchard for staff to use and they were welcome to take it home" (T3).

For pharmacy owner T20, her training and experience immediately enabled her to decide on business adaptations. Her first thoughts were that she required significantly more medicinal stock to provide to people and she wanted to take as much pressure from the doctors' surgeries as her business could.

In summary, self-examination around the causes of the contamination was limited because business owners knew, within four or five days, that people's sickness had occurred through the town water supply, not due to their own actions. Interviewees did not specifically speak about their own process of self-examination during the interviews, but they did convey the initial water supply changes they made to their operations. These changes had obviously required each individual to process their thoughts around required operational adjustments to their business.

## **4.5 Phase 3: Critical assessment**

Mezirow identifies the third phase of Transformative Learning Theory as when individuals critically assess expected role assumptions, and their sense of alienation is increased from previously taken-for-granted societal roles and expectations. Specifically this phase examines the extent to which business owners:- understood natural ecosystems; critically assessed the chlorination of their water supply; no longer trusted the authorities; trusted their councils to effect efficient processes and communications; understood the significant effects of the waterborne disease on their businesses; no longer trusted the tap water.

This means that recording how business owners critically assessed their predicaments for alternative potable water sources, the possible assumptions they made and how they reacted to their situation helps to illustrate the extent to which respondents were engaged to make those critical assessments.

#### **4.5.1 Natural ecosystems**

In response to interview question eight, 'Do you see yourself as a part of the food chain/ecosystem?' thirteen business owners critically assessed and acknowledged that people, water and ecosystems are all interconnected and interdependent. They also expanded on their answer and made mention that all living things were reliant on water. In addition they differentiated that this local contamination was based in nature, however they believed the event was caused by human decision-making.

Respondents who had experience in, or knowledge of, the health sector unreservedly acknowledged water's role within ecosystems. Respondent T10 had been a nurse for over twenty years before opening her own health food café in town. The café venture was a response to having seen how unhealthily people lived their lives and she wanted to offer them an alternative. Her feedback was, "Yes, because we are living creatures...I...think that way anyway, so [the contamination] was no different...Of course, we are absolutely part on the whole ecosystem, and we are all just particles."

A local pharmacist's career in health may have influenced her definitive answer to the ecosystem question. "Yes we are definitely part of an eco-system and we do quite a good job of sometimes disrupting that eco-system because we think we are more important than the rest of the players in the cycle...We're quite a big disruptor of [the ecosystem]" (T20).

As a small goods food producer, respondent T15's apprenticeship training ensured he was aware of food health issues and as such was adamant that humans are "100 percent" part of the ecosystem, "and a very important part of the ecosystem because what we do directly affects the whole thing. We can either help it flourish or we can destroy it." He recalled having a long conversation with his young children during that first week of the contamination. T15 talked with them about how the hydrological system works, and how aquifers receive water that has filtered through from the land's surface:

*So we went through the whole system of how we get water and then we started getting them to talk about how we use water. We were talking about our vegie garden at home and not being able to water our vegetables, what would happen to them. Without being able to feed our pets what happens to those, you know...me not being able to use water at work what happened to my business. So they started to see the whole. Something that we took for granted actually ended up affecting every facet of our lives. [T15]*

Other business owners had grown up on a farm and/or dependent on bore supply and they spoke about that experience having infused their thinking of water's connectivity to all living things and nature's ecosystems.

Respondent T12 affirmed her understanding that she is 'very much' part of an ecosystem.

*Being from a farm all my life I know the livestock need [water] just as much as we do and what happens if it's not available. I'm probably still the same but...I think it's different now, [then] our water just came from a creek...Growing up...we used to drink straight out of the creek coming down the hill. But you'd know damn well there's probably a possum dead in the creek but you just still trusted the filtration system as it comes down the hill, and all the rest of it.*  
[T12]

Health food café owner T10 recalled growing up on a large sheep station. There were large tanks filled with aquifer water, and the tanks could be contaminated by possums or peacocks so the water would 'get a bit revolting'.

Similarly, T17 noted her on-farm upbringing where she only had access to tank water. She was very aware of how crucial water was to the entire success of the farm, to her and her family water was 'obviously just enormous'. She talked about realising the difference between her personal awareness of water and town people's awareness.

*I've grown up always thinking about...being careful with water...not like when you're living in town. We always thought town people could have big baths and we couldn't. So I guess I've always thought about water...you know when you're a kid, I never really thought [deeply] about water...[I just knew] you just had to be really careful of [using] it.* [T17]

Some respondents noted humans as the "head of the food-chain" (T20, T18, T7, T6), and environmentally selfish in the way they go about providing for themselves. Respondent T18 appeared to have a heightened awareness of humanity's place within ecosystems and the environmental issues that have been created, "we are just like any other mammal, it's just [that we think] we've been granted the 'licence' to be considerably more destructive and not be held to any accountability out the other side".

Furthermore, another respondent, T7, commented on the way humans believe they can 'control' ecosystems. "We try and bully our way through and think we're top dog. I don't think we necessarily are. We rely on nature; we rely on those eco-systems for our survival so actually we are part of it." Pharmacy owner T20 also acknowledged that humans do a good job of disrupting eco-systems because "we think we are more important than the rest of the players in the cycle."

The remainder of respondents had not thought about water and the relationship water has with natural ecosystems until the *Campylobacter* contamination event occurred. Retail owner T3 grew up in town

and admitted he wouldn't have thought about "all living things...prior to the contamination". For him, "it was pretty much an instant realisation [during the outbreak] that if aquifers are contaminated then it's going to wipe out the whole of Hawke's Bay. It's going to put contaminated water on our crops and we won't be able to sell them." He talked about nothing being able to grow without sunshine and water and that water was beneficial because "the left over water goes back into the ground and carries on [through] the ecosystem."

Working in a travel-booking agency, respondent T9 had not thought about herself as being part of an ecosystem but she did start thinking about ecosystems after the contamination.

*I guess [water] is something I've taken for granted because I've grown up with it. It's just part of life. But yeah, when something like this happens you're like 'OK this is really affecting me', I can definitely see that now. But it didn't really occur to me beforehand...looking at the rivers [now], we drive over to get to work, and you can tell when they're really high and muddy and murky and I think 'oh, there's cows in the water, is that going to affect anything?'" [T9]*

The contamination also triggered new thoughts on environmental linkages for business owner T17.

*The contamination made me think about the water a bit more, definitely. Especially because they're talking about the rivers here being so dry. [The contamination] made me think 'if we don't get a lot of rain and you don't get the fall-off into the rivers, then things don't get flushed.' And the beautiful rivers we all swam in when we were kids have all turned into slimy little nothings. [T17]*

T16 understood the connectivity of water to all living things but he seemed reluctant to use the term 'ecosystem'. He talked about river water connectivity to aquifers, carbon dating of water and "yeah I suppose [water] starts in the ranges, goes down to the sea and goes back around again" but he appeared agitated with interview question number eight regarding the ecosystem and preferred to use the term 'food chain'.

*We are part of the food chain, everything's part of the food chain aren't they? If you take yourself out of it you're living in la-la land...every living organism has an effect on everything else. You've still got water coming in, you're still consuming food that's got to come from somewhere, it's not like Star Trek, you don't push a button and it turns up. [T16]*

Another respondent from the retail wine industry, T8, did not like the ecosystem question at all. He heaved a big sigh and answered in a rushed manner with annoyance in his voice.

*Not especially. I know we are but I don't consider it that way. I mean you know I'm intelligent enough to know we're definitely part of an ecosystem but...was it in my thinking about it in the water crisis? Was I thinking about animals or cows or plants in people's gardens getting sick? No. [T8]*



#### 4.5.2 Chlorinated water

This sub-category of the critical assessment phase was used to record business owners' comments regarding anything to do with chlorinated water. Most respondents consistently commented about the strong smell and different taste coming from their taps during and after the contamination. Within this category respondents commented that despite the *Campylobacter* contamination it was the chlorination by the Hawke's Bay Regional and Hastings District Councils that was unwanted – it affected their business operations; made them think more about their water supply; and/or was seen as only a quick fix, not a durable solution to the culmination of problems.

At the time the interviews were conducted interviewees were not happy with the long-term chlorination of their water supply, and spoke about how the smell of chlorine affected them and their overall perception of water. Some explained that during the first few days the chlorination taste and smell was very intense. By the time of the interviews, ten months later, that intensity had reduced, but not enough for them to have become indifferent to the chlorination of their water supply.

Initially Hastings District Council “shock dosed” chlorine to the water supply at two parts per million on the 18<sup>th</sup> August 2016, and then levelled it out to one part per million, for three months, as per requirements of the New Zealand Drinking Water Standards. Council has continued with chlorination in the Hawke's Bay to cover Havelock North, Hastings, Napier and surrounding water supplies. Respondent T10 noted, “The fact that it's now heavily chlorinated goes against the grain.” Respondent T11's commented as follows.

*It's foul. It just tastes awful. When you're used to non-chlorinated water to suddenly get this water that is so heavily chlorinated, it's just yuk... Otherwise if you put the tap water in there and you boil it, [the water] just stinks of chlorine...they must've put in truckloads of it because it was really strong. [T11]*

He went on to speak about the situation at the time of the interview.

*The chlorination has also changed my perception of water. The contamination made the chlorine come along. If it wasn't for the contamination maybe we might not have had the chlorination. All these varieties of water. And different areas have different water sources with different minerals which make different flavours, so yeah I now notice the differences. [T11]*

T11 was adamant that the chlorination itself had changed his perception of water, particularly in regards to the natural environment he understood the water had originated from, prior to being ‘processed’ by Council.

The contamination event made over 5,000 local people sick in Havelock North; it was out of business owners' control and had already occurred. The chlorination of the water supply significantly affected

operations for some business owners. Many perceived the chlorination as a significant disruptor to their business with some respondents only speaking about chlorine on a personal level, while others noted potentially industry-wide affects.

Respondent T14 was particularly angry about the chlorination.

*So for three weeks or so, I can't remember how long [the boil water notice] went for exactly, we were all under the boil water notice. So we had to keep [purchasing] boxed water for everything, cooking, washing and so on. When probably it was ok to run [water] out of the tap because there was that much bloody chlorine in it. There were probably no bugs in there from Friday afternoon/evening...and yet they hand-braked our business, they hand-braked our community.[T14]*

T14 refers here to the fact that even though council had deposited significant amounts of chlorine into the local water supply council still insisted that businesses keep boiling their water. He believed the extra time, cost and work involved to boil the chlorinated water was unnecessary, particularly given the high chlorine dosage.

Small goods supplier's high income-earner products were severely affected by chlorination.

*For us [chlorinated water] turns things green. Chlorine and meat don't go together. If you ever look at the chemical reaction – we use a chlorine detergent because it breaks down fat, the bubbles go green. So if you put chlorinated water into a sausage, it's not right. It has a chemical reaction with the meat for a start ...we lost about \$16,000 worth of products in week one." [T15]*

As a salon owner, T19 completely avoided talking about the chlorination with clients. "In the original days [the chlorination] was really bad. From a salon point of view, you had people asking questions like 'what's the chlorine doing to my hair?' It just became the wrong conversation topic."

The wine industry was particularly affected by chlorination. Water supply business owner T16 noted that his employees had installed numerous chlorination filter schemes at local vineyards. As well as using water to clean the production equipment vintners use water to adequately dissolve the yeast, reduce the acidity of the wine and dissolve all sugars.

*Overnight [council] put in the chlorine and didn't tell anybody. One of the wineries was just [fuming]. They almost lost [it all], chlorine just stuffs the wine, the taste is just horrible. I think one of them had to ditch their wine...They would've smelt the chlorine straight away and thought 'holy shit that's going to wreck our wine'. They're acutely aware of what's going into their wine. [T16]*

All the businesses interviewed had been physically affected by the contamination and subsequently the chlorination. Some business owners knew of other businesses who were not directly affected by the *Campylobacter* contamination itself, they did not get sick nor did their business suffer hugely. However,

businesses were still indirectly affected by the chlorination. As respondent T12 pointed out, “those living here say [the contamination] ‘didn’t affect me’, but they’re all saying how bad the chlorination is. Hairdressers are telling me their dyeing process has changed so much because chlorination is so bad.”

Retail clothing storeowner T17 stated, “So my perception has changed...the water out of our fridge is cold too so it’s filtered and tastes nice, and I think it tastes nicer.” In order to ‘disguise the taste’ of the chlorinated tap water, she had also been using the soda stream maker to carbonate and change the taste. She said that there is a distinction between tasting and smelling the chlorine, “you don’t actually taste the chlorine, you smell it more than what you taste it” (T17). She is offended by the smell and perceives the situation of having chlorine in her water at home as “quite strong, not like going to the public baths where it stinks of chlorine.”

A community perspective regarding chlorine was provided when pharmacist (T20) noted her concerns around the suspected health impacts of chlorination.

*There’s people that still buy bottled water for their pets around here because they don’t want the chlorine. There’s health problems coming in now from chlorination with eczema and allergies and generally not feeling great. That’s really hard to quantify if that’s from chlorine or whether it’s post gastro problems. Campylobacter hides in the bowel and re-grows so I’ve still got people who are getting flare-ups now and then. [T20]*

People were wondering what has been done to solve the original problems that led to the *Campylobacter* outbreak. Many stated that a quick fix solution such as chlorination of the water was not enough; it was not a proactive approach to the water problem, it was ‘an ambulance at the bottom of the cliff’ scenario.

*There’s always doubt because you know, they’re still chlorinating our water which means there’s still a problem. And the chlorine is only a mask it’s not a solution. It doesn’t fix the problem it just masks the problem...and [chlorination] might create other problems. [T15]*

Being a water supply engineer, T16 confirmed that chlorination was deemed a cost efficient, quick fix for councils when he said, “I think that’s one of the reasons they were so quick to whack in the chlorine, which they kind of needed to do to be fair – it’s cheap. It’s not very nice for people; it’s created some problems but yeah as a quick fix it worked” (T16).

#### **4.5.3 Mistrust of the councils, District Health Board and Ministry of Education**

Generally all respondents referred to the fact that they did not trust the way councils and the District Health Board responded to the contamination, nor did they trust their remediation actions. Most respondents were incensed and animated with their responses, others less so. Universally they were all angry at the way the councils responded, or rather did not initially respond, to the crisis.

Café owner (T10) emotionally responded that it was her belief the councils were lying, covering issues up, not acknowledging businesses, blame shifting and creating delays in notifications.

*Absolutely frickin' furious. I was so angry I was ready to lynch someone. And the fact that they lied and they cheated and they pushed it under the carpet. They've done nothing for us as businesses...There is a litany of lies that keeps popping up all the time...it happened, and shit happens....but it happened and it was covered up...The fact that they did not tell us – they knew on Tuesday, the Mayor definitely knew on Wednesday and they didn't tell us until Friday afternoon. As far as I'm concerned, had there been more deaths it would've been like manslaughter. [T10]*

Other respondents spoke more specifically about various issues that triggered their mistrust of both councils. Loss of trust developed in the community as local body employees appeared to fail to meet their council employee's responsibilities. A local small goods producer (T15) asserted that he had "lost all faith in any sort of local government whatsoever. I pay my rates, we pay their wages and they are useless. They should be behind bars. It's that simple. If I poisoned 4,500 people, I wouldn't expect to be sitting here talking to you without bars in between us."

T15 went on to focus specifically on the distinctions between the responsibilities of the Chief Executive Officer (CEO) and the Mayor. He felt the CEO's lack of accountability was appalling.

*The CEO is the one who is responsible for [operations]. Not Lawrence Yule; [the Mayor], he is the figurehead so he did need to stand up and say yes we're accountable, we are sorry. Not 'yes we didn't do our job properly but I didn't do it personally' that was what he said...You can't restore the trust in the local government, its damage done that can never be undone, it can only be forgiven. And you can't do that without an apology or a resolution. So that's people's feeling around the place, it's an older community...There's a whole lot of stuff that should be said but probably never will be. [T15]*

In terms of the broader council and its employees, respondent T16's comments around lack of trust came from his feeling that other councillors were not being responsible with the truth. He stated,

*I think differently now about the council, they had an inquest as to what caused [the contamination] and before the findings came out they released a statement. One of the lines they had in there was...that we can say that the council infrastructure didn't fail and it was all pretty good, and... just filthy lies really... A lot of [businesses] just take what the council says for granted...I think a lot of [businesses] feel massively let down, probably from both the regional and district councils...I'm surprised, we sold UV systems to people in Havelock that were on the town supply after it was getting chlorinated. They weren't prepared to take risks. They did not trust the council you know; they basically didn't trust their water supply. [T16]*

Another respondent, food producer T18, was not angry about role responsibilities *per se* but noted,

*The point is that the people who probably made the wrong decisions about what happened to the water weren't the [same] people that got to clean up the mess. And weren't the people that actually had to front us. You know? Yip there's been some wrong decisions made and some wrong behaviours but I guess for me 'intent' is really big. So no, I don't have any animosity towards that. [T16]*

Some interviewees appeared to have more specific information than those simply expressing mistrust. They had small insights around the physical or technical aspects of council's water extraction methods and this 'extra' knowledge made them incensed with what they knew.

Restaurateur T4 claimed,

*I know they've covered things up. The road where I drive home goes past the three [Brookvale Road] bores. Six months before this happened there was a mad panic, I don't know if it was bore 1 or bore 3...And they're very difficult to seal off. They had a rig there for a long time. Every day we were going past, and I don't know how they sealed them off, they must put concrete down to stop the water flow, but it kept obviously blowing because they'd re-do it and they'd re-do it. And there'd be water in the paddock and then they'd calm it down again. [T4]*

Another restaurateur, T5, discussed the technical aspects of what she had found out:

*The fact that the bores [at Brookvale Rd], I heard, I don't know if it's true or not, that [the bores are] only 20 metres deep and that to me seems like 'well you may as well just pump it out of the river'. You know, it made me think about how vulnerable that water was, it's not pristine [at 20m] and why would they ever assume it was? If it's true ...it doesn't seem like [the water] went deep enough into the earth to be purified...after a heavy rainfall. I'd imagine that water would get through 20 metres very quickly...I remember reading it two or three times and going 'how could that be?' You know? It just seems like completely irresponsible. [T5]*

She was incensed that while her business had suffered significant financial losses, "The councils have both gotten off 'scot-free' with the [government] report saying neither of them actually caused [the contamination]. Well of course they didn't cause it, they'd have had to go and pour poison in [the water] to cause it. But they didn't prevent it, did they? And to me that's causing it. So how do they get off 'scot-free'? (T5)

Respondent T16 noted that the council had tried to reconstruct the cause of the contamination event at Brookvale Bore 3 and the bores sub-surface cavity immediately filled up with water.

*[Name withheld]...had some footage from subsequent storms and with one of the bores you get this massive stream of water coming down and it just stops at the bore. It doesn't go any further; [the water] just disappears down the bore. The water level is only 3 meters down. [The water] was literally just sucked down. [T16]*

He has concerns for Havelock North that carbon dating for their water supply shows it is only about a year old, whereas carbon dating of Hastings water shows it is about 50 years old.

Regarding the overall water system, an observation was made by a fast food manager that supported his mistrust of the competence levels of council's water management staff. For T4 the fact that pipes, fire hydrants, and sections of the road were all leaking "thousands of litres of water" for over a week after bore pumps were stopped, was a 'fair indication' that the District Council staff did not know enough about the town's water infrastructure. To him it was not a 'good look'.

Other examples of mistrust were generated by individuals' general understanding of the perceived contradiction in the councils' water extraction policies. Respondent T17 commented on the paradox of drought messaging coming from the councils prior to the contamination, yet the export of bottled water in the community was still permitted.

*I guess there was a lot of contention over the summer because they told us they were really short of water, and so you couldn't water your garden, it was a drought, and [yet] they're selling off [export] water in Hastings. ...Shitty really. I don't trust them. I don't think anyone does. [T17]*

A hospitality manager was angry that even though there was only contaminated water available to ratepayers, there were a couple of businesses still able to export potable water from the area.

*Shouldn't it be that we should have our own good water and not send it off to China...or wherever it's going? We're not the only place are we? Canterbury does too, doesn't it? Apparently they were still bottling water and taking it away when we were having our water affected. Because [the export of water] out at Whakatu it wasn't affected." [T6]*

Another respondent, T18, spoke about not being able to 'afford' to rely on the council, her food production business relied so much on water that she had to be in regular contact with council 'like fleas on a dog' because she financially "can't afford to trust [the council], I just can't afford to. And it f...s me off because I'm still paying for water even though I'm also treating it myself."

A restaurateur with connections to the wine industry stated that local people were worried about the ability of businesses to sell what appeared to be unlimited water overseas.

*We have such a...natural resource here and no one knows how limited it is. [This] is a huge issue especially here because most of it's coming from Hawkes Bay...it incites a lot of anger. I guess we're fearful that we won't have water available to us as small enterprise owners or just as people living here...they don't have any idea of how deep these aquifers go or don't go. [Water's] our biggest resource which no-one's protecting, at the moment. [T7]*

Publican T14 pointed out that the District Health Board (DHB) was the authority that would not lift the 'boil water' notice even though the water had been significantly injected with chlorine. Even though

T20, a local pharmacist, worked within the health sector, she only found out “through a friend on Friday.” The friend happened to be a DHB staff member and informed T20 before it was publicly announced on the Friday night. Earlier that Friday morning she had received phone calls from “government agencies like the DHB and Primary Health Organisation (PHO)...wanting information [on customer’s illnesses].”

As a pharmacist she was so busy in store she remembered being annoyed that the DHB was taking up her time with unexplained phone calls for customer information when she had so many and such ill people standing at her counter. She was again vexed with the DHB a few weeks later when they phoned to notify her of a 5pm ‘review’ of the outbreak to gather information from local health professionals. T20 explained to the DHB employee arranging the review that pharmacists have to be in store until they close at 6pm. The employee replied, “Oh ok then.” T20 then offered her availability to provide review information via a phone interview, but the DHB employee replied with “I suppose we could do something like that.” However T20 has never heard back from the DHB.

Respondent T16 was disappointed by what he believed was a lack of independence within the initial Hasting’s Regional Council’s commissioned investigation, carried out by the environmental engineering consultancy Tonkin & Taylor. He perceived this as a certain way to fuel public mistrust.

*They created a science course [for the public] and you had some scientists from the District Council and some scientists from the Regional Council. There was no independent...I mean everyone involved had an agenda. You had the District Council wanting to push everything as far away from the bore as possible because the bore was their responsibility. And you had the Regional Council who wanted to point the finger at the bore because that wasn’t their responsibility. [T16]*

#### **4.5.4 Councils’ communications**

This sub-category captures general comments regarding various types of communications and contact from both councils to the business owners. A key finding of the New Zealand Government’s Havelock North Drinking Water Inquiry: Stage One (New Zealand Government, 2017a, p. 5) was that neither the Regional or District Council, nor the District Health Board had a communications plan for the general community. The Inquiry found that the District Council employed a “scattergun” approach that relied on late night media and social media channels. They expected the message to ‘trickle down’ through social media sharing, and “that those who used social media would communicate the message to those who did not” (p. 134).

Given this environment, it is understandable then that suspicions emerged for business owners due to the significant notification delays; they wondered why the councils would delay such an important announcement, especially given the councils knew people still had such easy access to the contaminated

water. By the time the research interviews took place, the local business community had the benefit of hindsight and were able to compile the actual timeline of both councils' contamination alerts and notifications to the community. Most interviewees mentioned inconsistencies between the timelines cited by the authorities and the timelines that they remembered. People asserted they were not told soon enough, especially when the issue was as integral to their lives, and livelihoods, as water.

Café owner T10 was furious with the councils' delayed communications, "well we were in a state of shock, mainly because it had taken so long to let us know. We had a chap that came in on the Friday and said that the Council had actually been advised on Tuesday that there was *E-Coli* in the water."

Respondent T17 commented that the authorities must have known something was wrong and they delayed communications.

*There's just no way that they couldn't have known. A lot of people were really sick by the Tuesday...Imagine if we had been told by the Tuesday. ...You feel quite deceived by that really. Like [name withheld] very elderly mother in-law just kept drinking [tap water] and got very, very sick and she will never be the same. You feel quite let down by the lack of action and the lack of information...And that was the key learning...I'm sure they had their own advisors and things but that was why the...witch-hunt [of council workers happened] they didn't inform people quickly enough. [T17]*

Office worker, T9, had heard a constructive suggestion at the Business Association meeting. "Someone pointed out that there are 400 employees at the Hastings District Council and if every one of them had knocked on ten doors each the whole of the greater Havelock region would have been notified within two hours. It was a Friday night. [They didn't]" (T9). She felt that the delay in notifying people was 'horrific'.

*The fact that there were people sick for three days before we even found out that it was the water, that's pretty terrible. If something's wrong, we need to know right away to stop drinking the water and we'll be like 'yeah ok, that's fine I won't drink the water'. Don't wait for three days. [T9]*

Many business owners were shocked that the council communicated such a serious incident through such a 'casual' form of media, particularly the social media medium of Facebook. Beverage retail owner T8 said council made a significant mistake announcing the contamination via Facebook. "The reality is...not everyone is on Facebook. [Was there] radio? There was nothing on TV. Nothing in the newspapers...Lawrence [Yule, Mayor] said repeatedly 'we made a bad mistake, that's our learning, we needed a better way of letting people find out'."

Hospitality business owner, T7, was helping with restaurant service until 7pm on Friday evening. About 10:30pm she started getting text messages, "I got messages from my staff [from] their Facebook or



social media accounts...so there was basically a message for me to check the social media and that maybe I need to bring in water for both drinking and cooking for the next service.”

Another respondent, T8, mentioned Twitter as the way he found out about the contaminated water, “I think I saw something on Twitter. I think it was from a private individual so I went to the council website [to check] and one thing led to another.” Given that he found out through social media his initial reaction was that the contamination was “probably not that serious...Facebook was full of the usual common sense and idiots.”

For a local pharmacist, T20, it was also a significant shock to find out via Facebook, especially when the Hawke’s Bay District Health Board and the Ministry of Health’s Primary Health Organisation had been calling her earlier that week and asking investigative questions. “I think there was a public announcement on Facebook and through social media channels. It didn’t really come out properly until Saturday.” T20 was disappointed to have had questions from authorities yet, as a health professional working within the community; she had not been officially notified.

Respondent T7 said she, and other business owners, did not know how to react, “we didn’t really know what was going on apart from the fact that we needed to bring water in [to our premises]”. It was not until the Monday afternoon that she received a formal notification from council, “a piece of paper was slipped through the bottom of our door.”

The absence of council communications around processes and procedures for businesses prompted local food producer and retailer T18 to phone the council and help them with information on what they needed to advise other business owners under the ‘boil water notice’ situation. “They didn’t come to me but they were going around businesses, basically with the hammer, because they had a panic situation to deal with. I went [to them] because I’m producing food; I need to have a plan. And just because they’re f...ing it up, there’s still a way through it.”

At the first Business Association meeting held a couple of weeks after the outbreak, business owners voiced their ideas on how the council could have communicated to them more efficiently. A publican, T14, suggested that had the council formally let him know of the contamination, he could have told his patrons in the bar that Friday night and they would have gone home and told family and friends. He also suggested that council staff could have put a loud speaker on a car roof and driven around the village announcing the situation to residents and business owners. He was incensed that communications between the numerous schools and the DHB did not occur, despite the school attendance figures dropping substantially over time.

*I had two kids at primary school here; there are 120 kids at that school. About 20 percent of the role were [away] on Friday morning – kids home sick and their symptoms were all the same. The school must ask, 'What's going on in the community here?' They should've advised the DHB. Another primary school also had about 100 [absent]. It wasn't just one school...if it was just one school with 120 off you'd say, 'Yeah righto it's within that school community.' But then we had [another] school with 100...and then the prep school had another lot away as well. If all those school's had phoned in [to the DHB], they'd have known by morning tea 'ok we've got something seriously going on in Havelock North,'...if they'd learned, 'my god every school's got it' they could've done something. It was a comedy of errors, [a case of], 'How can [we] do this really badly?' [T14]*

#### **4.5.5 Expectations of councils**

As ratepayers and business owners, many respondents commented on their expectations about how councils would be managing the business and general community's water supply.

A local publican provided an overview of what business owners expected from the councils:

*We pay our rates for water to be clean. My expectation is born out of city and regional councils taking rates off us to say they're going to...look after the environment...you have an expectation 'well I paid you guys to do that, you said you were going to do that, why can't I expect you to have done that?' And so as a member of the community who pays those rates, makes those contributions and [supports] all these councils and boards that are meant to manage [water] for us, I have every expectation to go to the tap, turn it on and it [is] fine to drink. [T14]*

While the contamination caused significant and sometimes detrimental effects to the health of over 5,000 residents in Havelock North, they were all also affected financially. Some were affected by reduced salary/wages and all by having to purchase uncontaminated water and additional medicines for relief and cure of their illnesses.

Businesses were also financially impacted by something they had no control over. Despite always having to adhere to their business' strict health and safety guidelines, they felt the council had not managed their municipal health and safety responsibilities. This being the case, many business owners wondered why they were not compensated for the financial deficit they found themselves in over the long-term, not just during the initial two to three weeks.

Food producer (T18) was angry "with the fact that there are businesses in this community that have taken significant financial hits for something that was totally out of their control. That they had no ability to be insured to protect themselves against it, in spite of the fact that I've got [insurance] cover for f..... everything."

*[While] the council were very good to us to a degree – we got some help – it really pisses me off. I don't think that I should be paying for water that could potentially destroy my business and not be fully compensated for it, and I wasn't. I shouldn't be \$50,000 in debt. [T18]*

Food retailer (T5) asserted,

*The other thing we're really pissed off about is they have very strict health and safety parameters that we must follow, and we do...[last inspection] they'd never seen such a competent job...if that [bacteria] had come from our kitchen we'd be shut down. But no it's come from somewhere else but we have to carry the brunt of it... There's no [accountability], we would be just laughed at if we went to council and said, "Actually could you replace all our losses?" [T5]*

In terms of losses, some of the interviewed business owners did submit claims to the council, although they spoke about the claim forms being very onerous, needing their accountant to assist and taking up considerable time to complete. Others did not attempt the forms because they were too long and arduous. "We all got sent, if we wanted, [forms] about that thick [indicates two inches], I didn't do it... And I think a lot of people...once they saw the paperwork they had to fill out, they thought [no]" (T6).

Hospitality general manager T6 noted that business owners had to 'fork out' on their own for staff that got sick, then they had to close the businesses.

*[The councils] should've [declared an emergency] and then everyone's insurance would've kicked in. Because if you close [your business] yourself you're not covered by insurance. I mean why did they close the schools in the end? They should've closed the businesses. [T6]*

Those businesses that did submit a claim voiced their disappointment at not seeking compensation over a longer time period. Respondent T5 pointed out that if she went back to council late in 2017 to say council had caused the contamination, council would say, "yeah but we gave you a grant...[But] I'd like to go back with the figures now and say 'actually look at these [now], what are you going to do?'"

Retailer T1 spoke about the fact that ratepayers and business owners rely on the councils to supply potable water. "The water supply is generally something that we cannot affect ourselves; we generally give that responsibility over to the Council. There's nothing, unless we went to bottled water permanently, which has its own problems...with plastic containers" (T1).

Publican T11 reiterated this when he said, "the council's got the big decision to make, where are they going to draw [safe water] from? At the end of the day they're the ones who have been placed in charge of giving us clean drinking water. And obviously they've failed, completely."

A few business owners were magnanimous with their expectations of the councils. Retailer T2 alluded that council "realised they had to up their game," but he wasn't "100 percent convinced that they

weren't doing what they thought was right in the first place. This hasn't happened to this scale before anywhere else as far as I know. You know, you don't know what you don't know, [but] they do know now. I'd be pretty annoyed if it happened again."

Contrary to most respondents, T8 believed the contamination was a 'bad luck issue'. He was...

*Pissed off with all the blame throwers...it's just one of those things where something went wrong. It wasn't an ideal situation. I'm definitely not looking to blame anyone; [not] productive at all...I didn't think they were negligent. [T8]*

He believed that social media's 'blame nation' alienated himself and other people from the issues.

*Everyone's on the blame generation, you know all the eco-warriors out there started thumping the table? ...people who wanted to have a voice on social-media were looking to persecute. But that was never going to fix the problem. It's a practical issue that needed a practical solution and all this ramping it up and making it emotive, it just doesn't get anyone anywhere. [T8]*

#### **4.5.6 Effects on business**

This category emerged through business owners' negative and positive comments on the effects that the contamination had on their businesses. Because their businesses were so severely impacted by the contamination, they inevitably made critical assessments in relation to their business.

A common thread in this section is that business owners originally thought their incomes would decline only during the short-term and increase in the medium-term. However, ten months after the contamination, their financial figures were showing cash flow was still considerably lower than the previous year. As one retailer, T2, commented, "It didn't seem to have any effect on business initially in September, but later on it did."

Food producer and retailer, T5, felt the personal risk of owning a business was not thought about by the councils and now she feels isolated:

*We are completely over Havelock North, the charming village that we loved; I could just walk away from it in a second now. So I see myself as part of a community that the gloss has gone off. And it's hard to run a business like that because they see that in you. I feel like what's the point in even saying anything to anybody anyway? Who cares? No one gives a shit...We're just so sick of it, heart-broken over it you know. What's been done [to fix it]? [T5]*

She and her husband were unsure if they would remain in business due to their cash flow deficit that they still had not turned around, even during the 2016 Christmas period when they expected income levels would recover. She felt that she could have told a thousand people about her huge losses and nobody would have said, "Here let me fix that." T5 could not bring herself to talk to the councils and

from the initial stages of the contamination had solidified in her mind that “when you’re in business it’s your own risk and responsibility...there’s nobody [else] accountable.”

*“[Others] wouldn’t have [had] the same amount of stuff sitting on the shelves as we had...Nobody else fits into the category. But the café’s, they might’ve had a quiet week because they may’ve had to cut their staff hours and suck it up a bit. But they didn’t have the stock, and that’s what I’m talking about the losses of the stock.” [T5]*

Retail food owner T6 was devastated at the contamination announcement and immediately started to wonder why she was in business.

*I think when you own a business you’ve got to be really optimistic all the time and [the contamination has] sort of dented that. Why are we doing this? We’re trying to do something really good. Food should be wholesome and good, healthy. This [contamination] shattered that. [T6]*

Restaurateur T7 experienced the harsh realities of relying on income from the general public in the year following the contamination.

*The fact that it’s pretty hard to make money, you are so vulnerable, and we put a lot on the line with personal risk against houses and finances and everything. We’re responsible for an awful lot of staff and their families. It’s a huge responsibility and you know that it could all go ‘tits up’ at any time like a house-of-cards and it’s kinda scary. It’s all through something that you don’t have any control over, the trust is gone. [T7]*

Café owner, T10 revealed that the contamination event was ‘nearly financially crippling’. “The cash flow didn’t come back until November. It came up incrementally and we were losing definitely \$1,000 a day, we were losing during the highest point.” Another food business, T18, noted they had become ‘a bank for a while’ because debtor clients had fallen ill and had to close their business so they were not physically able to go to their computers to do online banking to pay for their supplies.

Clothing retailer T17 estimated her sales income for the first two weeks generated only one eighth of normal turnover. People were at home sick but it also made her aware that the income levels of her central retail business are linked to people’s motivation and ability to frequent hospitality businesses. When customers are out to eat or drink they ‘pop in’ to a retail store while ‘in the village’. “If café’s have people in them, then we have people in our shop.”

The jeweller was stunned at the level he had to restructure his business due to lack of sales.

*Initially I thought I’d get by. And then, especially after that first month with such a big drop, I was struggling to pay the bills. So we really had to haul things in. It affected my Christmas because October/November are the months I manufacture stock for Christmas. I don’t buy stock in, we’re a manufacturer and I just make up stuff for Christmas and I just didn’t have the money. [T2]*

T2 found that he had to adjust his usual business strategy to cope with the low cash flow.

*Rather than make gold pieces I made silver pieces, which you retail at a lot less so it affected my Christmas revenues. So, that was the flow on effect then. I was worried I'd have to close. I just didn't know what was happening. There is no Plan B for the business...[closing] wasn't a thought I [had ever] entertain[ed]. But for the first time...I had started thinking 'ooooohh'. [T2]*

Turnover for the month of September was down by fifty-seven percent and October down forty percent, "it was a huge financial hit."

Respondent T3 was shocked at the downturn his business took because he perceived water as "only a commodity other than [my staff] drinking it, we wash our hands with it." He did not think the contamination would affect his car parts and servicing business because he was not reliant on water for production of goods; however his business still significantly slowed. "Our retail side just stopped. And you'd walk up town and nobody's around; the whole town was just dead." As with the retail jeweller, there were no customers to purchase parts or capable of bringing their cars in for a service.

Not all retail business owners noticed an income decline until weeks later, their trading income was slightly alleviated through established or promoted online sales. Foot traffic had ceased but orders from the online business kept coming in during those initial weeks for retailer T13. "We're fortunate, a lot of our out of town customers order from us so we actually had quite a good [revenue in] August" (T13). However, regular domestic tourists "just cancelled" and during subsequent months T13's retail income was "consistently down on previous years by twenty-five percent."

Symptomatic of the downturn in patronage were the many comments regarding Havelock North having turned into a ghost town during the initial days of the contamination. Retail storeowner T17 commented the situation was...

*Pretty sad really because for two weeks it was like a ghost town. No one was in the cafés; no one was eating because if you weren't sick yourself, or didn't have sick children, or had sick family, work colleagues...[no people for] more than a week because people just got crook, so mum stayed home to look after the kids, so that flow-on effect, we had that for weeks. [T17]*

An unexpected finding was that the contamination had a positive financial effect for some business owners. A minority of speciality businesses, such as healthcare and water supply improvement tools and equipment, noticed sales increases. As a water supplier, respondent T16, reservedly commented, "It probably helped our business because as soon as they chlorinated the water, no one wanted [chlorine] in their water so we sold a lot of carbon filters. [But] it's just not a good look." He did not want to be seen as profiting from the contamination and other people's misfortune.

As well as the domestic carbon filters, T16's company also installed a number of industrial systems for wineries to combat the chlorination. "Some of the wineries were freaking out because overnight [council] put in the chlorine and didn't tell anybody."

Café owner (T10) touched on the fact that bottling and exporting water takes something away from nature. Her husband worked for one of the biggest organic producers in New Zealand and "they use a shedload of water." She concedes they do pay "huge amounts of money for the right to [use the water], it is just something you have to do. It is not a tax; it is a reality and a necessity." She suggested some revenue from the water rights revenue could go into water quality maintenance and infrastructure upgrades.

The feeling of lack of closure, and that a resolution of the contamination incident had not been resolved (at that point Stage Two of the Inquiry was still in proceedings) was still evident ten months after the contamination event. One respondent, T12, was so relieved that someone had come to interview her about their business' experience that tears welled up. No one from the councils had been to talk to any business owners and she was relieved to be able to answer questions and voice her pent up frustrations. This interview process wasn't 'closure' for her, but it was therapeutic.

*There's [been] no endpoint and no one seems to...we all know it's come from that bore, and we know its sheep faeces. So what are they doing about it? And when are they going to seal [the bores] so that they can't ever get [contaminated] again? We just want some answers? [T12]*

#### **4.5.7 Mistrust of 'the tap'**

Over half of this study's respondents mentioned water coming from 'the tap' with varying levels of knowledge about how 'tap water' operates. There are those that do not care what is involved in this process, just that the process occurs. "So what I'm saying is, as a member of the community who pays those rates, makes those contributions and has all these councils and boards that are meant to manage it for us. I've every expectation to go to the tap, turn it on and it will be fine to drink" (T14). Another business owner acknowledged that nowadays we do presuppose that easy access, potable water is part of our lives, "we take it for granted that we just should be able to turn on the tap or scoop it out of the river, whatever, and it should just be clean" (T15).

Similarly, T20 noted that water supply is "all infrastructure and pipes, we take that for granted. We take for granted that we can turn a tap on and water's there." However, possibly due to working in the health sector, T20 stated that the idea of water coming from the mountains, over land and into our taps is only possible because water must go through filters before we drink it. "If the filter's wrong or hasn't been cleaned, there's a whole lot of other logistics between the mountains and the tap."

A hair salon owner's business was so affected by various aspects of the contamination that he now looks at taps with mistrust. "I've never been put in a situation where I've looked at a tap and treated it as taboo. It was the most...it was unbelievable!" (T19) To such an extent that he hardly uses any water from taps now and purchases his water in bulk from the supermarket. He concentrates on accessing filtered water wherever he goes, only using tap water when he absolutely has to.

In contrast, a food and beverage retailer now fully appreciates and trusts water from the tap because of the extra work and effort that was involved in bringing water in to the premises for his staff. The difficulty of not being able to go to the tap was frustrating and tiresome for him, "you realise what a precious resource [water] is and how difficult things are when you have to lug water in" (T8).

Again, water from a tap also now appears somewhat opulent for travel centre manager T9 when she states "you know just being able to go to the tap and get nice drinking water is well, now a luxury...[which is] kind of a bit third world." T9 has learnt that she cannot "take freshwater for granted, it's a luxury really, it shouldn't be but yeah, it is."

A local publican was amazed at how the contamination experience had made him more aware of all the different varieties of water. He now notices, "Different areas [with] different water sources with different minerals which make different flavours...I wouldn't have thought about before" (T11). Restaurateur owner T7 said that all of her staff 'brought water in', that "none of us want to drink the tap water, probably seventy percent of us, perception wise [based] on the taste."

#### **4.5.8 Mistrust of water supply**

Comments were made regarding people's levels of trust in the water supply. Comments were not necessarily about the water itself; the business owners do not perceive water as coming directly from nature. They mistrusted the water due to the way it was supplied to them with faulty infrastructure. Respondents commented that they now think about 'water security', the way water is made secure by the councils for supply. In many cases it appeared they had never thought of logistics and security around water supply before. A gift shop owner's quote captures this well:

*That [the water] wasn't as safe as they said it was. I think we've lost confidence in what they say. That's probably it. When they say [the water's] safe we're not completely sure now. Whereas before we would've said it must be. Yes there's a loss of trust. [T1]*

Due to this mistrust experience business owners started thinking for the first time about how they perceive their drinking water.

*[My perception] of water changed as soon as I knew there was something wrong with it, now it's unsafe because it's not secure. There was something*



*wrong with it. It's almost like once you sprain your ankle; you never fully trust it again. [T15]*

Even though local food provider T15 had completed numerous food safety courses throughout his career, he said his perception of water had now changed, “100 percent. 1 million percent...you turn the tap on [now] and...there's doubt.”

*Within that first week, it was almost instantly...don't trust the water...it's heightened my awareness...it takes time...and it costs money but yeah, it's a learned behaviour now more than anything. It's made me aware...because no one's got your back, that's how I feel about it all. [T15]*

This third phase illustrates that Havelock North business owners did critically assess the dire situation they found themselves in August 2016. Having to devise new water supplies, and mentally and physically react to the situation, portrays the extent to which interviewees made numerous and frequent critical assessments.

## **4.6 Phase 4: Relating personal discontent to the contamination**

Mezirow's fourth phase of transformation recognises that one's discontent and the process of transformation are shared, and that other people have negotiated a similar change. This section recounts business owners' realisations that the contamination had affected other community groups and that they were not alone in their experience. Respondents realised they were justified in their concerns regarding the effects of the contagion. Some, but not all, responses were in response to question nine – ‘how did the contamination make you feel about the councils' water supply services?’

### **4.6.1 Business discontent**

This section records where business owners' recognise discontent amongst the business community and their customers. The most pronounced indicator of the effects of the contamination on business owners was the reduction in customer purchasing goods and services.

Business owners could physically see and experience what was happening within the village and within their business. “Of course our customers were sitting at home on their toilets. We noticed a huge reduction in customers, [it was] quantum” (T11). Retailer T13 was on holiday when the announcement was made mid-week, but when he returned at the end of the week he immediately saw “the actual downturn of foot traffic as well.”

Another clothing retailer noticed a distinct change in attitudes towards eating out,

*There was just no one out eating. Everyone got the wind up about eating out of a public café or a restaurant because they were thinking ‘had the lettuce been washed in the water’? Like you do in an Asian country. [T17]*

Hospitality manager T6 was determined to keep supporting other restaurants in town as she and her Hastings friends usually did each week.

*The first Thursday they wouldn't go. They were too scared they might get sick. You just don't know...But I got them back here the next week, and I still got my coffees...And I was thinking you poor buggers because it affected [other restaurants] more than it affected us here. [T6]*

Retail storeowner T17 could not talk to her customers about how significantly her turnover had decreased. Sales declines are usually observed in relation to events in the community, or the weather, and casually considered as to what could be behind the decrease. Not so in this situation, business owners did not feel they could publicly say anything.

*You couldn't do anything about it. You wouldn't whinge. People had really sick families and just because you're not getting money in the till you couldn't even think about [saying something]. You could say it to other business owners 'it's been terrible', but you couldn't say it to someone who's had a sick child. [T17]*

Some respondents were angry because they believed other business owners were trying to “cash-in on the situation.”

*There was one poor chap; he had decided incorrectly that he was a victim of the water crises. And he basically said, 'last year at this time I had 115 people in my café...this year I've got five.' Well there's two things going on there – he could've had a wedding on last year, he could've had anything on. But the hilarious thing was that the other place directly across the road from him did exactly the same thing. Their café's weren't empty because they were on shit water – [because] they weren't even on the [town] bore. They were claiming thousands of dollars...yeah it's those bits and pieces I'm angry about. [T18]*

Beverage distributor T8 was also angered by what appeared to be other business owners trying to take advantage of the disrupted situation.

*There were obviously some people who saw it as a fantastic mechanism to get some cash. I know from the business community, a lot of the retailers and some of the most vocal people who were complaining, and all the Facebook warriors were the people whose businesses are marginal at best...a significant part of my thinking is that they saw it as a chance to fabricate some earnings and get some cash. [T8]*

Although, in contrast, a member of the business association noted that members were generally very proactive and helpful. During this time of crises T19 felt that business owners were not thinking about the collective as much as they were their business survival. “We had a good team of people, but suddenly when the crisis hit nobody wanted to step up and be a front runner.”

Regarding insurance coverage for businesses T7 recalled that the standard responses from the insurance companies were, ‘we'll get back to you as soon as possible’. “Basically they all came back saying, ‘because the Ministry of Health didn't shut us down it was considered an infectious disease and business

interruption doesn't pay out for infectious diseases'" (T7). Business owners were devastated by this. Restaurateur T7 related that she pays "huge amounts of insurance...you kinda wonder what you pay insurances for because there seems to be very little that they're actually willing to pay out for."

Accommodation provider T12 felt that their business went into a 'holding pattern'. Their business pays "huge insurances each year" so T12 immediately spoke to their insurance company about loss of profit insurance. However given that the councils did not declare a state of emergency T12's business was also not able to receive insurance for their loss of profit.

*If we could've proved on our books, if we could prove a trend, or even if we plateaued forever and then there was a huge dive we would've been looked after. Why, if there's 5,000 people ill, did they not call a state of emergency? And what would it have cost the council to do that? They wouldn't have lost anything. But we all have and still continue to. [T12]*

Similarly, hospitality manager T6 was adamant the councils should have declared a state of emergency so that "everyone's insurance would've kicked in because if you close [your business] yourself you're not covered by insurance. I mean they close[d] the schools...they should've closed the businesses [too]." T6 was appalled at the amount of paperwork the council's provided for their compensation package, the paperwork was 'overwhelming' and she did not complete it.

However, food producer T18 was factual about having been severely affected by the water contamination and that insurance does not cover for such events, as they are "really hard to quantify." Had the councils declared a state of emergency and forced businesses to close T18 reasoned that the reality would have been she could not supply twenty local cafes with barista milk. So her rationale was that claiming insurance would have told customers she did not have appropriate food safety policies in place to protect her business, when in fact she does. She was pleased that she did not claim insurance and could continue to supply safe products. Similarly, a local publican was doubtful there was a 'missed opportunity' to claim insurance. He had previously been through an insurance claim and said that it was not as simple as people had thought.

*We had a fire here three years ago and they shut us down for thirteen days, it was substantial. We had Business Interruption Insurance and it wasn't simple, you had to trawl through three years of profit & loss to prove [income levels]. And so to do that for a two day period, [insurance would] just go 'oh yeah'. It's not worth it, the reality is it's not...I'd suggest some of those businesses were pushing that point probably wouldn't have had sufficient record keeping to show...They wouldn't have found it that easy to do. [T14]*

#### **4.6.2 Divided wider community**

It appears that public issues around bottled water exports had already been simmering in the community prior to the contamination event, so these issues were aired frequently at the time of the

contamination. Packaging and exporting water from 'their' local resource and agricultural irrigation were key issues for interviewees.

Car parts retailer T3 was angry that within a kilometre of his home "they've got a well that's exporting so much water to China...I know when our neighbours irrigate hugely our well doesn't free flow. So yeah water's just [precious]...and my customers, we service a lot of [fruit] growing customers and they scream out for water."

Local pharmacy owner T20 asserts that organic farming uses significant amounts of water in production. "My husband works for [name withheld] – the biggest organic producer in NZ, and they use a shedload of water." She commented that she agrees that organic farms should pay significantly to use water but also said, "If only some of [the money] could go back into keeping water clean too."

Clothing retailer T17 noted the frequent occurrence of situations where, during times of drought, water exports continue within the region and this is a very 'topical subject'. She recounted that she had been at social events where people would start talking angrily about this 'taboo subject' because, "people go really hot under the collar about it. It's become an issue in Hawke's Bay."

#### **4.6.3 United wider community**

However, it is notable that within this 'public discontent' theme not every response was pessimistic of the disruption; some business owners noticed positive outcomes within the community.

A pharmacy business owner noted:

*There was a lot that was really good, a lot of community starting to help each other and checking in on neighbours and doing lots of good things. A lot of businesses jumping in and helping. Sometimes that actually was quite difficult...And then the media...umm...were...helpful in some respects but [they] were also after the nasty story and were digging for dirt. Where basically they only got told the positives [by us], that everyone's looking after each other. [T20]*

Fast food manager T4 was thrilled with the level of business community collaboration.

*The community was amazing. That was the best thing...that was the greatest thing to come out of this. It was actually better than the disaster and you had wealthy people who just brought pallets of water and you had shops and businesses, that obviously had the money, brought water. And the Indian community brought boxes of water and that was...amazing. [T4]*

For restaurateur T7, the positive outcomes lasted longer than the contamination period.

*It did bring a sense of community together locally which was great, just to see that people will step out and help each other as much as possible. Twelve months on I think we've built good relationships, we might not have otherwise,*

*to know there is that helping hand...[from a] shared community experience we've all come out as closer, tighter knit...The response from local businesses was really amazing, that everyone was really there to support each other. [T7]*

## **4.7 Phase 5: Exploratory phase**

In Phase 5 of Mezirow's Transformative Learning Theory individuals start exploring options for new ways of living. In the context of this water contamination event, individuals were considered to have reached Phase 5 when they started to explore different options within their business' daily interactions with water and started to approach their operations around water management significantly differently. They were also deemed to have reached Phase 5 if they discussed water management and supply at a macro level, thinking about the whole catchment, or the various types of collected water that can be aligned to the various water uses.

This phase is considered a proactive phase whereby business owners do not simply react quickly to short-term dilemmas. Examples were sought of respondents acknowledging that they had taken some time to think and contemplate their contamination experience, the hydrologic and hydrosocial cycles and then proceeded to think how they could proactively work toward a medium- or long-term solution for the water management in their own business and then also their catchment.

However, no business owners specifically voiced that they took time to forward-plan their current or a new source of medium- or long-term water supply management, thus none had contemplated or implemented new ways of operating on an industry or catchment level.

### **4.7.1 Testing water quality is crucial**

Business owners who used water as part of their food production process started thinking about how they could have more control over the water that was coming out of their taps or the new water supplies they could access. They realised that a key requirement for them to be secure with their current or new water supply was to investigate and establish a water-testing regime. In most cases they did some research on how water was currently tested by the council and they also looked at their own potential or current testing methods.

Fast food manager T4 used significant volumes of water to make takeaway products for customers so instead of using the town water supply he wanted to use his own bore water. He took water samples and explored local testing options but found there were none available within the Hawke's Bay region for either *Campylobacter* or *Giardia*. He would have to send the samples to Christchurch. He was frustrated that the councils were not proactive towards alternative water source testing by providing a list of New Zealand water testing centres so they could also get private bore water tested. He said they

were just looking after themselves and the litigation aspects of the situation, “council did not appear to be focused on the overall wellbeing of the community”. He also felt there was a lack of interest in helping to keep his business operational. He was told he would “have to pay for that to be done in Christchurch and it would take weeks, and it was really expensive.”

#### **4.8 Phase 6: Action planning**

The sixth phase of TLT involves planning a course of action and acquiring knowledge and skills for implementing one’s plans. Mezirow states that this planning phase can be, “ill conceived, tentative, provisional, incomplete and vague with respect to specific outcomes, but the transformative learner must act on her own reality... [this] often involves no more than deciding to see whether or not she can acquire the skills or credentials she deems necessary for taking further, more decisive action” (Mezirow & Marsick, 1978, p. 18). When this phase was applied to the data collected from Havelock North business owners not many interviewees had decisively planned different management strategies for their water supply or usage.

One respondent spoke about having to plan a course of action to change the way she managed the business’ water over the medium- to long-term. Café owner and food producer T18 was proactive regarding a forward plan to improve systems and keep her business operational within the current procedures. She kept in constant communication with a District Council employee and knew the *Campylobacter* organism could not survive 72°C or above, so she rang the Ministry for Primary Industries (MPI) to assist with her new production plan.

Over the short-term she immediately implemented the agreed MPI plan and began sterilising the whole production plant to reduce any instances of contaminated water in the plant lines. This gave her confidence that she would not have a contaminated product problem, over the short- and medium-term, but the Council was still insistent she operate under a boiled water notice. For T18 and her staff this was yet another layer of complex operational procedures they had to go through.

So I worked through the process with MPI in terms of a protocol that I would put in place and that I will be on-site at all times that anything was happening. Basically I licenced myself for 14-hour days for the first 7 days. At the end of the first seven days I got the phone call on the Friday morning saying ‘we’re going to extend [the boiled water notice] for an indefinite period – expect a minimum of two weeks’. I just said, ‘Jxxxx Cxxxx!’ [T18]

MPI required T18 to ‘micro-manage’ all production over the next few weeks. She had to think about two key things – first, making sure that what she had agreed with MPI did actually occur, and secondly not

putting undue pressure on her staff. During these early contamination days running a small, domestic capacity, ultra-violet water filter, for a short-term fix, T18 built up her knowledge and became confident enough to order an industrial capacity, ultra-violet water filter. This significantly reduced the amount of time taken to accumulate the large quantities of water required to make her products over the medium-term.

However this plan was essentially a work around with the town water supply she already had. Her devised plan did not integrate a new supply solution nor a solution that involved other business owners or looked at catchment wide solution.

Two other respondents generally acknowledged planning a change in the way they managed their water supply and usage for the short- to medium-term – one through a new water source, involving frequent transporting of water alongside the purchase of new equipment, and the other by intensifying their water quality testing regime.

Small goods producer T15 made immediate short-term changes in terms of himself and staff not washing their hands or the dishes with tap water, they accessed buckets of on premise boiled water instead. He and his staff also 'rejigged' the business recipes to use the minimum amount of water possible. Then he realised, in order to continue to produce a high turnover product he would have to 'bite the bullet' and purchase a considerably more water efficient, small goods production machine.

He had previously researched and sourced a new machine months earlier, however the high purchase cost constituted a significant, and at that stage, unaffordable 'luxury investment' for the business. However, once the outbreak occurred T15 immediately deemed the new machine to be essential to the long-term viability of the business, and he took out a business loan to fast track the purchase. The old machine had "consumed thousands of litres of water a day," so installing the new equipment resulted in his business only consuming twenty per cent of the previous amount and secured long-term, significantly reduced water quantities.

Additionally, as soon as the councils chlorinated the water supply T15 then had to immediately find unchlorinated water to use in the new equipment. "If you put chlorinated water into [my products they're] not right. There's a chemical reaction." He immediately had to plan another procedure to supply quality water by filtering the Council's chlorinated water. This was a time consuming extra step in his supply chain system but 'luckily' he found an orchardist based outside of the Havelock North village who had his own regularly tested bore. T15 entered a permanent agreement to pay his new water supplier for this new source, unchlorinated water. At a small charge of two dollars per 20 litres of water he continues producing his regular food items for customers over the long-term.

Established accommodation provider T12 recognised that in order for occupancy levels to return to pre-contamination figures the business had to devise a plan to become even more regulated and regimented in their bore water testing. They had always carried out routine testing and openly displayed test results in the units for guests because they've always been aware of the potential effects of a contamination within their own bore supply. "Safety is number one for us and for our guests. So we are constantly testing our own bore water, more so [now] than ever."

Unfortunately, no wine-makers or fruit farmers were willing to being interviewed in regards to the *Campylobacter* contamination and the new operational procedures they had to undertake in their production process. Many unreturned phone calls and comments from some interviewees made it clear that this contamination issue needed to remain 'below the radar' for these two large contributors to New Zealand's export industry.

#### **4.9 Phases 7-10: Building knowledge and competence to implement plans**

Phases 7 to 10 of Mezirow's Transformative Learning Theory cover the latter stages of his perspective transformation process. During these phases individuals consciously build their knowledge and skills to tangibly implement their plans. They then begin to try either new ways of operating or completely new roles and, while trying out these new processes or functionalities (essentially a series of sensory exercises that form new perceptions), they start and continue to build competence and self-confidence within their new perspective.

At the time of interviewing, T15 had built up his knowledge and competence around water usage and water quality through less water usage, a new water supplier and increased testing regimes. He had a keen awareness of the council water supply system and his previous interdependence on it. While T15 had not consciously set out on a line of inquiry to build up this knowledge as a result of the contamination he inadvertently did so. This gave him the competence to implement his forward plans for a safe and alternative water supply over the medium-term.

Given the use of Mezirow's transformative theory lens for this study, it is interesting to note that years prior to the Havelock North case, café and small goods business owner T18 had already significantly increased her understanding of water quality, water usage issues and the hydrosocial cycle. Talking to her about her experiences within her earlier corporate agribusiness positions it is likely she had previously experienced a transformative perspective change to become a sustainable business owner. Her prior disorienting dilemma may have been her compulsory redundancy from the corporation. So when it came to the Havelock North contamination T18's quick responses and rapid alterations to water



management, devised with MPI and local councils, enabled her to adjust quickly and continue to operate.

While both T15 and T18 did build their business operations' intellectual property and implement plans during this turbulent time, their plans were deemed to have evolved from their experiences and occurrences prior the *Campylobacter* contamination.

Specifically regarding phase eight none of the respondents mentioned that they had started, nor thought about, carrying out new roles. The responses to interview questions four and five were predominantly about interviewees verbally asserting they now *thought* about water differently.

T15 was the only interviewee who mentioned the interaction with and management of water in a more conservative, future-proofing way. After T15's interview he casually mentioned he would like to run for council, as he believed he might be able to make a difference to water supply processes and decision-making. However, there is no record of him as a current council member.

T15's purchase of the new small goods production machine did result in shorter operational procedures and a significant reduction in water volumes. This could tentatively be seen as constituting a new perspective within the realms of his business. However, he had decided to purchase the machine prior to the contamination event. Thus his decision to purchase was not based on the event itself, instead the contamination simply confirmed and fast-tracked his investment.

Additionally, the implementation of a new water supply from a local farmer triggered slightly new operational procedures for T15 and his employees. However, it is not known if transporting bore water from the outlying farm has continued long-term.

No interviewees were viewed as having built confidence or having changed their work methods and/or worldviews, as required by phase nine. Given that no business owners had convincingly experienced phases seven and eight they could not be deemed to have experienced phase nine.

The final TLT phase is defined by Mezirow (1978) as when a person "reintegrates back into society on the basis of conditions dictated by the new perspective." For the purpose of this study the Havelock North business owners' responses needed to reflect significant adjustments they had made to their business operations. All respondents *spoke* of a new understanding of their water supply; they said that they *thought* differently about their water supply; and/or that they identified a shift in their *appreciation of water* in general.

#### **4.10 Results summary**

Business owners' responses aligned to the first six phases of TLT. There were conceptual shifts and increased awareness of water issues. Many business owners expressed their realisation of the connectivity and importance of water and nature. Others, mostly from farming or rural backgrounds, reiterated the importance of that connectivity 'for all living things'. The statistical break down of respondents awareness of their connectivity to natural ecosystems was forty percent based on their rural upbringing; thirty percent based on their health career training, and thirty percent had not thought about connectivity until the contamination.

However responses that associated with the latter TLT phases, seven to ten – building new knowledge, trying out new methods or roles, and building competence and reintegrating with a new perspective on water supply – were not predominant from the interviews. Mezirow (1981) asserts that for a perspective transformation to occur people need to change how they see, think, feel and ultimately behave. Institutionalised ideologies that affirmed each business owner's individual rules, categories or governing conventions all appeared to remain the same for the interviewed business owners in this case study.

Knowledgeable awareness of the hydrologic cycle of water, cognisance of their local water supply's connectivity to and interdependence on natural ecosystems, and the cumulative effect of all MSME's on New Zealand's water supply, was required for businesses to have been engaged in transformational learning around water. While business owners were not specifically aware of the term 'hydrosocial contract', a perspective change required that the water supply contamination had triggered them to at least begin to think about their current provider-user hydrosocial contract within Havelock North. Ideally, they would also have begun to discuss the social and cultural aspects of their water and perhaps mooted alternate ways to secure and access water, in conjunction with the established, civic model.

In the following chapter, connections and interpretations of these results and the accompanying literature will be discussed, alongside a review of the usefulness of Mezirow's Transformative Learning Theory to this case study.

## Chapter 5

### Discussion

*For us to continue to survive as a species we must reconsider our relationship with nature and abandon our anthropocentric views of nature by taking a position that recognises our role in a complex system. Ultimately, mechanisms for building resilience and adaptation and reducing vulnerability rely upon a paradigm shift, an understanding of “true” and “false” sustainability, and adaptation and resilience strategies that afford us an opportunity to recast social-ecological relationships towards “true” sustainability.*

(Smith, Lopes, & Carrejo, 2011)

#### 5.1 Introduction

The previous chapter analysed the data collected from interviews held with twenty Havelock North micro and small and medium enterprises (MSMEs). This chapter will discuss those findings in relation to the key research questions of the study.

Analysis of the data found the highest number of responses related to Phase 3 Critical Assessment, so it is worth noting that the report of Stage One of the Official Government Inquiry was released in May 2017, ten weeks before the interviews were held. The interviewees were generally aware that the key finding of Stage One of the Inquiry was that the contamination event had occurred due to multiple issues (New Zealand Government, 2017a, pp. 2-5).

Catton and Dunlap (1978) argue that humans need to realise they are one species among many interdependent biotic communities that shape the sociality of their lives; humans are submerged within the intricate linkages of cause and effect; and the world is finite with biological and physical constraints to economic growth and social phenomena. However, the worldwide situation is that more than two billion people lack access to safe drinking water and demand is projected to increase by nearly one-third by 2050 (World Water Assessment Programme, 2018). Accelerated consumption, the multi-faceted impacts of climate change and increasing environmental degradation call for new ways to manage these competing demands on our freshwater resources (World Water Assessment Programme, 2018). Additionally, the support and maintenance of healthy ecosystems crucially depends on adequate volumes of good quality water, and vice versa. Nature is the regulator, cleaner and supplier of water so it follows that healthier ecosystems directly underpin improved water security for all (Martin-Ortega, 2015; World Water Assessment Programme, 2018).

The United Nations World Water Development Report (2018) has called for new solutions to manage our water resources, solutions that will offset the increasing challenges of water security from climate

change and population growth (World Water Assessment Programme, 2018). The report advocates for innovation that embraces working with nature instead of against it – for a more integrated, holistic approach towards water resource management. Emphasis is placed on nature-based solutions as an essential step to ensure the long-term sustainability of water resources. Others agree that major changes in water resource management need to occur in such a way that the impacts of climate change are recognised (Newig & Challies, 2014; Pahl-Wostl, Kabat, & Möltgen, 2008; Pahl-Wostl & Sendzimir, 2005). Pahl-Wostl et al. (2008) call for a paradigm shift through the implementation and development of both integrated and adaptive water management approaches. They define adaptive management as “a systematic process for improving management policies and practices by learning from the outcomes of implemented management strategies...[which] requires structural changes in water management regimes” (Pahl-Wostl et al., 2008, p. 13).

New Zealand’s geographical location ensures we generally receive significant quantities of fresh rainwater. However, we are increasingly aware that our native freshwater species are under pressure, water quality varies nationwide and the way we use our land significantly impacts our freshwater resources (Ministry for the Environment, 2017). We know that many of our historic and current economically driven impacts on our natural ecosystems may take decades to be fully realised. Consequently, society’s awareness of the crucial relationship between water and natural ecosystems is pivotal to reducing the pressures on nature.

While water users make decisions every day on their water interactions and consumption, the systems and infrastructure available to them strongly shapes those interactive decisions (Brown et al., 2009; Delaney & Fam, 2015; Keath & Brown, 2009; Linton, 2010; Shove, 2010; Sofoulis & Strengers, 2011; Sofoulis, 2005). Business owners have rate-based, provider-user (Sofoulis & Strengers, 2011) relationships with councils, similar to domestic water users. However, business owners currently face a changing landscape of consumer expectations regarding their environmental, social and economic sustainability strategies. As customers become more discerning and knowledgeable around their consumer choices, businesses’ decisions and strategies become increasingly influenced by the extent to which they embrace sustainability. From the effluent and nutrient management of dairy farm enterprises, to the degrees of recyclability in urban cafés, or the number of plastic containers forced on supermarket shoppers, businesses’ understanding and operationalisation of sustainability is becoming more crucial to their survival. Gregson et al (2015) note an increasing demand for businesses to reduce carbon emissions by decoupling economic growth from increasing resource use, and the promotion of waste reduction or minimisation within the business sector.

This discussion chapter explores the extent to which Havelock North business owners are aware of their connection and dependence on natural water ecosystems. Given MSMEs comprise the largest

proportion of New Zealand's business and industry sector, the interviewees' level of awareness of their effects on those systems will be explored. Consideration will also be given to the level of awareness they have around the unwritten hydrosocial contract (Turton & Meissner, 2002) between their council water providers and themselves as users, and their willingness to challenge that contract. Finally, this chapter determines the extent to which business owners in Havelock North have undergone a transformative change in their perspectives on water.

## **5.2 Research Questions**

### **5.2.1 Question One**

*Are Havelock North business owners aware their business is connected to and dependent on the natural water ecosystem?*

The characteristics and qualities of 'things' provide a commonality that constructs meaning; humans share common sensory and perceptual process through their experiences (Strang, 2005). There are many cultural characteristics and qualities of water that enable people to feel connected to, or disconnected, from water. The ways humans experience and connect with ice, rain, steam, lakes, drinking water, and so on, are as diverse as the contexts that they occur in, and their definitions of water are shaped by their sensory experiences (Strang, 2005).

Strang (2005) asserts humans assign material context to natural resources particularly water. Strang's ethnographic study (2005) revealed major themes of meaning whereby water was a matter of life and death; a potent generative and regenerative force; a basis of spiritual and social identity; and a symbol of influence and power (Strang, 2005). The study found strong cross-cultural, inter-cultural and inter-generational meanings in water, and concluded that "anthropological understandings of human-environmental relationships should incorporate a greater appreciation of sensory experience and of the part played by 'natural' resources and their characteristics in the generation of meanings" (2005, p. 115). Strengers and Maller (2012) refer to materiality as the proximity and visibility of resource systems in everyday life. According to Bakker (2012) materiality can be a difficult concept to establish because "it calls into question many of the precepts and concepts with which we customarily order the world" (Bakker, 2012, p. 621). Within the context of water, materiality is intrinsic to its biophysical and ecological characteristics, which then shape human responses, perceptions and discursive constructions regarding water (Bakker, 2012).

Many urban and industrial water users live in an 'immaterial' environment in regard to water whereby they are divorced from the proximity and visibility of the biophysical and ecological characteristics of their water supply. Those living in 'developed' countries with water supply piped into their houses have a very limited understanding of the significant amount of pipes, pumps, storage tanks, reservoirs, and

treatment and filtration systems – the water infrastructure – that goes into providing their access to efficient and safe water (Kaika, 2005). However, due to the August 2016 *Campylobacter* outbreak, numerous drought events, and the consequential discourse from these experiences, perhaps that limited awareness of the systems governing the abundance and quality of their water may slowly change over the long-term within the Hawke's Bay region. More than seventy percent of the interviewed business owners, now residing in an urban setting, said that the contamination prompted them to recall their early rural upbringing, or drew on their health education regarding water supply rules and regulations.

Most interviewees said they saw themselves either operating within a 'food chain' or connected to a natural ecosystem. Some had always recognised their connectivity to natural systems while others only started thinking about this as a result of the water contamination. Those who responded that they had 'always known' they, and their actions, were connected to the environment and natural ecosystems acknowledged it was likely their 'upbringing' or 'country life' that had given them this environmental awareness. They spoke about their early life, rural experiences and interactions with water, soil, land and contaminants, all of which formed their current environmental perspectives at a formative age. One interviewee mentioned that following the outbreak he had spent a significant amount of time with his young children explaining the hydrological cycle to them and the repercussions contaminated water had on their home life and directly on his business.

As Strengers & Maller (2012) found in their study of migrants to Australia, previous experience with limited water supply and physically witnessing how water ecosystems interact with everyday life, led first generation migrants to conceptualise water as a valuable resource that requires conservation and preservation, and that different types of water are used for different purposes. There are numerous other studies which have found that a rural upbringing is associated with a strong awareness of water availability and sustainable water resource management (Kadibadiba, Roberts, & Duncan, 2018; Phipps & Ozanne, 2017; Sofoulis, 2005; Strang, 2009; Strengers & Maller, 2012).

However, despite most Havelock North interviewees' awareness of connectivity to nature and appreciation of water conservation, they appeared to unquestioningly accept the provider-user model of water resource management and so all expressed an overwhelming expectation that the overall responsibility for water rested solely in the hands of government, local bodies and/or the District Health Board. This expectation of a clear separation of roles for water resource management has removed these users from any sense of responsibility for maintaining water quality or managing their amount of water use (Sofoulis & Strengers, 2011). Instead they have become what Shove (2010) terms merely *consumers* of water for sustenance, personal ablutions, general maintenance and production of goods or services. In what Sofoulis and Strengers' (2011) describe as the historic model, government providers

capture, control and supply water to consumers. The users' relationships are with the external authorities that supply the water, rather than relating physically, culturally, environmentally or socially to their water supply. Under the historic model, large-scale engineering projects are constructed, usually by government bodies, who then take complete responsibility to provide the public with access to water. The on-going management and maintenance of these large dams and pipelines, referred to by Sofoulis (2005) as 'Big Water', is then carried out by a bureaucracy that oversees the engineering and technical operations, completely separate from all the socially-driven ideological and political agendas "that rationalised the Big Water dreaming in the first place" (Sofoulis, 2005, p. 454). Big Water avoids dealing with the material barriers to change presented by the current "designs of technologies and systems and the cultural barriers of customs and habits" (Sofoulis, 2005, p. 457).

The New Zealand Government's Stage Two Report (New Zealand Government, 2017b) states that the new reality is that New Zealand's drinking water supplies face increased risks due to climate change, intensification of farming, population growth and urban sprawl. It would be beneficial to natural ecosystems, water resources and water conservation if businesses, researchers and policy makers began to expand beyond the existing, historic model of centralised public management of resources, where water users feel disconnected from their water supply systems. We need to start investigating and implementing ways to diversify the supply of water for business owners and the wider public.

Additionally, instead of applying significant and costly amounts of chlorine to our natural water resources, a focus on more nature-based solutions (World Water Assessment Programme, 2018) that maximise nature's potential to assist with enhancing water availability, reducing water contaminations and improving water quality could be created.

### **5.2.2 Question Two**

*Are Havelock North business owners aware of their cumulative water usage and the consequential, long-term effects on natural water ecosystems?*

In general, MSMEs do not perceive their own environmental impacts as significant, especially in comparison to larger businesses, so it is important they are encouraged to become more aware of and improve their environmental performance (Hillary, 2000). When business owners were asked to think about the Havelock North/Hastings catchment as a whole, and their cumulative impact on its water resource, they were somewhat perplexed. No one indicated having ever contemplated what the total amount of water used by MSMEs might be. They referenced fruit growers using considerable quantities of water, but those 'growers' were on their own bore systems so deemed not relevant to the town issue. While they did think of volumetric water usage in terms of the agricultural industry, understandably they did not perceive their total MSME volumes would be significant within the region,

especially 'in comparison to agriculture'. There was also a very clear distinction in their minds between rural, bore water supplies and urban, town water supply.

Business owners' reference to 'other water users' and industry-defined water use perhaps illustrates their tendency to think in terms of business silos (producers - retail - service), fragmented industries (agricultural - professional), or dualistic paradigms (ecocentric - anthropocentric). Numerous scholars argue that our global environmental crisis is a product of humanity's fragmented perspective (Bohm, 2002; Capra, 2004; Catton & Dunlap, 1978; Smith et al., 2011; Wilber, 2001). Also known as the Cartesian paradigm, this fragmented perspective tells us our world comprises separate "things" that can be observed objectively and, secondly, "that human (culture) and non-human (nature) systems are disconnected" (Reason, 2003, *as cited* Smith et al, 2011, p.70). Smith et al. (2011) assert that a considerable shift in worldview is necessary to start to consider resilient and adaptive ways that trigger large-scale, institutional changes along alternate pathways, which may create a more sustainable society. They refer to a more environmentally based social paradigm as proposed by Catton and Dunlap (1978). They identify three underlying assumptions – humans are one species connected to many other biotic communities; there are intricate linkages of cause and effect and natural feedback which produce many unintended consequences of human actions; and that the world is a closed, finite system with biological and physical limits constraining economic growth and social phenomena (Catton & Dunlap, 1978). A successful shift toward these significant paradigm changes can evolve based on ecological ethics that recognise our dependence on all diverse ecosystems and that "*life is fundamentally one*" (Smith et al., 2011, p. 71)

Perhaps a change is on the horizon – Sofoulis and Strengers (2011) cite a senior policy analyst calling for a change of water industry approach in Australia, toward a more integrated model. "[The industry has] got to shift from an engineering and technical approach, to a much broader approach that recognises engineering and technical efficiency, but also recognises what the human dynamic is, what the human impact is, and the interaction with people in terms of managing those impacts" (2011, p. 6). Pahl-Wostl et al. (2008) also call for adaptive water management that provides open and transparent access to relevant time-based monitoring information. All actors in the water management system need to unite throughout all phases of assessment, policy implementation and monitoring for the most appropriate sustainable outcome (Pahl-Wostl et al. 2008).



### 5.2.3 Question Three

*Are Havelock North business owners open to changes in their hydrosocial contract?*

As defined by Turton and Meissner (2002), the hydrosocial contract is the 'unwritten' water management contract between the government (provider) and the public (user). The contract acts as a basis to develop institutions to manage water resources and to determine the public's expectations that in return for paying their rates, their council has responsibility to supply them with plentiful and good quality water (Turton & Meissner, 2002). This expectation usually represents 'an unwritten contract' that is not vocalised until the contract is broken. When a disruptive situation arises, as happened in Havelock North, when the council is unable to supply good quality water, users become very vocal about the supplier failing to keep its side of the contract.

A predominant theme within the interview responses was the significant amount of mistrust business owners held towards their local authorities – still, nearly twelve months on from the contamination event. They mistrusted both the regional and district councils, the Hawke's Bay District Health Board and the Ministry of Education, and interviewees completely mistrusted the water coming from their taps. This mistrust was evident for eighty-five percent of business owners who believed the government authorities reacted inadequately to the seriousness of the event, particularly in how they managed, or rather failed to manage, systems and processes throughout the event. This perceived mismanagement, alongside the fact that the contamination was found to be partially the fault of both councils, did not endear the councils to the business owners, nor foster any confidence in the councils' employees, systems and processes. It was also clear that the interviewees had concluded that the national and local water security policies, devised by government bodies, were inadequate to deal with such a serious event.

During the interviews, a quarter of business owners spoke about their lack of confidence in the way water was managed and supplied well before the actual outbreak. Two spoke of how they knew various people who had often experienced gastroenteritis over the years, and they had thought that this was likely due to the water. Another spoke about how difficult it was to get their water tested by an official laboratory, and another on how frequently they saw water companies carrying out maintenance at the Brookvale Road bores. Had proactive, annual "local water forums" been held where ratepayers could raise concerns and discuss their hydrosocial contract, perhaps some of "the numerous reasons" for the contamination may have been avoided altogether. With the benefit of hindsight, it may be simple to assert that had a more co-operative water management arrangement been in place, consisting of regular collaboration and discussion at community, business and local government levels, the *Campylobacter* contamination may have been prevented.

Central to the high level of mistrust that Havelock North business owners felt towards their local and regional councils, was the significant chasm created by the perceived low level of council communication with their affected communities. Interviewees were appalled at the lack of communication and interaction between themselves and the councils, which considerably increased business owners' levels of mistrust. Comments that they were 'relieved' to finally have an interviewer to talk to about their ordeal illustrated the harrowing experiences some business owners had been through, and their feeling that they had not been heard or acknowledged.

Those retail business owners who had not previously perceived themselves to be 'reliant' on water – they did not use water to sell their shoes, their jewellery or their car parts – were astounded at how much their cash flow reduced over the short and medium term. Minimal, if any, income during those initial August weeks meant minimal, if any, available cash flow to purchase forward stock. The quality or type of stock procured had to be adjusted or reduced, or stock simply not purchased at all. Inevitably this reduced the goods available for customers during the Christmas period, which in turn reduced the amount of income for businesses. This was a depressing and unsustainable situation for some business owners who regarded the situation as solely the responsibility of their water providers.

For business owners, these 'knock-on' effects from the event illuminated the high levels of financial risk to which they had been unwittingly exposed. Prior to experiencing the financial effects of the outbreak, they had not been aware that a water contamination event could subject them to such a vulnerable situation. Initially, they felt secure in the knowledge that they had business insurance to cover their losses. The councils' made compensation forms available for business owners to complete; however these were deemed too large, unwieldy and costly because professional accountancy input was required. No income-loss reimbursements were made by insurers because the situation was never officially declared a state of emergency, nor a *force majeure*. Business owners were left on their own to simply trade their way out of their dire situations. If a similar situation occurred again in New Zealand, district and regional councils should be prepared to declare a state of emergency from the outset so that insurance protection could be triggered.

Council-managed water supplies are different from private sector supply in that direct responsibility and compensation is considerably more difficult to activate with council-managed supply. The New Zealand Government is due to respond to the findings of the Havelock North Inquiry (New Zealand Government, 2017b), and announced in July 2018 that an overhaul of Three Waters (drinking water, stormwater and wastewater) infrastructure is in the "conceptual policy stage" (Harris, 2018).

Notwithstanding their desperate situation, no affected business owners reached the point where they wanted to discuss alternative infrastructure or alternative models of management or co-management

for their water supply. Their focus was squarely directed back toward the councils 'putting things right' and business owners were just 'hopeful' a contamination event would never happen again. The same council-run systems are still in place, the same employees (at the time of interviews), and essentially identical infrastructure, remains.

Community trust in the provision and management of local water supply is crucial for successful water resource management. A robust hydrosocial contract is dependent on healthy dynamics between water users and water providers (Brown et al., 2009) and the contract will reflect the nature of the local provider-user relationship. Different power relations, behavioural assumptions and impacts on water conservation could evolve from different provider-user relationships (Sofoulis & Strengers, 2011). If water suppliers pay closer attention to the underlying assumptions and expectations of their local communities, the public health, community well-being and social sustainability of those communities can be enhanced and contributed to in a broader sense (Sofoulis & Strengers, 2011).

Only some interviewees physically accessed, and hence presumably thought about, alternative water resources. However, no interviewees implemented an innovative or more flexible approach that challenged their current water supply system. No business owners spoke with others about pooling their resources to access water or developing their own supply for a longer-term solution. The *Campylobacter* outbreak did not trigger them to investigate how much water their business actually used or what proactive steps they could take towards their own water resource management. As far as the interviewees were concerned, the local and regional councils were responsible for the contamination problem, therefore the councils should remedy the problem. Business owners expected the councils to redress the situation immediately – they did not perceive there was any alternative. Their general assumption reinforced Kaika's (2005) observation that the public have long-held an assumption that responsibility for supplying water, and 'controlling' water supply, belongs solely with the local authorities.

However, other producer-user relationships are possible, reflected in different hydrosocial contracts. As a learning from this event, it could be significant and useful for New Zealand communities to start to actively discuss what they perceive their local hydrosocial contract could and should look like. Their currently 'unwritten' contract could become written and thus developed as a long-term strategy, as opposed to a short-term fix. The hydrosocial contracts would not be used as a 'reactive' best practice tool that is only implemented when a drought or contamination occurs. Instead, it could be executed proactively, prior to disruptive events occurring. The community's hydrosocial contract could be used as the foundation for developing localised water institutions and infrastructure, based on what the public also determines to be legitimate practice. The agreed written contract could be continually

administered in line with various sustainable values, such as ecological sustainability (Turton & Meissner, 2002).

In order to develop more sustainable and resilient water supply systems (Brown et al., 2009), that can proactively respond to increasingly extreme water events, we need to attempt to disperse, or at least 'de-fog' (Sofoulis, 2005), the historic, rationalist (Sofoulis & Strengers, 2011) and 'Big Water' approach to water supply management. Research into, and the development of, policies that enable more proximity and visibility of water supply could be a beneficial place to start (Brown et al., 2009; Kaika, 2005; Shove, 2003; Sofoulis, 2005; Strang, 2005; Strengers & Maller, 2012). Strengers & Maller (2012) argue that understanding water's material presence, the range and variety of smaller available supply systems and people's perceptions of how much available water they actually need, will assist and foster a more adaptive capacity in these changing times. Repositioning water from a 'passive bystander' to an 'active element' within everyday practices (Strengers & Maller, 2012) and creating more water sensitive urban areas (Brown et al., 2009) would significantly assist in reducing the value-action gap (Shove, 2010) between people's attitudes to conserving and improving water quality and their actual behaviours (Sofoulis, 2005).

The prevailing one-size-fits-all perspective, particularly toward urban water management, does not foster the necessary degrees of social change required for lower risk and sustainable water supplies. There is a need for the management of water to cease being perceived as solely belonging within the technical realm (Brown et al., 2009; Keath & Brown, 2009; Sofoulis, 2005; Strang, 2005; World Water Assessment Programme, 2018). Councils and water managers need to address water resource management through infrastructure provision and scientific expertise alongside the political [and social] realm that involves human values, behaviours, and the way we organise ourselves (Linton & Budds, 2014). Water managers and communities need to recognise the social nature of physical water flows as well as the relational and dialectical interrelations between society and water (Linton, 2010; Linton & Budds, 2014). Essentially, water shapes people and people are constantly shaping water (Linton & Budds, 2014).

#### **5.2.4 Question Four**

*Have Havelock North business owners' undergone a transformative change in their perspectives on water?*

During times of insecurity our usual feelings of security become more open to scrutiny (Phipps & Ozanne, 2017). Our taken-for-granted routines are not contemplated until routines are disrupted (Keath & Brown, 2009; Phipps & Ozanne, 2017). Mezirow (1978) asserts that to undergo a transformative

change in perspective, subjects must undergo a 'non-negotiable', external event or else an internal, subjective experience. "The externally caused dilemma is likely to be less negotiable and to be more intense...it will more frequently lead to a perspective transformation...When the dilemma has an internal source, the degree of intensity...is often difficult to evaluate" (Mezirow & Marsick, 1978, p. 13). Mezirow upholds that not all adult learners move through the transformative phases in the set sequence of one to ten due to differences in their 'personal histories'. Typically, external dilemmas such as a death, a divorce, job loss or moving to a new city, are significant and impactful, whereas an internal dilemma can be a realisation of, or response to, changing social norms over time (Mezirow & Marsick, 1978).

A variety of self-organised actors and roles are required to bring about societal transformations which cannot occur solely by policy-makers exclusively persuading individuals' self-sacrifice or for an increase in individual environmental efficiencies (Shove, 2010). Continuous transformational change focuses on enabling and accelerating 'micro-level', in-depth changes *over time* that require patience, experimentation and shared experience (Termeer et al., 2017). Governing transformational change also requires the transformation of the governance systems themselves (Termeer et al., 2017).

In this case study, the Havelock North *Campylobacter* contamination and the subsequent illness and debilitation of the whole community, is considered to have been an external shock. All respondents knew at least one person who was physically ill from the contamination. Four respondents were unwell themselves and, prior to hearing any announcement, were perplexed as to why they were so ill. Interviewees were all affected by the seriousness of the situation itself and expressed "absolute shock" at various levels, from the fact that such an event could occur in their community, through to levels of physical debilitation and frightened mental states they witnessed.

As business owners and managers, they all experienced panic due to the significant collapse of income to their enterprises. This collapse was detrimental to their usual business processes and procedures. All normal operational methods ceased and interviewees reported having to scramble to come up with immediate, alternative solutions to remain a viable enterprise. This involved considerable thought and mental agility and, in many cases, logistics and extra physical work to literally carry water into their premises.

### **Early phases**

During the first week, the community began getting sick, but no official announcement had been made so business owners were wondering why local people were becoming ill. As time went on the numbers of affected people rose, the community was theorising what the cause could be, and interviewees reported having to work through their own initial panic, their emotional responses and ways of physically getting access to clean water for their business. They also witnessed the ways other business

owners responded within the community. Shields and Shelleman (2015) note that survival mode and a reactive mentality becomes prevalent for MSMEs that experience reduced access to natural resources. MSMEs in such a situation tend to focus on the processes that keep them economically viable and concentrate their efforts on their short-term survival. Correspondingly, during the initial days of the contamination, the self-examination and initial actions of MSME owners were predominantly indicative of survival mode. Half of the interviewed business owners became isolated and wary, while the other half reached out and made contact with other businesses.

After determining their own actions were not the source of the disruption, business owners stopped examining their own business processes and procedures. Once the owners of hospitality businesses realised customers had become ill, regardless of which premises they had patronised they experienced understandable relief. The next response and adaptation for many business owners was to start communicating whatever they knew to the people and stakeholders around them. They were shocked themselves at the significant notification delay from the local authorities regarding the contamination, so they tried to alleviate that delay for others.

For the first time, some business owners attended local business association meetings, particularly for support and information gathering. All food producers started thinking about and examining the water supply from their local authority. They specifically began to think about that water supply and ways they could by-pass the council managed system so as to continue their business operations using an alternative supply. However, generally their thinking was limited to purchasing larger plastic containers of water or filling 20 litre containers from rural residential bores, and physically bringing that 'private water' into the business to use. Of the few who did seek out and source rural 'private' water, most had a rural background and had experienced using bore water, either as children or often as adults. This reaction was fairly instinctive in the early stages of the outbreak in that they were aware of an alternative water resource, still sourced from nature that was nearby, so they temporarily collected their water there.

### **Later phases**

Business owners' responses were not indicative of the later phases described in Mezirow's Transformative Learning Theory. Kitchenham (2008) states that shaping meaning schemes (what one sees and how one sees or shapes it), assigning causality and critically reflecting on the situation are key components of transformative learning. Business owners did recognise the extent to which they had taken their water quality and water supply for granted but at the time of the interviews, eighty-five percent of business owners held the authorities responsible for the contamination. The others believed "it was just one of those things." As individual business owners, no respondents believed there was a need to implement anything permanent outside their usual business operation paradigms. Their

reasoning was they had paid their rates on time and in full which entitled them to receive fundamental 'council services'. This was their interpretation of their hydrosocial contract. All interviewees believed that given council had failed to provide full and reliable services, it was now up to council rectify the situation.

Regular rates payments give business owners ability to trade within their town, and to use the good quality infrastructure facilities and community services provided and maintained by local authorities. That is what the Havelock North business owners perceived as the content of their hydrosocial contract with the Havelock North District Council and the Hawke's Bay Regional Council. In attempting to make sense of the contamination event, business owners began questioning the meaning and values of their water supply and their purpose of being in business. They asked themselves why they were taking the risk of being in business when the hydrosocial contract they had assumed existed, had now failed them so catastrophically. The consequence of them not transforming their perspective on water supply was that the water supply system, their expectations of authorities and their local hydrosocial contract remained the same.

### **Perception and perspective**

Based on Mohammadi's Meta-model of Perception (2015), the disorienting dilemma phase of TLT can be interpreted as when interviewees experienced various and severe sensory perceptions. All of the Phase 1 reactions by interviewees were found to be sensory because they became involuntarily engaged in sensory inputs such as experiencing or witnessing severe illness, business panic, mistrust, communications failures and re-thinking their business operations. The accumulation of these shocking sensory experiences shifted interviewees' pre-contamination, low-level knowledge of water supply to an increased level of awareness and attempts to understand the infrastructure for their water supply. Perception involves an individual's ability to differentiate space, time, states, moods, feelings, and the beginnings and ends of these differentiations (Mezirow, 1991). Mezirow argues that perceptions *"endow events or objects with meaning to give them coherence...knowledge exists only in the learner's ability to construe and re-construe the meaning of an experience in his or her own terms"* (Mezirow, 1991, p. 20).

Rather than the actual contamination, it would appear that interviewee's *perceptions* of water changed predominantly due to the subsequent chlorination of the Havelock North water supply. Business owners had previously perceived their supply as 'high quality water', that was 'nothing like Auckland's' or 'other countries', but they now felt that quality was tarnished and sullied with the chemical chlorination of their natural water system. The application of chlorine was perceived by business owners as a way of 'covering up' the water contamination issue, a way to kill the pathogens that had entered their

'precious' water supply as a result of 'council negligence'. The smell and the taste of this apparent 'cover up' was abhorred by all interviewees.

Sensory approaches within sociological research have become increasingly established (Pink, 2015). While this case study was not designed as sensory ethnography, it became clear that sensory aspects were significant and relevant. Sensory experiences greatly contribute to people's learning experiences and change of behaviours (Cornell et al., 2011; Mezirow, 1991; Mohammadi & Banirostan, 2015). Some respondents frequently commented on the smell and different taste coming from the tap during and after the contamination. Most comments were to do with the chlorination, but it is also relevant to mention that those feelings appeared to become associated simply with 'the tap' and 'tap water'. Our human sensory and perceptual experiences of water are crucial to our views of water (Strang, 2005). Our perceptions are shaped and influenced by particular cultural landscapes and engagements with water. It appears that our common human physiological and cognitive processes provide enough continuous experiences to produce a universal hidden meaning toward water (Strang, 2005). Chlorination of the previously highly regarded water supply made business owners much more conscious of the importance of the quality of their water, and that quality, not just the quantity, was also the responsibility of their councils.

Responding to interview Question Four, "has your perception of and actions with water changed since the contamination?" eighty-five percent of the interviewees referenced sensory effects or feelings. These included the taste and smell of the chlorination, physically installing and having to pay for water filters, removing themselves directly from tap water with an increase in plastic bottle water usage, 'back to nature' and ecosystem dependence realisations and discourse; despondency regarding significant loss of income and custom; and feelings of detachment – "we're on our own". All of these were deemed as sensory experiences, or had sensory aspects, and thus elicited varying degrees of response. Of that eighty-five percent, seventy percent passionately reflected on the negative aspects of the taste and smell of the councils' chlorination of *their* water. All of these 'sensory responses' reflect Mezirow's definition of perception, as pre-reflective learning that is not solely the function of language (Mezirow, 1991).

In contrast, a *perspective* change is said to occur through the processing of numerous *perception* changes, critical reflections and critical self-reflections (Mezirow, 1990). So, while business owners experienced perception changes as described above, they did not internalise any of the blame for the contamination. During their critical reflections of the situation they may have substituted their own intuitions of the issues they were faced with, instead of critically self-reflecting on the various issues. This resulted in business owners not experiencing the crucial '*critical self-reflection*' element, which Mezirow identified as essential to a perspective transformation.



To varying degrees, a disorienting dilemma can elicit a deeper sense of self and awareness of social interaction (Dirkx, 1998). The Havelock North business community certainly experienced an increase in their understandings around their social, political and cultural contexts. However, they did not critically self-reflect on the situation. As far as business owners were concerned, and as was concluded by the outcomes of the Havelock North Inquiry (New Zealand Government, 2017b), there were multiple 'external' reasons for the outbreak, none of which were due to their own business' negligence. Given business owners did not perceive the contamination to be a result of their own direct actions or inactions; they did not discuss, think about, or facilitate any changes to, their incumbent, historical water supply model.

In terms of creating perspective transformation, business owner responses to the *Campylobacter* outbreak were all still confined within the existing 'Big Water' paradigm. They did not experience a transformative change in their perspective about water supply and management because they did not experience critical self-reflection during and after the *Campylobacter* contamination. Reintegration of a new perspective into a new operation or way of living, based on the conditions dictated by the new perspective, was not evident for any of the Havelock North business owners. No respondents had been motivated to build up new knowledge on how to tangibly save or harness water, nor had they increased their confidence to significantly change their water supply or conservation methods. Mezirow (1981) states that perspective transformation involves building competence in new roles and acquiring knowledge and skills to support the improved confidence required to operate assuredly within a person's new paradigm.

However, interviewees still retained the same patterns of thinking in terms of using the infrastructure required to have their water supplied. At a time when the business community came together in a rare occurrence of unification, they did not discuss nor explore any local or catchment-wide options for additional or alternative water supply, or alternate approaches to water resource management. Decision-making processes remained the same and alternate possibilities for water saving or water-capturing solutions were not explored nor expanded. Critical reflections were directed primarily toward both local and regional councils, and government authorities. The accompanying discourse within the business community demanded councils provide a rapid solution – still within the boundaries of the established infrastructure and fractured relationships.

### **5.3 Implications**

If a significant contamination event affecting over one-third of the population of a town of 15,000 people, for months afterwards, cannot transform business owners' perspectives on water, what could? Shove (2010) argues that it is not possible to transform behaviour or perspectives through current policy and research based on the dominant ABC paradigm. The ABC model is primarily predicated on social change

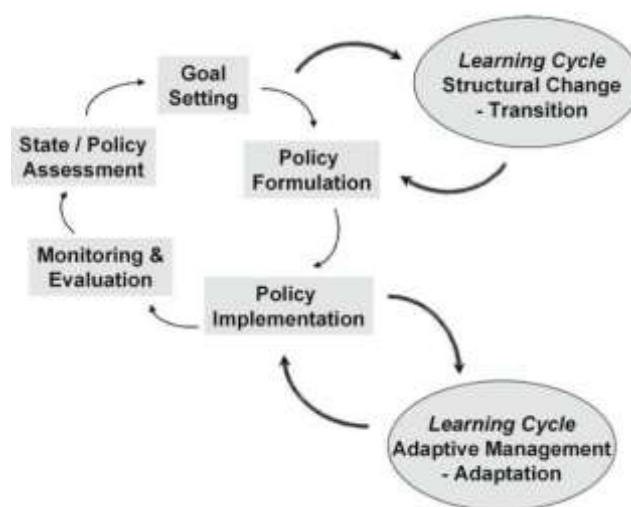
being dependent upon values and attitudes (the A), which in turn drive variations of behaviour (the B), that people then choose (the C) to adopt. 'Blaming' individuals, implying that their behaviour is the root cause of environmental problems, is not remedying the problems we face today. For Shove (2010), an example of this individual blame is the focus on the value-action gap (whereby individuals espousing green values do not always act in alignment with those values). Shove notes that in the United Kingdom there has been a tendency to commission behavioural studies (Department for Environment Food and Rural Affairs (DEFRA), 2008; Jackson, 2007; Prendergast, Foley, Menne, & Issac, 2008), which in turn feed 'evidence-based' policies that are implemented to try and persuade individual citizens to opt to adopt exclusively pro-environmental behaviour (Shove, 2010). According to Shove (2010), no studies in the United Kingdom have been carried out on current infrastructural arrangements that may be discouraging pro-environmental and socially cohesive behaviour.

At the civic level, Sofoulis and Strengers (2011) call for replacing historical models of provider-user relationships and the newer rationalist models, with integrated models. The historical models [as present in Havelock North] disconnect users from any knowledge or responsibility for their water supply, while rationalist models position responsibility for conservation and water management at the individual or household level (Sofoulis & Strengers, 2011). In contrast, integrated models "represent promising avenues for healthier provider-user relationships that overcome the non-responsibility of users built in to historical models, avoid the emphasis on data provision and guilt invoked by rationalist models, and potentially capture the socio-technical and cultural dynamics of water use lacking in both" (Sofoulis & Strengers, 2011, p. 6). The authors have identified three varieties of integrated provider-user relationships, all offering a wider range of engagement options than those possible in the traditional linear communication chain found in the historical and rationalist models. They highlight the need for social sciences, humanities and the arts based knowledge as a requirement to understand the intricate and complex cultural and social dynamics within those water systems. Building a platform to begin provider-user engagement around designing riparian transport routes, urban land-waterscapes, recycled water and vertical gardens on green buildings, and so on, could start a significant conversation between the Havelock North business community and civic water suppliers.

In some respects a New Zealand example of Sofoulis and Strengers' (2011) negotiation of a new hydrosocial contract can be found in Canterbury, the largest geographical region in the South Island. In 2009, the local regional council authority Environment Canterbury released the first draft of the Canterbury Water Management Strategy, an integrated, community-involved approach to their water supply (Environment Canterbury, 2018). Driven by consecutively dry seasons, Environment Canterbury had previously carried out studies on water availability issues and identified and reviewed potential water storage sites (Environment Canterbury, 2018). Numerous stakeholder meetings resulted in the establishment of a Steering Group. By 2010, the first Zone Facilitators were appointed, followed by Zone

Implementation Programmes (ZIPs), to help develop regional water plans within each of the eleven districts council areas (Environment Canterbury, 2018). Each ZIP is unique to the district council areas whereby the zone committees, in collaboration with local communities, lead a participatory process through identifying and explaining local issues, options, aspirations and recommendations for water management. The Strategy is considered “akin to social contract”, and does not carry any formal status other than its principles and visions are included in the Environment Canterbury Act (Lomax, Memon, & Painter, 2010). A more integrated social structure was informally framed for the region, but there were shortcomings. Lomax et al. (2010) note that while “collaborative approaches are widely advocated in the current international literature on water governance... successful implementation is highly dependent on the people and politics in a particular situation” (p. 28).

An approach to water management that does endeavour to incorporate particular time, locations and situations is Adaptive Water Resource Management. As promulgated at the first Integrated and Adaptive Water Management Conference, held in 2007, in Basel, Switzerland, an adaptive water management approach can also be implemented, alongside an integrated water management approach. Pahl-Wostl et al. (2008) states that adaptive management is an essential strategy for the on-going ability of water systems to adapt within current and future climatic changes, it must also be both anticipatory and reactive. Pahl-Wostl et al. (2008) argue that making a space for learning experiences, based on actual results and outcomes of various management adaptations, must become a fundamental part of the design of adaptive policies, so that learning does not just emerge by chance. Akin to Sofoulis and Strengers (2011), Pahl-Wostl et al. (2008) also call for water management regimes not to continue to be based on a “command and control approach focusing [only] on technical solutions” (Pahl-Wostl et al., 2008, p. 31). They advocate for policy formulation and implementation to involve the process of dedicated learning cycles for all stakeholders that include adaptive and transitional phases, as illustrated in figure 5.1 below.



**Figure 5.1: Diagram showing learning processes linked to the Adaptive Water Management policy cycle**

(Source: Pahl-Wostl et al., 2008)

Finally, if we are to achieve transformational change that does provide a verifiable, long-term, sustainable, resilient solution, specifically around water quality issues, New Zealand regional councils cannot continue to engage in incremental, “false” sustainability (Smith et al., 2011) strategies. Freese (1997), cited in Smith (2011), differentiates between “false” sustainability whereby sustainable strategies are based on anthropocentric paradigms, and “true” sustainability which is modelled on ecocentric and social systems based paradigms. Application of chlorine to all water supplies in New Zealand could be classified as a false sustainable solution that is solely focused on the physical and material safety benefits for humans, not addressing the contamination problem at source, and not considering the health of ecosystems that would also come into contact with chlorine over time. Adaptations adopted on a regional scale, providing a truly new approach to managing water, is the engagement required for the sustainable transformation of our water resource management (Termeer et al., 2017). Governance of water needs to become innovative, involve critical reflection and critical self-reflection within both communities and governing bodies, and must start to challenge dominant interests and norms. Instead of focusing on the ‘Big Water’ perspective and the ABC paradigm, all water managers must start working toward increasing resilience and harnessing adaptability around continuous transformational change (Termeer et al., 2017). Transformational change around water resource management “requires transformation of the governance systems themselves” (Termeer et al., 2017, p. 571).

## Chapter 6

### Conclusion

#### 6.1 Conclusion

The first two chapters of this thesis provided an introduction and contextual analysis of this case study of business owners in Havelock North. Chapters three and four covered the applied methodology and documented the results of the study. The fifth chapter discussed the findings of the research in relation to the key research questions, and the implications for water resource managers. This concluding chapter examines whether a contamination to drinking water supply transformed Havelock North business owners' perspectives on water. A brief discussion of the limitations of this case study, policy recommendations and future research opportunities are also documented.

The supply of water is a critical issue to numerous business activities throughout the world, particularly in regard to farming and food production businesses. Increasingly water usage and degradation of water quality are beginning to create serious operational, investment and reputational risks for the financial, industrial, mining and agribusiness sectors (Houdet et al., 2015). Increasingly, corporate businesses are starting to measure and report their dependencies and impacts on the environment (Bianchi & Noci, 1998; Bishop et al., 2010; Roberts & Gehrke, 1996; Whitehead, 2013). However, MSMEs are often focused on survival and growth; they do not always have the resources or finances to employ someone to carry out environmental evaluations, collate reports or devise and implement substantial changes (Shields & Shelleman, 2015). Nor do they perceive their business operations as large enough to require environmental good practice and natural resource conservation (Hillary, 2000), despite the fact that MSMEs account for an average of ninety-five percent of firms in most countries, and the vast majority of jobs (World Trade Organisation, 2016). In most capitalist countries, MSMEs perceive themselves as small and insignificant; they do not recognise their significant, cumulative effect on natural resources (Hillary, 2000). In New Zealand there are nearly 925,880 people employed in 773,600 MSMEs, so their personal water use alone, within workplaces around the country, are significant. The total amount of virtual water used to produce goods and services within these nearly 800,000 businesses is also considerable. The Environment (2014) calculates that New Zealand receives 608 billion m<sup>3</sup> of water each year and use 11 billion m<sup>3</sup> – fifty-three percent for agricultural irrigation, twenty-three percent within industry, seventeen percent consumed as domestic drinking water and seven percent for stock-water. Given that MSMEs comprise 97 percent of New Zealand's businesses (Ministry of Business, Innovation & Employment, 2017), new ways of thinking about their cumulative water usage in terms of a catchment, or regional, perspective could more sharply focus their water conservation, environmental good practice and financial performance.

Whitehead's (2013) study of MSMEs operating within New Zealand's manufacturing sector identified there is little information regarding their levels of environmental and/or sustainable behaviours. In relation to water resources, it was a key objective of this study to determine whether or not micro, small and medium business owners had undergone a paradigm shift to a more ecosystem services based approach toward their business operations. The lens of Mezirow's Transformative Learning Theory (Mezirow & Marsick, 1978) was applied to the business owners' responses in order to explore the four key research questions.

Based on the data analysis it was evident that most interviewees had experienced significant sensory and physical experiences that triggered a variety of thoughts, feelings and actions that changed their *perceptions* of water. The initial period of heightened and disorienting sensory experiences continued for a relatively short amount of time and then tapered off as the contamination threat to the community decreased. However, the memory of those sensory experiences was still vivid and real during the interview period, ten months after the event. Interviewees spoke about being open to learning more about water, they listened to the media, various local and national opinions and to the 'experts' involved, and they were captivated with the various water contamination issues.

Within the contexts of sensory experience and perception, this study found that the chlorination of the water supply appeared to have a bigger effect on business owners' perception of water than the contamination. It transpired that the Council's unprecedented application of considerable amounts of chlorine to the local water supply changed people's interactions with and perceptions of water. Firstly, the chlorine heightened business owners' awareness that the management of a high quality water supply, not just the availability, was the local councils' domain – "I now think a lot more about how it's managed and the responsibility that the councils have in doing that" (T2). Secondly, the application of chlorine triggered certain actions among business owners whereby they sourced different water supplies, installed filters, and carried out online searches regarding the effects of chlorinated water on humans. Based on the data these limited actions appeared to be triggered as a result of the councils' chlorination of the water rather than the contamination itself. Most likely this was due to the councils' immediate application of chlorine at the same time councils announced the actual *Campylobacter* contamination.

While there were varying levels of change in business owners' perceptions of water, there was no change in their actual *perspectives* on water, nor their water supply. They had undergone a period of disequilibrium and conceptual conflict that made them dissatisfied, and they diagnosed what they knew of existing infrastructure arrangements and critically reflected on them. However, no business owners spoke of any other way of managing or supplying water outside of their traditional and current water supply paradigms. Interviewees did not speak of saving or harnessing water through the installation of

rainwater tanks, activating water meters, petitioning Council for a review of the historic water infrastructure. One respondent did casually comment that he would like to run for Council to try and change the status quo from the inside but it is unknown if he did so. Business owner responses were still confined within the existing 'Big Water' paradigm. They did not experience a transformative change in their perspective of water supply and management because they did not experience critical self-reflection during and after the water contamination.

It is possible that the contamination period was too short to trigger any tangible perspective change. If the contamination had continued over a longer period (e.g. two or three months), or reoccurred several times, business owners would have experienced considerably more sensory experiences. This may have triggered business owners to carry out more critical reflection, and most importantly for a transformational learning experience, more critical *self*-reflection. Perhaps experiencing continuous transformational changes, as described by Termeer et al. (2017), could bring about "true" sustainable approaches, that are modelled on ecocentric and social systems rather than solely anthropocentric paradigms, and integrated water resource management initiatives.

## **6.2 Limitations and further research**

The majority of respondents in this study were micro or small businesses owners, based in the Havelock North township, with only a few medium businesses of fifty or more employees. None of the primary food producers that were approached from the wine, fruit and vegetable sector agreed to proceed with an anonymous interview. Issues, perceptions and actions of larger business owners are likely to have been different in terms of scale to the predominantly micro and small businesses that were interviewed. It also may have been useful to ask business owners for their individual opinions regarding a hypothetical percentage payment for the volume of water they use within their businesses. Two respondents referred to local examples of large rural fruit and vegetable businesses paying an undisclosed amount to the Hawke's Bay Regional Council towards their water usage, so a more thorough inquiry of this could have been useful, although disclosure may have been challenging.

Further research that could investigate the gaps and linkages between all water users and councils, and the inclusion of regional professionals with skills in the humanities, social science and the arts, could facilitate the development of a workable national framework for water resource management. Such research might open the way for more integrated and adaptive water management initiatives within urban environments around New Zealand. As suggested by Sofoulis (2011), an expansion of the depth and range of the humanities, arts and social sciences within urban water management, policy and

planning could guide water sustainability strategies that are also essential to community and personal wellbeing.

### **6.3 Recommendations for policy**

While Transformative Learning Theory provides a way of understanding how and whether personal transformations occur, it cannot be used as a policy tool to assist in changing New Zealand business owners' perspectives on water. Apart from the fact that business owners only experienced the early stages of Mezirow's ten-step theory, we cannot distribute countrywide disorienting dilemmas with the intention to trigger perspective changes on water supply. However, it could be argued that many New Zealand communities are now experiencing an increasing number of disorienting dilemmas due to the impacts of climate change.

Life on Earth is diverse, and water is diverse. We need to diversify our approach to water resource management so that it is just as inclusive of the societal aspects of water as is it of the technical and economic aspects. Instead of reducing water contamination risk with the extremely unpopular application of chlorine, local and regional government bodies could start to take a proactive approach to assist with the implementation of perspective changes. Councils could explore proactive water resource management by diversifying from the predominant provider-user, 'big water' paradigm to a 'hybridised' system that places water as a co-managed natural resource, involving non-state actors, to enable providers and consumers to share responsibility and decision-making (Carlsson & Berkes, 2005; Newig & Challies, 2014; Sofoulis & Strengers, 2011; Strengers & Maller, 2012). A proactive, annual "local water forum" could be held, whereby business owners and/or ratepayers raise any concerns, provide positive feedback and transparently establish and annually discuss their local, written, transparent hydrosocial contract. The establishment of integrated and adaptive water management strategies, where business and domestic users are more involved with decision-making (not control of) and physically connected to their water supplies, is crucial for understanding their cumulative impacts on natural ecosystems.



# Appendix 1

## INTERVIEW QUESTIONS<sup>11</sup>

(July 2016)

**Name of Project:** Perceptions of business owners in Havelock North after contamination of drinking water supply.

Thank you for agreeing to participate in this Masters project called *“Perceptions and perspectives of business owners in Havelock North after contamination of drinking water supply”* by completing the following questionnaire.

The aim of the project is to determine if MSME owners have experienced a change in the way they perceive their water resources since the contamination, if they interact differently with water and if they are more involved with any issues connected to their local water supply.

This questionnaire is anonymous, and you will not be identified as a respondent without your consent.

You may at any time withdraw your participation, including withdrawal of any information you have provided. If you complete the questionnaire, however, it will be understood that you have consented to participate in the project and consent to publication of the results of the project with the understanding that anonymity will be preserved.

1. Please tell me about your experience from when you found out about your local drinking water contamination? *(critical reflection/objective reframing)*
2. How did it make you feel in regard to your business operations? *(critical self-reflection/subjective reframing)*
3. What actions did you take within your business? i.e. carry out a call-to-action, engage with staff, attend a meeting, put up signage, etc.
4. Has your perception of and actions with water changed since the contamination in August last year? If there has not been change, why not? *(critical reflection/objective reframing)*
5. If you have undergone a perception and interaction change with water, can you remember a particular moment or period when this happened? *(critical self-reflection/subjective reframing)*
6. NZ MSME's comprise 92% of all businesses (p.7 proposal). There are 459,000 SME's employing 584,000 people (30% of the workforce) + 326,000 self-employed businesses (micro) i.e. 910,000 people. Industry uses 11% of water – do you ever think about the cumulative impact all of these businesses collectively have on water usage? (agriculture uses 77% and municipal use 8%)
7. Good quality and abundant water is a result of natural water cycling processes – i.e. water moves from one reservoir to another such as river to sea, or ocean to atmosphere and in doing so uses energy, via temperature changes, to go through different processes of being liquid, solid and vapour. As well as humans there are other living organisms on earth that rely on freshwater for survival – plants and animals are linked in a food chain, in an ecosystem. Do you think humans are part of the ecosystem? Did the contamination make you think about the reliance on water for all living things?
8. Do you see yourself as a part of the food chain/ecosystem? *(critical self-reflection/subjective reframing)*

---

<sup>11</sup> Questionnaire devised prior to thorough investigation/understanding of the difference between perception and perspective.

9. How did the contamination make you feel about the local Council's water supply services? *(critical self-reflection/subjective reframing)*
10. Do you see yourself as someone who usually reflects back over previous decisions or past behaviour? If so, does this reflection assist you with future decision-making? *(critical self-reflection/subjective reframing)*
11. Do you have any personal learnings from the contamination experience? *(critical self-reflection/ subjective reframing)*

Is there anything else you would like to share about your experience of the water contamination?

## Appendix 2

### RESEARCH INFORMATION SHEET

You are invited to participate as a subject in a project entitled: perceptions of business owners in Havelock North after contamination of drinking water supply.

The aim of the project is to determine if Micro, Small and Medium Enterprise (MSME) owners have experienced a change in the way they perceive their water resources since the contamination, if they interact differently with water and if they are more involved with any issues connected to their local water supply.

Your participation in this project will involve:

- you signing a consent form to agree to the interview
- meeting with the researcher at a venue of your choice and answering 11 questions around your experience of the campylobacteriosis contamination in August 2016
- voluntary review of the hardcopy transcript of your interview answers when they are completed in June. If you would like to read it over please advise at the end of the interview.

Participation in the research is voluntary and you may decline to answer questions or withdraw your involvement. Withdrawal is possible up until 30<sup>th</sup> June 2017. If you do withdraw at any stage, any information you have already provided will be destroyed.

The results of the project may be published in an industry journal, but you may be assured of your anonymity in this investigation. In the event of an audit your identity will not be made public, or made known to any person other than the researcher, his or her supervisors and the Human Ethics Committee without your consent. To ensure anonymity the following steps will be taken:

1. During the data collection phase I will have the consent forms and data collected in my locked bag and on my phone. When I am transcribing and analysing the data back at University I will store any hardcopies in my locked filing cabinet on the 7<sup>th</sup> floor of the Biology Building – Waterways Department. After normal working hours the Waterways Department can only be accessed with a security card. All interviews will be stored in 'the Cloud', on my mobile phone and on my laptop, all of which are password protected. Transcriptions/softcopy data will be stored on the University's network server (P: drive).
2. Each participant will be assured of the anonymity in any publications that result from the study. Regardless each interviewee and their corresponding interview answers will be given a numerical code. When the data is reported the numerical code will be used in all references. Only my supervisors and I will have access to the collected data. If photographs are taken for my own reference no identifying features will be used.

The project is being carried out by: Rachel Teen, e: [Rachel.teen@lincolnuni.ac.nz](mailto:Rachel.teen@lincolnuni.ac.nz), ph: 021 810028. She will be pleased to discuss any concerns you have about participation in the project.

The project is supervised by: Dr Lin Roberts, e: [lin.roberts@lincoln.ac.nz](mailto:lin.roberts@lincoln.ac.nz), ph: 03 423 0438.

The project has been reviewed and approved by the Lincoln University Human Ethics Committee.

## Appendix 3

### CONSENT FORM

**Name of Project:**

*Havelock North business owners' perceptions of water after contamination of drinking water supply.*

I have read and understood the description of the above-named project.

On this basis I agree to participate in the project, and I consent to publication of the results of the project in a relevant industry journal with the understanding that anonymity will be preserved.

I understand also that I may at any time withdraw from the project, including withdrawal of any information I have provided, up to 30th June 2017.

**Name:**

**Signed:**

**Date:**

## References

- Bakker, K. (2012). Water: Political, biopolitical, material. *Social Studies of Science*, 42(4), 616-623. <https://doi.org/https://doi.org/10.1177/0306312712441396>
- Bay, U., & Macfarlane, S. (2011). Teaching critical reflection: A tool for transformative learning in social work? *Social Work Education*, 30(7), 745-758. <https://doi.org/10.1080/02615479.2010.516429>
- Bianchi, R., & Noci, G. (1998). "Greening" SMEs' competitiveness. *Small Business Economics*, 11(3), 269-281. <https://doi.org/10.1023/a:1007980420087>
- Bishop, J., Bertrand, N., Evison, W., Gilbert, S., Grigg, A., Hwang, L., Kallesoe, M., Vakrou, A., van de Lugt C., Vorhies, F. (2010). *The economics of ecosystems and biodiversity report for business - Executive Summary* (978-3-9813410-1-0) [Report]. Progress Press, Malta: TEEB. Retrieved from <http://www.teebweb.org/media/2012/01/TEEB-For-Business.pdf>
- Bohm, D. (2002). *Wholeness and the implicate order*. London; New York: Routledge.
- Boyatzis, R. (1998). *Transforming qualitative information: Thematic analysis and code development*. California: Sage.
- Brown, R., Keath, N., & Wong, T. (2009). Urban water management in cities: Historical, current and future regimes. *Water Science and Technology*, 59(5), 847-855. <https://doi.org/http://dx.doi.org.ezproxy.canterbury.ac.nz/10.2166/wst.2009.029>
- Capra, F. (2004). *The Hidden Connections: A science for Sustainable Living*. Harpswell, ME: Anchor.
- Carlsson, L., & Berkes, F. (2005). Co-management: concepts and methodological implications. *Journal of Environmental Management*, 75(1), 65-76.
- Catton, W. R., & Dunlap, R. E. (1978). Environmental sociology: A new paradigm. *The American Sociologist*, 13(1), 41-49.
- Clark, C. (1993). *Changing course: Initiating the transformational learning process*. presented at the 34th Annual Adult Education Research Conference (AERC),
- Clover, D. E., de O. Jayme, Follen, S., & Hall, B. (2012). *Nature of Transformation: Environmental Adult Education*. Rotterdam, Netherlands: Sense Publishers.
- Cohen, E. (1976). Environmental Orientations: Multidimensional approach to Social Ecology. 17(1), 49-70. <https://doi.org/DOI: 10.1086/201669>
- Cornell, K., Jönsson, F., Larsson, M., & Olofsson, J. (2011). Affected by smells? Environmental chemical responsivity predicts odour perception. *Chemical Senses*, 36(7), 641-648. <https://doi.org/10.1093/chemse/bjr028>
- Cosgrove, W. J., & Rijsberman, F. R. (2000). *World Water Vision: Making water everybody's business* (1134201621).Routledge.
- Cussins, T. (2017). Havelock North water supply campylobacter outbreak: Source and ingress investigations. Retrieved 13 September, 2017, from [https://www.waternz.org.nz/Attachment?Action=Download&Attachment\\_id=2667](https://www.waternz.org.nz/Attachment?Action=Download&Attachment_id=2667)
- Dahles, H., & Susilowati, T. P. (2015). Business resilience in times of growth and crisis. *Annals of Tourism Research*, 51, 34-50. <https://doi.org/https://doi.org/10.1016/j.annals.2015.01.002>
- Delaney, C., & Fam, D. (2015). The 'meaning' behind household rainwater use: An Australian case study. *Technology in Society*, 42, 179-186. <https://doi.org/https://doi.org/10.1016/j.techsoc.2015.05.009>
- Department for Environment Food and Rural Affairs (DEFRA). (2008). *A framework for pro-environmental behaviours* [Report]. London: Retrieved from [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69277/pb13574-behaviours-report-080110.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69277/pb13574-behaviours-report-080110.pdf)
- Department of Internal Affairs. (2013). Local Councils: Hawke's Bay Regional Council. Retrieved from [http://www.localcouncils.govt.nz/lqip.nsf/wpg\\_url/Profiles-Councils-Hawkes-Bay-Regional-Council-Main?OpenDocument](http://www.localcouncils.govt.nz/lqip.nsf/wpg_url/Profiles-Councils-Hawkes-Bay-Regional-Council-Main?OpenDocument)
- Dirkx, J. (1998). Transformative Learning Theory in the practice of adult education: An overview. *PAACE Journal of Lifelong Learning*, 7, 1-14.
- Dunlap, R. E., & Van Liere, K. D. (1978). The "new environmental paradigm". *The Journal of Environmental Education*, 9(4), 10-19.

- Environment Canterbury. (2018). Canterbury Water Management Strategy: Quick guide. Retrieved from <https://www.ecan.govt.nz/your-region/your-environment/water/canterburys-approach-to-water-management/>
- Environment, M. f. t. (2014). *Delivering freshwater reform: A high level overview* (INFO 714). NZ Government. Retrieved from <http://www.mfe.govt.nz/publications/fresh-water/delivering-freshwater-reform-high-level-overview>
- Falkenmark, M., & Rockstrom, J. (2004). *Balancing water for humans and nature: The new approach in ecohydrology*. UK and USA: Routledge/Earthscan.
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International journal of qualitative methods*, 5(1), 80-92. <https://doi.org/doi:10.1177/160940690600500107>
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative inquiry*, 12(1), 219-245. <https://doi.org/10.1177/1077800405284363>
- Freese, L. (1997). *Environmental Connections*. Greenwich, Connecticut: JAI Press.
- Gioia, D. A., & Pitre, E. (1990). Multiparadigm perspectives on theory building. *The Academy of Management Review*, 15(4), 584-602. <https://doi.org/10.2307/258683>
- Gregson, N., Crang, M., Fuller, S., & Holmes, H. (2015). Interrogating the circular economy: The moral economy of resource recovery in the EU. *Economy and Society*, 44(2), 218-243. <https://doi.org/10.1080/03085147.2015.1013353>
- Groenewald, T. (2004). A phenomenological research design illustrated. *International journal of qualitative methods*, 3(1), 42-55.
- Harris, D. (2018). Major water management reform could take responsibility for drinking water from councils. Retrieved 23 July 2018, from <https://www.stuff.co.nz/national/politics/105533106/government-signals-changes-to-national-water-management-likely>
- Hastings District Council. (2015). *Havelock North Village Plan*. Brebner Print: Hastings District Council.
- Hawke's Bay Regional Council. (2017). Local Governance Statement 2017. Retrieved 2018, from <https://www.hbrc.govt.nz/assets/Document-Library/Council-Documents/HBRC-Local-Governance-Statement-2017.pdf>
- Hillary, R. (2000). *Small and medium-sized enterprises and the environment: Business imperatives*. Sheffield, Great Britain: Greenleaf Publishing.
- Hoekstra, A. Y. (2014, 25 April 2014). Water scarcity challenges to business. *Nature climate change*, 4, 318-320. <https://doi.org/10.1038/nclimate2214>
- Horton, R. E. (1931). The field, scope, and status of the science of hydrology. *Transactions American Geophysical Union*, 12(1), 189-202. <https://doi.org/10.1029/TR012i001p00189-2>
- Houdet, J., Johnstone, A., & Germaneau, C. (2015). Ecosystem services-based approaches to water management. In *Water ecosystem services: A global perspective*. (2015 ed., pp. 129-137). United Kingdom: Cambridge University Press.
- Hunt, M. (2016, 16 August). Two patients critical in hospital as gastro bug in Havelock North shuts schools. *Stuff*. Retrieved from <https://www.stuff.co.nz/national/health/83148539/two-patients-critical-in-hospital-as-gastro-bug-in-havelock-north-shuts-schools?rm=m>
- Jackson, T. (2007). Motivating sustainable consumption review. Retrieved from <http://sd-research.org.uk/research-and-resources/motivating-sustainable-consumption-review>
- Kadibadiba, T., Roberts, L., & Duncan, R. (2018). Living in a city without water: A social practice theory analysis of resource disruption in Gaborone, Botswana. *Global Environmental Change*, 53, 273-285. <https://doi.org/https://doi.org/10.1016/j.gloenvcha.2018.10.005>
- Kaika, M. (2005). *City of flows: modernity, nature, and the city*. Great Britain: Routledge.
- Keath, N. A., & Brown, R. R. (2009). Extreme events: Being prepared for the pitfalls with progressing sustainable urban water management. *Water Science and Technology*, 59(7), 1271-1280. <https://doi.org/http://dx.doi.org.ezproxy.canterbury.ac.nz/10.2166/wst.2009.136>
- Kember, D., Jones, A., Loke, J., McKay, K., Sinclair, H., Tse, C., Webb, F., Wong, F., Wong, M., Yeung, E. (1999). Determining the level of reflective thinking from students' written journals using a coding scheme based on the work of Mezirow. *International Journal of Lifelong Education*, 18(1), 18-30.

- Kember, D., McKay, J., Sinclair, K., & Wong, F. (2008). A four-category scheme for coding and assessing the level of reflection in written work. *Assessment and Evaluation in Higher Education*, 33(4), 369-379.
- Kerr, I. R. (2006). Leadership strategies for sustainable SME operation. *Business Strategy and the Environment*, 15(1), 30-39.
- King, P. M., & K. S. Kitchener. (1994). *Developing reflective judgement: understanding and promoting intellectual growth and critical thinking in adolescents and adults*. San Francisco: Jossey-Bass.
- Kitchenham, A. (2008). The Evolution of John Mezirow's Transformative Learning Theory. *Journal Of Transformative Education*, 6(2), 104-123. <https://doi.org/doi:10.1177/1541344608322678>
- Lincoln, Y., & Guba, E. (1985). *Naturalistic Inquiry* Beverly Hills, California: SAGE Publications.
- Lind, M. (May 1998). Liberalism Isn't Everything. *New York Times (1923-Current file)*, p. 2.
- Linton, J. (2010). *What is water?: The history of a modern abstraction*. Vancouver, Toronto, Canada: UBC Press.
- Linton, J., & Budds, J. (2014). The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water. *Geoforum*, 57, 170-180. <https://doi.org/http://dx.doi.org/10.1016/j.geoforum.2013.10.008>
- Lomax, A., Memon, A., & Painter, B. (2010). *The Canterbury Water Management Strategy as a Collaborative Planning Initiative: a preliminary assessment*. Lincoln, Canterbury, New Zealand: Lincoln University.
- Lynham, S. A. (2000). Theory Building in the Human Resource Development Profession. *Human Resource Development Quarterly*, 11(2), 159-178.
- Martin-Ortega, J., Ferrier, R. C., Gordon, I. J., Khan, S. (2015). *Water ecosystem services: a global perspective* United Kingdom: Cambridge Publishers.
- McDonough, W., & Braungart, M. (2000). A World of Abundance. *Interfaces*, 30(3), 55-65.
- Merriam, S. B. (2002). *Qualitative research in practice : examples for discussion and analysis*. San Francisco, CA: Jossey-Bass.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation (3)*. Somerset, US: Jossey-Bass.
- Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation (4)*. Newark, US: Wiley.
- Mezirow, J. (1981). A critical theory of adult learning and education. *Adult Education*, 32(1), 3-24. <https://doi.org/doi:10.1177/074171368103200101>
- Mezirow, J. (1990). How critical reflection triggers transformative learning. *Fostering critical reflection in adulthood*, 1, 20.
- Mezirow, J. (1991). *Transformative dimensions of adult learning* (1st ed.). San Francisco: Jossey-Bass.
- Mezirow, J. (1998, May 1, 1998). On Critical Reflection. *Adult Education Quarterly*, 48(3), 185-198. <https://doi.org/10.1177/074171369804800305>
- Mezirow, J. (2006). An overview on transformative learning. In P. C. Sutherland, J. (Ed.), *Lifelong learning: concepts and contexts*. London, New York: Routledge.
- Mezirow, J., & Marsick, V. (1978). *Education for perspective transformation: women's re-entry programs in community colleges*. New York: Centre for Adult Education, Teacher's College, Colombia University.
- Mezirow, J., & Taylor, E. (2009). *Transformative learning in practice: Insights from community, workplace and higher education*: Jossey-Bass.
- Ministry of Business, Innovation & Employment. (2016). Small business in New Zealand. Retrieved Nov 2016, from <http://www.mbie.govt.nz/info-services/business/business-growth-agenda/sectors-reports-series/pdf-image-library/the-small-business-sector-report-and-factsheet/small-business-factsheet-2016.pdf>
- Ministry of Economic Development. (2011). *SMEs in New Zealand: Structure and Dynamics* [Report]. MBIE website: Ministry of Economic Development. Retrieved from <http://www.mbie.govt.nz/info-services/business/business-growth-and-internationalisation/documents-image-library/Structure-and-Dynamics-2011.pdf>



- Ministry for the Environment. (2017). *New Zealand's Environmental Reporting Series: Our fresh water 2017* (ME 1305) [ ]. Wellington, New Zealand: New Zealand Government. Retrieved from [www.mfe.govt.nz](http://www.mfe.govt.nz) and [www.stats.govt.nz](http://www.stats.govt.nz)
- Ministry of Business, Innovation & Employment. (2014). *The small business sector report*. Wellington: Retrieved from <https://www.mbie.govt.nz/info-services/sectors-industries/sectors-reports-series/pdf-image-library/the-small-business-sector-report-and-factsheet/The%20Small%20Business%20Sector%20Report%202014.pdf>
- Ministry of Business, Innovation & Employment. (2017). *Small businesses in New Zealand: How do they compare with larger firms?* Wellington: MBIE. Retrieved from <http://www.mbie.govt.nz/info-services/sectors-industries/sectors-reports-series/pdf-image-library/the-small-business-sector-report-and-factsheet/small-business-factsheet-2017.pdf>
- Mohammadi, S., & Banirostan, T. (2015). A perceptual meta-model based on the ontology of mental models. *The International Journal of Humanities & Social Studies*, 3(11), 122-128.
- New Zealand Government. (2016). *Draft Terms of Reference for Havelock North Contamination*. Auckland, New Zealand: New Zealand Government. Retrieved from [http://www.waternz.org.nz/Attachment?Action=Download&Attachment\\_id=1445](http://www.waternz.org.nz/Attachment?Action=Download&Attachment_id=1445)
- New Zealand Government. (2017a). *Report of the Havelock North Drinking Water Inquiry: Stage 1* (978-0-473-39743-2). Auckland, New Zealand: Department Internal Affairs, New Zealand Government. Retrieved from <https://www.dia.govt.nz/Stage-1-of-the-Water-Inquiry>
- New Zealand Government. (2017b). *Report of the Havelock North Drinking Water Inquiry: Stage 2* [Inquiry Report]. Auckland, New Zealand: Department Internal Affairs, New Zealand Government. Retrieved from [https://www.dia.govt.nz/diawebsite.nsf/Files/Report-Havelock-North-Water-Inquiry-Stage-2/\\$file/Report-Havelock-North-Water-Inquiry-Stage-2.pdf](https://www.dia.govt.nz/diawebsite.nsf/Files/Report-Havelock-North-Water-Inquiry-Stage-2/$file/Report-Havelock-North-Water-Inquiry-Stage-2.pdf)
- New Zealand Institute of Economic Research. (2014). *Water Management in New Zealand: a road map for understanding water value*. New Zealand: <https://doi.org/ISSN> 1176-4384
- Newig, J., & Challies, E. (2014). Water, rivers and wetlands. In P. Harris (Ed.), *Routledge Handbook of Global Environmental Politics* (pp. 439-432). Oxon, England: Routledge.
- Ohlsson, L., & Turton, A. (2000). The turning of a screw: Social resource scarcity as a bottle-neck in adaptation to water scarcity. *Stockholm Water Front*, 10-11.
- Olsen, M. E., Lodwick, D.G. & Dunlap, R.E. (1992). *Viewing the world ecologically*. Boulder, Colorado, USA: Westview Press.
- Pahl-Wostl, C., Kabat, P., & Möltgen, J. (2008). *Adaptive and integrated water management*. Berlin Heidelberg: Springer.
- Pahl-Wostl, C., & Sendzimir, J. (2005). The relationship between IWRM and adaptive water management.
- Phipps, M., & Ozanne, J. L. (2017). Routines disrupted: Re-establishing security through practice alignment. *Journal of Consumer Research*, 44(2), 361-380. <https://doi.org/10.1093/jcr/ucx040>
- Piasentin, F., & Roberts, L. (2018). What elements in a sustainability course contribute to paradigm change and action competence? A study at Lincoln University, New Zealand. *Environmental Education Research*, 24(5), 694-715. <https://doi.org/10.1080/13504622.2017.1321735>
- Pink, S. (2015). *Doing sensory ethnography* (2nd ed. Vol. 2). Great Britain: Sage Publications Ltd.
- Pirages, D. C., & Ehrlich, P. R. (1974). *Ark II: Social response to environmental imperatives*. San Francisco: W. H. Freeman.
- Prendergast, J., Foley, B., Menne, V., & Issac, A. (2008). *Creatures of habit: the art of behavioural change*. Retrieved 23 July 2018, from <http://www.smf.co.uk/publications/creatures-of-habit-the-art-of-behavioural-change/>
- Price, R. (2016, 18 August). Inquiry to be launched into Havelock North's contaminated water, Newspaper and website. *Stuff*. Retrieved from <https://www.stuff.co.nz/national/politics/83313189/gastro-bug-inquiry-to-be-launched-by-govt-into-havelock-north-water>
- Richter, B. (2016). *Water Share Report: using water market and impact investment to drive sustainability*. online: The Nature Conservancy; Lida Hill Foundation; Rockefeller Foundation.
- Roberts, L., & Gehrke, T. (1996). Linkages between best practice in business and good environmental performance by companies. *Journal of Cleaner Production*, 4(3-4), 189-202.



- Shields, J., & Shelleman, J. M. (2015). Integrating sustainability into SME strategy. *Journal of Small Business Strategy*, 25(2), 59-75.
- Shiklomanov, I. (1998). *World water resources: A new appraisal and assesment for the 21st century*. Paris, France: UNESCO.
- Shove, E. (2003). *Comfort, cleanliness and convenience: the social organization of normality*. United Kingdom: Oxford Press.
- Shove, E. (2010). Beyond the ABC: climate change policy and theories of social change. *Environment and Planning*, 42, 1273-1285.
- Silverman, D. (2010). Doing Qualitative Research. In *Doing Qualitative Research* (Vol. 3, pp. 101-116). Great Britain: SAGE Publications.
- Smith, C. L., Lopes, V. L., & Carrejo, F. M. (2011). Recasting Paradigm Shift: "True" sustainability and complex systems. *Human Ecology Review*, 18(1), 67-74.
- Sofoulis, & Strengers, Y. (2011). *Healthy engagement: Evaluating models of providers and users for cities of the future* presented at the OZ Water'11, Adelaide, Australia. Retrieved from <https://researchbank.rmit.edu.au/view/rmit:15952>
- Sofoulis, Z. (2005). Big water, everyday water: A sociotechnical perspective. *Continuum*, 19(4), 445-463. <https://doi.org/10.1080/10304310500322685>
- Sofoulis, Z. (2011). *Cross-Connections: Linking urban water managers with humanities, arts and social sciences researchers*. Canberra, A.C.T., Australia: National Water Commission, Australian Government.
- Statistics New Zealand. (2013). 2013 Census Quickstats: Havelock North Central. Retrieved 2018, from [http://archive.stats.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-a-place.aspx?request\\_value=14072&parent\\_id=14032&tabname=](http://archive.stats.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-a-place.aspx?request_value=14072&parent_id=14032&tabname=)
- Steedman, P. (1991). *On the relations between seeing, interpreting and knowing*. London, United Kingdom: Sage.
- Strang, V. (2005). Common Senses: water, sensory experience and the generation of meaning. *Journal of Material Culture*, 10(1), 92-120. <https://doi.org/10.1177/1359183505050096>
- Strang, V. (2009). *Gardening the world: agency, identity and the ownership of water*. Australia: Berghahn Books.
- Strang, V. (2015). *Water: Nature & Culture*. London: Reaktion Books Ltd.
- Strengers, Y., & Maller, C. (2012). Materialising energy and water resources in everyday practices: Insights for securing supply systems. *Global Environmental Change*, 22(3), 754-763.
- Taylor, E. (2007). An update of transformative learning theory: a critical review of the empirical research (1995-2005). *International Journal of Lifelong Education*, 26(2), 173-191. <https://doi.org/10.1080/02601370701219475>
- Taylor, E. (2008). Transformative Learning Theory. *New directions for adult and continuing education*, 2008(119), 5-15. <https://doi.org/10.1002/ace.301>
- Termeer, C. J. A. M., Dewulf, A., & Biesbroek, G. R. (2017). Transformational change: governance interventions for climate change adaptation from a continuous change perspective. *Journal of Environmental Planning and Management*, 60(4), 558-576. <https://doi.org/10.1080/09640568.2016.1168288>
- Thomas, D. (2006). A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation*, 27(2), 237-246. <https://doi.org/doi:10.1177/1098214005283748>
- Thomas, G. (2011). *A typology for the case study in social science following a review of definition, discourse, and structure*. Qualitative inquiry (17, 6).
- Tokiwa-Fus, M. (2000). *Including Mezirow's concept of perspective transformation in the study of adult education*. presented at the SCUTREA - 30th Annual Conference, University of Nottingham, England. Retrieved from <http://www.leeds.ac.uk/educol/documents/00001446.htm>
- Tolich, M., & Davidson, C. (2011). *Getting Started: An Introduction to Research Methods*. New Zealand: Pearson Education.
- Turton, & Meissner. (2002). The hydrosocial contract and its manifestation in society: A South African case study. *Hydropolitics in the developing world: A southern African perspective*, 37-60.

- United Nations Educational Scientific and Cultural Organisation. (2017). Agriculture is the largest consumer of freshwater. Retrieved July 2018, from <http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/facts-and-figures/all-facts-wwdr3/fact2-agricultural-use/>
- United Nations Environmental Programme. (2016). *A Snapshot of the World's Water Quality: Towards a global assessment*. [Report Snapshot]. Nairobi, Kenya:
- United Nations Water. (2016). Towards a Worldwide Assessment of Freshwater Quality. Retrieved 2018, from [http://www.unwater.org/fileadmin/user\\_upload/unwater\\_new/docs/UN\\_Water\\_Analytical\\_Brief\\_20161111\\_02\\_web\\_pages.pdf](http://www.unwater.org/fileadmin/user_upload/unwater_new/docs/UN_Water_Analytical_Brief_20161111_02_web_pages.pdf)
- Uzzell, D. (2008). *The challenge of climate change; the challenge for psychology* presented at the 43 Australian Psychological Association Annual Conference, Hobart, Tasmania, Australia. Retrieved from <http://epubs.surrey.ac.uk/id/eprint/824146>
- Wacker, J. G. (1998). A definition of theory: research guidelines for different theory-building research methods in operations management. *Journal of Operations Management*, 16(4), 361-385. [https://doi.org/http://dx.doi.org/10.1016/S0272-6963\(98\)00019-9](https://doi.org/http://dx.doi.org/10.1016/S0272-6963(98)00019-9)
- Walter, P. (2011). Dead Wolves, Dead Birds, and Dead Trees. *Adult Education Quarterly*, 63(1), 24-42. <https://doi.org/doi:10.1177/0741713611426348>
- Whitehead, J. (2013). *An Exploratory Study of the Environmental Behaviour of New Zealand Small and Medium-Sized Enterprise (SME) Manufacturers* (Dissertation, Lincoln University).
- Wilber, K. (2001). *Sex, ecology, spirituality: the spirit of evolution*. United States: Shambhala Publications.
- World Economic Forum. (2016). Global Risks Perception Survey 2015. Retrieved November 2016, from <http://reports.weforum.org/global-risks-2016/part-1-title-tba/>
- World Trade Organisation. (2016). *World Trade Report 2016: levelling the trading field for SMEs*. Switzerland: World Trade Organisation. Retrieved from [https://www.wto.org/english/res\\_e/booksp\\_e/world\\_trade\\_report16\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/world_trade_report16_e.pdf)
- World Water Assessment Programme. (2018). *The United Nations World Water Development Report 2018: Nature-Based Solutions for Water*. Paris: UNESCO.
- World Wildlife Fund. (2016). *Living Planet Report. Risk and resilience in a new era* [Report]. Gland, Switzerland: World Wildlife Fund for Nature. Retrieved from [http://assets.worldwildlife.org/publications/964/files/original/lpr\\_living\\_planet\\_report\\_2016.pdf?1477582118&\\_ga=1.72469907.1429157313.1485120381](http://assets.worldwildlife.org/publications/964/files/original/lpr_living_planet_report_2016.pdf?1477582118&_ga=1.72469907.1429157313.1485120381)
- Yin, R. (2014). *Case Study Research: designs and methods*: SAGE Publications.